2015 - 2020
Circulation Element

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CIRCULATION ELEMENT

Purpose

The Circulation Element addresses the local roadway network as well as alternative means of transportation, such as bicycle and pedestrian travel throughout the City. The Circulation Element provides maps to guide the orderly development of all aspects of the transportation system, as well as goals, policies and programs that correlate the City's transportation network with the types, intensities and locations of land uses within the planning area.

Background

The Circulation Element both affects and is influenced by city and regional land use planning. It has fundamental effects on the physical, social and economic environment of the community and it is also directly linked to the Housing and Noise Elements, as well as the Conservation and Open Space Element, particularly as it pertains to alternative modes of transportation The Circulation Element is also closely connected to the Conservation and Open Space Element, particularly as it relates to the impact of transportation systems on local and regional air quality. As the city and the surrounding region continue to grow and develop, vehicle miles will increase and travel speeds will be reduced, resulting in higher emissions per mile traveled. The Circulation Element sets forth policies and programs that can play an important role in maintaining and enhancing the flow of traffic and preserving air quality in the community.

The Circulation Element examines existing conditions in the planning area and includes an analysis of projected future development, based on development likely to occur within the General Plan planning horizon as shown on the Land Use Diagram (see Land Use Element). Through the use of engineering principles and computer modeling analyses of existing and projected future traffic conditions, the Circulation Element establishes the backbone circulation system needed to accommodate planned growth, identifies a phasing plan for implementation of circulation improvements and establishes standards for each type of roadway as well as bicycle routes and pedestrian trails. These standards are accompanied by a comprehensive set of goals, policies and strategies that provide the City's elected and appointed officials, as well as staff and the public, with guidance on the development of these systems throughout the community.

Motorized Transportation and Indicators of Roadway Efficiency

The efficient movement of traffic on local and regional roadways is critical to the normal day-to-day functioning of a community. Consequences resulting from obstructions in traffic flow include economic loss due to delays in transporting goods, increased psychological stress for the traveling public, heightened risk of motor vehicle accidents and air quality deterioration. The efficiency of a roadway can be determined by assessing the roadway's *level-of service* (LOS), which describes the capacity of a roadway and the degree to which it is being utilized.

LOS is a qualitative measurement that takes into consideration factors such as speed, travel time, driving comfort, safety and traffic interruptions. Levels of Service are described as a range of alphabetical connotations, “A” through “F,” which are used to characterize roadway operating conditions. LOS A represents the best, free flow conditions, and LOS F indicates the worst conditions, i.e. gridlock. Quantitatively, LOS is often defined by the ratio of the number of vehicles utilizing a roadway section or intersection to its capacity (V/C Ratio). At LOS F, 100 percent of the capacity of a roadway segment or intersection is being utilized, resulting in a V/C ratio of 1.00.

Traffic engineers and transportation planners are involved in ongoing efforts to strike a balance between providing ideal roadway operating conditions and controlling the costs of infrastructure and right-of-way needed to assure those conditions. Roadway capacity can be increased by adding travel or turning lanes, constructing raised medians and/or restricting vehicle access to a roadway. Traffic flow can be substantially improved by reducing the number of vehicle conflict points, thereby avoiding the loss of capacity caused by disruptions to traffic flow caused by vehicles entering or leaving the roadway. Roadway capacity can also be influenced by the availability of alternative, non-motorized means of transportation. Communities typically use LOS C as the standard for acceptable roadway conditions.

Table C-1 defines the various LOS classifications.

Roadway Classifications

The General Plan Circulation Map (Figure C-1) visually depicts the city’s roadways, identifying a hierarchy of five classes of streets that collectively comprise the city’s vehicular circulation network. These classifications include:

Freeways (minimum 160-foot Right-of-Way): Defined as limited access roads providing largely uninterrupted travel and designed for high speeds;

Primary Arterials (100-foot ROW): Comprised of roads that carry most of the traffic entering and leaving an area and typically feature speed limits ranging from 30 to 50 miles per hour.

Secondary Arterials (80-foot ROW): These roads interconnect and augment the urban principal arterial roadway network. They also distribute traffic to smaller, local geographical areas.

Collectors (60-foot ROW): Roads designed to provide access within residential neighborhoods, commercial and industrial areas and to collect traffic from local roads and channel it into the arterial system.

Local Streets (50-60-foot ROW): Comprise the remainder of all roads not classified at a higher level. They serve primarily to provide direct access to properties and the higher order roads.

Table C-1
Roadway Level of Service Description

LOS	V/C Ratio	Quality of Traffic Flow
A	<.60	Primarily free-flow operations at average travel speeds usually about 90 percent of the free-flow speed of the roadway. Vehicles are completely unimpeded in their ability to maneuver within the traffic stream. Stopped delay at signalized intersections is minimal.
B	.61-.70	Reasonably unimpeded operations at average travel speeds usually about 70% of the free-flow speed of the roadway. Ability to maneuver within the traffic stream is only slightly restricted. Stopped delays are not bothersome, and drivers generally are not subject to appreciable tension.
C	.71-.80	Traffic operations are stable. However, mid-block maneuverability may be more restricted than in LOS B. Longer queues, adverse signal coordination, or both may contribute to lower average travel speeds of about 50% of the average free-flow speed. Motorists will experience some appreciable tension while driving.
D	.81-.90	Borders on a range where small increases in flow may cause substantial increases in approach delay and decreases in arterial speed. LOS D may be due to adverse signal progression, inappropriate signal timing, high volumes, or some combination of these factors. Average travel speeds are about 40% of the free-flow speed. For planning purposes, this level-of-service is the lowest that is considered acceptable.
E	.91-.99	Characterized by significant approach delays and average travel speeds of one-third or less of the free-flow speed. Typically caused by some combination of adverse progression, high signal density (more than two signalized intersections per mile), high volumes, extensive queuing, delays at critical intersections, and/or inappropriate signal timing.
F	1.00+	Arterial flow at extremely slow speeds, below one-third to one-fourth of the free-flow speed. Congestion is likely at critical signalized intersections, with high approach delays and extensive queuing.

Source: p. 11-4, Highway Capacity Manual, Special Report 209, Transportation Research Board, 1994.

COMMUNITY BLVD
OLD HWY 58
I 15 FWY
LENWOOD RD
STATE 58 HWY
MAIN ST
AVENUE H
I 40 FWY
MAIN ST
LENWOOD RD
MAIN ST
GREEN DESERT DR
BARSTOW RD
SALAMANDER BLVD
I 15 FWY
LENWOOD RD

N
W E
S

0 0.4 0.8 1.6
Miles

Exhibit C-1
Circulation Map

Legend

- City Limits
- Sphere of Influence
- Parcel Lines
- Freeway
- Primary Arterial
- Secondary Arterial
- Collector

Lenwood Road to Barstow Road Interconnect Phase

- 1
- 2

EV ChargingStations

- Existing EV Charging Stations
- Future EV Charging Stations

Non-Motorized Transportation

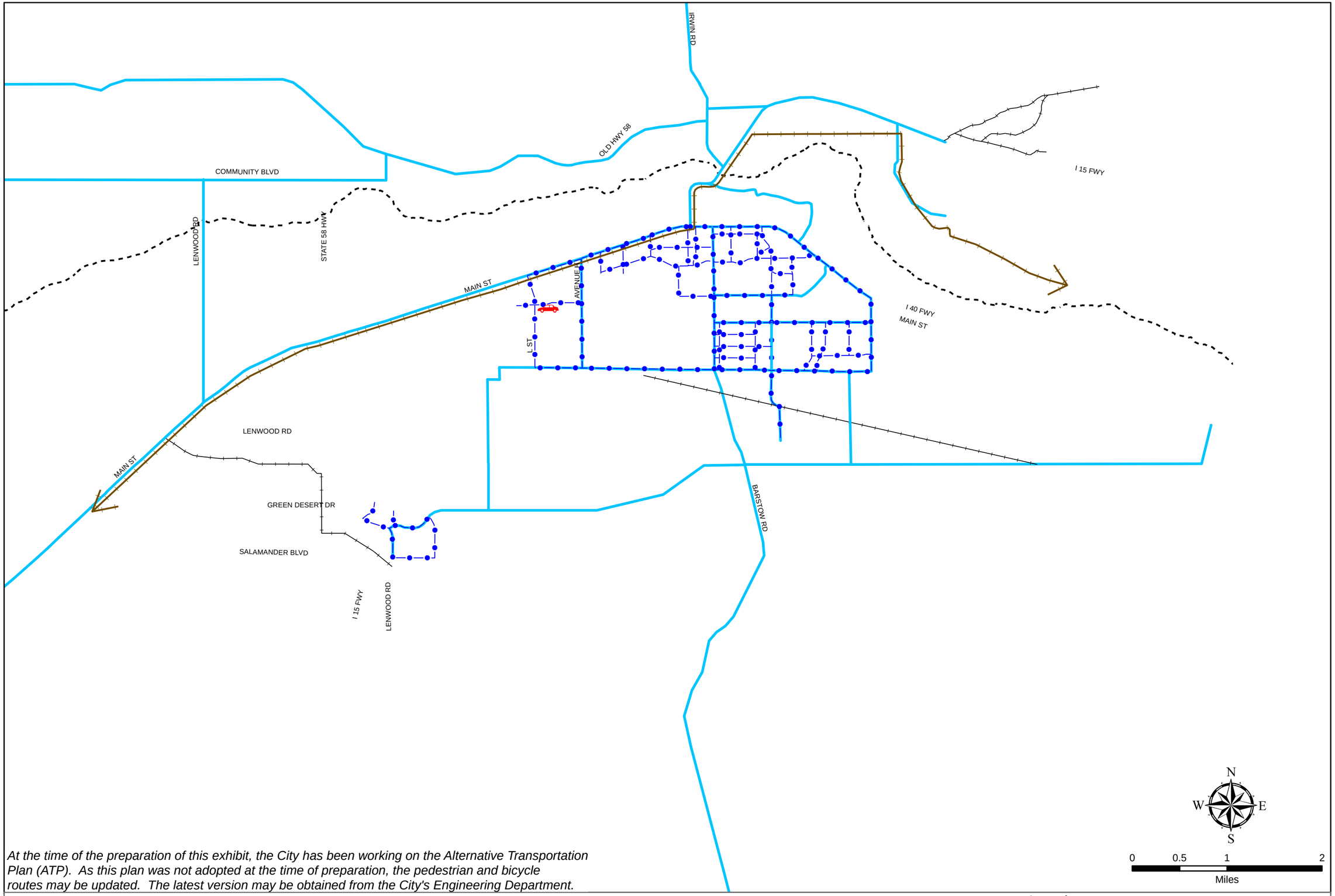
In addition to motorized vehicles, individuals increasingly employ non-motorized means of transportation, such as walking and bicycling, as means of traversing the community. Another more recent development related to the city's circulation network centers on a trend away from single-occupancy vehicle trips toward carpooling and ride-sharing. According to the 2010 United States Census Bureau, residents of Barstow carpool to work at a significantly higher rate than Californians as a whole (20 percent versus 11.7 percent). Additionally, Barstow residents walk to work at more than twice the average rate of the statewide workforce (7.5%/2.8%). Overall, the percentage of workers commuting via single-occupancy vehicle as opposed to carpooling, bicycling, walking or working at home is 65.7% in Barstow compared to a statewide rate of 73%.

The above findings concerning the transportation patterns of Barstow residents have important policy implications. First, in assessing the environmental impacts of commercial, residential and industrial development, vehicle trip generation models based on statewide estimates of vehicle use are likely to *overstate* the traffic and air quality impacts of projects located in Barstow. Consequently, estimates of these impacts need to be adjusted downward on the order of approximately 10 percent. Secondly, these comparatively low rates of travel by single-occupancy vehicle, accompanied by surprisingly high rates of walking, bicycling and carpooling, have emerged in spite of the relative lack of a concerted effort on behalf of public agencies to encourage this behavior through the provision of supportive infrastructure such as park-and-ride lots, carpool parking spaces, bicycle lanes and designated pedestrian pathways. This suggests that a modest increase in effort on the part of the City and other public entities to encourage the use of alternatives to single-occupancy vehicles for transportation could result in an even higher rate of utilization by city residents, accompanied by the resultant benefits in terms of traffic congestion reduction and air quality improvement. For this reason, this General Plan Circulation Element contains a broader range of policies and initiatives geared toward non-motorized transportation than the document it succeeds. Exhibit C-2 illustrates the City's planned network of bikeways, pedestrian pathways and park and ride facilities.

Key Circulation Issues

Based on the preceding discussion, augmented by the traffic analysis that is included as an appendix to the General Plan document, the following issues have been identified as high priorities for the 2015 – 2020 planning horizon:

- ✓ I-15 congestion, particularly on weekends
- ✓ Lack of connector roadway between Lenwood Road/I-15 commercial area and Barstow Heights
- ✓ Absence of bicycle lanes and designated pedestrian and bicycle routes
- ✓ Need for additional park and ride facilities
- ✓ Construction of 1st Street bridge and realignment of 1st Street intersection with Main Street



At the time of the preparation of this exhibit, the City has been working on the Alternative Transportation Plan (ATP). As this plan was not adopted at the time of preparation, the pedestrian and bicycle routes may be updated. The latest version may be obtained from the City's Engineering Department.

Exhibit C-2
Pedestrian Paths, Bicycle Routes and Park and Ride Facilities

Legend

- City Limits
- Parcel Lines
- Sphere of Influence
- Pedestrian
- Bike Lane/Route
- Equestrian
- OldSpanishTrail
- Trail
- Park and Ride

Circulation Goals, Policies and Strategies

GOAL 1: The City shall maintain and expand a safe, efficient and convenient circulation system.

POLICY 1.A: Continue to utilize Capital Improvement Program and Measure I funds to maintain and enhance the city's roadway network, retaining a minimum level of service of "C" along all roadways and at all intersections.

STRATEGY 1.A.1: Upon completion of the Rimrock Road, Montara Road and miscellaneous street improvement projects, identify additional roadway segments for enhancement and improvement.
Responsible Parties: City Engineer, Community Development Staff

STRATEGY 1.A.2: Continue to maintain and implement the City's Pavement Management Plan for complete asphalt concrete overlays or equivalent roadway improvements.
Responsible Parties: City Engineer, Community Development Staff

POLICY 1.B: Endeavor to avoid facing residential properties onto arterial roadways.

STRATEGY 1.B.1: Locate the rear yards of residences along arterial roadways when residential development is proposed to abut such roadways in order to provide separation of residences from the roadway and to minimize vehicular conflicts.
Responsible Parties: City Planning and Community Development Staff

STRATEGY 1.B.2: Seek to acquire right-of-way from developers proposing residential uses along arterial roadways for pedestrian pathways and/or bicycle routes.
Responsible Parties: City Planning and Community Development Staff

POLICY 1.C: Pursue expansion of the City's roadway network to accommodate planned residential, commercial and industrial growth and to address existing system deficiencies.

STRATEGY 1.C.1: Construct a connector roadway between the Lenwood Road Outlet Malls and Barstow Heights.
Responsible Parties: City Engineer, Community Development Staff

STRATEGY 1.C.2: Replace the First Street bridge. **Responsible Parties:** City Engineer, Community Development Staff

STRATEGY 1.C.3: Upgrade Rimrock Road between H and L Streets and L Street between Rimrock Road and I-15 from secondary to primary arterial roadways.
Responsible Parties: San Bernardino County Transportation Department (unless annexed to the City)

GOAL 2: Upgrade the appearance of freeway corridors and major gateways into the City.
POLICY 2.A: Pursue aesthetic enhancements of freeway sound walls.

STRATEGY 2.A.1: Add design elements such as decorative masonry, murals or city logos to existing freeway sound walls.
Responsible Parties: Community Development Staff

STRATEGY 2.1A.2: Treat sound walls with graffiti-resistant material to ensure complete removal whenever possible.
Responsible Parties: Community Development Staff

POLICY 2.B: Provide visual enhancements at major gateways to the City.

STRATEGY 2.B.1: Design and install gateway signage and landscaping at the following locations:

- I-15 and L Street
- I-15 and Barstow Road
- State Route 58 and West Main Street
- I-15 and East Main Street

Responsible Parties: Community Development Staff

STRATEGY 2.B.2: Secure financial support for gateway enhancements from private developers and public entities such as the National Park Service, the Bureau of Land Management and the State Lands Commission.
Responsible Parties: City Manager, Economic Development and Planning Manager

GOAL 3: Foster improved traffic flow and air quality by encouraging the use of non-motorized transportation, alternative fuel vehicles and multi-occupant vehicles.

POLICY 3.A: Encourage pedestrian travel by improving the means by which residents and visitors may walk throughout the community.

STRATEGY 3.A.1: An inventory of discontinuous sidewalks on all qualifying roadways shall be compiled and individual improvement projects shall be funded through the Capital Improvement Program to connect these sidewalks.
Responsible Parties: City Engineer, City Planner, Community Development Staff, City Council

STRATEGY 3.A.2: Install pedestrian enhancements along and in the vicinity of the route of the Old Spanish Trail as designated on Exhibit C-2.
Responsible Parties: City Planner, Community Development Staff, City Council

POLICY 3.B: Establish a network of bicycle routes as illustrated on Exhibit C-2.

STRATEGY 3B.1: Endeavor to designate and install at least one segment of Class 1 bikeway (i.e. separate pathway running parallel to existing roadway) within the 2015 – 2020 time horizon of the General Plan.
Responsible Parties: City Engineer, Community Development Staff

STRATEGY 3.B.2: Provide striping of Class 2 bikeways along routes shown on Exhibit C-2.
Responsible Parties: Community Development Staff

STRATEGY 3.B.3: Install signage along routes designated as Class 3 bikeways on Exhibit C-2.
Responsible Parties: Community Development Staff

POLICY 3.C: Encourage carpooling and the use of alternative fuel vehicles by city residents and employees.

STRATEGY 3.C.1: Construct at least one additional park-and-ride facility within the 2015-2020 time horizon of the General Plan.
Responsible Parties: California Department of Transportation in consultation with City Engineer, Community Development Staff

STRATEGY 3.C.2: Secure the installation of electric vehicle charging stations at City Hall and in conjunction with the development of major commercial and industrial land uses.
Responsible Parties: City Planner, Community Development Staff

POLICY 3.D: Implement incentives outlined in Municipal Code Chapter 19.49 – Design Guidelines such as relaxation of parking requirements, density bonuses and exceptions to building height and lot coverage requirements in exchange for on- or off-site provision of bicycle racks and/or storage facilities, bikeways, electric vehicle charging facilities, designated pedestrian pathways or other design features designed to foster alternatives to single-occupancy, internal combustion engine driven vehicle use.

STRATEGY 3.D.1: Work with property developers and project designers to incorporate features identified in Policy 3D above into proposed development projects.
Responsible Parties: Economic Development and Planning Manager, City Planner

STRATEGY 3.D.2: Remain abreast of new developments and innovations pertaining to the mitigation of adverse traffic and air quality impacts associated with urban development.
Responsible Parties: Community Development Staff, City Planner, Planning Commission