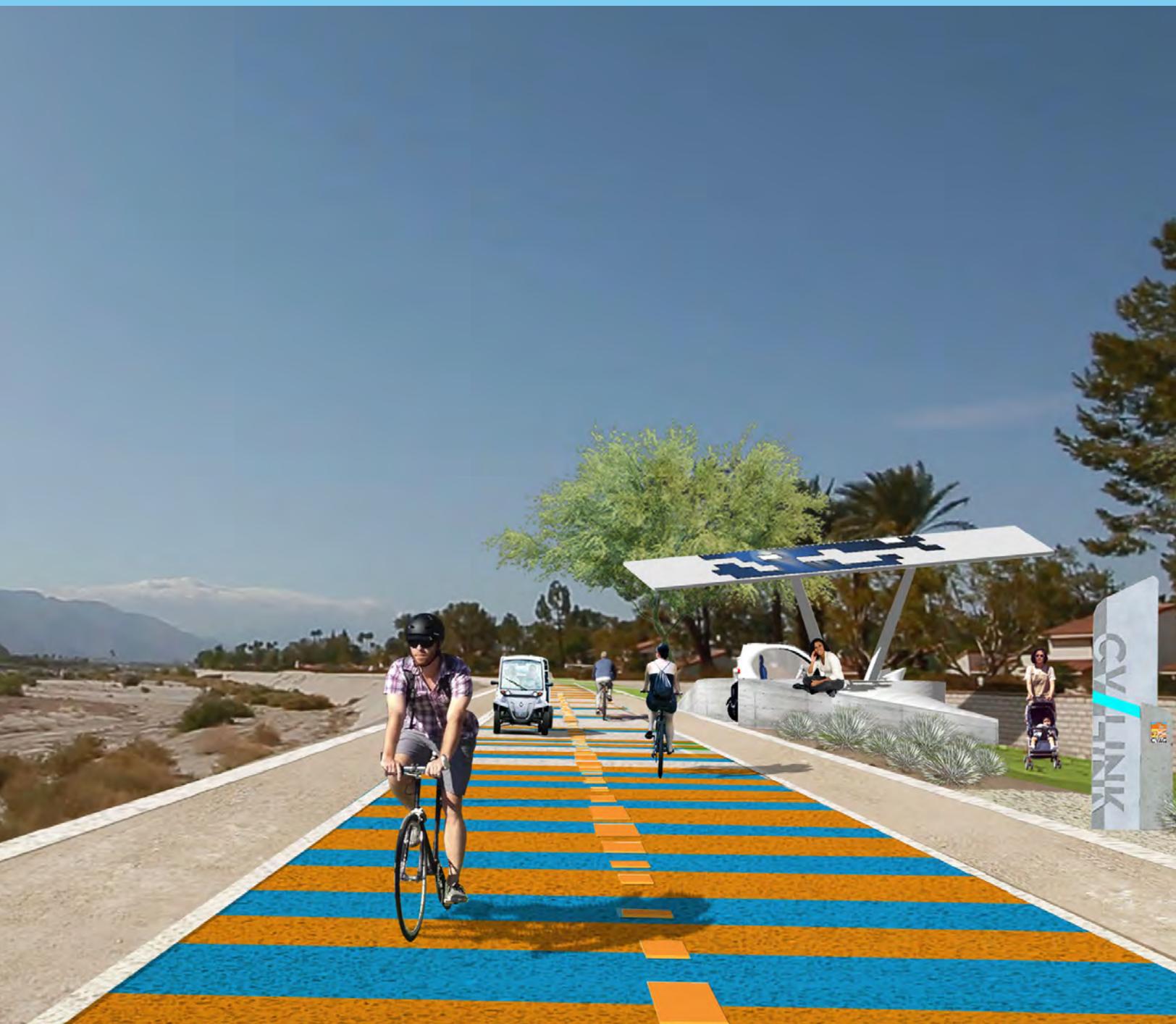




CONCEPTUAL MASTER PLAN

VOLUME 2: APPENDICES

JANUARY 2016



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PLANNING APPENDICES

APPENDIX 1. PLANNING AND DESIGN CONTEXT

1.1. Document Overview

The Master Plan development process has been informed by many planning and legislative documents. A selection of these documents is presented in Figure 1 (overleaf).

This memo reviews key planning documents and other resources that will inform the planning and design of the CV Link project over the next several years. An assessment of over 90 unique plans and documents identified the most relevant and important resources for this project and organized them into several different categories:

- Key resources that are intrinsically linked to the purpose of CV Link
- Policy resources that provide the context for issues such as regional transportation networks, land use, key destinations and activity areas.
- Design resources that will provide professional standards, example best practices, guidance and recommendations for specific elements such as geometric configurations and alignment decisions.
- Visioning resources that explain the importance of CV Link to the regional community and goals that construction of the facility is intended to accomplish.

NATIONAL

49 CFR Part 571 Federal Motor Vehicle Safety Standards; Low Speed Vehicles, NHTSA, Federal Register, 2005

STATE

Senate Bill No. 375, Regional Planning for Greenhouse Gas Reduction and Travel Demand, California Senate, 2008.

Senate Bill No. 663, Neighborhood Electric Vehicle Plan for the City of Palm Desert, California Senate, 2009.

Assembly Bill No. 61, Neighborhood Electric Vehicles, California Assembly, 2011.

Assembly Bill No. 1358, Complete Streets Act, California Assembly, 2008.

Assembly Bill No. 110, Chapter 334, Golf Cart Lanes / Transportation Plan for the City of Palm Desert, California Assembly, 1995.

Assembly Bill No. 118, Alternative Fuels and Vehicle Technologies: Funding Programs, California Assembly, 2007.

Assembly Bill No. 29633, Chapter 199, Neighborhood Electric Vehicle Plan, City of Lincoln and Rocklin, California Assembly, 2008.

Assembly Bill No. 956, Neighborhood Electric Vehicle Plan, Rancho Mission Viejo, California Assembly, 2007.

California Assembly Bill No. 2353, Chapter 422, Neighborhood Electric Vehicle Plan, City of Lincoln and Rocklin, California Assembly, 2004.

California Department of Motor Vehicles (DMV), Vehicle Code, Division 11 Rules of the Road, CA DMV, 2009

Senate Bill 732, Strategic Growth Council, California Senate, 2007

Regional

Whitewater River Channel Jurisdictional Delineation
(CVWD, 2012)

Whitewater River, All American Canal, Dillon Road Regional Trails Study
(Dangermond, 2009)

CVWD Development Design Manual
(CVWD, 2010)

Coachella Valley Non-Motorized Transportation Plan Update
(CVAG, 2011)

Riverside County Ordinance No. 782: Golfcart Transportation Plan
(County of Riverside, 1998)

Plug In Electric Vehicle Plan
(CV PEV Coordinating Council, 2012)

CV LINK (Alta Planning + Design Team)

Whitewater River / Parkway NEV / Bike / Pedestrian Corridor
Preliminary Study Report
(2012)

Design Report and Technical Supplement
(2013)

Master Plan
(2013)

Neighborhood Electric Vehicle (NEV) Plan
(2014)

LOCAL

Resolution No. 99-010 Sun City Golf Cart Transportation Plan, County of Riverside, 1998

Desert Hot Springs, 2000, City of Desert Hot Springs General Plan Circulation Element, City of Desert Hot Springs, 2000

Palm Springs General Plan Circulation Element 4-1, City of Palm Springs, 2007

Cathedral City General Plan Circulation Element, City of Cathedral City, 2009

Cathedral City Neighborhood Traffic Control Program, City of Cathedral City

Rancho Mirage General Plan Circulation Element, City of Rancho Mirage, 2005

City of Palm Desert California Municipal Code, Chapter 10.76 Golf Carts, City of Palm Desert

Indio General Plan 2020, (Chambers Group, Inc, 1994)

Indio Trails Feasibility Study, (CVCTA, LSA & PCA Engineering, 2009)

Coachella General Plan Circulation Element Update 2012, City of Coachella, 2012

La Quinta General Plan Circulation Element Update Traffic Impact Analysis, City of La Quinta

FIGURE 1: PLANNING DOCUMENT CONTEXT

1.2. Key Resources

1.2.1. WHITEWATER RIVER / PARKWAY 1E11 PRELIMINARY STUDY REPORT

Type	Corridor study	Geography	Coachella Valley
Author, Date	LSA Associates, Alta Planning + Design & RBF Consulting, 2012		

Document Significance

Building on the prior Whitewater River, All American Canal, Dillon Road Regional Trails Study (2009), the Whitewater River / Parkway 1E11 NEV/Bike/Pedestrian Corridor Preliminary Study Report (typically referred to simply as the “PSR”) added the concept of Low Speed Electric Vehicles (LSEVs – a vehicle category that includes Neighborhood Electric Vehicles or NEVs). It provided the starting point for this master plan process.

Key Aspects

- The PSR found that procuring right-of-way/easements, crossing arterials streets and topographical features, and passing through private developments like golf courses would be the greatest challenges to completing CV Link.
- Lesser, but notable challenges for the CV Link Master Plan identified in the PSR included maintenance and management agreements across multiple jurisdictions along the length of the corridor.
- Includes preliminary cross-sections and initial design guidelines.

1.2.2. PARKWAY 1E11 AIR QUALITY BENEFITS REPORT

Type	Planning document	Geography	Coachella Valley
Author, Date	Alta Planning + Design, 2012		

Document Significance

The Air Quality Benefits Report estimates are a useful resource for addressing environmental concerns.

Key Aspects

- The Seamless Travel Demand model estimates the mode shift from traditional motor vehicles to parkway users. By the planning horizon year 2035, it estimates that 43.5 million trips corresponding to 144.5 million miles will be eliminated in favor of the parkway. In the year 2035, this would be over 12 million less vehicle miles traveled (VMT).
- Using EPA and CARB emissions factors, the report estimates the air quality benefits (reductions in emissions) for hydrocarbons, particulate matter, nitrous oxides, carbon monoxide and carbon dioxide (CO₂). Table 4 presents annual benefits, while Table 5 presents cumulative benefits.
- By 2035, the total reduced emissions in pounds are estimated to be: hydrocarbons – 433,574; PM_{2.5} – 16,250; and CO₂ – 117,572,330.

- These reductions could be monetized if the US adopts a carbon trading market as used in the European Union and other countries, or translated into health terms through a Health Impact Assessment (HIA).

1.2.3. WHITEWATER RIVER, ALL AMERICAN CANAL, DILLON ROAD REGIONAL TRAILS STUDY

Type	Corridor study	Geography	Coachella Valley
Author, Date	Dangermond, 2009		

Document Significance

This 2009 study is the predecessor to the 2012 Whitewater River/Parkway NEV/Bike/Pedestrian Corridor Preliminary Study Report. The study proposed an alignment for the pathway along the Whitewater River, All American Canal and Dillon Road. Regional destinations and areas of interest, such as parks, were considered in the development of the alignment, as well as initial feasibility, cost, safety and environmental considerations.

Key Aspects

- In several cases, the study recommends detours around rather than through golf courses
- The study identified arterial crossings as a major barrier to completion. Initial recommendations for how to facilitate these crossings are included in the report and will be considered through this master plan project.
- Discrepancies between County Assessor and CVWD ROW data were identified.

1.2.4. TAHQUITZ CREEK TRAIL MASTER PLAN (TCTMP)

Type	Trails study	Geography	Palm Springs
Author, Date	Alta Planning + Design, 2010		

Document Significance

The TCTMP proposes the improvements to the section of Tahquitz Creek Trail between Belardo Road and the bridge east of Desert Chapel Church and School (approximately 1.5 miles). The TCTMP reviews existing conditions, identifies opportunities and constraints, presents alignment options, proposes trail themes, addresses arterial crossing options, and estimates permitting and construction costs. It is a resource that can be applied to other sections of Tahquitz Creek Trail.

Key Aspects

- Planning and design for CV Link segment 2A through Palm Springs should reference the TCTMP and the City of Palm Springs Bicycle Infrastructure Improvements Project (Phase II Report)
- Recommendations in two phases (Phase 1 unless otherwise noted):
 - a. Construct a soft-surface path on the south side of the Tahquitz Creek (Phase 2)
 - b. Extend the western terminus of the existing trail across Palm Canyon to Belardo Road
 - c. Install an equestrian trail at the bottom of the Creek (Phase 2)

- d. Realign the section between Sunrise and the small bridge east of Desert Chapel
- e. Build two trailheads (termed “access points” for CV Link)
- f. Add amenities such as landscaping, directional and interpretive signage, gateway monuments, and artistic elements.

1.2.5. CITY OF PALM SPRINGS BICYCLE INFRASTRUCTURE IMPROVEMENTS PROJECT

Type	Plan and project review; field study	Geography	Palm Springs
Author, Date	LSA with assistance from CVCTA, 2012		

Document Significance

This 2012 plan for the City of Palm Springs Sustainability Commission was Phase II of a two-part project. It reviewed existing city budgets and planned projects to identify opportunities for bikeway enhancements and included an extensive field study of the Tahquitz Creek Trail with photos. It is relevant to Segment 2A of the master plan.

Key Aspects

The report makes recommendations in the following areas:

- Identifying and directional signage, mileage markers
- Installation of a more direct crossing of Farrell Drive
- Re-paving and structures maintenance, including for the original route in Demuth Park.
- Rectifying the trail gap at the Tahquitz Creek Golf Course entrance (the head of the T intersection of 34th Avenue, Golf Club Drive, and Crossley Road).

1.2.6. INDIO TRAILS FEASIBILITY STUDY

Type	Trails study	Geography	Indio
Author, Date	CVCTA, with LSA & PCA Engineering, 2009		

Document Significance

This 2009 trails plan for the City of Indio proposed expanding the local trail network by nearly 100 miles, recommending improved facilities for use by pedestrians, bicyclists and equestrians. The plan also made some initial considerations of LSEV users. Much of the material presented in this plan was incorporated into recommendations of the CVAG Non-Motorized Plan update in 2010.

Key Aspects

- Planning and design considerations for sections of CV Link through the City of Indio will heavily reference the Indio Trails Feasibility Study for background information on the existing and planned local trail network.
- The Study also includes general recommendations about maintenance agreements, and trails partnerships between multiple entities, agencies and jurisdictions, that will be useful in several tasks of the master plan process.

1.2.7. COACHELLA VALLEY NON-MOTORIZED TRANSPORTATION PLAN (NMTP)

Type	Transportation plan	Geography	Coachella Valley
Author, Date	Ryan Snyder Associates & Urban Crossroads, 2010		

Document Significance

This comprehensive non-motorized plan for all cities in Coachella Valley summarized the existing conditions for bicycling and walking in the region in order to recommend future improvements. The proposed network of new facilities for bicycle and pedestrian users included design recommendations to accommodate shared use by equestrians and LSEVs. The NMTP was updated in 2011 and adopted by the City of Palm Springs as part of their General Plan.

Key Aspects

- The local bicycle network plans for each city that are included in the Non-motorized Transportation Plan will be referenced throughout the planning process. The master plan will consider how CV Link interfaces and connects with both existing and planned local bikeways.

1.2.8. CVWD JURISDICTIONAL DELINEATION (JD)

Type	Corridor study	Geography	Coachella Valley
Author, Date	ICF International for CVWD, 2012		

Document Significance

The Jurisdictional Delineation Report completed by ICF International (ICF) in 2012 identified water management issues along the Whitewater River and Coachella Valley Stormwater Channels and several tributaries for the Coachella Valley Water District (CVWD). The JD is required by the Army Corps of Engineers (ACOE).

Key Aspects

- The CVWD Jurisdictional Delineation Report omitted privately managed property and areas (such as golf courses) in Reach II because CVWD does not have responsibility for managing those areas. However, water and stormwater management may be an issue that arises later with private property owners through the course of CV Link planning and design.
- The report identified the extents of four different reaches (I, II, III and IV) throughout the study area, and identified agencies (such as the California Department of Fish and Game, and others) with jurisdiction over water and land management that could impact trail planning and design choices.
- Recent delineation of federal and State waters, riparian areas, and wetlands for much of the Whitewater channel.

1.2.9. CVWD DEVELOPMENT DESIGN MANUAL

Type	Design guide	Geography	Coachella Valley
Author, Date	Coachella Valley Water District, 2010		

Document Significance

Based on the applicable state, regional and local law, Section 8 Design Criteria Stormwater Facilities outlines the standards that pertain to the conveyance of floodwaters through the stormwater system and provide the maximum possible protection to properties. “Guidance is provided to developers and their engineers on submissions required for approval of the design and construction of projects that encroach on or are adjacent to stormwater facilities” (p.8-1).

Key Aspects

- Any manipulation of the levee structure will need to comply with the design criteria outlined in this manual, especially with respect to design flood capacity.
- Capacity issues are known to exist south of Indio to the Salton Sea and involve substantial planning uncertainties.

1.2.10. GOLF TRAILS BEST PRACTICES

Type	Design guide	Geography	California, Oregon
Author, Date	Alta Planning + Design, 2005		

Document Significance

The CV Link draft alignment interacts with seven golf courses along its length. This best practices document will inform specialty trail design in the vicinity of local golf courses in order to maximize shared benefits by local and regional trail users as well as golf course users and adjacent property owners.

Key Aspects

- Golf Trails Best Practices examines standards of liability of interactions between path users and golf course users and owners; this background information and understanding will provide a starting point for discussing CV Link segment alignments through local golf courses.
- Profiles of golf course-specific path treatments (such as high curved fences, cage fencing and netting) will be useful throughout the design stages of the project.
- Recommendations on maintenance, designs for shared use between passing trail users and golf course users, strategies for deterring trespassing and standards for hours of use will all be relevant to the development of maintenance agreements for CV Link between local jurisdictions and property owners.

1.2.11. PLUG IN ELECTRIC VEHICLE READINESS PLAN

Type	Transportation plan	Geography	Coachella Valley
Author, Date	ICF International, 2014		

Document Significance

With grant funding support from the California Energy Commission, CVAG convened the Coachella Valley PEV Coordinating Council to develop a plan to prepare for the influx of plug-in electric vehicles (PEVs). This document focuses on the near-term development of the infrastructure, market, and regulatory mechanisms necessary for regional deployment of electric vehicles. “Infrastructure” is limited to charging stations and EV Supply Equipment (EVSE), since the plan includes all EVs (not just NEVs).

1.2.12. REVEALING THE INVISIBLE COACHELLA VALLEY

Type	Health & Environmental Planning Report	Geography	Eastern Coachella Valley
Author, Date	UC Davis for California Institute for Rural Studies, 2013		

Document Significance

The authors developed a Cumulative Environmental Vulnerability Assessment (CEVA) that reveals “...residents in the Eastern Coachella Valley face significant and overlapping environmental hazards and social vulnerability that far exceed those in the Western Coachella Valley and the county as a whole. In particular, agricultural pesticide applications, drinking water quality, and housing quality are key challenges to community well-being.” The implication for CV Link is that environmental justice may be an important criterion in selection of early action segments.

Key Aspects

- A mismatch in affordable housing and job locations results in long trip distances; public advocates have prioritized equitable access to transportation due to gaps in public transportation
- The report recommends utilizing planning processes (including transportation) to improve environmental and social conditions, including in unincorporated areas

1.2.13. RECREATION AND PARKS MASTER PLAN

Type	Parks Plan	Geography	Coachella Valley
Author, Date	Coachella Valley Recreation & Park District, 2006		

Document Significance

This plan includes existing conditions (as of 2006), visioning, programs and policies, and funding sources. The CV Link master plan includes a Maintenance and Management Plan component that could build on the Recreation and Parks Master Plan.

1.3. Policy Resources

1.3.1. GENERAL PLANS

- Coachella General Plan Circulation Element Update 2012, City of Coachella, 2012
- La Quinta General Plan Circulation Element Update Traffic Impact Analysis, City of La Quinta.
- Rancho Mirage General Plan Circulation Element, City of Rancho Mirage, 2005
- Desert Hot Springs, 2000, City of Desert Hot Springs General Plan Circulation Element, City of Desert Hot Springs, 2000
- Palm Springs General Plan Circulation Element 4-1, City of Palm Springs, 2007.
- Cathedral City General Plan Circulation Element, City of Cathedral City, 2009.
- Cathedral City Neighborhood Traffic Control Program, City of Cathedral City.
- Desert Recreation District Strategic Plan, Desert Recreation District, 2012.

1.3.2. NEV PLANS AND STUDIES

- *NEV Transportation Plan*, City of Lincoln, 2006.
- Final Draft NEV Transportation Plan, Resolution No. 2008-39, City of Rocklin, 2008.
- Report to the California State Legislature, City of Lincoln Neighborhood Electric Vehicle Transportation Plan Evaluation, City of Lincoln, 2008.
- Woodland to Davis ATC Study, Fehr & Peers, 2009.
- NEV Operating Costs Study (Electricity), Paul Ternullo.
- The Mobility Needs of Older Americans: Implications for Transportation Reauthorization, Brookings Institute, 2003.
- Household Markets for Neighborhood Electric Vehicles, ITS Davis, 1995.
- Neighborhood Electric Vehicles, Office of Legislative Research (OLR) Report, Connecticut General Assembly, 2008.
- Prospects for Neighborhood Electric Vehicles, UCTC, 1994.

1.3.3. LEGISLATION

- 49 CFR Part 571 Federal Motor Vehicle Safety Standards; Low Speed Vehicles, NHTSA, 2005.
- SB 663 (2009), Neighborhood Electric Vehicle Plan for the City of Palm Desert.
- AB 110 (1995), Chapter 334, Golf Cart Lanes / Transportation Plan for the City of Palm Desert.
- AB 118 (2007), Alternative Fuels and Vehicle Technologies: Funding Programs,

- AB 29633 (2008), Chapter 199, Neighborhood Electric Vehicle Plan, City of Lincoln and Rocklin.
- AB 956 (2007), Chapter 442, Neighborhood Electric Vehicle Plan, Rancho Mission Viejo.
- AB No. 956 (2007), Neighborhood Electric Vehicle Plan, Rancho Mission Viejo.
- AB No. 2353 (2004), Chapter 422, Neighborhood Electric Vehicle Plan, City of Lincoln and Rocklin.
- *Vehicle Code*, California Department of Motor Vehicles (DMV), 2009.
- City of Palm Desert Municipal Code, Chapter 10.76 Golf Carts, City of Palm Desert.
- Resolution No. 99-010 Sun City Golf Cart Transportation Plan, County of Riverside, 1998.
- Riverside County Ordinance No. 782 An Ordinance of the County of Riverside establishing the Riverside County Golf Cart Transportation Plan, County of Riverside, 1998.
- SB 732 (2007), Strategic Growth Council.

1.4. Design Resources

Throughout the planning and preliminary design, established national and state design standards and guides have been consulted. However, in several respects CV Link is breaking new ground and setting new standards for quality, safety, comfort and efficiency. Accordingly, new ideas are proposed in the Design chapter and guidelines.

1.4.1. GENERAL DESIGN GUIDANCE

- *Development Design Manual*, CVWD, 2010. In particular, Chapter 8 Stormwater Facilities.
- A Policy on Geometric Design of Highways and Streets, 6th Edition, AASHTO, 2011.
- Highway Design Manual, Caltrans, 2012.
- Manual on Uniform Traffic Control Devices for Streets and Highways, CTCDC, 2012.
- Cathedral City Whitewater Bike Trail Phase 1, City of Cathedral City.
- Agua Caliente Complete Streets Planning Effort, Agua Caliente, 2013.

1.4.2. BICYCLE / PEDESTRIAN DESIGN GUIDANCE

- Guide for the Development of Bicycle Facilities 4th Ed, AASHTO, 2012.
- Urban Bikeway Design Guide, 2nd Ed, NACTO, 2012.
- Riverside County General Plan, Circulation Element - Non-motorized Transportation, County of Riverside, 2013.

1.4.3. NEV SPECIFIC DESIGN GUIDANCE

- Demonstration of Neighborhood Electric Vehicles (NEVs), CA Energy Commission, 2002.
- *Study of NEV User Behavior*, Green Car Institute, 2003.
- Thriving with Neighborhood Electric Vehicles, ASCE, 2007.
- Assessment of Low-Speed Electric Vehicles in Urban Communities, Transportation Development Centre (CAN), 2002.
- Policy and Design Considerations for Accommodating Low-Speed Vehicles and Golf Carts in Community Transportation Networks, AARP (Undated)
- Meeting Minutes on City of Lincoln NEV Signage, CTCDC, 2005.
- Roadway Infrastructure for Neighborhood Electric Vehicles, UC Berkeley, 1994.

- Studies of Road Infrastructure Requirements for Small Innovative Vehicles, ITS Berkeley, 1993.
- CTCDC Approved Experimental Standards, City of Lincoln.

1.5. Visioning Resources

These documents represent regional policy goals and a vision for a facility that will transform transportation and recreation within the Coachella Valley. Interim evaluation of the planning and design process with consideration of the vision established in these documents will help CV Link to achieve the level of impact desired by the regional community.

- Parkway 1e11 Economic Benefits Report, 2012.
- Building a Healthier Coachella Valley: A Toolkit for Change, CVAG.
- *Critical Evaluation of EV Benefits*, Transportation Development Centre (CAN), 1999.
- *Coachella Valley Blueprint for Action*, Clinton Foundation, undated.

APPENDIX 2. OUTREACH

2.1. Citizens Advisory Group

A Citizens Advisory Group (CAG) was formed by the project consulting team to serve as a sounding board on key master plan elements, assist the consulting team with identification of the opportunities and constraints found along the study area, and advise the project team on public involvement plan implementation. The group was not officially appointed. The meetings and topics discussed are listed as follows:

- 3/4/13 Introduction
- 4/17/13 Opportunities and Constraints
- 6/12/13 Design concept
- 9/18/13 Design elements
- 12/10/13 Alignment
- 2/19/14 Alignment and NEV Plan
- 5/6/14 Alignment and Phasing

The CAG membership was based on geographic and community diversity factors. Membership changed over the course of the project however, the list of members as of December 2013 is presented in Table 1.

TABLE 1: CITIZENS ADVISORY GROUP MEMBERSHIP AS AT DECEMBER 2013

Name	Affiliation	Location
Richard Arghittu	Go Go Green Golf Carts	La Quinta
Lorraine Becker	Cabots Museum Board, DHS Parks Committee, PS Desert Resorts, CVA Board	DHS
Ezekiel Bonillas	Coachella Valley Economic Partnership (CVEP)	Indio
Vic Gainer	Coachella Valley HOA Presidents Council, Palm Springs Track Club	Palm Springs
Tricia Gehrlein	William J Clinton Foundation	Palm Desert
Paul Harris	Friends of CV Link	Cathedral City
Gary Lueders	CV Bicycle Club, CVCTA, CVAG Trails Committee	Rancho Mirage
Judy A. May	Incight - Move Beyond Your Boundaries	Palm Desert
Larry McLaughlin	College of the Desert	Palm Desert
Dr. Nicole Ortiz	Live Well Clinic	La Quinta
Paul Quill	Quill Enterprises, LQ Planning Commission	La Quinta
Jim Rothblatt	Community Trails Alliance, Incight	Palm Springs
Ed Schiller	Innovative Land Concepts, Inc.	Indio
Roger Snoble	LA Metropolitan Transit Authority (retired)	Rancho Mirage
Tim Sullivan	Renaissance Esmeralda Resort & Spa	Indian Wells

Name	Affiliation	Location
Russ Collins	Rancho Mirage	Rancho Mirage

2.2. Events and Meetings

Aside from the aforementioned CAG meetings, a list of the events and meetings attended is presented in Table 2 below. Three media articles are presented following the table of events and meetings.

TABLE 2. EVENTS AND MEETINGS ATTENDED IN EARLY PLANNING

Date	Event or Meeting	Location
1/24/13	Palm Springs Bicycle Roundtable	Palm Springs
2/10/13	Unitarian Universalist Church of the Desert	Rancho Mirage
3/16/13	Rancho Las Palmas Community Meeting	Palm Desert
3/19/13	Desert Trails Coalition	Palm Desert
3/26/13	Associated Planners	Palm Springs
3/26/13	Caltrans - Jefferson Interchange	Indio
3/27/13	County Trails Committee	Other
3/28/13	Realtors Group Meeting	Palm Springs
4/8/13	Agua Caliente Planning Meeting	Palm Springs
4/14/13	International Trails Symposium	Other
4/18/13	Monterey Community	Monterey CC
4/18/13	Cathedral City HOA Presidents Council	Cathedral City
5/9/13	Palm Springs Bicycle Club	Palm Springs
6/4/13	Community Workshop # 1	Palm Springs
6/12/13	City of Desert Hot Springs staff meeting	Desert Hot Springs
6/27/13	City of Palm Springs staff meeting	Palm Springs
6/28/13	City of Rancho Mirage staff meeting	Rancho Mirage
7/1/13	Escena Community	Palm Springs
7/1/13	College of the Desert Board of Directors	Palm Desert
7/11/13	Welk Resorts / Desert Oasis	Cathedral City
7/17/13	Palm Springs Board of Relators	Palm Springs
7/25/13	Community Workshop #2	Indio
7/25/13	Frank Sinatra bridge planning meeting	Rancho Mirage

Date	Event or Meeting	Location
7/25/13	City of Palm Desert planning meeting	Palm Desert
7/26/13	Riverside County Parks and Open Space meeting	Palm Springs
8/7/13	Palm Springs Bicycle Roundtable	Palm Springs
9/27/13	Coachella Valley Water District	
10/4/13	Southern California Energy Summit	Palm Springs
10/8/13	Indian Wells Community	Indian Wells
10/15/13	Cathedral Canyon Country Club Representatives	Palm Springs
10/15/13	Tahquitz Golf Course Representatives	Palm Springs
10/15/13	Community Workshop #3	Rancho Mirage
10/16/13	Desert Princess Community	Palm Springs
10/18/13	Leadership Coachella Valley	Palm Desert
10/26/13	Mesquite Country Club Community	Palm Springs
11/20/13	Desert Sands Unified School District	La Quinta
11/21/13	Palm Springs Village Fest	Palm Springs
11/22/14	Palm Springs Unified School District	Palm Springs
11/22/14	Coachella Valley Unified School District	Thermal
12/3/13	Notice of Preparation (NOP) Meeting	Palm Desert
12/5/13	Community Workshop #4	Coachella
12/7/13	Tamale Festival	Indio
12/10/13	Indian Wells Country Club Representatives	Indian Wells
1/2/14	Rancho Las Palmas Country Club Representatives	Rancho Mirage
1/11/14	Humana Healthy Fun Fair	La Quinta
1/11/14	Palm Springs Mayor's Race & Wellness Festival	Palm Springs
1/11/14	CV Disability Sports Festival	Palm Desert
1/21/14	Four Seasons Community Meeting	Palm Springs
1/22/14	Rancho Mirage Mobile Home Park Community	Rancho Mirage
1/22/14	Mesquite Country Club Representatives	Palm Springs
1/22/14	Four Seasons residents	Palm Springs
1/22/14	Indio Middle School	Indio

Date	Event or Meeting	Location
1/22/14	La Quinta High School	La Quinta
1/30/14	Palm Desert Middle School / Lincoln Elementary	Palm Desert
2/6/14	Palm Desert International Sports Festival	Palm Desert
2/7/14	Tour de Palm Springs	Palm Springs
2/11/14	Indio Senior Health Fair	Indio
2/15/14	Palm Springs Modernism Week	Palm Springs
2/15/14	Color in Motion 5K run	Indio
2/19/14	Cathedral City Representatives	Palm Desert
2/27/14	City of Cathedral City staff	Cathedral City
3/15/14	Cathedral City Relay for Life	Cathedral City
3/29/14	7th Annual Picnic Community Expo	Palm Springs
3/30/14	Race to be Ready	Rancho Mirage
4/5/14	Day of the Young Child	Coachella
5/3/14	Salsa & 5k Festival	Coachella
5/5/14	NEV Plan meeting with City of Indio staff	Indio
5/5/14	NEV Plan meeting with City of Coachella staff	Coachella
5/6/14	NEV Plan meeting with City of Palm Desert staff	Palm Desert
5/6/14	NEV Plan meeting with City of Cathedral City staff	Cathedral City
5/12/14	NEV Plan meeting with City of Rancho Mirage staff	Rancho Mirage
5/13/14	NEV Plan meeting with City of Palm Springs staff	Palm Springs
5/15/14	NEV Plan meeting with City of La Quinta staff	La Quinta
5/9/14	CSUSB PD Environmental & Sustainability Expo	Palm Desert
5/10/14	City of Palm Springs Bike Festival	Palm Springs
6/10/14	Palm Springs Police Department	Palm Springs
6/12/14	Cathedral City Police Department	Cathedral City
6/16/14	Riverside County Sheriffs	

2.3. Selected Media Articles

2/26/13

Valley Voice: Whitewater parkway will improve fitness | The Desert Sun | mydesert.com

Valley Voice: Whitewater parkway will improve fitness

*Written by Dr. Nicole Ortiz Special to The Desert Sun
Feb 25*

mydesert.com

New Year's resolutions often target improvements in personal physical health and well-being. It is clear that these resolutions are often neglected as we all-too-passively observe the rise of obesity and diabetes in both adult and children of our community.

I would like our desert to commit to a resolution that is too important to fail yet another year to address: community well-being. I have been introduced to the valleywide proposal to create a parkway along the Whitewater River. This I believe is the greatest improvement to our community's health and well-being. Safe accessible recreational exercise areas are not abundant in the Coachella Valley. How can we expect our citizens to get out and get mobile when access is difficult to the existing recreation areas?

As a doctor who has dedicated her life to improving personal well-being, the health benefits alone of having a multi-use bike path that runs through the heart of the valley could be vast. When I was a medical student in Portland, Ore., I admired how the community placed an emphasis on access to safe outdoor recreation. Bike paths are available in every corner of the city. They allow for a range of citizens to use them, from a mode of transportation to school and work or a family outing. Portland is a model city that has taken advantage of seemingly every extra space to build bike paths, and it's a marvel at the resiliency of Portlanders who bike through the seemingly never-ending stream of rain.

For those who don't believe such a path would be used in the Coachella Valley, join me one morning on the Bear Creek Trail, which runs along the La Quinta Cove. Even on the hottest of summer days, before the sun rises, you will find many of us jogging, walking and enjoying a clean, paved path. I only wish more of my patients and the community as a whole would know about this great trail or at least have access to it. I believe a more accessible 46-mile parkway like the Bear Creek Trail would attract families, seniors and visitors alike. Trails like these do not exclude subsets of the population. This is an important limitation that a recreation facility such as a gym or a pool may have.

Concern about safety is one the factors that discourages outdoor activity. Today, many of my patients will not bike along our busy streets, such as Highway 111 because of traffic concerns. Few parents will let their children do so. Like the Bear Creek Trail that I use daily, the 46-mile-long parkway along the Whitewater would be separated from major streets and their fast-moving vehicles. The parkway is designed to dip under major bridges like Date Palm Canyon in Cathedral City and over major streets like Fred Waring Drive in Palm Desert.

It is a motivation to have the Clinton Foundation and the Humana Tournament focus on the well-being of the Coachella Valley each January. The first big push of the year reminds us of the fundamental importance of a community, its health and vitality. Wouldn't it be wonderful to channel this support and energy into building a safe "healthway" down the Whitewater River?

I can understand why the Desert Healthcare District is financially supporting the project. Obesity is not a quick-fix problem, and weeklong health initiatives and special events don't cure our community. It's time to look toward long-term investments into our health.

I see the Whitewater River Parkway as a financial investment that is wise and will truly pay it forward to the health of our community.

Dr. Nicole Ortiz is co-founder of Live Well Clinic, an integrative health center in La Quinta. To learn more about Live Well Clinic visit www.livewellclinic.org.

The Desert Sun

WEDNESDAY, OCTOBER 16, 2013

WWW.MYDESERT.COM

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SERVING THE COACHELLA VALLEY SINCE 1937

ENVIRONMENT: GREEN PARKWAY PROJECT



Coachella Valley officials want to build a 52-mile green parkway along the Whitewater River wash. The paved plan, as envisioned here, would be open to pedestrians, bikes, golf carts and neighborhood electric vehicles. IMAGE COURTESY OF CVAG

Future construction plans link Coachella Valley cities

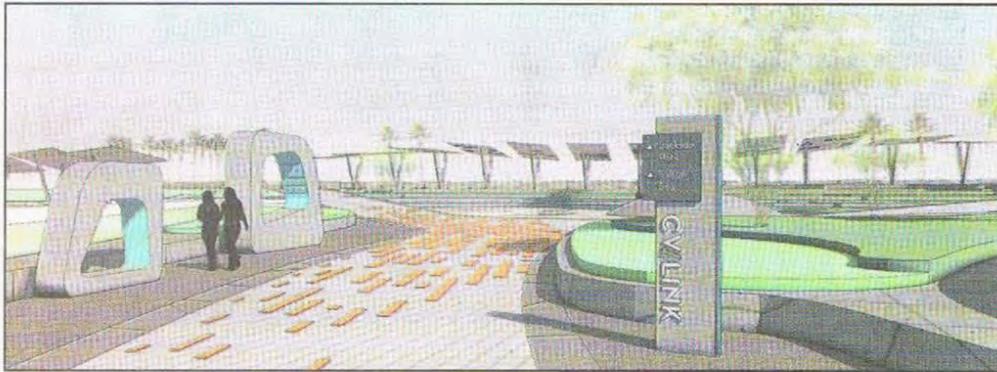


PHOTO COURTESY OF BURKE RIX COMMUNICATIONS

The Coachella Valley Master Plan aims to ease travel and stimulate the economy.

**BY DAMARIS TREVIZO
IN THE CITIES EDITOR**

Coachella Valley cities and tribal lands unite in the CV Link Master Plan that will allow citizens to travel on a safe, continuous pathway geared toward pedestrians, bicyclists, and low-speed electric vehicles. The trail will provide a passageway from Palm Springs to Coachella with ease of access from city to city.

Funded by California Strategic Growth Council, Caltrans, and Riverside County Regional Park and Open Space District, the CV Link is set to begin construction in 2015 and already has over 45 million dollars secured

in funding for the project.

According to Michael Shoberg, Transportation Manager for the Coachella Valley Association of Governments, "The entire build out is expected by 2022 or 2023. The first phase is expected to start construction in about two years."

The CV Link will provide numerous benefits, such as improvements in air quality, over 650 jobs, and additional recreation and fitness opportunities. The plan claims it will relieve congestion on Highway 111 and be an amenity for the tourist industry.

Predicted to stimulate the economy with design, construction, and maintenance jobs, the 52 mile long site will provide approximately 1.47

billion dollars in economic benefits, according to the Burke Rix Communications project description. It will include NEV charging stations, public art, and environmental benefits.

Parts of the pathway will be built on existing streets of the cities it will go through, but will ensure that the trail meets the needs of each community.

There will be an upcoming environmental scoping meeting on the CV Link project on Thursday November 21 from 6 p.m. to 8 p.m. at the Coachella Valley Association of Governments in room 115. It will be located on 73710 Fred Waring Drive, Palm Desert, CA.

For more information and construction updates, visit www.cvag.org

APPENDIX 3. RECOGNITION OF SPONSORS

Recognizing the contributions of sponsors is an important factor in maintaining partnerships and creating funding sources to support the Operations and Maintenance of CV Link.

The following principles form the basis of CV Link's recognition of sponsors:

1. CVAG appreciates all sponsorships that enable it to further its mission.
2. In recognition of a sponsor's contribution, preference will be given to providing a form of recognition that is not displayed within CV Link right of way.
3. Recognition of a sponsorship shall not suggest in any way the endorsement of the sponsor's goods or services by CVAG, member cities or agencies, or any proprietary interest of the sponsor in CV Link.
4. Any physical form of on-site recognition shall not interfere with visitor use or routine community center/park operations.
5. The form of any on-site recognition shall be of an appropriate size and color and shall not detract from the surroundings or any interpretive message.
6. All sponsorship agreements will be for defined period of time having regard to the value of the sponsorship and the life of the asset being sponsored.
7. Naming of events and/or facilities within CV Link right of way in recognition of a sponsor is permitted providing such names are subordinate to the name of the facility.
8. Where naming/renaming as a sponsorship benefit is to be offered in recognition of a sponsorship, the local neighborhood association will be notified of the proposal.

APPENDIX 4. PUBLIC SAFETY SURVEY RESPONSES

Message from Stan Henry requesting Input from each Jurisdiction

From: Joanna Stueckle
Sent: Wednesday, September 2, 2015 4:17 PM
To: Alex Gann (agann@rceo.org); Charles Mc Clendon (cmccleendon@cathedralcity.gov); Dan Martinez (danmartinez@indio.org); David Garcia (dgarcia@coachella.org); David Ready (David.Ready@palmsprings-ca.gov); Frank Spevacek (fspevacek@la-quinta.org); Jay Orr (jorr@rceo.org); John Wohlmuth (jwohlmuth@ci.palm-desert.ca.us); Martin Magana (mmagana@cityofdhs.org); Randy Bynder (randyb@ranchomirageca.gov); Slama Paul (pslama@cabazonindians-nsn.gov); Sutterfield Mallory (msutterfield@cityofblythe.ca.gov); Tom Davis (tdavis@aguacaliente.net); Wade Mc Kinney (wmckinney@indianwells.com); Andrea Carranza (acarranza@coachella.org); Cindy Cairns (cindy.cairns@palmspringsca.gov); devans@cityofpalmdesert.org; Diana Grant (dgrant@rceo.org); Jana Roush (jroush@rceo.org); Jeanette Lucas (jlucas@indianwells.com); Josie Meza; Larry Fossum (lfossum@aguacaliente-nsn.gov); Martha Sommons (msommons@indio.org); Sharon Jones; Sylvia Niño (sylvian@ci.rancho-mirage.ca.us); Teresa Thompson; Wanda Wise-Latta (wlatta@la-quinta.org)
Cc: LeGrand Velez
Subject: Message from CVAG Chair Stan Henry, Mayor of Cathedral City

The following is a message from CVAG Chair Stan Henry:

CVAG CV Link Public Safety Survey

In the last few weeks, CVAG has held two public workshops to give us insight into the CV Link operations and maintenance budget. The idea of these workshops was to help us better understand how the numbers were compiled, and I appreciate that so many of you participated in the discussion.

It was suggested that having a framework to lead the future discussion on the project could also be helpful, especially as we continue to consider any public safety needs. I've compiled some questions that could help us address those issues.

CVAG staff will be circulating this at the next Public Safety Committee meeting. I think it would be useful to send any information we compile to CVAG staff for their consideration, and you can do that by sending it to Transportation Program Manager LeGrand Velez (lvelez@cvag.org) by October 15.

I look forward to working with you on this.

1. What type of crimes has occurred in your parks, public trails or public bathrooms in the last 12 months?
2. How much time has your police department spent investigating those crimes? If you know the cost, how much?
3. How much time and dollars do your staff or law enforcement spend addressing graffiti in your city?
4. Do you allow low speed electric vehicles on your streets and roads?
5. Do you have bike lanes or paths that share with low speed electric vehicles?
6. Do you reregister your low speed electric vehicles in your city? If so, do you charge a fee to reregister them? How much time does it take your staff?
7. How much time does it take your staff to complete an inspection of the low speed electric vehicles? Do you charge a fee for the inspection?
8. How many citations has your police department written to low speed electric vehicles in the past 12 months?
9. How many accidents have you had involving low speed electric vehicles in the past 12 months?
10. How many accidents have you had involving bikes or pedestrians who were using public roadways in the past 12 months?
11. How many accidents have you had involving bikes or pedestrians who were using off-street or Class 1 trails in the past 12 months?
12. How much does your city budget to provide public safety on existing bike paths and trails?

Cathedral City

CVAG CV Link Public Safety Survey

In the last few weeks, CVAG has held two public workshops to give us insight into the CV Link operations and maintenance budget. The idea of these workshops was to help us better understand how the numbers were compiled, and I appreciate that so many of you participated in the discussion.

It was suggested that having a framework to lead the future discussion on the project could also be helpful, especially as we continue to consider any public safety needs. I've compiled some questions that could help us address those issues.

CVAG staff will be circulating this at the next Public Safety Committee meeting. I think it would be useful to send any information we compile to CVAG staff for their consideration, and you can do that by sending it to Transportation Program Manager LeGrand Velez (lvelez@cvag.org) by October 15.

I look forward to working with you on this.

1. What type of crimes has occurred in your parks, public trails or public bathrooms in the last 12 months?

See Attached.

2. How much time has your police department spent investigating those crimes? If you know the cost, how much?

Between 50-60 hours.

3. How much time and dollars do your staff or law enforcement spend addressing graffiti in your city?

See Attached.

4. Do you allow low speed electric vehicles on your streets and roads?

No.

5. Do you have bike lanes or paths that share with low speed electric vehicles?

No.

6. Do you reregister your low speed electric vehicles in your city? If so, do you charge a fee to reregister them? How much time does it take your staff?

No.

7. How much time does it take your staff to complete an inspection of the low speed electric vehicles? Do you charge a fee for the inspection?

N/A

8. How many citations has your police department written to low speed electric vehicles in the past 12 months? None.

9. How many accidents have you had involving low speed electric vehicles in the past 12 months?

None.

10. How many accidents have you had involving bikes or pedestrians who were using public roadways in the past 12 months? 16 Pedestrians

6 Bicyclists

11. How many accidents have you had involving bikes or pedestrians who were using off-street or Class 1 trails in the past 12 months? None.

12. How much does your city budget to provide public safety on existing bike paths and trails?

We do not have a budget for bike paths and trails, however we do have dedicated bike lanes in the city and the Department has 2 dedicated Motor Officers who are assigned to vehicle code enforcement throughout the city.

Cathedral City Park Reports October 1, 2014 to October 13, 2015					
Park	Offense	Case	Date	time	code Section/comments
Agua Caliente Park : 30800 San Luis Rey					
					No Reports during time frame
Century Park : 30555 Da Vall Dr					
	14601 (A)	1503C-2741	3/12/2015	935	Suspended/Revoked Drivers License
	496/ 22651 (C)	1508C-0551	8/2/2015	2300	Possession of Stolen Property/Recovered Stolen Vehicle
Panorama Park : 28905 Avenida Maravilla					
	11364/ OUT WRTM	1410C-2157	10/10/2014	1051	Possession of Paraphanalia/Warrant
	664/187 (a) 1203.2/182(A)1 186.22 (A)	1503C-3070	3/13/2015	1443	Attempt Homicide/violation of Probation/Conspiracy to comit felony crime/Participate in a criminal street gang
	1181/ 22350/22450 23103 (A)/27803 (A)	1502C-4941	2/21/2015	1546	Injury Traffic Accident/Speeding/failure to stop at stop sign/reckless driving/Helmit required
	261	1506C-4401	6/17/2015	1700	rape
	487 (A)	1412C-0335	11/28/2014	1500	grand theft
	FOUND	1502C-5104	2/7/2015	600	Found Property
Patriot Park : 33800 Date Palm Dr					
	245 (A)(1)	1503C-3537	3/15/2015	330	Assault with a deadly weapon - not a firearm
	MISSING	1411C-2972	11/14/2014	859	Missing Adult
Soccer Park : 69400 30th Ave					
	10851 (A)/20002 (A)	1506C-5008	6/21/2015	637	Stolen Vehicle/Hit and run
	1182	1509C-1553	9/8/2015	717	Non injury traffic accident
2nd Street Park : 68890 Buddy Rogers Ave					
	1182	1508C-2645	8/12/2015	32	Non injury traffic accident

**Cathedral City Bike Path Calls For Service
October 1, 2014 to October 12, 2015**

1507C-1765	166DV	Its the bike path on the southside of the wash off of date palm dr heading wb	Did not occur on bike path
1507C-3225	Indecent Exposure	Rp stating he might have gone in the bike path	Unable to locate
1508C-0932	Shots	Just east of cc in the wash close to the bike path area	Heard in the area UTL
1509C-4241	Suspicious Person	down bike path	Officer On-Sighted subjs running in the area - Gone on Arrival
1509C-2818	Found Property	Rp in the cc bike trail, Can not be seen from cat canyon have to drive down the bike trail	Found golf cart
1510C-0176	Info	Per 4101 sub Is eb on the bike path	Poss arson suspect seen in the area on a bike

TITLE:

Approve a One-Year Pilot Program Contract with Graffiti Protective Coatings, Inc. for Providing Graffiti Abatement Services.

FROM:

Pat Milos, Community Development Director

RECOMMENDATION:

Staff recommends that the City Council approve a one-year contract with Graffiti Protective Coatings, Inc. (GPC) to provide graffiti abatement services in an amount not to exceed \$6,000 per month and authorize the City Manager (or designee) to execute the contract.

BACKGROUND:

The Public Works Division is responsible for citywide graffiti abatement. In Fiscal Year 2014-2015, the Public Works Division removed approximately 3,000 graffiti tags throughout the City and expended \$104,556. Graffiti continues to be an ongoing issue and expense for the City. City Staff proposes a one-year pilot program to procure abatement support services to mitigate graffiti and reduce this expense.

DISCUSSION:

Graffiti Protective Coatings (GPC) is located in Southern California and has over 1,000 municipalities, government agencies and private clients. GPC's definition of professional abatement is a technique that leaves no traces of former vandalism. GPC also provides a minimum 98% color match quality to restore color on permeable surfaces.

GPC has a proactive zero-tolerance approach to graffiti abatement through constant patrol of the service area. GPC provides a 24 hour, seven day a week response based on requests received from City Staff and residents through the City's graffiti hotline and free smartphone application to the City for reporting graffiti service requests. In addition, GPC provides 60 minute or less response to emergencies.

The City intends to "piggyback" on the Desert Hot Springs contract with Graffiti Protective Coatings to provide a similar scope of services. Since its inception in Desert Hot Springs, the City has realized a significant reduction in the amount of graffiti and calls to remove graffiti.

FISCAL IMPACT:

According to the Cathedral City Biennial Budget, the City budgeted \$116,829 for Fiscal Year 2015 -2016 for graffiti abatement services from the General Fund. Approval of the recommended action will cost the City \$72,000 annually; saving the City \$44,829 per fiscal year.

ATTACHMENTS:

- Attachment No. 1: Draft Contract
- Attachment No. 2: List of Participating Cities



CITY OF COACHELLA

1515 SIXTH STREET, COACHELLA, CALIFORNIA 92236

PHONE (760) 398-3502 • FAX (760) 398-8117 • WWW.COACHELLA.ORG

October 16, 2015

Mr. Tom Kirk
Executive Director
CVAG
73710 Fred Waring Drive, Ste #200
Palm Desert, CA 92260

RE: CVAG CV Link Public Safety Survey- Coachella

1. What type of crimes has occurred in your parks, public trails or public bathrooms in the last 12 months? Graffiti. Its minimized by closing and locking public restrooms during the off hours and by regular patrols by the city park ranger.
2. How much time has your police department spent investigating those crimes? If you know the cost, how much? None
3. How much time and dollars do your staff or law enforcement spend addressing graffiti in your city? We spend 69 hours a week on graffiti abatement. Annually we spend approximately \$110k. (Staff and materials)
4. Do you allow low speed electric vehicles on your streets and roads? YES
5. Do you have bike lanes or paths that share with low speed electric vehicles? YES
6. Do you reregister your low speed electric vehicles in your city? If so, do you charge a fee to reregister them? How much time dose it takes your staff? NO
7. How much time does it takes your staff to complete an inspection of the low speed electric vehicles? Do you charge a fee for the inspection \$0/NO
8. How many citations has your police department written to low speed electric vehicles in the past 12 months? The Sheriffs dept doesn't track this that they are aware of. They searched their Crossroads software for the vehicle type using golf, golf cart and cart, but did not get any returns. One citation issued to someone driving a golf cart within the last year because Sheriff staff acknowledged they had signed one off. So technically one.
9. How many accidents have you had involving low speed electric vehicles in the past 12 months? One collision involving a golf cart. Y150730053 (March 14, 2015)

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CITY OF COACHELLA

1515 SIXTH STREET, COACHELLA, CALIFORNIA 92236

PHONE (760) 398-3502 • FAX (760) 398-8117 • WWW.COACHELLA.ORG

10. How many accidents have you had involving bikes or pedestrians who were using public roadways in the past 12 months? 5 bicycle collisions 10 pedestrian

11. How many accidents have you had involving bikes or pedestrians who were using off-street or Class 1 trails in the past 12 months? Coachella has any off-street or Class 1 riding areas. An internet search revealed the closest one is in Cathedral City if I searched it right. So I guess the answer to this one is none.

12. How much does your city budget to provide public safety on existing bike paths and trails? Currently we do not have patrols for trails as we do not have any. Our park ranger position annually runs at about 66k (salary and benefits). This would probably be the appropriate position to provide patrols of a recreational trail/linear park.

Respectfully,

Jacob I. Alvarez
Asst. to the City Manager

An Affirmative Action/Equal Opportunity Employer

Desert Hot Springs

From: Dale Mondary <dmondary@cityofdhs.org>
Sent: Tuesday, October 13, 2015 6:47 PM
To: LeGrand Velez
Cc: Martin Magana; Jan Pye
Subject: CV Link Public Safety Survey

Follow Up Flag: Follow up
Flag Status: Flagged

Mr. Velez,

Here are the Desert Hot Springs response to your survey questions. Please feel free to contact me if you have any questions.

1. What type of crimes has occurred in your parks, public trails or public bathrooms in the last 12 months? **The City has 8 parks. We handled a total of 122 calls for service over the past 12 months, of that 52 calls were actual crimes. They include; drug related offenses, robbery, assault with a deadly weapon, simple assault, vandalism, petty theft, annoying a child, reckless driving, violations of court orders, vehicle burglary, domestic violence, hit and run traffic accident and animal cruelty.**
2. How much time has your police department spent investigating those crimes? If you know the cost, how much? **In total we estimate that we have spent approximately 65 hours investigating those crimes at a patrol level. I do not have the statistics on how many detective hours were spent following up the cases. From a patrol standpoint it cost the City about \$1,877 dollars to handle the initial calls for service. This does not include the time spent writing reports, packing evidence, or follow up investigations by the detectives.**
3. How much time and dollars do your staff or law enforcement spend addressing graffiti in your city? **The City has a contract with a company who handles our graffiti. If it appears to be gang related an officer responds to document and investigate as necessary. That information was not tracked. The contract with our graffiti removal services is up to \$90,000 a year and each year that amount is totally encumbered.**
4. Do you allow low speed electric vehicles on your streets and roads? **NO**
5. Do you have bike lanes or paths that share with low speed electric vehicles? **NO**
6. Do you reregister your low speed electric vehicles in your city? If so, do you charge a fee to reregister them? How much time dose it takes your staff? **N/A**
7. How much time does it takes your staff to complete an inspection of the low speed electric vehicles? Do you charge a fee for the inspection? **N/A**
8. How many citations has your police department written to low speed electric vehicles in the past 12 months? **None**
9. How many accidents have you had involving low speed electric vehicles in the past 12 months? **None**
10. How many accidents have you had involving bikes or pedestrians who were using public roadways in the past 12 months? **From 07/01/14 to 07/01/15 we had 3 collisions involving bicycles and autos and 17 involving a pedestrian.**
11. How many accidents have you had involving bikes or pedestrians who were using off-street or Class 1 trails in the past 12 months? **none**
12. How much does your city budget to provide public safety on existing bike paths and trails? **Zero for that specific type of enforcement.**

Respectfully,

Dale Mondary | CHIEF OF POLICE



O: (760) 329-6411 Ext. 317 F: (760) 251-1257

Desert Hot Springs Police Department

65950 Pierson Boulevard • Desert Hot Springs • California, 92240

"Safety, Professionalism, Accountability"



Indian Wells

Subject: FW: Message from CVAG Chair Stan Henry, Mayor of Cathedral City

From: Wade McKinney [<mailto:wmckinney@indianwells.com>]
Sent: Thursday, September 3, 2015 2:57 PM
To: Joana Stueckle <stueckle@cvag.org>
Subject: FW: Message from CVAG Chair Stan Henry, Mayor of Cathedral City

Will this work?



Wade McKinney
City Manager

44-950 Eldorado Drive
Indian Wells, California 92210-7497
www.IndianWells.com
wmckinney@IndianWells.com
V (760) 776-0222 F (760) 346-0407

From: David Gassaway
Sent: Thursday, September 03, 2015 2:55 PM
To: Wade McKinney <wmckinney@indianwells.com>
Subject: RE: Message from CVAG Chair Stan Henry, Mayor of Cathedral City

Here you go. Our answers in red.

1. What type of crimes has occurred in your parks, public trails or public bathrooms in the last 12 months? **N/A**
2. How much time has your police department spent investigating those crimes? If you know the cost, how much? **N/A**
3. How much time and dollars do your staff or law enforcement spend addressing graffiti in your city? **Nominal**
4. Do you allow low speed electric vehicles on your streets and roads? **Yes, on 25mph roads and below – walkways all else**
5. Do you have bike lanes or paths that share with low speed electric vehicles? **No**
6. Do you reregister your low speed electric vehicles in your city? If so, do you charge a fee to reregister them? How much time does it take your staff? **No**
7. How much time does it take your staff to complete an inspection of the low speed electric vehicles? Do you charge a fee for the inspection? **N/A**
8. How many citations has your police department written to low speed electric vehicles in the past 12 months? **None**
9. How many accidents have you had involving low speed electric vehicles in the past 12 months? **None**
10. How many accidents have you had involving bikes or pedestrians who were using public roadways in the past 12 months? **Two**
11. How many accidents have you had involving bikes or pedestrians who were using off-street or Class 1 trails in the past 12 months? **N/A**
12. How much does your city budget to provide public safety on existing bike paths and trails? **None**



INDIO POLICE DEPARTMENT

46-800 JACKSON STREET • INDIO, CALIFORNIA 92201
(760) 391-4057 PHONE • (760) 391-4036 FAX

"Our Community... Our Commitment"

Richard P. Twiss
Chief of Police

October 16, 2015

Mr. LeGrand Velez
Transportation Program Manager
Coachella Valley Association of Governments
73-710 Fred Waring Drive, Suite 200
Palm Desert, CA 92260-2516

RE: CVAG CV Link Public Safety Survey

Dear Mr. Velez,

On behalf of the Indio Police Department, please see our responses below to the survey questions submitted to our department on behalf of CVAG Chair Stan Henry, Mayor of Cathedral City. It is my understanding from the email request that this information will be used as a framework to move forward with future discussions related to CV Link, particularly related to public safety issues.

The original questions have been included below, followed by our Indio Police Department responses in italics.

1. What type of crimes has occurred in your parks, public trails or public bathrooms in the last 12 months?

The City of Indio has 11 active parks with a variety of amenities, including public bathrooms. The Indio Police Department has law enforcement jurisdiction in these parks and investigates any criminal activity or violations of the Indio City Code that occur. The majority of incidents that occur in the parks within the City of Indio are common, non-violent crimes or Indio City Code violations, which include alcohol and/or miscellaneous drug violations and periodic vandalism. Although rare, the Indio Police Department has investigated some crimes against persons, to include assault and robbery.

2. How much time has your police department spent investigating those crimes? If you know the cost, how much?

Depending on the nature of the offense, including criminal and city code violations, a police investigation may take anywhere from a few minutes to several hours to complete. The average time of the incidents/investigations handled by the Indio Police Department in the parks within the City of Indio over the last 12 months took approximately 2 hours to complete.

3. How much time and dollars does your staff or law enforcement spend addressing graffiti in your city?

The City of Indio (Indio Police Department) has two full-time Graffiti Control Workers that address graffiti throughout the city. They respond to complaints of graffiti from all city departments and private citizens. Their mission is to eliminate graffiti blight as quickly as possible and do their part in keeping the City of Indio clean. Between the salaries of the two full-time Graffiti Control Workers and the equipment needed to do their job (paint equipment, vehicles, paint, etc.), the City of Indio spends approximately \$178k a year.

4. Do you allow low speed electric vehicles on your streets and roads?

Yes, along specifically designated roadways. In 2011, the City of Indio adopted a Golf Cart Transportation Program, which allows drivers of properly equipped golf carts to travel along designated pathways, sidewalks, and bicycle lanes throughout the city. The program requires the golf cart and the driver to meet certain minimum standards, and the golf cart must have a current permit (Please see the attached brochure for the City of Indio Golf Cart Transportation Program for more information).

5. Do you have bike lanes or paths that share with low speed electric vehicles?

Yes, along specifically designated pathways, sidewalks, and bicycles lanes. In 2011, the City of Indio adopted a Golf Cart Transportation Program which allows drivers of properly equipped golf carts to travel along designated pathways, sidewalks, and bicycle lanes throughout the city. The program requires the golf cart and the driver to meet certain minimum standards, and the golf cart must have a current permit (Please see the attached brochure for the City of Indio Golf Cart Transportation Program for more information).

6. Do you register your low speed electric vehicles in your city? If so, do you charge a fee to register them? How much time does it take your staff?

Yes. Per the City of Indio's Golf Cart Transportation Program, a permit is required every two years to drive a golf cart (low speed electric vehicle) on city designated golf cart lanes and paths. The charge to register a golf cart (low speed electric vehicle) costs \$9. This process takes approximately 10 to 15 minutes for city staff to process. Before a permit can be issued, the golf cart must be inspected for the required safety equipment. The golf cart program has been designed to accommodate golf carts (low speed electric vehicle) that meet industry standards for manufactured golf carts (or low speed electric vehicle). For purposes of the program, a golf cart (low speed electric vehicle) has two seats, at least three wheels in contact with the ground, and is operated at no more than 25 miles per hour. A golf cart (low speed electric vehicle) must be equipped with specific, required safety equipment in order for the driver to obtain a permit to travel on city cart lanes and paths (Please see the attached brochure for the City of Indio Golf Cart Transportation Program for more information).

7. How much time does it take your staff to complete an inspection of the low speed electric vehicles? Do you charge a fee for the inspection?

An inspection is required to obtain a permit to operate any golf cart (low speed electric vehicle) on city designated golf cart lanes and paths. The inspection is normally done by a designated member of the Indio Police Department, who is qualified to conduct this type of inspection. The inspection usually takes approximately 1 hour. There is no charge for the inspection.

8. How many citations has your police department written to low speed electric vehicles in the past 12 months?

The Indio Police Department has not issued any citations to any drivers of low speed electric vehicles (golf carts) in the past 12 months.

9. How many accidents have you had involving low speed electric vehicles in the past 12 months?

The Indio Police Department has handled two reported accidents involving a golf cart (low speed electric vehicle) in the past 12 months.

10. How many accidents have you had involving bikes or pedestrians who were using public roadways in the past 12 months?

The Indio Police Department has investigated 19 reported accidents involving bicycles and 36 reported accidents involving pedestrians. Most were non-injury or minor-injury.

11. How many accidents have you had involving bikes or pedestrians who were using off-street or Class 1 trails in the past 12 months?

The Indio Police Department has had no accidents reported involving bicycles or pedestrians who were using off-street or Class 1 trails in the past 12 months.

12. How much does your city budget to provide public safety on existing bike paths and trails?

The Indio Police Department provides the law enforcement component of public safety within the City of Indio and has an annual budget of \$24,561,000.00. The City of Indio does not specifically budget for public safety on bike paths and trails as these areas fall under the responsibility of the Indio Police Department.

I hope this information is helpful and if you would like to discuss these answers in more detail, please feel free to contact me at (760) 391-4035.

Cordially,



Richard P. Twiss
Chief of Police

Attachments:

City of Indio Golf Cart Transportation Program Brochure
City of Indio Golf Cart Routes
City of Indio Golf Cart Transportation Program Procedures – April 2011
Registration Form For Golf Cart Permit
Example of Certificate of Liability Form

In 2011, the City of Indio adopted a Golf Cart Transportation Program which allows drivers of properly equipped golf carts to travel along designated pathways, sidewalks, and bicycle lanes in the City. The program requires the golf cart and the driver to meet certain minimum standards, and the golf cart must have a current permit.

Golf Cart Transportation Program



Golf Cart Permit and Inspection

A permit is required to drive a golf cart on City designated golf cart lanes and paths. Before a permit can be issued, the golf cart must be inspected for required safety equipment. Inspections may be arranged by calling the Indio Police Department, Records Department (Monday-Friday) at (760) 391-4057, Press 2. The permit is valid for two years. Permits must be adhered to the right rear bumper/fender of your golf cart.

- Golf carts are permitted only on routes and paths specifically designated for their use.
- Golf carts are allowed on all streets in residential areas when posted speeds do not exceed 25 miles per hour.
- Citations may be issued for operating a golf cart in a location not included in this program.
- Golf carts are allowed to park in designated designated motor vehicle parking spaces.
- Golf carts are required to yield to bicycles and pedestrians when traveling along shared routes and paths.
- Children may not operate golf carts on City golf cart lanes and paths.
- Seat belts must be worn at all times when the cart is in operation.
- Golf carts may only cross public streets at intersections with pedestrian crosswalks.

Golf Cart Requirements

The golf cart program has been designed to accommodate golf carts that meet industry standards for manufactured golf carts. For purposes of this program, a golf cart has two seats, at least three wheels in contact with the ground and is operated at no more than 25 miles per hour. A golf cart must be equipped with all the required safety equipment listed below in order to obtain a permit to travel on City cart lanes and paths:

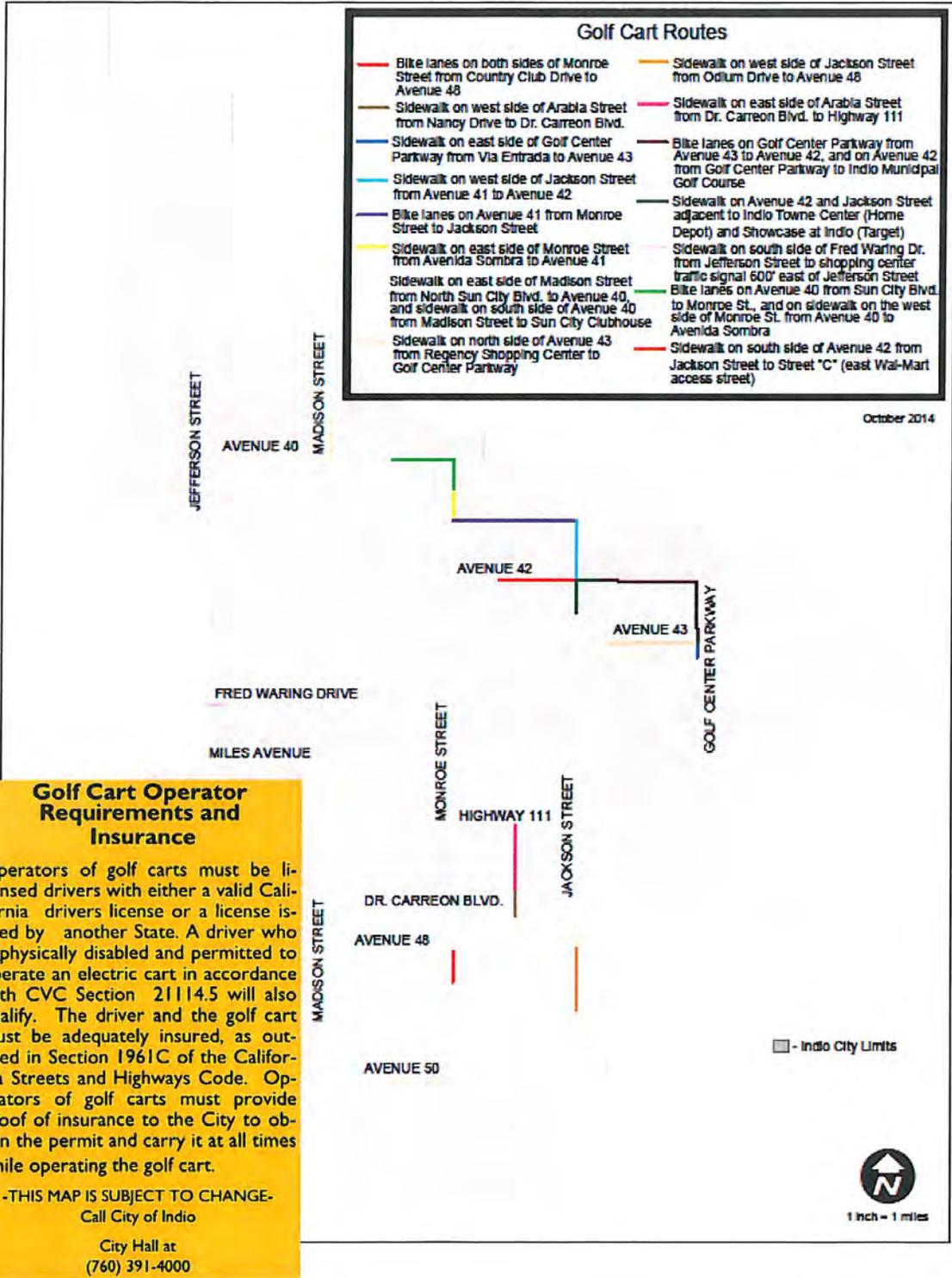
- | | |
|-------------------------------------|------------------------------------|
| SEAT BELTS | REAR LIGHTS |
| BRAKE LIGHTS | HEAD LIGHTS |
| UNOBSTRUCTED VIEW TO THE REAR | LOCKING DEVICE |
| COVERED PASSENGER COMPARTMENT | RED REFLECTORS (CYC 24607) |
| ONE MIRROR COMBINATION BELOW | FRONT & REAR TURN SIGNAL INDICATOR |
| -LEFT AND RIGHT SIDE MIRRORS | |
| -LEFT AND REAR VIEW MIRRORS | |
| -MULTI-DIRECTIONAL CROSS BAR MIRROR | |

All equipment listed is available from a local golf cart dealer



City of Indio

100 CIVIC CENTER
MALL
INDIO, CA 92201
MAIN: 760-391-4000
FAX: 760-391-4027



City of Indio Golf Cart Transportation Program Procedures – April 2011

Obtaining a Permit

- 1) Applicant modifies golf cart per City's Design Criteria including:
 - Red reflectors
 - Parking brake
 - Horn
 - Headlights, brake lights, and rear lights
 - Front and rear turn signal indicators
 - Seat belts
 - Covered passenger compartment
 - Backup buzzer
 - Golf cart locking device
 - Mirror combination (left and right side mirrors, OR left and rear mirrors, OR multi-directional cross bar mirror) AND unobstructed view to the rear
- 2) Applicant obtains proof of insurance (see sample form) for driver and for golf cart (consult with your insurance agent – a recreational vehicle policy may be required).
- 3) Applicant calls Indio Police Department Records Section (1-760-391-4057; Press 2) to schedule golf cart inspection at applicant's home.
- 4) Indio Police Department brings Permit Form to your home; applicant completes information at top of form and signs; Indio Police Department inspects golf cart and either signs off or notes deficiencies for correction.
- 5) Applicant brings completed permit form to Finance Department at City Hall, together with proof of insurance; applicant pays fee of fifty dollars (~~\$50.00~~ ^{7.00}) for two (2) years.
- 6) Finance Department issues permit, distributes copies to applicant and Police, and keeps original on file; Finance Department provides permit decal to applicant.
- 7) Applicant attaches permit decal to right rear fender of golf cart.

NOTE: Applicant may drive golf cart with permit ONLY on designated pathways, sidewalks, and bicycle lanes, as well as on any residential street, for two (2) years.

Renewing a Permit

- 1) Finance Department mails renewal notice to permit holder six (6) weeks before expiration.
- 2) Permit holder, as renewal applicant, repeats steps 2 through 7 above.

Requesting a New Golf Cart Route

Call City of Indio Public Works Engineering at 1-760-391-4017.

Attachments

- Registration Form for Golf Cart Permit
- Sample Proof of Insurance Form
- Currently Designated Golf Cart Routes



PERMIT NO: _____ MONTH/YEAR TO RENEW: _____ / _____

REGISTRATION FORM FOR GOLF CART PERMIT

Name of Principal Driver: _____ Driver's License No.: _____
 Name of Additional Drivers: _____ Additional Driver's License No.: _____
 Address: _____ Telephone No.: _____
 City/State/Zip _____ Cellular No.: _____
 Cart Manufacturer: _____ Identification No.: _____
 Model No.: _____ Cart Color: _____

I understand and agree to the following:

- 1) I have read and understand the Golf Cart Transportation Program and promise to operate, allow, and cause the operation of, the golf cart registered under this permit in accordance with this Program and other applicable laws, including relevant sections of the Code of Indio and the California Vehicle Code.
- 2) The golf cart registered under this permit will be operated only on approved and designated Class I, Class II and Class III golf cart facilities or in residential areas with speed limits of 25 mph or less.
- 3) The permit for operation of this golf cart shall be affixed to the right rear bumper of the cart described above.
- 4) Any violation of the provisions of the Golf Cart Transportation Program or applicable sections of the Code of Indio shall be grounds for immediate revocation of this permit, and may be grounds for criminal prosecution.
- 5) I shall forever indemnify, hold harmless and defend the City of Indio, its agents, employees and officials from any and all claims and/or liability to the full extent that such claims and/or liability arise from or relate to my negligence or recklessness, or the negligence or recklessness of any other driver and/or passenger in my golf cart, in the operation and/or maintenance of the golf cart subject to this permit is in use. I understand that this obligation extends beyond the life of this permit.
- 6) This golf cart will not be operated at speeds in excess of 25 miles per hour.
- 7) This permit shall be renewed every two years.
- 8) I understand that this permit to operate a golf cart shall not be approved until the vehicle has been inspected and approved by the City of Indio.

Permit Owner Signature: _____ Date: _____

FOR OFFICE USE ONLY					
	OPERATIVE	INOPERATIVE		OPERATIVE	INOPERATIVE
Seat Belts	<input type="radio"/>	<input type="radio"/>	Covered Passenger Compartment	<input type="radio"/>	<input type="radio"/>
Parking Brake	<input type="radio"/>	<input type="radio"/>	Mirrors, <u>one</u> of the following:		
Head Lights	<input type="radio"/>	<input type="radio"/>	*Left side and right side mirrors	<input type="radio"/>	<input type="radio"/>
Rear Lights	<input type="radio"/>	<input type="radio"/>	*Left side and rear view mirrors	<input type="radio"/>	<input type="radio"/>
Brake Lights	<input type="radio"/>	<input type="radio"/>	*Multi-directional cross bar mirror	<input type="radio"/>	<input type="radio"/>
Back-Up Buzzer	<input type="radio"/>	<input type="radio"/>	Red Reflectors (CVC 24607)		
Horn	<input type="radio"/>	<input type="radio"/>	*Red reflectors are required on	<input type="radio"/>	<input type="radio"/>
Front and Rear Turn			the left and right rear of the cart		
Signal Indicator	<input type="radio"/>	<input type="radio"/>	between 15 and 60 inches above		
Locking Device	<input type="radio"/>	<input type="radio"/>	the ground		

I recommend **approval** of the permit I recommend **denial** of the permit

Reason for Denial: _____

Signature of Designated City Official: _____ Date: _____

Certificate of Liability Insurance naming the City as a Certificate Holder Expiration Date: _____
 Fee Amount: ~~\$ 50.00~~ 9.00 (Code: EN) Receipt No.: _____
 Issued By: _____ Issued Date: _____

CITY OF INDIO, 100 Civic Center Mall, Indio, CA 92201 *** Main No: 760-391-4000

ACORD <small>TM</small> CERTIFICATE OF LIABILITY INSURANCE		DATE (MM/DD/YYYY)
PRODUCER	THIS CERTIFICATE IS ISSUED AS A MATTER OF INFORMATION ONLY AND CONFERS NO RIGHTS UPON THE CERTIFICATE HOLDER. THIS CERTIFICATE DOES NOT AMEND, EXTEND OR ALTER THE COVERAGE AFFORDED BY THE POLICIES BELOW.	
INSURED	INSURERS AFFORDING COVERAGE	NAIC #
	INSURER A:	
	INSURER B:	
	INSURER C:	
	INSURER D:	

COVERAGES

THE POLICIES OF INSURANCE LISTED BELOW HAVE BEEN ISSUED TO THE INSURED NAMED ABOVE FOR THE POLICY PERIOD INDICATED. NOTWITHSTANDING ANY REQUIREMENT, TERM OR CONDITION OF ANY CONTRACT OR OTHER DOCUMENT WITH RESPECT TO WHICH THIS CERTIFICATE MAY BE ISSUED OR MAY PERTAIN, THE INSURANCE AFFORDED BY THE POLICIES DESCRIBED HEREIN IS SUBJECT TO ALL THE TERMS, EXCLUSIONS AND CONDITIONS OF SUCH POLICIES. AGGREGATE LIMITS SHOWN MAY HAVE BEEN REDUCED BY PAID CLAIMS.

INSR (ADD'L LTR INSR)	TYPE OF INSURANCE	POLICY NUMBER	POLICY EFFECTIVE DATE (MM/DD/YYYY)	POLICY EXPIRATION DATE (MM/DD/YYYY)	LIMITS
	GENERAL LIABILITY <input type="checkbox"/> COMMERCIAL GENERAL LIABILITY <input type="checkbox"/> CLAIMS MADE <input type="checkbox"/> OCCUR GEN'L AGGREGATE LIMIT APPLIES PER: <input type="checkbox"/> POLICY <input type="checkbox"/> PROJ <input type="checkbox"/> LOC				EACH OCCURRENCE \$ DAMAGE TO RENTED PREMISES (EA OCCURRENCE) \$ MED EXP (Any one person) \$ PERSONAL & ADV INJURY \$ GENERAL AGGREGATE \$ PRODUCTS - COMP/OP AGG \$
	AUTOMOBILE LIABILITY <input type="checkbox"/> ANY AUTO <input type="checkbox"/> ALL OWNED AUTOS <input type="checkbox"/> SCHEDULED AUTOS <input type="checkbox"/> HIRED AUTOS <input type="checkbox"/> NON-OWNED AUTOS				COMBINED SINGLE LIMIT (EA accident) \$ BODILY INJURY (Per person) \$ BODILY INJURY (Per accident) \$ PROPERTY DAMAGE (Per accident) \$
	GARAGE LIABILITY <input type="checkbox"/> ANY AUTO				AUTO ONLY - EA ACCIDENT \$ OTHER THAN EA ACC \$ AUTO ONLY: AGG \$
	EXCESS/UMBRELLA LIABILITY <input type="checkbox"/> OCCUR <input type="checkbox"/> CLAIMS MADE DEDUCTIBLE \$ RETENTION \$				EACH OCCURRENCE \$ AGGREGATE \$ \$ \$ \$
	WORKERS COMPENSATION AND EMPLOYERS' LIABILITY ANY PROPRIETOR/PARTNER/EXECUTIVE/OFFICER/MEMBER EXCLUDED? If yes, describe under SPECIAL PROVISIONS below				<input type="checkbox"/> WC STATUTORY LIMITS <input type="checkbox"/> OTHER E.L. EACH ACCIDENT \$ E.L. DISEASE - EA EMPLOYEE \$ E.L. DISEASE - POLICY LIMIT \$
	OTHER				

DESCRIPTION OF OPERATIONS / LOCATIONS / VEHICLES / EXCLUSIONS ADDED BY ENDORSEMENT / SPECIAL PROVISIONS

Insurance coverage as required by Section 1961C of the California Streets and Highways Code to enable the driver to operate the golf cart with a valid City of Indio Golf Cart Permit only on designated golf cart facilities and only in accordance with provisions of the City's Golf Cart Transportation Program.

CERTIFICATE HOLDER	CANCELLATION
City of Indio Finance Department 100 Civic Center Mall Indio, California 92201	SHOULD ANY OF THE ABOVE DESCRIBED POLICIES BE CANCELLED BEFORE THE EXPIRATION DATE THEREOF, THE ISSUING INSURER WILL ENDEAVOR TO MAIL <u>30</u> DAYS WRITTEN NOTICE TO THE CERTIFICATE HOLDER NAMED TO THE LEFT, BUT FAILURE TO DO SO SHALL IMPOSE NO OBLIGATION OR LIABILITY OF ANY KIND UPON THE INSURER, ITS AGENTS OR REPRESENTATIVES. AUTHORIZED REPRESENTATIVE:

La Quinta

From: Chris Escobedo <Cescobedo@la-quinta.org>
Sent: Thursday, October 15, 2015 3:16 PM
To: LeGrand Velez
Cc: Joanna Stueckle; Frank Spevacek
Subject: FW: Message from CVAG Chair Stan Henry, Mayor of Cathedral City
Attachments: image003.png

Follow Up Flag: Follow up
Flag Status: Flagged

Hello, LeGrand,

Thanks so much for sending your survey request. Below, please find the City's responses to your questions. Please let us know if you need additional information.

1. What type of crimes has occurred in your parks, public trails or public bathrooms in the last 12 months?
Battery against citizens, resisting arrest, theft from persons and vehicles, narcotics violations, open alcohol containers, drinking alcoholic beverages, vandalism, Municipal Code violations (remaining inside park after hours, curfew, skateboard/bicycle helmet)
2. How much time has your police department spent investigating those crimes? If you know the cost, how much?
Approximately half the annual productive time, or 680 hours, of one peace officer. Approximately \$101,381.20
3. How much time and dollars do your staff or law enforcement spend addressing graffiti in your city?
In FY 14/15 Labor Costs: \$44,262.17, Materials \$24,012.52: Total Costs \$68,274.69
4. Do you allow low speed electric vehicles on your streets and roads?
Yes, on pre-designated routes and areas throughout the City
5. Do you have bike lanes or paths that share with low speed electric vehicles?
Yes, in some areas bike lanes/paths and/or sidewalks may be used for low speed electric vehicles
6. Do you reregister your low speed electric vehicles in your city? If so, do you charge a fee to reregister them? How much time does it take your staff?
Golf Cart Permits are \$20, annually issued upon satisfactory completion of a basic inspection. The inspection (including drive time to a residence) takes about 15-30 minutes
7. How much time does it take your staff to complete an inspection of the low speed electric vehicles? Do you charge a fee for the inspection?
Inspections (including drive time to/from residence) takes between 15-30 minutes. The fee is \$20 annually.
8. How many citations has your police department written to low speed electric vehicles in the past 12 months?
One citation/arrest for DUI on a golf cart- private property collision.
9. How many accidents have you had involving low speed electric vehicles in the past 12 months?
Five collisions involving low speed electric vehicles – all on private property.
10. How many accidents have you had involving bikes or pedestrians who were using public roadways in the past 12 months?
10 pedestrian involved collisions and 13 bicycle involved collisions
11. How many accidents have you had involving bikes or pedestrians who were using off-street or Class 1 trails in the past 12 months?
None
12. How much does your city budget to provide public safety on existing bike paths and trails?
The City does not have a specific budget line item for this type of patrol, however, LQPD will deploy resources on an as-needed basis, including increased patrols on bike paths and trails.
[\[http://archive.la-quinta.org/Logo/LaQuintaCitySeal.jpg\]](http://archive.la-quinta.org/Logo/LaQuintaCitySeal.jpg)

Chris Escobedo | Assistant to City Manager City of La Quinta
78495 Calle Tampico La Quinta, CA 92253
Ph. 760-777-7010
Website<<http://www.la-quinta.org/>> |
Map<<https://www.google.com/maps/place/78495+Calle+Tampico,+La+Quinta,+CA+92253/@33.677372,-116.2961092,17z/data=!3m1!4b1!4m2!3m1!1s0x80daf89717c7c625:0xce154ede710f28d5>>
cescobedo@la-quinta.org<<mailto:cescobedo@la-quinta.org>>
[Facebook]<<https://www.facebook.com/CityOfLaQuinta>> [Twitter] <<https://twitter.com/cityoflaquinta>> [Google Plus]
<<https://plus.google.com/+Playinlaquinta>> [test] <<https://instagram.com/cityoflaquinta/>> [Pinterest]
<<https://www.pinterest.com/cityoflaquinta/>>

APPENDIX 5. COLLISION DATA

Project alternatives that could address the identified safety hazards include a reduction in speed limits on arterial roadways and/or reallocation of road space to provide additional separation of users. However, these alternatives would be difficult to implement given the seasonal variability in traffic density resulting in congestion at peak periods and the existing geometric design of arterial roadways.

TABLE 3: COACHELLA VALLEY NON-MOTORIZED CRASH STATISTICS

Year	Bikes		Pedestrians	
	Injuries	Deaths	Injuries	Deaths
2008	62	2	50	5
2009	63	2	71	6
2010	63	3	59	9
2011	62	2	55	9
2012	66	5	58	9
Total	316	14	293	34

The number of reported fatal and injury bicycle and pedestrian collisions by city and by year is given in Table 3. While Palm Springs appears to be over-represented in the data, this is likely to be due to a higher rate of walking and biking compared to other cities.

All casualty information was taken from the 2006 to 2013 Statewide Integrated Traffic Records System (SWITRS) maintained by the California Highway Patrol.

TABLE 4: PED / BIKE CASUALTIES 2008-2012

Pedestrian Fatalities	2008	2009	2010	2011	2012	Total
CATHEDRAL CITY		1	1	3	1	6
COACHELLA	1	2	1	1	2	7
INDIAN WELLS						
INDIO	1		1		2	4
LA QUINTA				1		1
PALM DESERT	1		1			2
PALM SPRINGS	2	2	5		4	13
RANCHO MIRAGE		1				1
Grand Total	5	6	9	5	9	34

Pedestrian Injuries	2008	2009	2010	2011	2012	Total
CATHEDRAL CITY	8	6	15	5	9	43
COACHELLA	5	11	3	7	3	29
INDIAN WELLS			1			1
INDIO	10	10	14	10	20	64
LA QUINTA	3	8	2	2	3	18
PALM DESERT	12	14	8	9	7	50
PALM SPRINGS	12	21	15	21	16	85
RANCHO MIRAGE		1	1	1		3
Grand Total	50	71	59	55	58	293
Bicyclist Fatalities	2008	2009	2010	2011	2012	Total
CATHERAL CITY						
COACHELLA	2			1		3
INDIAN WELLS					1	1
INDIO		2			1	3
LA QUINTA			1			1
PALM DESERT						
PALM SPRINGS			2		1	3
RANCHO MIRAGE				1	2	3
Grand Total	2	2	3	2	5	14
Bicyclist Injuries	2008	2009	2010	2011	2012	Total
CATHEDRAL CITY	4	6	9	10	6	35
COACHELLA	3	1	3	5		12
INDIAN WELLS	1	1	1	1	1	5
INDIO	13	9	9	9	10	50
LA QUINTA	6	14	6	5	3	34
PALM DESERT	17	14	16	16	15	78
PALM SPRINGS	13	17	19	14	27	90
RANCHO MIRAGE	5	1		2	4	12
Grand Total	62	63	63	62	66	316

APPENDIX 6. RECREATIONAL DEMAND

Two-thirds of American adults own a smartphone¹, making crowd-sourced travel data sets more accessible for planning purposes. Cities such as San Francisco and Atlanta have launched smartphone applications such as CycleTracks to gather bicycle trip data. Although such applications have not yet been implemented in the Coachella Valley, the recreational running and cycling website Strava (www.strava.com) does have local data. With Strava, it is likely that the typical user is more technologically adept, younger, and athletic compared to the typical resident. Nevertheless, it is more data than previously available and helps confirm expert judgments on the routes that bicyclists are more or less likely to use given the current infrastructure. In Figure 2, the red lines indicate routes of high use, purple medium use, and blue light use.

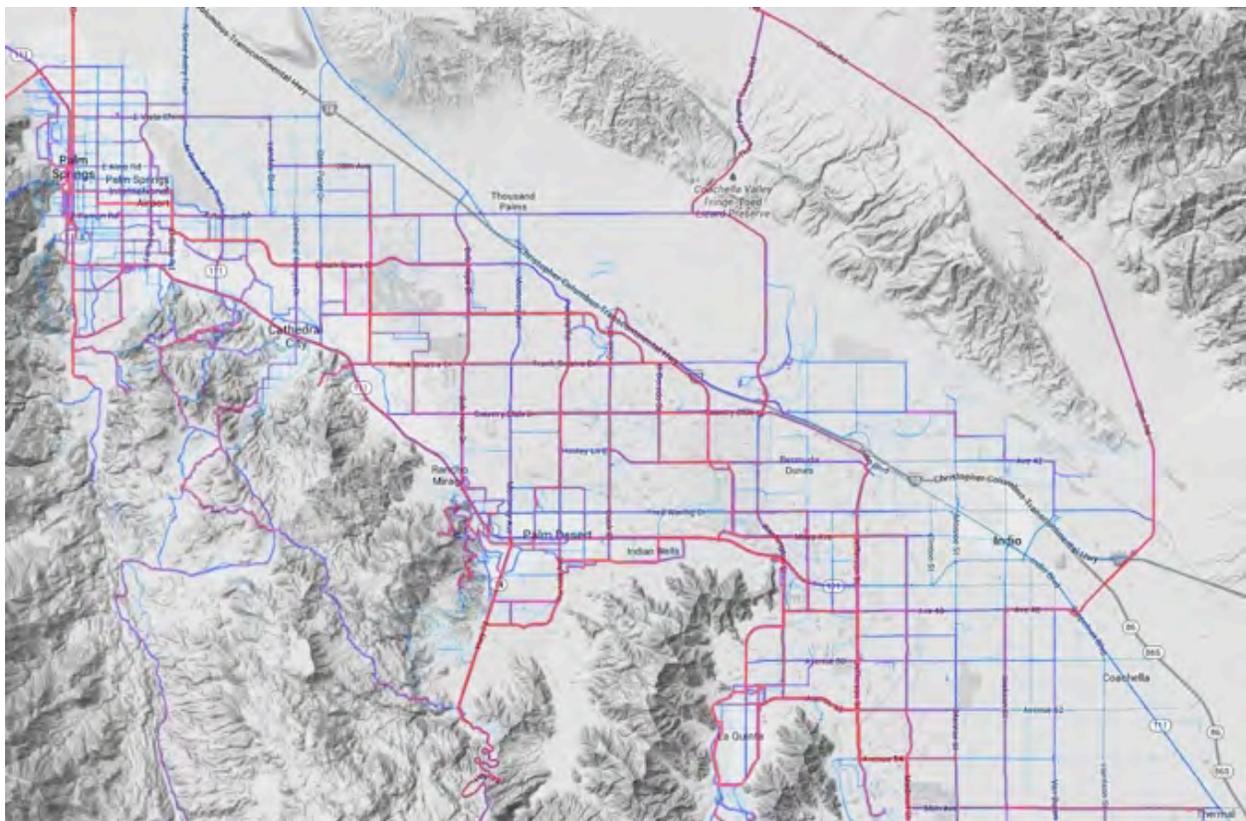


FIGURE 2: CROWD-SOURCED DATA ON RECREATIONAL WALKING AND CYCLING ROUTES

¹ <http://www.nielsen.com/us/en/reports/2014/the-us-digital-consumer-report.html>

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APPENDIX 7. EQUESTRIAN TRAILS

All known equestrian facilities with the potential for CV Link interaction have been reviewed based on local knowledge and online resources such as the Rancho Mirage Trails map². An extract from this map is presented in Figure 3.

1. Bud Fuhrer Trail – Palm Springs: This little-used urban equestrian trail begins at the Palm Canyon Wash where it intersects with the east terminus of Escoba Drive. There are stables on Escoba Drive and an equestrian trailhead at the east end of Sonora Road. The trail follows the south and east edges of Tahquitz Creek Golf Course to El Cielo Road. West of El Cielo Road the trail is primarily in the bed of Tahquitz Creek. The Rock Garden Restaurant, located SW of Palm Canyon and Tahquitz Creek, has a hitching post. The nexus with CV Link is in Tahquitz Creek between Sunrise and Belardo. *Since CV Link will be staying on the levee in this area, it should not have any impact on equestrian use on the trail.*
2. Whitewater Channel – Palm Springs: The entire Whitewater Channel in Palm Springs has been identified as an equestrian trail. This is not a formal trail, nor a high-use route, and CV Link should not have any impact on this little used equestrian route.
3. The Jenkins Trail – Palm Springs / Cathedral City: The Jenkins trail, which circumvents the Cathedral Canyon Golf Course, is signed as an equestrian trail. There is an asphalt path for bikes, and a dirt path for equestrians. *The trail does not appear to receive any equestrian use. The CV Link would either need to be narrower with a separating fence to preserve the unpaved equestrian facility or the equestrian aspect of the Jenkins Trail might be abandoned if no longer used or other equestrian connections could be found.*
4. Butler-Abrams Trail – Rancho Mirage: Beginning at Wolfson Park (Frank Sinatra) an asphalt trail parallels the Whitewater Wash dipping down into and out of the wash and becomes divided on the other side into separate asphalt and dirt (for equestrians) trails. As it continues between a residential area and Morningside Country Club, the trail ends at Country Club Drive, one block north of Highway 111. CV Link proposes to use the Butler-Abrams path as part of the core alignment. This path has a restricted right-of-way in some places. The amount of equestrian usage is unknown. *The CV Link may need to accommodate and preserve this equestrian trail.*
5. Clancy Lane Trail – Rancho Mirage: This trail begins on Clancy Lane between Rancho Manaña and the Monterey Gate as a developed trail, continues under Bob Hope Drive down into and crossing the Whitewater Wash to Whitewater Park, following the edge of the wash. The trail may extend into the Magnesia Falls Wash. East of Bob Hope the trail is on the left bank levee; west of Bob Hope it continues in the wash and on the right bank levee. There is equestrian parking at Whitewater Park, however the equestrian path is not clearly signed in the park. *Depending on the CV Link alignment in this area (to be determined), the project could adversely impact this equestrian trail. The trail east of Bob Hope on the left bank is a possible alternative for the CV Link. However, this equestrian resource will likely need to be preserved.*
6. East Valley Equestrian Trails: La Quinta, Indio, and the community of Vista Santa Rosa have a network of equestrian trails adjacent to major arterials. Lake Cahuilla Park has an equestrian

² http://www.ranchomirageca.gov/content_files/pdf/residents/things_to_do/CRM-parks-trails-map.pdf

campground. The resources are all located well south of the Whitewater River. *CV Link will have no impact on these trails.*



FIGURE 3: RANCHO MIRAGE EQUESTRIAN TRAILS MAP EXTRACT

In summary, the Butler-Abrams and the Clancy Lane trails (both in Rancho Mirage) could be adversely impacted by the project and will most likely need to be preserved. When the alignment has been refined in areas such as Rancho Las Palmas and Segment 2A through the Tahquitz Creek, equestrian groups should be consulted to help determine how existing trails can be accommodated for equestrian use.

APPENDIX 8. OPINION OF PROBABLE COSTS

8.1. Development of the Alignment and Cost Estimate

Step 1: Alignment Development in Google Earth

The process began with an export of the Preliminary Study Report alignment from GIS to Google Earth. Over the next 18 months and countless public and stakeholder meetings, the team tightened this line work and adjusted, added or removed route variations. Note that in National Environmental Policy Act (NEPA) terms, an alternative is “end-to-end” meaning from one end of the project the other. Therefore the term “alignment variation” is used throughout the Master Plan.

Step 2: Alignment Refinement in GIS

Once the alignment variations were selected, Google Earth files were transferred to GIS for further refinement. The core route from Palm Springs to Coachella was divided into 10 segments and then further divided into links by property boundary intersections, crossings, and connections to intersecting roadways.

Step 3: Data Tables Spreadsheet

The GIS data was then exported to a spreadsheet with the following attributes:

- Sheet-link number identifier
- Length in feet (Excel “CONVERT” function was used to obtain miles)
- Segment number (there are ten main segments)
- ROW needed (obtained through manual inspection of the ROW maps by our sub)
- ROW committed
- Indian Land encroachment or adjacency
- Channel lining (slope protection) present, not present, or unknown (sometimes the slope is concrete lined but sand obscures this)

Categorization of the links resulted in the identification of links or link alternatives. A given link may be present in multiple alignment variations.

Step 4: Guardrails and Screening Analysis

Back in Google Earth, the alignment was inspected again. For each link or link alternative that is proposed to traverse a golf course, it was assumed that 20% of the link length would need screening fencing to protect CV Link users from errant golf balls. For each link or link alternative that is proposed to be adjacent to private homes, it was assumed that the proportion of that link adjacent to homes would require privacy screening.

In AutoCAD, the 2' topographic contours were used to calculate height of the CV Link and adjacent slope gradients. AASHTO guardrail guidelines were reviewed and engineering judgment applied to establish a table specifying when guardrails are required. The resulting screening and guardrail requirements were entered in the main spreadsheet.

Step 5: Cost Basis

The engineering team calculated unit rates for each of 54 proposed sections, crossing types, or access point types in a two-step process.

1. Values derived from engineering experience, comparable projects, Caltrans guidelines, and the “Costs for Pedestrian and Bicyclist Infrastructure Improvements” synthesis (UNC Highway Safety Research Center, 2013) were entered in a vertical column in the “section costs” worksheet.
2. Section costs were then referenced in a horizontal array in a separate “sections” worksheet, permitting the use of the HLOOKUP formula in multiple columns in the main “segments” worksheet. Each section type was also assigned a customized contingency percentage from 10% to 25% depending on the level of confidence in the available data.

Step 6: Integration

In the segments worksheet, a section identifier was created to reference the section costs based on all previous steps (field studies, desktop reviews, AutoCAD analyses, etc.). Columns were developed for the following cost components:

- Path cost/LF - a lookup value referencing the sections worksheet
- Path cost total - calculated by multiplying the path cost by the linear feet
- Access point costs - a lookup value referencing a separate sheet on pathway support elements (landscaping, signage, shade structures, etc.)
- Grade separation costs - referencing undercrossing and overcrossing worksheets
- At-grade crossing costs - referencing costs for five types of at-grade crossings in the sections worksheet
- Screening / fencing costs
- Acquisition, contingency, art, and mobilization costs

Step 7: Summary

Pivot tables were then used to create the cost estimate. As numbers do not sort sequentially in a pivot table, letter identifiers (A to R) were assigned to alternative groups to enable sorting from east to west along the corridor. Alternatives and phasing identification columns enabled various cross tabulations to answer questions such as the length and value of various section types for the whole corridor, a breakdown of investment and mileage by city, the number and value of each crossing type, and lists of route variations.

8.2. Comparison to Previous Estimates

The anticipated CV Link budget has increased from the original PSR estimate. The project team performed extensive public outreach to gather input on the project and the budget increase directly responds to this feedback while also making significant enhancements to increase public safety. The budget increases were primarily in the following areas:

It was necessary to re-route around some of the major country club golf courses within the Whitewater River Channel in Rancho Mirage and Palm Desert. During public meetings it was clear that the residents of the gated golf course communities in Rancho Mirage and Palm Desert strongly preferred an alternative route that went around their developments. The Master Plan addresses these concerns by using existing on-street alignments for CV Link but this added length and street retrofits with increased cost.

Concrete instead of asphalt is proposed for paving CV Link. The cost of maintenance was consistently raised as a concern in all of our public outreach meetings. Concrete is more costly up front but cheaper to maintain over the long run. Colored stripes of recycled landscape glass will aid users in navigation as well as heighten awareness at high use areas.

Additional shade structures were added to the project. Community feedback indicated a need and desire to use CV Link year round. CV Link's regularly spaced shade structures include charging facilities and accommodate solar panels that will help offset lighting and other electricity costs. Other amenities will include drinking fountains and solar powered trash compactors to minimize litter and lower trash collection costs.

Width of the CV Link was increased. A consistent concern raised during public meetings was that there is sufficient room to safely accommodate all uses including pedestrian, bicycle and low speed electric vehicles. All parts of the CV Link have been slightly widened to alleviate those concerns.

The number of bridges has been increased to improve public safety. Getting users safely across major roads and stormwater channels is imperative in a project that is almost 50 miles in length. An additional bridge was added at Cook Street when it was determined there was not a safe way to have users cross without it. The community voiced concerns about older and physically impaired users being able to utilize CV Link. Five channel bridges were added to the original plan to eliminate some of the large inclines and declines resulting in a smoother and more even pathway making the project more accessible to a larger number of users. These bridges also reduce flooding incidents and thus long-term maintenance costs.

Lighting was added to CV Link. In all of the community meetings the public told us that they wanted to have access to the project at night particularly in the warmer months. Members of many communities also told us that they did not want lights shining into their windows. The proposed low maintenance and energy efficient lighting will provide for personal security and navigation while minimizing light spillover into homes and the night sky.

8.3. Cost Estimate Tables

The tables presented on the following pages summarize the preliminary (10%) level opinion of probable construction costs. As more data is collected (e.g. survey) and the design development advances through 30%, 60%, and 90% stages, the contingency percentage will decline and the estimates will be further refined. A Construction Manager process is planned to aid the engineering team with local constructability reviews and estimation.

Note: The design and engineering consultant team has no control over the cost of labor, materials, equipment, or over the contractor's methods of determining prices or over competitive bidding or market conditions. Opinions of probable costs provided herein are based on the information known to the team at this time and represent only the team's judgment as professionals familiar with the construction industry. There is no guarantee that proposals, bids, or actual construction costs will not vary from its opinions of probable costs.

DEFINITIONS	
Alt 1	Design team recommended alternative where there is more than one route option or design variation
Alt Group	A collection of route options or design variations at a given location. A letter identifier is used for sorting purposes, and is sequential from west to east
AP	Access Points include support elements e.g. identity signs, water fountains, shade structures, landscaping, and parking (if co-located with an existing park)
AP-xx	Where xx is either Regional (R) serving arterial roads or major city parks, Local (L) serving collector or local roads, Neighborhood (N) which may be a gated access, or Commercial (C) serving retail and/or service destinations
AP-xx-Basic	An AP where there are existing facilities; basic features only
AP-xx-RR	Restroom
CEQA/NEPA	California Environmental Quality Act / National Environmental Policy Act
Connector (Community)	A city-led spur to the mainline CV Link pathway
Connection (Roadway)	A path link between CV Link and any intersecting roadway
Cross Section Code	A design code that refers to the cross sections in the Master Plan Volume III - Preliminary Plans. Grouped: A is on-street, B, C, D is off-street, AP is Access Point, X-1: at-grade crossing, X-2: overcrossing (OC), X-3: undercrossing (UC)
Extension	A CVAG-led future extension of the mainline CV Link
Link	A portion of CV Link; represented by the double dots along the alignment shown in Volume III Preliminary Plans
Phase 1	The recommended Initial implementation package of core route, alternatives, and support elements. Depends upon environmental approvals, community input, and available funding. Likely to be subdivided, e.g. 1A, 1B, 1C. Please refer to Volume I for more about phasing.
ROW	Right of way, acquisition
Section Type	See "Cross Section Code"
Segment	CV Link has been divided into 10 segments, please refer to Volume I Section 6 Route.
Support Elements	CV Link pathway amenities (in pavement LED lighting, colored patterned concrete) or general amenities (shade structures, restrooms, drinking fountains, signs, etc)
Tab	Individual sheets of the supporting workbook with full details: Access Points, Amenities, Overcrossings, Undercrossings, Footprint+ROW, Standard Marginal rates, Section Costs, Sections, Segments (the individual links defined in Volume III), and Output (this document).

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Available by request: additional tables for footprint area and other cross-tabulations

TABLE 1. SUMMARY, DEFINITIONS AND ASSUMPTIONS

In most summary tables, values have been rounded to the nearest \$100

SUMMARY:	RATE	AMOUNT
Construction Cost (2014 dollars)		\$78,008,800
Mobilization is 7.5% of construction cost	7.50%	\$5,977,600
Art budget is 1% of construction cost	1.00%	\$780,100
Right of Way (ROW) acquisition for channel links	\$0.25/sf	\$963,100
Contingency (*varies by component/cross section)	10-25%*	\$14,267,700
	Capital cost total	\$99,997,300

The following items are EXCLUDED:

1. Preparation of Environmental Documents, Design Fees/PS&E (Plans, Specifications and Estimates)
2. Bid Preparation, Construction Administration, Management Reserve and Public Outreach

Pedestrians will:

- Have a decomposed granite (DG) or asphalt shoulder or sidewalk, subject to space availability and anticipated usage
- Share the path at right of way constraints for short distances, channel bottom paths, and connections to roadways
- Have a curb separated concrete path on bridges and some undercrossings
- Have the use of a 5' wide DG or asphalt shoulder adjacent to an off-center path on 20' wide levees

Initial Implementation Route and Design Assumptions (see also TABLE 4)

- Additional river channel slope protection and floodwall enhancements may be incorporated pending further coordination with the Coachella Valley Water District and Riverside County Flood Control District.
- Mesquite Ave will be restriped as Class II buffered bike/NEV lanes and signage only (no curb works)
- Demuth Park to Gene Autry to be 14'+6'; minor earthworks
- Gene Autry UC remains as existing, except lessening of the ramp grade east of Gene Autry
- Gene Autry to Crossley Rd alongside Knott's Water Park: signage and resurfacing/overlay

Crossley/Golf Club/34th Ave intersection upgraded with traffic signal

34th Ave will be a Class III route with signs only (short low volume on-street link)

Frank Sinatra Dr to be resurfaced existing channel crossing to Da Vall signals & Wolfson Park

Joe Butler Trail to remain current width; path resurfacing only

Hwy 111 frontage in Rancho Mirage - widen existing path, improve curb ramps and safety treatments

Paxton to Bob Hope - path benched below library; charging ports built into shade structures; no unshielded lights

Magnesia Falls Dr in Palm Desert - no change to existing layout (signs only)

Cook St will be a path overcrossing; at Fred Waring CV Link will cross to left bank using a new path on existing road

Fred Waring to Miles (IW Club) will be left bank lower slope full bench with gentle gradient below (D5 or D6)

Portions of Miles to Washington may require widening of the top of slope; similar cost to use Miles Avenue

At Washington, cross to right bank using a channel bottom path

Mid slope benched paths will have a separate pedestrian path (not a shoulder) if there is another bench

Steep 1:1 slope below bench will be retained by up to 15' of slope paving

Several undercrossings to be designed and built by others are included in cost estimate

TABLE 2. CONSTRUCTION BREAKDOWN BY LOCATION - CV LINK Pathway, Landscaping and Support Elements
(based on core alignment; does not factor in 'no build' options)

City	Miles	Total Cost	Cost/mi
Cathedral City	4.0	\$ 7,728,400	\$1,937,200
Coachella	5.2	\$ 10,276,900	\$1,958,600
Indian Wells	3.8	\$ 10,139,800	\$2,668,300
Indio	5.7	\$ 13,198,000	\$2,326,000
La Quinta	2.4	\$ 5,219,600	\$2,215,700
Palm Desert*	4.0	\$ 15,634,300	\$3,941,000
Palm Springs	15.0	\$ 23,949,900	\$1,598,500
Rancho Mirage	5.1	\$ 10,757,400	\$2,095,400
Unincorporated	2.2	\$ 3,093,000	\$1,394,300
Grand Total	47.4	\$ 99,997,300	\$2,111,000

* higher cost than the previous estimate, due to inclusion of a signature bridge at Cook Street in Phase 1

TABLE 3A. SUPPORT ELEMENTS**Path support elements are section type dependent:**

Crushed glass seeded aggregate for colored pavement used in defined design section types, up to 40 miles at \$15/LF

Lighted LED Mark center and edgelines (3 lines) up to 40 miles at \$15/LF, based on itemization in Amenities tab

Stainless steel architectural guardrail as required by path height and/or slope conditions up to 12 miles at \$150/LF

Non-Path Support Elements are included in the SEGMENTS tab as a line item, and itemized in the Amenities tab:

CV Link Support Elements	Qty	Cost/unit	Total
Shade structures - approximately 1 per mile	44	\$18,000	\$792,000
Solar panels on shade structures - \$30/sf	18	\$9,000	\$162,000
Light tubes - groups of 10 for crossings and gateways	20	\$90,000	\$1,800,000
Bollard lighting - at access points, roadway connections	200	\$1,800	\$360,000
Trash compactor and recycling receptacle	30	\$5,800	\$174,000
Drinking fountain - approximately 1 per mile	44	\$5,000	\$220,000
Benches - 1.5 per mile	75	\$2,000	\$150,000
Interpretive sign	8	\$8,500	\$68,000
Bike counters - portable loggers and fixed sensors	2	\$5,000	\$10,000
Directional signs	20	\$6,500	\$130,000
Mile pavement markings - thermoplastic, unidirectional	50	\$175	\$8,750
Wayfinding medallion - every 500' on-street	140	\$125	\$17,500
Regulatory signs and pathway rules / behavior signs	60	\$300	\$18,000
Rest areas - up to 8; locations TBD; with seat walls	8	\$34,600	\$276,800
SUBTOTAL			\$4,187,050
SOFT COSTS			\$355,899
CONTINGENCY			\$681,442
TOTAL (before rounding)			\$5,224,392
TOTAL (rounded)			\$5,224,400

FUTURE PHASE SUPPORT ELEMENT OPTIONS (not included):

Security cameras - shade structures will be designed to accept cameras if required

Call boxes - may be provided where cell phone reception is poor or unavailable

Bike counters - totems may be provided and feature permanent, low maintenance multi-info displays

TABLE 3B. LANDSCAPING SUMMARY**Landscaping itemization is in the Amenities tab and included via a line item in the SEGMENTS tab**

IMPORTANT NOTE: in the detailed itemization (see the Amenities tab, row 117 and down), landscaping costs were based on the Volume III preliminary "typical mile" plans specific to the west valley, central valley, east valley, and typical on-street conditions. However, Table 2 presents the capital investment by city. At this preliminary estimation stage, the total landscaping budget was simply divided by the number of miles of CV Link regardless of typical condition, and this uniform value was apportioned to each city.

This landscaping budget was originally prepared in 2013 to inform the 10% cost estimate in the Master Plan. The values given herein are currently being revised with desert xeriscaping in response to the drought. It is anticipated that a 30% level cost estimate will be ready in spring 2016.

Typical Condition	Per Mile Cost	Miles (up to)	Cost
West Valley (14,850 sq.ft./mi)	\$ 138,468	16	\$ 2,215,488
Central Valley (12,720 sq.ft./mi)	\$ 121,987	13	\$1,585,831
East Valley (9,750 sq.ft./mi)	\$ 114,226	13	\$ 1,484,938
On-street (7,830 sq.ft./mi)	\$ 106,208	8	\$ 849,664
TOTAL			\$ 6,135,921

The lower per mile cost for the Central and East valleys (compared to the west) is a reflection of the more uniform and straightforward conditions along CV Link when moving east, where the pathway is more often running alongside a levee and there are fewer opportunities to install landscaping that meets flood district requirements.

TABLE 4. RECOMMENDED ALTERNATIVES AND DESIGN VARIATIONS INCLUDED IN PHASE 1

Alternatives are grouped by location (west to east) and each group is assigned a letter for sorting. Within each group, alternatives are numbered; Alt 1 is the design team recommendation.

	Miles	Cost
A Palm Springs Gateway		
1. San Rafael signals, 111 north	0.9	\$ 1,152,100
B Four Seasons		
1. CHANNEL side	0.9	\$ 909,200
C Gene Autry Whitewater		
1. Via Escuela signals	0.2	\$ 168,200
D Vista Chino		
1. Vista Chino signals	0.4	\$ 643,500
E Sunrise Way Crossing		
1. Sunrise Way at-grade	0.2	\$ 196,000
F Gene Autry UC ramp		
1. Reconfigure ramp to lessen grade	0.1	\$ 106,900
G Tahquitz GC lake		
1. Existing lake bridge	0.2	\$ -
H 34th Ave		
1. Signage only	0.5	\$ 1,600
I Cathedral City		
1. Jenkins / Cathedral Cyn Channel	1.9	\$ 1,855,800
J Frank Sinatra		
1. Cross to L.Bank Abrams Trail	0.7	\$ 833,600
K Rancho Mirage Library		
1. Adjacent to Library along WWRC	0.4	\$ 1,528,100
L RM Paxton to Avenida Las Palmas		
1. Right bank and Bob Hope Dr	0.8	\$ 1,083,200
M RM Bob Hope to Parkview		
1. 111 north side	0.4	\$ 502,200
N Monterey Parkview		
1. Upgrade existing signals	0.0	\$ 185,200
O Magnesia Falls or San Pasqual		
1. Magnesia Falls alignment	0.7	\$ 599,500
P Indian Wells		
1. Left bank	2.0	\$ 5,098,900
Q Miles to Washington		
1. Left bank	1.4	\$ 3,352,600
R Washington crossing		
1. At-grade path on channel bottom	0.1	\$ 72,500

TABLE 5. COST SUMMARY

CV Link Component	Miles	Cost*	Section Type
Undercrossings and ramps	1.7	\$ 5,914,800	X-3
Bridge crossings of channels and roadways	0.2	\$ 8,463,300	X-2
Crossings of roadways at-grade	0.6	\$ 1,372,200	X-1
Existing routes with minor changes	2.5	\$ 6,500	Existing
Street segments to be upgraded	7.7	\$ 5,758,700	A
Off Street Pathway	34.8	\$ 43,479,300	B, C, D
Support Elements		\$ 4,187,100	
Landscaping		\$ 6,135,900	
Access Points		\$ 2,690,800	
Subtotal		\$ 78,008,800	
Mobilization		\$ 5,977,600	
Right of Way Acquisition		\$ 963,100	
Art		\$ 780,100	
Contingency (10-25%, varies by element)		\$ 14,267,700	
Total		\$ 99,997,300	

*Rounded to nearest \$100

TABLE 6. SECTION TYPES DETAIL (INCLUSIVE OF SOFT COSTS)

Section Type (Design Code)	Count	Miles	Cost
A-1	7	0.9	\$ 1,259,100
A-10	2	0.1	\$ 396,100
A-2	8	1.3	\$ 1,757,600
A-3	11	1.5	\$ 1,411,000
A-4	10	1.4	\$ 1,827,700
A-6	1	0.4	\$ 514,000
A-7B	9	1.3	\$ 330,400
A-9	2	0.7	\$ -
Amenities excluding art	1		\$ 5,224,400
AP-C	3		\$ 174,900
AP-L	2		\$ 493,800
AP-L Basic	5		\$ 436,500
AP-L RR	1		\$ 371,700
AP-N	8		\$ 453,600
AP-R	1		\$ 246,900
AP-R Basic	5	0.0	\$ 436,500
AP-R RR	2		\$ 743,400
B-1	13	1.3	\$ 1,729,500

B-2	4	1.1	\$	1,404,000
B-3	10	1.4	\$	1,356,500
B-4	64	6.0	\$	5,533,100
C-1	33	7.9	\$	15,861,100
C-5	40	9.2	\$	10,957,700
D-1	16	2.9	\$	3,754,300
D-12	2	0.2	\$	304,600
D-14	4	0.6	\$	1,431,300
D-2	14	2.1	\$	4,237,200
D-3	2	0.2	\$	227,200
D-4	8	1.1	\$	7,003,300
D-5	3	0.5	\$	881,300
D-6	2	0.4	\$	919,800
Existing Class I	5	0.4	\$	-
Existing Class II	12	1.1	\$	3,700
Existing Class III	2	0.9	\$	3,200
Landscaping	1		\$	7,656,100
Ramp	21	1.3	\$	-
X-1	9	0.1	\$	40,500
X-1 ES	3	0.1	\$	18,300
X-1 NS	7	0.1	\$	1,296,400
X-1 P	6	0.1	\$	58,200
X-1 PHB	3	0.1	\$	225,000
X-2	5	0.2	\$	11,637,000
X-3	16	0.4	\$	7,380,400
Grand Total	383	47.4	\$	99,997,300

TABLE 7. CROSSINGS IN PROPOSED PHASE 1

Crossing Type and Location	Count	Cost	DEFINITION
X-1	9	\$ 40,500	Upgrade curb ramps/crossing at existing stop/yield intersection
El Cielo Rd	1	\$ 4,500	
Farrell Dr	1	\$ 4,500	
Golf Club Dr	1	\$ 4,500	
Paxton crossing	1	\$ 4,500	
Sunrise Way at-grade option	1	\$ 4,500	
San Pablo (at Alumni Dr)	1	\$ 4,500	
San Pablo (at Magnesia Falls)	1	\$ 4,500	
Magnesia Falls	1	\$ 4,500	
Belardo Rd/Sunny Dunes road crosswalk	1.00	\$ 4,500	

X-1 ES	3	\$ 18,300	Upgrade curb ramps/crossing at existing signal
Bob Hope Drive at-grade crossing	1	\$ 6,100	
Tramway signals	1	\$ 6,100	
Cathedral Canyon Drive at Civic Center	1	\$ 6,100	
X-1 NS	7	\$ 1,296,400	New signal
Country Club / 111 intersection	1	\$ 185,200	
Crossley Rd at 34th	1	\$ 185,200	
Indian Canyon Dr	1	\$ 185,200	
Magnesia Falls / Portola signals	1	\$ 185,200	
Parkview / Monterey major signal upgrade	1	\$ 185,200	
Date Palm Drive	1	\$ 185,200	
Dune Palms Rd / Corporate Center Dr	1	\$ 185,200	
X-1 P	6	\$ 58,200	Add signal phase
Existing Da Vall signals	1	\$ 9,700	
Fred Waring / El Dorado signals	1	\$ 9,700	
Gene Autry Trail at E Via Escuela. Short term core route. Indian land to the west of street R/W.	1	\$ 9,700	
Thunderbird Rd signals upgrade	1	\$ 9,700	
Vista Chino/Clubhouse View signals upgrade	1	\$ 9,700	
Magnesia Falls Dr	1	\$ 9,700	
X-1 PHB	3	\$ 225,000	At grade beacon
Ave 44 at-grade - existing roadway	1	\$ 75,000	
Ave 50 at grade crossing short term	1	\$ 75,000	
Dillon Rd short term w/ connection	1	\$ 75,000	
X-2	5	\$ 11,637,000	Bridges
Cathedral Canyon Channel East bridge	1	\$ 1,132,500	
Cook St OC	1	\$ 8,306,100	
La Quinta Channel bridge at promontory	1	\$ 1,245,900	
Magnesia Falls Channel bridge (north)	1	\$ 536,100	
Thunderbird Channel - replace existing	1	\$ 416,400	
X-3	16	\$ 7,380,400	
Adams St UC right bank - completed	1	\$ -	Undercrossings
Dinah Shore UC	1	\$ 410,900	
Fred Waring Dr E UC	1	\$ 420,400	
Golf Center UC - retrofit existing	1	\$ 780,700	
Indio Blvd / RR / near I-10 UC	1	\$ 854,500	
Jackson UC	1	\$ 648,800	
Jefferson UC Right bank	1	\$ 420,400	
Miles Ave UC left bank	1	\$ 741,800	

Miles East UC	1	\$ 395,300	
Monroe UC	1	\$ 700,600	
Washington St UC right bank	2	\$ 400,400	
Ramon Rd UC - future bridge widening by others	2	\$ 273,000	
Ave 52 UC future new bridge	1	\$ 666,800	
Ave 56 / Airport Blvd UC future new bridge	1	\$ 666,800	
Grand Total	49	\$ 20,655,800	

TABLE 8. TYPICAL CONDITIONS IN MILES	
Alt Category	(Multiple Items)
Sum of Length mi	
Condition	Total
Route on Low Volume Road	1.6
Path connection channel to roadway	1.9
Path along roadway	5.7
Path along golf course	1.8
Path along channel (upgrade existing)	3.7
Path along channel (new)	26.5
Path (other locations)	2.1
LSEV/Bike Lane	3.5
Crosswalk/ride	0.6
Grand Total	47.4

END NEAR-TERM RECOMMENDED PROJECT TABLES, BEGIN ALL ALTERNATIVES

TABLE 9. CROSSINGS - ALL - BY PHASE AND ALTERNATIVE DESIGNATION	
Phase 1	
X-1	
El Cielo Rd	\$ 4,500
Farrell Dr	\$ 4,500
Golf Club Dr	\$ 4,500
Paxton crossing	\$ 4,500
Sunrise Way at-grade option	\$ 4,500
San Pablo (at Alumni Dr)	\$ 4,500
San Pablo (at Magnesia Falls)	\$ 4,500
Magnesia Falls	\$ 4,500
Belardo Rd/Sunny Dunes road crosswalk	\$ 4,500
X-1 ES	
Bob Hope Drive at-grade crossing	\$ 6,100

Tramway signals	\$ 6,100
Cathedral Canyon Drive at Civic Center	\$ 6,100
X-1 NS	
Country Club / 111 intersection	\$ 185,200
Crossley Rd at 34th	\$ 185,200
Indian Canyon Dr	\$ 185,200
Magnesia Falls / Portola signals	\$ 185,200
Parkview / Monterey major signal upgrade	\$ 185,200
Date Palm Drive	\$ 185,200
Dune Palms Rd / Corporate Center Dr	\$ 185,200
X-1 P	
Existing Da Vall signals	\$ 9,700
Fred Waring / El Dorado signals	\$ 9,700
Gene Autry Trail at E Via Escuela. Short term core route. Indian land to the west of street R/W.	\$ 9,700
Thunderbird Rd signals upgrade	\$ 9,700
Vista Chino/Clubhouse View signals upgrade	\$ 9,700
Magnesia Falls Dr	\$ 9,700
X-1 PHB	
Ave 44 at-grade - existing roadway	\$ 75,000
Ave 50 at grade crossing short term	\$ 75,000
Dillon Rd short term w/ connection	\$ 75,000
X-2	
Cathedral Canyon Channel East bridge	\$ 1,132,500
Cook St OC	\$ 8,306,100
La Quinta Channel bridge at promontory	\$ 1,245,900
Magnesia Falls Channel bridge (north)	\$ 536,100
Thunderbird Channel - replace existing	\$ 416,400
OC or UC of future Fred Waring bridge, incl. 42-1a	\$ 3,028,200
X-3	
Adams St UC right bank - completed	\$ -
Dinah Shore UC	\$ 410,900
Fred Waring Dr E UC	\$ 420,400
Golf Center UC - retrofit existing	\$ 780,700
Indio Blvd / RR / near I-10 UC	\$ 854,500
Jackson UC	\$ 648,800
Jefferson UC Right bank	\$ 420,400
Miles Ave UC left bank	\$ 741,800
Miles East UC	\$ 395,300
Monroe UC	\$ 700,600
Washington St UC right bank	\$ 1,201,200
Ramon Rd UC - future bridge widening by others	\$ 273,000

Ave 52 UC future new bridge	\$ 666,800
Ave 56 / Airport Blvd UC future new bridge	\$ 666,800
Phase 2	
X-2	
Deep Canyon Channel bridge	\$ 2,265,000
Frank Sinatra OC connection to roadway bridge	\$ 412,500
Frank Sinatra OC of future bridge - skewed	\$13,073,200
New boardwalk over lake	\$ 1,509,300
Parkview / Monterey signature overcrossing	\$ 8,984,000
Point Happy	\$ 9,357,000
X-3	
Sunrise Way UC option	\$ 124,800
Vista Chino UC - future new bridge	\$ 604,000
Ave 44 UC future new bridge	\$ 501,700
Phase 3	
X-2	
Gene Autry Trail OC long term	\$ 1,906,700
Tennis Garden cross channel	\$ 2,561,600
X-3	
Dune Palms UC right bank - future new bridge	\$ 245,600
Dillon Rd UC future new bridge	\$ 612,700
Ave 50 UC future new bridge	\$ 570,500
No phase assigned	
X-1 PHB	
Cathedral Canyon Drive beacon	\$ 300,000
Alt 2	
X-1	
San Jacinto / RLP Dr crossing	\$ 4,500
X-1 P	
111/Mag.Falls signals (two legs)	\$ 9,700
Fred Waring / El Dorado signals	\$ 9,700
Gateway signals	\$ 9,700
X-2	
Cathedral Canyon Channel West bridge	\$ 1,698,800
Magnesia Falls Channel bridge (south)	\$ 444,000
X-3	
Date Palm UC	\$ 658,500
Miles Ave UC right bank	\$ 370,900
Parkview Channel / 111 UC (cost not yet available)	\$ -
Portola Ave UC	\$ 810,700
Alt 3	

X-1	
111/Desert Drive side road crossing	\$ 4,500
San Jacinto / RLP Dr crossing	\$ 4,500
IW driveway	\$ 4,500
X-1 P	
111/Mag.Falls signals (two legs)	\$ 9,700
Fred Waring / El Dorado signals	\$ 9,700
X-2	
Cathedral Canyon Channel West bridge	\$ 1,698,800
Hwy 111 overcrossing - signature	10,872,000
Washington St cross channel	\$ 3,025,300
X-3	
Date Palm UC	\$ -
Miles Ave UC right bank	\$ 370,900
Parkview Channel / 111 UC (cost not yet available)	\$ -
Sunrise Way UC option	\$ 124,800
Alt 4	
X-1 ES	
Sunrise Wy (N) / San Rafael / Golden Sands	\$ 6,100
X-1 P	
111 south side	\$ 9,700
X-1 PHB	
Cathedral Canyon Drive beacon	\$ 150,000
X-2	
Cathedral Canyon Channel West bridge	\$ 1,698,800
X-3	
Date Palm UC	\$ 658,500
Grand Total	\$90, 77,700

TABLE 10. ALL ALTERNATIVES

Alternatives are grouped by location (west to east) and each group is assigned a letter for sorting. Within each group, alternatives are numbered; Alt 1 is the design team recommendation.

Route	Miles	Cost
A Palm Springs Gateway		
1. San Rafael signals, 111 north	0.9	\$ 1,152,100
2. 111 south, Gateway signals, 111 north	0.9	\$ 1,169,000
3. 111 south, overcrossing	0.9	\$ 11,951,000
B Four Seasons		
1. CHANNEL side	0.9	\$ 909,200
2. GULLY residential side	0.9	\$ 907,300
3. LEVEE top	0.9	\$ 1,453,500

4. Sunrise Way / Golden Sands route	1.3	\$ 959,700
C Gene Autry Whitewater		
1. Via Escuela signals	0.2	\$ 168,200
2. Gene Autry Overcrossing	0.1	\$ 2,103,900
3. not an alt; design variation	0.1	\$ 78,000
Path to Roadway Connections	2.6	\$ 2,875,200
Core route not including alternatives	33.0	\$ 75,407,200
D Vista Chino		
1. Vista Chino signals	0.4	\$ 643,500
2. Vista Chino UC	0.4	\$ 1,265,000
E Sunrise Way Crossing		
1. Sunrise Way at-grade	0.2	\$ 196,000
2. Sunrise Way UC and channel	0.2	\$ 232,600
3. Sunrise Way UC and road frontage	0.2	\$ 299,100
F Gene Autry UC ramp		
1. Reconfigure ramp to lessen grade	0.1	\$ 106,900
2. Existing steep ramp	0.0	\$ -
G Tahquitz GC lake		
1. Existing lake bridge	0.2	\$ -
2. CVLink lake bridge	0.1	\$ 1,509,300
H 34th Ave		
1. Signage only	0.5	\$ 1,600
2. Two-way path wider 34th	0.5	\$ 473,600
I Cathedral City		
1. Jenkins / Cathedral Cyn Channel	1.9	\$ 1,855,800
2. Left bank	2.0	\$ 4,814,100
3. Right bank	1.9	\$ 4,071,200
4. Jenkins Trail	2.3	\$ 4,693,800
J Frank Sinatra		
1. Cross to L.Bank Abrams Trail	0.7	\$ 833,600
2. Frank Sinatra OC and R.Bank	0.8	\$ 14,174,000
K Rancho Mirage Library		
1. Adjacent to Library along WWRC	0.4	\$ 1,528,100
2. Hwy 111 south / Mag Falls Channel	0.5	\$ 2,164,100
L RM Paxton to Avenida Las Palmas		
1. Right bank and Bob Hope Dr	0.8	\$ 1,083,200
2. San Jacinto and through The River	0.7	\$ 617,300
3. San Jacinto and around The River	0.8	\$ 962,300
M RM Bob Hope to Parkview		
1. 111 north side	0.4	\$ 502,200
2. 111 south side bike boulevard route	0.6	\$ 613,500
3. 111 south side vacant land route	0.6	\$ 653,300

4. not an alt: Hwy 111 south variation	0.3	\$ 338,600
N Monterey Parkview		
1. Upgrade existing signals	0.0	\$ 185,200
2. Signature overcrossing bridge	0.0	\$ 8,984,000
O Magnesia Falls or San Pasqual		
1. Magnesia Falls alignment	0.7	\$ 599,500
2. Channel alignment	1.0	\$ 3,762,300
P Indian Wells		
1. Left bank	2.0	\$ 5,098,900
2. Left to right bank	2.4	\$ 5,924,400
3. El Dorado and 111	2.5	\$ 3,415,800
4. Potential future Fred Waring grade separation	0.5	\$ 3,762,900
Q Miles to Washington		
1. Left bank	1.4	\$ 3,352,600
2. Miles Avenue	1.5	\$ 3,364,700
3. Right bank	1.4	\$ 14,422,500
R Washington crossing		
1. At-grade path on channel bottom	0.1	\$ 72,500
2. Reallocate space on existing bridge deck	0.1	\$ 103,000
3. Widen existing bridge	0.1	\$ 3,025,300
Grand Total	73.7	\$198,840,600

TABLE 11. ACCESS POINTS BY TYPE AND PHASE

Type	Future AP	Phase 1 AP	Grand Total
AP-C			
Corporate Center Dr		\$ 58,300	\$58,300
Frank Sinatra Office Center	\$ 58,300		\$58,300
Jefferson Retail Center		\$ 58,300	\$58,300
La Quinta Retail Center		\$ 58,300	\$58,300
Rancho Las Palmas Shopping Center	\$ 58,300		\$58,300
Wild Bird Center	\$ 58,300		\$58,300
AP-L			
Ave 52		\$ 246,900	\$246,900
Desert Highland	\$ 246,900		\$246,900
Sunrise Way (north)	\$ 246,900		\$246,900
Whitewater Park Drive	\$ 246,900		\$246,900
Ave 54		\$ 246,900	\$246,900
AP-L Basic			
Belardo Road		\$ 87,300	\$87,300
Buddy Rogers Ave		\$ 87,300	\$87,300
Shields Park		\$ 87,300	\$87,300
Sierra Vista Park at Tyler St		\$ 87,300	\$87,300
Wolfson Park / De Vall / Frank Sinatra		\$ 87,300	\$87,300

AP-L RR		
34th Avenue	\$ 371,700	\$371,700
Barbara Dr / 111 in vacant parcel	\$ 601,700	\$601,700
Indian Wells Tennis Garden	\$ 371,700	\$371,700
AP-N		
Columbine Dr and/or Deep Canyon	\$ 56,700	\$56,700
Dream Homes at Chia Place	\$ 56,700	\$56,700
Escena	\$ 56,700	\$56,700
Golden State St	\$ 56,700	\$56,700
Kelsey Circle	\$ 56,700	\$56,700
Lafayette Court	\$ 56,700	\$56,700
Park Pl	\$ 56,700	\$56,700
Rancho Mirage Racquet Club	\$ 56,700	\$56,700
Sunbeam Way	\$ 56,700	\$56,700
Wakefield Circle	\$ 56,700	\$56,700
AP-R		
111 / Indian Wells City Hall	\$ 246,900	\$246,900
Cathedral Canyon Dr	\$ 246,900	\$246,900
Palm Desert Civic Center	\$ 246,900	\$246,900
Portola	\$ 246,900	\$246,900
Ramon Road	\$ 246,900	\$246,900
AP-R Basic		
111 / Rancho Mirage Library	\$ 87,300	\$87,300
111/ Visitor Center	\$ 87,300	\$87,300
Demuth	\$ 87,300	\$87,300
Jackson Park	\$ 87,300	\$87,300
Whitewater Annex	\$ 87,300	\$87,300
AP-R RR		
111 / Country Club Drive	\$ 371,700	\$371,700
Airport Blvd	\$ 371,700	\$371,700
Amistad, Golf Center Parkway	\$ 371,700	\$371,700
Date Palm Dr: Cathedral City Promontory 1	\$ 371,700	\$371,700
Gene Autry	\$ 371,700	\$371,700
Indio Blvd	\$ 371,700	\$371,700
Miles Ave (west)	\$ 371,700	\$371,700
Vista Grande: La Quinta Promontory 2	\$ 371,700	\$371,700
Fred Waring / El Dorado Dr Access Point	\$ 371,700	\$371,700
Grand Total	\$ 5,591,900	\$ 3,357,300
		\$8,949,200

TABLE 12. ACCESS POINTS - COUNT

TYPE	Phase 1	Phase 2	Phase 3
------	---------	---------	---------

AP-L		5	
AP-L Basic	4	1	
AP-L RR	1	2	
AP-N	8	2	
AP-R	1	3	1
AP-R Basic	5		
AP-R RR	2	7	
Grand Total	21	20	1

TABLE 13. SEGMENT LENGTH IN MILES

Segment	Total
1	5.9
2	4.4
3	4.2
4	4.2
5	3.6
6	3.6
7	3.8
8	4.5
9	3.6
10	3.5
2a	5.9
Grand Total	47.4

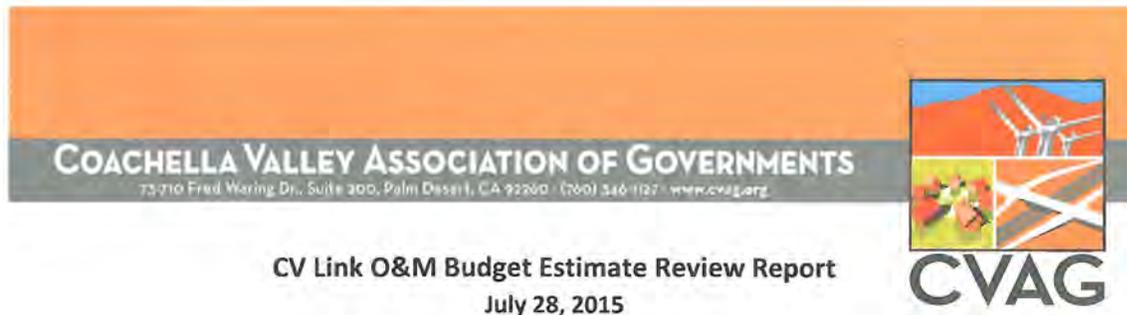
APPENDIX 9. UTILITY COSTS

The operational costs due to power consumption have been estimated and are summarized in the following table. Energy costs are expected to be minimal, as CV Link will include solar power generation on the shade structure roofs.

TABLE 5: CV LINK POWER CONSUMPTION

Description	Quantity		Electrical Power		
	Number	Unit	kW Load	Total kW Load	Total kWh
Shade structure lighting	42	ea.	0.15	6.30	18,396
Shade structure power	42	ea.	0.18	7.56	22,075
8 kW solar system / shade structures	42	ea.			
Device charging receptacles	42	ea.	0.18	7.56	22,075
Wifi equipment / shade structures	42	ea.	0.05	2.10	6,132
Security camera / shade structures	42	ea.	0.05	2.10	6,132
240V cart charging station / shade structures	42	ea.	1.00	42.00	122,640
Big belly trash system	200	ea.	0.50	100.00	292,000
Bollard lighting	200	ea.	0.04	7.00	20,440
Light tubes	200	ea.	0.50	100.00	292,000
In-ground traffic counters	42	ea.	0.10	4.20	12,264
Traffic volume display poles	2	ea.	0.20	0.40	1,168
Restroom building lighting & dryers	4	ea.	0.36	1.44	4,205
Electrical meter pedestals	42	ea.			
Lighting control system	42	ea.			
Sub-total			3.31	280.66	819,527
			kW Load	Total kW Load	Total kWh
					819,527
2 kW solar system energy production	42	ea.	8	336	735,840
Project sub-total					83,687
			Cost of power		\$0.15
			Total annual energy cost		\$12,553.08
			Total monthly energy cost		\$298.88

APPENDIX 10. OPERATIONS AND MAINTENANCE COST ESTIMATE DEVELOPMENT



CV Link O&M Budget Estimate Review Report July 28, 2015

Introduction

On June 1, 2015, the CVAG Executive Committee directed staff to “distribute the information on the CV Link operations and maintenance (O&M) budget currently prepared to every individual city so that they can have their finance directors, law enforcement and public works staff review the information and come back with any estimates at a joint meeting of all of those working people to come up with what could be a high and a low budget for all of CV Link; and then bring that information forward to a meeting of all that want to participate.” On June 17, CVAG staff sent a packet of information to the city managers of the nine Coachella Valley municipalities and to representatives of the Agua Caliente Band of Cahuilla Indians and the Riverside County Parks Department. The O&M packet included the latest CVAG Active Transportation Plan existing facilities maps for each city, the Draft CV Link Master Plan Operations and Maintenance Costs Section, CV Link O&M cost estimate development supporting data, and the revised O&M budget estimate that incorporated Transportation Committee recommendations. Responses were received from four cities and the county and additional information was obtained from a fifth city through public records.

The Executive Committee has encouraged finance directors, law enforcement and public work staff to review this information during a CV Link O&M budget workshop. That meeting will be held at 1 p.m. on Friday, Aug. 21 at Palm Desert Community Center, 43-900 San Pablo Avenue.

Assessment of CV Link O&M Estimate Methodology

Table A below compiles the responses to the distribution of the CV Link O&M estimate methodology and projected costs. The general consensus was that the methodology used by CVAG and the consulting team is reasonable and the budget numbers are sound. Two aspects of the O&M budget were questioned: 1) Estimate for restroom maintenance may be low (Cathedral City and Rancho Mirage); and 2) Using volunteers for routine maintenance is challenging and may divert volunteer resources from the cities (Indio), though La Quinta concurred that “ranger duties” could be managed by volunteers.

CITY OF BLYTHE · CITY OF CATHEDRAL CITY · CITY OF COACHELLA · CITY OF DESERT HOT SPRINGS · CITY OF INDIAN WELLS
CITY OF INDO · CITY OF LA QUINTA · CITY OF PALM DESERT · CITY OF PALM SPRINGS · CITY OF RANCHO MIRAGE · COUNTY OF RIVERSIDE
AGUA CALIENTE BAND OF CAHUILLA INDIANS · CABAZON BAND OF MISSION INDIANS

Summary of Local O&M Cost Examples

Cathedral City has no dedicated budgets for trail or bike lane maintenance. Bike lanes are swept and restriped as part of the street maintenance program. Police respond to calls on any of the paths or lanes just as they respond to calls anywhere else in the city, there is no separate cost.

Riverside County has a trails budget of roughly \$73,000 for FY 15/16 that covers the SART, trails within regional parks, and some open-space trails.

Indio estimates annual O&M costs of \$33,600 for 36 miles of bike and golf cart lanes. Bike and golf cart lanes are swept with the rest of the road.

The La Quinta Bear Creek Trail (2.6 miles) has an annual O&M budget of ~ \$90,000, most of which goes for maintaining the landscaping.

Conclusions

The consensus is that the CV Link O&M estimate methodology is reasonable. The projected annual O&M budget of approximately \$1 million is sound, and is more encompassing than most of the examples CVAG has reviewed. A more detailed review of the feedback is provided in Table A.

Next Steps

This report is being distributed to all nine cities, the county, and the Agua Caliente Band of Cahuilla Indians. A workshop will be held Friday, Aug. 21 at the Palm Desert Community Center, 43-900 San Pablo Avenue. It will start at 1 p.m. The Executive Committee has suggested city managers should choose which representatives to send – with no limit – and encouraged finance directors, law enforcement and public work staff to participate.

Based on the Executive Committee's direction, a second meeting will be scheduled after the workshop to get feedback from all City Council members on the workshop findings and the O&M budget.

Please send your RSVP information to Joanna Stueckle by 5 p.m. Monday, Aug. 17 by calling (760) 346-1127 or sending an email to jstueckle@cvag.org



Table A: Responses Received

Jurisdiction	Existing Facilities Map Feedback	Info on Local O&M Costs	Feedback on CV Link O&M Estimate	Source / Date
Indian Wells	Detailed feedback and exhibit provided	No data available	No Comment	Bondie Baker 7/1/15
Cathedral City	No Comment	"We have no identified operations and maintenance or public safety costs for any of our trails, lanes or paths. On-street lanes are restriped whenever the rest of the street is and are swept along with the rest of the street, there are no separate costs. Police respond to calls on any of the paths or lanes just as they respond to calls anywhere else in the city, there is no separate cost. We have no specific maintenance costs associated with the existing dirt pathways and no separate budgets for any of it."	"I reviewed the methodology CVAG staff used to estimate CV Link O & M costs as did our Finance/Facilities director. I find the methodology used to be consistent with what I would do to estimate maintenance costs. O & M costs for a project like this will always have to be an estimate at least until the design phase is completed. The only comment I received from other reviewers was that the restroom maintenance estimate (\$20,000) may be a little low based on our costs to maintain restrooms in parks. We have no restrooms associated with trails."	Charles McClendon 7/1/15
Riverside County Parks	N/A	The County Parks District has a trails budget of ~ \$73,000 for FY 15/16. "This budget covers the Santa Ana River Trail (SART), some Open-Space trail work, and trails within individual Regional Parks."	No Comment	Keith Herron 7/7/15
Indio	Detailed corrections provided	"Citywide, Street Maintenance spends \$24,000 a year on striping 190,000 linear feet of solid and dashed 6" white paint along with	"The City reviewed the estimated striping, signage, sweeping, and maintenance and takes no	Eric Weck 6/29/15 and 7/8/15

Jurisdiction	Existing Facilities Map Feedback	Info on Local O&M Costs	Feedback on CV Link O&M Estimate	Source / Date
		120 legends. Sign replacement is estimated at \$800 per month for labor and materials and this covers two signs that are typically damaged or vandalized a month. There is no special sweeping of the bike lanes as they are done with the rest of the road. Total estimated operations and maintenance is \$33,600 for 36 miles of bike and golf cart lanes."	exceptions as they appear reasonable costs." "Use of volunteers to handle ongoing maintenance tasks has been difficult to make happen for our City, as volunteers are not consistent in their schedules. Additionally, any volunteers the City is able to obtain may be siphoned off from the City of Indio to work on CV Link."	
La Quinta	No Comment	Bear Creek Trail: 2.6 miles; ~\$90,000 annual O&M costs; most of which is for landscaping services. (Data previously submitted to CVAG)	"Tim Jonasson the City Engineer and Public Works Director and I both reviewed the Operations and Maintenance estimates prepared by the Alta Planning Group and want to communicate the budget for this project is more than adequate. We agree with the committee members that ranger positions could be filled by volunteers rather than paid staff and to utilize the staff at CVAG for contract oversight. As you know staff in La Quinta have experience with this type of extensive regional trail systems and we are satisfied with the budget as developed."	Edie Hylton 7/15/15

Jurisdiction	Existing Facilities Map Feedback	Info on Local O&M Costs	Feedback on CV Link O&M Estimate	Source / Date
Rancho Mirage	No Data Received	The 2015/16 Rancho Mirage (RM) City Budget, adopted on 6/8/2015, identifies \$28,000 (account # 7630) for "contract services for the annual maintenance of the city's multi-use trail system." RM Public Works Director, Bruce Harry (since retired), made the following relevant comments to LeGrand Velez in a telephone conversation on 6/29/15. 1) Restroom maintenance costs appear low; 2) RM assigns the maintenance responsibilities for on-street and sidewalk bike and golf cart trails to the adjacent land owners or homeowners associations.	No Data Received	Rancho Mirage City Records

DESIGN APPENDICES

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APPENDIX 11. CASE STUDIES

LONG SLEEVE SKYWALK



XUZHOU CITY, CHINA

This pedestrian bridge, which crosses several riparian systems and connects Harmony Square to Forest Plaza, was designed to strengthen spatial connections while ensuring safe pedestrian crossing over or across the fast-paced expressway, Xuning Road, below.

FUN/WACKY/COLORFUL + ARTFUL INTEGRATION OF FUNCTION + FORM

QINGHUANGDAO RED RIBBON PARK



QINGHUANGDAO CITY, CHINA

Red Ribbon Park spans five hundred meters, and integrates the functions of lighting, seating, environmental interpretation, and orientation. While preserving as much of the natural river corridor as possible during the process of urbanization, this project demonstrates how a minimal design solution can achieve a dramatic improvement to the landscape.

FUN/WACKY/COLORFUL + ARTFUL INTEGRATION OF FUNCTION + FORM

BEKO MASTERPLAN



BELGRADE, SERBIA

An urban regeneration project that was architecturally designed as a series of lines that “carve the inhabited landscape and act as continuities where outdoor spaces, landscape undulations, balconies, roof edges, and bridges all flow into one another”. The ground level of the building is open and exposed to the city, allowing the public and the flexible civic space to flow through the site in an uninterrupted and harmonious manner.

MOTION/ MODERN EDGE/ FLOW

HENDERSON WAVE BRIDGE



SINGAPORE

The Henderson Wave Bridge spans 284 meters across Henderson Road with a flowing organic form of “wave” spans. The bridge’s organic, undulating form is visually appealing while satisfying functional needs. While the pedestrian route is level, the waves deform as access ramps, balustrades, benches, and shelters for leisure walking and scenic viewing for the public.

MOTION/ MODERN EDGE/ FLOW

SUPERKILEN



COPENHAGEN, DENMARK

The Superkilen is defined by three color-coded areas, each offering distinctive functions and atmospheres, and stands as a vehicle of integration for the cultures represented by the area. The kilometer-long “Super Park” consists of three themed parts—“Red Square”, “Black Market”, and “Green Park”. The goal of the project was to create a unifying space for a very diverse neighborhood. Rather than try to make the space Danish or cater to satisfy the needs of specific groups, the design team decided to reference every group represented.

INTUITIVE CIRCULATION

HIGH TRESTLE BIKE BRIDGE



IOWA

This trail runs for 25 miles through five towns (Ankeny Sheldahl, Slater, Madrid, and Woodward), and through Polk, Story, Boone, and Dallas counties. The trail includes a 13-story-high bridge across the Des Moines River valley, one of the largest trail bridges in the world. The bridge decking incorporates a decorative structure that represents the view through a mine shaft, and includes decorative lighting that remains on until midnight. At each end of the 1/2-mile-long bridge are four 42-foot-tall artistic towers. The dark bands represent geologic coal veins found in area limestone deposits.

SITE APPROPRIATE MATERIALS, DRAMATIC LIGHTING, FUNCTION + FORM

APPENDIX 12. DESIGN GUIDELINES

The following provides recommended design guidelines for CV Link that are consistent with guidelines currently observed in California and in the United States. Ultimately, the path must be designed to meet the safety of path users. Considerations specific to the Coachella Valley Water District and Riverside County Flood Control District (RCFCD) are addressed at the end of this section. The challenge is to find ways of accommodating each of the anticipated uses with minimum compromises related to safety or function.

Planning, design, and implementation standards in this document are derived from the following sources:

- American Association of State Highway and Transportation Officials (AASHTO), *Guide for the Development of Bicycle Facilities*, 4th Edition, 2012
- AASHTO, *Roadside Design Guide*, 4th edition, 2011
- AASHTO LRFD Guide Specification for Design of Pedestrian Bridges, 2nd Edition, December 2009
- AASHTO LRFD Bridge Design Specifications, 4th Edition, 2010
- Caltrans, California Manual on Uniform Traffic Control Devices, 2012
- Caltrans, California Amendments to the AASHTO LRFD Bridge Design Specifications, November 2011
- Caltrans: Highway Design Manual, 6th edition 2013
- Institute of Transportation Engineers (ITE), *Design and Safety of Pedestrian Facilities*, 1997
- Coachella Valley Area Government (CVAG), Whitewater River/Parkway 1e11 NEV/Bike/Pedestrian Corridor Preliminary Study Report, 2012
- CVAG, Coachella Valley Non-motorized Transportation Plan Update, 2010
- Coachella Valley Water District (CVWD), *Development Design Manual*, 2010
- Riverside County, General Plan Draft Circulation Element, Trails and Bikeway System, 2013
- City of Lincoln, NEV Transportation Plan, 2006
- City of Lincoln, CTCDC Approved Experimental Standards, 2005
- National Association of City Transportation Officials (NACTO), *Urban Bikeway Design Guide*, 2nd Ed, 2012.
- U.S. Department of Agriculture, Forest Service Trail Accessibility Guidelines, 2006
- USDOT, FHWA, Conflicts on Multiple-Use Trails: Synthesis of the Literature and State of the Practice, 1994
- U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA), 2009 *Manual on Uniform Traffic Control Devices* (MUTCD), with revisions 1 and 2, May 2012

The sources listed above provide details on many aspects of path design, but a) may contain recommendations that conflict with each other; b) are not, in most cases, officially recognized “requirements”; and c) do not cover all conditions on most paths. All design guidelines must be supplemented in the application to specific situations by the professional judgments of the path designers and engineers.

12.1. Off-Street Facilities

CV Link will accommodate a wide range of users including pedestrians, persons in wheelchairs, motorized mobility devices, bicyclists of varied abilities including family cycling, and Low Speed Electric Vehicles (LSEVs). Due to the speed differential between pathway users, CV Link will be a dual path system whenever possible incorporating a shared use path for faster modes of travel including bicycles and electric mobility devices and LSEVs (up to 25 mph) and a separate pedestrian path for slower modes.

12.1.1. SHARED USE PATH DESIGN

Shared use paths are completely separated from motorized vehicular traffic and are constructed in their own corridor, or within an open-space area. Path design recommendations are listed below:

- The typical cross section is 14' wide minimum with 2' wide compacted crushed stone shoulders.
- The preferred cross section for areas of heavy use is 16' wide with 2' wide compacted crushed stone shoulders.
- On the overcrossings (bridges), 14' wide with 1' shoulders to separate pedestrian traffic.
- Steep grades should be avoided on any shared use path, with less than 5% as the recommended maximum gradient. Steeper grades can be tolerated for short distances (up to 30 feet).
- A 2% cross slope will resolve most drainage issues on a shared use path, except along cut sections where uphill water must be collected in a ditch and directed to a catch basin, where the water can be directed under the path in a drainage pipe of suitable dimensions. No sharp curves are anticipated along the path.
- Dashed centerline striping shall be used along the path with constrained areas and sharp or blind curves having a solid line.
- The typical setback from edge of tread to obstructions shall be 3 feet, 2-foot minimum.
- The design speed for the shared use path should be 25 miles per hour. Speed bumps or other surface irregularities or obstacles should not be used to slow bicycles. Slower speeds may be posted for areas that have at least one of the following: higher typical user volumes, substandard pathway conditions, or equestrian usage.
- Stopping sight distance on horizontal curves and lateral clearance can be calculated using the equations in the American Association of State Highway and Transportation Officials Guide for the Development of Bicycle Facilities, 4th Edition (AASHTO). Sight distance is generally not expected to pose a problem on CV Link.
- A twelve-foot desirable minimum vertical clearance should be maintained. Any exception shall be documented and will require CVAG approval. The vertical clearance area should be free from tree limbs and any other obstructions that may interfere with pathway use.
- The use of bollards for access control is discouraged to avoid creating obstacles for bicyclists. Bollards, particularly solid bollards, have caused serious injury to bicyclists. Instead, design the path entry and use signage to alert pathway users that combustion engines are prohibited. In cases where bollards must be used, they should be installed to be removed or be flexible to allow passage of maintenance or emergency vehicles. Solid bollards should not be used at all.
- Bollards may be used for pathway lighting if placed outside the traveled way.

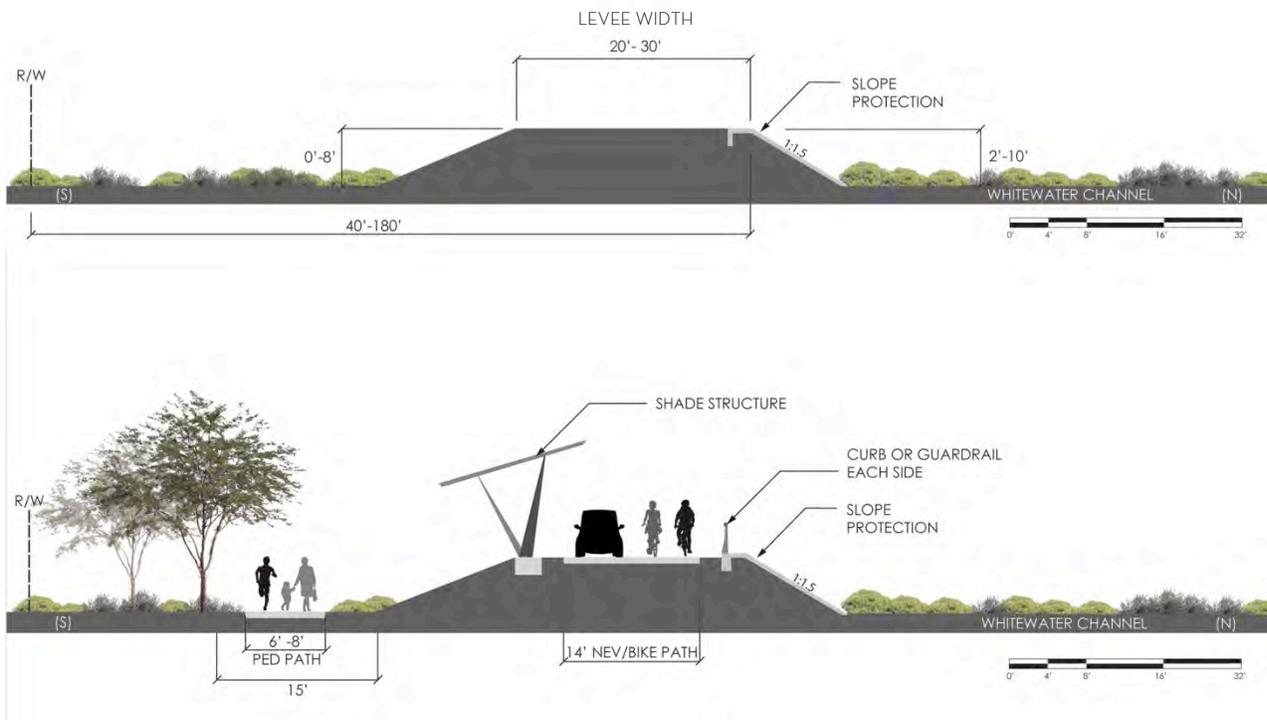
12.1.2. PEDESTRIAN PATH DESIGN

Pedestrian paths are also separated from motorized vehicular traffic but are usually narrower than shared use paths. Path design recommendations for segments that are not within the roadway right-of-way are listed below:

- Stabilized decomposed granite is the recommended surface treatment.
- The typical cross section is 4'-8' wide.
- The running slope should be less than 5%.
- The cross slope should be 2% maximum and 0.5% minimum.

12.1.3. TYPICAL CROSS-SECTIONS

Single Low Independent Levee



Existing

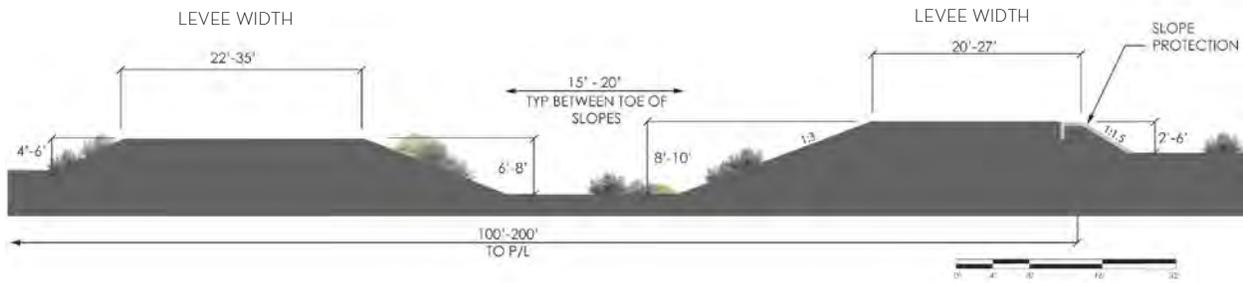
- Single elevated levee 25' - 30' wide
- Slope reinforcement to top of levee on channel side
- Vacant lands south of levee to be developed

Proposed

- LSEV/bicycle path on levee
- Guardrail each side of levee where slope and vertical drop warrants are met, and 5' horizontal separation not feasible
- Shade structures on non-channel side of levee

- Separate pedestrian path on non-channel side of levee
- Trees to be 15' minimum from toe of levee slope on non-channel side
- Grasses and shrubs under 3' tall may be planted on levee structure

Double Low Independent Levee



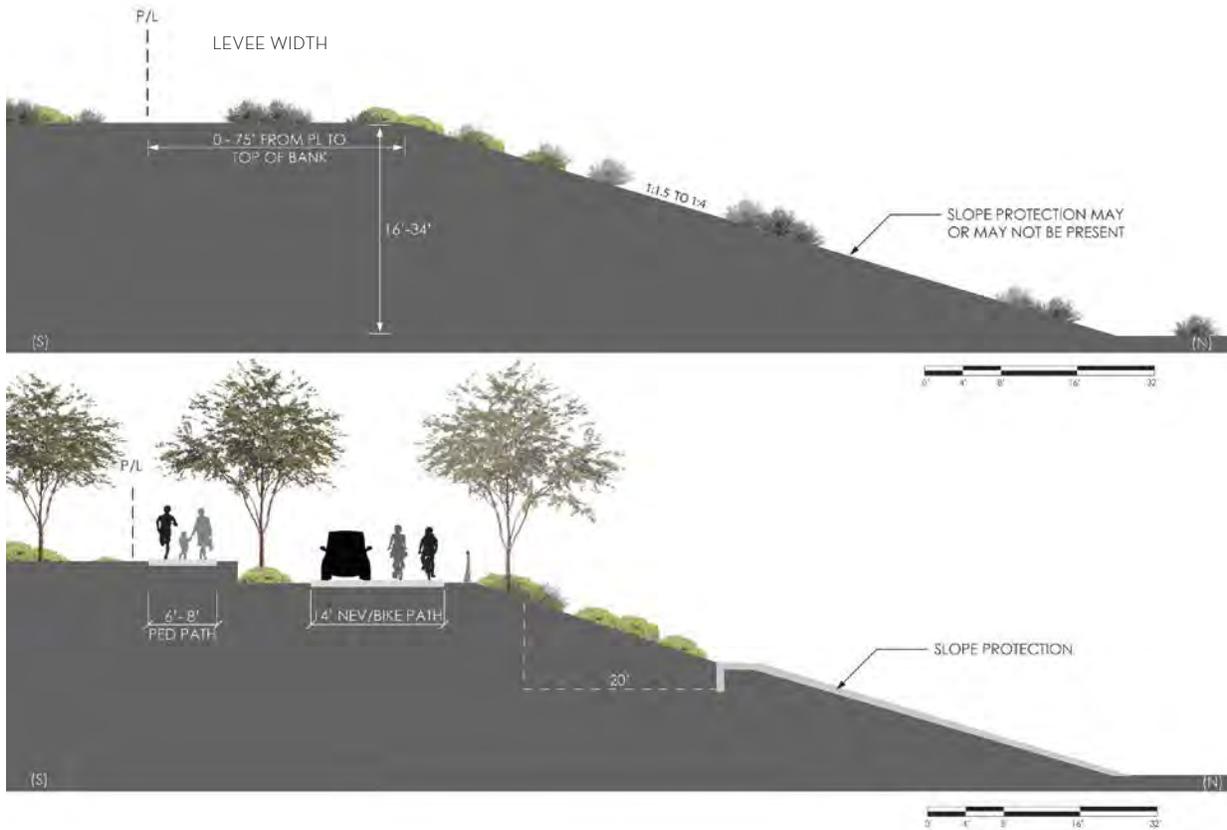
Existing

- Two elevated levees 20' - 35' wide
- Slope reinforcement to top of channel adjacent levee on channel side
- Residential properties adjacent to south side of right-of-way

Proposed

- LSEV/bicycle path on channel adjacent levee, pedestrian path on secondary levee
- Guardrail each side of levee where slope and vertical drop warrants are met, and 5' horizontal separation not feasible
- Shade structures on non-channel sides of levees
- Trees to be 15' minimum from toe of levee slope on non-channel side
- Grasses and shrubs under 3' tall may be planted on levee structures

ROW Adjacent Levee, Unconstrained



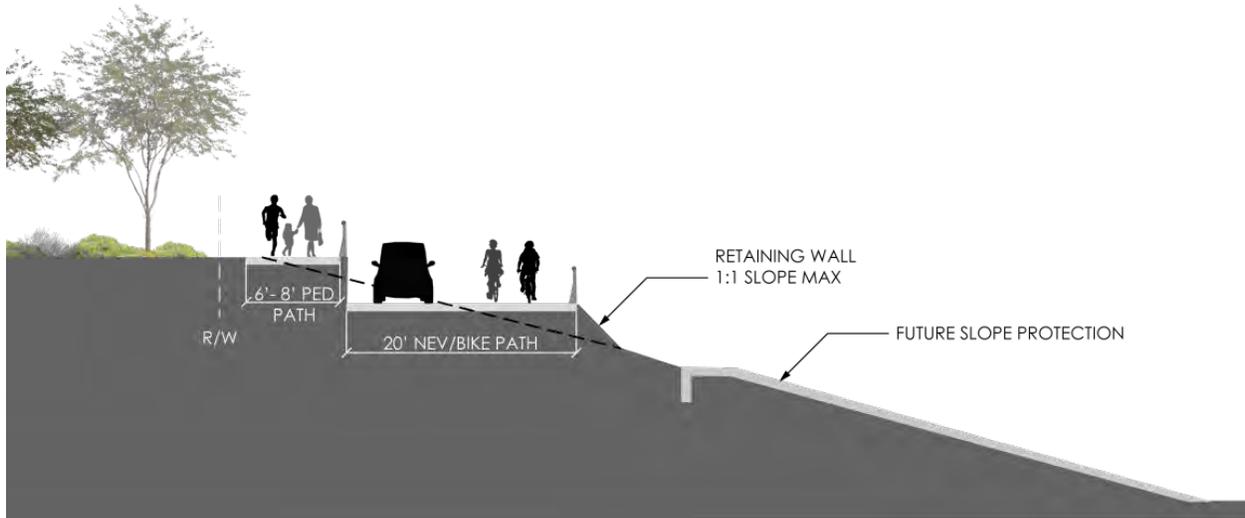
eExisting

- Right-of-way adjacent levee
- No existing slope protection, anticipated in future
- Sufficient width between area of future slope protection (High Surface Water elevation) and right-of-way line for pathway improvements

Proposed

- LSEV/bicycle path adjacent to channel edge
- Separate pedestrian path adjacent to LSEV/bicycle path
- Guardrail to be used where slope and vertical drop warrants are met, and 5' horizontal separation not feasible
- Trees to be 20' minimum from top of slope protection
- Grasses and shrubs under 3' tall may be planted on levee

ROW Adjacent Levee, Constrained Bench



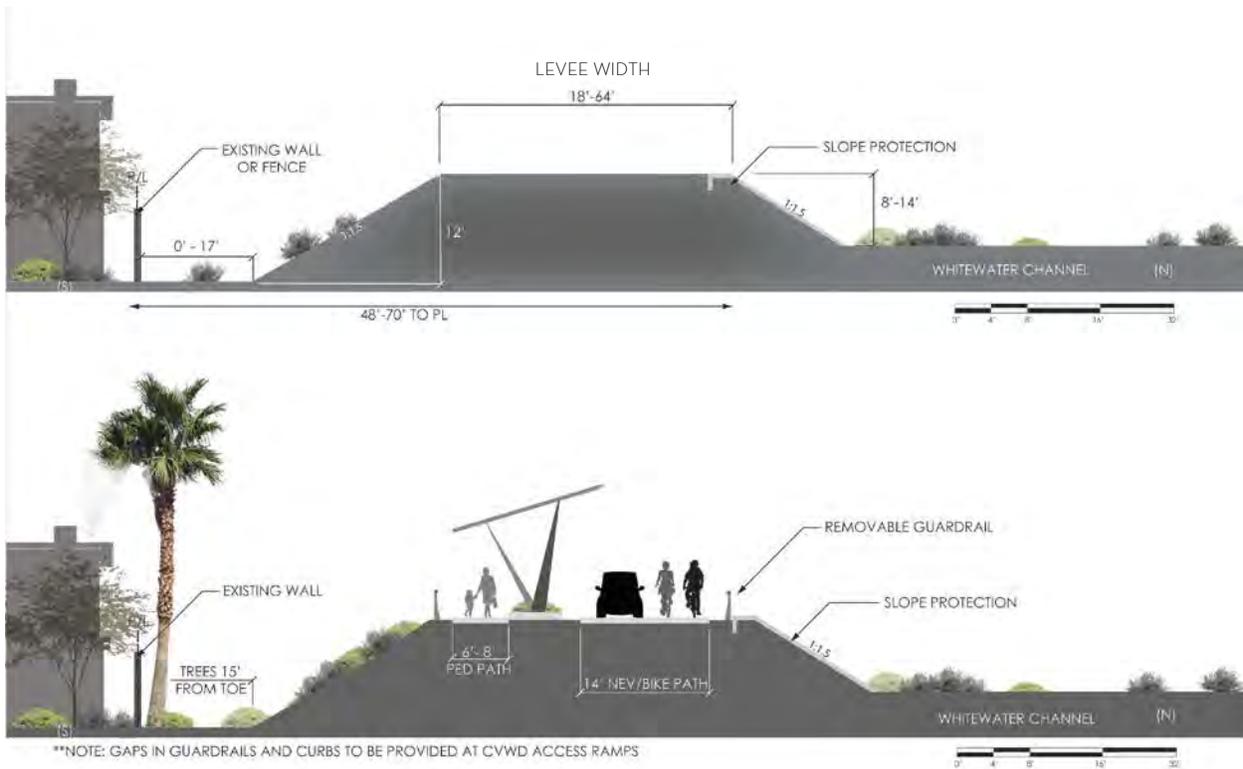
Existing

- Right-of-way adjacent levee
- Constrained bench width between slope protection and right-of-way line for pathway improvement
- Slope protection may or may not be present, anticipated in future

Proposed

- LSEV/bicycle path adjacent to channel edge
- Separate pedestrian path adjacent to LSEV/bicycle path
- Half bench (cut/fill) used to create area for CV Link paths
- LSEV/bicycle path may be a full bench into slope or half bench with retaining wall with 1:1 slope max
- Guardrail to be used where slope and vertical drop warrants are met, and 5' horizontal separation not feasible
- Curb and guardrail where slope is greater than 1:3 and sufficient horizontal separation is not achievable
- Trees to be 20' minimum from top of slope protection
- Grasses and shrubs under 3' tall may be planted on levee

Raised Independent Levee



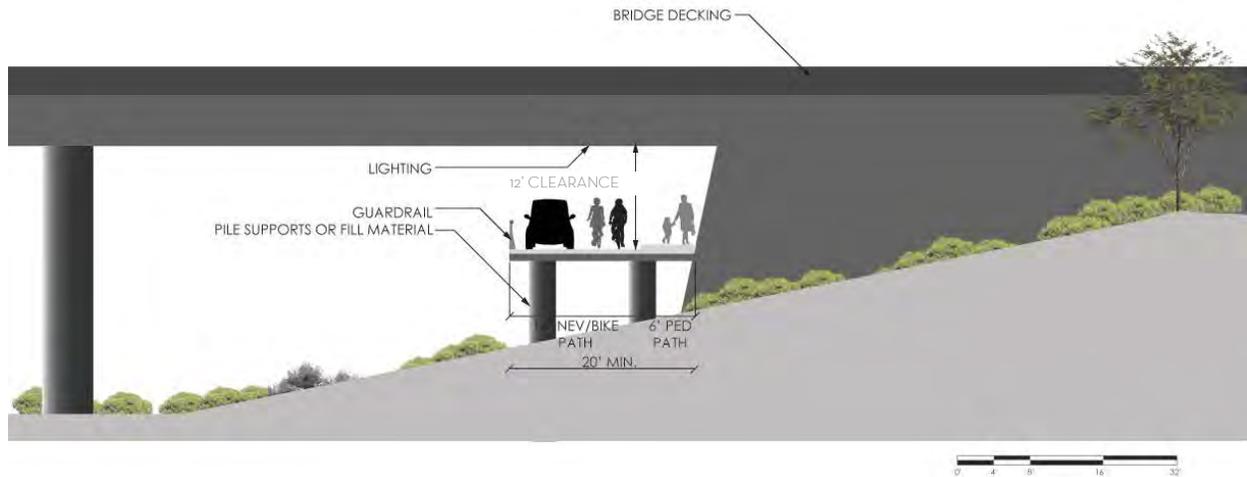
Existing

- Single elevated levee 30' - 40' wide
- Slope reinforcement to top of levee on channel side
- Residential properties typically 12' below top of levee

Proposed

- LSEV/bicycle and pedestrian paths on levee
- Guardrail each side of levee where slope and vertical drop warrants are met, and 5' horizontal separation not feasible
- Shade structures on non-channel side of levee
- Trees to be 15' from toe of levee slope on non-channel side
- Grasses and shrubs under 3' tall may be planted on levee structure
- Screening of adjacent residences to be provided via fencing, walls and/or vegetation

Undercrossing



Existing

- Roadway or rail bridge undercrossing

Proposed

- Pathway on pile supports or fill under road and rail bridges
- 12' is the desirable minimum vertical clearance. Any exceptions shall be documented and will require CVAG approval.
- Guardrail to be used where slope and vertical drop warrants are met, and 5' horizontal separation not feasible
- Full pathway design width to be maintained

12.2. Bridge Design

12.2.1. DESIGN CRITERIA

The Bridge Structure Alternatives described in the following section have been selected considering the following design criteria. Detailed discussion of each of the parameters follows the list.

- Geometry
- Loads - Pedestrian, Bike, LSEV (NEV), Equestrian, pickup truck, Bridge Inspection Trucks/Units, and Environmental conditions
- Materials
- Approaches
- Construction Cost & Schedule
- Bridge Deck Drainage
- Bridge Lighting
- Barrier and Safety fence Options
- Aesthetics - Bridge superstructure, Barriers, fences, screenings etc.

12.2.2. GEOMETRY

Geometry includes width, span configuration, horizontal alignment/curvature, vertical clearance, cross slope and longitudinal profile, skew angle, pier and abutments, approach embankments/ramps.

Bridge width/cross section: The roadway width on the bridge is selected to match with the width of approach pathway/roadway.

The total out-to-out deck width of a typical bridge is set at a minimum of 23'-0" accommodating 1 - 6'-0" lane (pedestrian use), 1 - 14'-0" lane (NEV/Bike shared path), and 2 - 1'-6" wide barriers with safety fences on top.

Horizontal and Vertical Alignment: The bridge will be on a tangent alignment horizontally, with a maximum skew of 60 degrees at bridge begin and/or bridge end locations. The longitudinal slope will be limited to 8% in order to meet the ADA requirements. Maximum Cross slope of 2% will be used on the deck to facilitate drainage on the bridge and approach embankments.

Vertical Clearance: Only with regards to the overcrossing of Highway 111 where it is a state highway AND the overcrossing is classified as a pedestrian overcrossing rather than a roadway for LSEVs, per Caltrans sec. 309.2, minimum vertical clearance for is 2 ft. greater than the standard for major structures for the state facility in question. Accordingly, the following vertical clearance will be adopted for CV Link overcrossing structures.

- Over State Highway 111: 17'-6" if the design is not considered to have the redundancy needed for protection from oversize vehicles; otherwise 15'-6"
- Over Local Roads: 17'-0" if the design is not considered to have the redundancy needed for protection from oversize vehicles; otherwise 15'-0"
- Over Channel/Waterways: 1' min. free board will be provided over the Standard Project Flood (SPF) or 3' free board over the 100-year design flood.

Span Configuration: The total bridge length will be established based on the site conditions, and a maximum longitudinal/run slope of 8%. The number of spans and maximum span length will be derived based on the structure type, and hauling and erection limitations.

12.2.3. LOADS

The bridge and approach embankments/ramps will be designed for a 90 psf pedestrian load, and AASHTO H10 truck load. Expected loads due to pedestrian, small pickup or maintenance vehicles and equestrian loads all will be less than AASHTO H10 loads on most of the overcrossings on the path. In addition, wind and seismic loads will be considered in the design according to the Caltrans Bridge Design Specifications. The temperature range in the region is 20° F-120° F, and the overcrossings will be designed appropriately for "Hot Climate" category per AASHTO and Caltrans standards. Combined with the hot climate, possible wind blasting effect on the longevity of the paint will be considered in the final design and appropriate recommendations will be made as to the type of the paint and number of coatings for the painted steel girder option. In addition, the wind loads are specifically critical for the cable-stayed bridges, and special wind studies are warranted. The seismicity is expected to be very high in the region and all the structures both - traditional and signature types will be appropriately designed meeting Caltrans requirements.

12.2.4. MATERIALS

Steel and concrete options will be considered and selected appropriately based on the structural performance, and cost criterion. Weathering steel, painted and galvanized steel will be considered on a case-by-case basis, upon discussion with CVAG, to mitigate the corrosion, but also considering the aesthetics.

12.2.5. APPROACHES

Approaches to the overcrossing bridges consist of embankment fill supported by cantilever walls or MSE walls. MSE wall consist of precast concrete panels, metallic soil reinforcement, and granular backfill. MSE walls provide a composite retention system where strength and stability are derived from the frictional interaction between the granular backfill and the reinforcements. Both wall type offer flexibility to modify the exposed faces for architectural treatments.



These walls are generally more economical than the conventional cantilever walls for wall heights greater than 20 ft. The cost difference between the two types of walls is expected to be small for the overcrossing approaches on this project.

12.2.6. CONSTRUCTION COST & SCHEDULE -

In order to minimize the cost, schedule, and disruption to the traffic, Accelerated Bridge Techniques are considered in reviewing the structure alternatives. For example, the use of steel girders, prefabricated steel trusses for superstructures, precast abutment and precast wingwall elements for substructures is recommended for overcrossings of roadways.

12.2.7. BRIDGE DECK DRAINAGE

Deck cross slope and longitudinal profile will be designed to drain the runoff water on the deck without the need of any special drainage devices/systems. A design cross slope of 2% (max.) will be provided over the travel way on the overcrossings to facilitate the deck drainage. This combined with 8% longitudinal slope is sufficient to meet the expected runoff on the overcrossings. However, for the structures crossing local roads, use of scuppers, downspouts, and other drainage devices will be considered, as deemed necessary, to discharge the water at suitable outlet points.

12.2.8. BRIDGE LIGHTING

Lighting on the bridge will be provided consistent with the lighting along the pathway, with additional consideration given to the safety requirements as per the applicable standards. For example, lighting on the overcrossings above highways and local roads are required to meet additional safety and illumination requirements that may not be applicable to the pathway at-grade lighting.

12.2.9. BARRIER AND SAFETY FENCE OPTIONS:

Caltrans defines specific barrier and fence types such as Type 3 chain link, Type 26 and Type 732 barriers for overcrossing structures. For bridges over channels, tall tubular railing may be an option. The heights of the fence and railing will be designed to meet safety requirements maintaining a minimum combined height of 42". Modifications to the Caltrans standards will be made to incorporate project specific aesthetic requirements in the final design.

12.2.10. AESTHETICS

Exposed faces of the bridge superstructure, embankment walls, barriers, and safety fences will be modified to enhance the structure aesthetics. Some of the measures that will be considered include: use of color concrete, impregnating city/neighborhood logos, and screenings.

In addition, other criteria such as Future Maintenance or reparability, and Construction Cost and schedule will be considered in reviewing various structure types, and recommendation will be made based on the context sensitive for a given location.

12.3. Bridge Types

12.3.1. 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. Since this option requires falsework, this alternative is best suited for bridges over creeks/channels/canyons. No additional topping is required with this option. The superstructure depth with this option will be less than that of a steel truss option, and will be similar to that of a steel girder option (Inverset option).

This alternative is suitable for spans ranging from 100 ft. to 250 ft. The superstructure depth is about 4% of the span length.

The substructure units consist of single column concrete bents at the intermediate supports, and high cantilever concrete abutments at the bridge ends. The approaches will consist of embankment fills supported by MSE walls, with wall panels treated for aesthetics. Pile foundations consisting of CIDH piles are expected at both the pier supports and abutments.

To enhance the aesthetics, architectural treatment can be applied to the exposed faces of the superstructure and barriers with custom colors and captions. Similarly, architectural features can be added to the safety fences with special screenings to further enhance the aesthetics.

The estimated cost of this alternative is \$180/sf.

Advantages:

- Most common structure type in California
- Aesthetically Pleasing
- Low Maintenance
- Longer Spans

Disadvantages:

- Longer Construction Time.
- Falsework is required.
- Traffic disruption expected.



12.3.2. PRECAST, PRESTRESSED CONCRETE VOIDED SLABS

This alternative consists of a precast prestressed concrete superstructure voided slabs supported on concrete pier and abutment substructure. A 3" concrete or asphalt topping is applied as riding surface after installation of the precast slabs in place.

Advantages:

- Economical
- Easy erection/installation
- Minimal or No Traffic Disruption
- Shorter Construction Time
- Aesthetically Pleasing
- Low Maintenance

Disadvantages:

- Shorter spans.

This alternative offers benefits of the speed of construction and low maintenance. This alternative is suitable for shorter span situations with span lengths up to 85 ft. The superstructure depth is about 3% of the span length. The width of a typical precast slab unit is 4 ft., and depth varies from 12" to 30". This alternative does not require falsework, and hence best suited for overcrossing applications with limited available vertical clearance.



The substructure units consist of single column concrete bents at the intermediate supports, and seat type concrete abutments at the bridge ends. No embankment fills are expected at the location where this option is proposed (Tahquitz GC Lake Boardwalk). Pile foundations consisting of CIDH piles are expected at both the pier supports and abutments.

To enhance the aesthetics, the exposed faces of the beams, and barriers can be treated with custom colors. Similarly, the safety fences with architectural finishes/ screening could be used to further enhance the aesthetics.

The estimated cost of this alternative is \$260/sf

12.3.3. STRUCTURAL STEEL GIRDER/TRUSS SYSTEM

This alternative consists of a steel girders or prefabricated steel truss superstructure with cast-in-place concrete deck. The substructure units consist of concrete bent and abutments. The prefabricated truss superstructure is a proprietary system pre-engineered (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 onsite per manufacturer's recommendations.

The bridge is designed to meet all the applicable national standards such as AISC, AASHTO, and AISI design criteria. It is also possible to use prefabricated substructure elements with this alternative.

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 superstructure depth ranges from 7% to 10% of the clear span.

The substructure units consist of steel column bents at the intermediate supports, and seat type concrete abutments at the bridge ends. No embankment fills are expected at the location where this option is proposed (Tahquitz GC Lake Boardwalk). Pile foundations consisting of CIDH piles are expected at both the pier supports and abutments.

Three finishing options are available for the steel girder/truss superstructure units and support columns - weathering steel, painted, and galvanized - to resist corrosion and enhance the longevity of the bridge.

Four material choices are available for the bridge deck - timber, concrete, asphalt, or steel grating to choose from - depending upon the bridge location. However, traditional concrete deck is recommended for the proposed overcrossings to maximize the structural efficiency and minimize the construction cost. Similarly, a variety of rail options are also available which can be custom designed and/or treated.

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

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



12.3.4. LONG SPAN - ARCH / CABLE-STAYED

This alternative is suitable for span lengths greater than 250 ft.

Within this alternative, multiple structure types are available - ranging from Concrete or Steel Arch to Cable-Stayed Bridge option. While the Arch Bridges are suitable for moderately longer spans (300 ft - 1,500 ft), cable-stayed bridges are best suited for spans ranging from 300 ft - 3,500 ft).

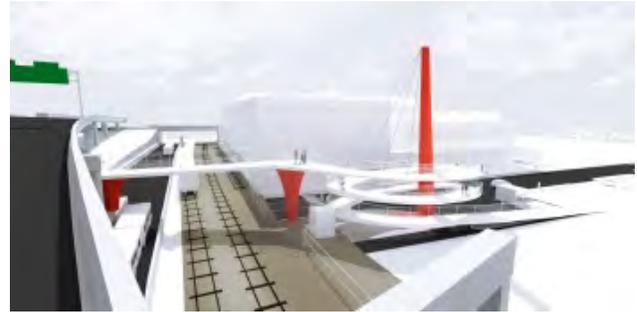
Arch Bridges are relatively difficult to build compared to the Cable-Stayed bridges, but the later is very sensitive to lateral wind loads. While both the Arch and Cable-Stayed bridges require longer construction time, it can be minimized by using prefabricated steel trusses or arches for superstructures.

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 special design, and specialty contractors
- Maintenance



The substructure will consist of pile supported concrete abutments and concrete towers/pylons (for cable stay option) and will be designed according to the final structure type selected.

The forces on the foundation of these structures, especially cable-stayed type require competent soil/geological conditions to support the structure foundation - specifically at the abutments. Hence, the suitability of the foundation soil will be evaluated before a final recommendation is made.

These structures are aesthetically elegant and pleasing. The cost of these bridges varies from \$750/sf- \$900/sf.

12.4. On Street Facilities

12.4.1. LSEV/BICYCLE FACILITIES

On street or within road right-of-way facilities should provide a safe and comfortable facility to maintain consistency in the experience of CV Link. Where traffic volumes and speeds are high and space is available, protected or buffered LSEV/bike facilities should be considered.

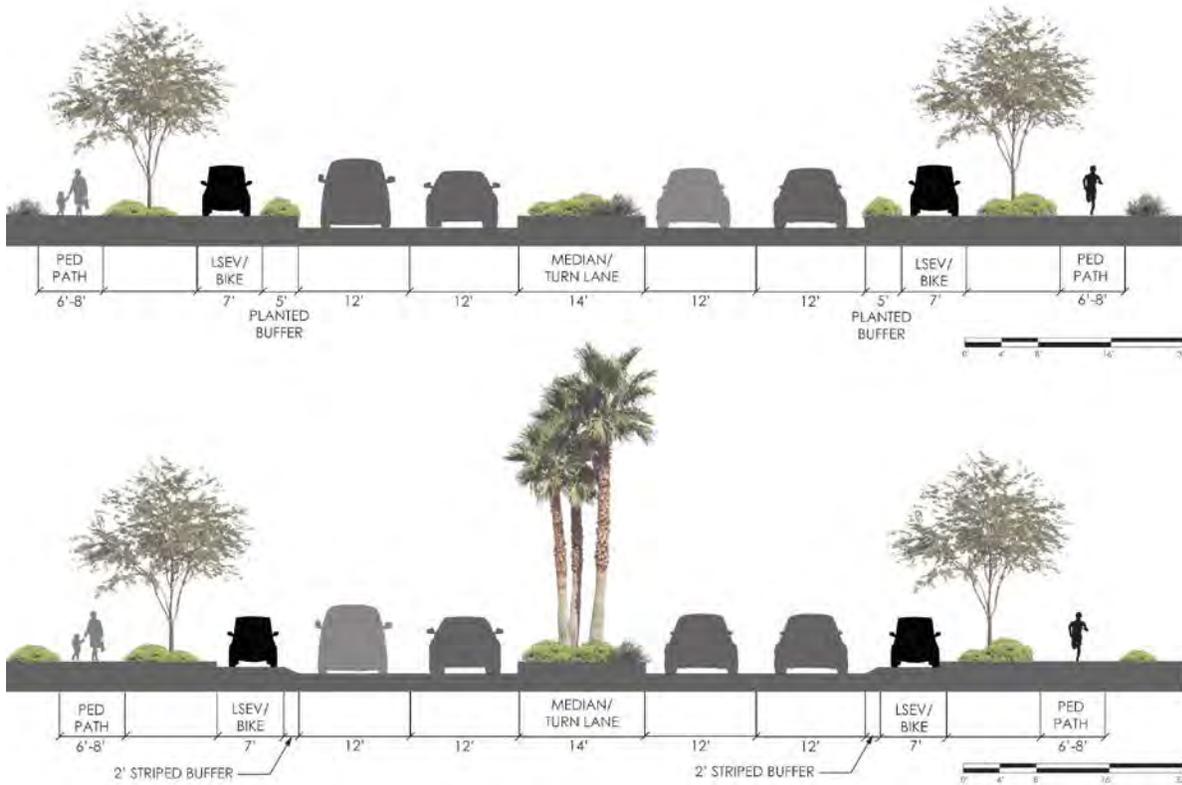


Depending on roadway width available, this could be as elaborate as a planted strip between concrete curbs, to something as simple as a two foot wide painted buffer area.

Each potential within road right-of-way alignment needs to be closely assessed for the optimum cross section configuration. On roadways with higher vehicle volumes and/or higher posted vehicle speeds, a greater level of protection should be pursued. On roadways with drainage issues or where numerous driveway or roadway intersections occur, separation techniques may be limited to the use of painted buffers.

Where physical space is constrained, LSEV/bicycle lanes or boulevard type treatments may be used to achieve the pathway system. LSEV/bike facilities are a portion of the right-of-way that has been designated by either vertically separated concrete path/cycletrack (preferred) or striping, signing, and pavement markings for the use of LSEVs and bicyclists. LSEV/Bicycle facilities should be located on both sides of the road, except on one-way streets, and carry users in the same direction as adjacent motor vehicle traffic.

Typical On-Street Options



Proposed

- 7' wide LSEV/bicycle facilities
- 8' wide pedestrian paths, 6' minimum
- 8" wide white barrier line between LSEV/bike lane and traffic lane required, with LSEV and bicycle pavement markings
- Bike friendly catch basin grates shall be used for on street segments
- Painted lines appropriate for use on roadways with average daily traffic (ADT) counts of 3,000 or more. If the ADT is over 10,000, then a separated LSEV/cycle track should be considered.
- Not suitable where there are a high number of commercial driveways



- A separate lane is required for LSEVs on roadways with speed limits greater than 35 mph

Alignments occurring on low volume local streets may accommodate LSEVs and cyclists within the existing roadway. Similar to bicycle boulevards, streets with less than 3,000 ADT and under 35 mph do not warrant lane striping. Instead, a system of wayfinding signs and markings, supplemented by traffic calming measures, is considered acceptable practice.

12.4.2. SIDEWALKS

Sidewalks are separated from motorized vehicular traffic but typically within right-of-way. Design guidelines for new sidewalk construction related to the CV Link alignment are listed below:

- Permeable concrete is the recommended surface treatment.
- The preferred cross section width is 8' wide, 6' minimum.
- The running slope should be less than 5%.
- The cross slope should be 2% maximum and 0.5% minimum.
- Curb ramps with tactile warning devices to be used at all at-grade roadway crossings.

12.5. LSEV Design Requirements

12.5.1. Design Speed and Speed Limit

Based on the legislated maximum LSEV speed (25 mph) and HDM table 1003.1, the path design speed conventionally would be 30 mph. In an effort to maintain the desired maximum speed of the pathway, a design speed of 25 mph should be utilized. A posted speed limit of 20 mph should be considered. In comparison, the adult cyclist typically travels between 8 and 15 mph.

American roads are often over-engineered, or designed to accommodate higher speeds that are not only faster than the posted speed limit, but also faster than is appropriate for the area. Aligning the design speed (the speed that vehicles can navigate the facility without losing control) with the desired driving speed, results in a speed that makes sense for the context.

The maximum speed on the shared use path should be 20 mph due to the significant increase in injury at higher speeds. Research on highway capable motor vehicle collisions has shown that at 20 mph, a pedestrian or cyclist has a 95% chance of surviving a crash. As speed increases above 20 mph, the chance of survival decreases significantly. Lower speed limits have been effective at reducing the crash and fatality rate in cities across Europe.

Table 6 shows how, when a pedestrian is struck, the likelihood of death increases faster than the percentage increase in vehicle speed, in a nonlinear fashion.

Table 7 shows the injury severity in single vehicle collisions based on Florida data 1993-1996³.

³ NHTSA (1999) *Literature Review on Vehicle Travel Speeds and Pedestrian Injuries*

TABLE 6. PROBABILITY OF PEDESTRIAN DEATH IN COLLISION WITH VEHICLE

Vehicle Speed	Probability ⁴
20 mph	5%
30 mph	37-45%
40 mph	83-85%

TABLE 7: VEHICLE TRAVEL SPEED AND PEDESTRIAN INJURY SEVERITY

Injury Severity	Travel Speed (Officer Estimates)						Total
	1-20 mph	21-25 mph	26-30 mph	31-35 mph	36-45 mph	46+ mph	
Fatal (K) injury	1.1%	3.7%	6.1%	12.5%	22.4%	36.1%	6.5%
Incapacitating (A)	19.4%	32.0%	35.9%	39.3%	40.2%	33.7%	27.0%
Nonincapacitating (B)	43.8%	41.2%	36.8%	31.6%	24.7%	20.5%	38.8%
Possible inj (C) or none	35.6%	23.0%	21.2%	16.6%	12.7%	9.7%	27.7%
Total frequency	13,368	1,925	2,873	2,188	2,493	906	23,753

However, no research has been conducted on collisions between LSEVs and non-motorized users. The lower mass and improved visibility (and therefore reaction time) of a LSEV may provide comparable injury risk at 25 mph as a highway capable motor vehicle at 20 mph. If a speed limit of 20 mph were to be established, LSEV operators would have to maintain awareness of speed (rather than allowing the vehicle speed limiter to control maximum speed). This may absorb some of the operator’s attention and therefore reduce the ability of the operator to observe and react to potential conflicts. Furthermore, a 20 mph speed limit for LSEVs would reduce the travel time competitiveness with using automobiles on the existing public streets and may therefore reduce the potential usage of CV Link. In the absence of data on the risk and severity of collisions between lighter LSEVs and non-motorized users, it cannot be concluded that a 20 mph speed limit is justified.

Recommendations

- Path speed limit to be 25 mph.
- Design speed to be 25 mph.

12.5.2. SHARED USE PATH WIDTH

A 4-seat LSEV is approximately 5.5’ wide with a 7’ minimum design envelope. The minimum paved width or travel area of a shared use path accommodating two-way LSEV travel should be paved 14’ wide and 16’ preferred. Wider widths are recommended when high user volumes or a mix of user types are anticipated. A reduced path width of 12’ may be used over short distances due to physical constraints

⁴ UK DOT (1994) *Killing Speed and Saving Lives*; lower percentages are cited in Australian Federal Office of Road Safety (1994) *Vehicle Speeds and the Incidence of Fatal Pedestrian Collisions*

including: environmental features, bridge abutment, utility structure, or fence. A minimum path width of 12' is regarded as appropriate where maintenance vehicles are anticipated. Path less than 12' wide are subject to edge breakage from vehicle loads. Constrained pathway sections should be indicated with warning signs or markings.

12.5.3. STOPPING SIGHT DISTANCE

This refers to the distance the LSEV driver needs to be able to see in order have room to stop in advance of an obstacle on the path. The LSEV braking distance is 10' at 25 mph. AASHTO provides formulae for calculating stopping sight distance depending on the gradient and the typical design vehicle coefficient of friction (a lower coefficient applies to inline skaters and recumbent bicyclists). For shared use path design purposes, the stopping sight distance should be based on bicycles.

12.5.4. HORIZONTAL CLEARANCE

A shoulder or recovery area provides a driver or cyclist room to maneuver to avoid crashes, recover a vehicle that has left the travel way, as well as an area for temporarily disabled vehicles. While shoulder or recovery area guidelines do not exist for NEVs, the standards for low speed vehicle roadways and bicycle facilities have been reviewed.

Horizontal clearance also includes a clear zone or area where lateral objects shall not be placed. The width of a clear zone along the horizontal alignment is dependent on roadside geometry, design speed, radius of horizontal curve, and the number of Average Daily Trips (ADT). Higher speeds mean vehicles will travel farther before recovering. In general, hazards within the clear zone, which cannot be removed, relocated, or made breakaway, will warrant guardrail.

Bicycle Guidance

AASHTO's bicycle design guidelines require 5' of recovery area from the hazard (channel slope). When sufficient recovery area is not present, a safety rail should be used as follows:

- Slopes 1V:3H or steeper, with a drop of 6 ft. (1.8 m) or greater;
- Slopes 1V:3H or steeper, adjacent to a parallel body of water or other substantial obstacle;
- Slopes 1V:2H or steeper, with a drop of 4 ft. (1.2 m) or greater; and
- Slopes 1V:1H or steeper, with a drop of 1 ft. (0.3 m) or greater.

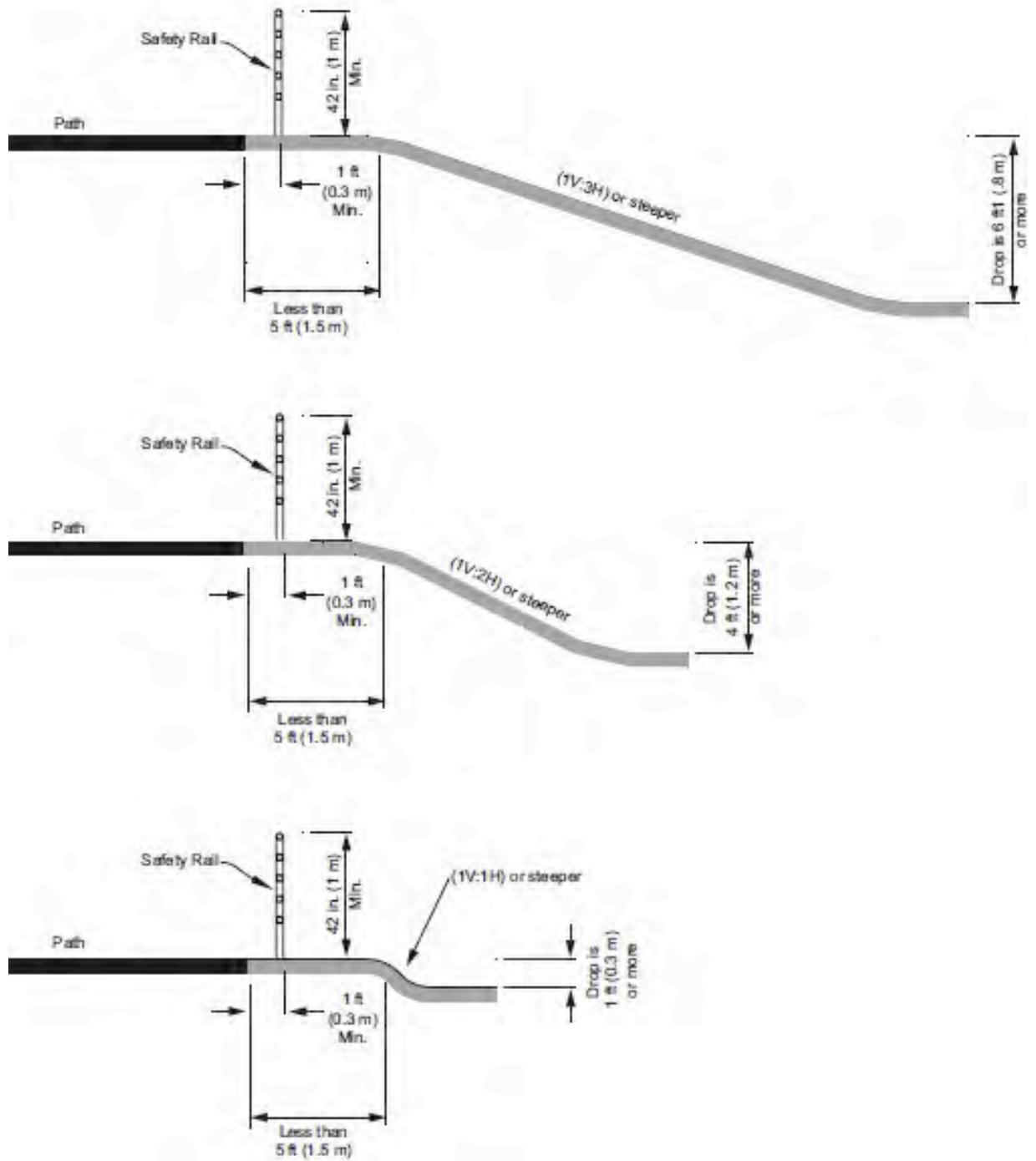


FIGURE 4. BICYCLE PATH SAFETY RAIL RECOMMENDATION BY CONDITION

Source: AASHTO Bicycle Guide, 2012

Vehicle Guidance

The FHWA's 2005, *Barrier Guide for Low Volume and Low Speed Roads*, clarifies clear zone and barrier warrants for low volume roadways. Guardrail itself is considered a hazard. Every effort should be made to maintain a sufficient clear zone recovery area so that guardrail is not needed.

TABLE 8: CLEAR ZONE DISTANCES FROM EDGE OF THROUGH TRAVELED WAY

DESIGN SPEED	DESIGN ADT	FORESLOPES			BACKSLOPES		
		1V: 6H or flatter	1V: 5H to 1V: 4H	1V: 3H	1V: 3H	1V: 5H to 1V: 4H	1V: 6H or flatter
20 mph	Under 750	2 - 6	3 - 7	**	2 - 6	2 - 6	3 - 7
	750 - 1500	3 - 7	5 - 8		2 - 6	2 - 6	3 - 7
	1500 - 6000	5 - 8	6 - 10		3 - 7	3 - 7	5 - 8
	over 6000	7 - 10	7 - 10		5 - 8	5 - 8	7 - 10
25 - 30 mph	Under 750	3 - 7	5 - 8	**	2 - 6	2 - 6	3 - 7
	750 - 1500	5 - 8	6 - 10		3 - 7	3 - 7	5 - 8
	1500 - 6000	7 - 10	7 - 10		5 - 8	5 - 8	7 - 10
	over 6000	7 - 10	10 - 12		7 - 10	7 - 10	7 - 10
35 mph	Under 750	5 - 8	6 - 10	**	3 - 7	3 - 7	5 - 8
	750 - 1500	7 - 10	7 - 12		5 - 8	5 - 8	7 - 10
	1500 - 6000	10 - 12	12 - 14		7 - 10	7 - 10	10 - 12
	over 6000	12 - 14	14 - 16		10 - 12	10 - 12	12 - 14
40 mph *	Under 750	7 - 10	7 - 10	**	7 - 10	7 - 10	7 - 10
	750 - 1500	10 - 12	12 - 14		10 - 12	10 - 12	10 - 12
	1500 - 6000	12 - 14	14 - 16		12 - 14	12 - 14	12 - 14
	over 6000	14 - 16	16 - 18		14 - 16	14 - 16	14 - 16
45 - 50 mph *	Under 750	10 - 12	12 - 14	**	8 - 10	8 - 10	10 - 12
	750 - 1500	14 - 16	16 - 20		10 - 12	12 - 14	14 - 16
	1500 - 6000	16 - 18	20 - 26		12 - 14	14 - 16	16 - 18
	over 6000	20 - 22	24 - 28		14 - 16	18 - 20	20 - 22

* Data in these rows come directly from the AASHTO *Roadside Design Guide*.

** Foreslopes between 1V: 4H and 1V: 3H are traversable but non-recoverable. Since vehicles will not reduce speed or change direction on these slopes the needed clear zone is determined by the slopes above and below the non-recoverable slope and extended by the width of the non-recoverable slope. See Chapter 3 of the *RDG* for more information on this procedure. Foreslopes steeper than 1V: 3H are considered hazards.

At 25 mph, and an estimated ADT of less than 750 (bicycle and NEV), 3-7' of near level shoulder or clear space between the edge of traveled way and the top of the hazardous condition is considered sufficient to not warrant a safety barrier.

As engineering judgment may be used, Table categorizes the severity of different hazards to assist designers with design decisions. Slopes greater than 1:2 are deemed moderately severe when less than 13' tall and as having high severity when the vertical difference is more than 13'.

TABLE 9: INJURY SEVERITY BY SLOPE GRADIENT

Potential Hazard	Group 1 (Low Severity)	Group 2 (Moderate Severity)	Group 3 (High Severity)
Parallel Ditches:			
Ditches outside the preferred cross section on Figures 3.6 and 3.7 of the <i>RDG</i> and with foreslope flatter than 1V: 3H	X		
Ditches with foreslopes 1V: 3H or steeper (Deep ditches should also meet the foreslope criteria below)		X	
Slopes			
1V: 3H foreslope less than 2 m (7 ft) high*	X		
1V: 3H foreslope 2 m (7 ft) and higher*		X	
1V: 2H to 1V: 1.5H foreslope less than 4 m (13 ft) high*		X	
1V: 2H to 1V: 1.5H foreslope 4 m (13 ft) high and higher			X
Vertical foreslope or fill wall less than 2 m (7 ft) high		X	
Vertical foreslope or fill wall 2 m (7 ft) and higher			X
Backslopes that are uneven, or with deep erosion ruts, large rocks, and trees		X	
Vertical backslope with horizontal projections of 200 mm (4 in) or smaller	X		
Vertical backslope with horizontal projections larger than 200 mm (4 in)		X	
Downward intersecting slope (transverse to travel way, such as a river bank) 1V: 4H or steeper, between than 0.5 (2 ft) high to 2 m (6 ft) high		X	
Downward intersecting slope (transverse to travel way, such as a river bank) 1V: 4H or steeper, 2 m (6 ft) or higher			X
Upward intersecting slope (transverse to travel way, such as an overpass fill) 1V: 4H to flatter than 1V: 1.5H, greater than 0.3 m (1 ft) high		X	
Upward intersecting slope (transverse to travel way, such as an overpass fill) 1V: 1.5 H or steeper, greater than 0.3 m (1 ft) high			X

* Slopes are assumed to be relatively smooth and free of obstacles. If slopes are uneven, have deep erosion ruts, large rocks and trees or other vegetation that may cause a vehicle to be unstable, then the classification should be increased one category. Conditions at the bottom of these slopes must also be evaluated.

Corrective Actions

CV Link often occurs next to an edge having a 1:1.5 slope. The above chart classifies this as a moderate severity condition when the vertical distance to the bottom of the channel is less than 13' and as having high severity when vertical distance is greater than 13'. FHWA recommends the following based on severity rating.

- Group 1: Low Severity - Accepting the risk and leaving the hazard is usually appropriate. Avoid placing these conditions in the clear zone or take simple, low-cost corrective actions if possible. Group 1 hazards commonly do not justify expenditure of substantial funds to correct.
- Group 2: Moderate Severity - Consider cost-effective strategies to reduce probability, eliminate the hazard or reduce the severity of the hazard. Because these hazards generally do not warrant shielding with a roadside barrier, the cost of a corrective action should be less than the expected cost of a barrier. If a new road, avoid placing Group 2 hazards in the clear zone.
- Group 3: High Severity - Evaluate for possible use of roadside barriers if it is too expensive or impractical to eliminate either the hazard or make it crashworthy. If a barrier is not warranted or if an alternate treatment is less expensive than a barrier, treat as a Group 2 hazard.

Additional barrier warrant considerations are described in Table .

TABLE 10: BARRIER WARRANT CONSIDERATIONS

Consideration	Barrier is more warranted if:	Barrier is less warranted if:
Speed	70 km/h (45 mph) or higher	40 km/h (25 mph) or lower
Hazard on outside of horizontal curve	350 m (1,150 ft) or smaller radius	Radius larger than 400 m (1,430 ft)
Hazard does not fit the descriptions in Tables 2.3 through 2.6	Hazard is more severe	Hazard is less severe
Size of hazard	Very large	Very small
Traffic volume	Above 1,000 vpd	Below 400 vpd
Hazard on inside of horizontal curve	350 m (1,150 ft) or smaller radius	Radius larger than 400 m (1,430 ft)
Hazard on a downgrade	5 percent or greater	Less than 3 percent
Crash history	Clear crash pattern	No crash pattern
Anticipated cost of barriers	Expected costs are low	Expected costs are high
Roadway cross section	Severe section elements	Good section elements
Multiple hazards exist at the site	Many additional hazards	
Aesthetic impacts		Serious concerns
Environmental impacts		Serious concerns

Recommendations

Based on the severity of the channel slope hazard, an assumed design speed of 25 mph and a projected ADT of less than 750, a 5' wide minimum shoulder/recovery area should be provided on each side of the NEV/bike path where space allows. The recommendations for barrier use described by existing condition are given in Table .

TABLE 11. BARRIER RECOMMENDATIONS BY CONDITION

	5' Separation Not Possible		5' Separation Possible	
	Height > 6'	Height < 6'	Height > 6'	Height < 6'
Shallow Slope > 1V:3H < 1V:2H	Guardrail	Curb	Curb	NA
	Height > 4'	Height < 4'	Height > 4'	Height < 4'
Moderate Slope > 1V:2H < 1V:1H	Guardrail	Curb	Curb	NA
	Height > 1'	Height < 1'	Height > 1'	Height < 1'
Steep Slope > 1V:1H	Guardrail	Curb	Curb	NA

12.5.5. EDGE PROTECTION

A critical foreslope is one on which a vehicle is likely to overturn. Per AASHTO, slopes over 1:3 (vertical to horizontal) are considered non-recoverable and special design consideration is required. If sufficient recovery area is not achievable adjacent to a slope 1:3 or greater, a guardrail may be warranted. The design of the guardrail will depend on many factors. In any guardrail/fencing type condition, the structure will need to withstand a minimum of 5,000 pounds of lateral force (LSEV traveling at 25 MPH).

Barriers are not an ideal treatment for roadside hazards on low volume, low speed roads for a number of reasons, including the costs of installation, maintenance and repair as well as possible environmental and aesthetic impacts. The frequency of crashes into barriers will be larger than crashes into the hazard (simply because barriers are closer to the travel way and longer than the condition being shielded). Crashes into barriers can be serious events.

Curbs offer little or no redirection for vehicles departing the roadway. Per the FHWA, curbs are generally recognized as having no significant containment or redirection capability. Curbs greater than 4" in height may cause vaulting and instability of a vehicle.

Although generally a lower speed impact with a curb results in more redirection, crash tests and crash analyses find that curbs are frequently mounted by an impacting vehicle even at very low speeds. The decision to place curbs should be based on other factors including drainage, available right of way and land-use characteristics.

The AASHTO Roadside Design Guide recommends not placing barriers where curbs are present:

1. It is preferable to not use barriers with curbs at speeds 80 km/h (50 mph) and higher. If necessary, the best location for the barrier is in front of the curb. If the curb is sloped and no higher than 100 mm (4 in) the barrier may be placed flush with the face of the curb. Do not place a wall-type barrier on top of a curb. Remove the curb if necessary.
2. Avoid placing barriers with curb present at speeds 50 km/h (30 mph) to 70 km/h (45 mph). If necessary, the best location for the barrier is in front of the curb. If the curb is sloped and no higher than 150 mm (6 in) the barrier may be placed flush with the face of the curb. Do not place a wall-type (CSS, PCG, or SMG) barrier on top of a curb. Remove the curb if possible. A shoulder gutter design may be good option to a curb.
3. It is acceptable to place curbs in line with the face of a barrier at speeds 40 km/h (25 mph) and lower.

If a curb is used, 18" of clear zone behind the curb (channel side) should be provided in addition to the shoulder. Obstructions that may interfere with vehicle operation should not be placed within this area. If a "smooth" feature, such as a bicycle railing or fence is present, a lesser clearance of 18" may be used.

12.5.6. TURNING RADIUS

LSEVs come in various shapes and sizes, a typical 4-seat LSEV has an inside turn-radius of 12' and exterior turn radius of up to 18'. Based on the maximum design speed of 25 mph, the smallest radius along the shared use path should be 115'. Tight turns should be signed and/or striped well in advance of the turn, and sign location should be based on braking distance.

12.5.7. RANGE

Travel distance between charging is reported to be between 20 and 30 miles. This number is influenced by terrain with steeper routes resulting in faster battery drain. While the SBCCOG Local Use Vehicle (LUV) Demonstration project showed 99% of trips occurring within 3 radial miles of the residential origin, the Demonstration project is adapting local residential streets for LSEV/electric vehicle use without construction of a robust LSEV network or backbone network as proposed with CV Link.

12.5.8. PARKING DESIGN STANDARDS

Most LSEVs using CV Link will be parked at home origins and existing parking lots at destinations. LSEV parking along CV Link will be limited to one or two charging spaces in most locations. For any parking that is provided, the following guidance should be considered during detailed design.

Signage

The colors, shapes and wording of electric vehicle parking and charging station signs are still evolving nationwide, leading to confusion as to the proper formats and procedures that a government official or local business owner should adopt when installing EV supply equipment in a public location. These sources offer design guidance:

- Plug-In Electric Vehicles: Universal Charging Access Guidelines and Best Practices (California Office of Planning and Research, 2013)

- Draft Coachella Valley Plug-in Electric Vehicle Readiness Plan (CVAG, 2014)
- Electrical Vehicle (EV) Signs (National Committee on Uniform Traffic Control Devices, 2014)

The latter document notes that human factors studies indicate black background signs are more effective than blue. Blue is also considered inappropriate because it has been established through the MUTCD for guidance, not regulation of parking spaces.

Parking Space Design

LSEV parking spaces should take into account the size of LSEV, rather than a highway capable electric vehicle. A six seat LSEV manufactured by GEM is 162" long (13'6"). Although six seat LSEVs are likely to be a small proportion of LSEV traffic on CV Link, this should be the minimum dimension to avoid overhang into traveled ways. Therefore 7' x 15' is preferred. Locations for parking spaces will be adjacent to charging stations if available.

12.6. Path Related Facilities

12.6.1. STRIPING

The Manual of Uniform Traffic Control Devices (MUTCD) regulates the design and use of all traffic control devices including both signs and pavement markings. A summary of the MUTCD guidance for both bicycles and vehicles follows.

Striping for Bicycle Paths

A 4 to 6 inch wide solid line may be used when passing by path users should be discouraged. A dashed line may be used when adequate passing conditions are present. While the CA-MUTCD section 9C.03 provides optional guidance suggesting yellow striping, there is no requirement to use yellow. CV Link colors may be considered.

The use of striping is particularly beneficial at areas of restricted sight distance, high traffic areas, intersection approaches and/or where nighttime riding is expected with limited lighting. Some path design professionals believe that center and edge lines give paths the appearance of being a roadway and thus are oftentimes not recommended except in the special circumstances listed above. When pathway striping is judiciously used, its impact on safety is more effective.

On the striping of shared use paths, AASHTO states the following:

On pathways with heavy peak hour and/or seasonal volumes, or other operational challenges such as sight distance constraints, the use of a centerline stripe on the path can help clarify the direction of travel and organize pathway traffic. A solid yellow centerline stripe may be used to separate two directions of travel where passing is not permitted, and a broken yellow line may be used where passing is permitted. The centerline can either be continuous along the entire length of the path, or may be used only in locations where operational challenges exist.

Per the MUTCD, all markings used on bikeways shall be retroreflective. Section 9C.03 of the CAMUTCD describes Marking Patterns and Colors on Shared-Use Paths as optional.

Option: Where shared-use paths are of sufficient width to designate two minimum width lanes, a solid yellow line may be used to separate the two directions of travel where passing is not permitted, and a broken yellow line may be used where passing is permitted (see Figure 9C-2).

Guidance: Broken lines used on shared-use paths should have the usual 1-to-3 segment-to-gap ratio. A nominal 3-foot segment with a 9-foot gap should be used. If conditions make it desirable to separate two directions of travel on shared-use paths at particular locations, a solid yellow line should be used to indicate no passing and no traveling to the left of the line.

Support: A centerline marking is particularly beneficial in the following circumstances:

- A. Where there is heavy use
- B. On curves with restricted sight distance
- C. Where the path is unlighted and nighttime riding is expected

Striping for Roadways

The standards, guidance and warrants for centerline striping of vehicle travel ways are described in chapter 3B of the CAMUTCD.

Center line pavement markings, when used, shall be the pavement markings used to delineate the separation of traffic lanes that have opposite directions of travel on a roadway and shall be yellow.

Standard: Center line markings shall be placed on all paved urban arterials and collectors that have a traveled way of 20 feet or more in width and an ADT of 6,000 vehicles per day or greater.

Guidance: Engineering judgment should be used in determining whether to place center line markings on traveled ways that are less than 16 feet wide because of the potential for traffic encroaching on the pavement edges, traffic being affected by parked vehicles, and traffic encroaching into the opposing traffic lane.

Option: Centerline markings may be placed on other paved two-way traveled ways that are 16 feet or more in width.

The design section for the CV Link travel way is 16' wide at most.

Recommendations

Based on a review of the guidance available for bicycles and motor vehicles, centerline and edge striping of the pathway is not required unless substandard conditions are present (sharp curves, constricted lane widths). If center and edge line striping is desired due to the design concept, it may be used. Benefits include clear vehicle placement within the travel way. The cons include less effective warning at substandard conditions as well as regular maintenance to maintain effectiveness. LED pavement marker lights may be considered to augment the presence of a centerline. Cycle guide lights are flush mounted, solar powered LED lights to assist with travel delineation.

12.6.2. LANE MARKINGS

The California Traffic Control Devices Committee (CTCDC) Experimental Standard LSEV Pavement Marking is predominantly text. It is recommended that a graphic symbol pavement marking design be developed so that the markings are more legible to locals and tourists who may not fully understand the difference between an LSEV and a motor vehicle or golf cart. Additionally, a graphic symbol serves international needs and does not require comprehension of written English.

12.6.3. SIGN SIZE

The California Manual on Uniform Traffic Control Devices (CAMUTCD) lists sizes for shared use path regulatory signs in Part 9, Traffic Control for Bicycle Facilities. Proposed sign sizes should be based on the larger dimensions found in the Roadway column of table 9B-1(CA). California Bicycle Facility Sign and Plaque Minimum Sizes.

12.6.4. SIGNAGE AND WAYFINDING

A comprehensive system of signs ensures that information is provided regarding the safe and appropriate use of the path, both on-road and off-road.

Pathway systems typically include the three basic sign categories:

- Directional/wayfinding signs
- Regulatory and warning signs
- Educational/interpretive features

12.6.5. DIRECTIONAL/WAYFINDING SIGNS

Directional or wayfinding signs improve pathway experience and function for path users while increasing awareness by motorists. For path users, directional signs and street name references help orient users as well as clarify the route to destinations.

Directional signs should impart the overall design theme so path users know they are on CV Link and which direction they are going. The theme shall be conveyed in a variety of ways: imprinted concrete, color, gateway features, and mile markers. A central information installation at major access points also helps users find their way and acknowledge the rules of the path.

- Kiosks may provide directional signage as well as information on other path opportunities, regional destinations, or local/seasonal events occurring along the path.
- Path access signs with overall path maps shall be located at path access points to help users entering the path determine their next destination.
- Locate directional signs at key decision points along the path to help users identify their destination or orient their position.
- Locate mile markers no closer than 3' from the edge of the path and at 1-mile intervals and at path-roadway intersections to help users determine their location and the distance to their destination. Mile markers may be referenced in emergency situations.
- Conveying distance in terms of length as well as time required to walk, bike or drive an LSEV to one's destination.

Identity

The CV Link logo should be used to aid in reinforcing the path's identity. Identity signs with the logo should be placed at each major and secondary entry point to the path system. An identity sign is the first step in the path visitor's way-finding experience. Identity signs may be small-scale plaques or large-scale monuments depending on the site context. Images and text on the identity sign should be clear and legible from a roadway when oriented towards those arriving via motorized vehicle. Smaller scaled signs, legible from the pedestrian perspective, are recommended for neighborhood gateway points.

- Identity signs should be simple, direct, and consistent in design theme.
- Logo elements should be symbolic in nature with high levels of contrast to be legible to a broad spectrum of the population.
- Logo use should be consistent throughout the path by using it as a standalone element, on other signage, or incorporating it into path furnishings or surfaces.

12.6.6. REGULATORY AND WARNING SIGNS

Layout

Shared use path, bike lane, and bike route signing and markings should generally follow the standards and guidelines in the California Manual on Uniform Traffic Control Devices (CA-MUTCD). This includes advisory, warning, directional, and informational signs for bicyclists, pedestrians, and motorists. All signs shall be retro-reflective on shared-use paths. Lateral sign clearance shall be a minimum of three feet and a maximum of six feet from the near edge of the sign to the near edge of the path. Mounting height shall be seven feet from the bottom edge of the sign to the path surface level. The final striping, marking, and signing plan for CV Link will be resolved in the full design phase of the path. This will be most important at locations where there are poor sight lines from the path to cross-traffic (either pedestrian or motor vehicle).

Traffic Control

Crossing features for all roadways include warning signs for both vehicles and path users. The type, location, and other criteria are identified in the Manual for Uniform Traffic Control Devices (MUTCD). Adequate warning distance is based on vehicle speeds and line of sight. Signs should be highly visible; catching the attention of motorists accustomed to roadway signs may require additional alerting devices such as a flashing light, roadway striping, or changes in pavement texture. Signs oriented towards path users must include a standard stop sign and pavement marking, sometimes combined with other features such as a kink in the path to slow bicyclists. Care must be taken not to place too many signs at crossings lest they overwhelm the user and lose their impact.

Etiquette Signs

Potential conflicts between user types need to be considered on any shared use path system. Etiquette signs should be developed to orient users to the expected modes on the shared use path. Etiquette signs often convey who should yield way when more than one user type is present.

12.6.7. EDUCATIONAL/INTERPRETIVE FEATURES

Educational signs provide path users with information about the path, the local environment, history and culture, and significance of elements along the path. While signs are the most well known method of conveying interpretive information, other means such as art, three-dimensional models, auditory experiences and interactive features are also options. QR Codes (images smartphone-users can scan with free downloadable apps) can be added to any path sign or feature. QR codes typically send scanners to websites for more information including GPS coordinates, regional maps, agency websites, videos, additional interpretive information etc.

- Consider the character of the path and surrounding elements when designing informational signage.
- A skilled graphic designer should be used for any sign design.
- Locate interpretive signs a minimum of 3' from the edge of the path.

12.7. Path / Roadway Crossings

12.7.1. CROSSINGS INTRODUCTION

It is highly desirable to minimize the number of roadway crossings that occur on any pathway system. As a general rule, when crossings are required, they should occur at established pedestrian crossings, or at locations completely away from the influence of intersections.

LSEV/Bike/Pedestrian crossing stencils may be placed in advance of path crossings to alert motorists. Curb ramps should be designed to accommodate the range and number of users.

When considering a proposed off-street shared-use path and required at-grade crossings of roadways, it is important to remember two items: 1) path users will be enjoying an auto-free experience and may enter into an intersection unexpectedly; and 2) motorists may not anticipate LSEVs or bicyclists riding out from a perpendicular path into the roadway. However, in most cases, an at-grade path can be properly designed to a reasonable degree of safety and meet existing traffic engineering standards.

Evaluation of shared use path crossings should involve an analysis of vehicular traffic patterns, as well as the behavior of path users. This includes traffic speeds (85th percentile), street width, traffic volumes (average daily traffic and peak hour traffic), line of sight, and path user profile (age distribution, range of mobility, destinations). A traffic safety study should be conducted as part of the actual engineering design of the proposed crossings to determine the most appropriate design features. This study would identify the most appropriate crossing options given available information, which must be verified and/or refined through the actual engineering and construction document stage.

Like most paths in built urban areas, CV Link must cross roadways at certain points. These roadway crossings may be designed at-, below-, or above-grade. At-grade crossings create potential conflicts between path users and motorists. However, well-designed crossings have not historically posed a safety problem, as evidenced by the thousands of successful paths around the United States with at-grade crossings.

12.7.2. BASIC CROSSING PROTOTYPES

Intersection approaches are based on established standards, published technical reports, and experiences from existing facilities. The Preliminary Plan set includes additional information on bridge structures and a bridge report is in development. The following typology pictures are only for categorization purposes and do not reflect the CV Link aesthetic.

TABLE 12: CROSSING TYPES

Type 1: Unprotected/Marked

Unprotected/marked crossings include path crossings of residential, collector, and sometimes major arterial streets or railroad tracks.



Type 2: Route Users to Existing Intersection

Paths that emerge near existing intersections may be routed to these locations, provided that sufficient protection is provided at the existing intersection.



Type 3: Signalized/Controlled

Path crossings that require signals or other control measures due to traffic volumes, speeds, and path usage.



Type 4: Grade-Separated - Overcrossing

Bridges or under-crossings provide the maximum level of safety but also generally are the most expensive and have right-of-way, maintenance, and other public safety considerations.



Type 4: Grade-Separated - Undercrossing

Roadway undercrossings (an “underpass” if below a railway) can have shorter ramps than overcrossings. CV Link desirable minimum overhead clearance is 12’, although exceptions may be required.



Type 4: Grade-Separated - Bridges

CV Link has several tributary channels to cross. Existing bridges may be widened or replaced.



12.7.3. TYPE 1: UNPROTECTED/MARKED CROSSINGS

An unprotected crossing (Type 1) consists of a crosswalk, signing, and often no other devices to slow or stop traffic. The approach to designing crossings at mid-block locations depends on an evaluation of vehicular traffic, line of sight, path traffic, use patterns, vehicle speed, road type and width, and other safety issues such as the proximity of schools. The following thresholds recommend where unprotected crossings may be acceptable:

- Install crosswalks at all path-roadway crossings
- Maximum traffic volumes:
 - Up to 15,000 ADT on two-lane roads, preferably with a median.
 - Up to 12,000 ADT on four-lane roads with median.
- Maximum travel speed
 - 35 mi/h
- Minimum line of sight:
 - 25 mi/h zone: 250 feet
 - 35 mi/h zone: 350 feet
 - 45 mi/h zone: 450 feet

On two lane residential and collector roads below 15,000 ADT with average vehicle speeds of 35 mph or less, crosswalks and warning signs (“LSEV/Bike/Pedestrian Xing”) should be provided to warn motorists, and stop signs and slowing techniques should be used on the path approach. Care should be taken to keep vegetation and other obstacles out of the sight line for motorists and path users. Engineering studies should be done to determine the appropriate level of traffic control and design.

A flashing yellow beacon such as the Pedestrian Hybrid Beacon (PHB) or Rectangular Rapid Flashing Beacon (RRFB, formerly “HAWK”) may be used with a marked crosswalk, activated by the path user rather than operating continuously. Some jurisdictions have successfully used flashing lights activated by motion detectors on the path, triggering the lights as path users approach the intersection. This equipment, while slightly more expensive, informs motorists about the presence of path users. This type of added warning would be especially important at locations with restricted sight distance.

12.7.4. TYPE 2: ROUTE USERS TO EXISTING INTERSECTION

Crossings within 250 feet of an existing signalized intersection with pedestrian crosswalks are often diverted to the signalized intersection for safety purposes. For this option to be effective, barriers and signs may be needed to direct path users to the signalized crossings. Ideally, signal modifications would be made to add pathway user detection and to comply with ADA recommendations.

12.7.5. TYPE 3: SIGNALIZED/CONTROLLED CROSSINGS

New signalized crossings are recommended for crossings more than 250 feet from an existing signalized intersection and where 85th percentile travels speeds are 40 mi/h and above and/or ADT exceeds 15,000 vehicles. Each crossing, regardless of traffic speed or volume, requires additional review by a registered engineer to identify sight lines, potential impacts on traffic progression, timing with adjacent signals, capacity and safety.

Path signals are normally activated by push buttons, but also may be triggered by motion detectors or weight sensors. The maximum delay for activation of the signal should be two minutes, with minimum crossing times determined by the width of the street. The signals may rest on flashing yellow or green for motorists when not activated, and should be supplemented by standard advanced warning signs.

12.7.6. TYPE 4: GRADE-SEPARATED CROSSINGS

Grade-separated crossings are needed where ADT exceeds 25,000 vehicles, and 85th percentile speeds exceed 45 mi/h. Safety is a major concern with both overcrossings and undercrossings. When designed properly, grade-separated crossings practically eliminate any safety concerns related to crossing a roadway.

Grade-separated crossing approaches should minimize the out-of-direction travel required by the path user, so that users don't alternatively attempt to dart across the roadway. Under-crossings, like parking garages, have the reputation of being places where crimes occur, but these safety concerns can be addressed through design.

An undercrossing can be designed to be spacious, well lit, equipped with emergency phones at each end, and completely visible for its entire length prior to entering. For LSEVs, cyclists and pedestrians, the desirable minimum vertical clearance is 12'.

New crossings of the Whitewater Channel may be considered with the preferred alignment. The width of the channel bottom ranges from approximately 565' in width and would not require extensive approach ramps since the channel is sunken below the grade of the path.

12.8. Accessible Path Design

The design guidelines listed above for pedestrian paths, adequately address the needs of people with disabilities. General guidelines include: running slopes not greater than 5% grade and cross slopes at less than 2%. Ramps at 8% may be used, however landings or resting areas must be provided every thirty feet at a minimum. Travel ways shall be a minimum of three feet in width.

Surfaces shall be firm and stable. The Forest Service Accessibility Guidelines defines a firm surface as a path surface that is not noticeably distorted or compressed by the passage of a device that simulates a person who uses a wheelchair.

Curb ramps with high visibility tactile warning strips shall be provided at roadway crossings. It is also a best management practice to provide auditory crossing signals help those with site impairments safely negotiate roadway crossings.



Providing a path that is accessible to everyone, regardless of age or ability, often improves the experience for all users; for instance curb ramps that were originally designed for people in wheelchairs provide easier access for bicyclists and people with strollers. Americans with Disabilities Act (ADA) guidelines currently include:

- Minimum clear width of four feet, and where less than five feet, a passing space should be provided at least every 100 feet.
- Signs shall be provided indicating the length of the accessible path segment.
- Curb ramps shall be provided at roadway crossings and curbs. Tactile warning strips and auditory crossing signals are recommended.
- The path surface shall be firm and stable.⁵

Slopes typically should not exceed 5 percent. However, certain conditions may require the use of a steeper slope. For conditions exceeding a 5 percent slope, the recommendations are as follows:

- 8.3 percent for a maximum of 200 feet
- 10 percent for a maximum of 30 feet
- 12.5 percent for a maximum of 10 feet⁶

Between each maximum gradient run length, a flat rest interval can be provided. To avoid path user conflicts, these rest intervals should ideally be positioned only on the pedestrian path, not on the LSEV / bicycle path.

⁵ The *Forest Service Accessibility Guidelines* defines a firm surface as a path surface that is not noticeably distorted or compressed by the passage of a device that simulates a person who uses a wheelchair.

⁶ FHWA. (2001). *Designing Sidewalks and Paths for Access*, Chapter 14: Shared Use Path Design, Section 14.5.1: Grade.. <http://www.fhwa.dot.gov/environment/sidewalk2/sidewalks214.htm>

CV Link will meet all applicable requirements of the Americans with Disabilities Act (ADA) and the Architectural and Transportation Barriers Compliance Board's Architectural Barriers Act Accessibility Guidelines; Outdoor Developed Areas.

- ADA was fully taken into consideration as a design driver with the development of the design guidelines for CV Link
- LSEVs inherently improve mobility options for people of all abilities
- Design elements will include high visual contrast for the visually impaired
- Drinking fountains will be accessible for wheeled pedestrians and people using recumbent bicycles
- The wayfinding concept makes the corridor readily legible to a wide spectrum of users including the cognitively impaired
- Smartphone technology will provide auditory information.
- The CV Link website will continue to meet ADA requirements
- During the design development and construction phases, public meeting invitations will include contact information should language translation or signing services be needed.

12.9. Path Surface Materials

12.9.1. OVERVIEW

When approaching a path or road project, designers and local agency representatives often assume asphalt or concrete. But this may not be what local residents had in mind or considered until a specific surface was proposed, and then suddenly everyone has an opinion. These conflicts lead designers into exploring possible surfacing options (of which there are more every year), including:

- Traditional asphalt and concrete, with or without recycled materials
- Permeable asphalt and concrete
- Decomposed Granite (DG)
- Rubberized running track materials

12.9.2. SELECTION CONSIDERATIONS

In arriving at a recommended surface, several key criteria have been considered including:

- **Initial Capital Cost** – Construction costs include excavation, subbase preparation, aggregate base placement, and application of the selected path surface and can vary substantially.
- **Maintenance and Long Term Durability** – The anticipated life of a pavement surface can vary from a single year (e.g. bark surface in a moist climate) to 25+ years (e.g. concrete). In addition, each surface has varying maintenance needs that will require regular to sporadic inspections and follow-up depending on the material selected. Some surface repairs can be made with volunteer efforts such as on a crusher fines path, while other surfaces such as concrete will require skilled contractors to perform the repair.
- **Existing Soil and Environmental Conditions** – Soil conditions are predetermined and play a critical role in surface selection. In addition, when considering the use of a permeable concrete or asphalt surface, the success of these surfaces is directly correlated to the permeability of the soil and climatic conditions. The lower the permeability and moisture, the greater the risk of failure. For the Coachella Valley, impermeable soil is obviously not a problem – but sand clogging the pores of the pavement is.
- **Availability of Materials** – A successful path surface in one area of the country may prove cost-prohibitive in another area due to availability of materials. This may be a particular issue for recycled products like glass in asphalt (called “Glassphalt”).
- **Anticipated Use/Functionality** – Who are the anticipated users of the path? Will the path surface need to accommodate maintenance vehicles in addition to LSEVs and bicycles? Does the path provide critical access to a popular destination for many users or is it a local access route to a community park? Multi-use paths attempt to meet the needs of all anticipated path users. This may not be feasible with a single path surface. Considering the shoulder area as a usable surface, it may be possible to provide enough width to accommodate use by those preferring a softer material. Each surface also has varying degrees of roughness and therefore accommodates different users. In-line skates, for example, cannot be used on most permeable concrete surfaces due to the coarseness of the finished surface.
- **Funding Source** – The funding source for the path may dictate the path surface characteristics. If the path has federal funds and is being administered through a state Department of

Transportation (i.e. Caltrans), the DOT will need to review and approve the selected path surface.

- **Susceptibility to Vandalism** - Path surfaces are not usually thought of as being susceptible to vandalism, but the characteristics of the varying surfaces do lend themselves to a variety of vandalism including movement of materials such as crusher fines or graffiti on hard surfaces.
- **Aesthetics** - Each path surface has varying aesthetic characteristics that should fit with the overall design concept desired for the project and for the region in which the path is located.

12.9.3. SURFACING OPTIONS

There are many options related to path surfacing. This choice determines the types of users who can enjoy the path, as well as construction costs, maintenance costs, and other factors. The most common surfacing materials for a path are concrete, or asphalt; less common surfaces are permeable concrete, permeable asphalt, crusher fines, or Glassphalt. The following paragraphs show the path surfacing options reviewed for this project.

Concrete

Concrete was used to build much of the nation's highway system and with rising petroleum prices driving up the cost of asphalt, concrete is once again becoming cost effective. Using modern construction practices, concrete provides a smooth ride for bicycles with low maintenance costs. Runners may prefer to use the softer surface along the sides of the path. Concrete does not become brittle with age or deformed by roots and weeds as with asphalt.



FIGURE 5: CONCRETE PATH SURFACE

It has been speculated that the lighter color of concrete relative to asphalt reduces the heat island effect. There is ongoing research at Arizona State University and the University of California at Davis on this topic. Concrete lasts 25-40 years, must be periodically inspected for uplift and settlement, and repaired as needed. Figure 6 shows a typical concrete path section.

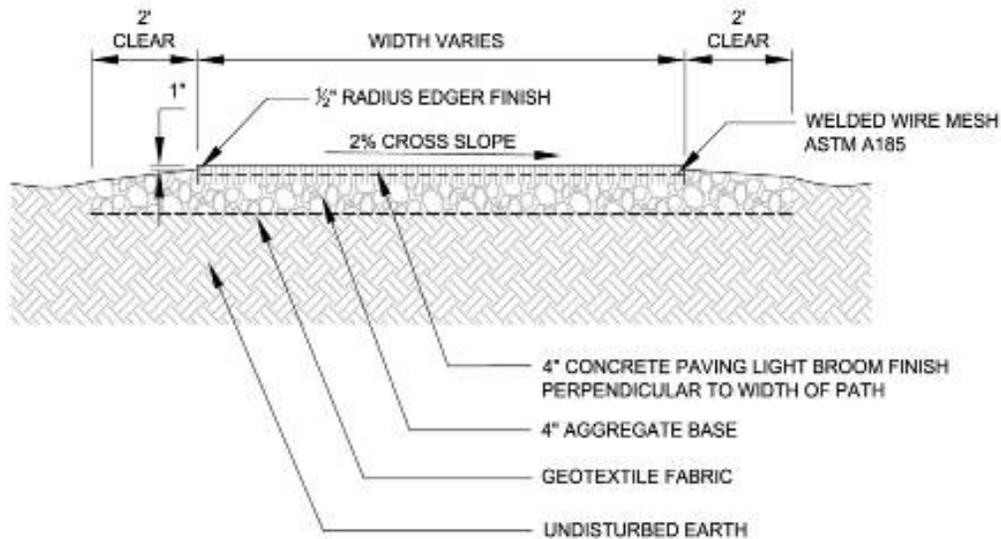


FIGURE 6. CONCRETE PATH CROSS-SECTION⁷

Recycled Materials in Concrete⁸

Concrete typically used for a paved path tread can be composed of recycled materials that otherwise would end up in a landfill instead of new base material. This reuse of materials reduces hauling-related energy consumption and construction waste management. These materials include:

- Recycled Concrete Aggregate (RCA): RCA is granular material manufactured by removing, crushing, and processing hydraulic-cement concrete pavement for reuse with a hydraulic cementing medium to produce fresh paving concrete. Except for removing steel, impurities, and contaminants, this process is identical to the process used to produce aggregate from virgin stone materials. Adding RCA to concrete pavement may reduce costs, depending on the availability of RCA vs. virgin stone materials.⁹
- Fly Ash: Fly ash is a fine, glass-like powder recovered from gases created by coal-fired electric power generation. U.S. power plants produce millions of tons of fly ash annually, which is usually dumped in landfills. Fly ash is an inexpensive replacement for Portland cement used in concrete, and it improves strength, segregation, and ease of pumping of the concrete. The techniques for working with this type of concrete are standard for the industry and will not impact the budget of a job.

⁷ Note: The “clear” shoulders shown on the cross-section should be kept empty of buildings or fences; however, low-lying vegetation or bioswale plantings are encouraged in these areas. Depth of subbase should be determined by a soil analysis.

⁸ Bondurant, Julie and Thompson, Laura. (2009). *Path Planning in California Communities*.

⁹ Additional information available at: <http://www.fhwa.dot.gov/pavement/t504037.cfm>

Permeable Concrete

Permeable concrete allows rain to seep through the surface and percolate into the soil, reducing run-off. The use of permeable pavement systems attenuates the peak discharge of storm water into drainage systems. Regions that receive a lot of rain and a small amount of snow and ice in the winter are good places for permeable-surface concrete. It is less successful in regions that receive a lot of snow and ice during the winter months as the concrete, tends to crack, similar to normal pavement.



FIGURE 7: PERMEABLE CONCRETE

Permeable concrete lasts for approximately 15 years and requires frequent sweeping, pressure washing or vacuuming to keep the pores open and maintain the performance characteristics. Given the sandy desert environment, permeable concrete is not likely to be cost-effective except in very limited quantities and locations.

Asphalt

Asphalt is the most common surface treatment for roads and paths (Figure 8). The material composition and construction methods used can significantly affect the longevity of the surface. Thicker asphalt sections and a well-prepared subgrade will reduce deformation over time and reduce long-term maintenance costs. Asphalt is suitable for a wide variety of users and is less jarring on people's joints than concrete. **Figure 9** shows a typical section of an asphalt path.



FIGURE 8: ASPHALT PATH SURFACE

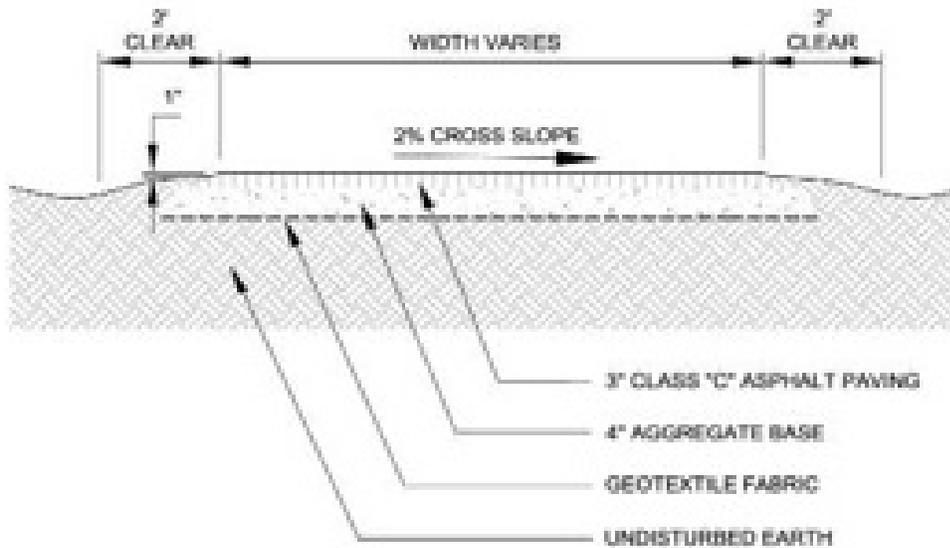


FIGURE 9: ASPHALT PATH CROSS SECTION

However, the different thermal expansion properties of asphalt and concrete means that where a joint is required (e.g. at an undercrossing ramp where concrete must be specified for structural reasons) a bump may form over time. Careful design and ongoing maintenance would be required to maintain a smooth ride and avoid trip hazards.

The edges of asphalt often crumble over time, and the material is prone to cracking, doming, heaving, and settling. To improve the lifespan of the path, an adequate pavement structural section is required to support any maintenance vehicles that may be using the path and enough width is needed to avoid pavement edge break.

Based on observations and analysis of existing asphalt paths, the pavement surfacing will need an overlay or extensive replacement and renovation every 15 to 20 years. Deteriorated sections are easier to remove and replace than concrete. However, this extensive replacement could be mitigated and the expense reduced with preventative maintenance measures such as chip-sealing every five to eight years. Chip seal is not recommended for use near water resources due to the potential for excess oil to be washed off the surface.

Recycled Materials in Asphalt¹⁰

Asphalt can be composed of recycled materials including:

- Glassphalt: A mixture of traditional asphalt and recycled glass. The glass is used to replace some of the sand that would otherwise be found in asphalt. Glassphalt can be installed using the same equipment and procedures as conventional asphalt.
- Reclaimed Asphalt Pavement (RAP)¹¹: RAP can be used as an aggregate in the hot recycling of asphalt paving mixtures. RAP is routinely accepted in asphalt paving mixtures as an aggregate

¹⁰ Bondurant, Julie and Thompson, Laura. (2009). *Path Planning in California Communities*.

¹¹ Source: <http://www.fhwa.dot.gov/pavement/recycling/rap/index.cfm>

substitute and as a portion of the binder in nearly all 50 states. Substitution rates of 10 to 50 percent or more, depending on state specifications, are normally introduced in pavements, and recently developed technology has even made it possible to recycle 90 to 100 percent RAP in hot mix.

- Rubberized Asphalt Concrete (RAC): Also known as asphalt rubber hot mix, this material uses crumb rubber from scrap tires. Below is a list of the benefits of rubberized asphalt according to the California Department of Resources Recycling and Recovery CalRecycle,¹²:
 - RAC can be used at a reduced thickness compared to conventional asphalt overlays--in some cases at half the thickness of conventional material--which may results in significant material reduction and cost savings.
 - RAC is long lasting. It resists cracking, which can reduce maintenance costs.
 - RAC provides better skid resistance, which can provide better traction. Moreover, RAC retains its darker color longer so that road markings are more clearly visible and can reduce road noise.
 - A two-inch-thick RAC resurfacing project uses about 2,000 scrap tires per lane mile.

Permeable Asphalt

Permeable asphalt (Figure 10) is similar in appearance to traditional asphalt. Permeable asphalt is similar to permeable concrete in that it allows rain to seep through the surface, thereby reducing run-off. Paths that are along bodies of water or that may have flooding problems should consider using this surface.



FIGURE 10: PERMEABLE ASPHALT SURFACE

¹² Source: <http://www.calrecycle.ca.gov/tires/RAC/>

Decomposed Granite (DG) Crusher Fines

As a natural path surface, decomposed granite crusher fines or simply DG (Figure 11) is a practical option for narrow facilities that will not see significant traffic. DG provides a stable surface while allowing rainwater to percolate down into the earth.

DG is made from angular crushed rock particles that interlock and bind to form a firm surface. The particle screenings should be graded from 3/8-inch particles to dust, and applied over landscape fabric to a depth of 4-6 inches minimum.



FIGURE 11: DG SURFACE

Costs for DG paths include grading, vegetation clearing, aggregate base, landscape fabric, and crusher fines. Maintenance of paths includes annual inspection and repair of low spots or ruts to avoid erosion and tripping hazards. DG paths should last 5-7 years. Figure 12 shows a standard cross-section of a DG path.

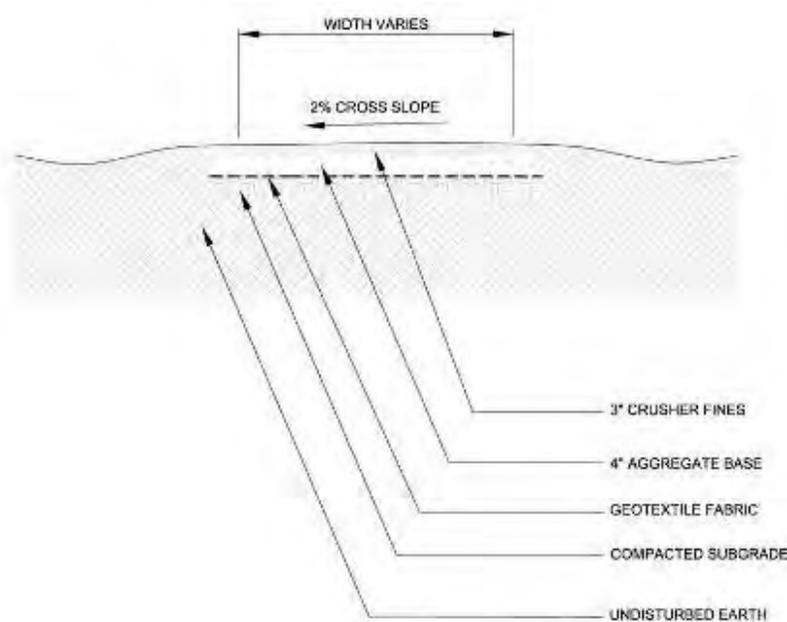


Figure 12: DG cross section

12.9.4. SURFACE MATERIALS SUMMARY

The materials discussed in this section are summarized in Table . Note that wheelchair users typically have the same requirements as high-pressure tire equipped road bicycles, although some power wheelchairs are now available with tires suitable for softer surfaces.

TABLE 13: SURFACE MATERIALS SUMMARY

Product	Description / Installation Method	Life (years)	Maintenance Description	Permeable	Functionality P=Pedestrian S= Skates B=Bike N=NEV	Initial Cost \$/SF
Nike Grind - Atlas Tracks	Prepare subbase, place geotextile, 6" aggregate base, apply Nike grind atlas track rubberized surface over base.	8-10	Reapply binding agent every 5-6 years. Keep surface clean, dirt and sand wear surface down, full replacement needed after 10 years	Yes	P	\$12.50
Nike Grind - Rebound Ace	Prepare subbase, place geotextile, 6" aggregate base, pour concrete or asphalt base, apply rebound Ace surface directly over hard surface.	8-12	Replace topcoat after 10 years	No	P, S, B	\$10.50
Permeable Concrete	Prepared subbase, place geotextile, 12" depth aggregate base, Portland cement, coarse aggregate, water, 5" depth section	15	Vacuum sweep and pressure wash 4 times a year	Yes	P, B, N	\$6.00
Concrete	Prepared subbase, place geotextile, 6" agg. base, Portland cement, aggregate, sand, water 4" depth section	25+	Periodic inspection for uplift and settlement, repair as needed	No	P, S, B, N	\$4.75
Permeable Asphalt	Prepared subbase, place geotextile, 12" depth aggregate base, emulsion and coarse aggregate 2" depth section	8	Vacuum sweep and pressure wash 4 times a year, patch any pot holes as needed	Yes	P, S, B, N	\$3.50
Glassphalt	Prepared subbase, place geotextile, 6" agg. base, asphalt with aggregate/glass, 2" depth section	7-10	Pothole patching	No	P, S, B, N	\$2.75
Reground Asphalt	Prepared subbase, place geotextile 6" aggregate base, emulsion recycled asphalt chips 2" depth section	7-10	Pothole patching	No	P, S, B, N	\$2.75
Asphalt	Prepared subbase, place geotextile, 6" aggregate base, emulsion, aggregate	10	Pothole patching	No	P, S, B, N	\$2.75
Poly Pave	Prepared subbase, place geotextile, 6" aggregate base,	5-10	Reapply Poly pave solidifier every 1-2 years	No	P, S, B, N	\$2.50

Product	Description / Installation Method	Life (years)	Maintenance Description	Permeable	Functionality P=Pedestrian S=Skates B=Bike N=NEV	Initial Cost \$/SF
	grade and shape, mix poly pave in top 2" of base, spray on two top coats of poly pave 2" depth section		depending on level of use. Make spot repairs as needed.			
Chip Seal	Prepared subbase, place geotextile, 6" aggregate base, emulsion, .5" - .75" aggregate, two coat process	7-10	Pothole patching	No	P, B, N	\$2.00
Decomposed Granite (DG)	3/8-inch particles are ground up and applied over landscape fabric to a depth of 4-6 inches minimum.	5-7	Reapply additional material as needed	Yes	P, B, NEV	\$2.00

12.9.5. LIFE CYCLE COST ANALYSIS OF CONCRETE VERSUS ASPHALT

A life-cycle cost analysis has been conducted using the information known at this time about pavement durability. Geotechnical testing of the soils condition and more detailed pavement design tailored to each of the many conditions throughout CV Link will enable a more refined estimate of life-cycle costs.

CV Link - Pavement Cost Comparison

2/19/14

By :

KSR



		Unit Price		Quantity			SY/in	Ton/SF	Cost \$/SF
		Caltrans 2012 Price Index		L (ft)	W (ft)	T (in)	V (cf)	V (CY)	
A.	Rigid Pavement								
	Concrete Pavement (401000)	\$250.00	\$/CM						
		\$191.11	\$/CY	1.00	1.00	6.00	0.50	0.02	\$3.54
	Class 2 Aggregate Base, 260200	\$26.00	\$/CY	1.00	1.00	8.00	0.67	0.02	\$0.64
								Total	\$4.18
B.	Flexible Pavement (HMA)								
	Hot Mix Asphalt, Type A (390132)	\$100.00	\$/ton	1.00	1.00	4.00	0.44	0.03	\$2.56
	Class 2 Aggregate Base, 260200	\$26.00	\$/CY	1.00	1.00	8.00	0.67	0.02	\$0.64
	Class 2 Aggregate Sub base, 250101	\$18.00	\$/CY	1.00	1.00	0.00	0.00	0.00	
								Total	\$3.20
C.	Total Cost (Initial + Maintenance)								
		Concrete	Asphalt	Remarks					
	1. Initial cost (\$/SF)	\$4.18	\$3.20	Asphalt includes load conversion factor 0.0575					
	2. Maintenance								
	Replace Asphalt Concrete Pavement	\$1.06	\$1.42	\$230/CY, Item Code, 390095					
	Interval of Maintenance	45	15						
	Asset Life	75	75						
		\$0.67	\$4.00						
	Total maintenance Cost over (years)	\$0.71	\$5.68						
	Total Cost (Initial + Maintenance)	\$4.89	\$8.88	Assuming 2" Asphalt is removed					
			\$6.04	Assuming 1" Asphalt is removed					

12.9.6. PAVEMENT RECOMMENDATIONS

The following recommendations may be revised when the geotechnical testing has been completed.

Pedestrian Paths

Based on community input and cost considerations, most pedestrian paths will be DG whether separated or adjacent shoulders to the LSEV/bicycle path. Exceptions to this will be where sand accumulation is known - mechanized sweeping will require a hard surface and in these locations asphalt or concrete will be used.

NEV / Bike Paths

Based on the life-cycle cost analysis, concrete with DG shoulders is recommended. The pavement will have recycled glass aggregate sub-base and crushed colored glass seeding in the concrete mix in mixing zones. The DG shoulder provides space for runners and pedestrians where no separate pedestrian path is provided. In areas of high sand accumulation, the shoulders may have a steeper cross fall (camber) and be composed of aggregate only.

Road Connections

Most of these pathways are anticipated to be a single 14' wide concrete path, with 3' DG shoulders where possible.

Undercrossings and Channel Crossings at Grade

A single 14-16' wide concrete path without shoulders will be provided, except where a low pile supported "all-season" path is constructed. In the latter case, a curb-separated concrete pedestrian path may be provided.

Bridges and Overcrossings

A 6' concrete sidewalk will be curb separated from a 14' wide concrete bicycle and LSEV roadway.

12.10. Operating Standards

The US Army Corp of Engineers, Coachella Valley Water District (CVWD) and Riverside County Flood Control and Water Conservation District (RCFCWCD) own much of the area within which the CV Link will occur. Accordingly, operational and maintenance requirements must be respected with the development of any related path facilities.

The main priority for the public agencies is to maintain the flood capacity of Whitewater Channel. Any changes or alterations to the river channel itself must assure that design improvements do not negatively impact flood capacity. Alterations that result in improvements to water quality should be considered.

A maintenance road is currently found along much of the embankment adjacent to the Whitewater Channel. A 20' width is desired for accommodation of maintenance vehicles. Curbs and guardrails present challenges to maintenance vehicles and should be kept to a minimum or be designed to be removable. Straight roadways are preferred with minimum 50' turning radii. CVWD maintenance procedures include:

- Spraying herbicides to control vegetation
- Sediment removal on an as-needed basis
- Debris removal on an as-needed basis

The following matrix represents design features that CVWD may find acceptable within their right-of-way.

		Acceptable	Conditionally Acceptable	Unacceptable	
CVWD Design Parameters					
Updated 24 July 2013					
NOTE: CVWD is not be responsible for any costs associated with the operation or maintenance of the facilities					
Red comments: CVWD, Black comments: Alta					
Items initially marked unacceptable (X) by CVWD, moved to conditionally acceptable after additional discussion/explanation. Items are subject to further review and discussion.					
CVWD Comments (8 July 2013) & Discussion/Resolution (16 July 2013)					
Non-Site Specific Improvements (above slope protection)					
1	14-16' wide concrete path with 2' d.g. shoulders		X		Must support H-20+ loading
2	6-8' wide d.g. or concrete path adjacent to (1)		X		
3	12-24" wide 8" high curb for separation b/t (1) & (2) NEV/bike/maintenance route and pedestrian path		X		
4	5-10' wide planted buffer b/t NEV/bike/maintenance route and pedestrian path		X	X	Initial response no. Per discussion open to separation if space is available and not needed by CVWD. Location dependent, subject to further review.
5	Trees to be 15' away from toe of outside bank of slope protection		X		On non-channel side of bank
5b	Trees to be 20' away from top of slope protection		X		On non independent levee
6	Shrubs >3' tall 15' away from toe of slope protection/HWS		X		On non-channel side of bank; HWS = High Water Surface
7	Grasses and shrubs <3' tall above slope protection		X		On non-channel side of bank.
8	Irrigation above slope protection line		X	X	May be ok 20' away from top of slope protection, drip assumed
9	12" wide x 8" high curb above slope protection		X	X	More explanation required. They are ok with it as long as we acknowledge that it may be damaged and they will not replace.
10	Guardrail above slope protection line		X		Rail would need to be removable for access
11	Barrier or retaining wall above slope protection		X		Want to retain ability to drive down slope.
12	Cut and fill above slope protection		X		
13	Site furnishings above slope protection				
14	Benches, picnic tables, signs, trash receptacles, bike racks		X		
15	Drinking fountains (w/ water line)		X		
16	Water features (splash pad or fountain feature)		X		
17	Light fixtures		X		Structure would need to be removable for access. Clearance to be the same as a bridge minimum.
18	Shade structures (10' vertical clearance)		X		
19	Structures				
20	Restrooms		X	X	Initially said no, ok if it were on surplus lands.
21	Trailhead vehicle parking and NEV charging stations		X		
22	Elevated pathway with structural support embedded in levee		X	X	Initial "no" response." Maybe 30-40' from slope protection would be ok. Bring this idea back for additional discussion.
Non-Site Specific Improvements (below slope protection)					
23	14-22' wide pile supported pathways at bridge underpasses		X		
24	Decorative treatments of concrete slope lining				Overall concern for maintenance and impact to slope protection. Welcome to bring below ideas back with additional information.
25	Paint or-colored stain		X		CVWD not responsible for maintenance as noted above
26	Sand blasted decorative patterns			X	Concern about integrity of concrete
27	Painted, tile or glass mural art			X	Concern about integrity of concrete
28	Decorative lighting mounted to concrete			X	More explanation required

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APPENDIX 13. PLANTING GUIDELINES

The purpose of these guidelines is to provide an organized approach to defining and recognizing the CV Link throughout the Coachella Valley. Creativity is encouraged, as all conditions have not been defined at this time.

13.1. Overview

The Coachella Valley is classified as a “tropical desert” where there can be frost in the winter and temperatures that reach 120 in the summer. The coldest month is typically December and the hottest is July. The average annual rainfall is less than 4” and it typically occurs in the fall and winter with occasional monsoon conditions that bring in higher levels of humidity and intermittent rainfall. Flash floods often occur during monsoon season, which is the time that the Whitewater wash will often be flowing with runoff. Evergreen plants grow nearly year round with a short dormancy. This results in an exceptional rate of growth for the arid climate if adequate watering is provided. Annual color is tricked into blooming in the late winter by the high UV light index and warm daytime temperatures. See Attachment A for evapotranspiration rates.

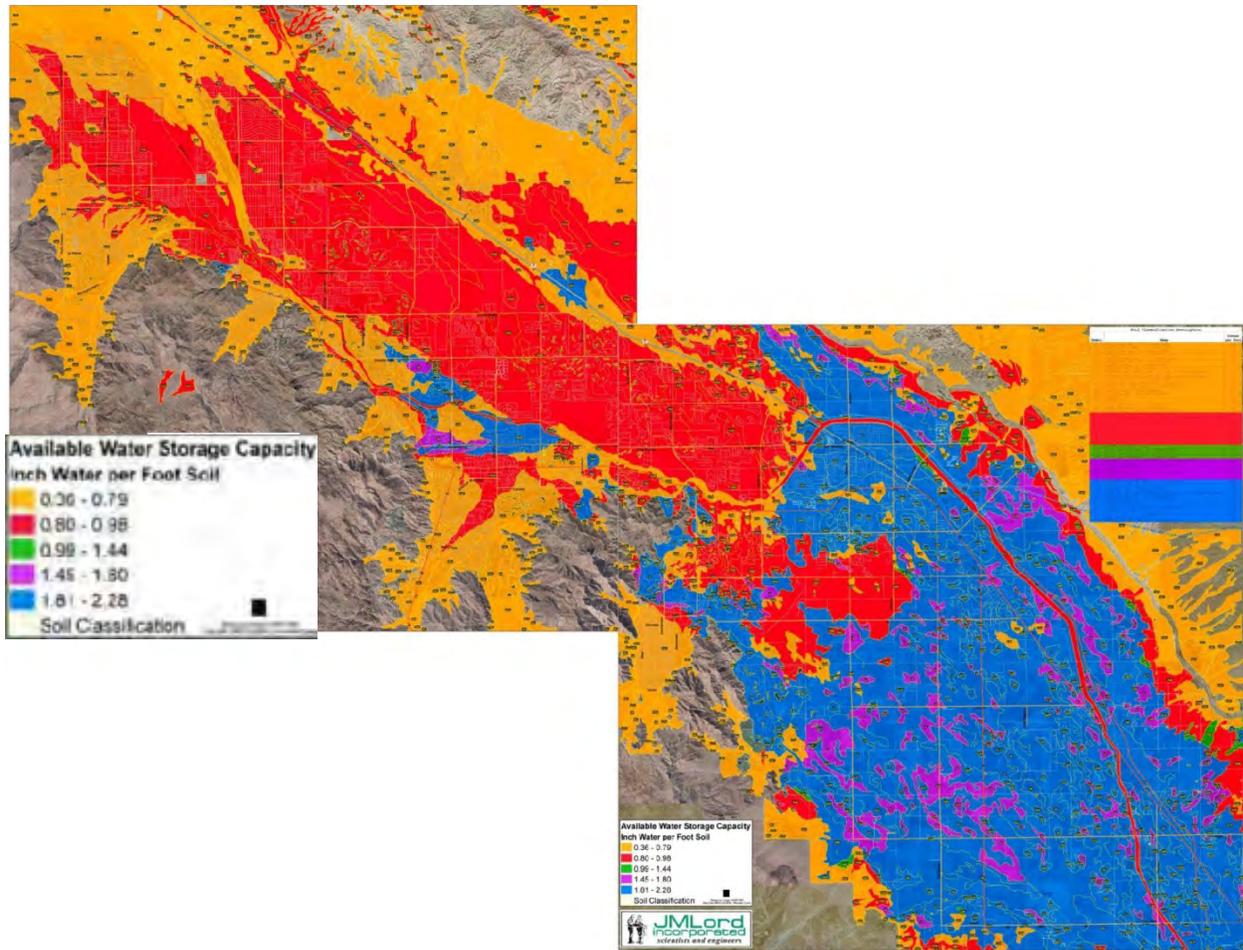
Water in the desert is held in an aquifer below the desert floor and is in good supply. Every effort needs to be made to minimize the use of water in the landscape. The Coachella Valley Water District (CVWD) has a very good book available to the public on this topic and is a wonderful resource on plant material selection. The State of California passed Model Efficient Landscape Ordinance AB 1881 in January 2010 in an effort to manage this precious resource through design.

13.2. Coachella Valley Soils

There are sandy soils in Desert Hot Springs, Palm Springs, Thousand Palms, Bermuda Dunes and the windy areas of Palm Desert. There is little for plant nutrition and with most non-native plants, soil amendments including fertilizer, mulch, and compost need to be added to the plant backfill. Watering in these fast draining soils needs to be sufficient to overcome the wind and heat.

The foothills edging the valley, including the coves of La Quinta, Palm Desert, Cathedral City and south Palm Springs, are either rocky or so dense that water needs to be applied slowly. This may mean changing irrigation control clocks to run for only a minute or two but have several start times per day. In order to improve the drainage of these soils, compost should be added to allow larger gaps in the soil to prevent water, fertilizer, and soil particles from packing in tightly.

The Whitewater Wash is composed primarily of fluvents within the Coachella Soils Series. The soil has been worked by water as well as wind and can usually be found near the old streambed of the Whitewater River flood course. It is probably the best soil in the Coachella Valley because it is an ideal mix of available water-holding capacity, permeability, and drainage. Stratifications are often present, but they are usually thin and deep, posing only a problem to deep-rooted trees. A deep planting hole will usually solve this problem because the backfill will have shattered and mixed up the restricting layer.



13.3. Planting Design Concept

13.3.1. CONCEPT INTRODUCTION

The landscape design for the CV Link has been conceived to reinforce the overall design concept of *contrast* by introducing color, vibrancies, and levity into the planting design. Interesting forms and textures will be derived from native species found in the Mojave and Sonoran desert environments. The use of grasses will soften the edges and provide kinetic motion. Low water demand materials will contrast the bold, contemporary forms of architectural elements such as shade, seating, walls, and planter areas. Plants with spines, thorns, and other potentially harmful characteristics must be carefully considered to not be a danger to users. Planting is not planned along the entire length of the path.

A plant palette and matrix (Attachment C), illustrates the following eight conditions along CV Link and the preferred plant material choices that help inform the design:

1. Slopes
2. Barriers
3. Windbreaks
4. Speed Zones
5. Social nodes
6. Connections
7. Charging Stations
8. Channel protection

13.3.2. COLOR THEME

The primary choices for flowering shrubs and ground cover will be orange with contrasting accents of purple, blue, and violet. Yellow and pink will be used to complement these colors where they can be viewed and appreciated. A seasonal color chart is provided as part of this technical resource document.

13.3.3. PLANTING GUIDELINES

CVWD Standards – Trees are to be 15’ from levee toe of slope on the non-channel side of levees. In places where slope protection is adjacent to the property line without a freestanding levee configuration, trees are to be 20’ from slope protection. Grasses and shrubs under 3’ high may be planted on levees as well as adjacent to slope protection. Please refer to the typical cross-sections within the Design Guidelines for additional information on CVWD requirements.

Slopes – Plants under 3’ in height will be used on slopes on the non-channel side and above slope protection where permitted. The best way to retain soil on slopes is with a variety of rooting depths. Native seeds are proposed above concrete slope protection that are hydroseeded and established with temporary water. Species such as *Eschscholzia californica* (California poppy), *Lupinus texensis* (Lupine), and *Arbronia maritima* (sand verbena) are suggested in the plant palette.

Barriers – Planting that will be used to define edges, separate users, and provide privacy to adjacent landowners. Typically, these areas are 5’-8’ in width; however, there are locations where small trees may be used for barrier planting.

Windbreaks – A combination of heights and types of plants provide the best opportunity to break up the wind. This is especially important on the west end of the Valley.

Speed zones – Long stretches of the CV Link are considered speed zones and will emphasize speed and efficiency of travel. These areas will emphasize movement predominantly through the judicious use of low-maintenance, low water use grasses. Transitions to major access points and social nodes will be planted with *Phoenix dactylifera* (Date palm) or *Washingtonia robusta* (Mexican fan palm). Spacing will be used to provide a visual cue about speed with 50' spacing indicating the highest rate of speed. As pathway users approach caution areas such as pathway intersections or high use areas, spacing would be reduced to as little as 20'.

Social Nodes – These locations will have shade trees and interesting plantings for those seeking to rest, relax, be social or otherwise have a moment of pause.

Connections – Access to CV Link from adjoining properties may be as wide as 40' and as little 20'. Plant material selections will be sensitive to the ultimate growth characteristics of each plant and provide another thematic queue that is consistent throughout the entire length of CV Link.

Charging stations – These locations will have shade, interesting planting, and a thematic design that carries throughout the project.

Slope protection areas – At locations above the top of concrete slope protection there are numerous opportunities to introduce plantings of native seeds that will bloom and thrive on seasonal rainfall once established. Several seed choices are included, as well as the use of self-attaching vines at the top of the concrete slope protection to help soften the hard lines of the channel. Glare and heat will also be reduced through the strategic placement of these types of plants that are placed on drip irrigation.

Root Barriers – Where trees are planted within 5' of paved surfaces, in raised planters or above slope protection, root barriers will be used. BioBarrier or Deep Root Barriers will be acceptable.

Maintenance – Where date palms are selected consideration for long-term maintenance costs will be reduced if a local date company harvests dates. Often times the date company will maintain trees and pay a portion of water costs to have access to the fruit. If this option is not feasible, watering of dates can be drastically reduced and fruiting will not take place. Trimming of fronds will be the only required maintenance just like any other trees that are selected for CV Link. Pruning practices should be limited to keeping natural forms by selectively thinning branching. Tree pruning will follow standard arboricultural practices in the desert where tree canopies are reduced in size once a year to provide deeper root growth and reduction of wind damage.

13.3.4. IRRIGATION

Irrigation design will meet CVWD design standards. Irrigation will be designed to accommodate grade differences by separating zones for top, center and bottom of slope. All spray and rotor irrigation must be installed to eliminate overspray into access, sidewalks, and hardscape. Flow sensors and master valves are required by CVWD downstream of the all points of connection.

Drip irrigation will be provided for all planting and will be controlled by smart weather-based equipment with rain sensors. *At this time, solar-powered controllers do not support flow control valves and master valves required by CVWD.*

Where planting is permitted above concrete slope protection, aboveground systems such as Salco Irrigation will be considered using UV-resistant pipe. Typical details for CVWD approved installations are included as part of this technical guide.

The plant palette is presented on the following pages. These varieties should be considered a menu of possibilities; the final selection will depend on availability and budget.

13.4. Plant Palette

LATIN NAME	COMMON NAME	IMAGE	MAX SIZE	WATER	BLOOM	BLOOM SEASON	EXPOSURE	BARRIERS	SLOPES	WIND BREAKS	SPEED ZONES	SOCIAL NODES	CONNECTIONS	PATH SEPARATION	SHADE STRUCTURE	CHANNEL (OPTIONAL)
Trees																
Acacia aneura	Mulga		20' h x 20' w	L	Yellow	Spring-Summer	Full sun			X				X		
Acacia farnesiana	Sweet Acacia		15-25' h & w	L	Yellow	Winter-Spring	Full sun	X	X	X	X	X	X	X		
Acacia Stenophylla	Shoestring Acacia				Creamy White	Fall - Spring	Full sun							X	X	
Chilopsis linearis	Desert Willow		30' h x 25' w	M	Pink-Purple	Spring - Summer	Full sun					X	X			X
Parkinsonia floridum	Blue Palo Verde		35' h x 30' w	L	Yellow	Spring - Summer	Full sun	X	X	X					X	X
Parkinsonia x. 'Desert Museum'	Desert Museum		25' h x 25' w	L	Yellow	Spring	Full sun					X	X		X	X
Parkinsonia praecox	Palo brea		20-30' h & w	L	Yellow	Spring - Summer	Full sun	X	X	X	X	X	X	X	X	X
Phoenix dactylifera	Date Palm		60' h x 20' w	L	Creamy Yellow	Spring - Summer	Full sun				X	X		X		
Phoenix roebellini	Pigmy Date Palm		6-10' h & w	M	None	N/A	Full sun					X	X		X	
Pinus eldarica	Afghan Pine		30-40' h & w	M	None	N/A	Full sun	X	X							
Prosopis chilensis 'thornless'	Thornless Chilean Mesquite		25' h x 25' w	L	Yellow-Green	Late Spring	Full sun	X				X			X	
Rhus lancea	African sumac		20-25' h & w	M	Whitish-Green	Spring	Full sun	X	X	X	X	X	X		X	
Tipuana tipu	Tipu		25'-40' h x 30'-60' w	M	Yellow	Spring	Full sun					X	X		X	
Washingtonia filifera	California fan palm		35' 40' h	M	Creamy Yellow	Spring	Full sun				X	X	X		X	X

LATIN NAME	COMMON NAME	IMAGE	MAX SIZE	WATER	BLOOM	BLOOM SEASON	EXPOSURE	BARRIERS	SLOPES	WIND BREAKS	SPEED ZONES	SOCIAL NODES	CONNECTIONS	PATH SEPARATION	SHADE STRUCTURE	CHANNEL (OPTIONAL)
Washingtonia robusta	Mexican fan palm										X			X		

Citrus Trees

Grapefruit		10' -12' h & w	M	White	Spring	Full sun	X	X	X	X	X					
Orange		10' -12' h & w	M	White	Spring	Full sun	X	X	X	X	X					
Lemon		10' -12' h & w	M	White	Spring	Full sun	X	X	X	X	X					
Lime		10' -12' h & w	M	White	Spring	Full sun	X	X	X	X	X					

Groundcover

Acacia redolens 'Prostrata'	Desert Carpet		2' h x 8' w	L	Yellow	Spring	Full sun	X								
Baccharis x centennial	Prostrate Desert Bloom		2' h x 6' w	L	White	Spring	Full sun	X								
Carissa "Green Carpet"	Prostrate Natal Plum		2' h x 4' w	L	White	Spring-Summer	Part shade	X								
Dalea capitata	Golden dalea		1' h x 3' w	M	Yellow	Spring-Fall	Reflected	X								
Dalea greggii	Trailing indigo bush		1 1/2' h x 10' w	L	Light Purple	Spring	Full sun	X								
Eschscholzia californica	California poppy		2' h & w	L	Yellow-Orange	Spring-Summer	Full sun	X								
Evolvulus glomeratus	Hawaiian Blue Eyes		1' h x 3' w	M	Blue-Purple	Spring-Summer	Part shade	X								
Guara lindheimeri	Gaura		3' h x 3' w	M	Pink-White	Summer-Fall	Part Shade	X								
Lantana 'Spreading Sunset"	Spreading lantana		3' h x 8' w	M	Orange	All	Full sun	X								
Myoporum parvifolium	Myoporum		4" h x 6' w	H	White	Spring	Part Shade									

LATIN NAME	COMMON NAME	IMAGE	MAX SIZE	WATER	BLOOM	BLOOM SEASON	EXPOSURE	BARRIERS	SLOPES	WIND BREAKS	SPEED ZONES	SOCIAL NODES	CONNECTIONS	PATH SEPARATION	SHADE STRUCTURE	CHANNEL (OPTIONAL)
Ruellia brittoniana 'Katie'	Dwarf Ruellia		1' h x 2' w	M	Blue-Purple	Summer-Fall	Full sun		X							
Trachelospermum jasminoides	Star jasmine		2' h x 6' w	H	White	Spring	Part shade		X							
Verbena peruviana	Verbena		1' h x 3' w	M	Purple, Pink	Spring-Fall	Full sun		X							
Shrubs																
Caesalpinia pulcherrima	Red Bird of Paradise		10' h x 10' w	L	Orange-Yellow	Summer	Full sun					X	X		X	X
Calliandra californica	Baja Fairy Duster		6' h x 4' w	L	Red	Spring-Fall	Full sun	X				X				
Callistemon "Little John"	Dwarf Bottlebrush		3' h x 3' w	M	Red	Fall-Spring	Full sun		X		X	X	X	X	X	
Carissa "Boxwood Beauty"	Dwarf Natal Plum		2' h x 2' w	M	White	Spring-Fall	Part shade		X							
Cassia nemophila	Green Cassia		8' h x 8' w	L	Yellow	Winter-Spring	Reflected	X								
Dodonea viscosa	Hopseed Bush		15' h x 10' w	M	Inconspicuous	None	Full sun	X		X						
Encelia farinosa	Brittle Bush		3' h x 4' w	L	Yellow	Spring	Full sun		X						X	X
Ficus nitida columnar	Indian Laurel Fig		20' h x 5' w	L	Inconspicuous		Full sun			X			X			
Hamelia patens	Firebush		5' h x 5' w	M	Orange	Spring-Summer	Full sun					X	X	X	X	
Ixora coccinea	Jungle Flame		4' h x 4' w	M	Orange	Winter-Spring	Part shade					X	X		X	
Justicia spicigera	Mexican Honeysuckle		4' h x 4' w	M	Orange	Spring-Fall	Part Sun					X	X	X	X	X
Larrea tridentata	Creosote Bush		8' h x 8' w	L	Yellow	All	Reflected	X		X		X	X		X	X

LATIN NAME	COMMON NAME	IMAGE	MAX SIZE	WATER	BLOOM	BLOOM SEASON	EXPOSURE	BARRIERS	SLOPES	WIND BREAKS	SPEED ZONES	SOCIAL NODES	CONNECTIONS	PATH SEPARATION	SHADE STRUCTURE	CHANNEL (OPTIONAL)
Leucophyllum "Green Cloud"	Green Cloud		6-8' h x 6-8' w	L	Purple	Summer-Fall	Reflected	X	X	X	X	X	X	X	X	X
Leucophyllum pruinosum	Sierra Bouquet		6-8' h x 6-8' w	L	Blue-Violet	Summer-Fall	Reflected	X	X	X	X	X	X	X	X	X
Leucophyllum langmaniae	Lynn's Legacy		5' h x 5' w	L	Lavender	Summer and Fall	Reflected	X	X	X	X	X	X	X	X	X
Leucophyllum lanmaniae 'Rio Bravo'	Rio Bravo		5' h x 5' w	L	Lavender	Summer	Reflected	X	X	X	X	X	X	X	X	X
Russelia equisetiformis	Coral Fountain		5' h x 5' w	M	Red-Orange	Spring - Summer	Part shade			X	X	X			X	
Simmondsia chinensis	Jojoba		8' h x 8' w	L	Green	Spring	Full sun	X	X	X	X				X	X
Tagetes lemmonii	Desert Marigold		4' h x 4' w	M	Yellow	Fall	Part shade		X			X	X	X	X	X
Tecoma x. 'Orange Jubilee'	Orange Bells		12' h x 8' w	L - M	Orange	Spring-Fall	Full sun			X		X	X		X	
Thevetia peruviana	Lucky Nut		25' h x 25' w	M	Yellow	Spring-Fall	Reflected	X	X	X	X				X	
Grasses																
Aristida purpurea	Purple Three Awn		12"-20" h & w	M	Purple	Spring-Fall	Full sun		X	X	X	X	X	X	X	X
Muhlenbergia c. 'Regal Mist'	Pink Muhly		4' h x 5' w	M	Purple-Pink	Summer-Fall	Reflected		X	X	X	X	X	X	X	X
Nassella tenuissima	Mexican Feather Grass		2' h x 2' w	L	None	N/A	Full		X	X	X	X	X	X	X	X
Succulents/Cactus																
Agave americana	Century plant		10' h x 10' w	L	None	N/A	Reflected	X				X	X		X	
Agave parryii v parryii	Parry's agave		2' h x 2' w	L	None	N/A	Full sun					X	X		X	
Agave desmettiana	Smooth agave		3' h x 3' w	L	None	N/A	Full sun					X	X		X	

LATIN NAME	COMMON NAME	IMAGE	MAX SIZE	WATER	BLOOM	BLOOM SEASON	EXPOSURE	BARRIERS	SLOPES	WIND BREAKS	SPEED ZONES	SOCIAL NODES	CONNECTIONS	PATH SEPARATION	SHADE STRUCTURE	CHANNEL (OPTIONAL)
Agave vilmoriniana	Octopus agave		6' h x 6' w	L	None	N/A	Full sun					X	X		X	
Agave geminiflora	Twin flowered agave		3' h x 3' w	L	None	N/A	Reflected					X	X	X		
Asclepias subulata	Desert Milkweed		4' h x 4' w	L	Yellow	Spring-Fall	Full sun					X	X	X		
Aloe 'Blue Elf'	Blue Elf Aloe		3' h x 3' w	L	Orange-Red	Winter-Spring	Part sun					X	X	X		
Aloe Vera	Medicinal Aloe											X	X		X	
Dasyliroium longissimum	Mexican Grass Tree		10' h x 6' w	L	None	N/A	Full sun					X	X			
Dasyliroium wheeleri	Desert Spoon		5' h x 5' w	L	None	N/A	Full sun	X				X				X
Fouquieria splendens	Ocotillo		15' h x 10' w	L	Orange-Red	Spring	Full sun	X					X		X	
Hesperaloe 'Brakelights'	Red Yucca		3' h x 3' w	L	Red	Spring-Summer	Full sun					X	X	X	X	
Pedilanthus macrocarpus	Lady Slipper		3' h x 3' w	L	Orange-Red	Spring-Fall	Full sun					X	X	X	X	
Yucca rostrata	Beaked Yucca		10' h x 5' w	L	White	Late Spring	Full sun	X				X	X		X	
Vines																
Bougainvillea species	N/A		20' h x 15' w	L	Orange, Red, Pink	Spring-Fall	Full sun	X								
Calliandra haematocephala	Powder Puff Vine		10' h x 10' w	L	Red	Fall-Spring	Part shade					X	X		X	
Campsis radicans	Orange Trumpet vine		20' h x 20' w	M	Orange	Summer-Fall	Part shade					X	X		X	
Duranta repens	Skyflower		20' h x 15' w	L	Purple	Summer-Fall	Full sun					X	X		X	

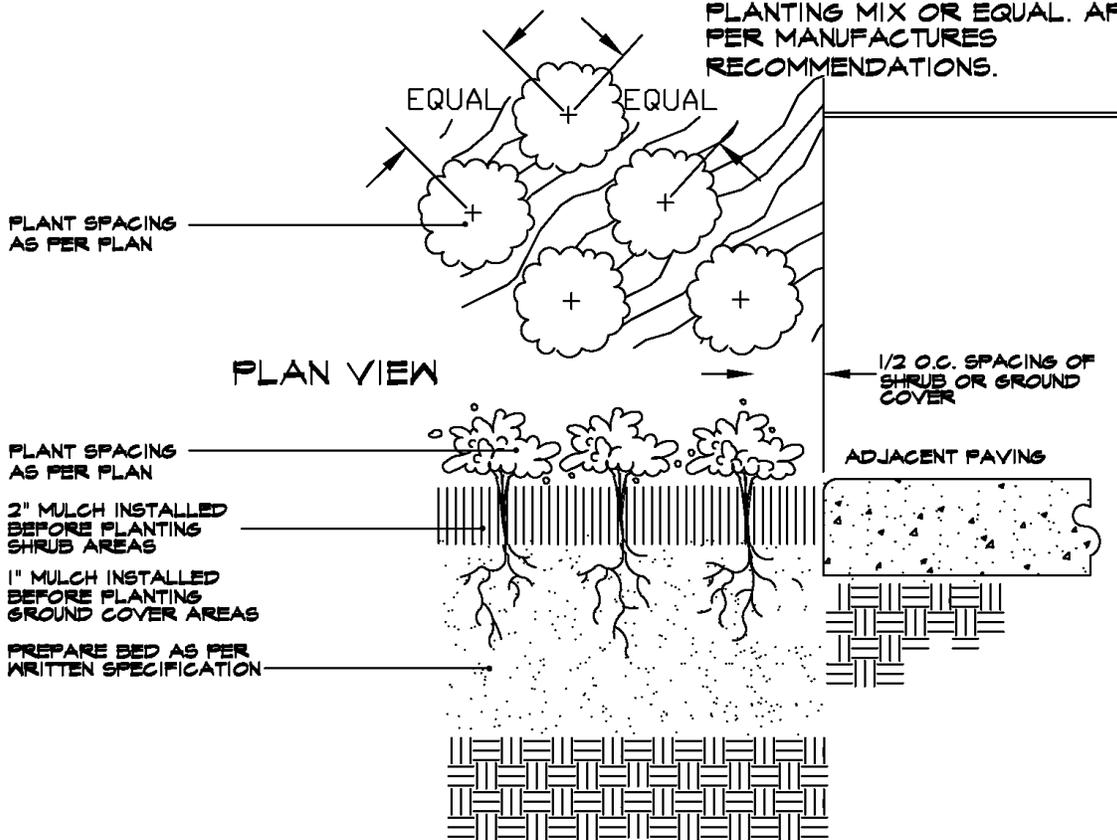
LATIN NAME	COMMON NAME	IMAGE	MAX SIZE	WATER	BLOOM	BLOOM SEASON	EXPOSURE	BARRIERS	SLOPES	WIND BREAKS	SPEED ZONES	SOCIAL NODES	CONNECTIONS	PATH SEPARATION	SHADE STRUCTURE	CHANNEL (OPTIONAL)
Macfadyena -unguis-cati	Cat Claw		40' h x 40' w	L	Yellow	Spring	Part sun		X			X	X		X	

13.5. Landscaping Details

The following pages cover these topics:

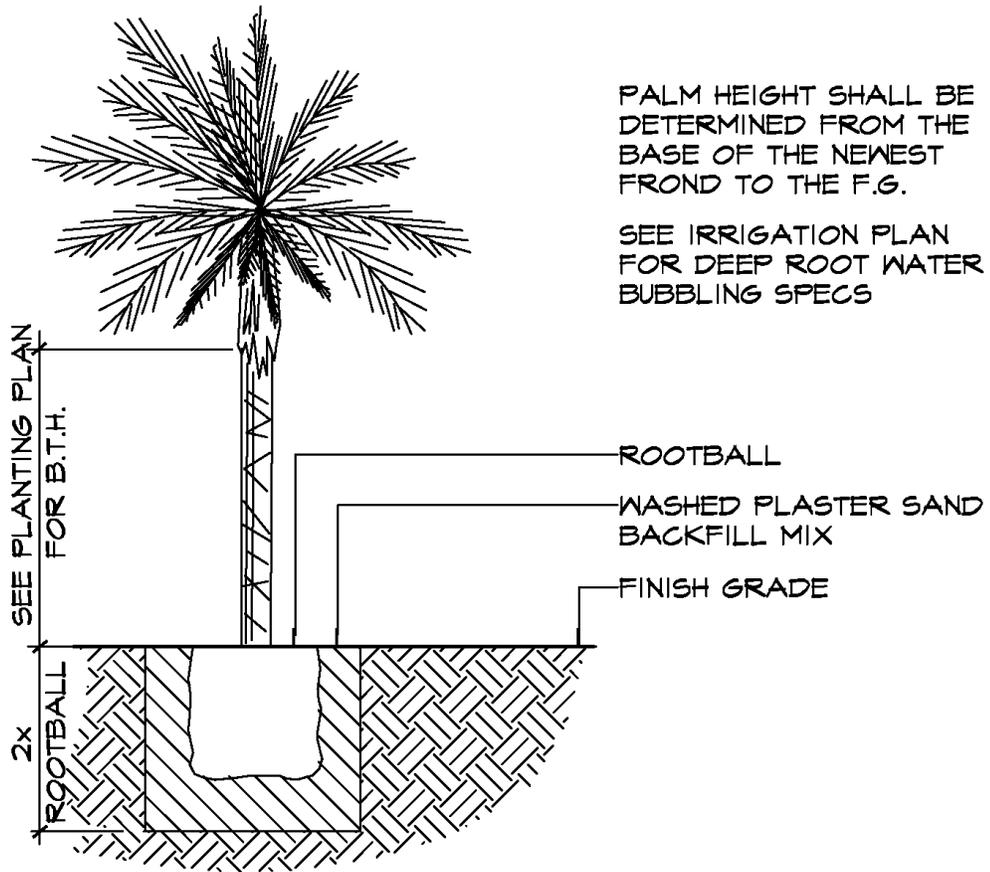
- GROUND COVER
- PALM PLANTING
- DEEP ROOT BARRIER
- SHRUB/VINE PLANTING
- TREE PLANTING
- VINE ON WALL
- DEEP ROOT WATERING SYSTEM
- MASTER VALVE
- QUICK COUPLER
- TRENCHING
- TREE/PALM BUBBLER
- SHRUB EMITTER
- BALL VALVE
- SLEEVING
- FLOW SENSOR
- REMOTE CONTROL VALVE
- DRIP REMOTE CONTROL VALVE
- CONTROLLER
- AUTOMATIC FLUSH VALVE
- EMITTER ASSEMBLY
- SHRUB EMITTER ASSEMBLY
- POINT-TO-POINT LATERAL LAYOUT

NOTE: BACK FILL MIX FOR DESERT PLANTS TO BE NATIVE SITE SOIL ONLY. ALL OTHER PLANTS SHALL RECEIVE DR. EARTH PLANTING MIX OR EQUAL. APPLY PER MANUFACTURES RECOMMENDATIONS.



SECTION

GROUND COVER



PALM PLANTING

Linear Style Planting with DeepRoot Barriers

Determine the correct number of panels to be used. Depending upon the actual planting plan and the number of trees involved the length of linear barrier will vary, but as a general rule of thumb take the anticipated mature canopy diameter of the tree and add 2 feet (61cm). This will be the number of feet necessary for a Linear style planting application. (See chart below.)

A. Choose the barrier that best suits the application. Generally if a sidewalk, patio or driveway is to be protected, 18" (48cm) (LB 18-2) is sufficient depth with 12" (30cm) (LB 12-2) as an alternate choice for non-aggressive, deeper rooting trees. However for curb and gutter protection or more aggressive roots 24" (61cm) (UB 24-2) is generally the better choice.

B. Dig the trench to the depth based upon the particular barrier chosen.

C. Install the barrier. When using DeepRoot Linear Barriers simply pull the appropriate number of panels out of the box (they come preassembled) and separate the joiner at the correct length. When installing DeepRoot Universal Barriers in a linear fashion you will need to join the appropriate number of panels together.

D. Next place the barrier in the trench with the vertical ribs facing toward the tree and align in a straight fashion. It is helpful to place the barrier against the hardscape. Use the hardscape as a guide and backfill against the barriers to promote a clean smooth fit to the hardscape. Be sure to keep the barrier's double top edge at least 1/2" (13mm) above grade to ensure roots do not grow over the top.

E. Plant the tree(s). The Linear style offers a more expansive rooting growth area, however adverse soil and drainage conditions may exist in the actual planting area. Take steps to ensure healthy growth of the tree at planting. Consult with a local Arborist for planting tips and recommendations.

F. If the tree(s) will be subject to maintenance work such as lawn mowing or weed trimming we strongly recommend the installation of ArborGard+ Tree Trunk Protectors which is placed around the base of young trees to protect them from damage by weed trimmers, lawn mowers and small rodents.

For additional information please consult the 16 page DeepRoot Product Selection and Installation Guidelines.

For information regarding distributors please call: 1 800 ILV ROOT (458.7668). For help with difficult drainage or other difficult installation questions please call DeepRoot Technical Support at: 1 800 ROOT TEK (766.8835).

For a simple formula to determine the quantity of panels required for a Linear application use:

$$\text{Estimated Diameter of the Tree Canopy at Maturity} + 2' (61\text{cm}) = \text{Length of Barrier per Side.}$$

As little as one side of the tree may need barrier for root direction as there may be no hardscape elsewhere requiring protection.

Note: Linear Barriers (LB 12-2 and LB 18-2) are packaged in 2' (61cm) long panels with pre-attached flexible joiners ready to pull out of the carton and install in one continuous line of up to:

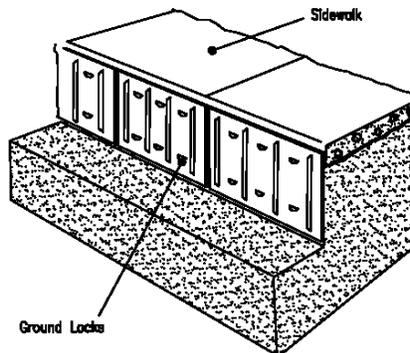
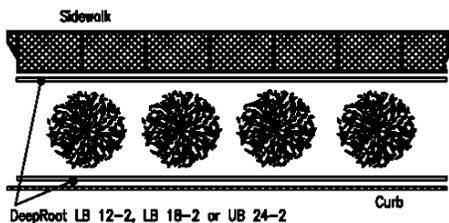
LB 12-2 80' (24 m) per Carton
 LB 18-2 52' (16 m) per Carton

Line can be separated at any two foot interval.

For One Side of Tree

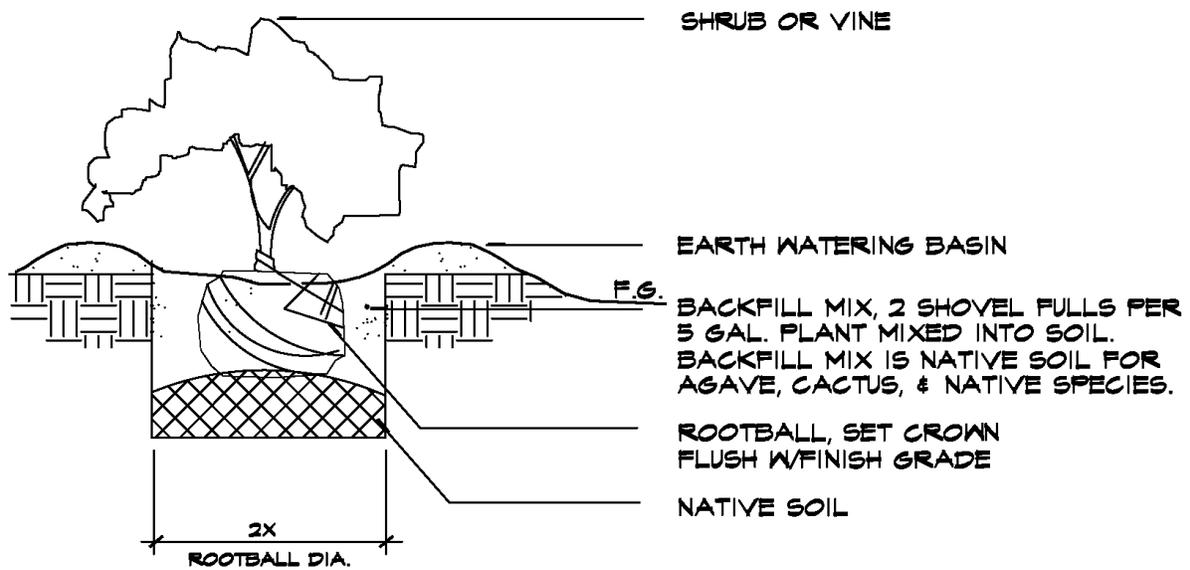
Expected Tree Canopy at Maturity	Number of Feet of Linear Barrier (LB 12 or LB 18)	Optional Universal Barrier (UB) in number of Panels
12' (3.6m) Diameter	+2' (61cm) = 14' (4.2m)	7 Panels
18' (5.5m) Diameter	+2' (61cm) = 20' (6.1m)	10 Panels
24' (7.3m) Diameter	+2' (61cm) = 26' (7.9m)	13 Panels

DeepRoot LB 12-2, LB 18-2 or UB 24-2



TO BE 24" DEEP ON ALL SIDES

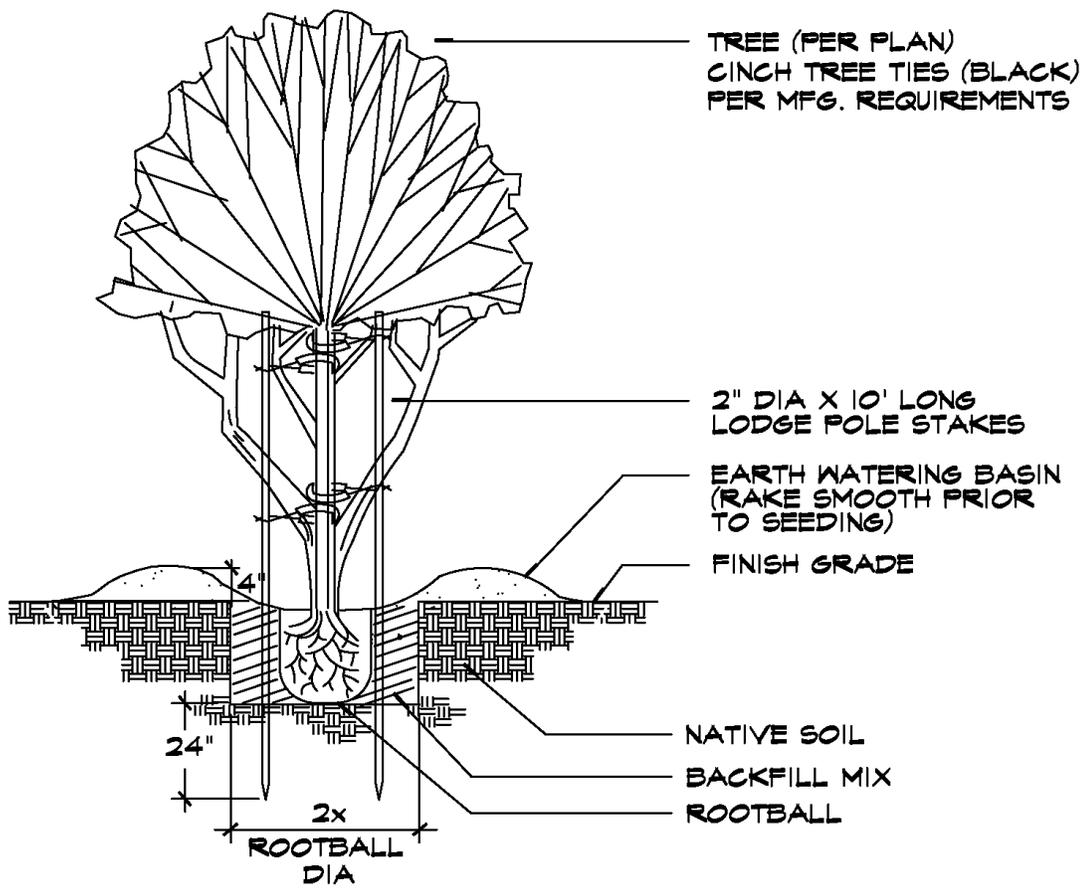
13.5.4. SHRUB/VINE PLANTING



SHRUB/VINE PLANTING

13.5.5.

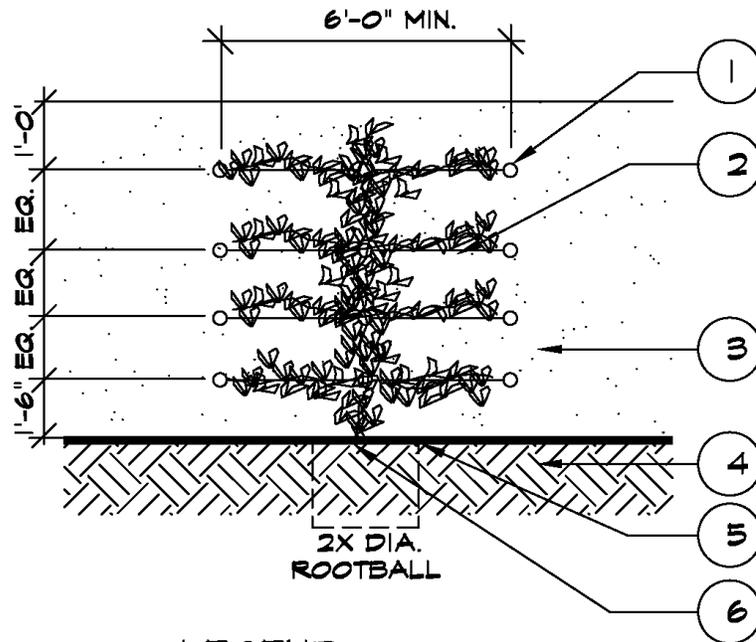
TREE PLANTING



TREE PLANTING

13.5.6.

VINE ON WALL

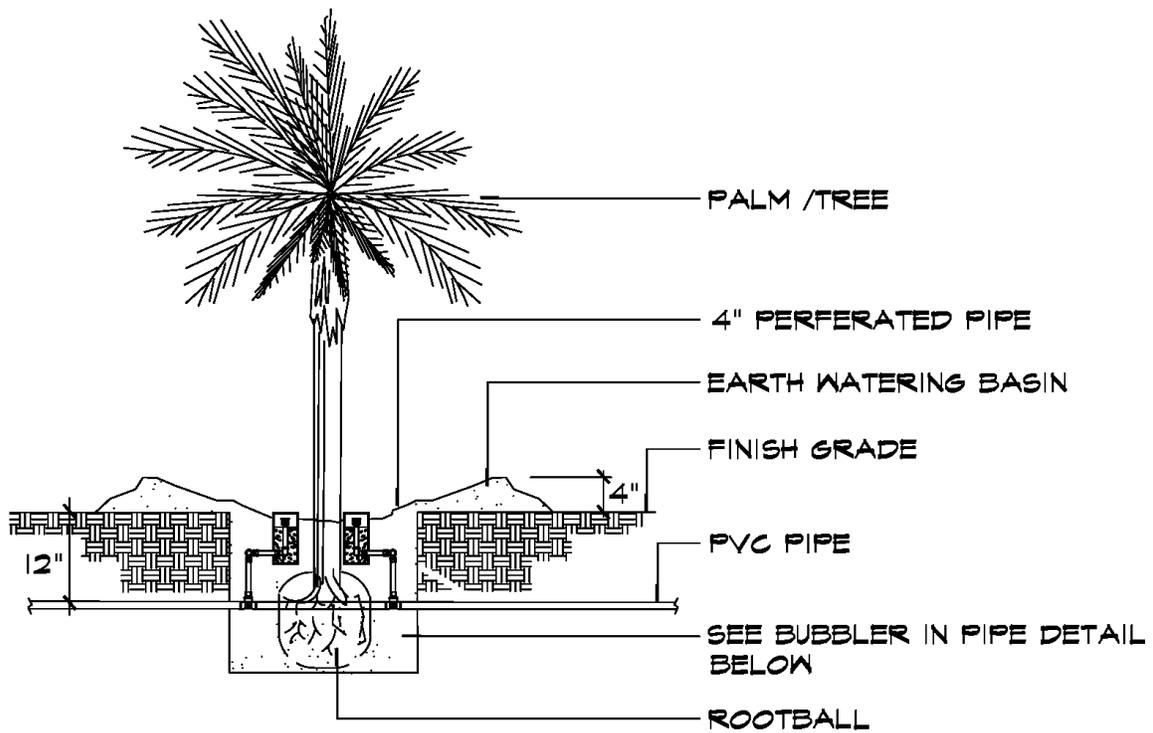


LEGEND

1. 1" x 1" EYE BOLTS
2. 1/8" GALVANIZED CABLES (TYP.)
ATTACH VINES TO CABLES WITH
TIE WIRE.
3. WALL/FENCE
4. AMENDED SOIL
5. PLANT DIRECTLY
ADJACENT TO VERTICAL
GRADE
6. SEE SHRUB PLANTING
DETAIL

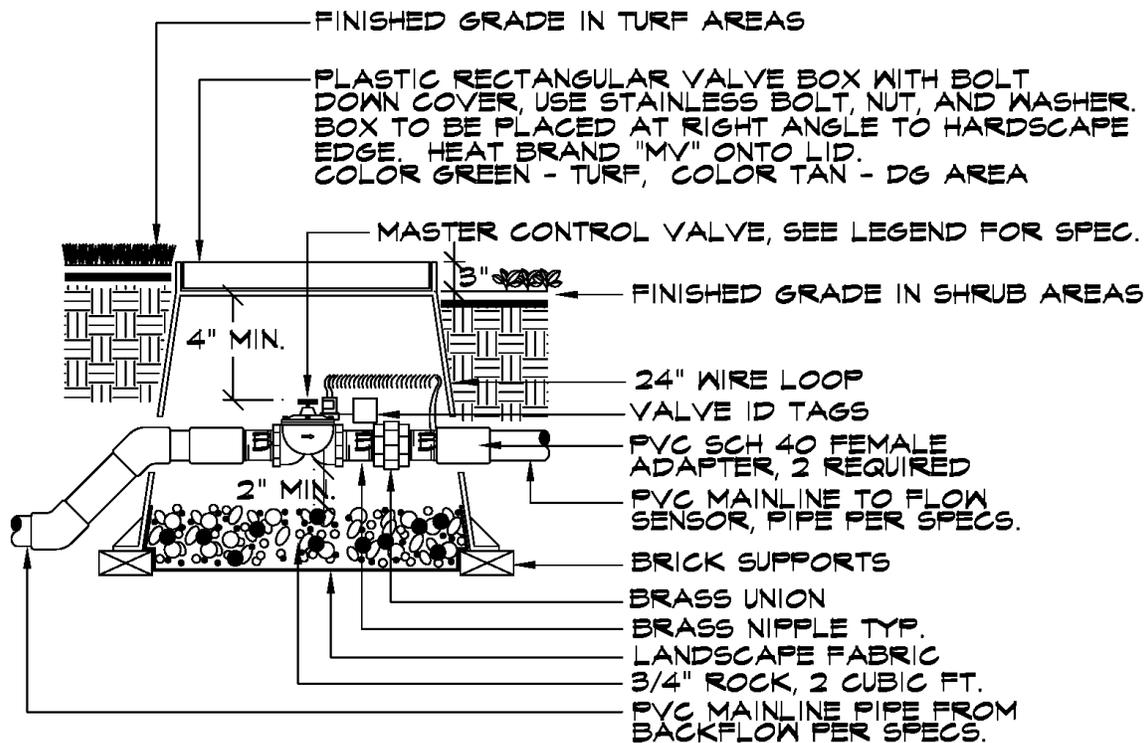
VINE ON WALL

13.5.7. DEEP ROOT WATERING SYSTEM



DEEP ROOT WATERING SYSTEM

13.5.8. MASTER VALVE



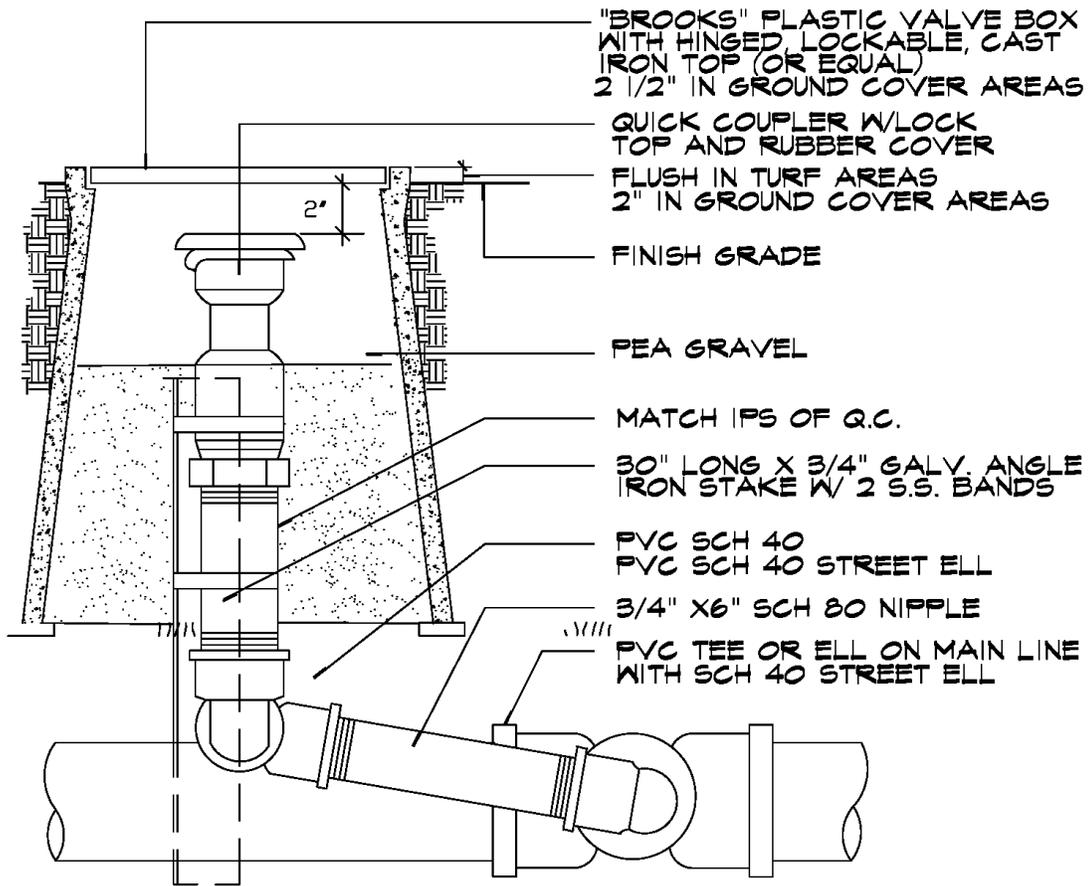
SECTION VIEW - N.T.S.

NOTE:

USE 45 DEGREE ELLS TO ACHIEVE MAINLINE DEPTH FROM UP-STREAM SIDE OF THE MASTER VALVE ASSEMBLY.

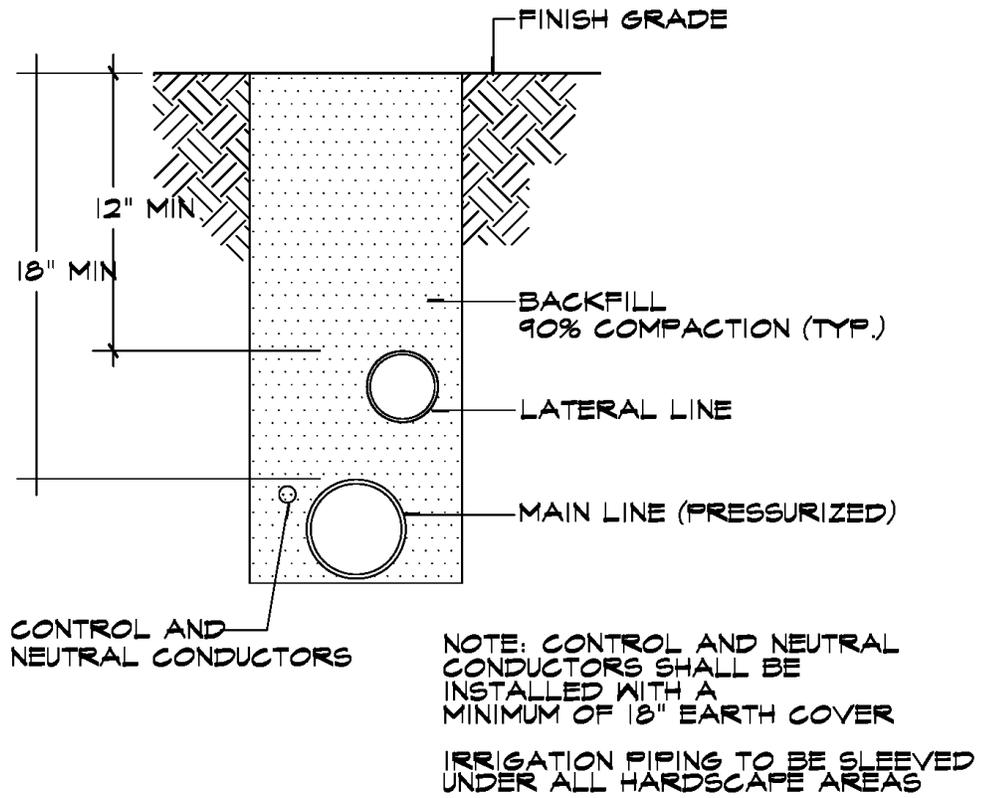
MASTER VALVE

QUICK COUPLER



QUICK COUPLER

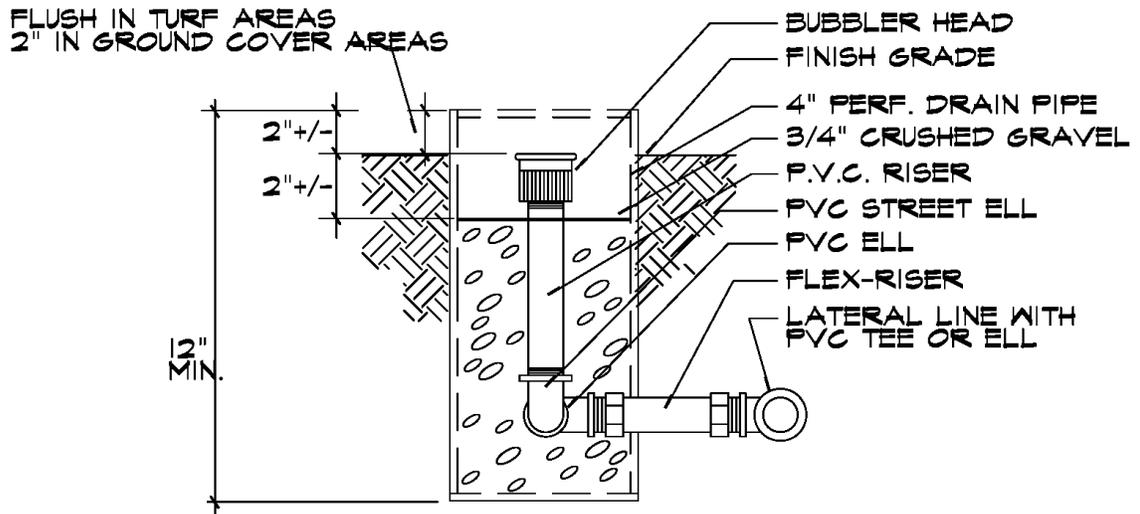
13.5.10. TRENCHING



TRENCHING

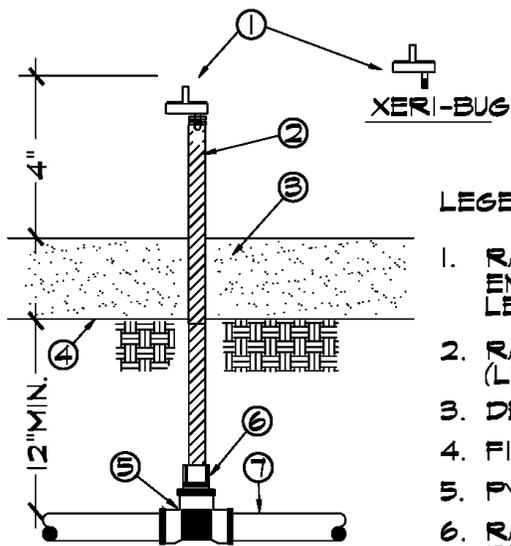
13.5.11.

TREE/PALM BUBBLER



TREE/PALM BUBBLER

13.5.12. SHRUB EMITTER

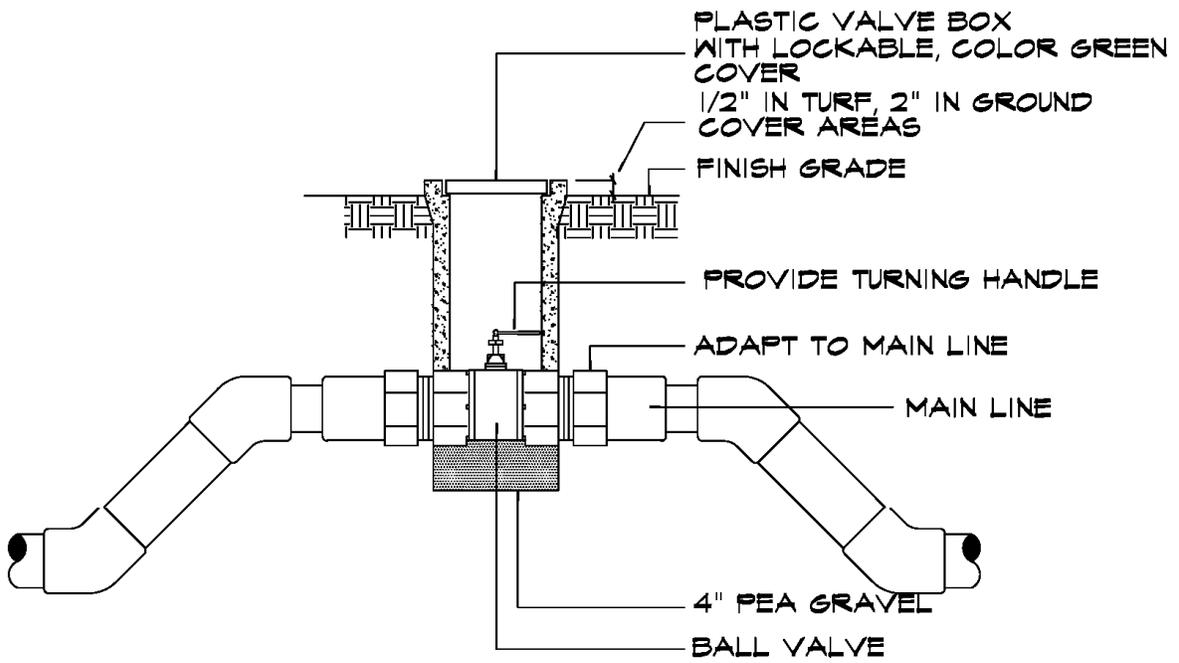


LEGEND

1. RAIN BIRD XERI-BUG - THREAD EMISSION DEVICE (SEE IRRIGATION EQUIPMENT LEGEND FOR MODEL #).
2. RAIN BIRD MODEL # PFR-12 POLY FLEX RISER (LENGTH AS REQUIRED).
3. DECOMPOSED GRANITE/ MULCH
4. FINISH GRADE.
5. PVC FITTING (S x S x 1/2" FIPT).
6. RAIN BIRD MODEL # FRA-050 POLY FLEX RISER ADAPTER.
7. PVC PIPE (12" COVER).

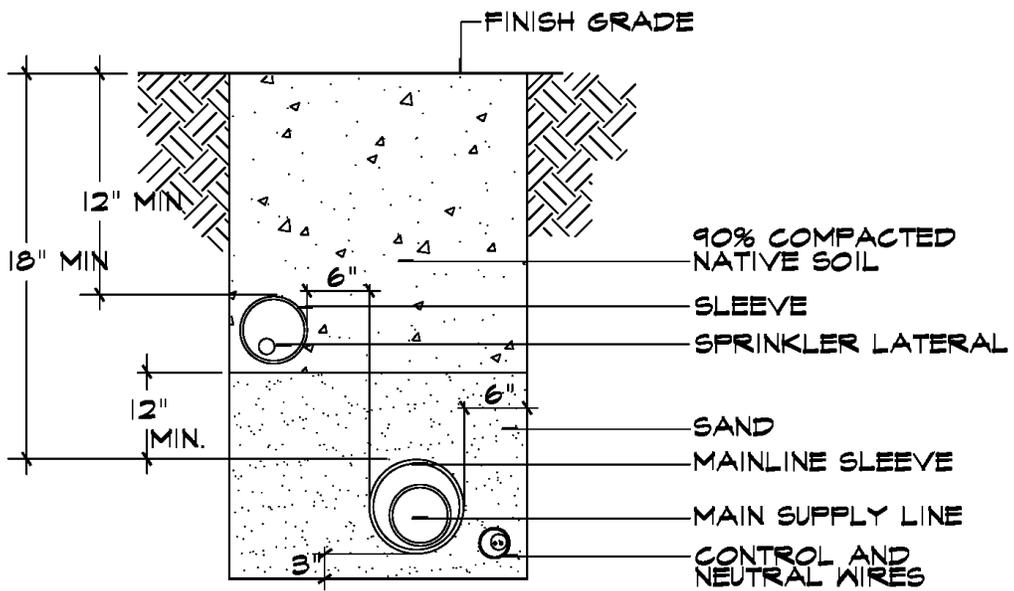
SHRUB EMITTER

13.5.13. BALL VALVE



BALL VALVE

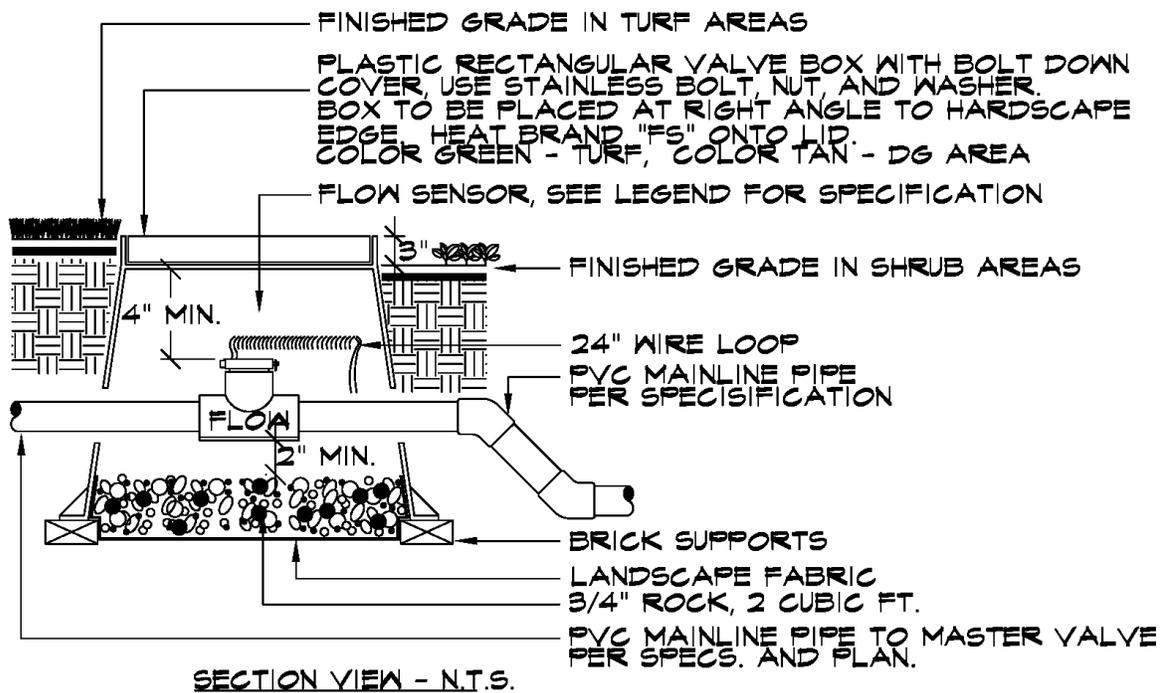
13.5.14. SLEEVING



LATERALS LINES AND MAINLINE SLEEVING UNDER A.C. OR CONCRETE VEHICULAR PAVED SURFACES SHALL BE INSTALLED WITH MIN. 36" COVER

SLEEVING

13.5.15. FLOW SENSOR



PLASTIC RECTANGULAR VALVE BOX WITH BOLT DOWN COVER, USE STAINLESS BOLT, NUT, AND WASHER. BOX TO BE PLACED AT RIGHT ANGLE TO HARDSCAPE EDGE. HEAT BRAND "FS" ONTO LID. COLOR GREEN - TURF, COLOR TAN - DG AREA

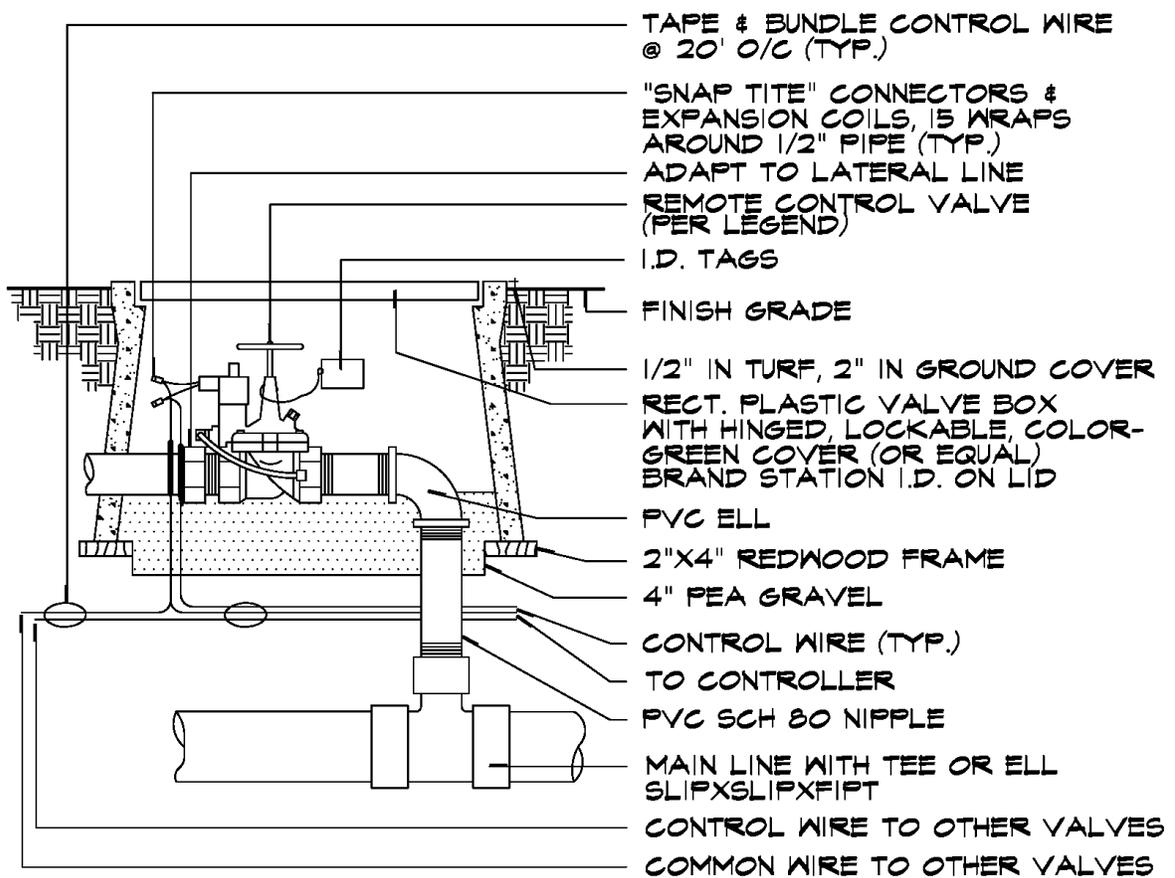
FLOW SENSOR, SEE LEGEND FOR SPECIFICATION

NOTE:
INSTALL FLOW SENSOR AS PER THE MANUFACTURER'S RECOMMENDATIONS,
WIRE TO IRRIGATION CONTROLLER.

USE 45 DEGREE ELLS TO ACHIEVE MAINLINE DEPTH ON THE DOWN-STREAM
SIDE OF THE FLOW SENSOR.

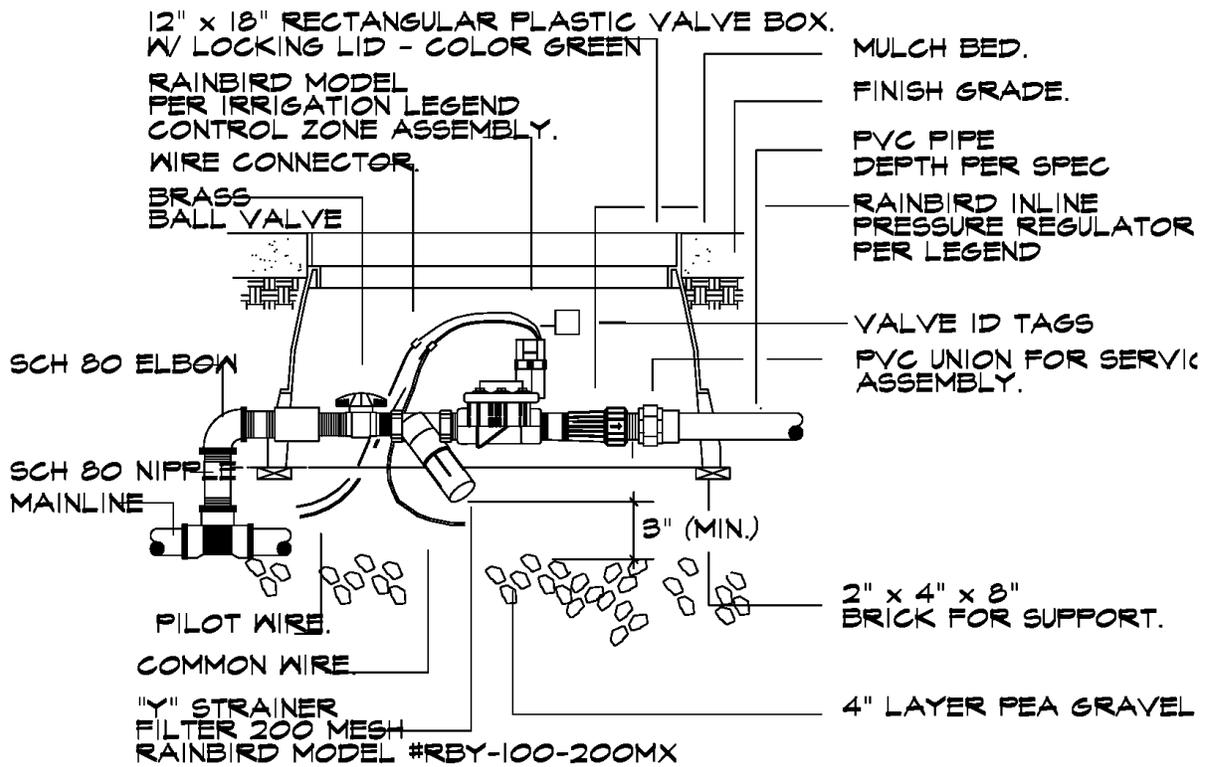
FLOW SENSOR

13.5.16. REMOTE CONTROL VALVE



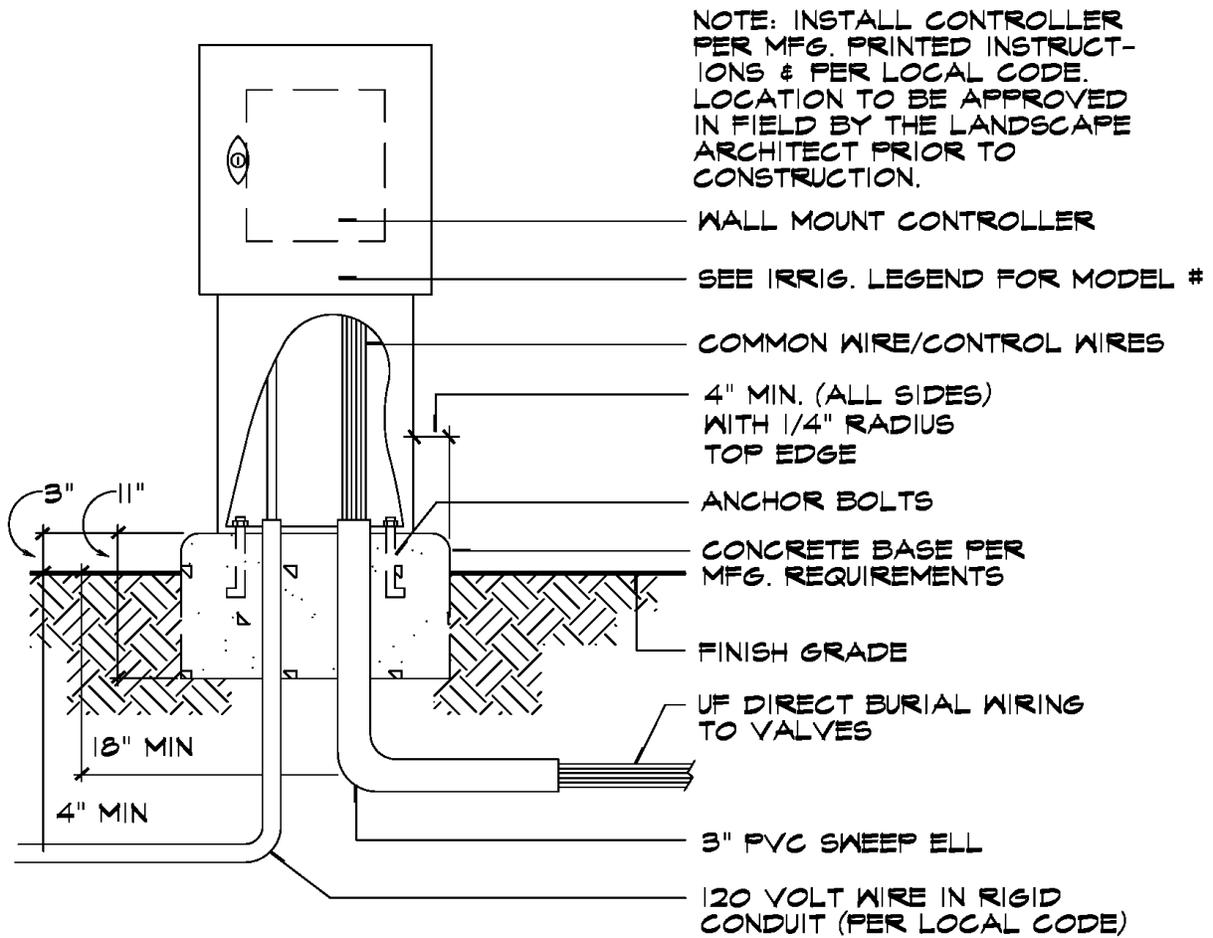
REMOTE CONTROL VALVE

13.5.17. DRIP REMOTE CONTROL VALVE



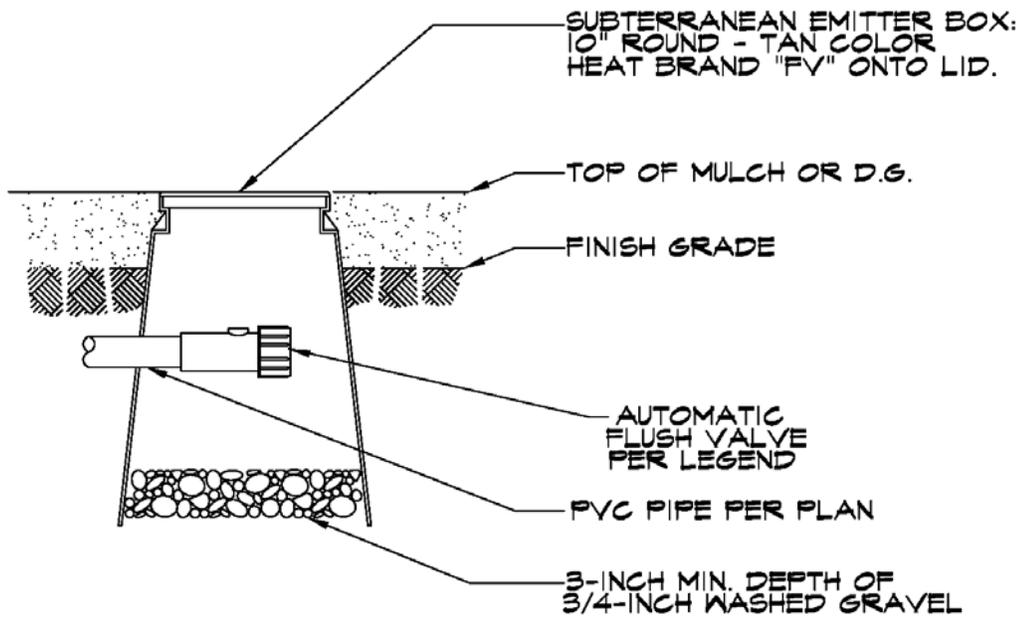
DRIP R.C. VALVE

13.5.18. CONTROLLER



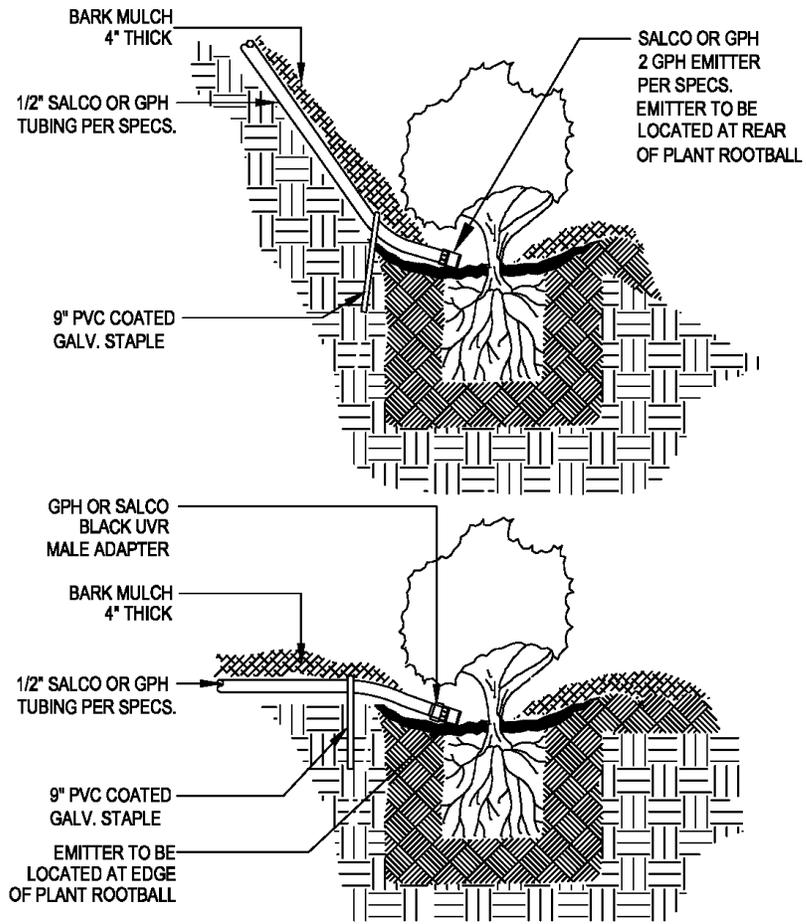
CONTROLLER

13.5.19. AUTOMATIC FLUSH VALVE



AUTOMATIC FLUSH VALVE

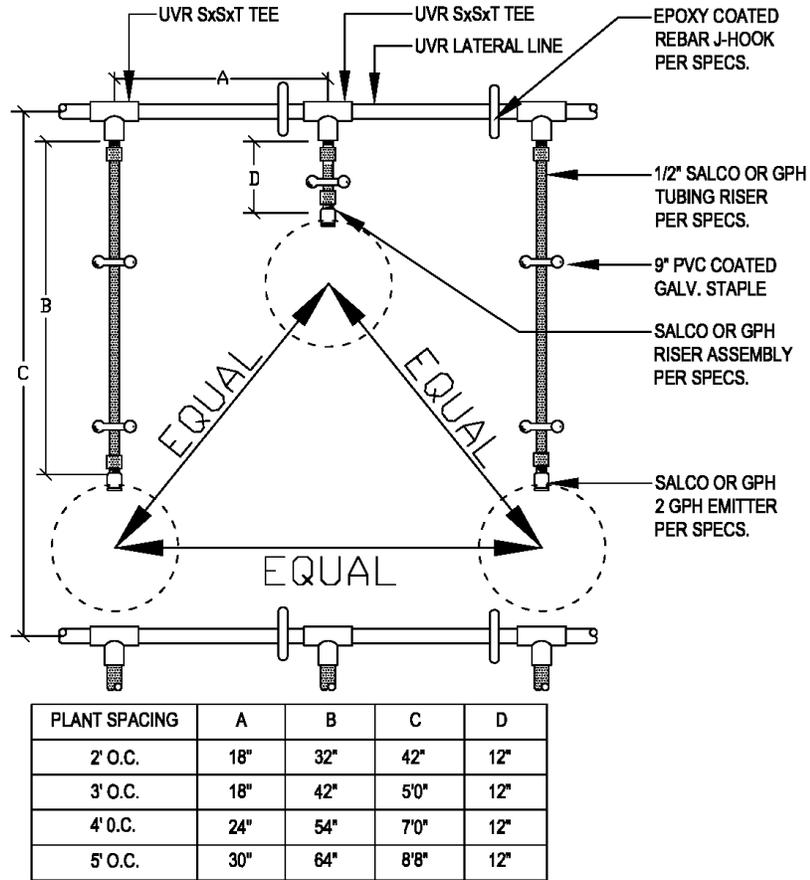
13.5.20. **EMITTER ASSEMBLY**



EMITTER ASSEMBLY SECTION VIEW

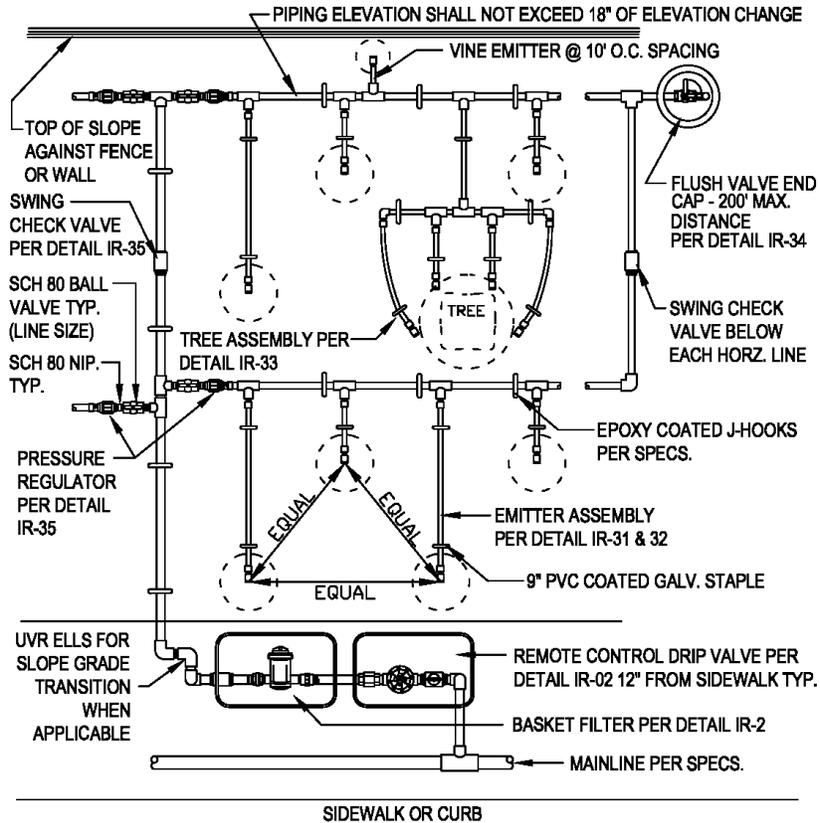
13.5.21.

SHRUB EMITTER ASSEMBLY



SHRUB EMITTER ASSEMBLY LAYOUT

13.5.22. POINT-TO-POINT LATERAL LAYOUT



- NOTES:
1. ALL PIPING FOR POINT TO POINT LATERALS WITHIN 8 FEET OF ANY WALKING OR DRIVING SURFACE SHALL BE BURIED 4" DEEP. PIPING SHALL BE UVR PVC AND HAVE J-HOOKS PER DETAILS AND SPECS.
 2. ALL UVR PIPE JOINTS AND FITTINGS BELOW AND ABOVE GRADE SHALL BE PRIMED.

POINT TO POINT LATERAL LAYOUT

APPENDIX 14. GREEN DESIGN GUIDELINES

14.1. Pre-design

14.1.1. PRE-DESIGN SITE ASSESSMENT

A detailed assessment of existing site conditions was performed to explore opportunities for sustainable site design, construction, operations, and maintenance. The following areas were reviewed during site assessment:

- Review of the historical and environmental role of the corridor,
- Establish environmental limitations (natural and cultural constraints),
- Microclimate analysis,
- Hydrology (streams, floodplains, wetlands, vegetative buffers for water bodies, and drainage patterns)
- Soils (cursory analysis of site soils – quality and structure of existing),
- Vegetation (habitat analysis, natives vs. invasives)
- Materials Inventory (identification of existing site elements – structures, roadways, parking lots, existing pathways, etc.), and
- Human use of the facility (identification of anticipated users, existing shops, services and facilities that have access to the project, elements of significant local or historical value, and interesting or unique features that will enhance or encourage facility usage, e.g. key viewpoints, landmarks or water bodies)

14.1.2. ENGAGE USERS AND OTHER STAKEHOLDER IN SITE DESIGN

Site users and other stakeholders were engaged in meaningful participation during the site design process to identify needs and supplement professional expertise with local knowledge. The stakeholder engagement process included:

- Meetings with Citizen’s Advisory Group throughout design process
- Public meetings held in each sub-region of the valley
- The creation of a project website where the public is welcome to review and comment on project progress

14.2. Design

14.2.1. PATHWAY LAYOUT AND GRADING

The project site was evaluated in detail for opportunities to incorporate sustainable practices while creating a circulation network that decreases costs for long-term maintenance and protects the site’s natural environment. Sustainable road design techniques include:

- Maintain or improve existing community connectivity and circulation patterns for pedestrians, cyclists and LSEV drivers to reduce pollution and development impacts, support local economies and improve human health.

- Design pathway systems that are long lasting, low maintenance and, minimize erosion.
- Contour and bench pathway beds to align with the site’s natural topography to avoid excessive cut and fill slopes.
- Route pathways to protect sensitive/significant natural/cultural resources and avoid segmenting of wildlife corridors.

14.2.2. DRAINAGE AND WATER MANAGEMENT

Water on a project site can take many forms and serve many functions. Water from the site will be managed in the most beneficial and efficient manner possible. Sustainable drainage and water management techniques include:

- Pathways shall be designed and constructed to maximize sheet (surface) drainage and drain such that natural hydraulic flow patterns of the site are maintained.
- Pathways will be designed for inclusion of a Storm Water Pollution Prevention Plan (SWPPP). When the project site and/or right-of-way allows, storm water may be captured and treated in a series of onsite water quality swales and basins prior to offsite release of the water. The design team will review the best management practices (BMP’s) for the most current storm water pollution prevention techniques and how they may apply to the project.
- The team will route pathways to improve flood control and water quality, stabilize soils, control erosion and provide wildlife corridors and habitat. Pathways will be designed to not be damaged by flooding and to result in no negative impact to the existing floodplain storage or conveyance. The project recommends the use of efficient irrigation systems, plant materials appropriate for the site conditions and climate, and the use of captured rainwater and/or gray water to reduce waste and conserve resources.
- When feasible, the design team will integrate visually and physically accessible rainwater/storm water features into the site in an aesthetically pleasing way creating a unique landscape amenity. Collaborations with local artists/craftsman can yield rainwater systems that provide both function and amenity while also promoting a stronger connection to local climate and water systems.

14.2.3. SOILS AND VEGETATION MANAGEMENT

The preservation and enhancement of site soil and vegetation systems are integral to a project’s sustainability. Existing site soils and vegetation shall be evaluated. Measures will be utilized to minimize disturbance and maximize sustainable practices, techniques include:

- Develop and communicate to construction contractors a soil management plan (SMP) prior to construction to: limit disturbance, assist soil restoration efforts, and define the location and boundaries of all vegetation and soil protection zones (VSPZ).
- Limit disturbance of healthy soil to protect soil horizons and maintain soil structure, existing hydrology, organic matter and nutrients stored in the soils.
- VSPZ shall be protected with a fence or other physical barrier (wildlife-permeable barrier, if appropriate) that protects the zone during construction from equipment parking and traffic, storage of materials, and other construction activities.

- Identify and preserve all vegetation designated as special status by local, state or federal entities.
- Plant appropriate vegetation that is native to the ecoregion of the site and preserve native plant material that contributes to regional diversity of flora and provides habitat for native wildlife.

14.2.4. PATHWAY DESIGN FOR HUMAN HEALTH AND WELL BEING

Alternative transportation facilities have numerous benefits to the communities in which they are constructed including being a healthy, nonpolluting choice. The positive impacts of community pathway networks are widespread and contribute significantly to the improvement of human health and well-being. The positive impacts of alternative transportation networks may be achieved by incorporating, the following techniques:

- Promote sustainability awareness and education.
- Interpret on-site features and processes to promote understanding of sustainability in ways that positively influence user behavior on site and beyond.
- Protect and maintain cultural and historical sites, attributes and artifacts to enhance a project's sense of place and meaning. Enhanced human experience and attachment to the land leads to a stronger sense of stewardship.
- Provide for optimum site accessibility, safety, and wayfinding. Safe, accessible and legible projects encourage both use and enjoyment.
- Promote site use by increasing user's ability to understand and safely access the system.
- Provide opportunities that encourage outdoor physical activity to improve human health.
- Provide view areas and quiet spaces for mental restoration.
- Provide outdoor gathering spaces of various sizes and orientations to accommodate groups, for the purpose of building community and improving social ties.
- Reduce light pollution by minimizing light trespass on site for the purpose of reducing sky-glow, increasing nighttime visibility and minimizing negative effects on nocturnal environments and human health and functioning.

14.3. Construction

14.3.1. PROTECTION AND RESTORATION OF SOILS DURING CONSTRUCTION

Construction is a critical phase in a project life cycle. During construction there is the most risk of contamination as well as opportunity for putting the site on the correct track to restoration. The protection and restoration of soils during construction shall be achieved through the following means:

- Control and retain construction pollutants. The design team shall create and implement an erosion, sedimentation, and pollutant control plan (SWPPP-Stormwater Pollution Prevention Plan).
- Restore soils disturbed during construction in all areas that will be re-vegetated. This includes restoring the soil's ability to support healthy plants, biological communities, water storage and infiltration. It does not apply to areas of the site that were not disturbed.

14.3.2. DIVERT MATERIALS FROM DISPOSAL

Non-hazardous materials will be diverted from landfills. Efforts will be made to recycle and/or reuse construction and demolition materials on site or redirect materials back to the manufacturing process, other construction sites, or building materials reuse markets.

14.3.3. USE OF LOCAL, RECYCLED/SALVAGED MATERIALS

Using local materials reduces the amount of fuel needed and pollution expended for construction. Recycled and/or salvaged materials should be evaluated for use in construction and pathway surfacing. Some examples of such materials include reclaimed asphalt and recycled plastic lumber. Recycled plastic lumber diverts plastics from the landfill while lowering maintenance costs on existing projects. Vegetation, rocks and soil generated during construction should also be reused thereby reducing the need to truck in new materials while simultaneously reducing the need to haul away material generated during construction.

14.3.4. MINIMIZE CONSTRUCTION EMISSIONS

Minimizing generation of greenhouse gas emissions and exposure to localized air pollutants during construction may be achieved by reducing diesel engine idling time to no more than five minutes per 60-minute period during construction. Other ways include implementing a preventative maintenance plan for all equipment and using ultra low sulfide diesel fuel. Sourcing materials locally thereby decreasing transportation requirements may also avoid the generation of greenhouse gases.

14.3.5. SUSTAINABLE PLANT PRODUCTION

Landscape plants should be purchased from providers who reduce resource consumption and waste. For example, plant providers that use peat-free potting soil mixes help to preserve the environment around them. Other sustainable practices in plant production include:

- Reduce, capture and reuse runoff from irrigation
- Use integrated pest management
- Reduce use of potable water and waste
- Recycle organic matter for use on site

14.3.6. PROMOTE EQUITABLE SITE DEVELOPMENT

During construction of the site, ensure that the pathway provides economic or social benefits to the local community.

14.4. Stewardship and Management

14.4.1. PLAN FOR SUSTAINABLE MAINTENANCE

Plant stewardship requires thought and an action plan for plant maintenance. The process of plant stewardship entails a list of aspects vital to thriving plant life. That list includes a plant maintenance process, good plant health through proper monitoring, and site safety by properly maintaining vegetation to meet the needs of the intended users of the site. A list of potentially appropriate replacement plants

should be prepared for use if the need arrives. A Pest Management plan should also be crafted to control pests, diseases and any unwanted species of plants and animals.

14.4.2. INVASIVE SPECIES MANAGEMENT

Invasive species are defined as plant species in the area that are currently listed as invasive on regional, state, and federal laws or lists. An invasive species management plan must include integrated pest management strategies, a procedure for how to identify additional invasive species as well as follow-up treatment and long-term control.

- Organic materials management-A plan needs to be in place for disposal of excess healthy as well as diseased plant material or other vegetation that is not suitable for composting.
- Soil stewardship
- Irrigation and water use
- Stormwater management features and BMPs
- Materials management
- Recyclable materials
- Landscape Maintenance Equipment
- Provide for storage and collection of recyclables
- Recycle organic materials generated during site operations and maintenance
- Reduce outdoor energy consumption for all landscape and exterior operations
- Minimize generation of greenhouse gases and exposure to localized air pollutants during landscape maintenance activities

14.4.3. MONITORING

Monitor and document sustainable design practices to evaluate their performance over time and improve the body of knowledge on long-term sustainability.

APPENDIX 15. CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

15.1. CPTED Defined

CPTED is a proactive approach to deterring undesired behavior in neighborhoods and communities. CPTED is defined as “the proper design and effective use of the built environment that can lead to a reduction in the fear and incidence of crime and an improvement in the quality of life.”¹³ The basic premise of CPTED is that the arrangement and design of buildings and open spaces can *encourage* or *discourage* undesirable behavior and criminal activity. A report prepared for the National Institute of Justice noted that “physical features influence behavior” and the “[offenders] prefer to commit crimes that require the least effort, provide the highest benefits and pose the lowest risks”¹⁴. When all spaces have a defined use and the use should be clearly legible in the landscape, it makes it easier to identify undesired behavior. The following are the four key CPTED principles:

- Natural Access Control, including the placement of entrances, exits, fencing, landscaping, hours of operation and lighting. Natural access control helps to clearly differentiate public and private space.
- Natural Surveillance, including the placement of physical features, activities and people to maximize visibility. Natural surveillance increases the opportunity “to be seen” and therefore deters unwanted behavior.
- Territorial Reinforcement strategies put the spotlight on undesired behavior and activities, increasing the perception of being watched. Strategies include the use of physical attributes such as fences, paving materials, public art, signage and “security” landscaping materials to convey ownership of the space along the corridor and buffer private properties. Pedestrian scaled mile markers tagged with emergency ID or “address” codes; along with emergency phones (where cell service is not available) are key territorial reinforcement strategies.
- Maintenance is an expression of ownership of a property. Unmaintained facilities indicate that there is a greater tolerance of disorder and less control by the intended users.

A safety analysis of the project area highlighted a number of potential safety issues. The identified issues are listed in table 14.

TABLE 14: IDENTIFIED CPTED ISSUES

¹³ “Designing Safer Communities” A Crime Prevention Through Environmental Design Handbook,” National Crime Prevention Council, Washington D.C., pg.7.

¹⁴ “Physical Environment and Crime: A Final Summary Report Presented to the National Institute of Justice”, U.S. Department of Justice, National Institute of Justice, January 1996.

Crime	<ol style="list-style-type: none"> 1. Manage vegetation so that CV Link can be visually surveyed from adjacent streets and residences; select shrubs that grow below 2' in height and trees that branch out greater than 6' in height 2. Utilize thorny vegetation to eliminate entrapment areas and control off-path usage 3. Use uniform lighting to minimize shadowed areas and allow CV Link users to identify facial features from 20 yards away 4. Place benches and other CV Link amenities at locations with good visual surveillance and high activity 5. Create a "CV Link Watch Program" involving local residents 6. Proactive law enforcement of CV Link regulations
Litter and dumping:	<ol style="list-style-type: none"> 1. Place garbage receptacles at access points 2. Encourage local residents to report incidents promptly 3. Remove dumpsites as soon as possible
CV Link user safety	<ol style="list-style-type: none"> 1. Post regulatory signage 2. Provide mileage markers at quarter-mile increments and clear directional signage for orientation 3. Include signage encouraging users to bring water
Unwanted vehicle access	<ol style="list-style-type: none"> 1. Utilize landscaping to define the corridor edge, including earth berms, large boulders and fencing 2. Use bollards at intersections
Vandalism	<ol style="list-style-type: none"> 1. Select materials that are durable and vandal resistant 2. Use permeable fencing wherever possible 3. Respond through removal or replacement in rapid manner 4. Encourage local residents to report vandalism 5. Create a neighborhood watch program 6. Maintain good surveillance of the corridor 7. Involve neighbors in projects to build a sense of ownership

15.2. Safety and Security Strategies

15.2.1. COMMUNITY ENGAGEMENT

Active and informed community members are a tremendous resource. Volunteer patrol groups have been used successfully to assist local government by reporting on conditions, picking-up litter, and filing safety reports. Ambassadors can provide guide and interpretative services, organize rides/walks, carry informational material, and generally promote CV Link. Community service organizations, school classes or clubs, church groups and businesses are often looking for outlets to support the community.

15.2.2. FENCING

Fencing can serve as a key design element define corridor edges and delineate between public and private property. Fencing installed along the corridor should be permeable, where feasible, to encourage natural surveillance opportunities. Where the corridor is fenced for long stretches, intermittent openings should be located to enable access at locations with good visibility from the surrounding neighbors.



15.2.3. GRAFFITI

Graffiti hurts communities in a number of ways and often encourages other undesired behaviors such as loitering, littering, crime and more graffiti. According to the Graffiti Hurts website¹⁵ graffiti costs \$1-\$3 per year, per taxpayer, and accounts for lost revenue for transit systems, retail sales and declines in property values. The appearance of graffiti is perceived as an indicator that an area is in decline.



Rapid removal of graffiti is a key component to maintaining a safe corridor. Rapid removal signals to the taggers and the community that the path is cared for and being regularly observed. Data shows that

¹⁵ www.graffitihurts.org

graffiti removal within 24 to 48 hours results in a nearly zero rate of recurrence.¹⁶ Signage should include the 911 contact number to report graffiti (e.g., immediately report any observed graffiti to 911).

15.2.4. LANDSCAPING

Landscaping that obstructs natural surveillance and allows entrapment areas or “hiding” places should be avoided.

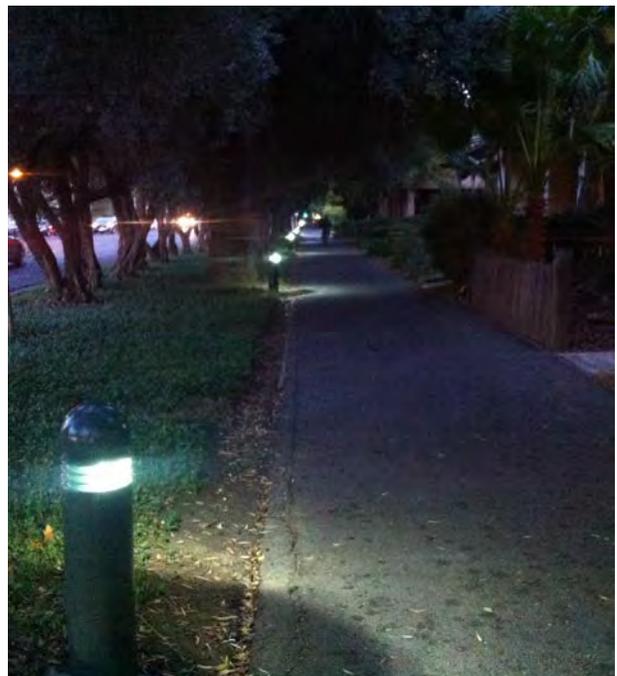
- All groundcover and shrubs to be trimmed to a max. 24” above ground level height.
- Trees should be trimmed up to provide a minimum of 8’ of vertical clearance within the corridor.
- Tree canopies should not obstruct pathway illumination.
- Hostile landscaping material (e.g. vegetation with thorns) can be used in strategic areas to discourage off-path use and eliminate entrapment areas.



15.2.5. LIGHTING

Adequate pedestrian-scaled lighting helps users observe their surrounding and respond to potential threats. Where lighting is installed on pathways, the illumination should:

- Be adequate to identify a face up to 20 yards away
- Have full cut-off fixtures to reduce light pollution
- Provide uniform coverage, eliminating dark pockets
- Provide good color rendition (the measure of light quality to replicate colors as viewed on a typical sunny day)
- Not be obstructed by tree canopies



The use of metal halide or light emitting diodes (LED) lamps is recommended, as they provide excellent color rendition. Color rendition is especially important when describing identifying features such as hair, clothing and vehicle color. Light quality is as important as the quantity. Poor lighting, whether too bright or not bright enough can diminish safety.

¹⁶ Jay Beswick and Ernie Garrett, Graffiti Prevention Systems, data from over 1,500 sites in Los Angeles County

Lighting should respond to the conditions of the site and meet the minimum standards set forth by the Illuminating Engineering Society of North America (IESNA) standards.

At high traffic (e.g. intersections) and more urban locations a higher degree of luminance may be required. Section 7.2.13 of the Guideline for Security Lighting for People, Property, and Public Spaces¹⁷ notes that “Sidewalks, footpaths, and grounds supporting mass movement of persons should be illuminated to at least an average maintained luminance of 10 lux (1 fc), with an average-to-minimum uniformity ratio not greater than 4:1 during planned use periods.”

15.2.6. LITTER AND ILLEGAL DUMPING

Staff or volunteers should remove litter as soon as possible. Litter receptacles should be placed at access points such as access points and intersections with other access points. CV Link should be patrolled for litter (not in receptacles) at least once a week and after any special events held on the pathway.

Vehicle barriers, regulatory signage and fines should control illegal dumping.



When it does occur, it must be removed as soon as possible in order to prevent further dumping. Neighborhood volunteers, friends groups, alternative community service crews and inmate labor should be used in addition to maintenance staff.

¹⁷ IESNA Guideline for Security Lighting for People, Property, and Public Spaces” (G-1-03), section 7.2.13, Schools and Institutions (IESNA Security Lighting Committee 2003)

15.2.7. PUBLIC ART

Public art installations contribute and enhance a community’s identity and character, creating a strong “sense of place” branding. Public art incorporated into CV Link provides visual cues that it is “owned” and cared for by the community.

From a CPTED perspective, the use of public art in the landscape is an effective “target hardening” strategy. Public art can result in a large reduction of graffiti vandalism, can define trail edges, improve the appearance of the community, and discourage unwanted behaviors.



15.2.8. MURALS

CPTED practices encourage the installation of murals with faux windows and/or human features in areas where visibility is limited due to physical or other barriers. These types of murals have a psychological effect on people, conveying the perception of being watched.

The depiction of athletes in a mural promotes the perception of safety and the illusion of activity.



This perception can discourage undesired behaviors in an area. The National Crime Prevention Council reports “Community paintbrush murals are rarely defaced by graffiti and instill a sense of pride among those who live nearby.”¹⁸

¹⁸ <http://bit.ly/mOr7CY>

15.2.9. SEATING

CV Link is designed for movement and users not moving can attract attention. However, periodic 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 they have good visibility from the surrounding neighbors.



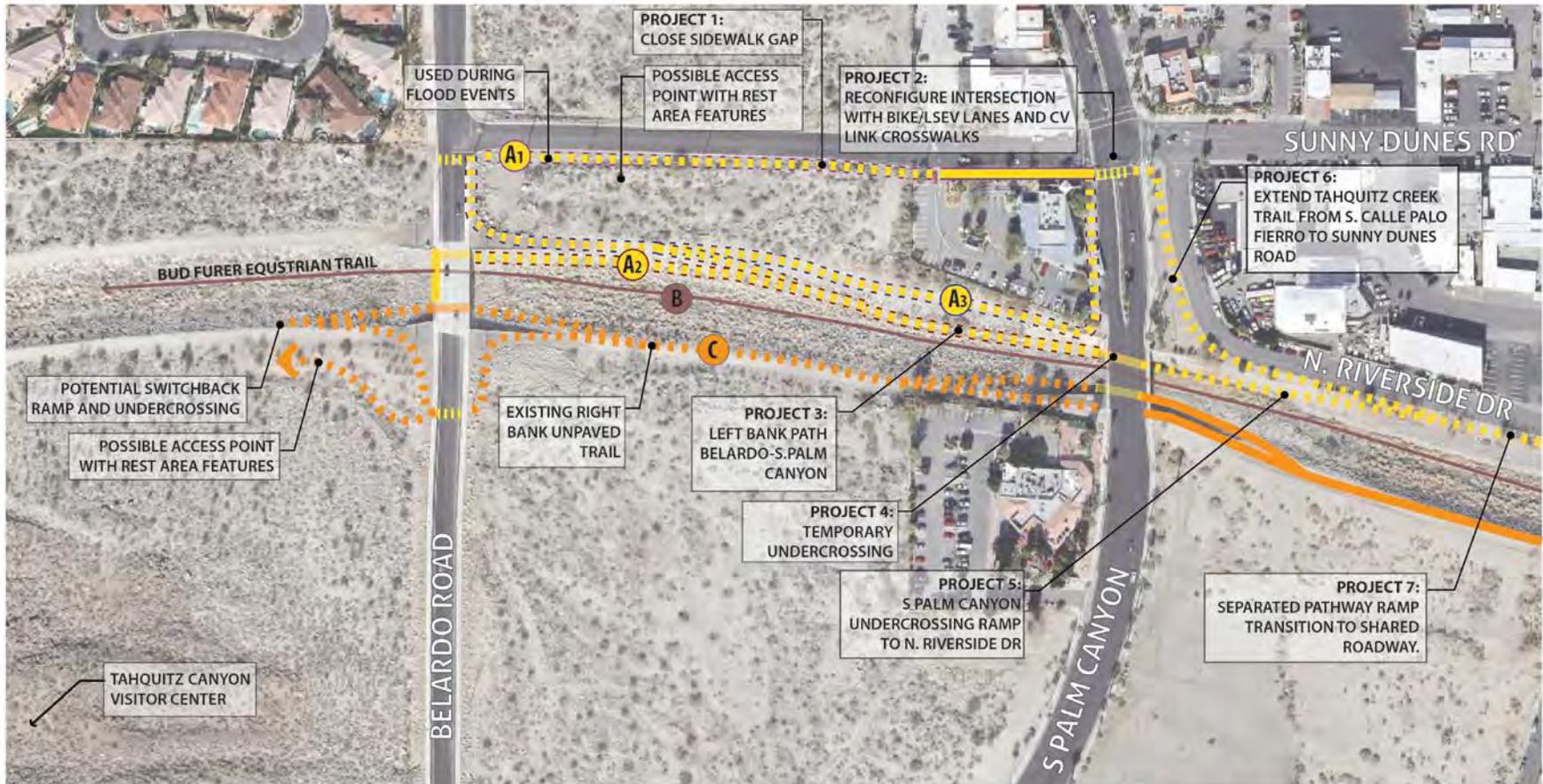
15.2.10. WAY FINDING

A comprehensive way finding system should be incorporated into the network. Way finding signage at major decision points should include the walking and bicycling times.

Pedestrian-scaled mile markers should be posted at one-quarter mile intervals. The mile markers should include either a GPS coordinate or an address identification number to assist emergency responders in locating users in need of assistance.

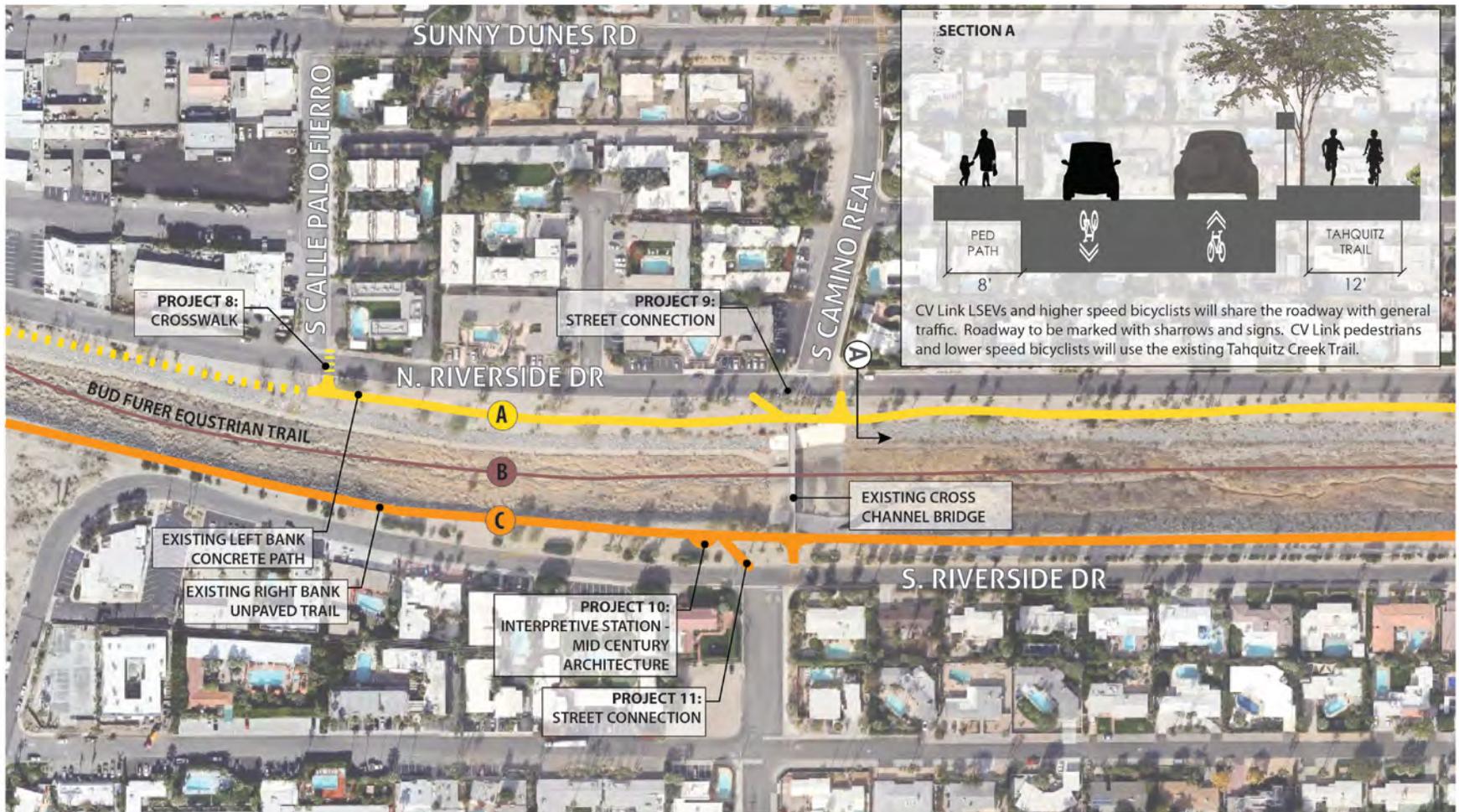


APPENDIX 16. TAHQUITZ CREEK TRAIL PROJECT

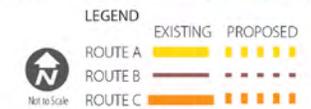


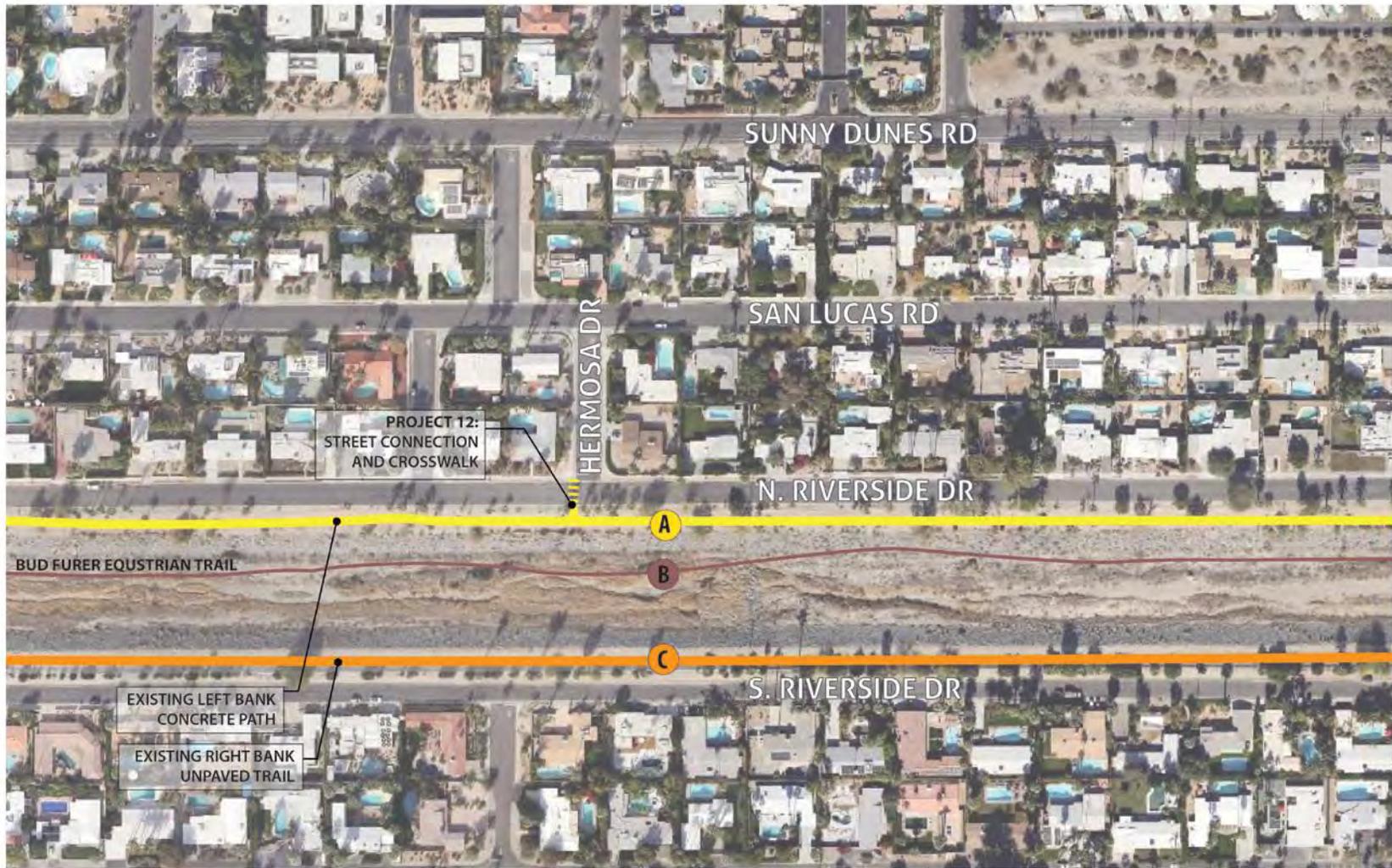
Tahquitz Creek Trail Projects





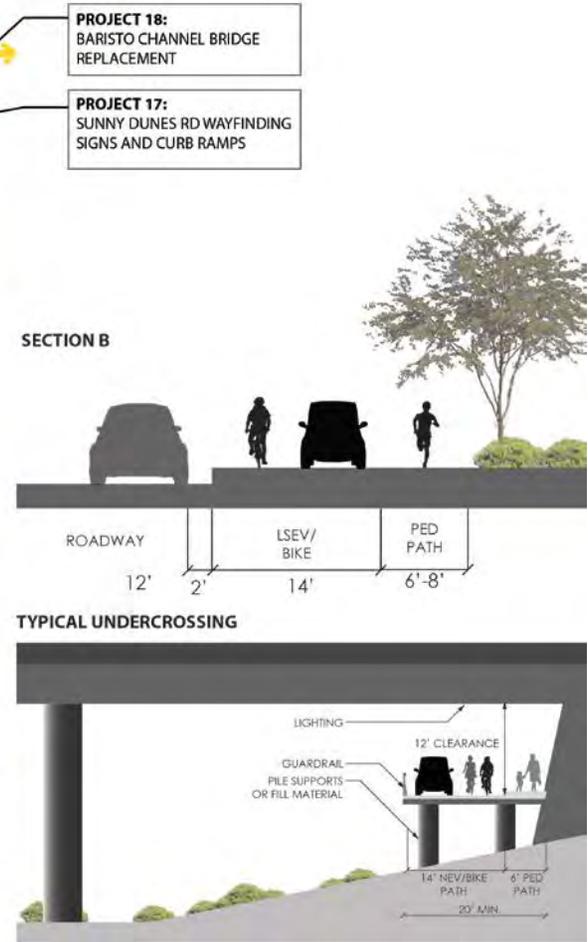
Tahquitz Creek Trail Projects





Tahquitz Creek Trail Projects





Tahquitz Creek Trail Projects

