Neighborhood Electric Vehicle (NEV) Plan

Report prepared for Coachella Valley Association of Governments

March 2015

CVAG

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1 Introduction

1.1 Context and Definitions

This Neighborhood Electric Vehicle (NEV) Plan was developed in conjunction with planning and design of CV Link, a new transportation and recreation pathway that will generally follow the Whitewater River flood channel between Palm Springs and Coachella. CV Link is anticipated to become a backbone for the further development of pathways throughout the valley. In the CV Link Master Plan, NEVs are one of several types of Low Speed Vehicle (LSV, also known as Low Speed Electric Vehicle or LSEV) that are anticipated to use the new facility.

This Plan will describe the specific duties required of NEV operators and the key design parameters that will make NEVs a practical option for mobility throughout the Coachella Valley. While the federal definition may be interpreted to exclude golf cars (carts), for the purposes of this plan three principal types of 3 or more wheel LSVs are considered:

A Neighborhood Electric Vehicle (NEV) is a type of Low Speed Vehicle (LSV) that can travel at least 20 mph and up to 25 mph. By federal and state law, NEVs can travel on any public street in the general traffic lane as long as the speed limit is 35mph or less, unless a local jurisdiction passes a law prohibiting this use. NEVs can travel on a public street with a speed limit of 40mph or greater if there is a separate lane or path provided.

Golf cars (carts) are usually designed for use in private spaces and have a top speed of no more than 15 mph. Some cities permit golf cars on designated public paths and roads.

- Golf cars (carts) that are factory designed to travel up to 15 mph within golf course environments. Golf cars that are not modified for on-street use may be used on roadways or paths designated for such use by local jurisdictions
- Golf carts that are modified after manufacture for use on public streets and can travel up to 25 mph (Figure 1). While increasingly common, DMV guidance (FFVR37) requires owners to register them as motor vehicles that meet regular passenger vehicle standards or risk a citation.
- Neighborhood Electric Vehicles (NEVs) that are designed and manufactured to be used on streets with posted speed limits up to 35 mph and can travel up to 25 mph (Figure 2)

Figure 1: Golf car modified for on-road use

Figure 2: Four and Six-seat NEVs

The following links provide more information on the differences in golf cars and NEVs.

National Highway Traffic Safety Administration publication on the Code of Federal Regulations (CFR) for Low Speed Vehicles (LSVs) that are capable of at least 20 mph but not more than 25 mph):

http://www.nhtsa.gov/cars/rules/rulings/lsv/lsv.html#lsv3

Alternative vehicles definitions and information from Newport Beach Police Department, with comprehensive list of California Vehicle Code references:

http://www.nbpd.org/community/altveh.asp

California Department of Motor Vehicles (DMV) fact sheet on LSVs and golf carts:

http://apps.dmv.ca.gov/pubs/brochures/fast_facts/ffvr37.pdf

Golf Car Portal's clear definition of the differences between golf cars and NEVs:

http://golfcarportal.com/education/defference_between.php

1.2 NEV Plan Development Process

A series of public meetings related to the Coachella Valley CV Link project also informed elements of the NEV Plan. The cities of Cathedral City, Indio, Palm Desert, and Rancho Mirage returned detailed stakeholder surveys that assessed their current efforts, existing conditions, and future interest in NEV facility implementation. Meetings were held with a number of agency staff:

- April 30, 2014 – Indio with the Principal Engineer
- May 6, 2014 - Cathedral City with the City Engineer
- May 6, 2014 – Palm Desert with the Director of Community Development
- May 12, 2014 – Rancho Mirage with the Planning Manager
- May 13, 2014 – Palm Springs with the City Engineer
- June 9, 2014 – La Quinta with the Director of Community Development
- June 11, 2014 – Coachella with the Community Development Director
- Meeting with the Agua Caliente Tribe Director of Planning and Natural Resources

City staff input has been incorporated into this plan as shown in Table 1.

Table 1: Summary of City Staff Issues and Plan Section Where Incorporated

Key Themes	Where Covered in This Plan
Inconsistent policies and laws; prohibitions on use; confusion on definitions	Section 0 City Municipal Codes Section 5 Recommended Education, Legislation, and Enforcement
Roadway speed limits are too high for use of NEVs	Appendix C Roadway Speed Limit Maps presents city-provided or published information that was used in the route planning.
NEVs travel too fast to share designated golf cart paths	Section 4 Design Guidelines recommends path widths likely to minimize user conflicts. Signage (e.g. Figure 22) may be used to identify where NEVs may operate at reduced speed or prohibited.
Concern about reducing 12' wide car lanes to accommodate 7' wide NEV/bike lanes	Section 4.4 Class II NEV Lane refers to the key resources for city engineers to reference for narrower lanes.

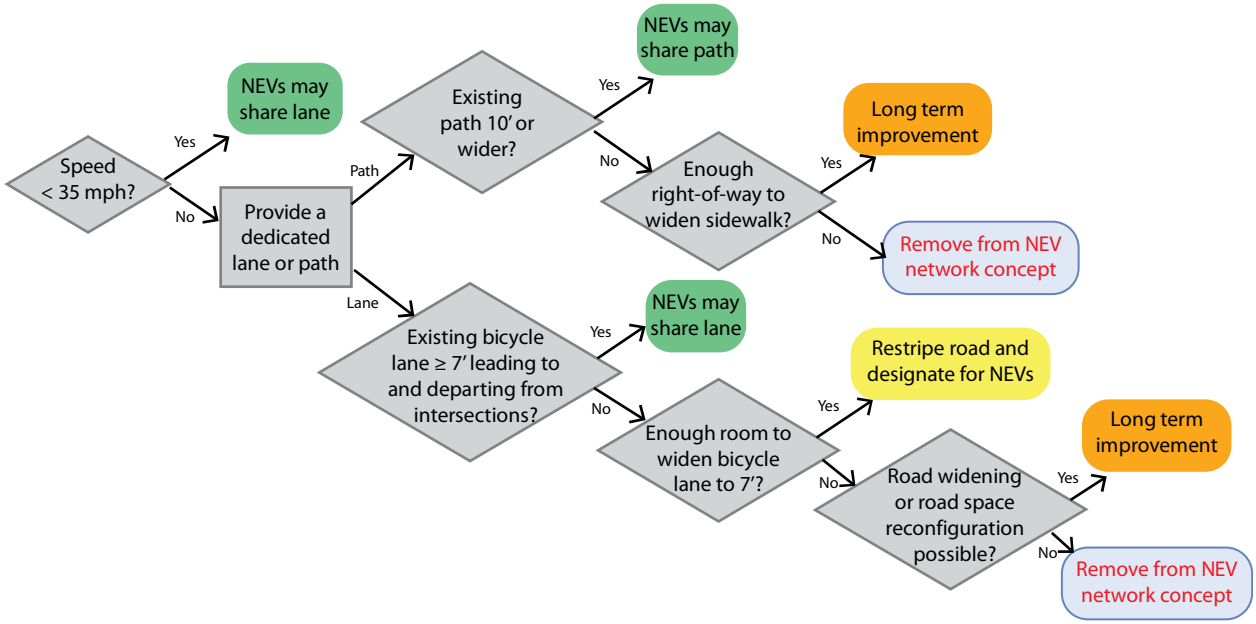
California Assembly Bill 61 stipulates that this transportation plan must be submitted to the director for approval following a review and recommendation by the California Traffic Control Devices Committee (CA-TCDC). This plan has been placed on the agenda for the March 5, 2015 committee meeting.

1.3 NEV Network Development Process

This NEV Plan has been based on the GIS NEV Suitability Analysis (NEVSA) described in Chapter 2 where the inputs are demographics (population, jobs, and land uses). The outputs are shown in the maps in this plan, which should be seen as the ultimate vision.

This analysis did not have the benefit of roadway information such as right of way width, curb-to-curb roadway width, and existing and proposed number of lanes at and between intersections. As a next step, a NEV Plan Implementation Program should be developed based on assessment of each roadway and intersection to determine how NEVs can be accommodated. The Implementation Program would follow a general process as outlined below.

Figure 3: Generalized NEV Plan Network Development Process



The proposed standards in this document represent the desirable widths and conditions for Neighborhood Electric Vehicle (NEV) travel. To achieve a critical mass of connected trip ends, it is recommended that the maximum possible number of streets and paths be made accessible to NEV and golf cart operators even if the desirable widths cannot be achieved initially. Once the number of users has grown, higher geometric standards can be implemented on a segment-by-segment basis to permit more comfortable routes for all users.

2 Legislative Context

2.1 Introduction

Recent California climate change and air quality legislation including Assembly Bill 32, Senate Bill 375, and Assembly Bill 1358 have strengthened transportation and land use policies aimed at reducing single occupancy vehicle trips through multimodal transportation options. Local policy and planning efforts must make progress toward reduction targets set forth by state climate change legislation and a growing number of communities have identified Neighborhood Electric Vehicles as an effective means of attaining those goals. A number of local cities and counties in California (Lincoln, Rocklin, Western Riverside County, Rancho Mission Viejo, Coronado, and Playa Vista), have developed NEV Plans with various goals such as reducing reliance on gasoline, reducing vehicle emissions, reducing roadway wear and tear, and creating more sustainable communities.

2.2 Federal Register: 49 CFR 571.500, 1998

In 1998, the National Highway Transportation Safety Administration (NHTSA) created a new Federal Motor Vehicle Safety Standard (FMVSS-500) category for low speed vehicles (LSV) - including NEVs - in response to the growing popularity of low speed vehicles for short trips. The intent of 49 CFR Part 571 was to establish consistent treatment of LSVs at the Federal, state, and local levels with respect to on-street operations, speed, and safety standards. The new LSV class was defined to include "small, 4-wheeled vehicles with top speeds of 20-25 mph." This effectively removed conventional golf carts with a top speed of 15 mph from the classification and provided a more appropriate set of safety standards specific to LSVs (as compared to the umbrella "Passenger Car" class designation).

Consistent rulemaking specific to LSVs would in turn enable manufacturers of these electric vehicles to bring new technologies to the market. 49 CFR 571.500 did not affect state and local decision making with regard to permitting on-street operation of LSVs, or requiring existing LSV owners to retrofit their vehicles to meet the safety standards established. In subsequent years, NHTSA would amend the definition of LSVs to allow for commercial vehicle utility and an increase in the maximum gross vehicle weight restriction from 2,500 lbs. to 3,000 lbs.

2.3 California Assembly Bill no. 61, Chapter 170, 2011

AB-61 authorizes the County of Riverside or any of its jurisdictions to develop an NEV Transportation plan for a designated plan area. The California Streets and Highway Code sections 1962-1962.8 were established to implement the bill.

Section 1 of AB-61 establishes the scope of NEV Transportation plans, which includes route selection and provisions for "NEV Lanes", parking and turnouts, signage, striping and roadway markings, roadway crossings, connections to other travel modes, and electrical charging stations. The bill further requires the development of facility design criteria, traffic control devices, safety criteria, route restrictions, and plan evaluation measures. Sections 2 and 3 amend the California State Vehicle Code language with respect to vehicle class provisions, operation of LSVs on roadways with operating speeds in excess of 35 mph and the operation of LSVs at certain roadway crossings. Section 4 absolves the State of California

from responsibility for reimbursing jurisdictions for expenses incurred as a result of the state mandated local program. All NEV transportation plans must be submitted for review and approval by Caltrans.

2.4 California Streets and Highways Code

The California Streets and Highways Code Division 2.5 City Streets, Chapter 6 Section 1950-1961 establishes a framework for any county or city to establish a Golf Cart Transportation Plan. Golf carts are defined as:

> "Golf Cart" means a motor vehicle having not less than three wheels in contact with the ground and unladen weight less than 1,300 pounds which is designed to be and is operated at not more than 25 miles per hour and is designated to carry golf equipment and not more than two persons, including the driver.

In the context of code Section 1962.1 authorizing the County of Riverside or cities contained within to establish NEV Plans, the code defines NEVs as:

> (b) "Neighborhood electric vehicle" or "NEV" means a low-speed vehicle as defined by Section 385.5 of the Vehicle Code

2.5 California Vehicle Code

2.5.1 Definitions

According to California State Vehicle Code Section 385.5, NEVs are defined as "low-speed vehicles" and:

a) Having four wheels,
b) Attaining a maximum speed of 20-25 mph on a paved level surface, and
c) Having a maximum gross vehicle weight of 3,000 pounds.

NEV drivers must be licensed as motor vehicle drivers and abide by the California State Vehicle Code when operating on street.

2.5.2 Lane Use

The California Vehicle Code (CVC)[1] permits NEVs on all roadways with posted speed limits of 35 mph and under. NEVs are also permitted on roadways up to 55 mph within on-street Class II NEV striped lanes. For roadways with posted speed limits above 55 mph, NEV travel can only be accommodated with a separated off-street path. Table 2 summarizes lane use allowed by the CVC. Please refer to Chapter 4 of this document for more information on how this legislation will impact route development.

[1] http://www.dmv.ca.gov/pubs/vctop/d11/vc21260.htm

Table 2: Vehicle Access Permitted by Legislation

Traffic Condition	≤ 25 mph	≤ 35 mph	40-50 mph	≥ 55 mph
Shared general traffic lanes	NEVs Golf carts* Bicycles	NEVs Bicycles	Bicycles permitted	Bicycles not advised but may be permitted
Separate lane or shoulder	NEVs Golf carts* Bicycles	NEVs Golf carts* Bicycles		Bicycles
Separate path	NEVs Golf carts* Bicycles			NEVs Golf Carts

* Generally limited to close proximity to golf courses and as authorized in a golf cart plan approved by the jurisdiction

2.5.3 Crossings

NEV crossings at roadways with speed limits above 35 mph must be orthogonal (90 degree intersection angles). If such crossings are a major part of the NEV network and the crossing is not orthogonal, there may be opportunities to reconfigure the geometry of the intersection to meet this requirement. Caltrans must approve any uncontrolled crossing of a state highway. The code states:

> (1) The operator of a low-speed vehicle may cross a roadway with a speed limit in excess of 35 miles per hour if the crossing begins and ends on a roadway with a speed limit of 35 miles per hour or less and occurs at an intersection of approximately 90 degrees.

However, the CVC also permits NEVs on roadways with a posted speed of 40, 45, or 50 mph where that roadway has a dedicated NEV / bike lane. Such use would be impractical if turning or crossing movements were not continuous. The CVC is interpreted to mean that at an intersection, as long as the NEV / bike lane is carried all the way through the approach up to the stop line, and again on the departure side of any leg that a NEV would be permitted to travel to, the movement would be permitted. If the movement is a left turn, then the NEV driver could perform:

- A two-stage turn (with or without special provisions) although at higher volumes there could be an issue with queuing space for NEVs
- A vehicular style left turn, just like a bicyclist is permitted to do, as long as they have a NEV/bike lane to turn into on the departure side. The NEV driver would not be in a designated NEV lane on the approach - like a vehicular bicyclist, they would be in the general traffic left turn lane. Even on a green indication, there should not be an issue with this because a NEV has similar acceleration and cornering capabilities as an automobile.

2.6 City Municipal Codes

This section provides relevant golf cart and NEV vehicles and traffic regulations obtained from each jurisdiction's municipal code available from the www.qcode.us, www.municode.com or www.amlegal.com websites.

2.6.1 Desert Hot Springs

No applicable municipal code.

2.6.2 Palm Springs

Definitions

Chapter 12.84 sets out the following definitions.

a) "Golf cart" means a motor vehicle having not less than three wheels in contact with the ground, having an unladen weight less than one thousand three hundred pounds, which is designed to be and is operated at not more than fifteen miles per hour and designed to carry golf equipment and not more than two persons, including the driver.

b) "Darkness" means any time from one-half hour after sunset to one-half hour before sunrise and any other time when visibility is not sufficient to render clearly discernible any person or-vehicle on the highway at a distance of one thousand feet.

c) "Real estate development offering golf facilities" means an area of single-family or multiple-family residences, the owners or occupants of which are eligible for membership in, or the use of, one or more golf courses within the development by virtue of their ownership or occupancy of a residential dwelling unit in the development. (Ord. 1405 § 1, 1991)

Operation

a) Any person operating a golf cart on designated city streets shall abide by all applicable traffic laws of the city and state.

b) No person shall operate a golf cart on a designated city street after darkness unless the golf cart conforms with the equipment requirements of the California Vehicle Code.

c) No person shall operate a golf cart on a designated city street for any other purpose than transporting persons and golfing equipment to or from a golf course. (Ord. 1405 § 1, 1991)

Routes

Chapter 12.84.030 designates thirteen streets are for operation of golf carts. No NEV routes have been established in the municipal code, but the City published a NEV network map in 2009 (although this is no longer readily found on the city website). The map is provided in Appendix D to this plan.

Discussion

The Palm Springs definition of a golf cart (1300 lb / 15 mph) excludes NEVs and prohibits non-golfing purposes of travel, severely limiting the transportation utility of such vehicles. The city code does define an electric personal assistive mobility device (EPAMD, popularized by the "Segway" scooter, but does not define electric bicycles or NEVs.

2.6.3 Cathedral City

Although city staff have advised that golf carts and NEVs are prohibited, no such prohibition is found in the municipal code.

2.6.4 Rancho Mirage

Definitions

Chapter 10.70 sets out the following definitions.

Golf cart means a four-wheeled motor vehicle with an unladen weight of less than one thousand three hundred pounds, which is designed to be and is operated at not more than twenty miles per hour and is designed to carry golf equipment and not more than two persons, including the driver, and can be utilized on local golf courses for the purpose of playing golf.

Golf cart facility means all travel ways, as designated by the city, that provide for golf cart travel. There shall be three categories of golf cart facility:

1. Class I golf cart paths provide an area separate from the roadway used by automobile traffic for shared one-way or two-way use by golf carts, bicycles and pedestrians.
2. Class II golf cart lanes provide a striped eight-foot lane for one-way golf cart and bicycle travel on a street or highway.
3. Class III golf cart routes provide for shared use with automobile and bicycle traffic. Class III facilities are established by placing golf cart route signs along roadways with speed limits of twenty-five miles per hour or less in order to link them to Class I or Class II facilities.

Golf cart circulation plan means the adopted map depicting routes and crossing that will be constructed, posted and designated for use by permitted golf carts. (Ord. 713 § 3, 1999)

Operation

All golf cart operators operating golf carts on any golf cart facility in the city must conform to the following operator requirements and safety criteria:

1. Golf cart operators must be licensed drivers in the State of California with valid California driver's license, or a driver's license issued by another state.
2. Golf cart operators must comply with the financial responsibility requirements established pursuant to Chapter 1 (commencing with Section 16000) of Division 7 of the California Vehicle Code.
3. Golf cart operators must maintain golf cart in a safe condition.
4. Golf carts are limited to daytime operation and are not permitted before one-half hour prior to sunrise or after one-half hour after sunset.
5. Golf cart operators must yield the right-of-way to automobiles, pedestrians and bicyclists.
6. Golf cart operators may only travel on designated golf cart facilities, and only in those golf carts that meet the minimum design criteria required by Section 10.70.030 and that are also properly permitted by the city. (Ord. 713 § 3, 1999)

Routes

The city has developed a golf cart map, last updated March 2012, identifying class 1 paths and class 2 on-street lanes between Dinah Shore Drive and Highway 111. This is provided in Appendix D.

Discussion

The Rancho Mirage definition of a golf cart (1300 lb / 20 mph) excludes NEVs and in contrast to Palm Springs also prohibits night-time use of golf carts regardless of whether they are equipped for such use.

The lack of a connection between the Eisenhower Medical Center at Country Club Drive and The River at Highway 111 along Bob Hope Drive is a significant barrier to CV Link access.

2.6.5 Palm Desert

Definitions

"Golf cart" means an electric powered motor vehicle having not less than four wheels in contact with the ground and an unladen weight of less than three thousand pounds which is designed to be and is operated at not more than twenty-five miles per hour and is designed to carry not more than six persons, including the driver.

"Golf cart lanes" is synonymous with "golf cart routes" and means all publicly owned facilities that provide for golf cart travel including roadways designated by signs or permanent markings which are shared with pedestrians, bicyclists, and other motorists in the plan area. There shall be three categories of golf cart lanes:

1. Class I golf cart lanes provide a right-of-way completely separated from any highway, with cross traffic by other motorists minimized, and designated for the exclusive use of golf carts, or, where feasibly safe and when no parallel improvements for pedestrians and bicyclists are available, designated for the shared use of golf carts, bicyclists and pedestrians.
2. Class II golf cart lanes provide a restricted right-of-way on a highway designated by striping and signage for the exclusive or semiexclusive use of golf carts, with through travel by motor vehicles or pedestrians prohibited, but with vehicle parking and cross traffic by pedestrians and other motorists permitted.
3. Class III golf cart lanes are lanes on local streets with speed limits of forty-five miles per hour or less and are shared with pedestrians, bicyclists and other motorists. (Ord. 1174 § 1, 2008; Ord. 895 § 2, 1998; Ord. 703 § 1, 1993)

Routes

The city's golf cart map was last updated in September 2010 and is provided in Appendix D.

Discussion

The Palm Desert definition of a golf cart (3000 lb / 25 mph) effectively includes NEVs. The exclusion of lanes on roadways with a posted speed of 50 mph is in variance with the California Vehicle Code which permits operation of NEVs within a designated lane on such roadways.

2.6.6 Indian Wells

No applicable municipal code.

2.6.7 La Quinta

Definitions

Chapter 12.69 sets out the following definitions. "Golf cart" means a four-wheeled electric motor vehicle with an unladen weight of less than one thousand three hundred pounds, which is designed to be, and is operated at not more than twenty-five miles per hour, and is designed to carry golf equipment and no more than two persons, including the driver.

"Golf cart paths" or "golf cart routes" means all city-owned travel ways that allow golf cart travel, including roadways.

There shall be three categories of golf cart paths:

1. Class I golf cart paths provide an area separate from the roadway used by automobile traffic for shared one-way or two-way golf carts, bicycles, pedestrians, and equestrians.
2. Class II golf cart paths provide a striped eight-foot lane for one-way golf cart and bicycle travel on a street or highway.
3. Class III golf cart paths provide for shared use with automobile and bicycle traffic. Class III paths are established by placing golf cart route signs along roadways with speed limits of twenty-five miles per hour or less in order to link them to Class I or Class II paths.

"Golf cart route" means the map depicting routes and crossings that will be constructed, posted and designated for use by permitted golf carts. (Ord. 474 § 1, 2009)

Operation

All golf cart operators operating golf carts on any golf cart path in the city must conform to the following operator requirements and safety criteria:

A. Golf cart operators must be licensed drivers in the state of California with valid California driver's license, or have a valid driver's license issued by a jurisdiction in accordance with Vehicles Code Sections 12502 through 12505.
B. Golf cart operators must comply with the financial responsibility requirements (insurance) established pursuant to Chapter 1 (commencing with Section 16000) of Division 7 of the California Vehicle Code.
C. No golf cart shall be operated on golf cart paths or golf cart routes within the city without a current golf cart permit decal visibly displayed on the right rear fender of the golf cart.
D. The golf cart permit shall be valid for two years from the date of issuance.
E. Golf cart operators must maintain the golf cart in a safe condition and be properly loaded to conform with CVC Section 24002.
F. Golf cart operators may only travel in those golf carts that meet the minimum design criteria required by Section 12.69.030.
G. Golf carts are limited to daytime operation and are permitted on public streets only during the time period between one hour prior to sunrise and one hour after sunset.
H. A maximum of two persons may ride in the golf cart and may only ride in the main passenger compartment equipped with safety belts. Both driver and passenger must wear safety belts at all times while the golf cart is being operated on Class I, II, or III golf cart paths.

I. Golf cart operators must yield the right-of-way to pedestrians, bicyclists, and equestrians.
J. Golf cart operators may only travel on designated golf cart routes or along streets with speed limits of twenty-five miles per hour or less.
K. Golf cart operators may not travel on or along streets with speed limits in excess of twenty-five miles per hour except on designated golf cart routes, and shall only cross at controlled intersections as designated on the golf cart route map.
L. Golf carts modified by removing any of the above safety equipment or a modification that in any way creates an unsafe cart will result in the immediate revocation of the golf cart permit and will be subject to any violations that apply under the California Vehicle Code. Should a golf cart be impounded pursuant to a violation under the State Vehicle Code, the registered owner shall be subject to any regulations imposed by the impounding authority pursuant to Section 22850.5 of the California Vehicle Code.
M. No person shall operate or move a golf cart upon a sidewalk except those persons who in the course of their employment by a state, federal, or local government, or school district maintenance crew. (Ord. 474 § 1, 2009)

Routes

Undated map; includes specification of 8' lanes; included in a detailed brochure.

Discussion

The La Quinta definition of a golf cart (1300 lb / 25 mph) effectively includes on some NEVs, because the maximum number of occupants is only 2. La Quinta has substantially more regulations beyond those provided in the California Vehicle Code.

2.6.8 Indio

Definitions

GOLF CART. A motor vehicle having not less than three wheels in contact with the ground that is designed to be and is operated at not more than 25 miles per hour and carries golf equipment, food/beverages for golfers, and one or more people, including a driver, and can be utilized on a golf course for play, service to golfers or maintenance.

GOLF CART CIRCULATION PLAN. The plan presented by city staff concurrent with this chapter's approval or such plan as may supersede same by determination of the Planning Commission. The golf cart circulation plan shall be a public record maintained by the City Clerk.

GOLF CART FACILITY. All travel ways, as designated by and located in the city within public right-of-way, that provide for golf cart travel. There shall be three categories of golf cart facilities:

1) Class I golf cart paths provide an area separate from the roadway used by automobile traffic for shared one-way or two-way use by golf carts, bicycles and pedestrians.
2) Class II golf cart lanes provide a striped lane for one-way golf cart and bicycle travel on a street or highway.
3) Class III golf cart routes provide for shared use with automobile and bicycle traffic. Class III facilities are established by placing golf cart route signs along roadways with speed limits of 25 miles per hour or less in order to link them to Class I or Class II facilities.

GOLF CART OPERATOR. Any person that operates a golf cart within public right-of-way per this chapter.

GOLF CLUB. A public or private golf course owned by an institutional golf cart operator and located in its entirety on private or city-owned property with the sole exception of city street crossings identified in § 72.06.

INSTITUTIONAL GOLF CART. A golf cart owned by an institutional golf cart operator and operated exclusively within a golf club.

INSTITUTIONAL GOLF CART OPERATOR. Any entity, e.g., a company, corporation, homeowners' association, management association, etc., that owns and allows usage of golf carts at a golf club by persons who are playing golf, and are:

1) Members of the entity in question, or
2) Residents or guests of residents of a community related to the entity in question, or
3) Otherwise affiliated with, paying fees to, or in receipt of consent from the entity in question to do so.

(Ord. 1583, passed 12-15-10)

Operation

A. A golf cart operator must be possess a valid California driver's license, a driver's license issued by another state, or other proof of legal authority to operate a motor vehicle in California;
B. A golf cart operator must have insurance that complies with the financial responsibility requirements established pursuant to Cal. Vehicle Code Chapter 1, Division 7, §§ 16000 et seq.;
C. Each golf cart must be maintained in a safe condition;
D. In the case of an institutional golf cart, the party responsible to fulfill this duty to maintain the golf cart in question is the institutional golf cart operator, not an individual golf cart operator;
E. Operation of a golf cart that does not meet the design criteria specified in § 72.03 is prohibited between one-half hour after sunset and one-half hour before sunrise at designated crossings;
F. Golf cart operators must yield the right-of-way to automobiles, pedestrians and bicyclists;
G. Golf cart operators may only travel on a designated golf cart facility, a golf club crossing conforming to § 72.06, or a public street with a speed limit of 25 miles per hour or less; and
H. Except as otherwise provided in this chapter, each golf cart operated in the city shall comply with the design criteria required by § 72.03 and be properly permitted as required by § 72.05.

(Ord. 1583, passed 12-15-10) Penalty see § 72.99

Routes

Eight streets are identified for golf cart operation in the March 2011 map, provided in Appendix D.

Discussion

Indio's definitions are less prescriptive than other jurisdictions, and could effectively include NEVs. The speed limit restriction to 25 mph roadways varies from the California Vehicle Code, which permits operation in mixed traffic lanes up to and including 35 mph posted speeds. The route map does not identify many local streets that could serve as Class III mixed traffic routes, and a explicit approval for such neighborhood street operation could clarify the bylaw.

2.6.9 Coachella

No applicable municipal code. As an aside related to the CV Link Master Plan, the code provides for bicycle licensing by the Chief of Police, applicable to resident operation of bicycles on city streets.

2.6.10 Summary

A summary of City Ordinances Relevant to Golf Carts and NEVs is provided in Table 3, showing that there are no two cities with the same definition of a golf cart. By permitting golf cart operation up to 25 mph on designated city streets, three cities effectively permit NEVs. No city explicitly defines or prohibits an NEV.

Table 3: Summary of City Ordinances

Jurisdiction	Weight (lb)	Speed (mph)	Maximum Occupants	Prohibitions	Routes
Desert Hot Springs	N/A				
Palm Springs	1300	15	2	Non-golf use	Separate golf cart and NEV maps
Cathedral City	N/A				
Rancho Mirage	1300	20	2	Night use	Golf cart map
Palm Desert	3000	25	6		Golf cart map
Indian Wells	N/A				
La Quinta	1300	25			Golf cart brochure
Indio	not defined	25	not defined		Golf cart map
Coachalla	N/A				

2.6.11 Executive Order B-16-2012 and ZEV Action Plan, 2013

In March 2012, California State Governor Edmund (Jerry) Brown issued Executive Order B-16-2012 requiring all state agencies and entities to make efforts toward the rapid deployment of Zero-Emissions Vehicles (ZEV) in the state of California. This order also required that state agencies – including the California Air Resources Board, California Energy Commission and Public Utilities Commission – partner with the Plug-in Electric Vehicle Collaborative and California Fuel Cell Partnership to develop zero-emissions benchmarks for the state to achieve by 2015, 2020, and 2025. ZEVs as defined here include the broad range of electric vehicles including NEVs, but also other plug-in Battery Electric Vehicles (BEV), Plug-in Hybrid Vehicles (PHEV) and hydrogen fuel cell vehicles.

The 2013 ZEV Action Plan was drafted in response, and outlines strategies and actions necessary to meet the benchmarks set forth in EO B-16-2012. The Action Plan places emphasis on the market conditions and charging/fueling infrastructure necessary for large-scale deployment of ZEVs, and the public-private partnership opportunities that will enable these developments. The plan consists of four general goals:

1) Complete needed infrastructure and planning
2) Expand consumer awareness and demand
3) Transform fleets, and
4) Grow jobs and investment in the private sector

3 Existing Conditions

As the Coachella Valley region continues to expand, attracting new residents and jobs, the mobility and accessibility needs of its residents will also increase. Neighborhood Electric Vehicles (NEVs) can contribute to a more livable and sustainable region. The purpose of this chapter is to establish a base understanding of the current state of NEV development and the plans for future NEV infrastructure development in the Coachella Valley region.

This chapter begins with summaries of existing local plans and relevant reports for NEV system design and policy in the Coachella Valley. Residential density, employment density and other key local destinations are used to complete an NEV Suitability Analysis (NEVSA). The chapter concludes with a summary of identified opportunities and constraints to NEV network development. Additional NEVSA documentation is provided in Appendix A and existing network maps are provided in Appendix B and C.

3.1 Document Review

Several local NEV plans and reports have been published in recent years. These plans and reports provide a number of effective approaches towards NEV system development directly applicable to the Coachella Valley region.

3.1.1 Draft CVAG PEV Readiness Plan

The recently published draft CVAG Plug-in Electric Vehicle (PEV) Readiness Plan provides the foundation for a regional NEV transportation network in the Coachella Valley. The purpose of the plan was to prepare for the system-wide deployment and adoption of PEVs throughout the region over the next decade. The plan is the result of close coordination between local communities, local, regional, state, and federal agencies, members of the California PEV Coordinating Council, electric vehicle industry representatives, and numerous stakeholder groups.

The plan estimates up to 13,000 PEVs will be on Coachella Valley roads by 2025. These projections were based on current vehicle registration data (there are currently about 148 PHEVs, 76 BEVs and 440 NEVs in the Coachella Valley). The plan notes that the NEV fleet has not grown over the last decade, which may be attributable to the current road network limitations. These projections were also used to generate demand estimates for non-residential charging stations. Several indicators of adoption were identified through surveys and market data. These indicators were then used to develop a weighted scoring methodology for charging station siting throughout the region. This was further refined to identify workplace and opportunity charging locations.

The PEV Readiness Plan considers the broad range of Plug-in Hybrid Electric Vehicles (PHEVs) and Battery Electric Vehicles (BEVs). As a result of this general scope, the PEV Readiness Plan focuses primarily on vehicle technology and Electric Vehicle Supply Equipment (EVSE) infrastructure and the corresponding market and policy/regulatory drivers necessary for deployment. That is, it does not specifically address the infrastructure required for NEV adoption - NEV Class I, II, and III facilities.

3.1.2 WRCOG NEV Plan

The Western Riverside Council of Governments Neighborhood Electric Vehicle Plan (WRCOG NEV Plan) was drafted to develop the "backbone" network of NEV facilities between the cities of Corona, Norco, Riverside, and Moreno Valley in 2010. It was designed as a model plan for each of the individual cities to consult in developing their own local NEV Plans. Most of the backbone network is based on existing and planned routes with Class II bike facilities, as these can be relatively easy and cost-effective to convert for NEV use.

The WRCOG NEV Plan provides a model design guide section with guidance on NEV facility types, signage and pavement markings, wayfinding, charging stations, parking, and facility maintenance. This guidance informed the CVAG NEV Transportation Plan.

3.1.3 City of Lincoln NEV Transportation Plan

The City of Lincoln was the first city in California to adopt a NEV Transportation Plan. The Lincoln plan was primarily created to accommodate high usage of NEVs in the Sun City Lincoln Hills development and expand the NEV network to meet increasing demand in the greater Lincoln area. Much of that demand is generated from the large and growing retirement community in Lincoln. This provides a similar context for cities across the Coachella Valley. The plan was intended to prescribe relatively "minor modifications" to existing facilities including signing and striping improvements, parking, charging stations, and crossings.

The Environmental Justice element of the plan estimates that the cost of owning and operating an NEV is 20% of the cost of owning a passenger automobile, suggesting that NEVs provide an affordable transportation options for low-income drivers. The plan provides a special drivers permit to improve the safety and independence of aging or disabled drivers that can no longer hold a driver's license.

3.1.4 Local Support and Opposition to NEVs

NEVs provide mobility options for a wide range of trip purposes, including commute trips, school, shopping, errands and recreation. The replacement of short passenger vehicle trips with NEV trips will reduce fuel consumption and emissions. With lower new vehicle purchase prices and reduced long-term maintenance costs, NEVs can be attractive to a wide range of household incomes, and have the potential to increase independence and mobility options of older residents who are no longer able to operate a motor vehicle. As the infrastructure and market develop, the barriers to NEV ownership and operation are further reduced.

As documented in the draft CVAG PEV Readiness Report, the opportunities for NEV development in the Coachella Valley are abundant. Many valley residents are already accustomed to travel by golf cart, and PEVs have been on the road in the region for over a decade. Current PEV and golf cart use has contributed to a general understanding of the need for improved facilities, and safer, more convenient connections to local and regional destinations. Several of the cities in the region have in recent years begun to invest more heavily in NEV infrastructure. For example, the City of Palm Springs has an electric vehicle fleet and has installed electric vehicle charging stations throughout the city.

The majority of local and regional policy makers are supportive of NEV development efforts including CVAG, Riverside County Supervisors, and the mayors of most of the cities in Coachella Valley. In recent years, local and regional support for NEV development has centered on CV Link. While not necessarily specific to NEV vehicles or the infrastructure, this media attention has simultaneously elevated the profile of the project and reaffirmed the region's goals toward NEV development.

Despite the many opportunities and benefits of NEV development, support has not been unanimous. Outreach conducted for CV Link has indicated concern about the safety of mixing NEVs, bicyclists and pedestrians on existing and constrained new pathways. This NEV Plan and the CV Link Master Plan will help guide the development of facilities that minimize path user conflicts. However, the cities will also need to consider widening of existing paths and/or traffic control devices where widening is not feasible.

3.2 NEV Demand and Access Analysis

The purpose of this NEV Suitability Analysis (NEVSA) is to identify areas of high current and potential activity as well as patterns of land use and demographics that will generate NEV travel within the study area. This analysis will help guide route selection and infrastructure decisions.

The analysis provides the following benefits:

- Quantify factors that impact NEV activity, objectively identifying areas where NEV users might want to be, while focusing on destinations like schools, and parks
- Provides the basis for a geographically based alternative alignment analysis
- Quantifying the economic benefits that are derived from construction of various alignment alternatives
- Guide community leaders and the public on alternative alignment analyses

3.2.1 Development of NEVSA

The analytical methods in NEVSA provide an objective, data-driven process of identifying clusters of high potential NEV activity and areas with poor existing network connectivity.

Background, Overview of NEVSA, and Use Considerations

This NEVSA has its basis in a technique devised by prominent landscape architect, Ian McHarg. His influential book Design with Nature (1969) highlighted the importance of considering the natural environment when introducing new development and infrastructure. McHarg was an early pioneer of GIS analysis and established innovative techniques for route planning using photographic map overlays. McHarg asserted that in order to find the most suitable route, one must determine the least social cost; meaning factors that would impact social values would have to be considered. Once identified, each factor was mapped on individual transparent sheets using three different color shades to represent the level of social cost. The sheets were overlaid into a single stack revealing the most suitable route location. McHarg's photographic map overlay analysis paved the way for the foundation of modern day GIS models.

Models serve as an effective means to understand how factors in a complex system interact by providing a simplified version of the system for study. However, by definition, models are representations of reality and are constrained by the quality of available data and the complexity of the system under consideration.

NEVSA provides a general understanding of expected activity in the environment by combining categories representative of where people live, work, play, and go to school into a composite sketch of regional demand. Area specific land use and transportation factors, such as transit service, local retail and service destinations, and schools are considered, as well as demographic factors. This analysis will form the basis of the route selection process, because it predicts where there will be a high demand for trip making. Subsequent to completing this demand model, the likely routes, based on average NEV trip length and roadway suitability, can be prioritized.

NEVSA Demand Analysis Development

NEVSA's Demand Analysis relies on spatial consistency in order to generate logical distance and density patterns. All scores are aggregated to a central location at the census block level, the census block corner, referred to as "NEVSA Point". Census blocks closely represent the street network and therefore Census block corners closely represent street corners where NEV traffic is prevalent. This method is based on the "Low-Stress Bicycling and Network Connectivity" report[2]. The report discusses the benefits of using a smaller geographic setting for pedestrian and bicycle demand analyses rather than using more traditional traffic model features such as census block groups, census tracts or traffic analysis zones (TAZs). Due to the current lower range of NEV movement relative to automobiles, this smaller geographic unit of analysis is also suitable.

3.2.2 Utilization of NEVSA – Demand Analysis

Demand Analysis Scoring Method

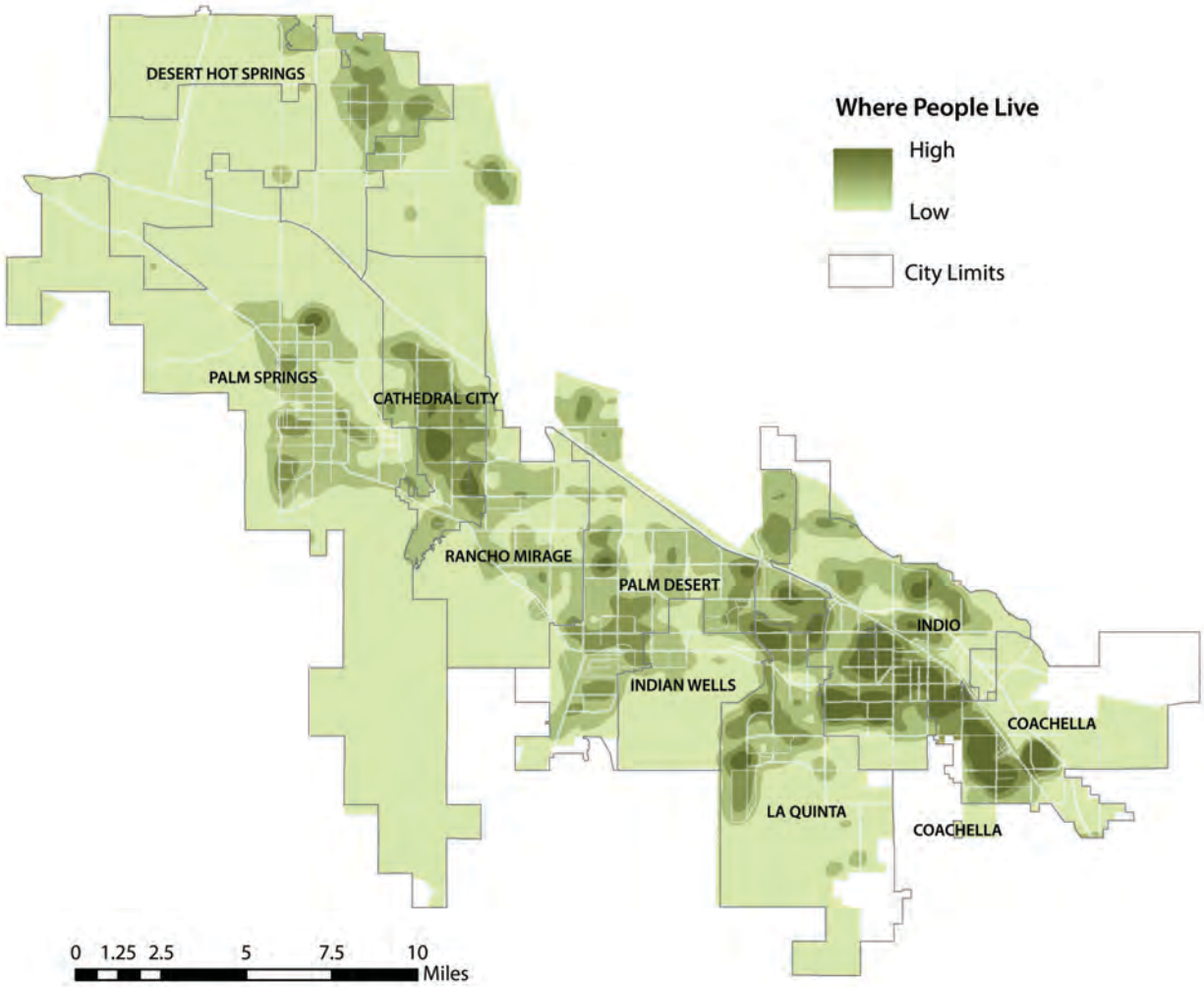
Generally speaking, the scoring method for the demand analysis is a function of density and proximity of trip generators. Areas with a large number of destinations close to each other score highly. Similarly, areas that are expected to generate more NEV trips score highly. Appendix A provides further detail on destination types and feature scores and weights.

Results of Demand Analysis

The following thematic maps illustrate where people live, work, play, learn and access transit. For the purposes of this analysis, shopping centers are considered locations where people play.

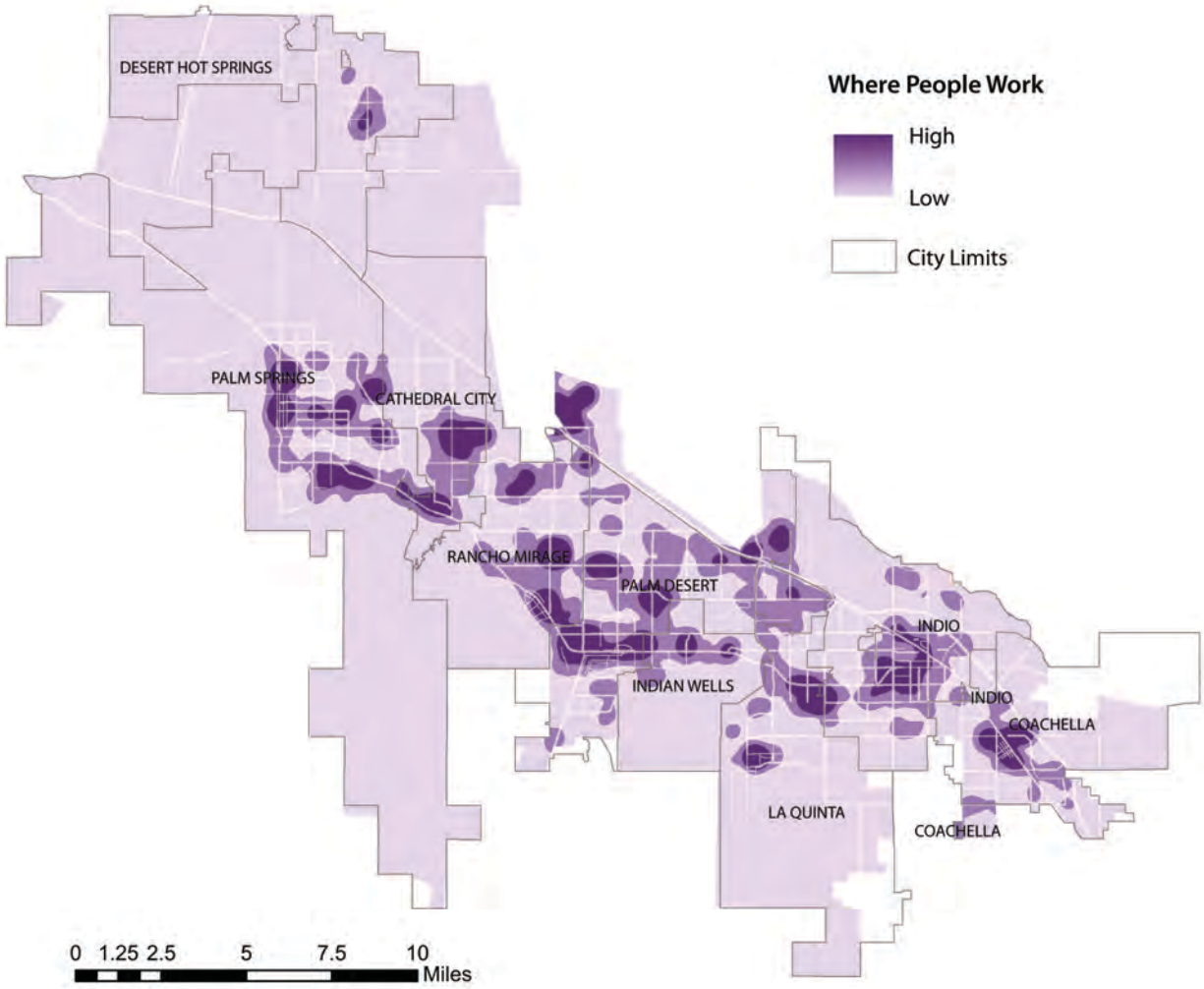
[2] Maaza, Mekuria, P. Furth, and H. Nixon. *Low Stress Bicycling and Network Connectivity.* Mineta Transportation Institute. May, 2012.

Map 1: Where People Live



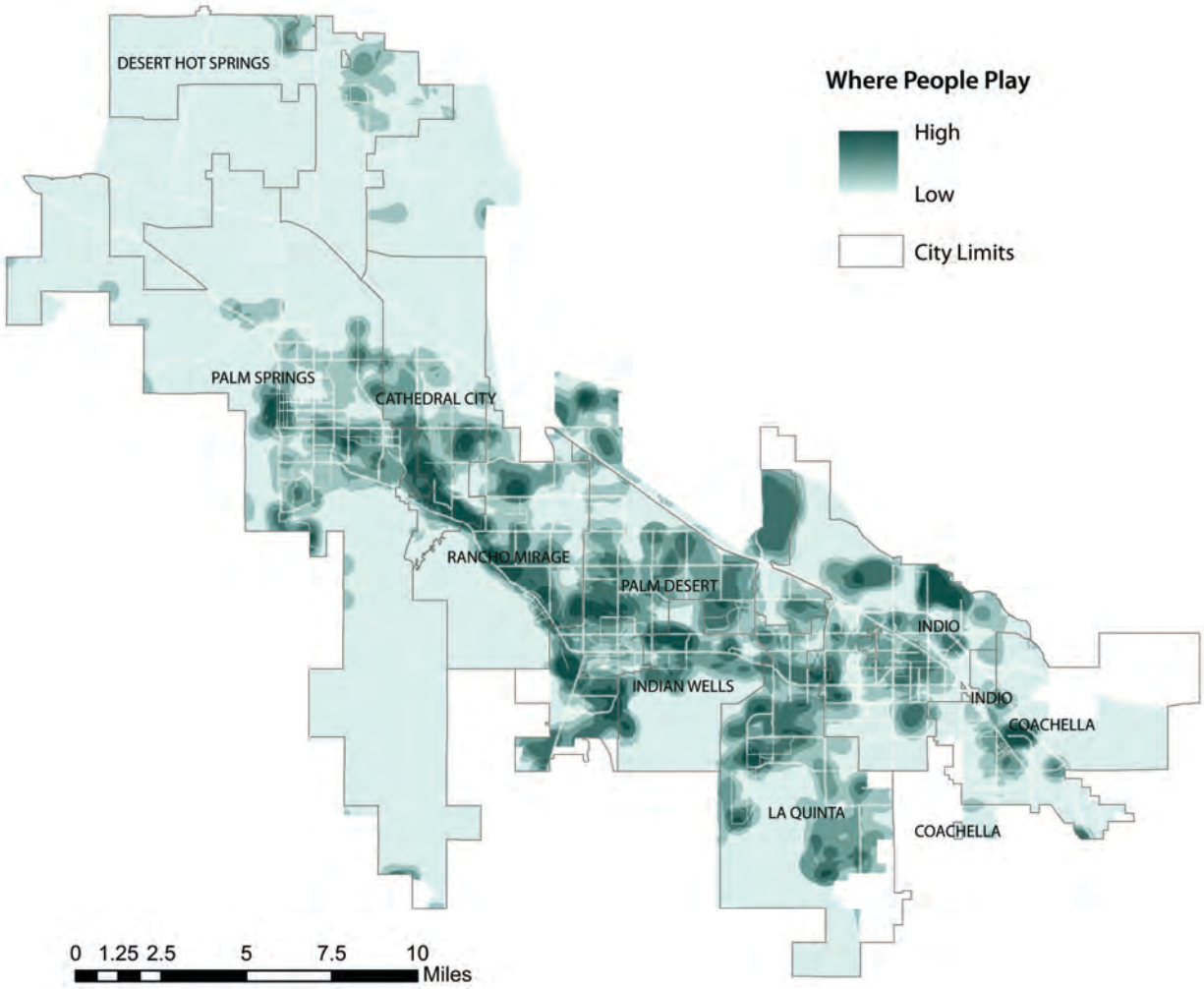
Where people live includes 2010 census block level population density information. These locations represent potential trip origin locations. More trips can be made in areas with higher population density if conditions are right. Areas with the densest populations are found in the southeast portion of the region, in Indio and Coachella. This category is a function of the number of NEVSA points within a half-mile of each other. As for all maps, the areas shaded more deeply represent higher demand areas relative to lighter colors. See Appendix A for scoring details.

Map 2: Where People Work



Where people work mainly represents trip ends for people working within the Coachella Valley region regardless of residency. Its basis is 2010 total employment by census block. Areas of dense employment are found in Palm Springs, Palm Desert along Highway 111, Thousand Palms Indio and Coachella. Depending on the type of job, this category can represent both trip attractors (i.e., retail stores or cafes) and trip generators (i.e., office parks and office buildings) in terms of base employment population. It is therefore also used in the where people play category by overlaying with specific job types, such as retail. This category accounts for the number of employees per NEVSA Point within a half-mile. See Appendix A for scoring details.

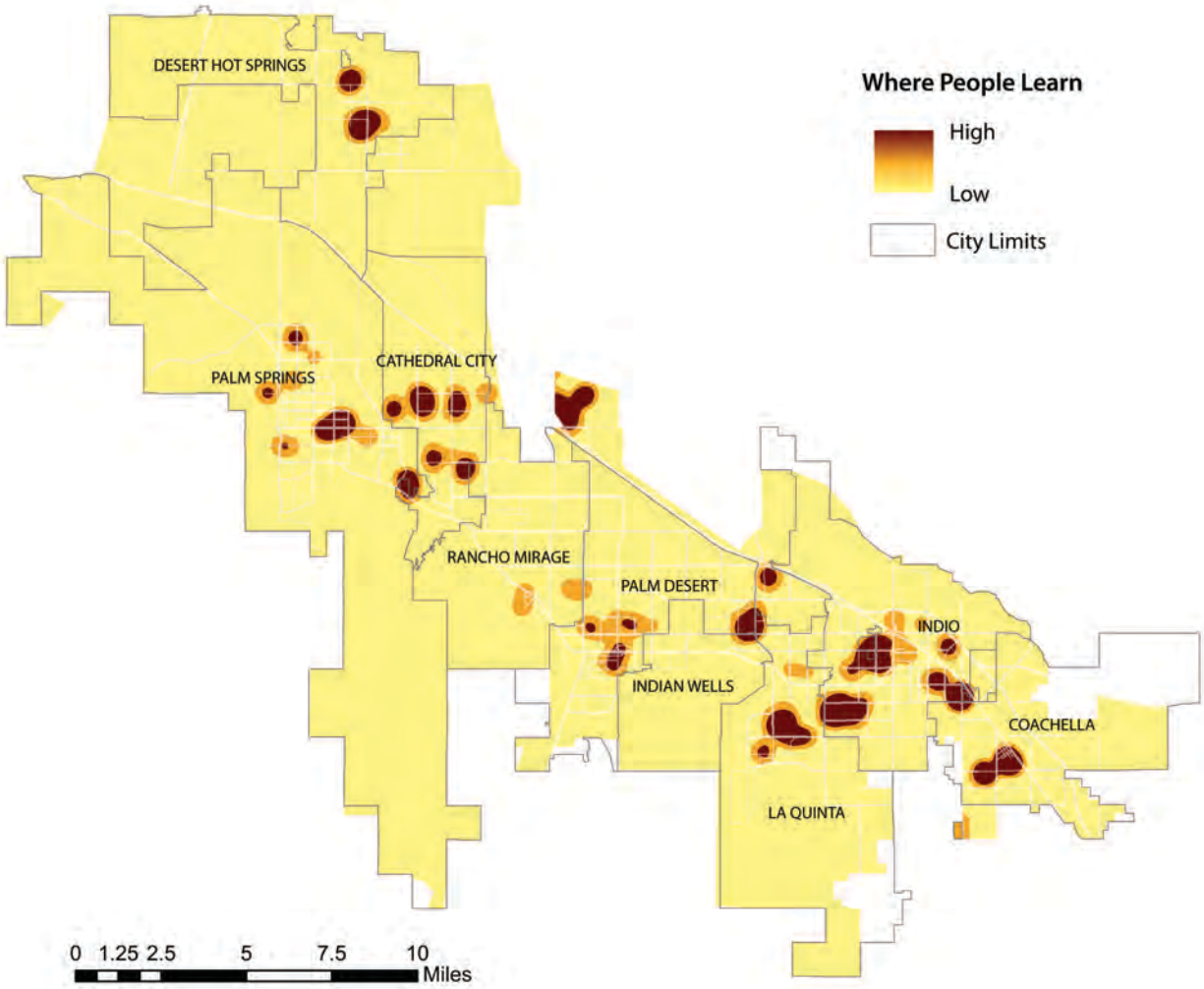
Map 3: Where People Play



Where people play is a combination of varied land use types and destinations. Overlays such as golf courses, retail destinations, parks and services and hospitals all contribute to this category. While hospitals and services are not exactly where one would expect to "play," these civic amenities are still destinations of importance reflected in this category due to the temporary nature of the visit. As shown above, the greatest concentration of play destinations in the valley is found along Highway 111, in downtown Palm Springs and the northern portion of Indio.

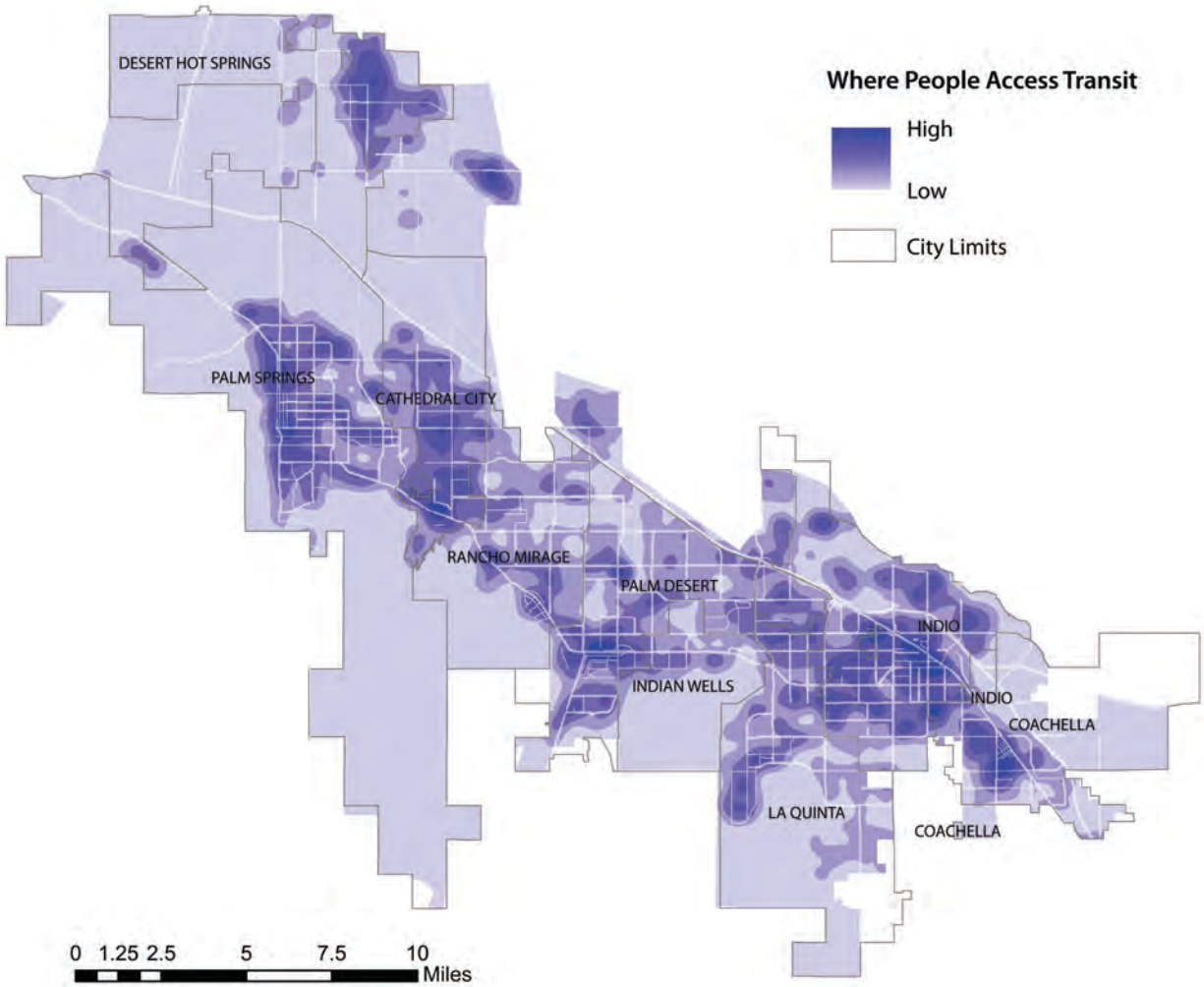
This category accounts for the number of destinations per NEVSA Point as well as the relative importance of each destination. See Appendix A for scoring details.

Map 4: Where People Learn



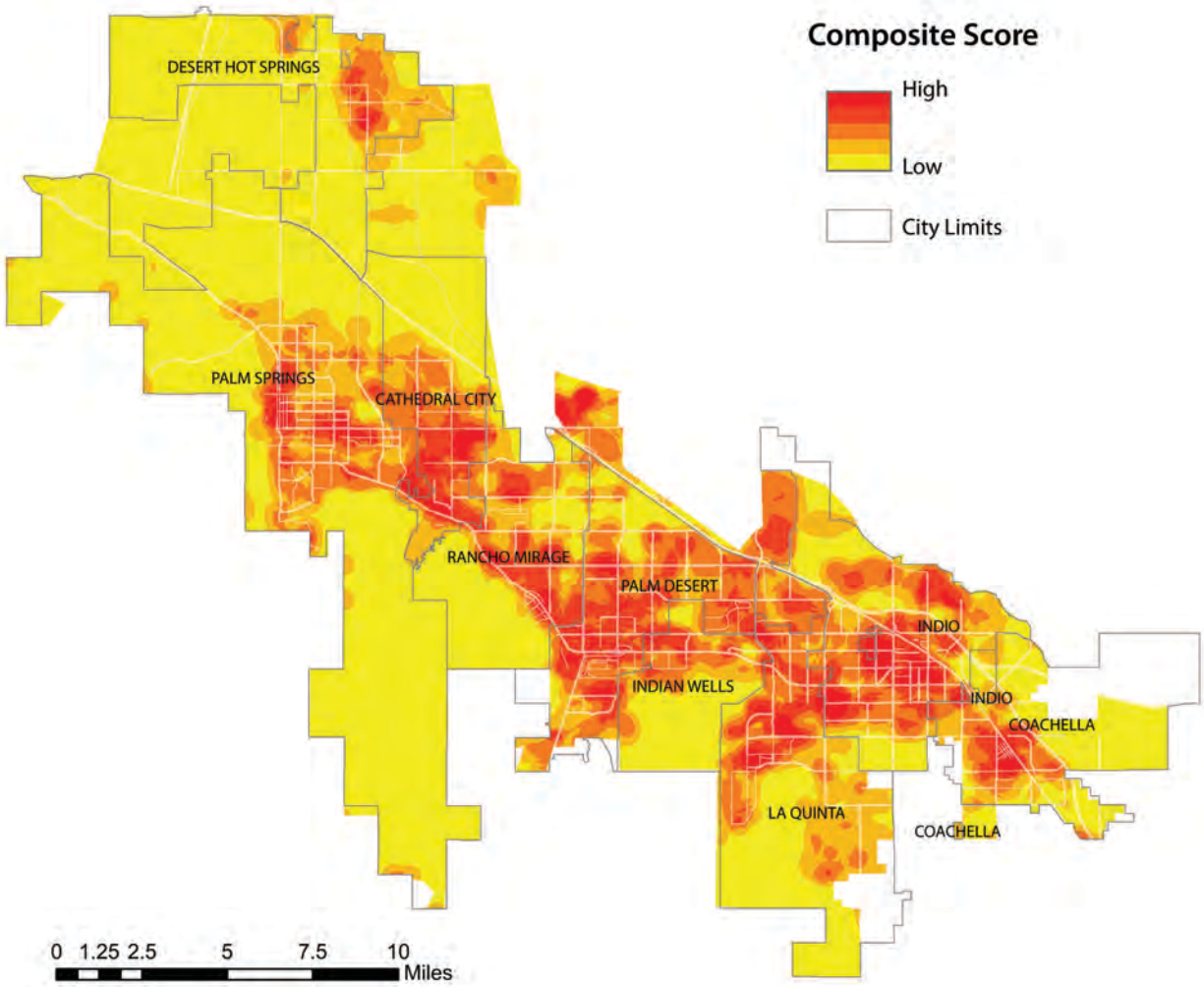
Where people learn is important due to the number of children that could receive rides to school and the role schools play as civic destinations for all types of activities. Darker shading indicates areas where learning destinations are closer together and parents or other family members would have an easier time accessing multiple schools. Schools with the greatest proximity are found in population centers within the valley. See Appendix A for scoring details.

Map 5: Where People Access Transit



Where people access transit is assessed using transit stop locations. This category accounts for the transit stops within a half-mile of each other. Areas with the greatest density of transit stations are typically in commercial areas, where roadways are served by multiple transit lines. This category is included in the model, because it is specified in the legislation prescribing the considerations for NEV plans in California. See Appendix A for scoring details.

Map 6: Composite NEV Demand Map



After independently processing the features, the composite model is created and grouped into five demand classes using natural breaks in the data values. Estimated demand is highest along Highway 111, between Palm Springs and Indian Wells, along Indio Boulevard in Indio, and at the confluence of retail land uses, 'play destinations,' residences and places of work. Moderate demand is seen between high demand areas, representing movement between destinations in these areas. Areas with moderate demand are often characterized by a single dominant land use (e.g., employment centers). The route selection process draws from this demand analysis to recommend the high priority NEV routes that can connect the areas in high demand using the appropriate street types.

See Appendix A for a description of the extent to which each feature influences the composite demand model. By comparing the total possible score (per NEVSA Point) with the actual scores one can see both how social and cultural features affect demand and how increasing distance between origins and destinations reduces demand.

Areas with Poor Existing Network Connectivity

Areas with poor connectivity have barriers and gaps such as roadways with posted speed limits greater than 35 mph. In these cases, NEVs must either travel in an exclusive NEV/bike lane, travel along a designated grade-separated path or travel greater distances to arrive at their intended destination via lower speed, lower-stress local streets. A list of these high speed roadways are listed in Table 4 below, and are further illustrated in Appendix B and C. This table may include roads that currently have some segments marked for bike or golf cart lanes.

Table 4: Barriers to Connectivity

Road	Speed Limit	Road	Speed Limit
Palm Springs			
Highway 111	50	Alejo Road	45
Gene Autry Trail	50	Mesquite Avenue	45
Indian Canyon Drive	45	Palm Canyon Drive	40-45
San Rafael Drive	45	Tachevah Drive	40
Racquet Club Road	45	Amado Road	40
Farrell Drive	45	Baristo Road	40
Vista Chino	45	Escoba Drive	40
Sunrise Way	45	Ramon Road	40
Crossley Road	45	Sunny Dunes Road	40
Cathedral City			
I-10	70	Ramon Road	45
Date Palm Drive	45-55	Perez Road	45
Highway 111	50	Dinah Shore Drive	40
Gerald Ford Drive	50		
Rancho Mirage			
Bob Hope Drive	40	Morningside Drive	50
Highway 111	50	Da Vall Drive	45
Frank Sinatra Drive	50	Country Club Drive	45
Dinah Shore Drive	50	Parkview Drive	45
Monterey Avenue	50		
Indian Wells			
Highway 111	45-55	Fred Waring Drive	45-50
Washington Street	50	Cook Street	45-50
Miles Avenue	50	Eldorado Drive	40
La Quinta			
Avenue 53	55	Avenue 42	45-50

Road	Speed Limit	Road	Speed Limit
Avenue 54	55	Dune Palms Road	40-50
Highway 111	50-55	Washington Street	40-50
Jefferson Street	45-55	Adams Avenue	45
Miles Avenue	50	Avenue 52	45
Fred Waring Drive	50	Madison Street	45
Avenue 50	50	Eisenhower Drive	40
Palm Desert			
I-10	70	Portola Avenue	40-50
Highway 74	55	Highway 111	45
Frank Sinatra Drive	55	Fred Waring Drive	45
Gerald Ford Drive	55	Parkview Drive	45
Oasis Club Drive	55	Hovely Lane	45
Magnesia Falls Drive	50	Country Club Drive	45
Monterey Avenue	50	Haystack Road	45
Eldorado Drive	50	Cook Street	50
Washington Street	50	Mesa View	40
Indio			
I-10	70	Avenue 52	45
Avenue 50	55	Avenue 44	45
Jefferson Street	40-55	Monroe Street	40-45
Indio Boulevard	50	Dr Carreon Boulevard	40
Fred Waring Drive	50	49th Avenue	40
Hjorth Street	50	Burr Street	40
Avenue 48	40-50	Clinton Street	40
Madison Street	45-50	Arabia Street	40
Jackson Street	40-50	Oasis Street	40
Miles Avenue	45	46th Avenue	40
Cabazon Avenue	45	Market Street	40
Golf Center Parkway	45	45th Avenue	40
Dillon Road	45	Calhoun Street	40
Highway 111	45	Van Buren Street	40
Coachella			
I-10	70	Fillmore Street	40-50
Highway 86 S	65	Avenue 53	45

Road	Speed Limit	Road	Speed Limit
Highway 111	40-55	Jackson Street	45
Van Buren Street	50	Dillon Road	45
Harrison Street	50	Tyler Street	40-45
Avenue 54	50	Polk	40
Avenue 52	50	Avenue 49	40
Avenue 48	40-50	Avenue 50	40
Desert Hot Springs			
I-10	70	Palm Drive	40-50
Highway 62	65	Dillon Road	45
Indian Avenue	55	Mission Lakes Boulevard	40
Fairview Road	55	Hacienda Avenue	40
Pierson Boulevard	50-55	Camino Aventura	40
Little Morongo Road	40-55		

Other network gaps occur at many of the Whitewater River Channel bridge crossings. These locations are considered to be constrained since they have limited space for new NEV specific facilities (and where outward expansion is cost prohibitive). In some cases existing golf cart or bike lanes exist and narrowing existing travel lanes can be a cost-effective way of accommodating shared Class II NEV lanes or an NEV path. As mentioned above, roadway speeds and right-of-way widths will determine whether Class II NEV lanes are possible on these bridges. These opportunities and constraints are explored in further detail in Table 2 of this chapter.

3.3 Opportunities and Constraints

This section identifies general opportunities and challenges for the development and implementation of a comprehensive NEV network in the Coachella Valley. Some of the opportunities and constraints identified here may apply more to some jurisdictions than others, but Riverside County and CVAG have a key role in coordinating NEV development efforts and ensuring that plans and development strategies are consistent throughout the region.

3.3.1 Connectivity and Circulation

Coachella Valley street networks are generally characterized by grids of multi-lane arterials on one mile spacing with curvilinear suburban residential streets within. The suburban style road networks create disconnected street patterns, which present major challenges for through transportation, because they limit route options and increase travel distances for all roadway users.

Fewer route choices, due to lower street and intersection densities, means that there are decreased opportunities for individuals to use low-stress streets to reach their destination. In general, the routes that *do* connect to key destinations (e.g. commercial centers, schools, and parks) are on more heavily travelled, high speed arterial streets. On streets with a posted speed limit greater than 35 mph and no

separate NEV accessible lane, NEV users are legally prohibited from completing their journey. Where a NEV accessible lane is present, many would-be users may not feel safe or comfortable alongside much faster vehicles

A second symptom of a disconnected street network is that street connections are often indirect. Traveling to an adjacent neighborhood, a local park, or a commercial area may be a short distance "as the crow flies", but taking the existing street network will lead to longer travel times due to out-of-direction travel. Since NEVs are generally slower than passenger automobiles, travel by NEV is at a competitive disadvantage to travel by automobile. This can be addressed through the design of roadways and intersections. For example, plans for CV Link will improve the level of service for NEV users by providing an alternative to the street network. Access to various roadway types permitted by legislation is summarized in Table 2 earlier in this document.

Street connectivity varies throughout each city in the Coachella Valley as a result of a unique mix of land uses including golf courses, limited access gated communities, drainage channels, major roads and highways, larger block sizes, and areas with lower residential densities. These constraints are illustrated in further detail in city profile maps in Appendix B and C.

There are also some areas within Desert Hot Springs, Indian Wells, La Quinta, Rancho Mirage, Cathedral City and Palm Springs where the residential street network includes lower speed streets, smaller blocks sizes, and an orthogonal grid. Roadways in these mostly residential areas have tremendous potential to serve as low-speed, low-stress NEV routes that connect to other NEV facilities and destinations.

In the long term, NEV connections to transit may provide residents with a "first and last mile" trip solution. SunLine Transit Agency provides bus service for the entire Coachella Valley region. Having a single regional transit provider offers the advantage of simplifying coordination between neighboring jurisdictions, allowing for a more seamless and convenient transit user experience. NEV Park and Ride facilities at local bus stations can offer residents a multimodal connection point for longer trips.

3.3.2 Integration with Existing Bike Network

Similar to Caltrans bicycle facility classifications, three classes of NEV facilities are proposed. These are described in detail in Chapter 5, and briefly described below.

- Class I NEV paths are off-street facilities where standard passenger cars are prohibited.
- Class II NEV lanes are travel lanes for the shared use of bicycles, NEVs and golf carts, adjacent to the right or left-most motor vehicle lane.
- Class III NEV Routes are shared lanes on low speed streets.

Planned Class II facilities listed in local bike plans and in the Coachella Valley Non-motorized Transportation Plan should be assessed for future shared NEV/bike lane use.

With minor roadway striping modifications, many NEV focused facilities can be shared with bicycles. Maps of existing bike networks in each city are provided in Appendix B. In other cases, existing streets can be considered for future NEV route and NEV lane designations. Maps of street speed limits for each city are provided in Appendix C.

3.3.3 Integration with Existing Golf Cart Network

The cities of Rancho Mirage, Palm Desert, La Quinta and Indio all have existing golf cart transportation plans and policies. Existing public pathways designated for golf cart use may present opportunities for conversion to shared-NEV paths. However, many of these paths are constrained by geometries (widths and curve radii) more suited to the typical top speed of a golf cart (under 15 mph). Because NEVs are capable of travelling up to 25 mph, the route planning may suggest upgrades to existing golf cart facilities, or the use of other routes. NEV operators may also simply decrease their speed when using constrained paths. The existing width of the path, presence of shoulders (and potential for expansion of the path) will dictate whether the path can be used as one-way or two-way, whether there is sufficient space for passing and turnouts, and shared-use with bikes and pedestrians. The opportunities and constraints listed for Class II shared NEV/bike lanes apply to shared NEV/golf cart lanes.

NEV users are likely to prioritize routes that offer the most direct connection between points, so consideration should be given to minimization of out-of-way travel and potential congestion points. These opportunities will need to be assessed in further detail during the implementation of the network.

Existing golf cart networks are typically designed around golf courses as the primary destination. Because golf cart paths are designed for golf course access and circulation, they may not offer direct transportation connections to other destinations. When integrating these pathways into the larger NEV network, providing safe and convenient connections to a variety of destinations should be the top priority.

3.3.4 Wayfinding

Wayfinding signage provides NEV drivers with valuable travel information, including direction, travel distance, and estimated travel time. Signs help people reach destinations via optimal routes, with minimal uncertainty. The lack of consistent NEV wayfinding throughout the Coachella Valley limits the number of people who know how to access local destinations (e.g. parks, schools, and commercial centers) using existing low-stress routes, on-street lanes, and paths.

Basic Wayfinding Signage

The cities of Lincoln and Rocklin have already initiated a California Traffic Control Device Committee Request to Experiment process for the design of NEV wayfinding signage.. A simple potential wayfinding sign based on their design is presented as Figure 33 on page 68 of this document.

Custom Wayfinding Signage

Designing more personalized wayfinding could effectively provide CVAG and/or the individual cities within it the opportunity to use wayfinding as a branding tool. Establishing a unique style of wayfinding signage that will clearly differentiate each city's Class I, II and III NEV facilities from other kinds of facilities could improve the visibility of the network as a whole. Unique branding will also help users navigate transitions between facilities. For example, if an on-street Class III NEV route transitions to an existing NEV/shared-use path, the path may already have a sign identifying it as such. However, a second sign of a differing color and/or shape will allow users to quickly identify it as being part of the Class III network. It is recommended that CVAG work with cities that adopt this plan during the implementation phase to design a custom wayfinding signage program.

3.3.5 High-Speed Road Crossings

Even with marked crossings, some roads feel too uncomfortable for operators to cross in an NEV. As noted in section 2 of this document (page 6), California Vehicle Code Section 21260 specifies that NEVs shall not cross roadways with speed limits greater than 35 mph, unless the crossing "begins and ends on a roadway with a speed limit of 35mph or less and occurs at an intersection of approximately 90 degrees." NEVs are also not permitted to cross state highways *at uncontrolled locations* unless the crossing has been approved and authorized by Caltrans.

Undercrossings and overcrossings are one such improvement, but they are also often cost prohibitive. The CV Link Master Plan includes many of these types of crossings. Securing funds for their development can be a long-term challenge, especially for jurisdictions with multiple major road and highway crossings and poor on-street connectivity.

3.3.6 Whitewater River Channel Crossings

One of major impediments to NEV travel in the Coachella Valley is the lack of accessible Whitewater River Channel crossings. The CV Link Master Plan focuses on the path crossings of the arterials, while this NEV Plan identifies gaps for access to the path and across the channel between other origins and destinations.

As new bridges are built, wide (7'+) shared bike/golf cart lanes or paths are typically included on both sides. Therefore, where a bridge is currently deficient but programmed for replacement, it is assumed that NEV access will be provided. Class II NEV lanes are recommended for bridges on roadways with speeds 35 mph and under. However, many of these bridges are on roadways with posted speed limits greater than 35 mph. In these circumstances, Class II Lanes may be considered on roadways with posted speed limits up to 55 mph. A NEV Class I grade-separated path is the only option on bridges with speed limits over 55 mph. Sufficient space and the potential for road diets, lane narrowing, conversion of existing golf/bike lanes, and other lower-cost path alternatives should be explored at each location. Table 2 below details the existing roadway provision of bike/golf cart lanes, posted speed limits and opportunities for future Class II NEV/Bike/Golf cart lanes and Class I NEV Paths.

Table 5: NEV Accessibility on Whitewater River Channel Bridges

Bridge	Existing Provision[3]	Possible Class II Lane*	Possible Class I Path?*	Bridge Replacement Planned	Posted Speed Limit
Date Palm Drive	None	NO	NO	YES	40
Country Club Drive	Class II Bike lane	YES	NO	NO	45
Indio Boulevard	None	NO	NO	NO	50
Monroe Street	None	NO	NO	NO	40
Jackson Street	None	NO	NO	NO	40
Bob Hope Drive	4' Sidewalk	NO	YES	NO	40

[3] Existing facility widths are approximate measures obtained via Google Earth.

Bridge	Existing Provision[3]	Possible Class II Lane*	Possible Class I Path?*	Bridge Replacement Planned	Posted Speed Limit
Monterey Avenue	None	NO	YES	NO	50
Fred Waring Drive W	None	NO	YES	NO	50
Miles Avenue W	5' Bike lanes	YES	YES	NO	50
Washington Street	None	NO	YES	NO	50
Jefferson Street	7' Bike lanes	YES	YES	NO	55
Miles Avenue E	5' Bike lanes	YES	YES	NO	45
Vista Chino	6' Shoulder (Westbound), Wide sidewalk (Eastbound)	YES	YES	YES	35
Ramon Road	None	NO	NO	YES	40
Cathedral Canyon Drive	4'-5' Shoulder (both directions)	NO	NO	YES	40
Cook Street	12' Golf Path (Southbound) Bike Lane (Northbound)	YES	YES	YES	50
Dune Palms Road	18' Shoulder (Northbound)	YES	YES	YES	45
Ave 44	8' Shoulder (both directions)	YES	YES	YES	45
Dillon Road	4' Shoulder	NO	NO	YES	45
Ave 50	None	YES	YES	YES	40
Ave 52	7' Shoulder (both directions)	YES	YES	YES	50
Ave 66	7' Shoulder (both directions)	YES	YES	?	55
Adams Street	?	?	?	YES	45
Airport Blvd (Ave 56)	None	YES	YES	?	35
Ave 62	7' Shoulder (both directions)	YES	YES	?	25
Dinah Shore Drive	Wide Sidewalk	YES	YES	NO	40
El Dorado Drive	8' Shoulders	YES	YES	?	40
Frank Sinatra Drive	None	NO	NO	YES	50
Gene Autry Trail	8' Shoulders (both directions)	YES	YES	?	35
Golf Center Parkway	8' Bike lane	YES	YES	NO	35

Bridge	Existing Provision[3]	Possible Class II Lane*	Possible Class I Path?*	Bridge Replacement Planned	Posted Speed Limit
Indian Canyon Drive	Wide Shoulder	YES	YES	?	55
Lincoln Avenue	None	NO	YES	?	25
Portola Avenue	7' Bike Lane, 7' Golf Path	YES	YES	NO	50
Railroad Bridge	None	NO	NO	?	N/A
SR-111 (Grapefruit Road)	None	NO	NO	?	55
State Highway 86	8' Shoulders (both directions)	NO (due to speed)	YES	?	65
US Highway 111	None	NO (due to speed)	YES	YES	65

* Considers travel lane narrowing/re-striping

3.3.7 NEV Parking

Section 5.1 of this document provides guidelines on NEV parking.

Local parking ordinances can be structured to support NEV development by prescribing a minimum number of NEV parking spaces in zoning and building codes, variable/free on-street NEV parking rates, and free or reduced rate electric vehicle charging station parking. Agencies may also consider development incentives for on-site electric vehicle parking and charging stations. At the very least, local parking ordinances should allow NEV parking spaces to count toward parking minimums.

Design standards for NEV parking should be consistent throughout a planning area. After adopting consistent design guidelines, cities could develop a design toolkit to assist developers and property owners in designing off-street NEV parking spaces. Coordination between County planning staff and local jurisdictions for the planning and implementation of parking facilities will help to avoid inconsistencies in design. The PEV Readiness plan contains some general design guidelines that could be adopted by all local jurisdictions and made available through design toolkits. CVAG or Riverside County could further assist local jurisdictions by providing design toolkit workshops or trainings that would ensure consistency, enhance participation, and lend transparency to local planning efforts.

3.3.8 Electric Vehicle Charging Infrastructure

Section 5.1 of this document provides guidelines on NEV charging facilities.

To support widespread NEV adoption, providing frequent and appropriately located EV charging facilities will ensure that NEV operators can get from point A to point B without running out of energy and getting stranded. Insufficient or poorly located charging stations can lead to "range anxiety" and is a major inhibitor of NEV adoption for longer trips. Charging stations at workplaces and other opportunity locations such as grocery stores and shopping centers help to alleviate the uncertainty associated with NEV energy requirements, and the reliability of NEVs for longer trips. CV Link access points provide an opportunity for users to park and recharge while using the facility for recreation.

The cost of installing charging stations is much less expensive when the location is "pre-wired" for EV charging stations. Local building and zoning codes can be amended to require such pre-wired parking spaces for new development. Alternatively jurisdictions can offer other incentives such as FAR bonuses, reduced development fees, fast-tracked permitting, etc. to have developer's pre-wire projects for future NEV charging stations. The CVAG PEV Readiness Plan provides information about EV Charging Station design and installation.

3.3.9 Market-based Opportunities

According to the CVAG PEV Readiness Plan, supporting NEV economies including NEV retail sales, maintenance and repair, battery recycling, and NEV sharing programs, are likely to develop as NEV sales increase. As such, the plan suggests that "targeted strategies to attract these particular enterprises" are not necessary. The plan also suggests the College of the Desert's specialized Advanced Transportation Technologies degree program could play a key role in developing the skilled workforce of technicians needed as NEV use expands.

The plan focuses on engineering and design supply chain strategies to promote widespread NEV adoption. These include NEV vehicle and component manufacturing, and engineering and design of vehicles and charging infrastructure. According to a study by Zhou et.al[4], PEV manufacturing economies tend to present lower barriers to entry, as a result of their horizontal supply chain structures and simple componentry. This presents the Coachella Valley region with an opportunity to re-establish its large-scale manufacturing base that has experienced significant declines during the recession. The PEV Readiness plan provides a summary of economic development strategies for NEV business attraction, retention, expansion, and incubation.

[4] Zhou, Lei, J.W. Watts, M. Sase, and A. Miyata. *Charging Ahead: Battery Electric Vehicles and Transformation of an Industry*. Deloitte Review. Issue 7. 2010.

4 Route Selection

The purpose of this chapter is to outline the proposed method for developing a safe and comfortable regional NEV Network Concept. The first part of this chapter explains the assumed facility hierarchy and considerations relating to CV Link, street crossings, golf courses, existing golf cart routes, existing NEV routes, and sidewalk paths. The latter part of this chapter provides a narrative and visual summary of the recommended Network Concept, including alternative facility improvements that may be considered given physical constraints or budget.

4.1 Route Selection Assumptions

The following assumptions form the basis for the preliminary assignment of priority NEV routes throughout the Coachella Valley. According to the Streets and Highways Code (section. 1962.3), the plan must address how the route will accommodate NEVs without an adverse impact upon traffic safety. Towards this end, the routing method seeks to minimize conflict opportunities between NEVs and conventional vehicles, and suggests methods to reduce the probability and severity of collisions.

4.1.1 Facility Hierarchy

Route selection prioritizes placing NEV routes on the "most comfortable" roadways, a relative measure that takes into account roadway posted speed limits, separation of modes, standardized designs, and the opportunity to communicate clear NEV user expectations. The potential facility types that will make up the network are listed below:

- Class I NEV Path (such as CV Link)
- Class II NEV lane (shared with bikes and golf carts)
- Class III NEV Route (shared with bikes, golf carts and motor vehicles)

An example of a Class I NEV Path is the CV Link. The CV Link represents an enormous opportunity to provide quick, convenient and safe connections for residents. It will enhance the experience for residents using NEVs, bikes, and pedestrians within and between cities by providing a major non-motorized corridor eventually running from Desert Hot Springs and Palm Springs all the way to the Salton Sea. This backbone path network will allow NEVs to traverse longer distances without driving on major arterials or highways, and connect them to local destinations via local streets with Class III NEV routes and Class II NEV lanes.

Class II NEV Lanes are on-street striped lanes exclusive to NEVs, bicycles and golf carts. The exclusive NEV lane is intended for roadways with a posted speed limit of 55 mph and under, but generally recommended on roadways with lower speeds since the striped lane does not feature any physical separation from higher speed traffic. This facility offers some flexibility to make connections along or across high speed roadways where barriers or network gaps exist such as bridge crossings and where space or cost does not permit a Class I Path.

In the proposed Network Concept, Class III NEV Routes are the recommended facility on selected roadways 25 mph and under, because NEVs sharing the roadway with conventional vehicles are traveling approximately the same speed, reducing the severity of any collisions that may occur. These streets are

ideal candidates for additional treatments such as traffic calming and wayfinding. The Class III signed route designation provides a navigational function optimized for direct travel, directing users to safe transitions at high speed crossings, lending predictability to the system, and clarifying roadway user expectations.

Detailed descriptions of NEV facility types are available in Chapter 4, and are consistent with Assembly Bill 61 and the California Streets and Highway Code Division 2.5, Chapter 7.1 Section 1962. In infrastructure terms, they are similar to the Caltrans Class I, II, and III bikeway infrastructure categories.

The appropriate type of NEV facility depends on the posted speed of the roadway, vehicle volumes, roadway geometry and lane widths. As noted in section 2 on page 5, the CVC permits NEVs on all roadways 35 mph and under. Table 2 presents a broad categorization of NEV facilities by speed limit. Table 6 further describes the legal and recommended facility types.

Table 6: Legal and Recommended Facility Type by Speed Limit

Facility Type Category	Posted Speed Limit			
	≤25 mph	30-35 mph	40-55 mph	≥60 mph
Minimum Required Facility Type on Non-Designated Routes	None	None	Class II NEV Lanes	Class I NEV Path
Legal Facility Type for Designated Routes	Class III NEV Routes	Class III NEV Route	Class II NEV Lanes	Class I NEV Path
Recommended Facility Type for Designated Routes	Class III NEV Route	Class II NEV Lanes	Class I NEV Path	Class I NEV Path

The recommended facility type may differ from the legally required facility type for the purpose of enhanced comfort and user safety. The Class II NEV lane facility is legally acceptable for roadways with a posted speed limit of 55 mph and under, but generally recommended on roadways with lower speeds since the striped lane does not feature any physical separation from higher speed traffic. This facility offers some flexibility to make connections along or across high-speed roadways where barriers or network gaps exist such as bridge crossings and where space or cost does not permit a Class I NEV path.

4.1.2 CV Link Routes

The plan's routing method assumes that CV Link will attract all NEV trips with origins or destinations within a 1.2 mile travel shed. This figure is based on a method proposed by the South Bay Cities Council of Governments and the mature suburban context of each of the cities, where the average trip length is estimated at 1.13 miles. Route selection is based on roadway network distances rather than direct, "as the crow flies" distances, and takes into account potential access issues from different directions.

4.1.3 CV Link Street Crossings

All street crossings are assumed to provide access to CV Link, although not all streets that the CV Link crosses will have dedicated NEV facilities along them. The route selection method considers all access points equal, for the purpose of transportation. Further consideration will be given to points that may not be accessible from every direction due to roadway or intersection configuration and NEV facility type.

Opportunities for access points at these locations will require future evaluation of designs for grade-separated CV Link crossings and other nearby route opportunities.

4.1.4 Golf Courses

All golf courses within 1.2 miles of CV Link will be considered major destinations and will be connected to CV Link via designated NEV routes. Similar to CV Link, route selection is also based on roadway network distances rather than direct "as the crow flies" distances. Route evaluation will also consider limited access from different directions.

4.1.5 Existing Golf Cart and NEV Routes

Based on their existing design characteristics, existing golf cart "routes" should be reclassified as either Class I NEV/Golf Cart Paths, Class II NEV/Golf Cart Lanes, or Class III NEV/Golf Cart Routes per Streets and Highway Code 1962.3(g). After this is established, a determination can be made whether to maintain, relocate or upgrade the facility. Existing golf cart routes and NEV routes will be considered for inclusion in the NEV network if there is an opportunity to connect local and/or regional origins and destinations. Where existing golf cart or NEV routes are within ½ mile of the proposed NEV route and where only a short (up to ½ mile) detour is required to access the same point, the preference is to include the existing golf cart or NEV route in the network. In addition, consideration should be placed on improving existing golf cart facilities on roadways greater than 35 miles per hour. For example, where an opportunity exists to widen an existing off-street golf cart path along a 45 mph roadway, a higher priority should be given to this option than relocating the route to lower speed streets. These improvements should be completed with user safety and comfort in mind, as this is critical to increasing NEV usage across the region.

4.1.6 Sidewalks

In some communities, the existing golf cart network may route a golf cart "path" on what would otherwise be considered a sidewalk. Here, sidewalks are defined as:

- Paths less than 10' wide
- Paths greater than or equal to 10' but not designated for shared use (e.g. commercial district sidewalks)

Due to the low level of service and NEV incompatibility with pedestrian activity, sidewalks are not considered valid NEV facilities. As mentioned above, it may be possible to upgrade a sidewalk to a path, but not at the expense of separated pedestrian facilities.

4.2 Network Concept

The Network Concept presented in this section illustrates the primary backbone network for NEV travel throughout the region. Roadway characteristics such as speed, bridges, and block structure create gaps in network connectivity, and limit the options for low-stress NEV route alternatives. The Network Concept considers these factors in addition to the above route selection assumptions to connect regional origins and destinations in a complete NEV network. In Figure 4, Class I paths do not include CV Link or any existing trails such as the Tahquitz Creek Trail; Class II lanes do not include bicycle lanes without golf cart or NEV symbols, and Class III routes do not include all the local streets which are accessible but not signposted.

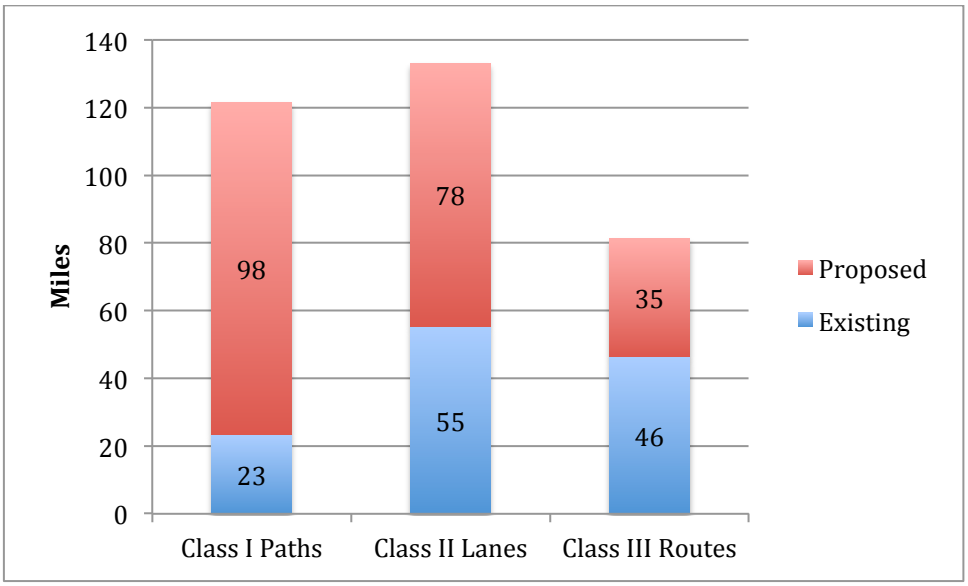


Figure 4: Existing and Proposed Network by Class

The Network Concept takes advantage of CV Link as the most attractive and desirable NEV path in the valley. As CV Link would be utilized for most trips, it is important to have a dense network of connected facilities on all roads that intersect with CV Link. By designating facilities on these roadways, travel by NEV is simplified and users are not required to spend significant effort remembering where designated routes exist.

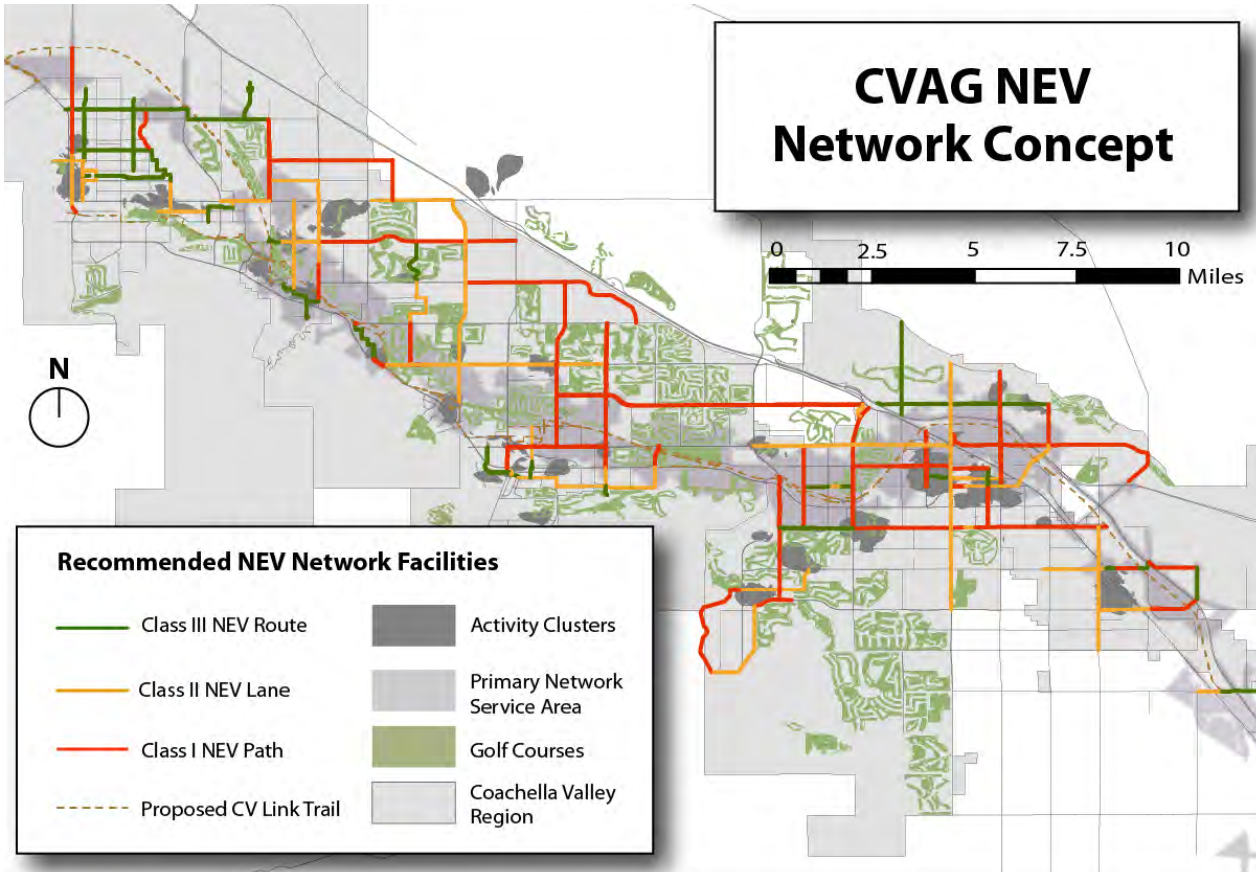
The recommended network routing and facility types take advantage of the directness of arterial streets. However these tend to be higher volume and speed streets, so both Class I and Class II facilities should be considered in the actual designing of the routes. As such, the city route maps on the following pages illustrate the recommended facility type, as well as an alternative facility type for consideration after factoring speed limits, location-specific constraints, and budget. Jurisdictions may choose to adopt a phased approach to the recommended improvements based on the ease of implementation, cost, traffic safety impact and community support.

This concept will involve the reallocation of road space on some major arterial streets. Class II NEV lanes are optional on streets with speed limits higher than 25 mph, but would provide a more comfortable experience for all vehicle drivers, and therefore lane narrowing is recommended, where possible, to

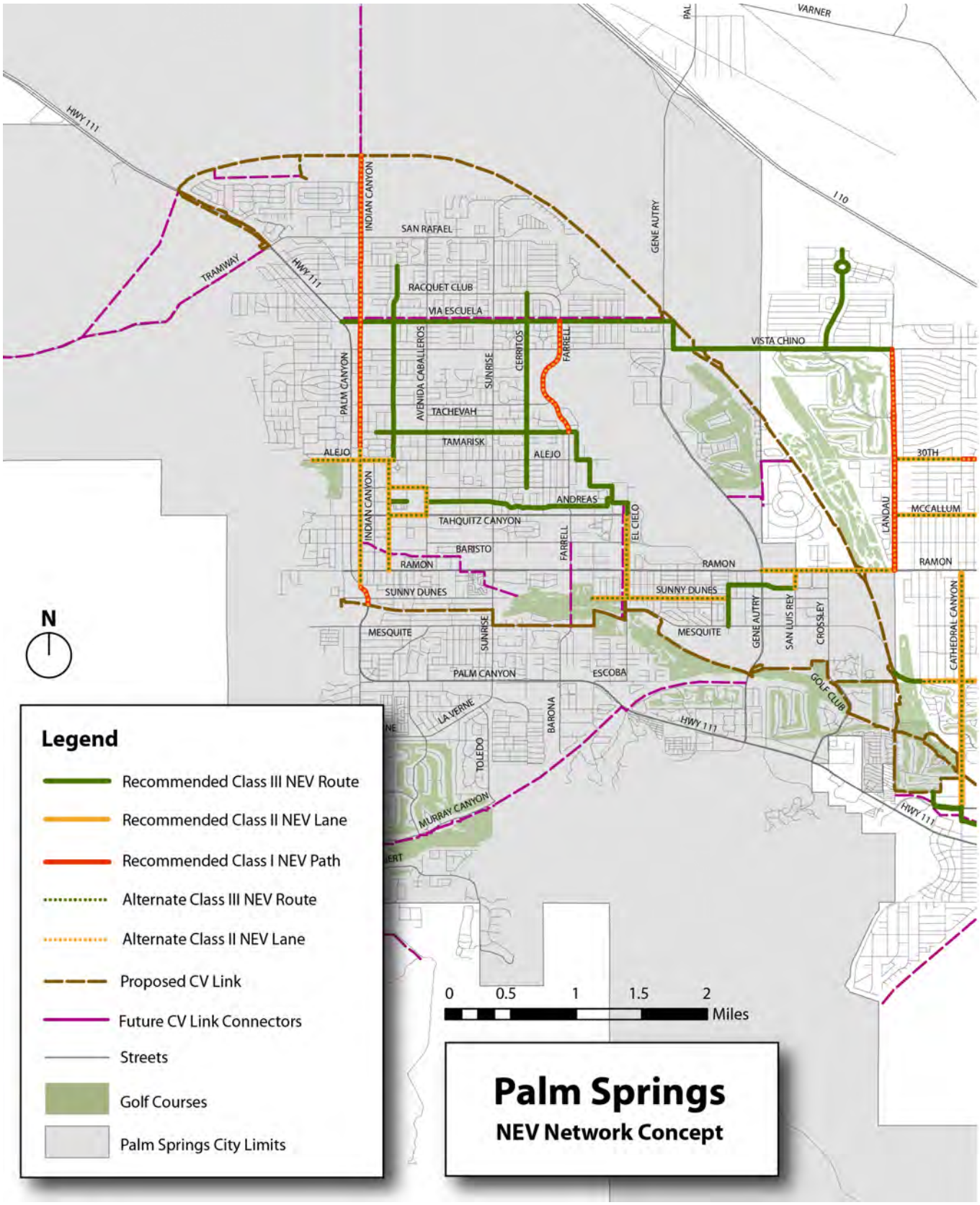
accommodate this facility type on streets with 30 or 35 mile per hour speed limits. Similarly, for streets and bridges with speed limits higher than 35 mph, motor vehicle lane narrowing or, in some cases, sidewalk widening treatments will be needed to accommodate NEV users on a separated Class I NEV path or Class II NEV lanes. On streets with speed limits higher than 25 mph, consideration should be given to the facility type that provides greater separation to reduce the probability and severity of collisions between NEVs and highway capable motor vehicles. Finally, separated off-street facilities are required on roadways with speed limits greater than 55 mph.

Minor route adjustments should be considered when it is possible to reroute the network away from locations with specific safety challenges such as high-speed crossings, or where the recommended facility type is infeasible. However, this should be accomplished with out of direction travel limited to ¼ mile or less.

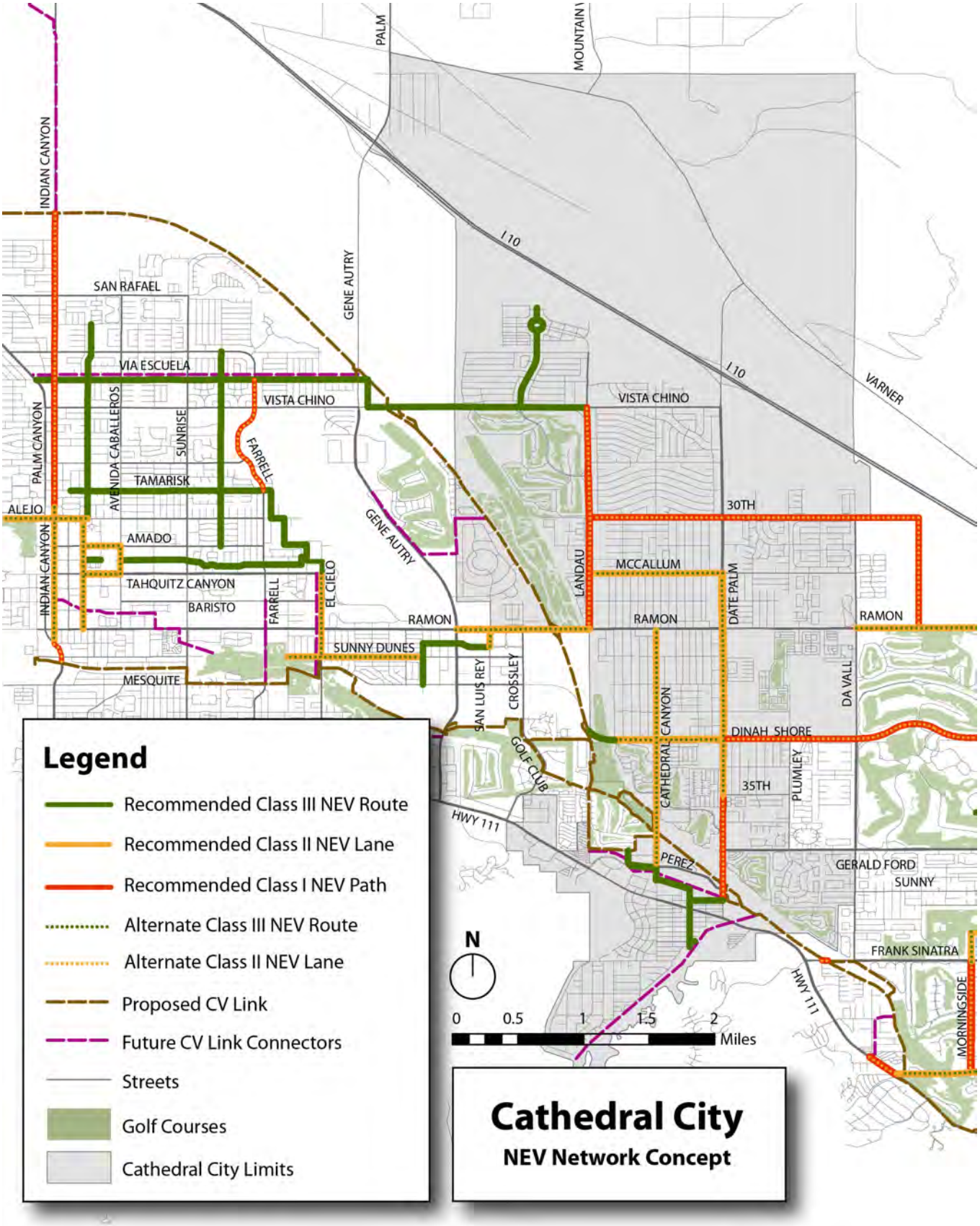
Map 7: CVAG NEV Recommended Network Concept



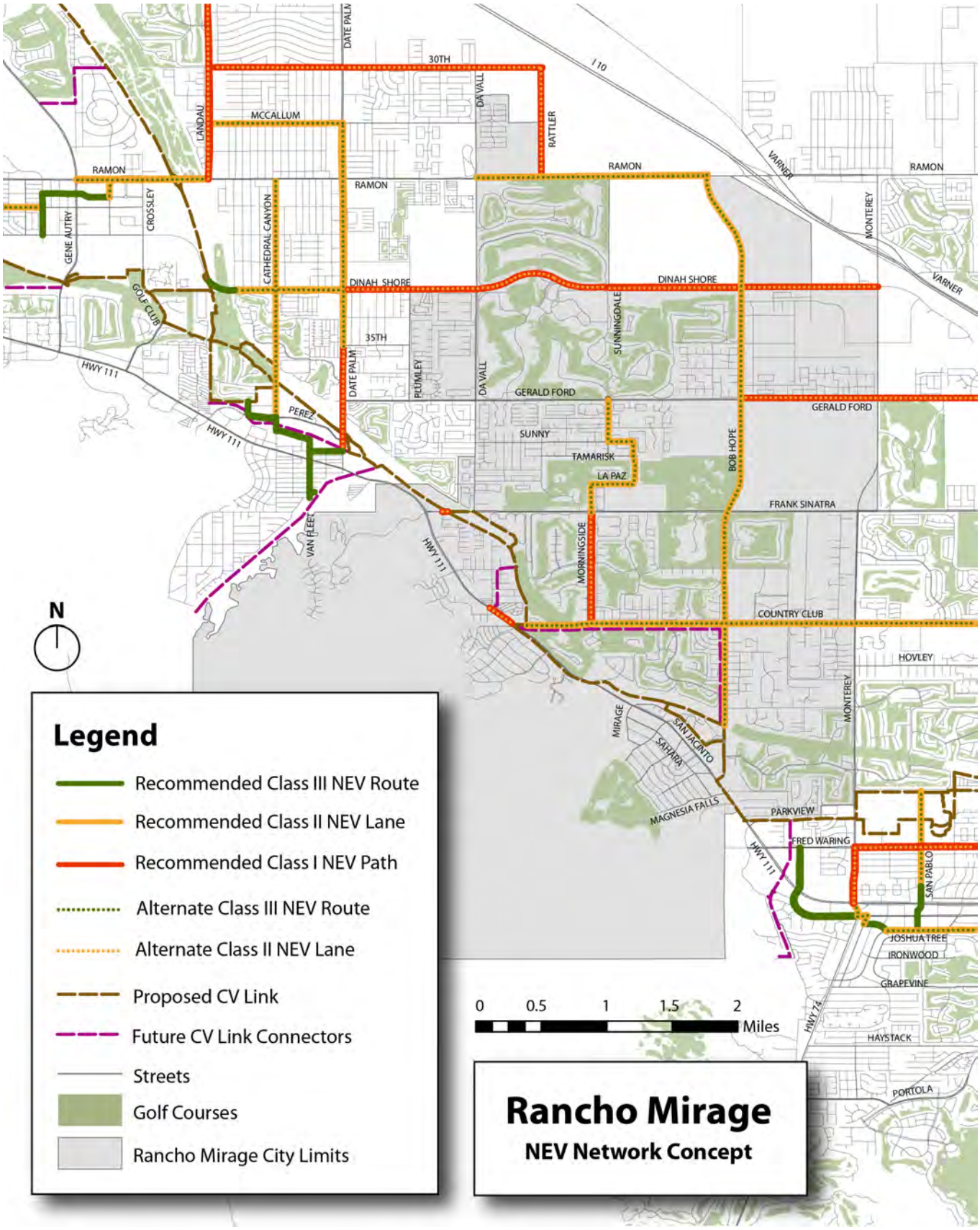
Map 8: CVAG NEV Recommended Network Concept - Palm Springs



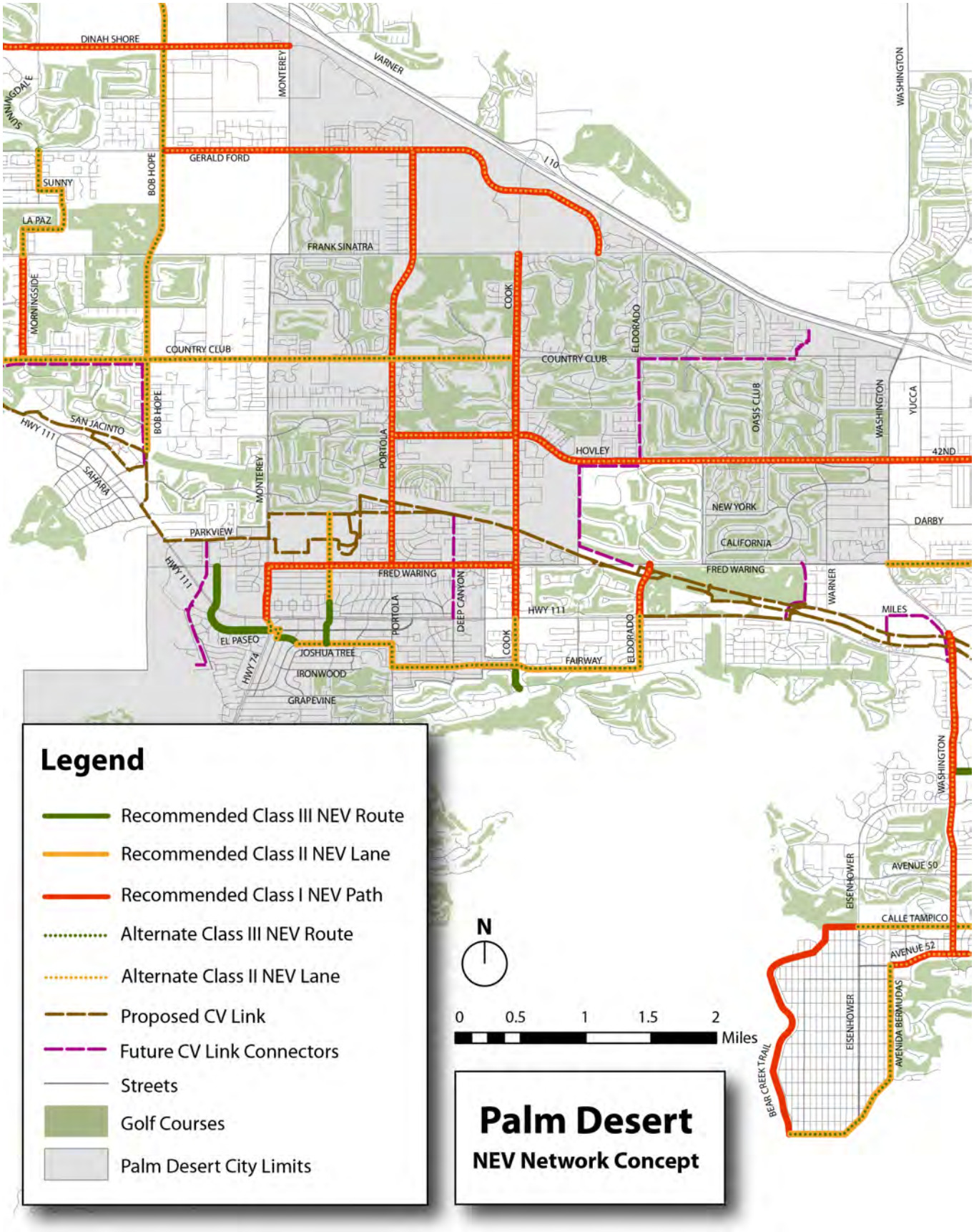
Map 9: CVAG NEV Recommended Network Concept – Cathedral City



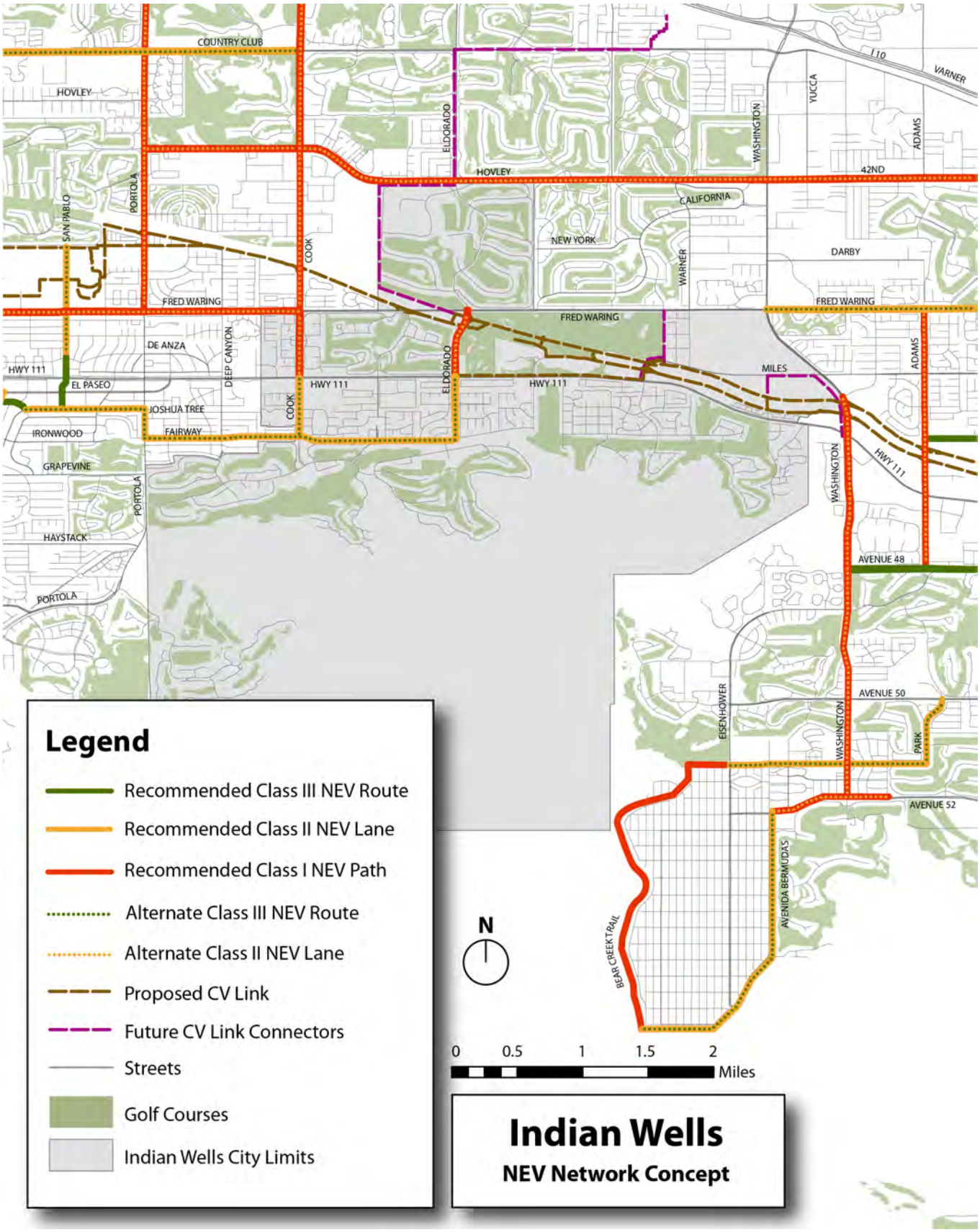
Map 10: CVAG NEV Recommended Network Concept –Rancho Mirage



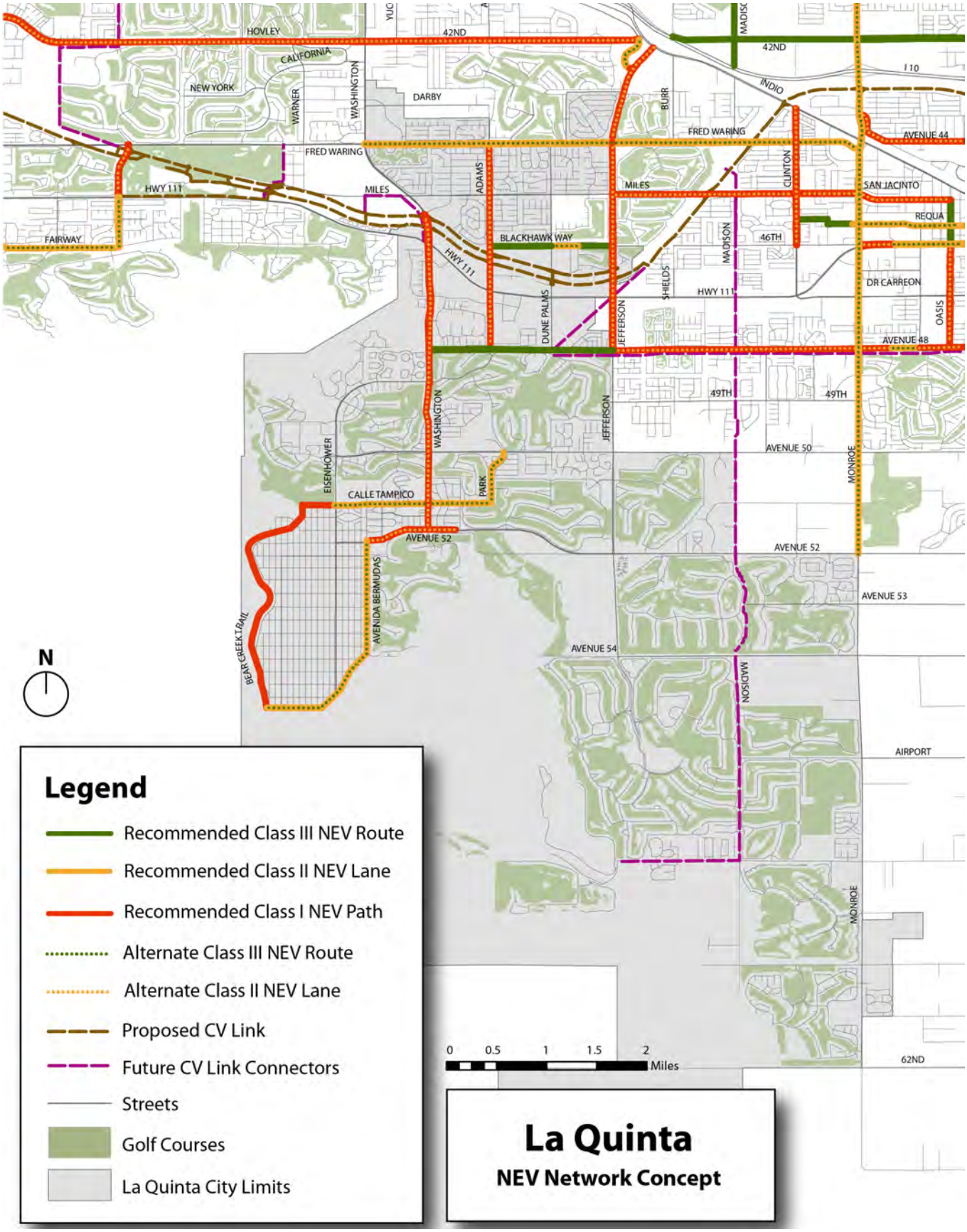
Map 11: CVAG NEV Recommended Network Concept – Palm Desert



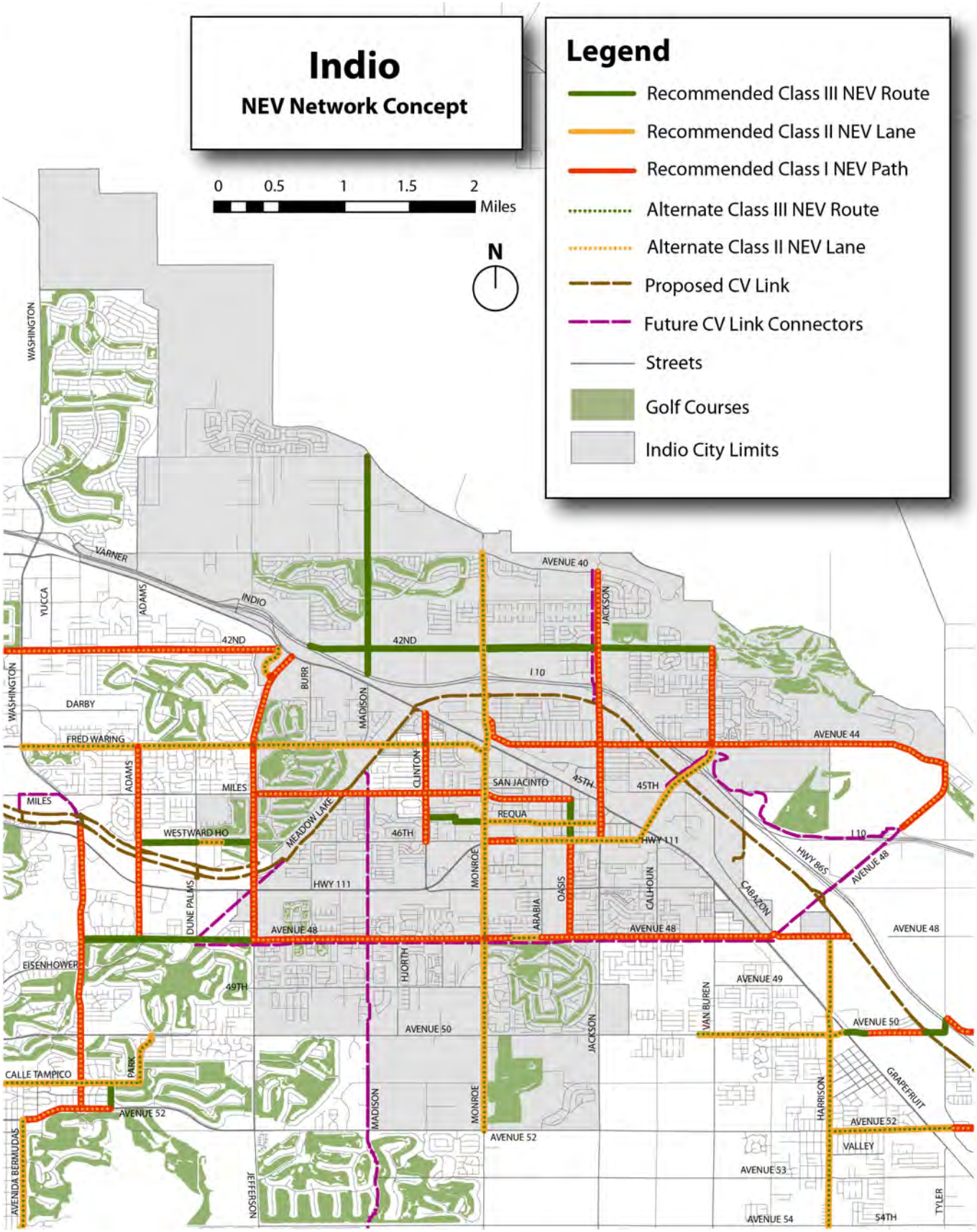
Map 12: CVAG NEV Recommended Network Concept – Indian Wells



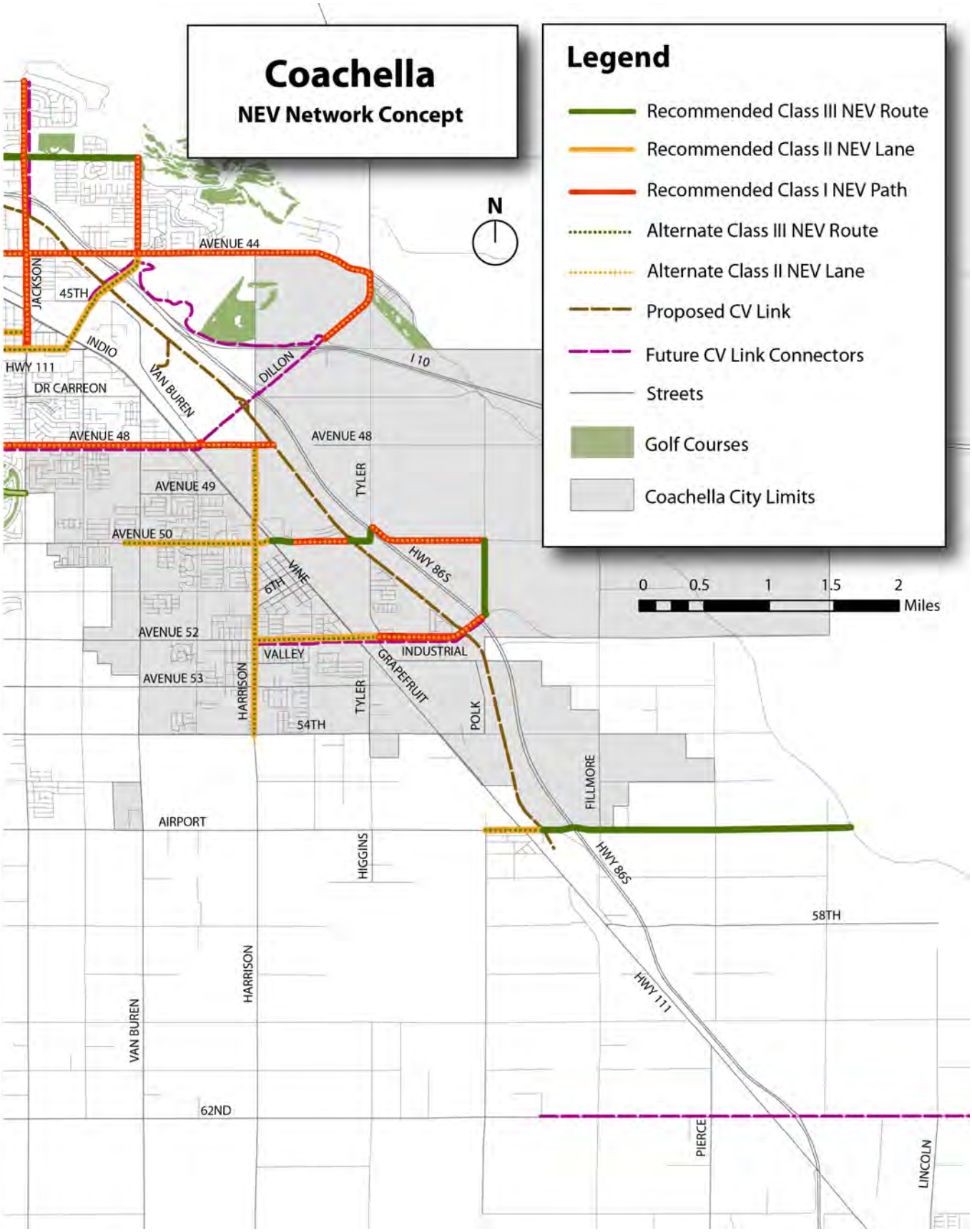
Map 13: CVAG NEV Recommended Network Concept – La Quinta



Map 14: CVAG NEV Recommended Network Concept – Indio



Map 15: CVAG NEV Recommended Network Concept – Coachella



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5 Design Guidelines

This chapter is intended to assist the Coachella Valley Association of Governments and member jurisdictions in the selection and design of on-street NEV facilities. These guidelines are consistent with California state code and have been developed based on existing guidance in NEV plans for Lincoln CA, Rocklin CA, and the Western Riverside Council of Governments (WRCOG). The following guidance is not exhaustive and is not intended to substitute for professional design and engineering judgment under local conditions.

5.1 Design Needs of NEV Facilities

5.1.1 Spatial Needs of Users

NEVs and bicyclists are the expected users of NEV facilities, and design dimensions should be built with these user types in mind. Similar to conventional motor vehicles, NEVs and bicyclists exist in a variety of sizes and configurations. These variations occur in the types of vehicle and behavioral characteristics (such as the skill level of the driver). The design of an NEV facility should consider reasonably expected user types on the facility and design for the appropriate dimensions.

Physical Dimensions

The figures below illustrate the operating space and physical dimensions of NEVs and bicyclists, the typical users of NEV paths and lanes. Because NEVs and bicyclists require clear space to operate within a facility, the minimum operating width is greater than the physical dimensions of the user.

Dimensions below are based on GEM vehicles, a popular NEV manufacturer. All GEM NEVs are the same width regardless of model. The GEM catalog refers to 55" (4'7") width however this is from fender edge to fender edge. A GEM with dual mirrors was measured at the Palm Springs Energy Summit and found to be 60" (5').

Figure 5: Spatial Needs of NEVs

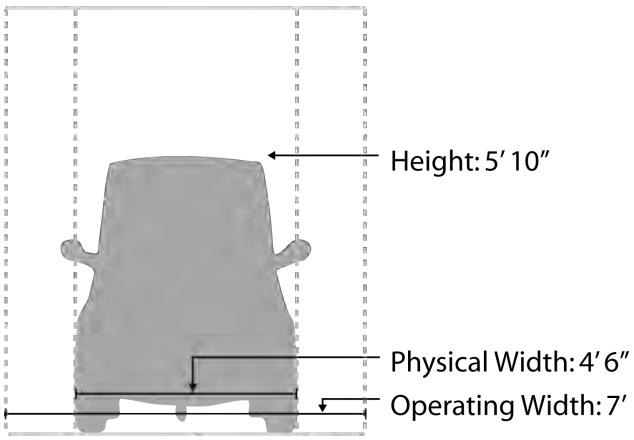
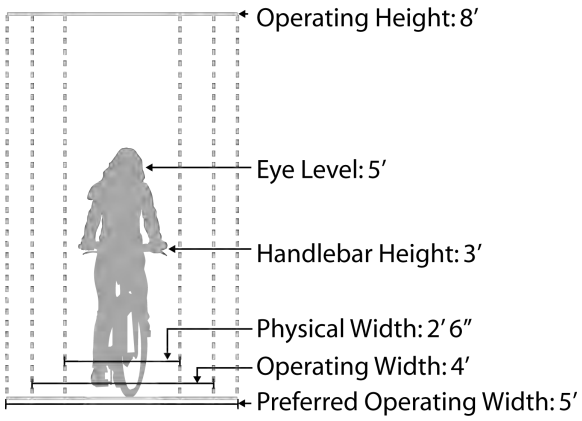


Figure 6: Spatial Needs of Bicyclists



5.1.2 Travel Speeds

Based on the legislated maximum NEV speed (25 mph) and the Highway Design Manual (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.

In comparison, the adult cyclist typically travels between 8 and 15 mph[5]. AASHTO guidelines specify that 18mph is a sufficient design speed for most relatively flat shared bicycle paths[6]. American roads are often over-engineered, or designed to accommodate higher speeds that are not only faster than the posted speed limit, but 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.

5.1.3 Other Geometric Design Details

It is assumed that NEVs can stop at least as quickly as bicyclists under the same conditions, and the operating requirements of bicyclists are the limiting factor in shared NEV/Bicycle facility design. As such, horizontal curves and stopping sight distances should be calculated according to the American Association of State Highway and Transportation Officials (AASHTO) Guide for the Development of Bicycle Facilities, 4th Edition. It is presumed that these measures will meet the needs of NEVs, although research has not been conducted to support this assumption. Through future testing and evaluation these guidelines may change to reflect NEV specific operating conditions.

Stopping Sight Distance

Stopping sight distance is the distance required by the NEV driver to be able to see in order to have room to stop in advance of an obstacle on the path. Trees, vegetative buffers, and other landscaping elements should be maintained so as not to obstruct visibility, especially at intersection and driveway approaches.

The NEV braking distance is 10 feet at 25 miles per hour. Based on a maximum speed of 30 mph, AASHTO lists stopping sight distances for bikes ascending a hill as 300' (0%) and 200' (.15%), and descending a hill, as 250' (0%) and 1,600' (.15%).

Table 7: Stopping Sight Distance vs. Grade (Bicyclists)

	0% Grade	15% Grade
Ascending	300 Feet	200 Feet
Descending	250 Feet	1600 Feet

Horizontal Curves

NEVs come in various shapes and sizes. A typical 4-seat NEV 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 horizontal curve along an NEV facility segment should be 115'. Turns tighter than this should be signed and/or striped well in advance of the turn, and sign location should be based on breaking distance.

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[5] FHWA. Characteristics of Emerging Road and Trail Users and Their Safety. 2004.

[6] AASHTO. Guide for the Development of Bicycle Facilities. 2012.

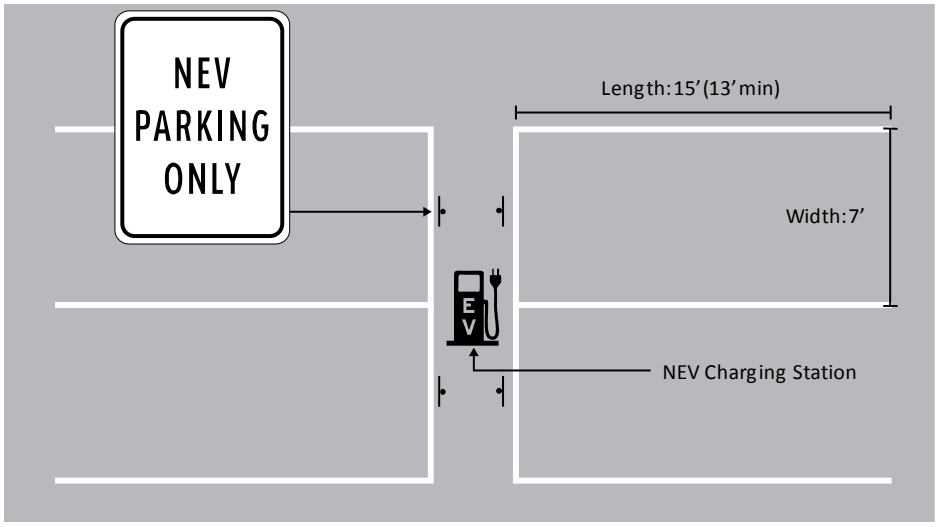
5.1.4 NEV Parking

Some jurisdictions (e.g. Indio) prohibit golf carts from parking in a "motor vehicle" space, notwithstanding that the California Department of Motor Vehicles will register a golf cart as a motor vehicle. To the general public, a golf car and an NEV are indistinguishable and any such parking prohibitions will be confusing and may limit adoption of LSEVs. Given that golf cars and NEVs can serve the same purposes as a regular car and there would therefore have no impact on parking supply and demand, parking should be permitted in any space. The following guidelines are intended to provide greater parking capacity because golf cars and NEVs are smaller and therefore more of them can fit in a given land area compared to regular motor vehicles.

A typical NEV parking space is 15' x 7' utilizing a 6" white striping pattern, compared to 18' x 8'6" for standard vehicles. NEVs occupy less physical space than standard passenger vehicles, so a relatively higher number of NEV spaces can be accommodated in a given parking area. This means that NEVs may also be able to utilize existing spaces more efficiently, in a wider assortment of configurations, both on-street and in private lots and garages.

Parking should be located adjacent to charging stations if available.

Figure 7: Typical NEV Parking



5.1.5 Charging Stations

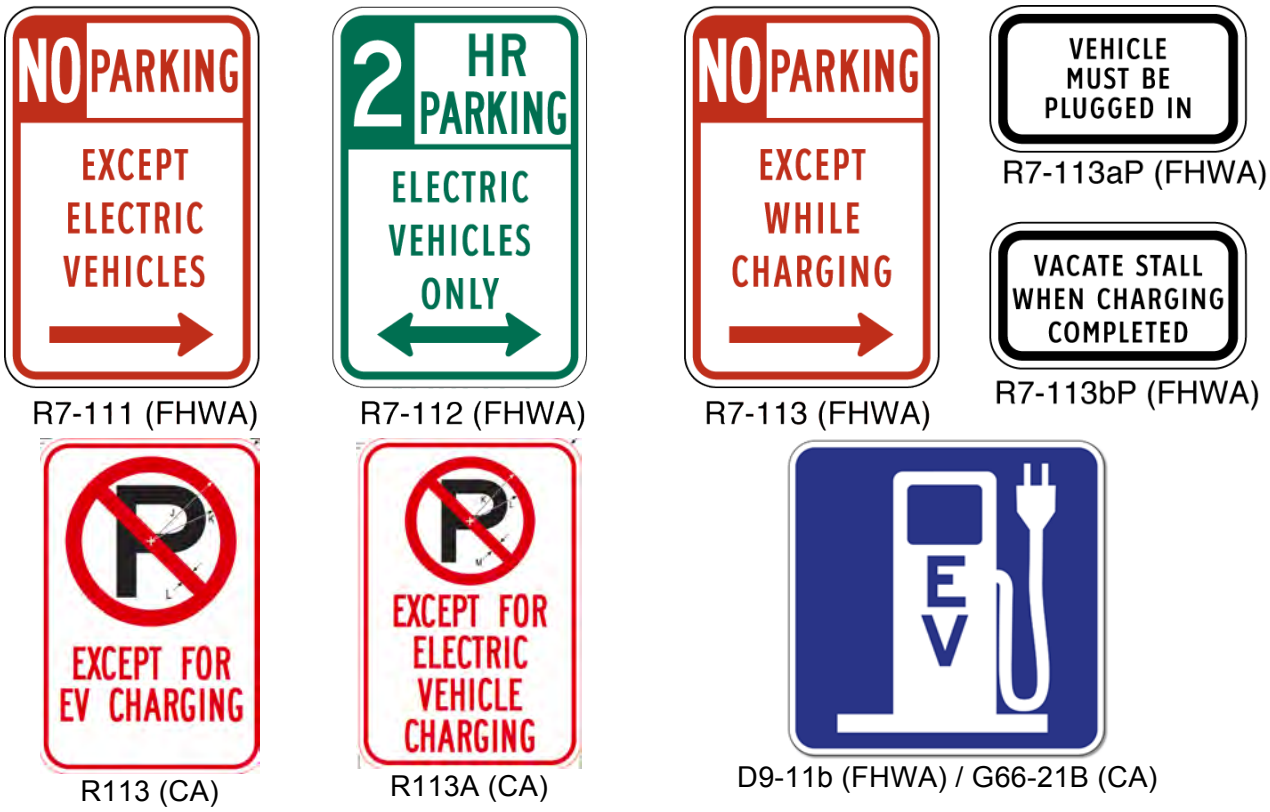
NEV parking location s should be configured with or placed within functional reach of electric vehicle charging stations. To date, no symbol has been developed that can effectively convey regulations associated with electric vehicle charging or parking facilities.

Symbols that have not been adopted in the CAMUTCD for use in a specific application cannot be used in untested applications without approved official experimentation that includes the requisite human factors evaluation for comprehension and legibility.

FHWA guidance provides typical examples of modified parking restriction signage to identify, reserve and regulate parking and charging locations. Some of them have been explicitly adopted for use in California. These signs are:

- No parking – FHWA R7-111, R7-112, and R7-113 are augmented in the CAMUTCD by R113, R113A
- Supplementary text – FHWA R7-113aP and R7-113bP signs (approved in informational letter dated 6/17/13) have been approved by the CA-TCDC for inclusion in the next CAMUTCD
- Blue background EV sign D9-11b (FHWA) or G66-21B (CA) may be used as per FHWA approval lA-13-1 issued 4/11/11

Figure 8: Recommended NEV/Electric Vehicle Regulatory Parking and Charging Signs



5.2 NEV Facility Classification and Selection

5.2.1 Facility Classification

There are three Neighborhood Electric Vehicle (NEV) facility classes.

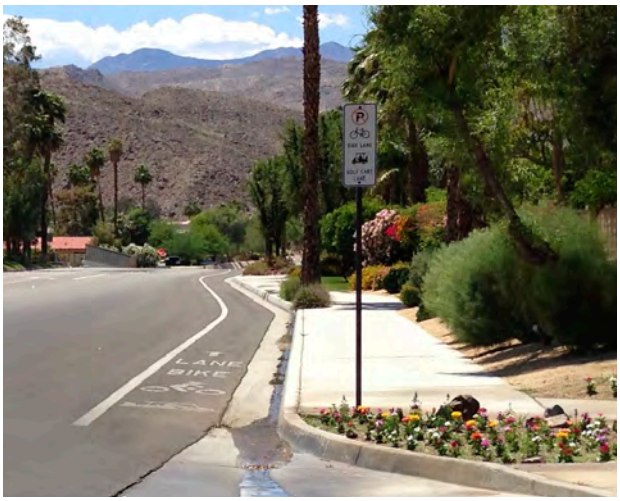
Class I NEV Paths

Class I Paths are physically separated pathways exclusive to NEV and bicycle travel. Due to the speed differential, Class I NEV paths are not intended for shared-use with pedestrians although in constrained conditions this may be unavoidable. Class I paths should be located immediately adjacent, or as close to the street as space permits to provide direct connections to local destinations and minimize out-of-direction travel.

Class II NEV Lanes

Class II Lanes designate an exclusive space for NEVs and bicyclists through the use of pavement markings and signage. The lane is typically located on the right side of the street, between the adjacent travel lane and curb, and is used in the same direction as motor vehicle traffic.

An additional buffer treatment can be implemented between the NEV/bike lane and travel lane where space provides.



Class III NEV Routes

Class III Routes are low-volume, low-speed streets with shared operating conditions comfortable for use by NEVs and bicyclists. Treatments such as signage, pavement markings, traffic calming and/or traffic reduction are utilized to achieve specific speed or volume targets.

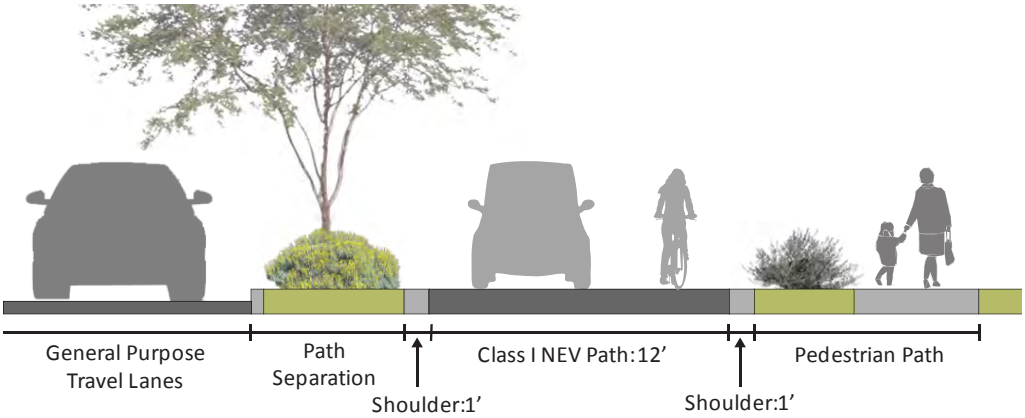
5.3 Class I NEV Path Design

Class I routes provide for a physically separate path for the use of NEVs and bicyclists, golf carts, pathway maintenance vehicles, emergency service, and potentially water district maintenance. Typically, Class I NEV paths will be one-way, on the right hand side of the street traveling the same direction as the adjacent general-purpose traffic lanes.

5.3.1 Cross Sections

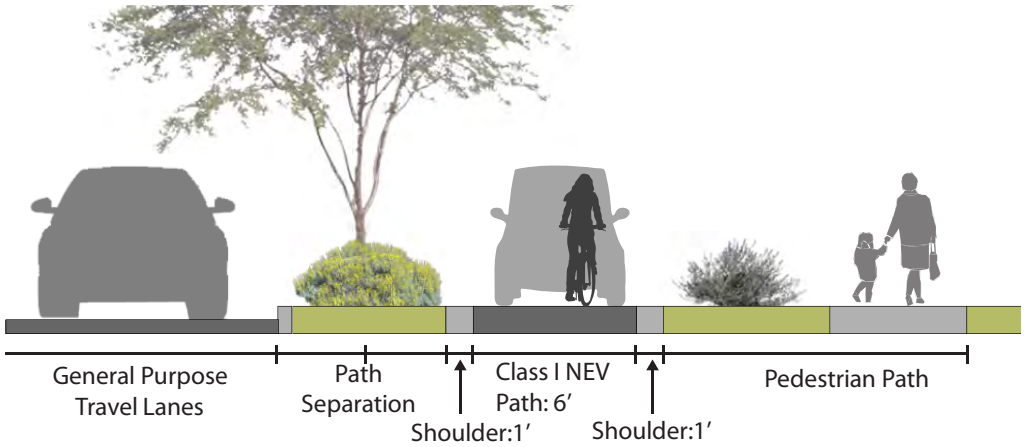
The preferred pathway width for a one-way Class I NEV path is 12 feet with 1-foot shoulders on each side. This provides adequate room for a NEV and bicyclist to pass side-by-side in comfort, and may permit two NEVs to pass in the event of a breakdown. Providing for passing within the Class I path is important if a physical barrier or landscaping prohibits convenient egress from the path.

Figure 9: Preferred Cross Section for One-way Class I NEV Path where Passing is Permitted



If passing is not required, or if the configuration permits users to easily and safely leave the path, the pathway width for a one-way Class I path should be 6 feet, with 1-foot shoulders on each side. In tightly constrained segments, a 5-foot pathway with 1-foot shoulders may be necessary. Constrained segments should be indicated with warning signs or markings.

Figure 10: Preferred Cross Section for One-way Class I NEV Path where Passing is Not Allowed

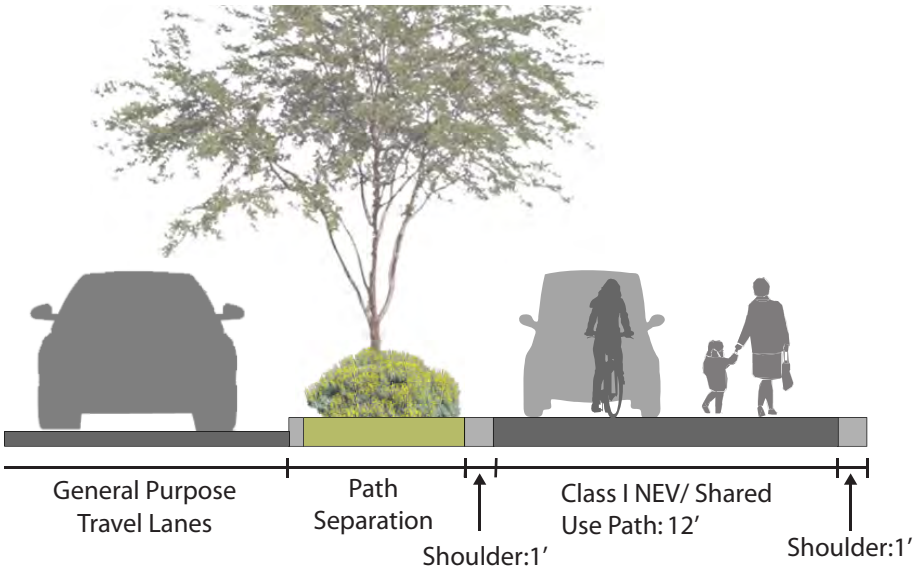


In highly constrained conditions, it may not be possible to provide separate path treads for pedestrians and NEVs/bicyclists. In these conditions, a class I shared use path used by a wide spectrum of users may be considered. This is only appropriate where there is limited right of way or if necessary to provide connections to the CV Link.

In this configuration NEV and bicyclists are only permitted to travel in one direction, matching that of adjacent traffic. Pedestrians and other non-motorized users may travel in both directions. Because NEV and bicycle users should operate following the same direction as adjacent traffic, Class I paths along roadways should generally be provided on both sides of the street to offer mobility in both directions.

The recommended pathway width for an all user class I shared use path path is 12 feet, with 1-foot shoulders on each side. In tightly constrained segments, a 10-foot pathway may be necessary. Constrained segments should be indicated with warning signs or markings. Efforts should be made to maintain a reduced NEV operating speed in areas shared with pedestrians.

Figure 11: Constrained Cross Section for All User Class I Path



5.3.2 Markings and Signs

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.

Class I NEV Path Crosswalk Markings

Consider implementing a unique crosswalk marking style to support path crossings on the NEV network. Enhanced crosswalk designs may serve to raise awareness of the NEV path crossing to all users. Standard

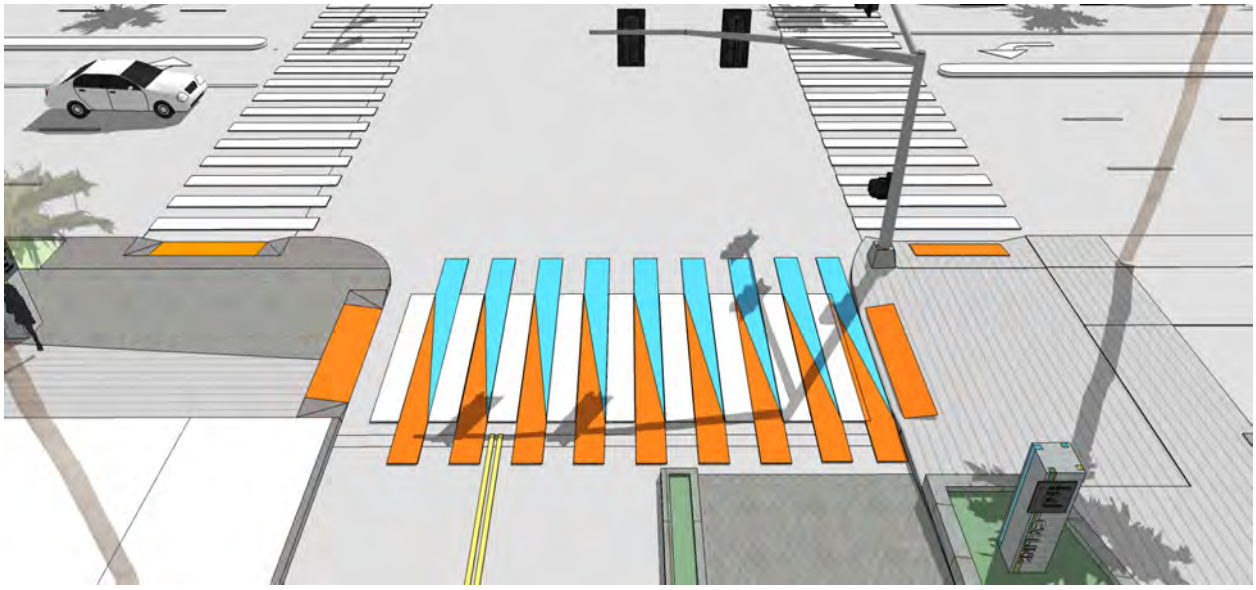
marked crosswalks may be enhanced with decorative painting and designs, assuming such designs do not compromise the effectiveness of the crosswalk.

Per FHWA guidance[7], enhanced crosswalks designs should:

- Use subdued-colored aesthetic treatments between the legally marked transverse crosswalk lines.
- Be devoid of retroreflective properties to clarify that they are not a traffic control device.
- Not diminish the effectiveness (contrast) of the legally required white transverse pavement markings (however, a crosswalk is not needed to provide a legal crossing at intersections)
- Acceptable colors for these materials would be red, rust, brown, burgundy, clay, tan or similar earth tone equivalents. The colors yellow, blue and green are discouraged to prevent confusion as a traffic control device.
- If brighter colors are desired, a buffer space or black coloring may be used to create the necessary contrast. This is not preferred by the FHWA, but may be acceptable.

The current CV Link crosswalk design concept is shown in Figure 12. This is a conceptual illustration only. The concept could be augmented with white lines parallel to the crosswalk. The FHWA representative to the California Traffic Control Devices Committee (CATCDC) has advised that the ruling is guidance and jurisdictions can exercise engineering judgment. The conceptual CV Link crosswalk may need to be further refined in discussion with local jurisdictions, including materials testing for enhanced durability in the desert environment.

Figure 12: CV Link Type Crossride / Crosswalk Concept Markings



[7] Interpretation Letter 3(09)-24(I) – Application of Colored Pavement - August 2013. http://mutcd.fhwa.dot.gov/resources/interpretations/3_09_24.htm

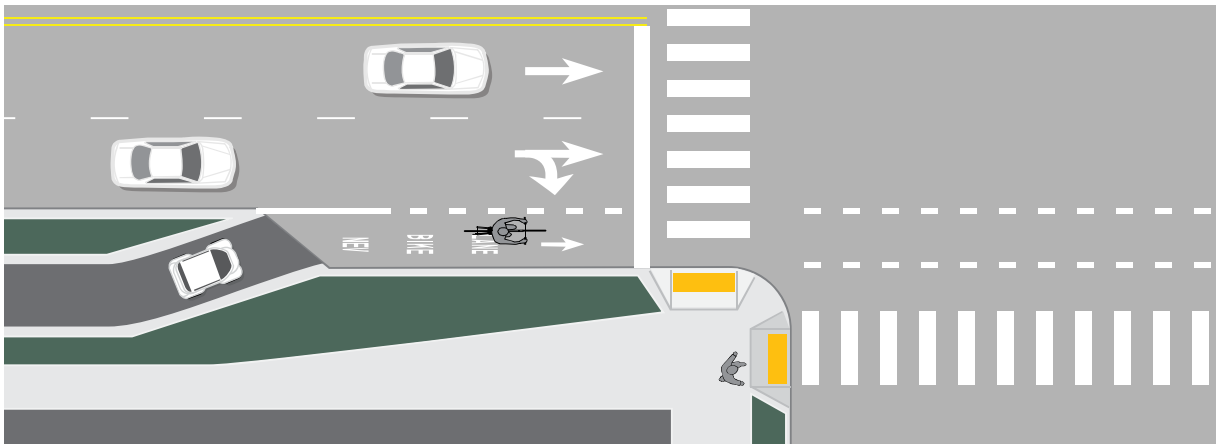
5.3.3 Intersection Crossing Strategies

The following general strategies apply when Class I NEV Paths approach signalized intersections.

Convert to Class II NEV Lane

One strategy in advance of the crossing is to transition the Class I NEV into a Class II NEV Lane. Motor vehicles must make right turns from the right most travel lane, which requires NEVs and motor vehicles to negotiate right of way upstream of the intersection. See Section 4.4 for additional guidance on how to integrate Class II lanes with right turn lanes.

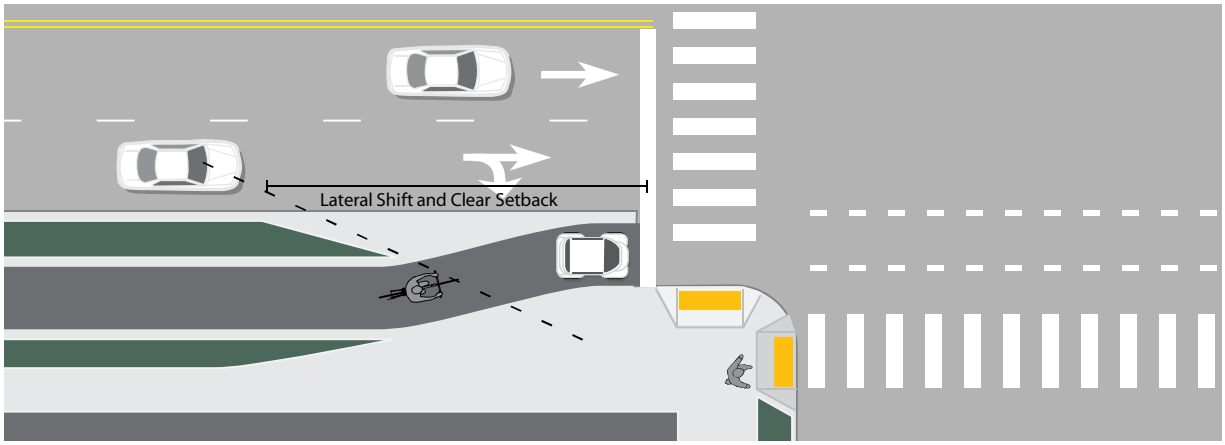
Figure 13: Transition the Class I NEV Path into Class II NEV Lane



Separated Class I Crossing

When a greater degree of separation is desired, the separate Class I NEV Path should be maintained. To ensure adequate visibility, consider laterally shifting the path toward the roadway and/or establish a clear zone in advance of the intersection. Consider signalization schemes that allow NEVs to cross with the pedestrian signal.

Figure 14: Lateral Shift and Class I NEV Path Crossing

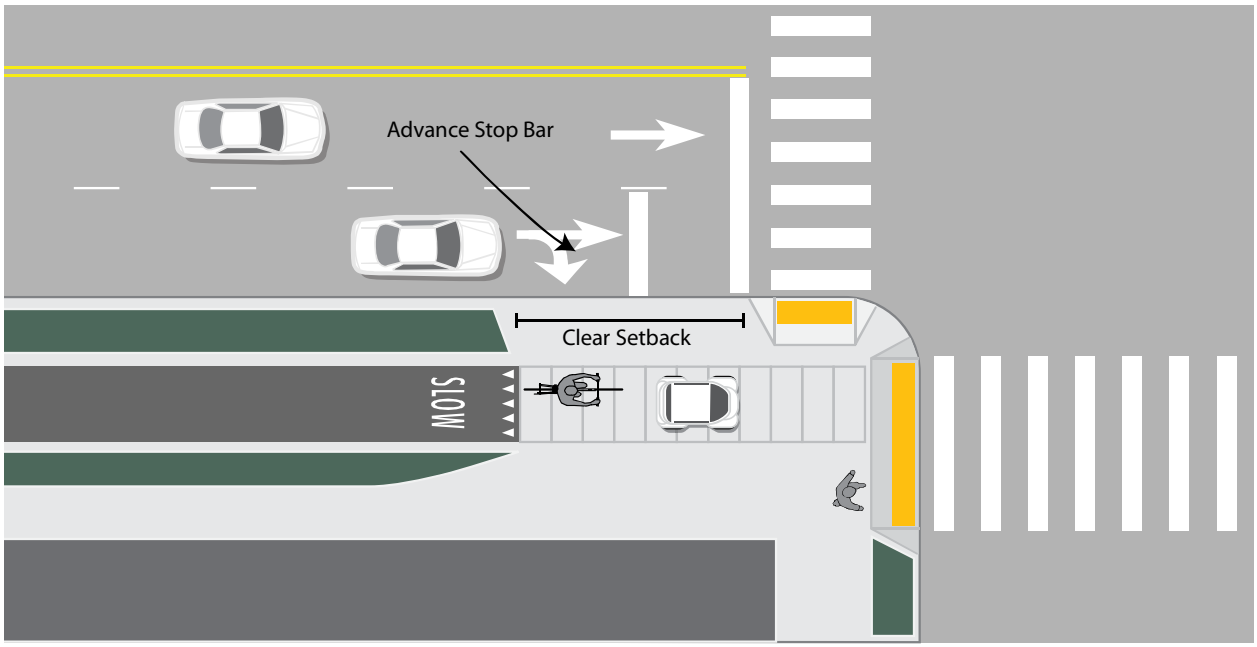


Convert to Shared Use Path

In highly constrained conditions the Class I NEV path may be converted into a conventional Class I shared use path.

Because this design potentially combines NEVs, bicyclists and pedestrians in the same space it is important to encourage NEV speeds closer to that of pedestrians. Markings, warnings signs and tactile markings may be used to indicate a speed transition zone.

Figure 15: Transition the Class I NEV Path Into Conventional Class I Shared Use Path



Street Crossing Signal Phasing

When operating on Class I NEV Paths, users will rely on either the standard traffic signal indication or the pedestrian signal head to provide traffic control at signalized intersections.

When NEV and bicyclists are expected to use the pedestrian signal head, a modified R9-5 NEVs/BIKES USE PED SIGNAL sign should be provided. This sign has been approved by the CATCDC for inclusion in the next CAMUTCD.

Figure 16: NEV/BIKES USE PED SIGNAL Sign

Protected Signal Phasing

In areas where conflicts between NEVs and turning motor vehicles is a high risk, providing an exclusive pedestrian phase for use by NEVs, bicyclists and pedestrians will provide full protection of NEV Crossings. Right turn on red should be prohibited at these locations.

Leading Pedestrians/NEV Interval Phasing

Where a protected signal phase for pedestrians/NEVs is impractical, it may be possible to provide a short-duration head-start protected phase to allowing path users to enter the intersection before adjacent conflicting motor vehicles. Right turn on red should be prohibited at these locations.

Signal Detection and Actuation

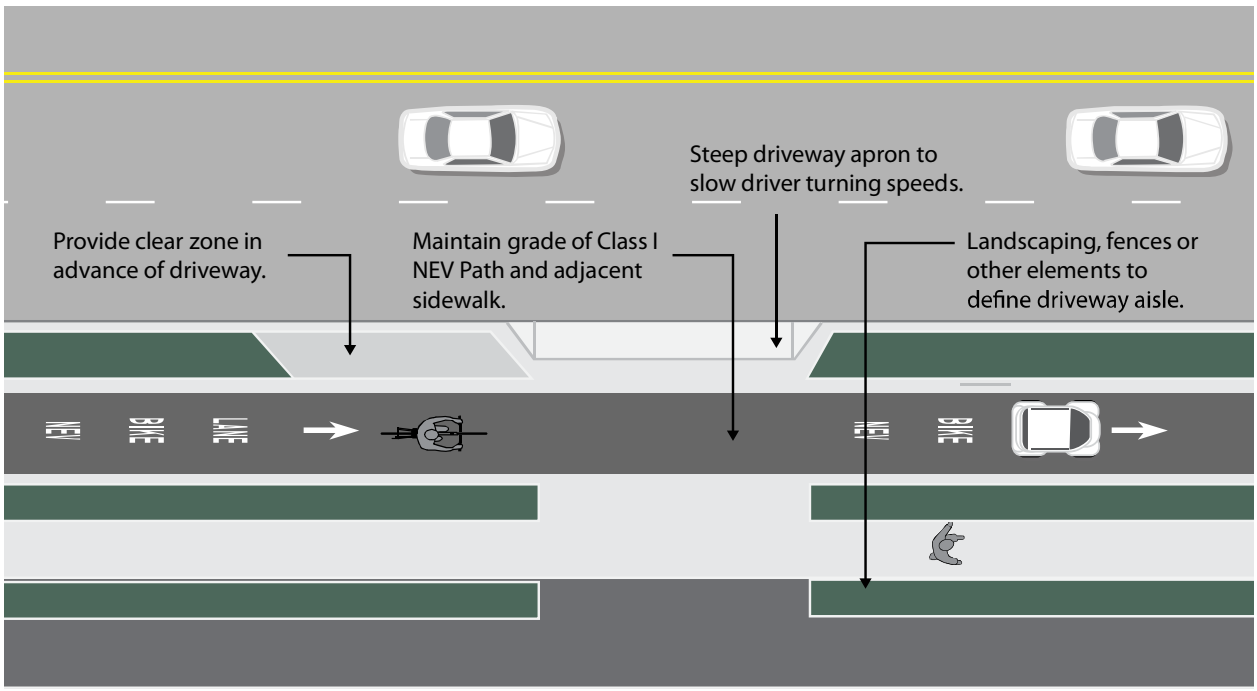
NEVs can be detected at signalized intersections using the same technologies that are often used to detect bicycles. Similar to bicycle detection and actuation, NEV detection and actuation, can employ video imaging detection, magnetometers, microwave radar, and embedded inductive loop detectors at signalized intersections and further upstream. Embedded inductive loop detectors and video imaging detection systems are the most commonly used detection technologies for passenger vehicles and bicycles.

More research is needed to determine the most effective loop detector configuration for NEVs given their larger width and wheelbase. However, if the sensitivity of the loop detector is adjusted for bicycles (more sensitive), and pavement markings or signage are used to indicate appropriate NEV position, then NEVs can effectively use existing bike detectors. Installing new loop detectors would serve both NEV operators and bicyclists.

Driveways

Motor vehicles are required to yield to NEVs, bicyclists and pedestrians at driveways. It is important for driveway designs to communicate the priority of these users, and to encourage appropriate turning speed by motor vehicles.

Figure 17: Class I NEV Path Driveway Crossing



5.4 Class II NEV Lane Design

Class II NEV/Bike lanes provide for a separate striped lane adjacent to roadways with speed limits of 55 miles per hour or less. The lane may be shared with bicyclists, or may be configured as an additional lane adjacent to a bicycle lane. Adjacent general traffic lanes may need to be narrowed to between 10-11' to accommodate wider Class II NEV/Bike lanes. Less than 12' wide lanes are proven to improve safety for all road users and are appropriate for multi-modal urban arterials as noted in the California Highway Design Manual and other documents supported by Caltrans promoting multi-modal design[8].

5.4.1 Cross Sections

Class II lanes should have a minimum width of 7 feet. Where possible, a 3-foot or wider buffer should allow for passing and provide additional comfort and separation from traffic and/or parking lanes. See Figure 16 for buffer striping options. Special attention should be given to the continuity of NEV lanes through intersections, between vehicle travel and turn lanes and transitions to other NEV facility types. In constrained locations, Class II NEV Lanes may be 7' wide and delineated with a single 8" white stripe.

Figure 18: Preferred Cross Section for Class II I NEV Lane

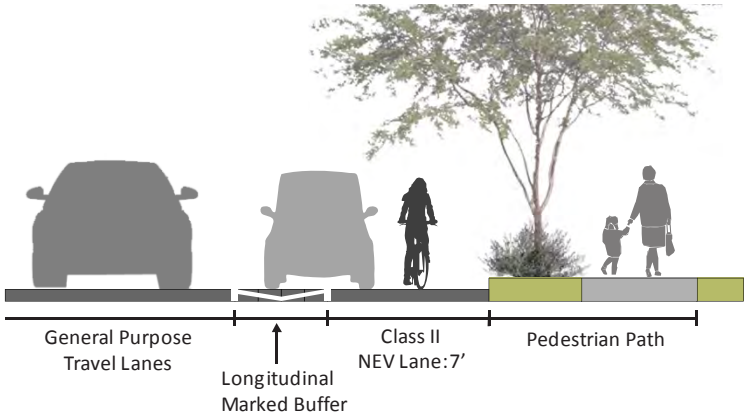
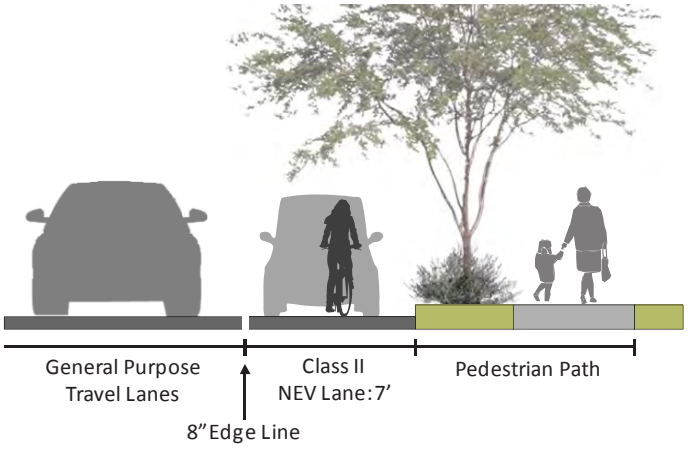


Figure 19: Constrained Cross Section for Class II NEV Lane



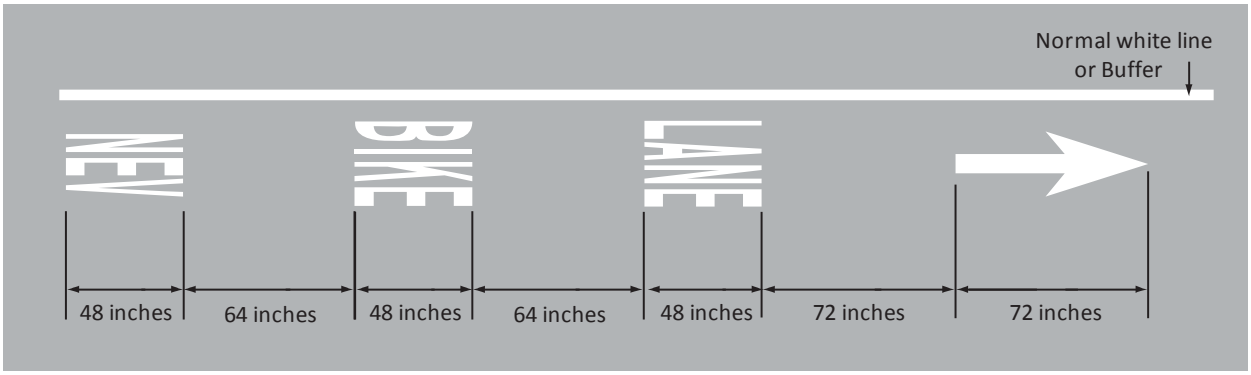
[8] http://www.dot.ca.gov/Documents/2014-4-2-Flexibility-in-Design.pdf

5.4.2 Markings and Signs

Preferential Lane Markings

The California Traffic Control Devices Committee (CATCDC) has approved the inclusion of the letters "NEV" for use in the bike lanes markings in the next CAMUTCD and this marking may be implemented now. Subject to approved experimentation process, 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 NEV and a motor vehicle or golf cart. Additionally, a graphic symbol serves international needs and does not require comprehension of written English.

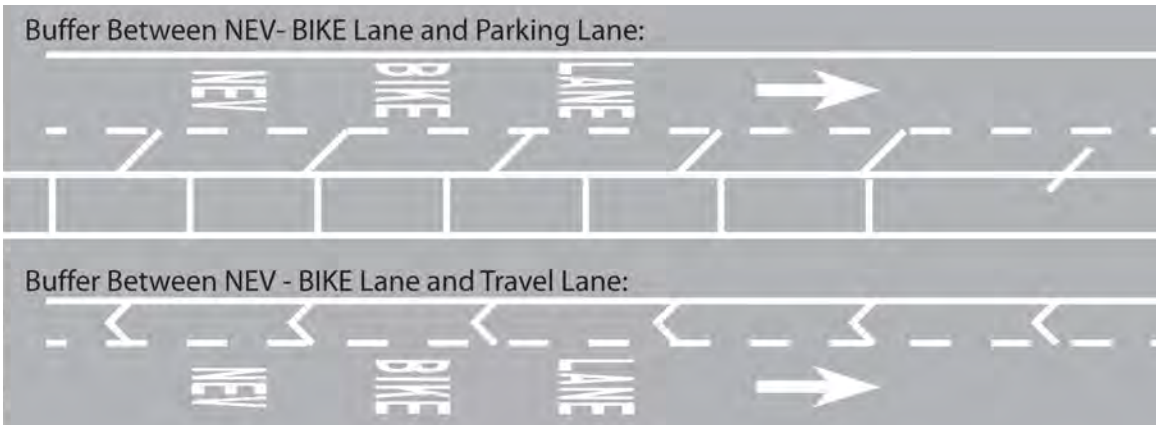
Figure 20: Experimental Standard NEV Pavement Marking



Lines and Buffers

Class II NEV Lanes require lane striping to identify the boundary between the NEV Lane and the adjacent travel lane. Class II lanes are typically marked with a normal 6" white line, although in locations with insufficient room for a standard buffer, a line of up to 12" may be used[9]. Preferential lane striping is described in section 3D.02 of the CAMUTCD and the buffers shown have been adopted by the CATCDC.

Figure 21: Longitudinal Edge Striping Alternatives (modified CAMUTCD Figure 9C-104)

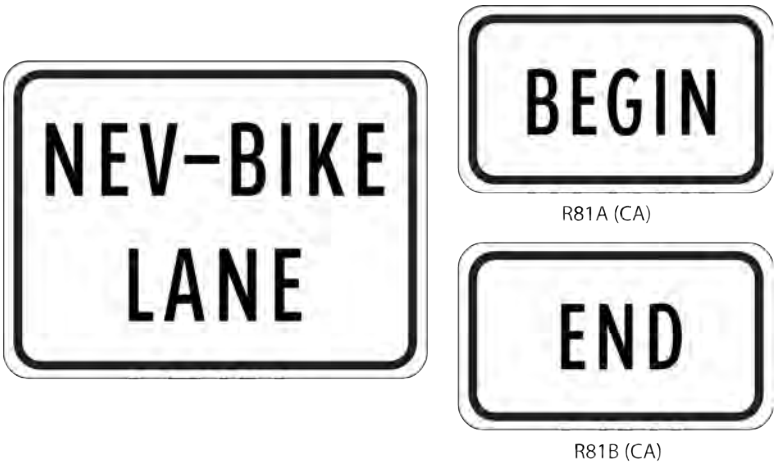


[9] For example, the City of Davis, CA has recently installed 12" striping on 5th Street where there was insufficient room for a full buffer

Signs

The combination NEV/Bike Lane sign should be placed on NEV Lanes designed for use by both NEVs and bicyclists. The sign should be placed at the far side of collector street intersections and at a minimum of one-half mile intervals on all continuous NEV lane segments.

Figure 22: Combination NEV/Bike Lane Sign and Supplemental Plaques



In locations where a NEV Lane is terminated or transitioned into or from a Class I or Class III facility, the R81A "BEGIN" or R81B "END" plaques may be used to the Combination NEV/Bike Lane sign.

NEV prohibition

This regulatory plate may be placed at entrances to public streets that will not accommodate NEV travel. This sign may be placed on the right-hand side of the roadway approximately 25 feet past the intersection so it is visible to operators before they enter that portion of the public right-of-way.

Figure 23: NEV Prohibition Signs

The CTCDC has explained that NEV is an acronym for Neighborhood Electric Vehicle or Neighborhood Electric Vehicles, and accordingly will be adopted with "NEV PROHIBITED" rather than "NEVS PROHIBITED". This sign may be used in conjunction with an existing "BEYOND THIS POINT" supplementary sign or in one sign.

5.4.3 Intersection Design Elements

Right Turns and NEV Lanes

Experience in the City of Lincoln indicates that there are no significant issues with NEV use of conventional roadway left turn lanes. From the Lincoln Evaluation Report[10]:

> *"NEVs tend to move over to the left turn lane, much like bicycles are able to do. The general feelings of safety for turning and maneuvering an NEV are subjective. Driving skills, experience, and familiarity with the driver's surroundings area all key factors. However, as a general rule of thumb, if a bicycle has sufficient speed, site distance, and capability to move from a bike lane to a left turn lane, then an NEV would certainly have similar capability, since NEVs are generally faster and more visible than a standard bicycle."*

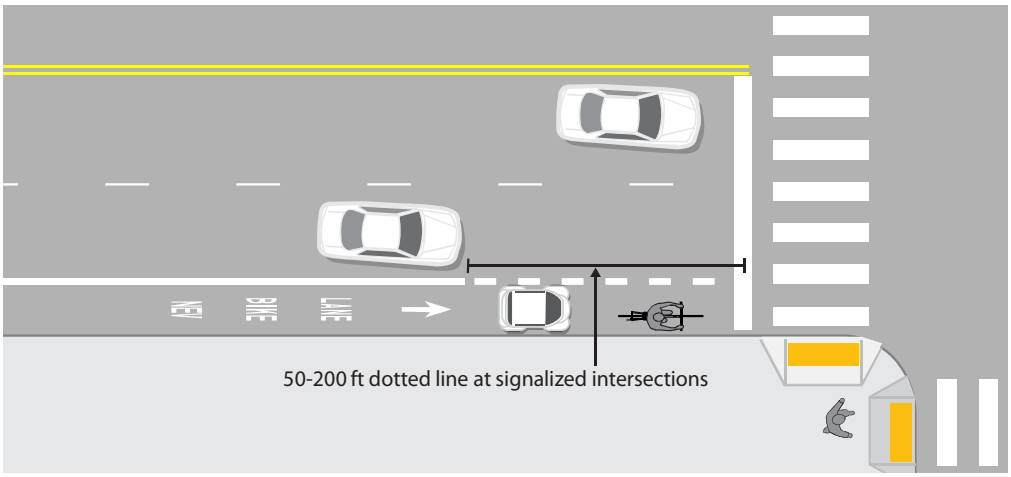
Because such operation requires shared roadway conditions for short segment, exercise caution when expecting this type of operation on roadways with a posted speed limit above 35 mph.

Managing Right Turns and NEV Lanes

Managing conflict between NEVs and right turning vehicles is one of the most important aspects of Class II NEV Lane design at intersections.

At locations adjacent to a shared through/right turn lane, the NEV lane should be dashed in advance of the intersection to allow right turning vehicles to turn from the rightmost lane of the street. Motorists are required to yield to NEVs and bicyclist prior to positioning for the right turn. However according to the CVC they can enter a bike lane 150' prior to an intersection when safe to do so.

Figure 24: Dashed NEV Lane Next to Through/Right Lane

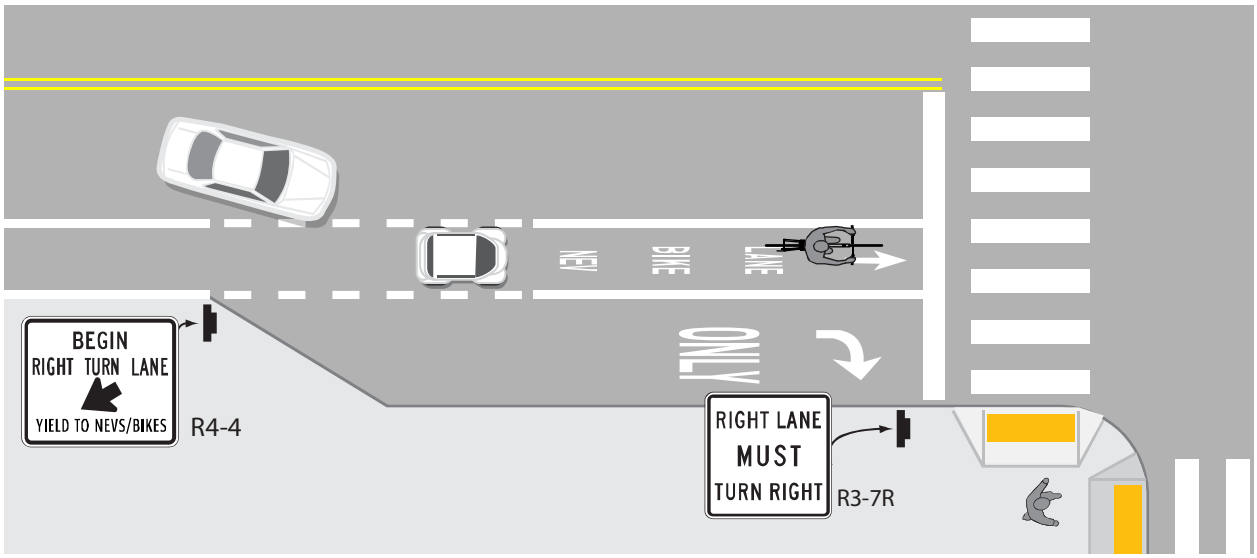


In areas of high right turn volumes, a dedicated right-turn-only lane should be provided. The right turn only lane should be added to the right of the NEV lane and the merge area should be marked with dashed lines. The NEV lane alignment should be straight through the merge area (so the right-turn lane is

[10] City of Lincoln and City of Rocklin. *Neighborhood Electric Vehicle Transportation Plan Evaluation.* 2011.

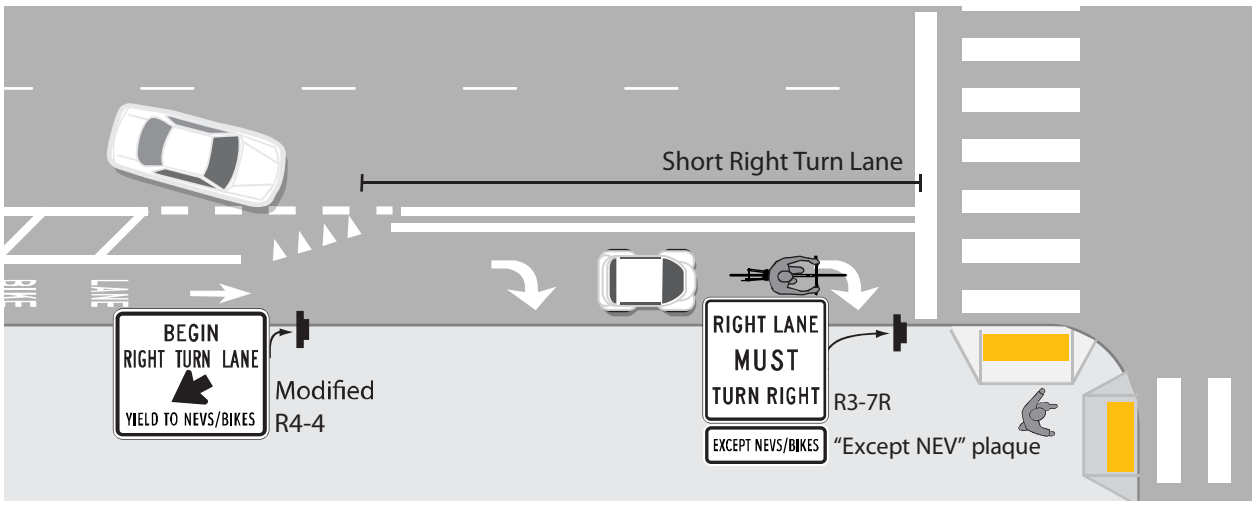
designer as an "add" lane) with as little deflection to the NEV lane as necessary. Motorists are required to yield to NEVs and bicyclist at the entrance to the right-turn-only lane.

Figure 25: Through NEV Lane and Added Right Turn Only Lane



When there isn't adequate space for a dedicated right-turn-only lane, a Combined NEV/Turn Lane (Figure 22) may be provided to encourage users to negotiate priority in advance of the intersection. This treatment is based off a similar configuration used for bike lanes[11]. Signs should be used to permit through movements by NEVs and bicyclists in these locations.

Figure 26: Combined NEV Lane/Turn Lane (Mixing Zone)

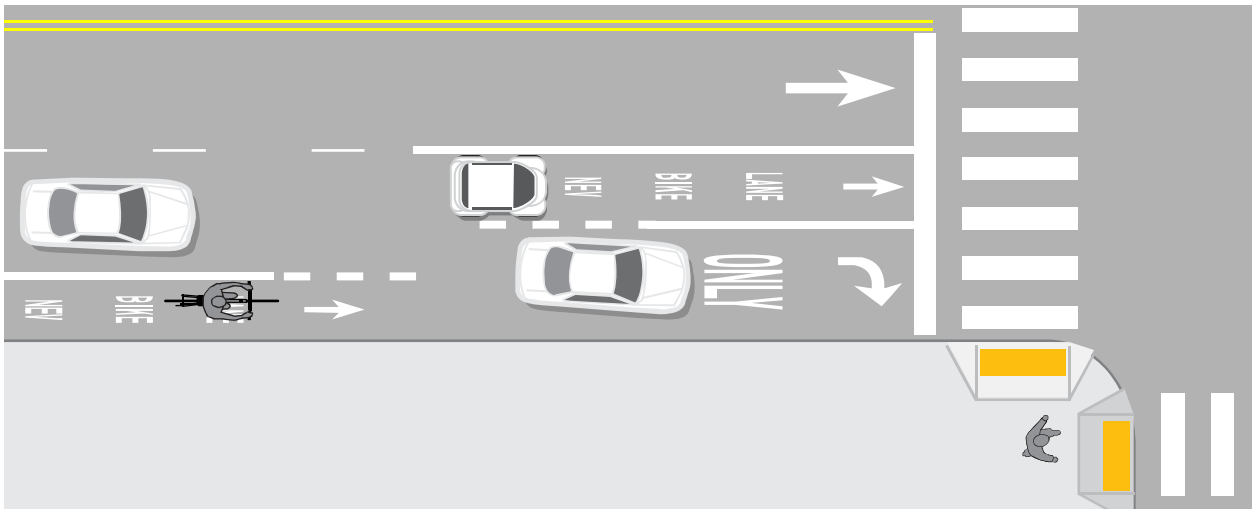


[11] NACTO. Urban Bikeway Design Guide: Combined Bike Lane/Turn Lane. 2012.

In situations where a through travel lane becomes a right-turn-only lane, NEV operators and bicyclists are required to move laterally to maintain a through position to the left of the right-turn-only lane. This situation is highly undesirable, as motor vehicles are traveling at a high rate of speed and user priority is ambiguous.

Because this configuration creates a short-length of shared-roadway condition, exercise caution when applying this treatment on roadways with a posted speed limit above 35 mph.

Figure 27: Through NEV Lane with Transition to Right-Turn-Only Lane (35 mph or lower)



Signals Detection and Actuation

At signalized intersections the Class II NEV Lane users must be able to reliably and easily actuate the signal controller if the signal is not operating on fixed timing mode. Most commonly this is done through loop detectors or other technology.

Loop Detectors

NEV/Bicycle-activated loop detectors are installed within the roadway to allow the presence of an NEV lane user to trigger a change in the traffic signal. Loops that are sensitive enough to detect bicycles should be supplemented with pavement markings to instruct users how to activate the signals.

Video Detection Cameras

Video detection systems use digital image processing to detect a change in the image at a location. These systems can be calibrated to detect NEVs and bicyclists. Video camera system costs range from $20,000 to $25,000 per intersection.

Remote Traffic Microwave Sensor Detection (RTMS)

RTMS is a system which uses frequency modulated continuous wave radio signals to detect objects in the roadway. This method marks the detected object with a time code to determine its distance from the sensor. The RTMS system is unaffected by temperature and lighting, which can affect standard video detection.

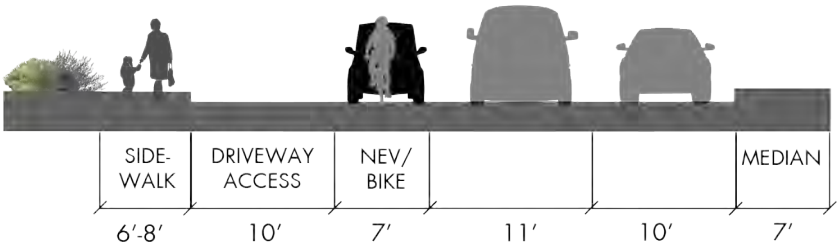
Right Turn Access Lanes

In many areas of the Coachella Valley where arterial roads intersect other arterial roads, consecutive right-turn lanes can present a significant challenge for NEV operators and bicyclists. To make a right turn, an NEV operator would use the right-turn lane as though they were in a motor vehicle. However, once they've executed the turn, they no longer have a dedicated NEV facility, and are instead forced to share another right-turn lane with vehicles turning into driveways or parking lot entrances. This is especially problematic for NEV operators because they must negotiate a shared space with faster travelling vehicles entering the right-turn lane, while trying to merge over into the through travel lane (again with faster moving vehicles continuing straight). Two options are presented below.

Figure 22 depicts a typical right-turn departure NEV/bike lane transition. This lane striping provides separation after the turn and forces vehicles to turn across the NEV/bike lane to access driveways. The dashed vehicle merging area can utilize a green colored surface treatment to further highlight the potential conflict area. Where roadway widths allow, buffered bike lanes (on one or two sides) offer additional space, and increased comfort for NEV operators and bicyclists along higher speed roadways. Physical separation can also be achieved with a concrete channelization island near the intersection.

Figure 28: Typical Right-turn Departure NEV/Bike Lane

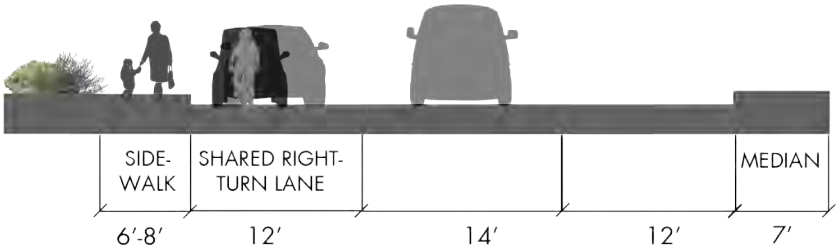
Figure 29: Right-turn Departure NEV/bike Lane Roadway Section



When the roadway is not wide enough to accommodate a 7-foot NEV/bike lane, a secondary option is to provide a shared or "mixing" lane, where motor vehicles must turn right for driveway access, and NEVs and bikes are permitted to proceed through (Figure 24). Shared lane markings ("Sharrows") may be used and "Right-Turn Only – Except NEVs/Bikes" signage should be used in this context.

Figure 30: Shared Right-turn Only Lane with Exception for NEVs and Nikes

Figure 31: Shared Right-turn Only Lane Roadway Section



5.5 Class III NEV Route Design

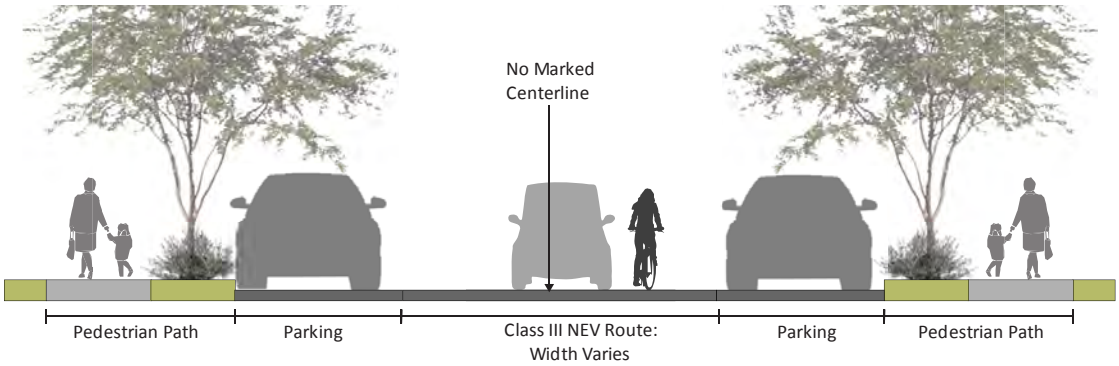
Class III Routes are shared, on-street facilities without exclusive NEV striping or separation from motor vehicles, bikes or other modes, typically designated on residential streets with posted speed limits of 25 mph or less[12].

Designers should create streets with low design speeds to create "self explaining" or "self enforcing" operating conditions. Narrow cross sections and traffic calming elements such as speed tables, chicanes and neighborhood roundabouts should be used to encourage appropriate driver operating speed without the need for enforcement or education.

5.5.1 Cross Sections

When Class III Routes coincide with designated bicycle boulevards, Class III Routes may also feature a bicycle shared lane marking to indicate the facility type to other roadway users. Commonly, the centerline is not marked, to permit and encourage full use of the roadway for comfortable passing.

Figure 32: Typical Class III Route on Residential Street



5.5.2 Markings and Signs

No identifying pavement markings are required for Class III NEV Routes. NEV ROUTE signs should be used to raise awareness to other users of the presence of NEVs. The word BIKE has been included because it is assumed that any route preferred for NEVs would also be a preferred for bicyclists.

Figure 33: Class III NEV Route Sign

[12] State regulations permit shared roadway NEV use on streets with speed limits of 35 mph or lower.

5.6 Implementation Strategies

5.6.1 Travel Lane Reconfigurations

The removal of a single, wide travel lane may provide sufficient space for NEV lanes on both sides of a street. Streets with excess vehicle capacity provide opportunities for NEV lane retrofit projects.

Depending on a street's existing configuration, traffic operations, user needs and safety concerns, various lane reduction configurations may apply. For instance, a four-lane street (with two travel lanes in each direction) could be modified to provide one travel lane in each direction, a center turn lane, and bike lanes. Prior to implementing this measure, a traffic analysis should identify potential impacts.

5.6.2 Travel Lane Narrowing

Lane narrowing utilizes roadway space that exceeds minimum standards to provide the needed space for NEV lanes. Many roadways have existing travel lanes that are wider than those prescribed in local and national roadway design standards, or which are not marked. Most standards allow for the use of 9-12 foot travel lanes to create space for NEV lanes.

Special consideration should be given to the amount of heavy vehicle traffic, desired speed of the roadway and horizontal curvature before the decision is made to narrow travel lanes. Narrow travel lanes have proven effective in reducing motorists speeds on roadways as they are more appropriately designed for the predominate passenger vehicle users of the roadway rather than the largest roadway users like semi trucks and buses ability to drive the design speed. Two way left turn lane or Center turn lanes can also be narrowed to 9'-11' in many situations to repurpose pavement space for NEV lanes.

AASHTO supports reduced width lanes in *A Policy on Geometric Design of Highways and Streets:* "On interrupted-flow operation conditions at low speeds (45 mph or less), narrow lane widths are normally adequate and have some advantages."

5.6.3 Parking Lane Removal

Like travel lane removal, the removal of one or both parking lanes may provide necessary space to establish NEV lanes. Typical parking lane widths of 8 feet are directly compatible with one-direction NEV lanes and such conversions may be very cost effective. Parking lane removal may be controversial and a public process is typically needed.

5.6.4 Shoulder Widening

NEV lanes can be accommodated on streets with excess right-of-way through shoulder widening. Although roadway widening incurs higher expenses compared with re-striping projects, NEV lanes can be added to streets currently lacking curbs, gutters and sidewalks without the high costs of major infrastructure reconstruction. Due to the cost of street reconstruction, shoulder widening is most appropriate on roads lacking curbs, gutters and sidewalks.

5.6.5 Speed Limit Adjustments

In some cases, a roadway may be operating at a speed too fast for Class III shared roadway use (> 35 mph), but would otherwise be compatible with NEV operation. In these situations, it may be possible to adjust the design speed of the road through striping, geometry adjustments, and traffic calming to reduce the posted speed limit to 35 mph or less as appropriate for NEV use.

5.7 Facility Maintenance

5.7.1 Considerations

Regular NEV facility maintenance includes sweeping, maintaining a smooth roadway, ensuring that the gutter-to-pavement transition remains relatively flush, and installing bicycle- and NEV-friendly drainage grates. Pavement overlays are a good opportunity to improve NEV facilities. The following recommendations provide a menu of options to consider enhancing a maintenance regimen.

Table 8: Recommended Maintenance Activities

Maintenance Activity	**Frequency**
Inspections	Seasonal – at beginning and end of Summer
Pavement sweeping/blowing	As needed, with higher frequency in the early Spring and Fall
Pavement sealing	5 - 15 years
Pothole repair	1 week – 1 month after report. Marked with high visibility paint until repairs can be completed.
Culvert and drainage grate inspection	Before Winter and after major storms
Pavement markings replacement	As needed
Signage replacement	As needed
Shoulder plant trimming (weeds, trees, brambles)	Twice a year; middle of growing season and early Fall
Tree and shrub plantings, trimming	1 – 3 years
Major damage response (washouts, fallen trees, flooding)	As soon as possible

5.7.2 Street Sweeping

NEV users often avoid shoulders and lanes filled with gravel, broken glass, sand accumulation and other debris; they will ride in the roadway to avoid these hazards, potentially causing conflicts with motorists. Debris from the roadway should not be swept onto sidewalks (pedestrians need a clean walking surface), nor should debris be swept from the sidewalk onto the roadway. A regularly scheduled inspection and maintenance program helps ensure that roadway debris is regularly picked up or swept. Street sweeping maintenance practices should include:

- Establish a seasonal sweeping schedule that prioritizes roadways with NEV facilities
- Sand removal should occur after each wind storm event
- Sweep NEV facilities whenever there is an accumulation of debris on the facility.
- Develop a "debris in roadway" hotline to report
- In curbed sections, sweepers should pick up debris; on open shoulders, debris can be swept onto gravel shoulders
- Pave gravel driveway approaches to minimize loose gravel on paved roadway shoulders
- Perform additional sweeping in areas where debris accumulates

5.7.3 Gutter to Pavement Transitions

On streets with concrete curbs and gutters, 1 to 2 feet of the curbside area is typically devoted to the gutter pan, where water collects and drains into catch basins. On many streets, the NEV lane is situated near the transition between the gutter pan and the pavement edge. This transition can be susceptible to erosion, creating potholes and a rough surface for travel.

The pavement on many streets is not flush with the gutter, creating a vertical transition between these segments. This area can buckle over time, creating a hazardous condition for bicyclists. Gutter maintenance strategies include:

- Ensure that gutter-to-pavement transitions have no more than a ¼" vertical transition.
- Examine pavement transitions during every roadway project for new construction, maintenance activities, and construction project activities that occur in streets.
- Inspect the pavement 2 to 4 months after trenching construction activities are completed to ensure that excessive settlement has not occurred.
- Provide at least 5 feet of smooth pavement outside of the gutter seam.

5.7.4 Access through Construction Areas

Wherever NEVs are allowed, measures should be taken to provide for the continuity of a user's trip through a work zone area. NEV drivers should not be led into conflicts with work site vehicles, equipment, moving vehicles, open trenches, or temporary construction signage.

Efforts should be made to re-create an NEV lane (if one exists) to the left of the construction zone. If this is impossible, then consider the closure of a standard-width travel lane to accommodate separated NEV travel.

Contractors performing work should be made aware of the needs of NEV users and be properly trained in how to safely route NEVs through or around work zones.

Construction Signage

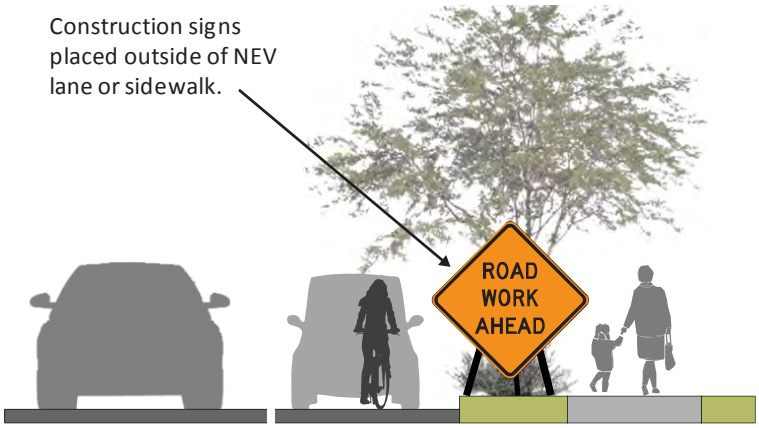
- Place in a location that does not obstruct the path of NEV drivers, bicyclists or pedestrians.
- Detour and closure signs related to NEV travel may be included on all bikeways where construction activities occur. Signage should also be provided on all other roadways.

Travel on and around Steel Grates

Plates used to cover trenches tend to not be flush with pavement and have a 1"-2" vertical transition on the edges. This can puncture a hole in a bicycle tire and can be be jarring to NEV drivers. Although it is common to use steel plates during non-construction hours, these plates can be dangerously slippery, particularly when wet. Good practices include:

- Require temporary asphalt (cold mix) around plates to create a smooth transition.
- Use steel plates only as a temporary measure during construction, not for extended periods.
- Use warning signs where steel plates are in use.
- Require both temporary and final repaving to provide a smooth surface without abrupt edges.

Figure 34: Proper Placement of Construction Signage Outside of NEV Lane



5.8 Additional AB 61 Considerations

5.8.1 Safety and Maintenance Requirements

NEVs eligible to use NEV lanes shall meet the safety requirements for low-speed vehicles as set forth in Section 571.500 of Title 49 of the Code of Federal Regulations, included below.

TITLE 49 OF THE CODE OF FEDERAL REGULATIONS
§571.500 Standard No. 500; Low-speed vehicles. S5. Requirements.

S5. Requirements.

(a) When tested in accordance with test conditions in S6 and test procedures in S7, the maximum speed attainable in 1.6 km (1 mile) by each low-speed vehicle shall be not more than 40 kilometers per hour (25 miles per hour).

(b) Each low-speed vehicle shall be equipped with:

(1) Headlamps,

(2) Front and rear turn signal lamps,

(3) Taillamps,

(4) Stop lamps,

(5) Reflex reflectors: one red on each side as far to the rear as practicable, and one red on the rear,

(6) An exterior mirror mounted on the driver's side of the vehicle and either an exterior mirror mounted on the passenger's side of the vehicle or an interior mirror,

(7) A parking brake,

(8) A windshield that conforms to the Federal motor vehicle safety standard on glazing materials (49 CFR 571.205).

(9) A VIN that conforms to the requirements of part 565 Vehicle Identification Number of this chapter, and

(10) A Type 1 or Type 2 seat belt assembly conforming to Sec. 571.209 of this part, Federal Motor Vehicle Safety Standard No. 209, Seat belt assemblies, installed at each designated seating position.

(11) Low-speed vehicles shall comply with the rear visibility requirements specified in paragraphs S6.2 of FMVSS No. 111.

S6. General test conditions. Each vehicle must meet the performance limit specified in S5(a) under the following test conditions.

S6.1. Ambient conditions.

S6.1.1. Ambient temperature. The ambient temperature is any temperature between 0 °C (32 °F) and 40 °C (104 °F).

S6.1.2. Wind speed. The wind speed is not greater than 5 m/s (11.2 mph).

S6.2. Road test surface.

S6.2.1. Pavement friction. Unless otherwise specified, the road test surface produces a peak friction coefficient (PFC) of 0.9 when measured using a standard reference test tire that meets the specifications of American Society for Testing and Materials (ASTM) E1136, "Standard Specification for A Radial Standard Reference Test Tire," in accordance with ASTM Method E 1337-90, "Standard Test Method for Determining Longitudinal Peak Braking Coefficient of Paved Surfaces Using a Standard Reference Test Tire," at a speed of 64.4 km/h (40.0 mph), without water delivery (incorporated by reference; see 49 CFR 571.5).

S6.2.2. Gradient. The test surface has not more than a 1 percent gradient in the direction of testing and not more than a 2 percent gradient perpendicular to the direction of testing.

S6.2.3. Lane width. The lane width is not less than 3.5 m (11.5 ft).

S6.3. Vehicle conditions.

S6.3.1. The test weight for maximum speed is unloaded vehicle weight plus a mass of 78 kg (170 pounds), including driver and instrumentation.

S6.3.2. No adjustment, repair or replacement of any component is allowed after the start of the first performance test.

S6.3.3. Tire inflation pressure. Cold inflation pressure is not more than the maximum permissible pressure molded on the tire sidewall.

S6.3.4. Break-in. The vehicle completes the manufacturer's recommended break-in agenda as a minimum condition prior to beginning the performance tests.

S6.3.5. Vehicle openings. All vehicle openings (doors, windows, hood, trunk, convertible top, cargo doors, etc.) are closed except as required for instrumentation purposes.

S6.3.6. Battery powered vehicles. Prior to beginning the performance tests, propulsion batteries are at the state of charge recommended by the manufacturer or, if the manufacturer has made no recommendation, at a state of charge of not less than 95 percent. No further charging of any propulsion battery is permissible.

S7. Test procedure. Each vehicle must meet the performance limit specified in S5(a) under the following test procedure. The maximum speed performance is determined by measuring the maximum attainable vehicle speed at any point in a distance of 1.6 km (1.0 mile) from a standing start and repeated in the opposite direction within 30 minutes.

[63 FR 33216, June 17, 1998, as amended at 68 FR 43972, July 25, 2003; 79 FR 19249, Apr. 7, 2014]

5.8.2 Operator Requirements

Operators shall be required to possess a valid California driver's license and to comply with the financial responsibility requirements established pursuant to Chapter 1 (commencing with Section 16000) of Division 7 of the Vehicle Code.

5.8.3 Restrictions on Use

Operation of NEVs is restricted to those NEV routes identified in the transportation plan, and limited to those NEVs that meet the safety equipment requirements specified in the plan.

5.8.4 Violations

Any person operating a NEV in the plan area in violation of these rules and regulations is guilty of an infraction punishable by a fine not exceeding one hundred dollars ($100).

5.8.5 Evaluation and Monitoring

Any city that adopts a NEV transportation plan shall submit a report to the Legislature on or before January 1, 2016, in consultation with the Department of Transportation, the Department of the California Highway Patrol, and any applicable local law enforcement agency.

The report shall include all of the following:

1. A description of the NEV transportation plan and its elements that have been authorized up to that time.
2. An evaluation of the effectiveness of the NEV transportation plan, including its impact on traffic flows and safety.
3. A recommendation as to whether AB 61 should be terminated, continued in effect, or expanded statewide.

More detail on evaluation and monitoring is provided in section 0 of this plan.

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6 Recommended Education, Legislation, and Enforcement

6.1 Legislation

The disparate patchwork of current bylaws and policies are presented in Appendix D. In order to provide greater consistency across jurisdictional boundaries, support the objectives of CV Link, and promote wider adoption of lower cost and environmentally friendly transportation options, a model set of municipal city codes and policies should be developed to include:

- Coachella Valley wide standard definitions of the types of golf cars, NEVs, LSVs and LSEVs based on the California Vehicle Code
- All golf carts and NEVs shall be permitted to park in any parking space
- NEVs and golf carts that have a state issued registration for on-street use shall be exempt from city permits
- The acceptance of permits issued by other jurisdictions in the State of California and/or a California Department of Motor Vehicle (DMV) issued license plate for operation on identified routes
- Publication of a map indicating which streets with posted speed limits above 35 mph have NEV facilities, and which designated golf cart paths are available for:
    - Unrestricted NEV speed (up to the legal 25 mph limit) as conditions permit
    - Restricted NEV speed up to 15 mph due to geometric or other considerations
    - Prohibited for NEVs but still permissible for golf carts (not recommended, as this may lead to confusion and enforceability issues)

6.2 Education and Enforcement

As NEVs are a nascent technology, many residents and officials conflate them with golf cars (carts). Following on from the recommendation for a Coachella Valley wide set of definitions, there will be a need to educate the public on what each type of vehicle is and where they may be used.

- CVAG and the member cities should conduct outreach and public service announcements to clarify the various vehicle types
- All Coachella Valley DMV offices should feature hardcopies of the DMV's fact sheet available online here: http://apps.dmv.ca.gov/pubs/brochures/fast_facts/ffvr37.pdf
- Member cities should distribute to all residents the adopted uniform municipal code sections applying to NEVs and golf carts via regular mail as well as throughout all city departments including the police
- Riverside County Sheriffs Department should distribute the DMV's fact sheet and applicable municipal city codes to all officers

As previously noted, to support the development of golf cart and NEV plans, streets and paths must be designated for use or prohibited access.

- Inter-jurisdictional development and publication of maps with routes for the operation of NEVs. This is needed for planning and design of streets, education, wayfinding, and enforcement purposes

6.3 Frequently Asked Questions

Q. What does the State of California require me to do to drive an NEV / LSV, and do I have to follow the same laws as a car driver?

A. An NEV / LSV driver must have registration, insurance, and driver's license. Although the legislation has established a separate class for LSVs, almost all laws applicable to motor vehicle drivers also apply to LSV drivers. A driver may not operate a vehicle under the influence of alcohol (CVC 23152)

Q. Can I modify my golf cart to achieve 25 mph like a NEV?

A. While it is not difficult to do this and many businesses are currently doing it, the California Department of Motor Vehicles (DMV) states:

> *A golf cart cannot be converted for registration as an NEV/LSV. If you modify your golf cart to go faster than 15 mph or seat more than two persons, the vehicle is considered a regular motor vehicle and must comply with Federal Motor Vehicle Standards for passenger vehicles. Failure to comply with all necessary regulations may result in a citation.*

You may register the golf cart with the DMV as a golf cart, and you may obtain any currently required city permits for operation on public pathways or streets with speed limits generally limited to 25 mph, but you will not be able to legally operate a modified golf cart on a street with a speed limit of 30 or 35 mph.

7 Evaluation and Monitoring

To meet the reporting requirements of Assembly Bill No. 61, CVAG must submit to the legislature by January 1, 2016 an NEV Plan Evaluation and Monitoring Report to the legislature, in consultation with the Department of Transportation, the Department of the California Highway Patrol, and local law enforcement agencies.

According to AB 61, the report shall describe the plan adopted, evaluate its effectiveness and impact on traffic flows and safety, and make a recommendation to the Legislature on whether to extend the sunset date or expand the authorization for NEV transportation plans statewide. Required elements include:

- A description of NEV transportation plan and its elements that have been authorized up to that time.
- An evaluation of the effectiveness of the NEV transportation plans, including their impact on traffic flows and safety.
- A recommendation as to whether AB61 sunset date should be extended and if the authorization for NEV transportation plans should be expanded statewide.

In 2011 the City of Lincoln and Rocklin prepared an NEV Plan Evaluation for the California Legislature to meet the requirements of AB 2963. The Lincoln evaluation requirements are equivalent to those in AB 61, and as such offers a model for CVAG to follow in preparation and execution of their own Evaluation and Monitoring Report. It is recommended that the CVAG report evaluate the same categories included in the Lincoln/Rocklin report plus additional measures not previously evaluated. The recommended evaluation categories for CVAG are:

Traffic Engineering Speed Study

Histograms of operating speed frequency for both motor vehicles and NEVs on Class II and Class III facilities.

Incident and Traffic Violation Databases

Inquiry and analysis of NEV-involved traffic collision or violations from local law enforcement agencies and the California Highway Patrol.

Surveys

Surveys of travelers of all modes, to understand the perception of NEV use safety and NEV facility design. Survey results can be evaluated separately by mode to understand differences in perception between motorist, NEV operators and bicyclists. A copy of the full survey used by the City of Lincoln is available in Appendix C of the City of Lincoln NEV Transportation Plan Evaluation report.

Energy and Air Quality Impacts

A detailed travel survey can form the bases of an analysis of air quality and energy benefits of current and future NEV use.

Evaluation of Signs, Striping and Pavement Markings

To understand comprehension and compliance with NEV specific traffic control devices, methods such as surveys or an analysis of operation should evaluate the effectiveness of non-standard signs and markings. This evaluation may be necessary as part of an experimentation process with the MUTCD.

Education Campaign

Experience in other cities indicates that there may be some confusion about compatibility between NEV and golf cart facilities. It is important to educate users about the limitations and capability differences between the two vehicle types. A NEV Brochure/Route Map would help educate the public about where NEVs can be legally and comfortably operated, and help explain the difference of NEVs and golf carts. The brochure can include safety tips for NEV operators and answer frequently asked questions about using the network.

8 References

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

- AASHTO, Roadside Design Guide, 2002.
- U.S. Department of Transportation (USDOT), Federal Highway Administration (FHWA), Manual of Uniform Traffic Control Devices (MUTCD), 2009.
- Caltrans, California Manual on Uniform Traffic Control Devices, 2012.
- USDOT, FHWA, Conflicts on Multiple-Use Trails: Synthesis of the Literature and State of the Practice, 1994.
- Caltrans, Highway Design Manual, 2014
- Institute of Transportation Engineers (ITE), Design and Safety of Pedestrian Facilities, 1997.
- National Association of City Transportation Officials (NACTO), Urban Bikeway Design Guide, 2nd Ed, 2012.
- Assembly Bill No. 61. Chapter 170. 2011-2012. Section 571.500 of Title 49 of the Code of Federal Regulations
- Coachella Valley Area Governments (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

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.

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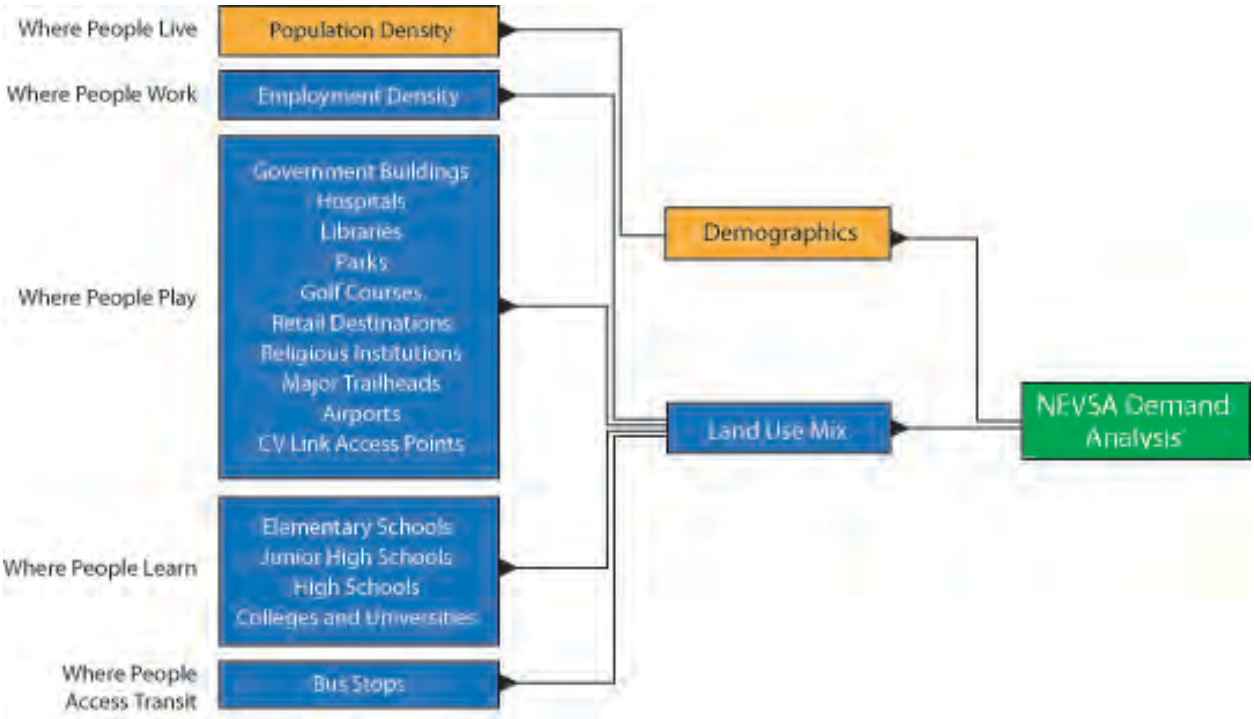
Appendix A: NEVSA Features

Summary of Total Possible Scores

- Where People Live – 20%
- Where People Work – 20%
- Where People Play – 30%
- Where People Learn – 20%
- Where People Access Transit – 10%

NEVSA Inputs



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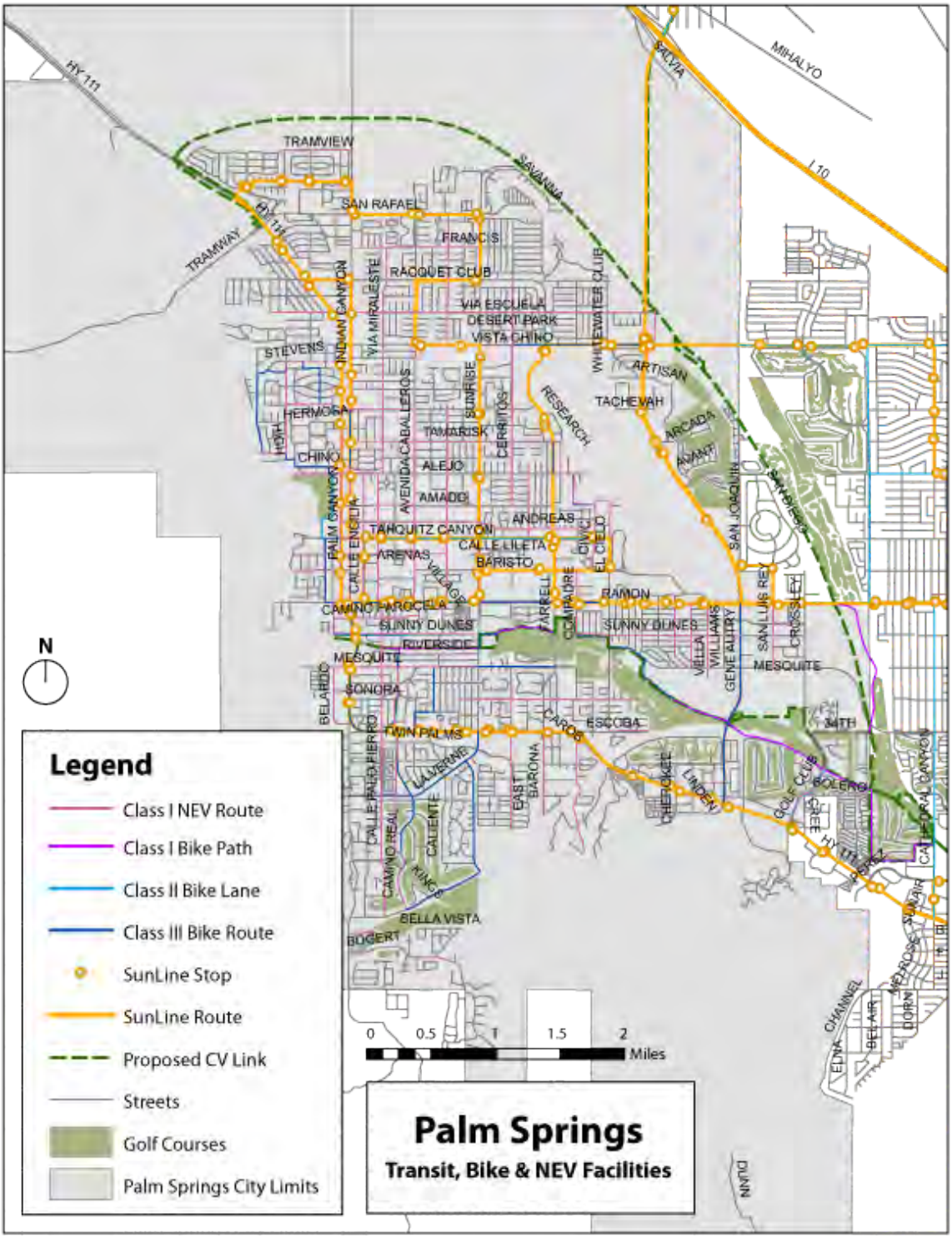
Appendix B. Existing Transit, Bike, Golf Cart and NEV Facility Maps

The following maps are based upon the:

- Published golf cart maps for each jurisdiction (where available)
- Non-Motorized Transportation Plan (NMTP)
- City staff feedback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Class I NEV Route
Class I Bike Path
Class II Bike Lane
Class III Bike Route
SunLine Stop
SunLine Route
Proposed CV Link
Streets
Golf Courses
Palm Springs City Limits
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FRANCIS
RACQUET CLUB
VIA ESCUELA
DESERT PARK
VISTA CHINO
STEVENS
INDIAN CANYON
VIA MIRALESTE
HERMOSA
CHINO
TAMARISK
ALEJO
AMADO
ANDREAS
TAHQUITZ CANYON
CALLE ENCIDIA
ARENAS
CALLE LILETA
BARISTO
CAMINO PAROCELA
SUNNY DUNES
RIVERSIDE
MESQUITE
SONORA
TWIN PALMS
ESCOBA
BELARDO
CALLE PALO FIERRO
LAUREL
CALIENTE
CAMINO REAL
KINGS
BELLA VISTA
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EAST BARONA
PAROS
CHEROKEE
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GOLF CLUB
BOLERO
CATHEDRAL CANYON
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SAVANNA
WHITEWATER CLUB
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ARCADA
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AVENIDA CABALLEROS
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SAN PIERRO
SAN LUIS REY
CROSSLEY
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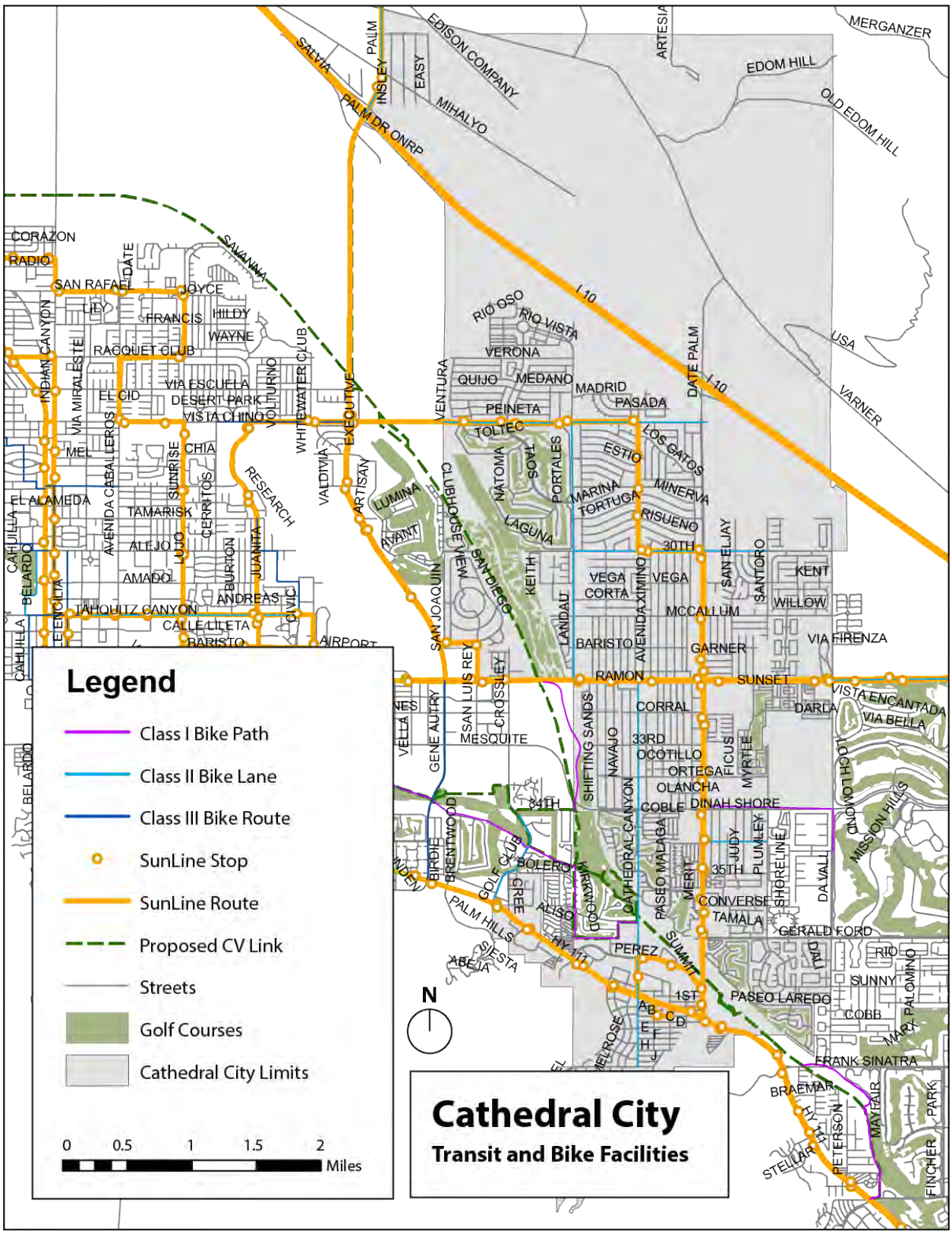
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DESERT PARK
VISTA CHINO
VOLTURNO
WHITEWATER CLUB
EXECUTIVE
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BURTON
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TAHQUITZ CANYON
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CATHEDRAL CANYON
PASEO MALAGA
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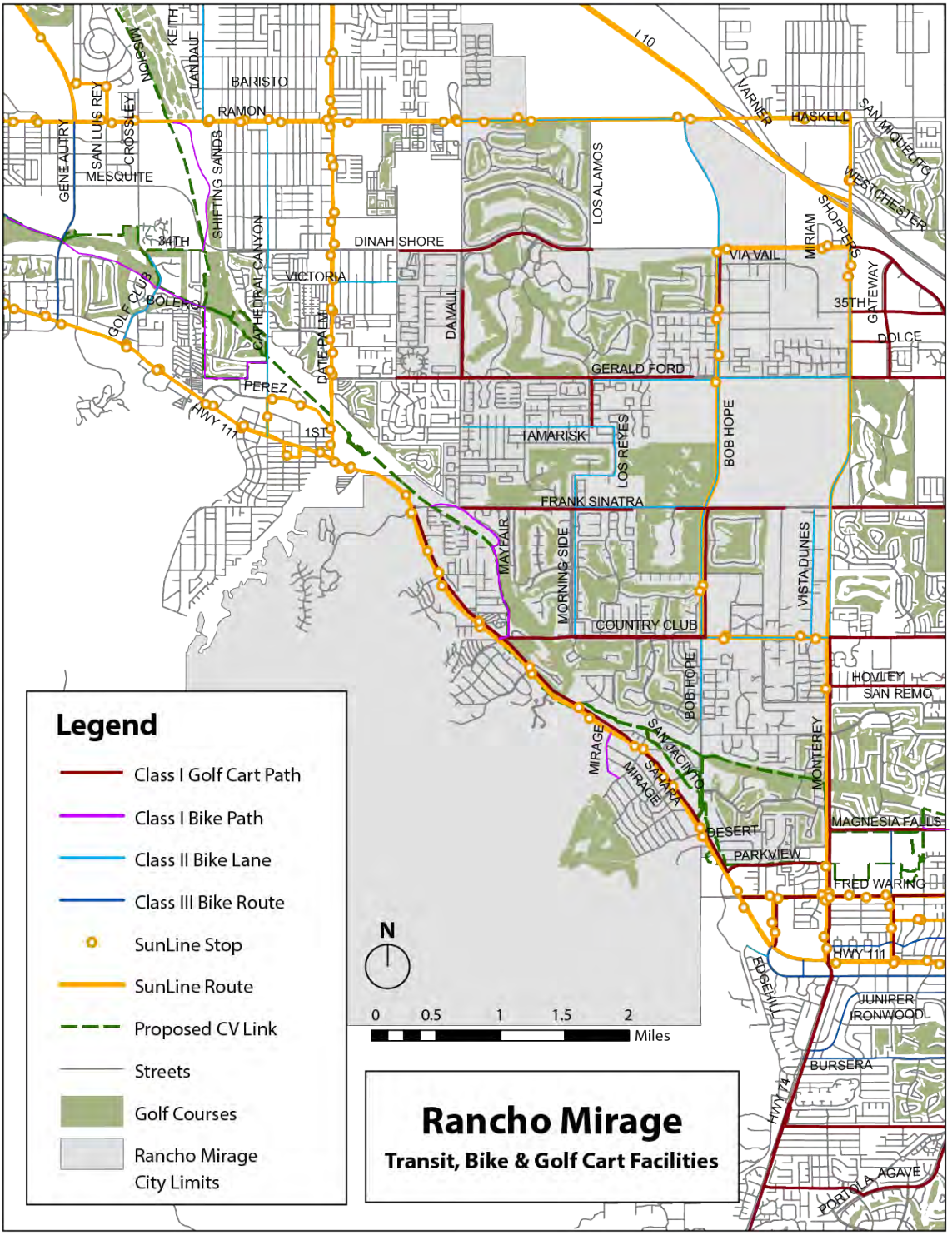
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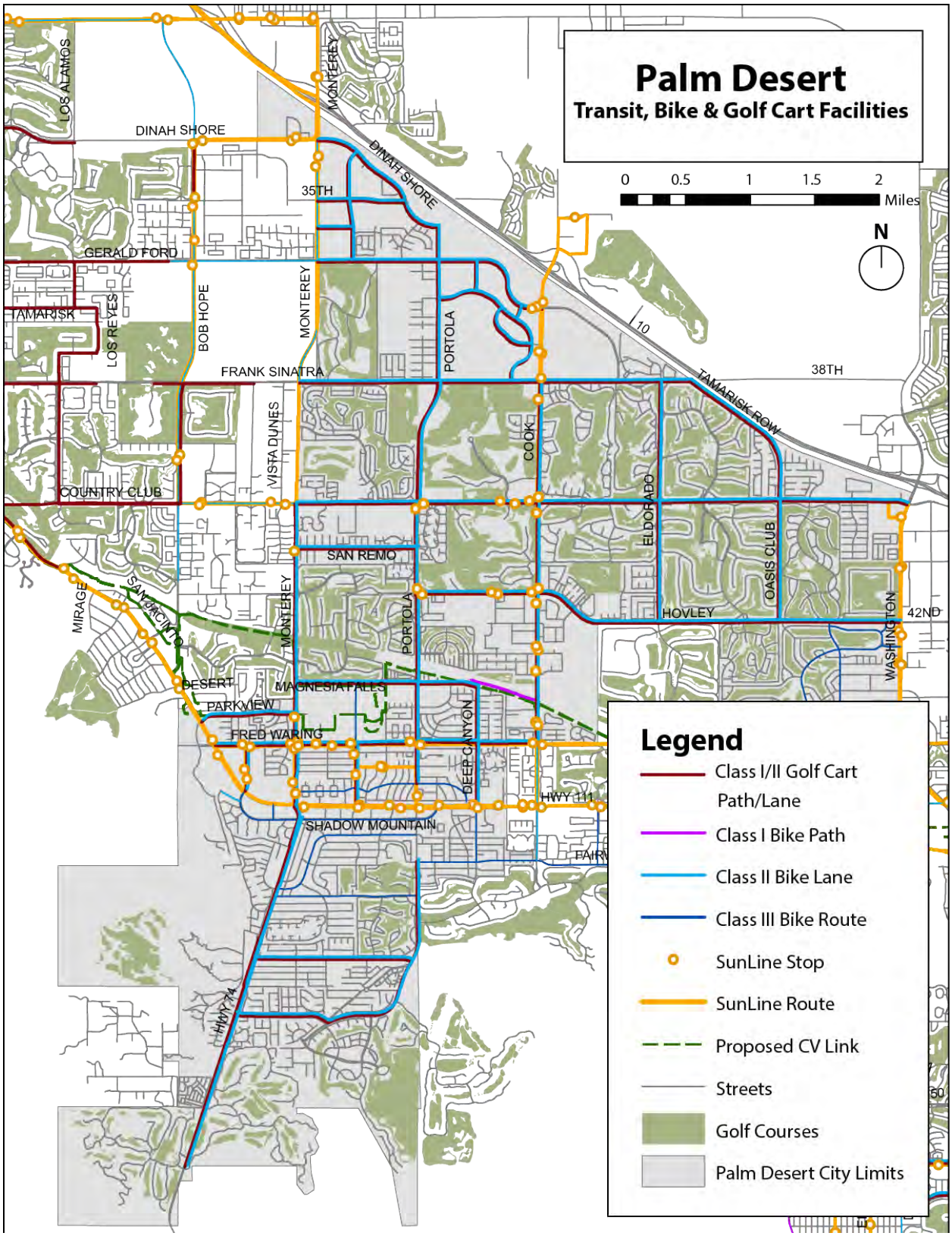
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Class III Bike Route
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Proposed CV Link
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Golf Courses
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LOS REYES
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COOK
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TAMARISK ROW
VISTA DUNES
COUNTRY CLUB
ELDORADO
OASIS CLUB
SAN REMO
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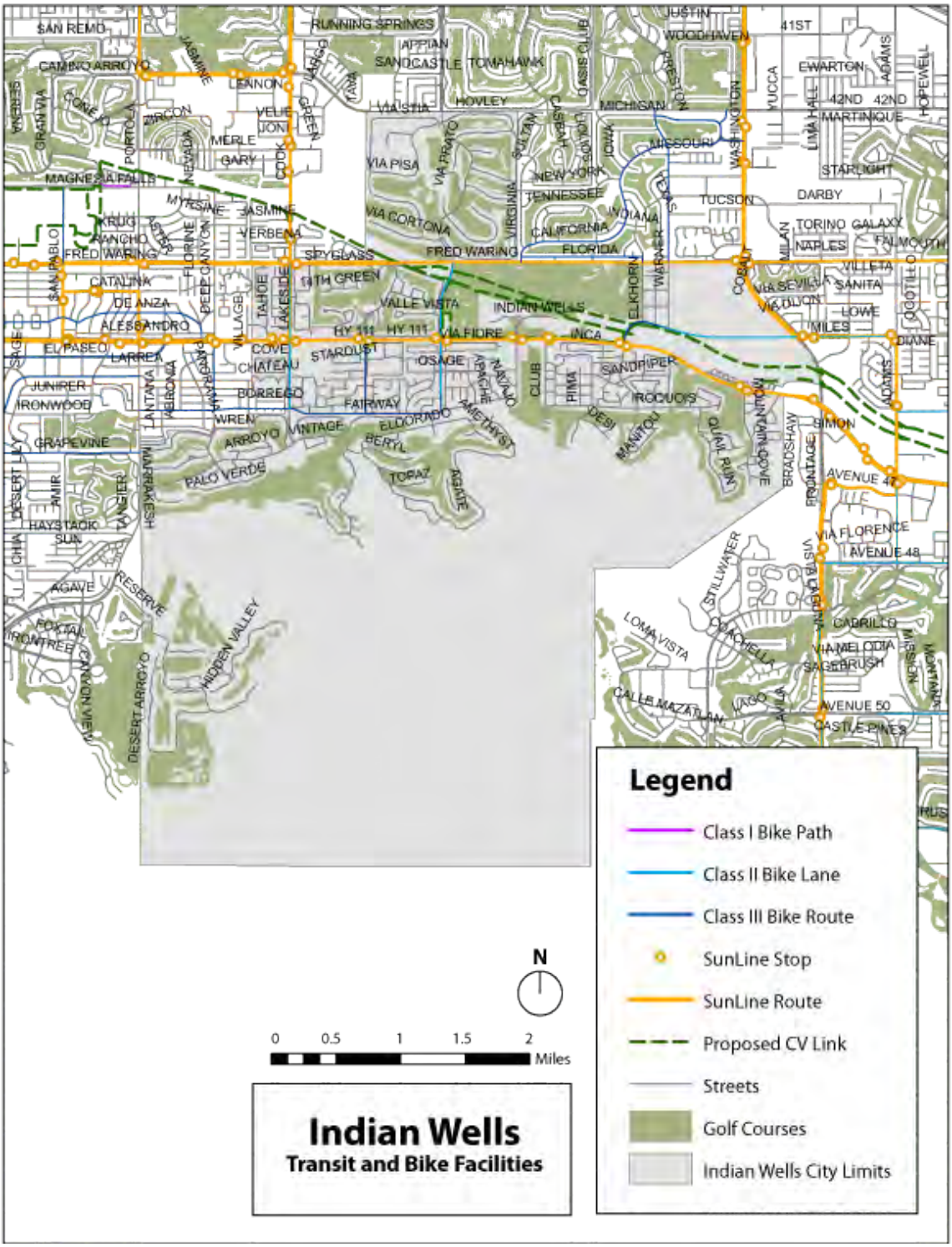
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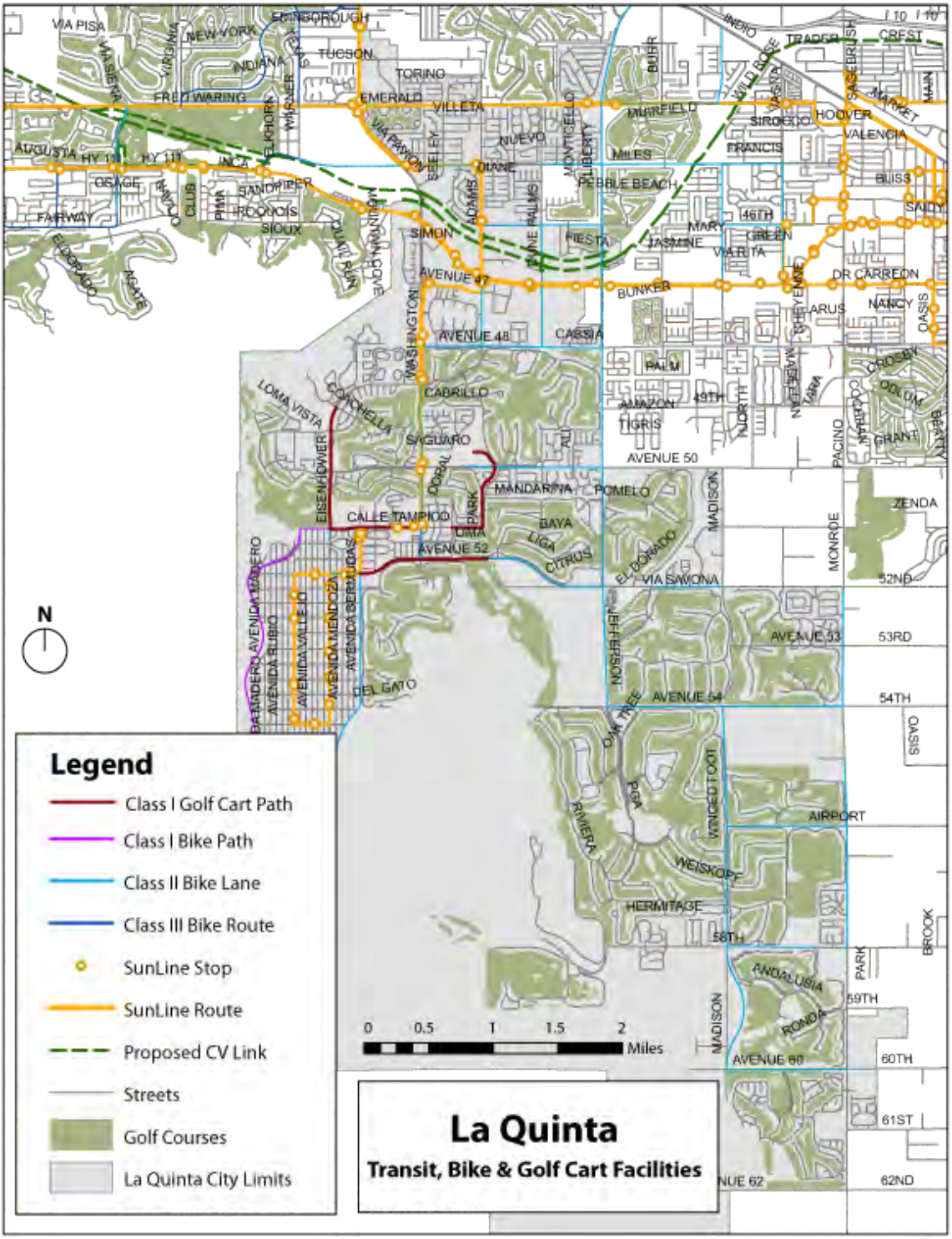
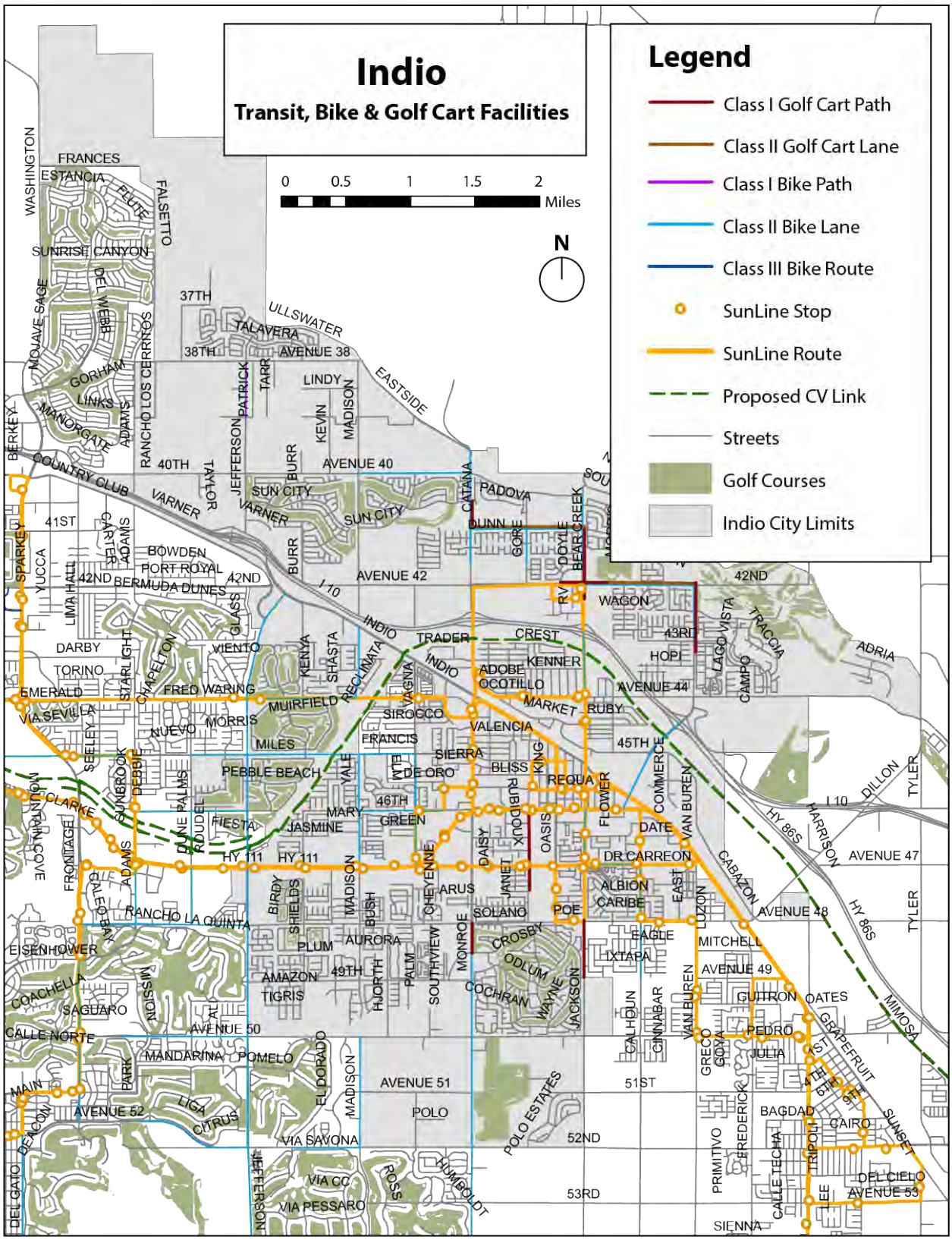
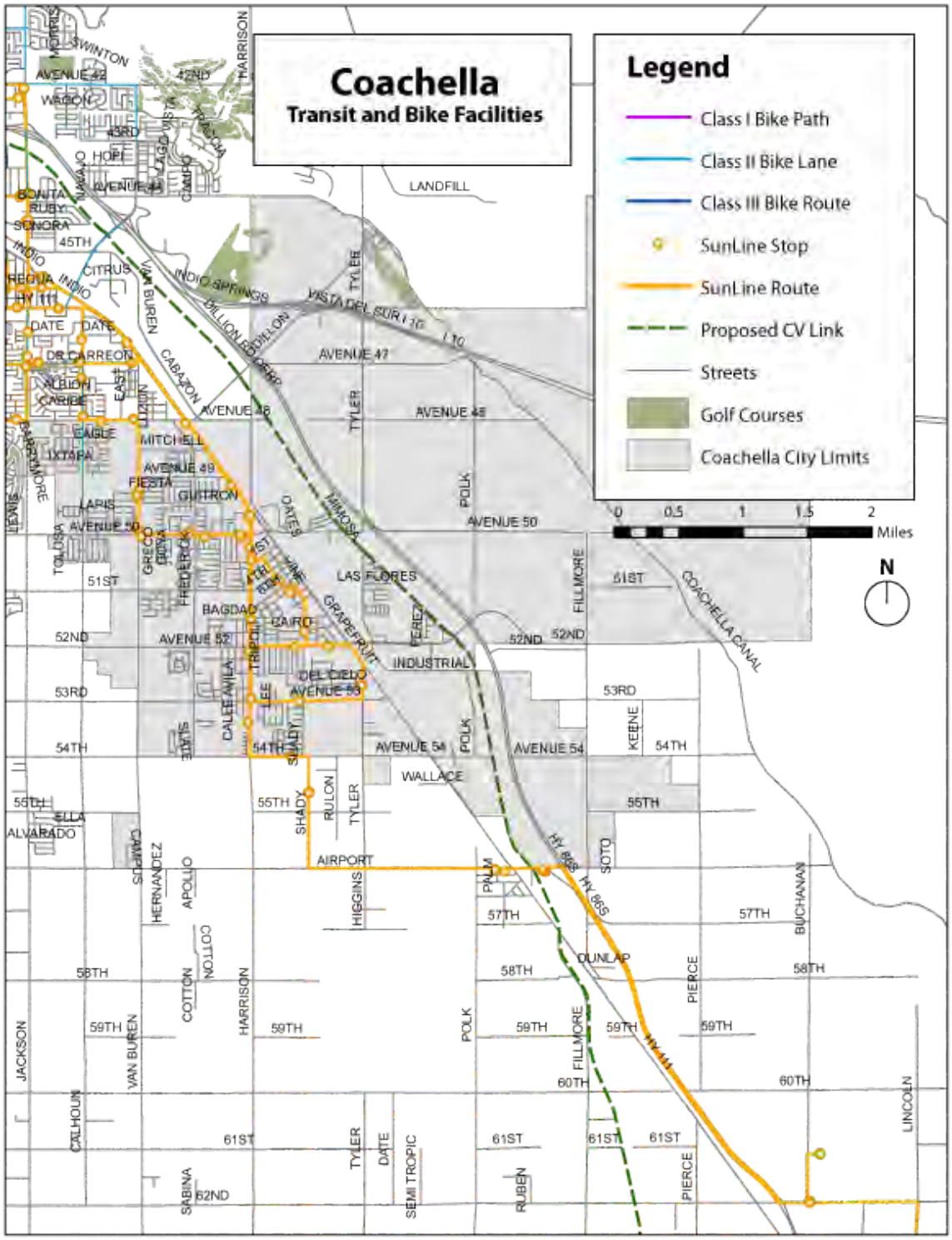
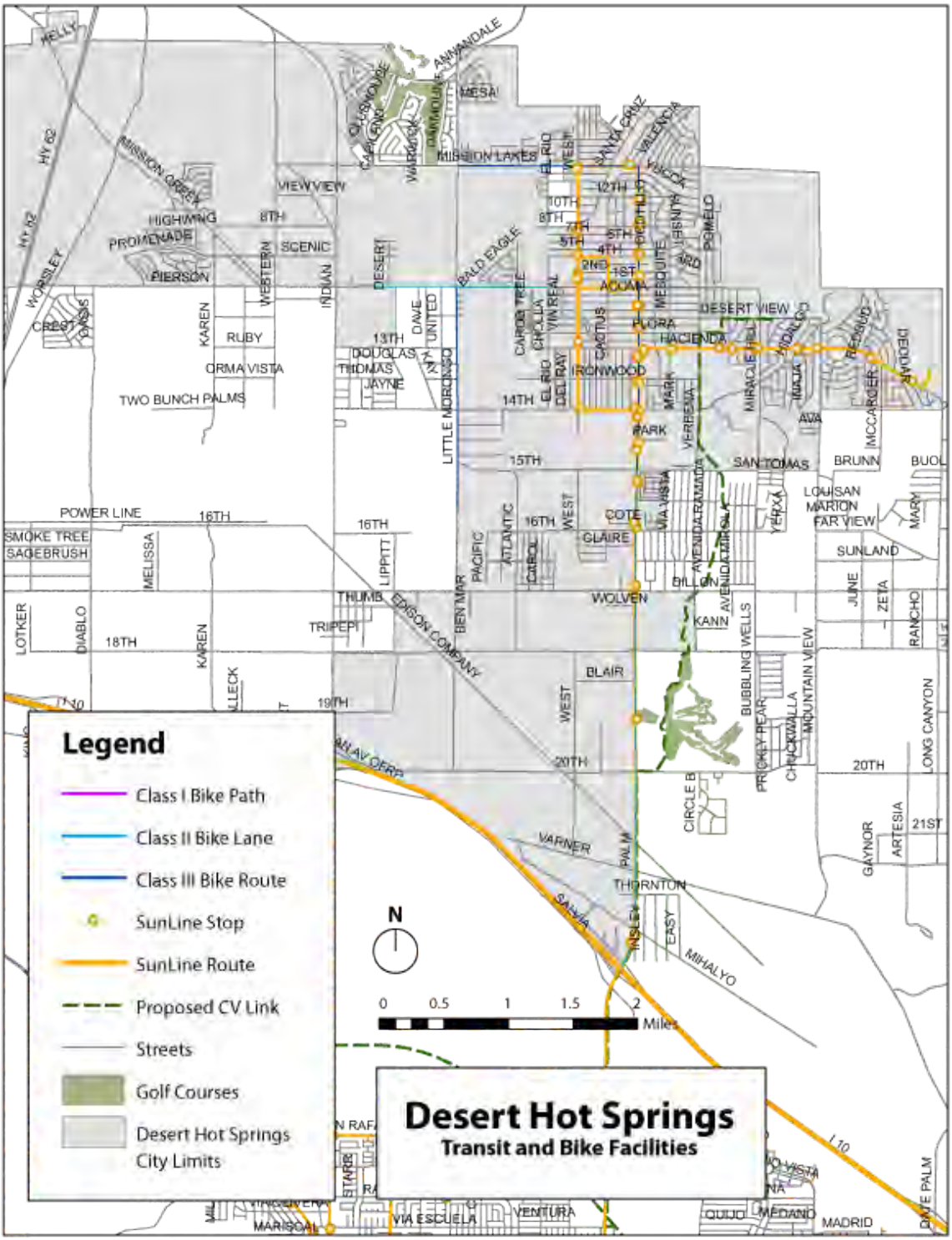

Legend
Class I Golf Cart Path
Class I Bike Path
Class II Bike Lane
Class III Bike Route
SunLine Stop
SunLine Route
Proposed CV Link
Streets
Golf Courses
La Quinta City Limits
0 0.5 1 1.5 2 Miles
N
La Quinta
Transit, Bike & Golf Cart Facilities
AVENUE 47
AVENUE 48
AVENUE 50
AVENUE 52
AVENUE 53
AVENUE 54
AVENUE 60
AVENUE 62
EISENHOWER
WASHINGTON
JEFFERSON
MADISON
MONROE
PACINO
WINGED FOOT
PGA
RIVERA
WEISKOPF
HERMITAGE
ANDALUSIA
RONDA
AIRPORT
OAK TREE
DOLORA
PARK
DEL GATO
CALLE TAMPICO
CABRILLO
SAGUARO
MANDARINA
POMELO
BAYA
LIMA
LIGA
CITRUS
EL DORADO
VIA SAWONA
COACHELLA
LOMA VISTA
AVENIDA BANDERO
AVENIDA VALLEJO
AVENIDA MENDOZA
AVENIDA SERRANO
AVENIDA BUBIO
TIGRIS
AMAZON
PALM
CASSIA
BUNKER
FIESTA
SIMON
JASMINE
MARY
GREEN
VIA RITA
DR CARREON
NANCY
OASIS
ZENDA
52ND
53RD
54TH
58TH
59TH
60TH
61ST
62ND
BRIDGE
BRIDGE
BRIDGE

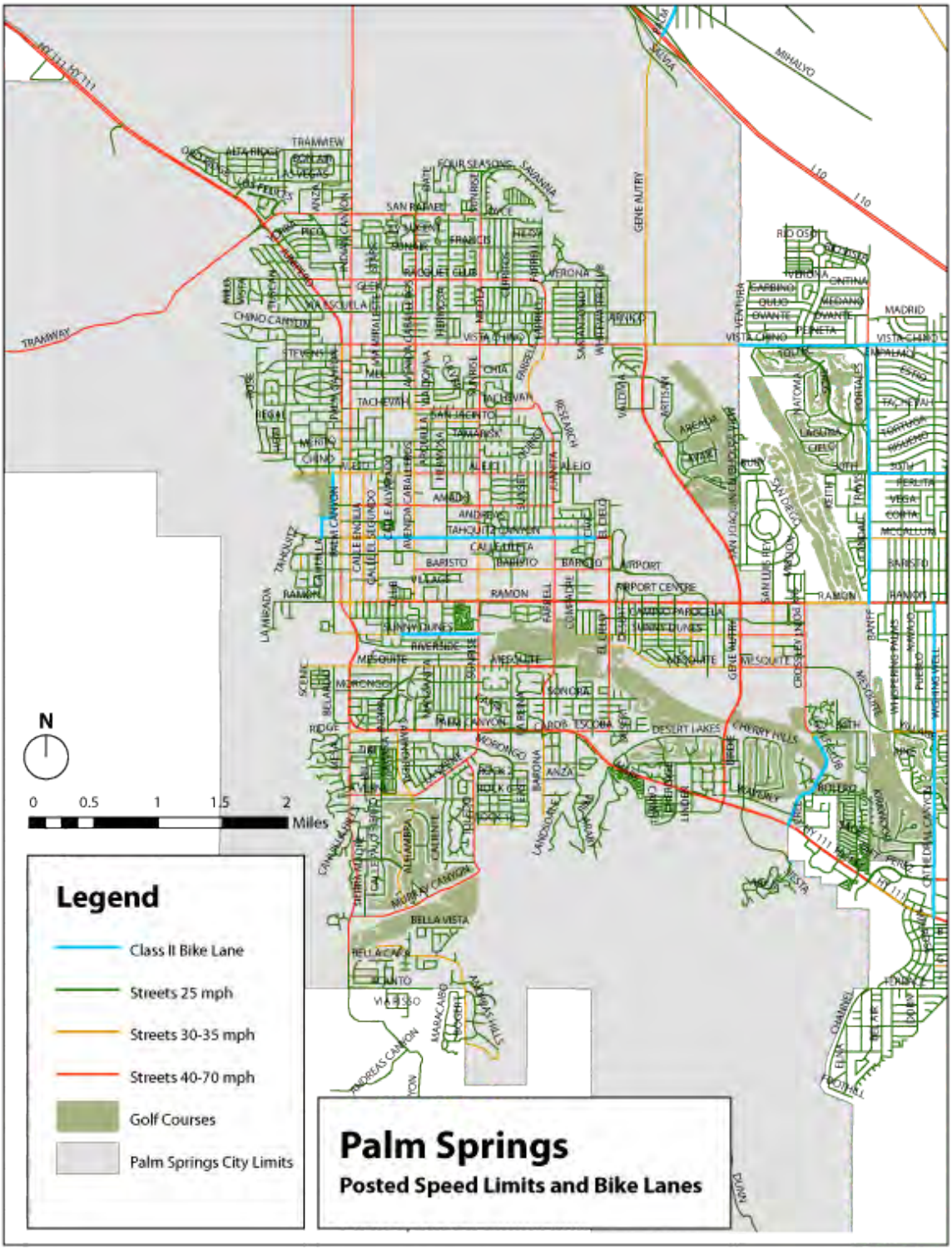

Indio
Transit, Bike & Golf Cart Facilities
Legend
Class I Golf Cart Path
Class II Golf Cart Lane
Class I Bike Path
Class II Bike Lane
Class III Bike Route
SunLine Stop
SunLine Route
Proposed CV Link
Streets
Golf Courses
Indio City Limits
0 0.5 1 1.5 2 Miles
N
WASHINGTON
FRANCES
ESTANCIA
FLUTE
FALSETTO
SUNRISE CANYON
DEL WEBB
MOJAVE SAGE
GORHAM
LINKS
MANORGATE
BERKEY
COUNTRY CLUB
RANCHO LOS CERRITOS
ADAMS
37TH
38TH
TALAVERA
ULLSWATER
AVENUE 38
EASTSIDE
LINDY
PATRICK
TARR
KEVIN
MADISON
JEFFERSON
TAYLOR
BURR
40TH
AVENUE 40
VARNER
SUN CITY
CATANA
PADOVA
DUNN
GORE
DOYLE
BEAR CREEK
41ST
SPARKEY
YUCCA
LIMA HALL
CARTER
BOWDEN
PORT ROYAL
42ND
BERMUDA DUNES
AVENUE 42
I 10
INDIO
WAGON
RV
43RD
HOPI
LAGO VISTA
TRACCIA
ADRIA
CAMPO
DARBY
TORINO
STARLIGHT
CHAPELTON
GLASS
VIENTO
KENYA
SHASTA
RECLIMATA
TRADER
CREST
KENNER
ADOBE
OCOTILLO
AVENUE 44
EMERALD
FRED WARING
MUIRFIELD
SIVAGNA
MARKET
RUBY
VIA SEVILLA
SEELEY
NUEVO
MORRIS
SIROCCO
VALENCIA
MILES
FRANCIS
SIERRA
45TH
COMMERCE
VAN BUREN
DILLON
TYLER
MOUNTAIN COVE
CLARKE
SUNBROOK
PEBBLE
PEBBLE BEACH
YALE
ELM
DE ORO
BLISS
KING
REQUA
FLOWER
HY 86S
HARRISON
FRONTAGE
DUNE PALMS
RUDDEL
FIESTA
MARY
JASMINE
46TH
GREEN
DAISY
RUBIDOUX
OASIS
DATE
DR CARREON
AVENUE 47
HY 111
ADAMS
DALE
BIRDY
SHIELDS
MADISON
BUSH
CHEYENNE
ARUS
JANET
ALBION
CARIBE
EAST
LUZON
CABAZON
RANCHO LA QUINTA
SOLANO
POE
AVENUE 48
EISENHOWER
PLUM
AURORA
SOUTHVIEW
MONROE
CROSBY
EAGLE
MITCHELL
IXTAPA
COACHELLA
AMAZON
49TH
HJORTH
PALM
ODLUM
WAYNE
JACKSON
AVENUE 49
TIGRIS
COCHRAN
CALHOUN
CINNABAR
GUITRON
OATES
SAGUARO
MISSION
AVENUE 50
CALLE NORTE
MANDARINA
POMELO
ELDORADO
PEDRO
GRECO
COMA
JULIA
GRAPEFRUIT
MIMOSA
MAIN
PARK
AVENUE 51
51ST
AVENUE 52
LIGA
CITRUS
POLO
POLO ESTATES
BAGDAD
FREDERICK
CAIRO
SUNSET
VIA SAVONA
52ND
PRIMITIVO
TRIPOLI
CALLE TECHA
DEL CIELO
DEL GATO
MELLENSON
VIA CC
ROSS
HUMBOLDT
VIA PESSARO
53RD
AVENUE 53
LEE
SIENNA

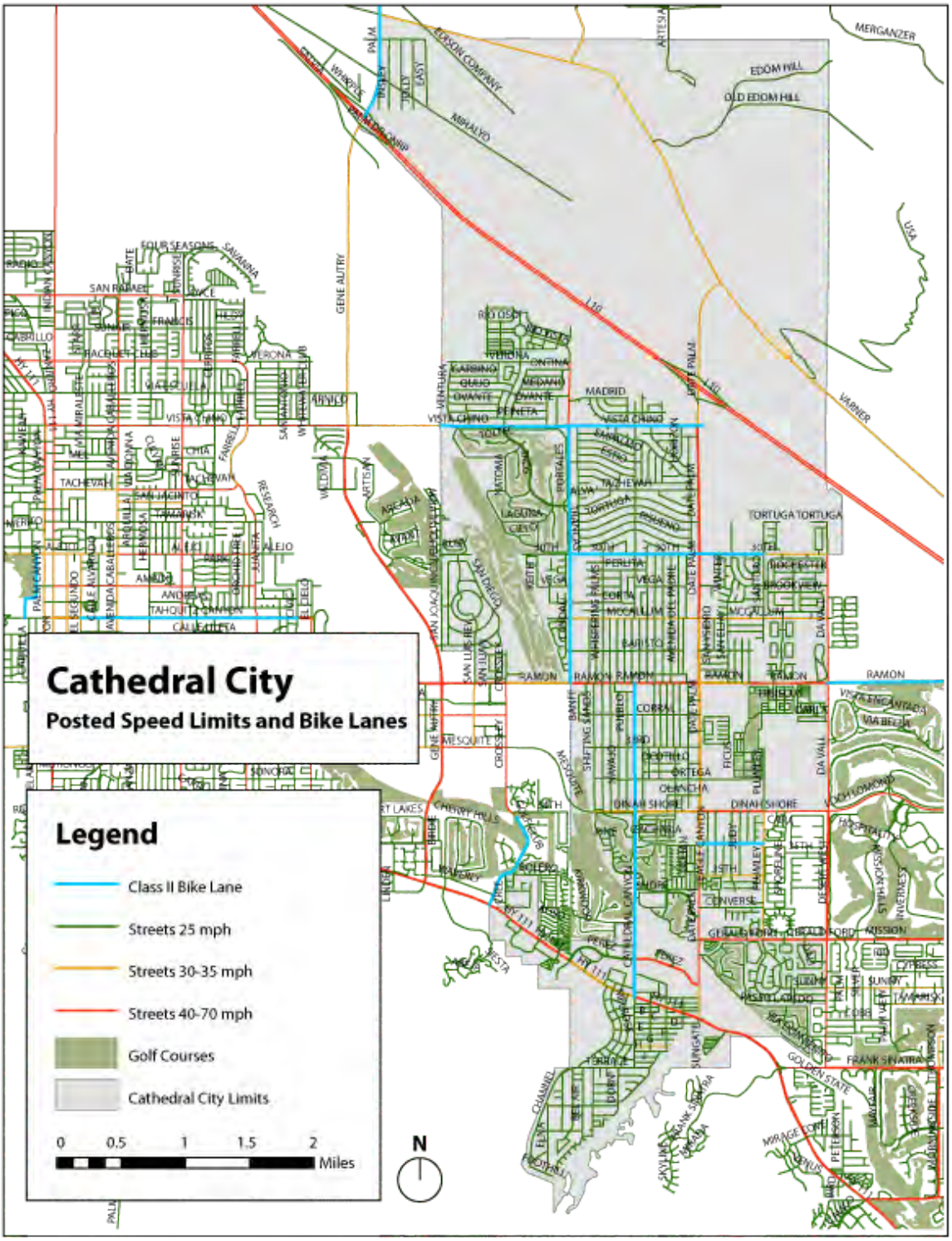

Coachella
Transit and Bike Facilities
Legend
Class I Bike Path
Class II Bike Lane
Class III Bike Route
SunLine Stop
SunLine Route
Proposed CV Link
Streets
Golf Courses
Coachella City Limits
0 0.5 1 1.5 2
Miles
N
LANDFILL
AVENUE 47
AVENUE 48
AVENUE 49
AVENUE 50
AVENUE 52
AVENUE 53
AVENUE 54
AVENUE 55
AVENUE 42
42ND
43RD
44TH
45TH
51ST
52ND
53RD
54TH
55TH
57TH
58TH
59TH
60TH
61ST
62ND
HARRISON
TYLER
POLK
FILLMORE
VAN BUREN
JACKSON
CALHOUN
COTTON
HERNANDEZ
APOLLO
HIGGINS
PALM
SOTO
BUCHANAN
PIERCE
LINCOLN
DATE
SEMI TROPIC
RUBEN
SABINA
SHADY
RULON
AIRPORT
WALLACE
DUNLAP
INDUSTRIAL
LAS FLORES
GRAPEFRUIT
BAGDAD
CAIRO
DEL CIELO
MIMOSA
OATES
FIESTA
GUITRON
MITCHELL
EAGLE
IXTAPA
LAPIS
GRECO
FREDERICK
ALVARADO
ELLA
CAMPOS
DE CARREON
ALBION
CARIBE
BONITA
RUBY
SONORA
INDIO
REGINA
CITRUS
DATE
INDIO SPRINGS
VISTA DEL SUR
BILLION
CABAZON
HY 111
HY 86S
HY 86S
HY 111
COACHELLA CANAL

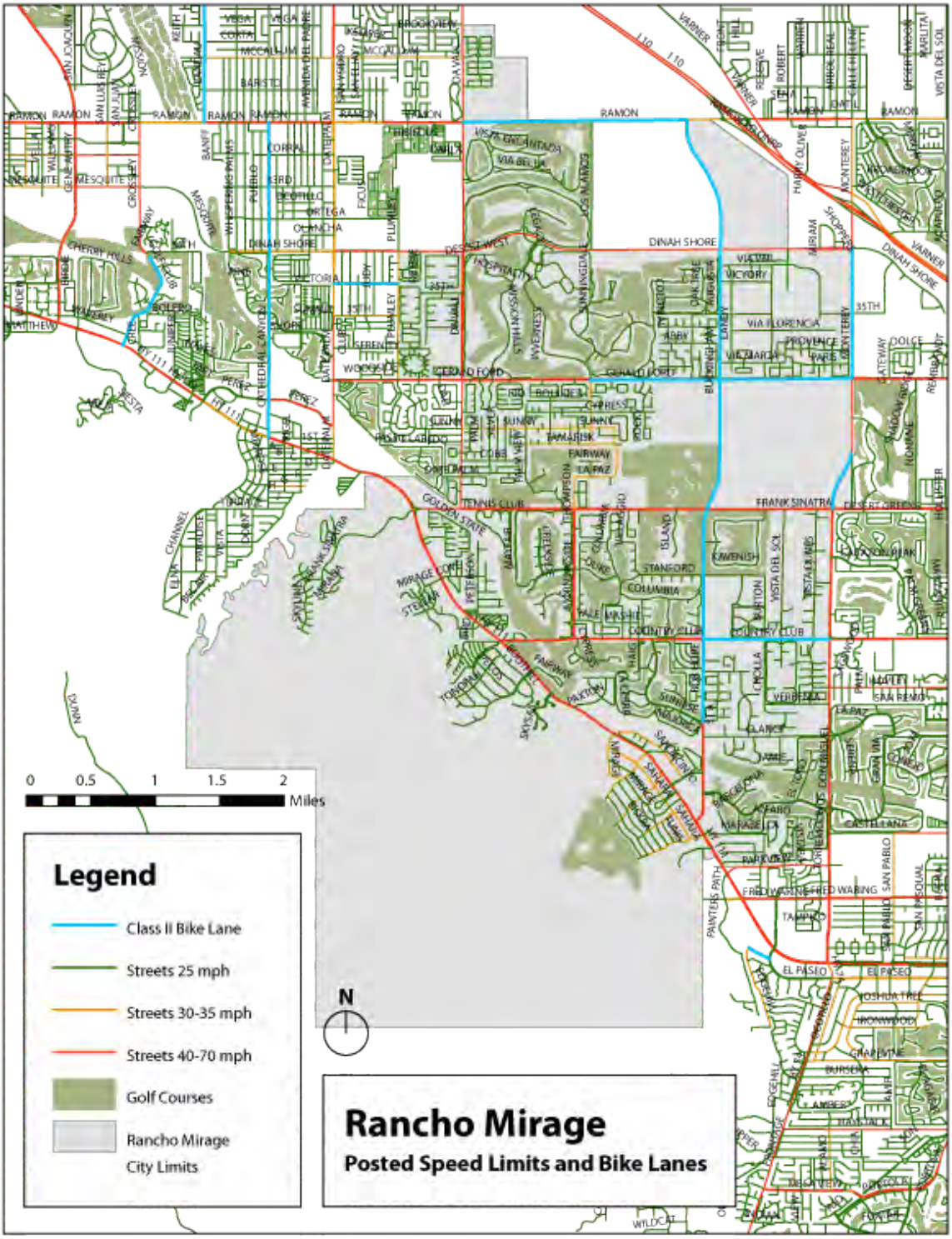

Desert Hot Springs
Transit and Bike Facilities
Legend
Class I Bike Path
Class II Bike Lane
Class III Bike Route
SunLine Stop
SunLine Route
Proposed CV Link
Streets
Golf Courses
Desert Hot Springs City Limits
N
0 0.5 1 1.5 2 Miles
MISSION LAKES
VIEWVIEW
HIGHWING
PROMENADE
PIERSON
SCENIC
WESTERN
INDIAN
DESERT
BALD EAGLE
DESERT VIEW
HACIENDA
PARK
SAN TOMAS
BRUNN
LOU SAN MARION
FAR VIEW
SUNLAND
POWER LINE
SMOKE TREE
SAGEBRUSH
MELISSA
LOTKER
DIABLO
KAREN
RUBY
ORMA VISTA
TWO BUNCH PALMS
DOUGLAS
THOMAS
JAYNE
LITTLE MORONGO
IRONWOOD
COTE
GLAIRE
WOLVEN
BLAIR
THORNTON
VARNER
MIHALYO
EDISON COMPANY
BUBBLING WELLS
MOUNTAIN VIEW
LONG CANYON
GAYNOR
ARTESIA
21ST
20TH
19TH
18TH
16TH
15TH
14TH
13TH
12TH
10TH
8TH
7TH
5TH
4TH
2ND
1ST
VIA ESCUELA
VENTURA
MARISCAL
MADRID
DATE PALM
I 10
HY 62

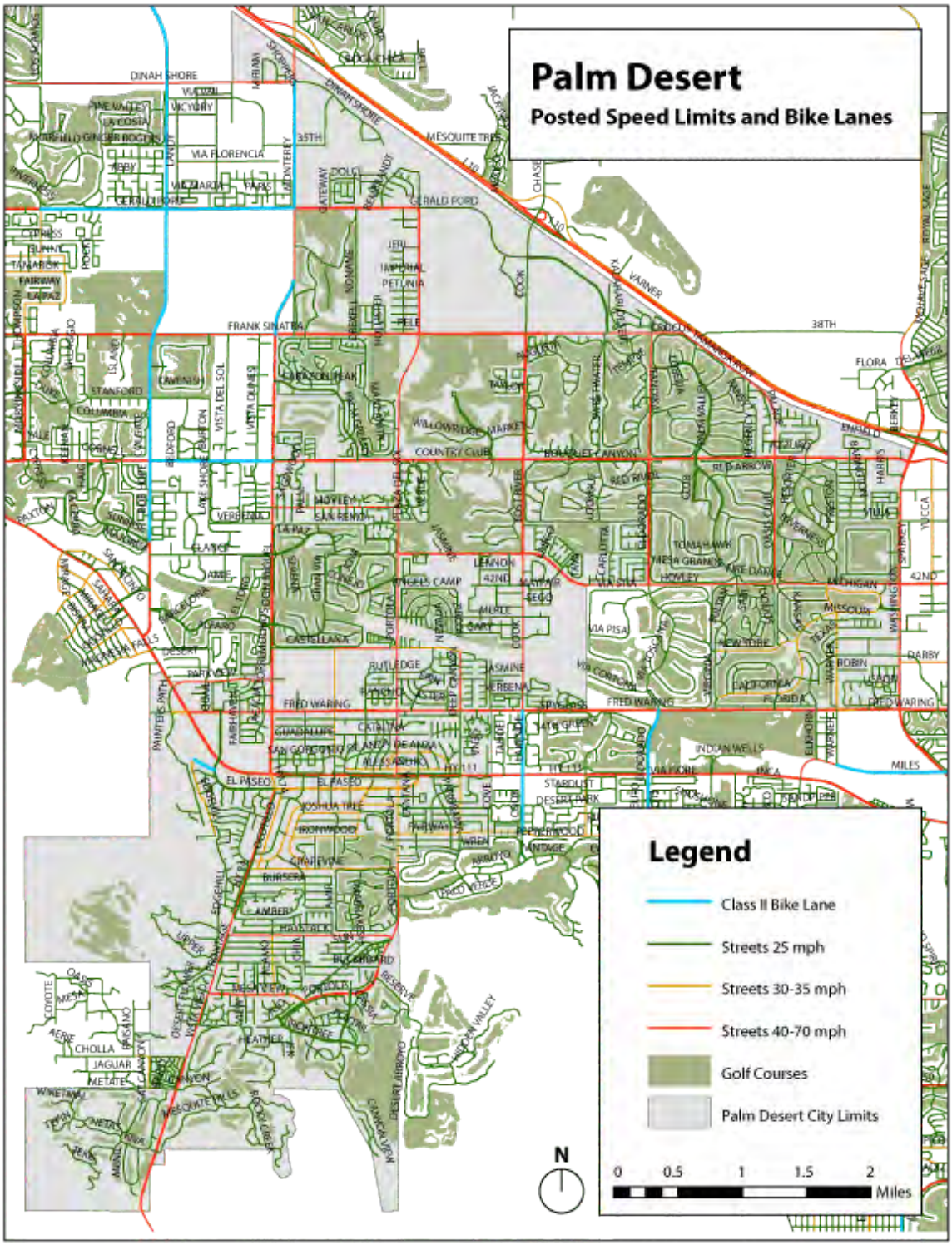
Appendix C. Roadway Speed Limit Maps

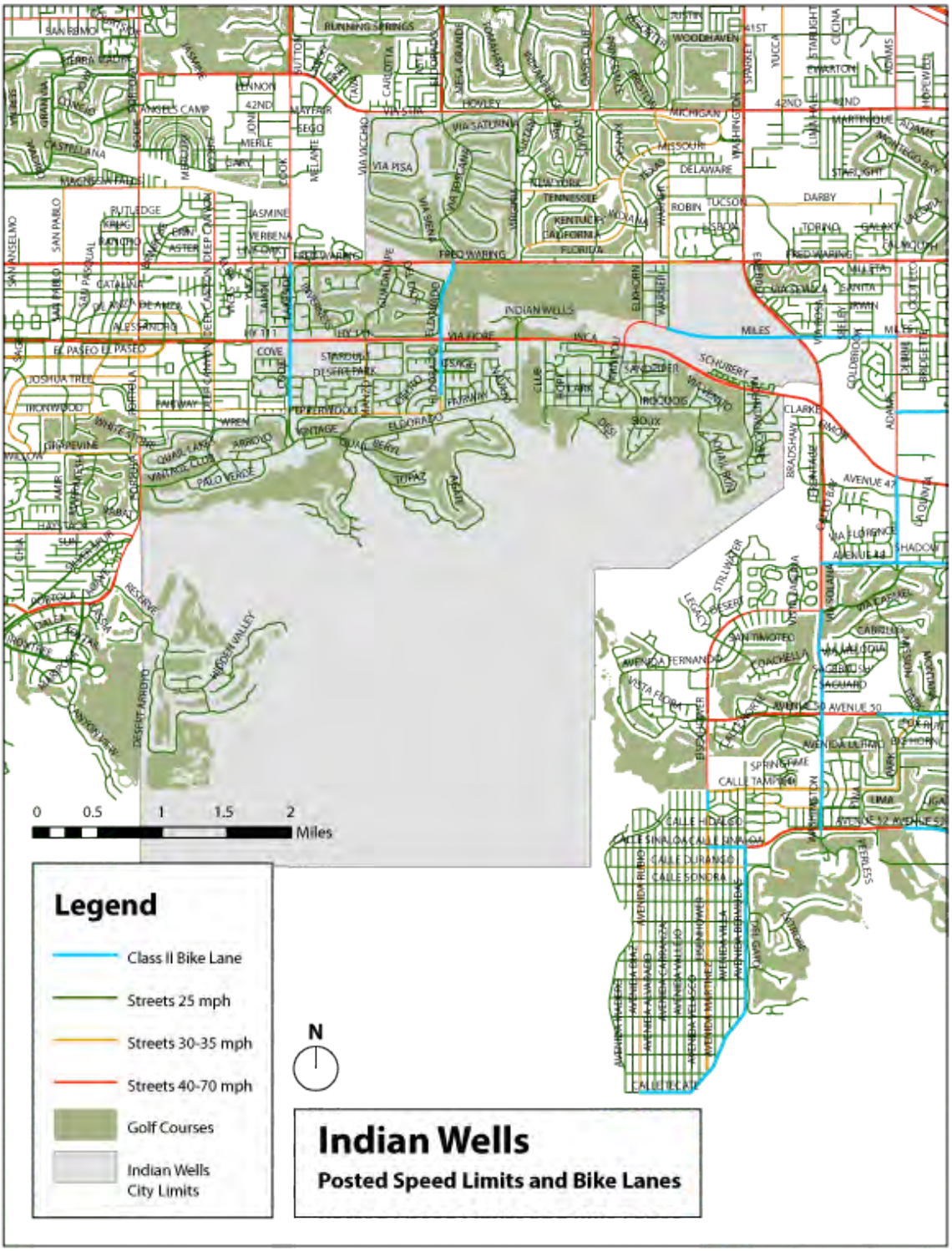
The following maps are based upon data collected from CVAG, jurisdictions that supplied data, and inspection of posted speed limit signage as found via street-view imagery available online in 2014. This data was used in the development of the network maps, as NEVs are only permitted to share a general travel lane if the speed limit is 35mph or less.

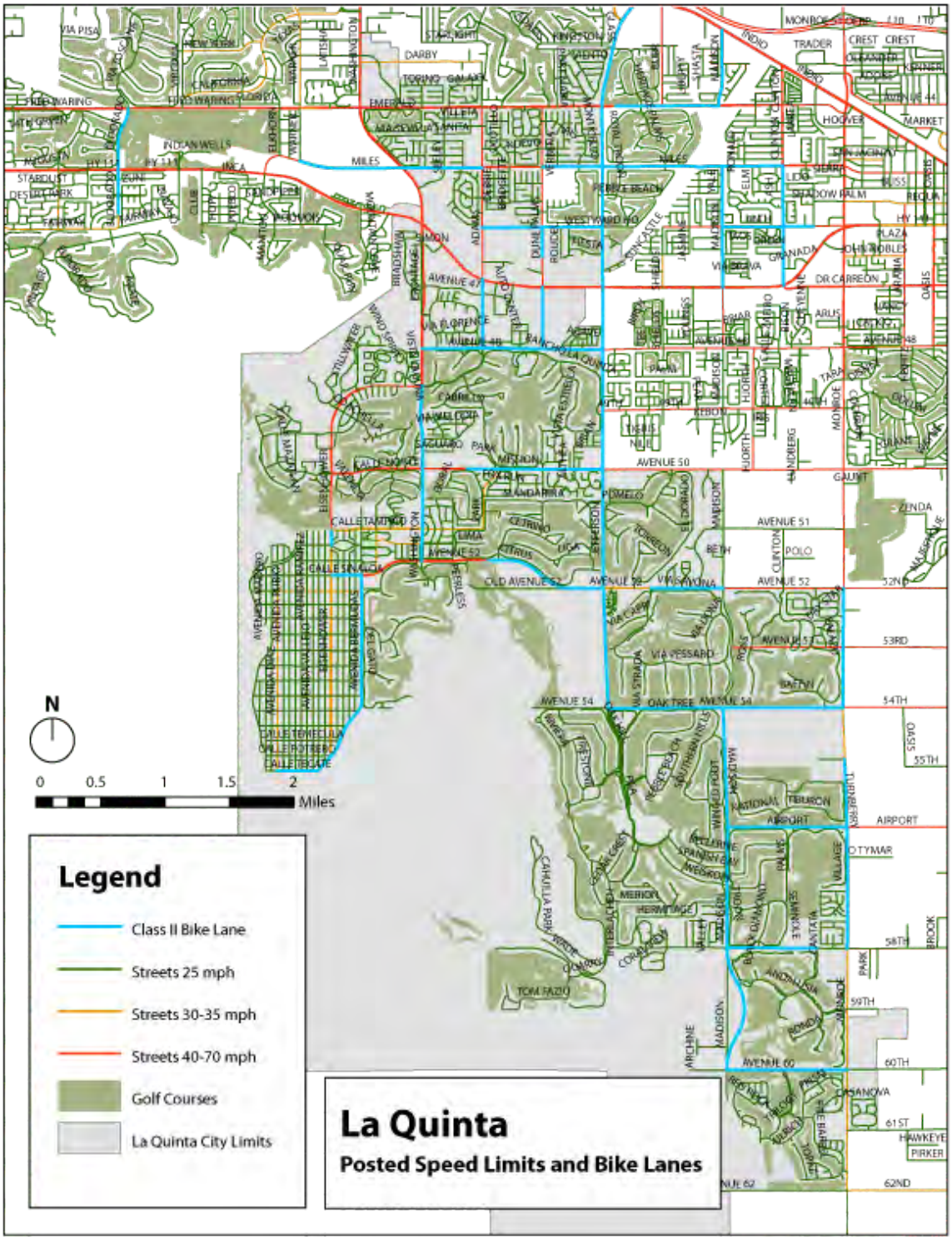

Palm Springs
Posted Speed Limits and Bike Lanes
Legend
Class II Bike Lane
Streets 25 mph
Streets 30-35 mph
Streets 40-70 mph
Golf Courses
Palm Springs City Limits
N
0
0.5
1
1.5
2
Miles

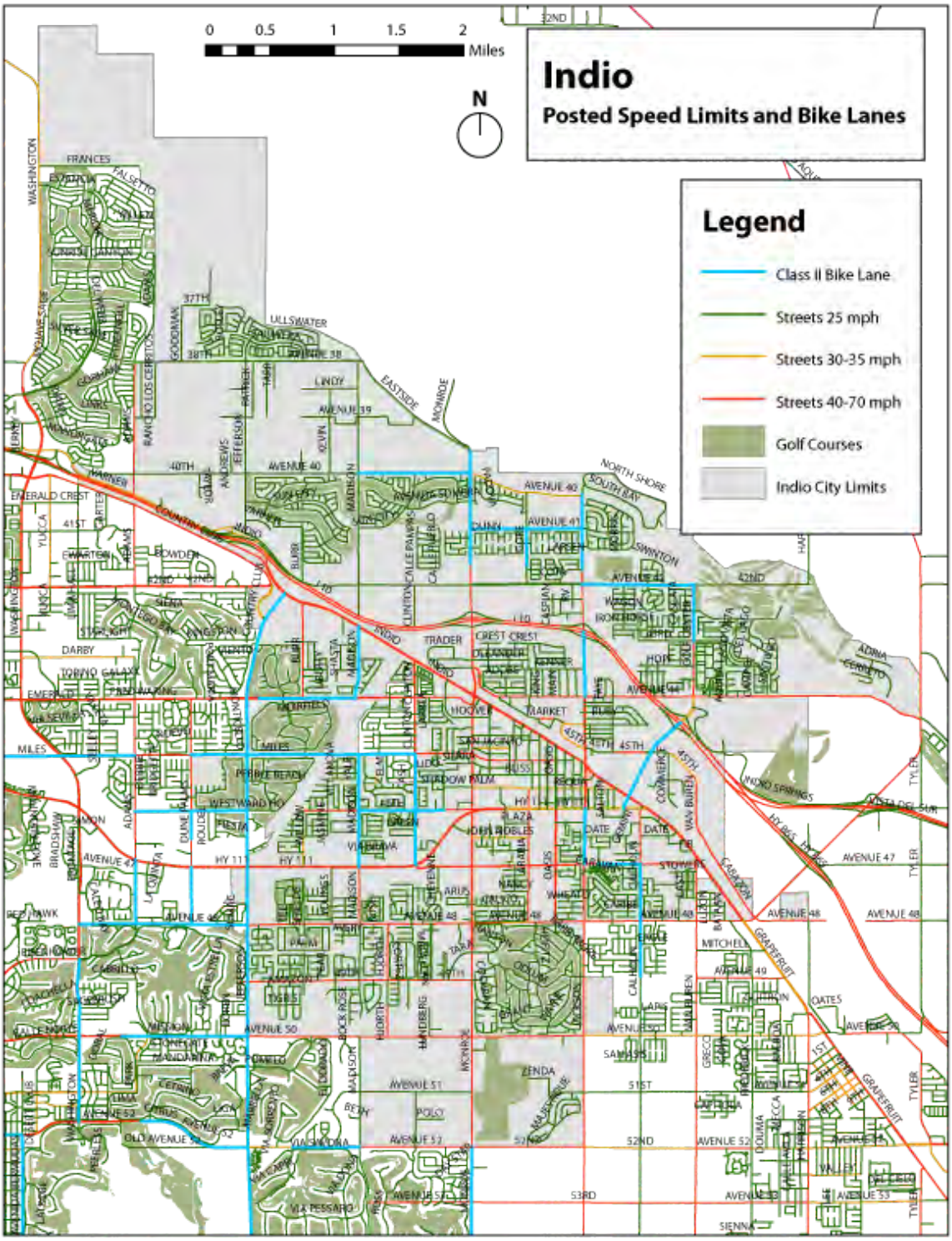

Cathedral City
Posted Speed Limits and Bike Lanes
Legend
Class II Bike Lane
Streets 25 mph
Streets 30-35 mph
Streets 40-70 mph
Golf Courses
Cathedral City Limits
0
0.5
1
1.5
2
Miles
N

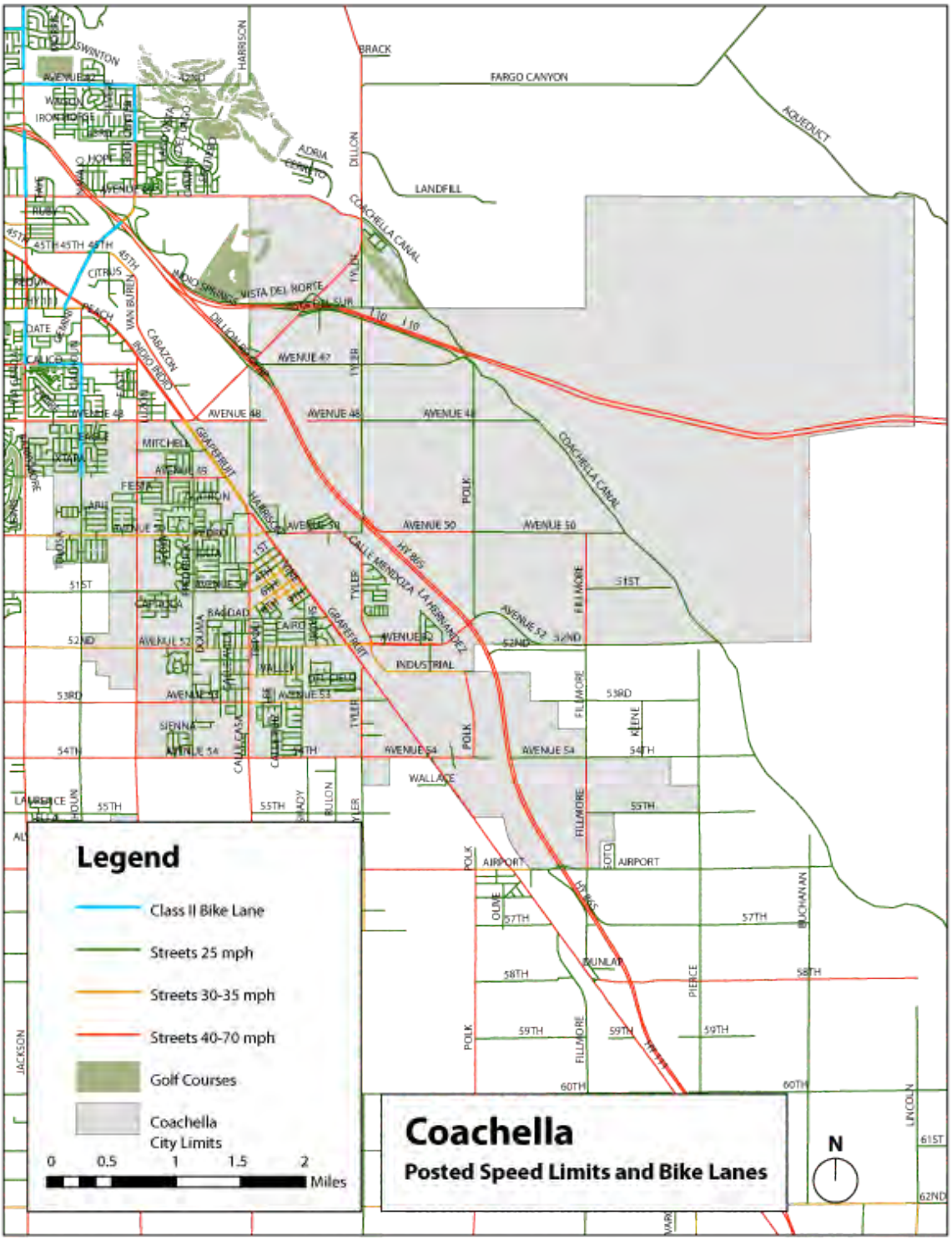

Legend
Class II Bike Lane
Streets 25 mph
Streets 30-35 mph
Streets 40-70 mph
Golf Courses
Rancho Mirage City Limits
0 0.5 1 1.5 2 Miles
N
Rancho Mirage
Posted Speed Limits and Bike Lanes


Palm Desert
Posted Speed Limits and Bike Lanes
Legend
Class II Bike Lane
Streets 25 mph
Streets 30-35 mph
Streets 40-70 mph
Golf Courses
Palm Desert City Limits
N
0
0.5
1
1.5
2
Miles


Indian Wells
Posted Speed Limits and Bike Lanes
Legend
Class II Bike Lane
Streets 25 mph
Streets 30-35 mph
Streets 40-70 mph
Golf Courses
Indian Wells City Limits
N
0 0.5 1 1.5 2
Miles


N
0
0.5
1
1.5
2
Miles
Legend
Class II Bike Lane
Streets 25 mph
Streets 30-35 mph
Streets 40-70 mph
Golf Courses
La Quinta City Limits
La Quinta
Posted Speed Limits and Bike Lanes


Indio
Posted Speed Limits and Bike Lanes
0 0.5 1 1.5 2 Miles
N
Legend
Class II Bike Lane
Streets 25 mph
Streets 30-35 mph
Streets 40-70 mph
Golf Courses
Indio City Limits


Legend
Class II Bike Lane
Streets 25 mph
Streets 30-35 mph
Streets 40-70 mph
Golf Courses
Coachella City Limits
0 0.5 1 1.5 2 Miles
Coachella
Posted Speed Limits and Bike Lanes
N
FARGO CANYON
AQUEDUCT
LANDFILL
COACHELLA CANAL
VISTA DEL NORTE
AVENUE 47
AVENUE 48
AVENUE 50
AVENUE 52
AVENUE 53
AVENUE 54
INDUSTRIAL
WALLACE
AIRPORT
DUNLAP
HARRISON
DILLON
TYLER
POLK
FILLMORE
PIERCE
BUCHANAN
LINCOLN
JACKSON
BRACK
CITRUS
MITCHELL
FESTIVAL
CALLE MENDOZA
LA HERMANITA
GRAPEFRUIT
CABAZON
BROADWAY
SIENNA
CAIRO
RAILROAD
VALLEY
45TH
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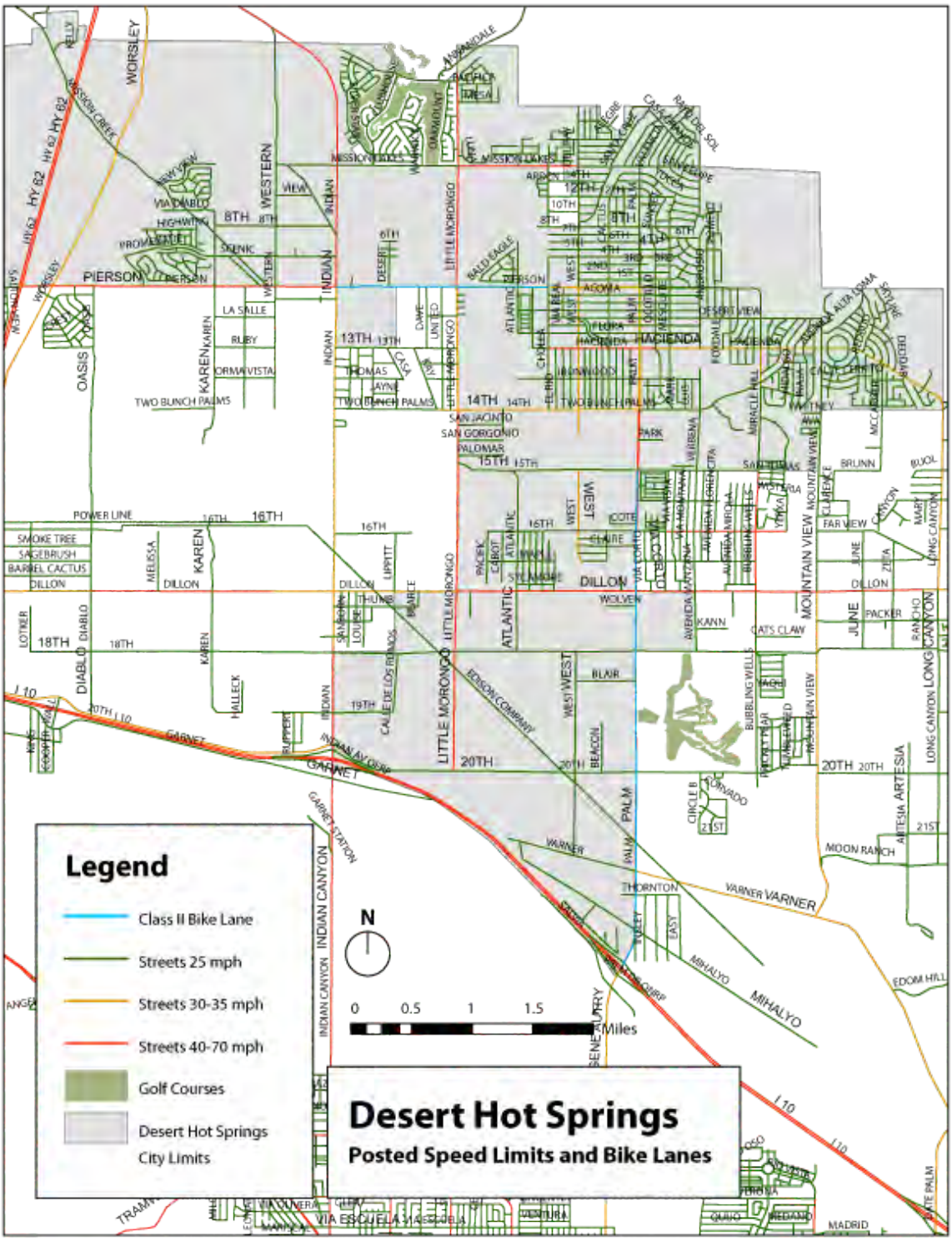
60TH
61ST
62ND


Legend
Class II Bike Lane
Streets 25 mph
Streets 30-35 mph
Streets 40-70 mph
Golf Courses
Desert Hot Springs City Limits
N
0 0.5 1 1.5 Miles
Desert Hot Springs
Posted Speed Limits and Bike Lanes

Appendix D – Existing Golf Cart Permit Requirements and Maps

The following maps are the latest versions of any maps available on each city's website or as obtained through interviews with city staff. Traffic regulations and definitions are provided in more detail in Chapter 2 of this plan.

Indio

The City of Indio adopted a Golf Cart Transportation Plan in 2010 that sets out definitions, design and safety criteria, permits, crossings for golf clubs, and enforcement policy.

The City of Indio's definition of a golf cart is a motor vehicle that "is operated at not more than twenty-five (25) miles per hour" which conflates higher speed golf carts with federal and state certified NEVs that are street legal on roadways up to 35 mph. Furthermore, the City of Indio defines Class III routes as roadways with speed limits of 25 mph or less, while federal and state legislation permits a street legal NEV to operate on roadways with speed limits of 35 mph or less. It is likely that there are few roadways which serve as connections between Class I paths and Class II lanes posted for 25 mph or less.

Indio's plan also sets out a seven-step procedure for obtaining a permit for street operation, including the requirement to provide proof of insurance. After scheduling a police department inspection of the golf cart at the applicant's home and payment of a $50 two-year permit fee, the "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." In comparison to the requirements for operating a car on a public roadway, this procedure is more involved and may dissuade the public from adopting NEVs that are designed for street legal operation from the outset.

The city prohibits parking of golf carts in motor vehicle spaces. By federal and state legislation, an NEV is a motor vehicle, yet the similarity between golf carts and NEVs is likely to lead to confusion on whether or not an NEV operator may park in a "motor vehicle" parking space. As a golf cart or an NEV can serve the same trip purposes as a highway capable car, there is no reason from a parking demand and supply perspective for this restriction.

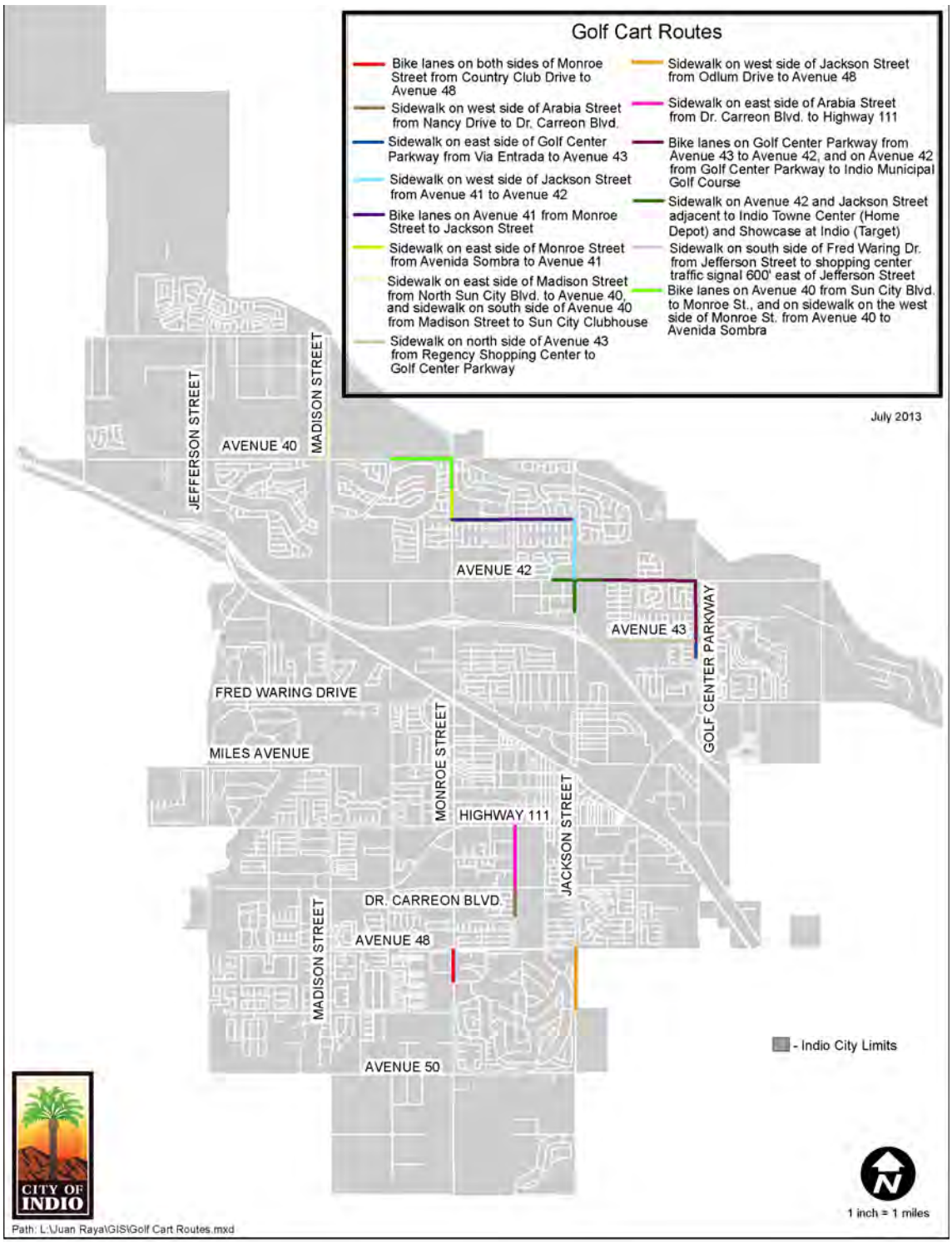


Figure 35: City of Indio Golf Cart Map

Cathedral City

City staff have advised the following (paraphrased):

> Golf carts and NEVs are currently not allowed on Cathedral City streets. Their use is illegal on public streets, and they have been cited. The City vehicle code would need to be changed in order to permit their use.

The city's municipal code: http://qcode.us/codes/cathedralcity/ does not reference golf carts or NEVs. NEVs are permitted by state legislation on public streets, although the same state legislation permits cities to pass bylaws prohibiting their use.

Cathedral City does not publish a golf cart or NEV route map online.

La Quinta

The City of La Quinta has a golf cart ordinance regulating the operation of golf carts on public streets. The city does not mention NEVs. A permit is required, but it is less costly ($20) and difficult to obtain than it is in Indio. The standards which conflict with current developments in NEV design and are likely to limit wider adoption of NEVs include the following, with commentary added in parentheses:

- Golf carts are limited to daytime operation (golf carts modified for street use and factory designed NEVs have front and rear lighting that meet USDOT standards, so there is no obvious reason for this prohibition)
- Golf carts are limited to streets with speed limits of 25 mph or less (this would need to be clarified so that vehicles meeting the LSV definition are permitted on streets with speed limits of 35 mph or less)
- Golf carts must be designed to carry golf equipment and no more than two persons including the driver (NEVs are not designed to carry golf equipment and models are available that carry up to six persons including the driver)

The city publishes a brochure that includes a map of routes by class as shown in Figure 36.

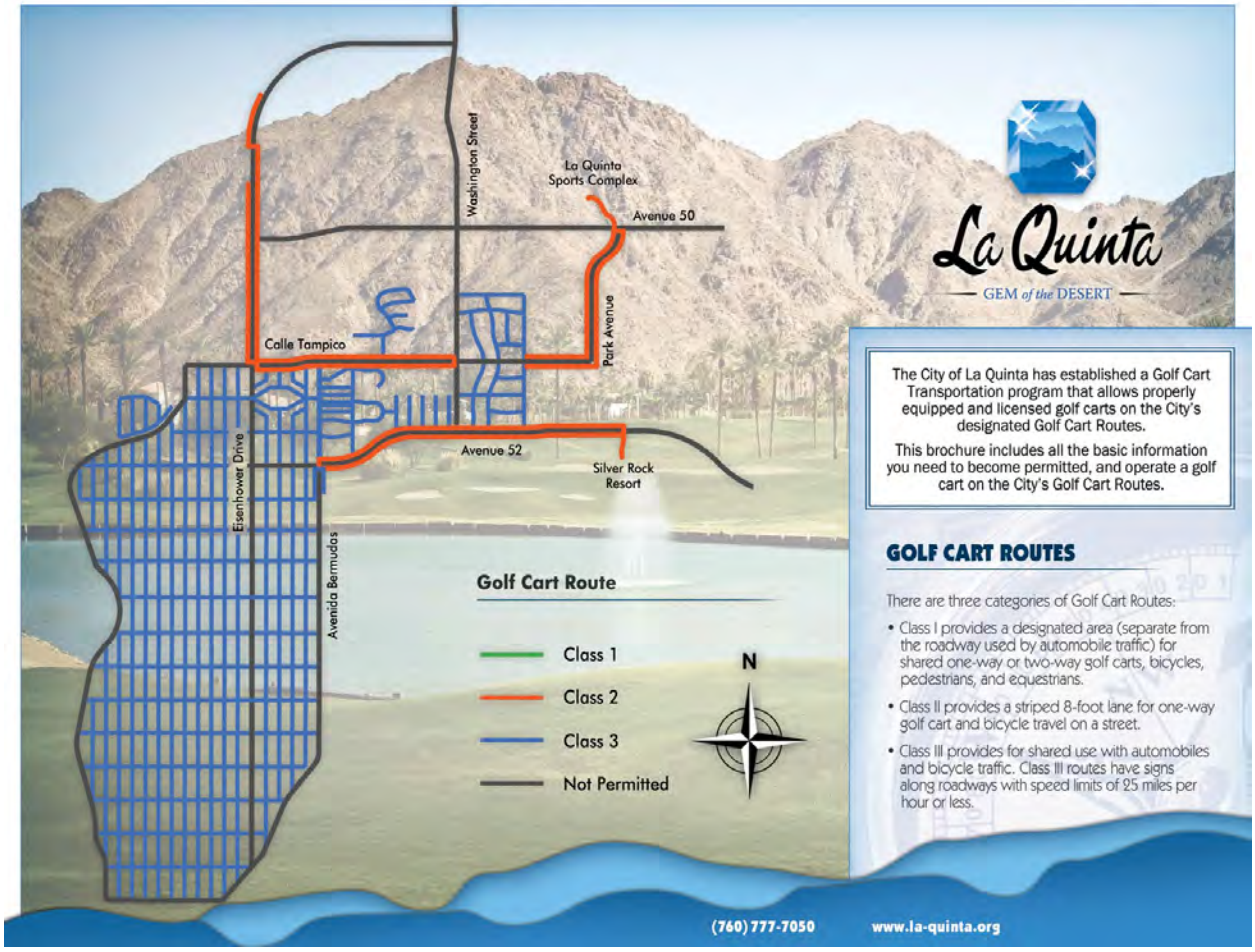


Figure 36: City of La Quinta Golf Cart Map

Palm Desert

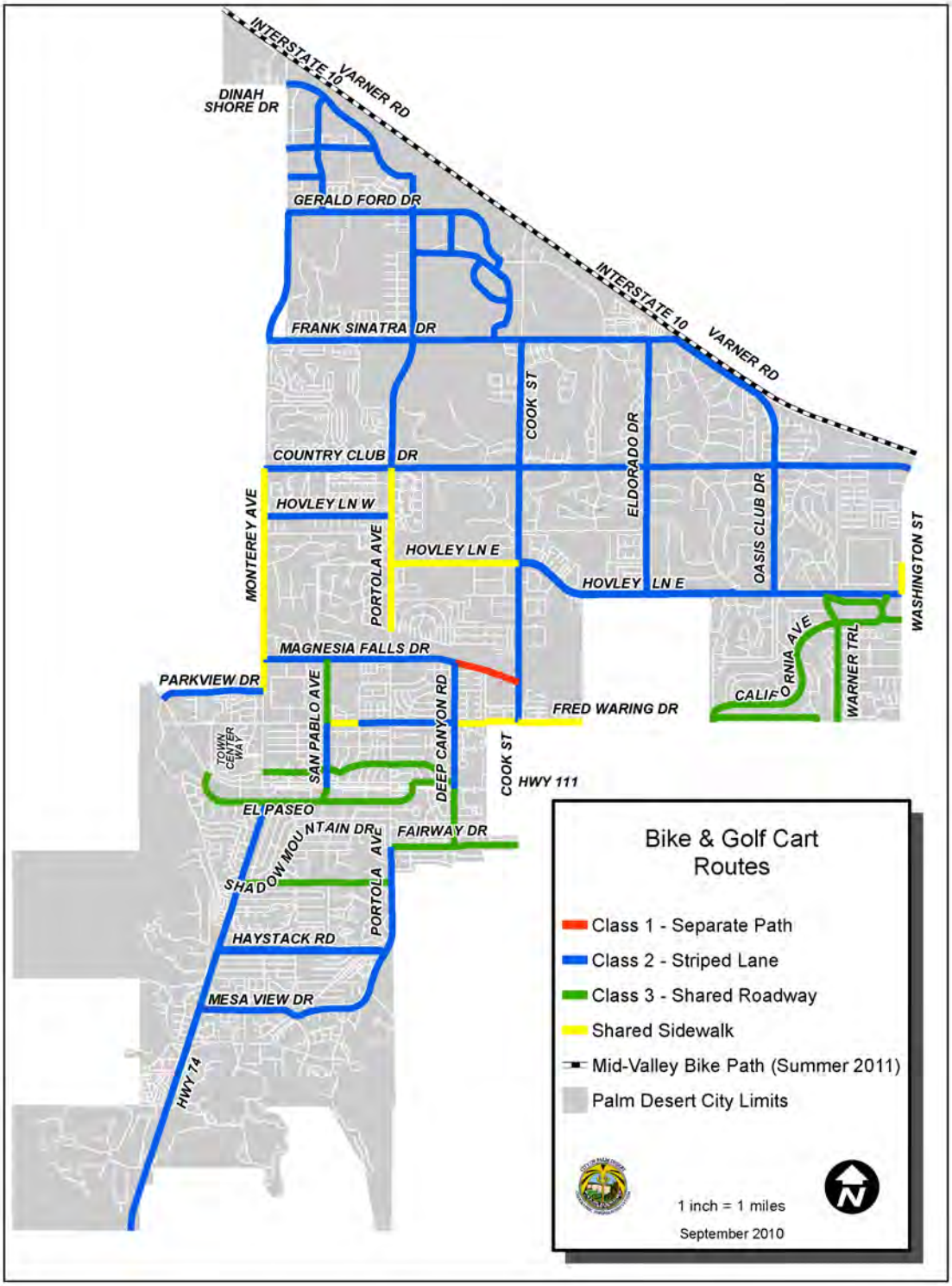
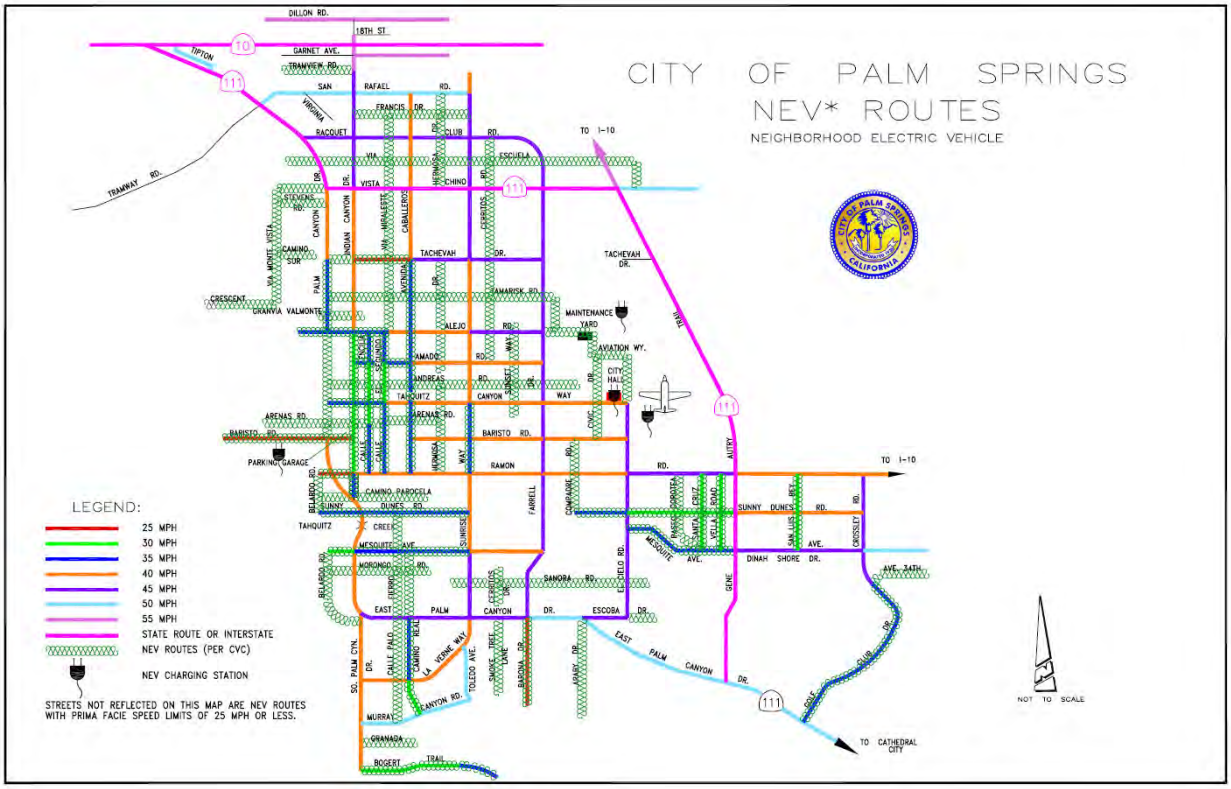


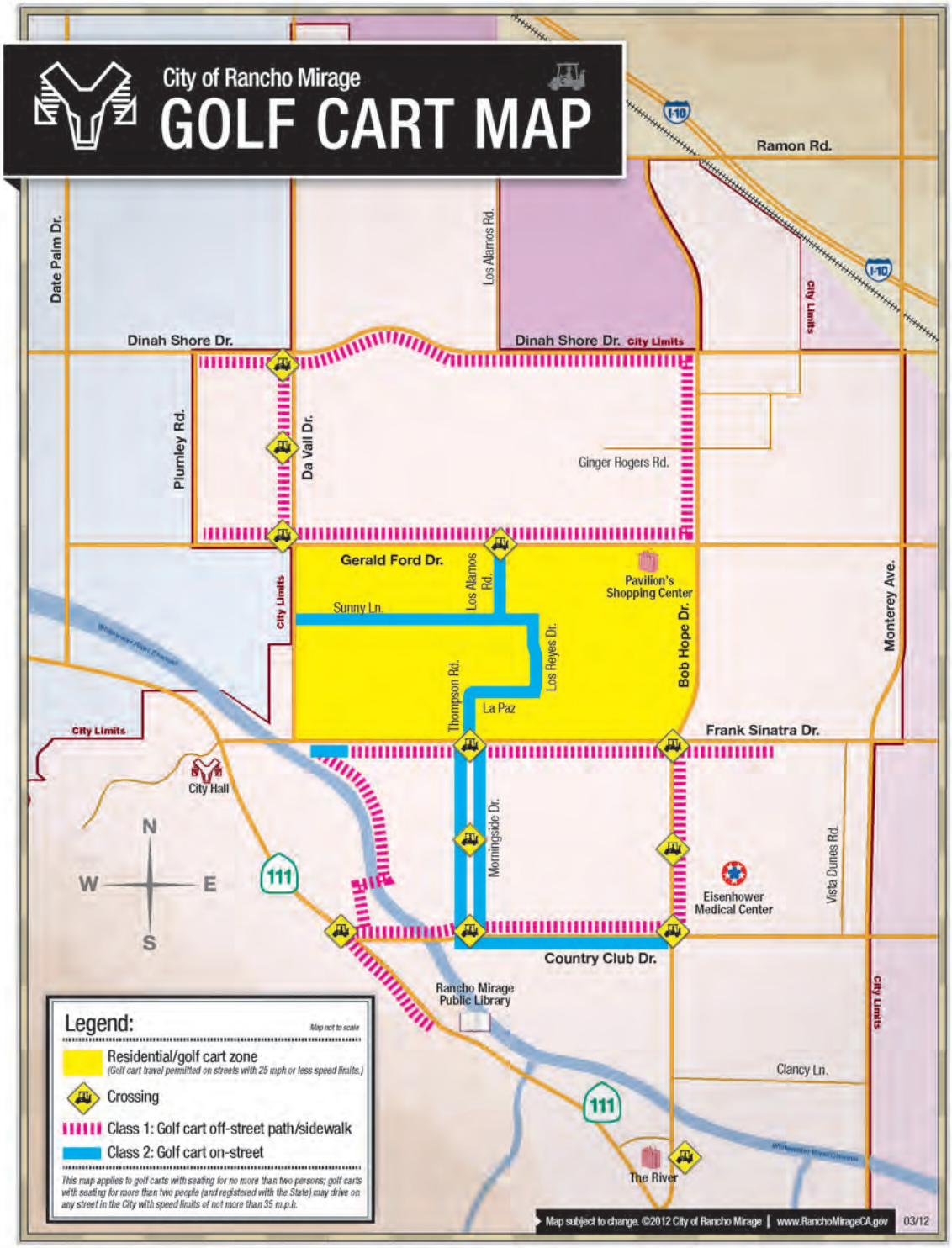
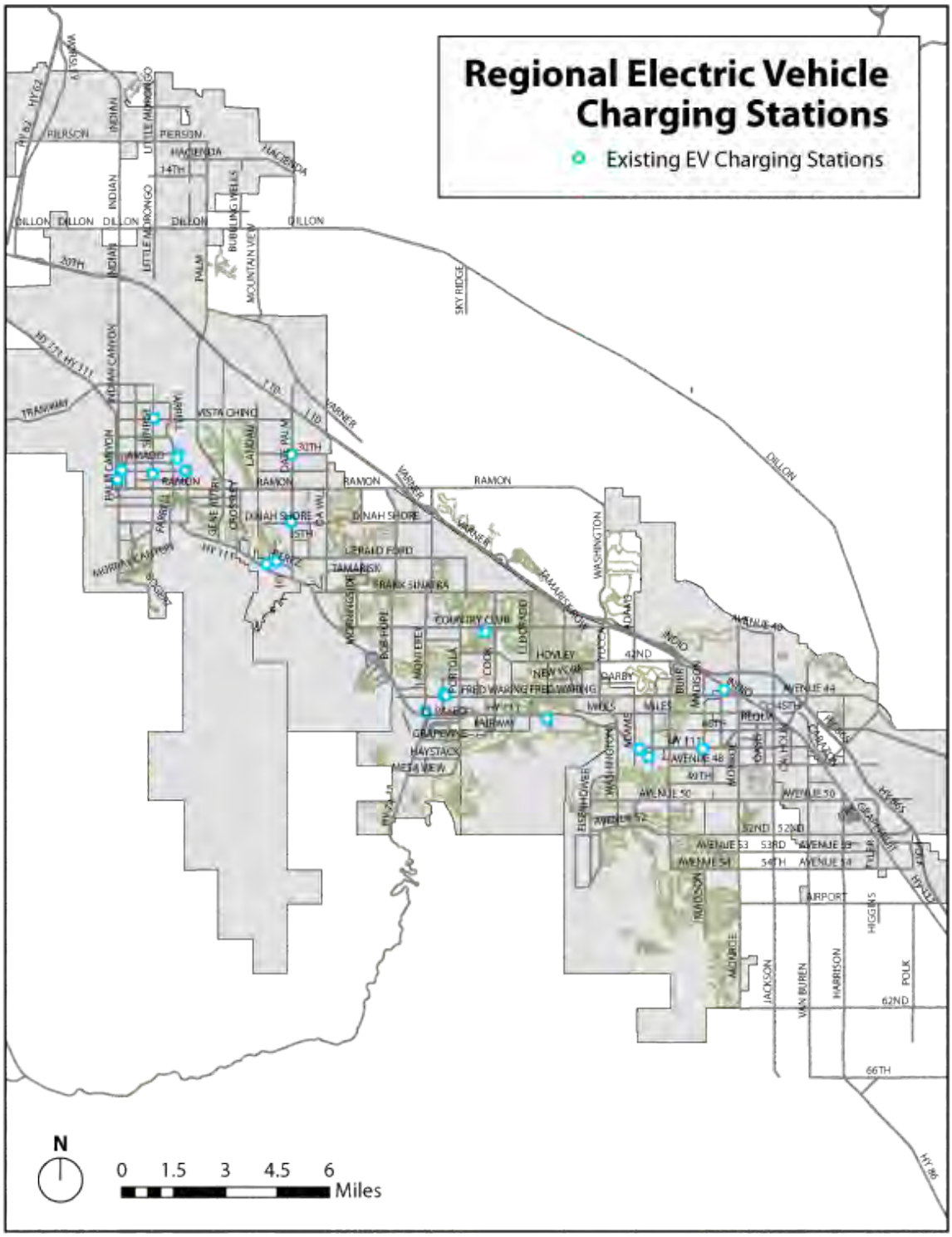
Figure 37: Palm Desert Bike and Golf Cart Route Map

Palm Springs

Palm Springs is the only known Coachella Valley city to have a route map aimed at NEVs, dated 2009. It is not readily found on the City's website.



Rancho Mirage



Appendix E – Electric Vehicle Charging Station Locations