

CALIFORNIA NEVADA ARIZONA UTAH

I-15 CORRIDOR SYSTEM MASTER PLAN **UPDATE 2017**



ch2mSM

MARCH 2017



ACKNOWLEDGEMENTS

The I-15 Corridor System Master Plan (Master Plan) is a product of the hard work and commitment of each of the I-15 Mobility Alliance (Alliance) partner organizations and their dedicated staff.

Individuals within the four states and beyond are investing their time and resources to keep this economic artery of the West flowing. The Alliance partners come from state and local transportation agencies, local and interstate

commerce, port authorities, departments of aviation, freight and passenger rail authorities, freight transportation services, providers of public transportation services, environmental and natural resource agencies, and others.

Their efforts are a testament of outstanding partnership and a true spirit of collaboration, without which this Master Plan could not have succeeded.

I-15 MOBILITY ALLIANCE PARTNERS

American Magline Group	City of Orem	Authority
Amtrak	City of Provo	Millard County
Arizona Commerce Authority	City of Rancho Cucamonga	Mohave County
Arizona Department of Transportation	City of South Salt Lake	Mountainland Association of Governments
Arizona Game and Fish Department	City of St. George	National Park Service - Lake Mead National Recreation Area
Bear River Association of Governments	Clark County Department of Aviation	Nellis Air Force Base
BNSF Railway	Clark County Public Works	Nevada Army National Guard
Box Elder County	Community Planners Advisory Committee on Transportation	Nevada Department of Tourism and Cultural Affairs
Brookings Mountain West	County of San Bernardino	Nevada Department of Transportation
Bureau of Land Management	Davis County	Nevada Department of Wildlife
Cache Metropolitan Planning Organization	Economic Development Corporation of Utah	Nevada Division of State Parks
California Department of Transportation	El Dorado Holdings	Nevada Governor's Office of Economic Development
California High Speed Rail Authority	Envision Utah	Nevada Governor's Office of Energy
California Trucking Association	Federal Highway Administration	Nevada Highway Patrol
Carmen Group Inc.	Federal Railroad Administration	Nevada Motor Transport Association
Cedar City	Five County Association of Governments	Nevada State Office of Energy
City of Clearfield	Freeway and Arterial System of Transportation	Northern Arizona Council of Governments
City of Fontana	Idaho Transportation Department	NV Energy
City of Henderson	Iron County	Orange County Transportation Authority
City of Las Vegas	Las Vegas Global Economic Alliance	Parametrix
City of Layton	Las Vegas Metro Chamber of Commerce	Port of Long Beach
City of Lehi	Las Vegas Motor Speedway	Port of San Diego
City of Murrieta	Los Angeles Metro Transportation	



- Regional Transportation Commission of Southern Nevada
- Riverside County Transportation Commission
- Riverside Transit Agency
- Salt Lake City Chamber of Commerce
- San Bernardino County Transportation Authority
- San Diego Association of Governments
- San Diego International Airport
- Sierra Club, San Diego Chapter
- Sierra Club, Utah Chapter
- Southern California Association of Governments
- Southwest Airlines
- State of Nevada Division of Environmental Protection
- The Toll Roads
- Union Pacific Railroad
- U.S. Army Corps of Engineers
- U.S. Coast Guard
- U.S. Fish and Wildlife Service
- Utah County
- Utah Department of Transportation
- Utah Transit Authority
- Utah Trucking Association
- Wasatch Front Regional Council
- Washington County
- Weber County
- Western High Speed Rail Alliance
- XpressWest

CONSULTANT SUPPORT

The consultant team of CH2M would like to recognize the tireless efforts of the I-15 Mobility Alliance partners in providing invaluable data, resources, and assistance in capturing, analyzing, and summarizing the technical data into this Master Plan. The consultant teams and their specific roles in this project include:

CH2M: Program management and partner agency coordination, responsible for preserving the I-15 program with Alliance partners and program stakeholders, maximizing visibility by promoting the corridor on a national level, and sustaining the Alliance partnership’s competitive advantage by capitalizing on federal grants.

RCG Economics: Technical support on the economic performance and implications of I-15 and the broader corridor.

Kimley-Horn and Associates: Project manager of the I-15 Dynamic Mobility Project, including interface with the Alliance.

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I-15 CORRIDOR SYSTEM MASTER PLAN

The I-15 Corridor System Master Plan defines a multi-decade multimodal transportation system vision, governance, implementation strategy, and provides a prioritized program of projects needed to serve all modes of transportation. Defining this vision is a regional partnership between government and private interests in California, Nevada, Arizona, and Utah—the I-15 Mobility Alliance. Developing a clear unified vision for the I-15 Corridor enables us to look beyond highway corridor preservation and focus on regional and global competitiveness.

The purpose of this Master Plan is to maintain an understanding of Interstate 15 (I-15) through the Alliance states (California, Nevada, Arizona, and Utah) and implement improvements to continually advance operations, capacity, safety, resiliency, and access.

This Master Plan is meant to evaluate the corridor as a whole, and is not intended to produce a state by state analysis nor to supplant the priorities established by the various agencies that form the I-15 Mobility Alliance. The Master Plan tells a story of the importance of the corridor and the challenges facing it, and outlines an approach for addressing these challenges, including multi-jurisdictional and interest group collaboration. Each of the five chapters tells the following part of the story:

1. **Economic Lifeline:** defines this transcontinental corridor and provides an overview of its importance to the nation and local communities served by it.



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2. **Moving People:** describes the socio-economic make-up of the adjoining megaregions and the opportunities and challenges of moving people between these major population centers via car, rail, and airplane.



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3. **Moving Goods:** establishes the importance of goods movement to the financial well-being and quality of life of those living along the corridor, and to the nation.



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4. **Performance Measures:** tracks progress of improvements along the corridor as each state implements capacity, safety and operational enhancements.



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5. **Mobility Alliance:** introduces the organizational structure and mission of the Alliance, and the successes achieved through collaboration.



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I-15 AT A GLANCE

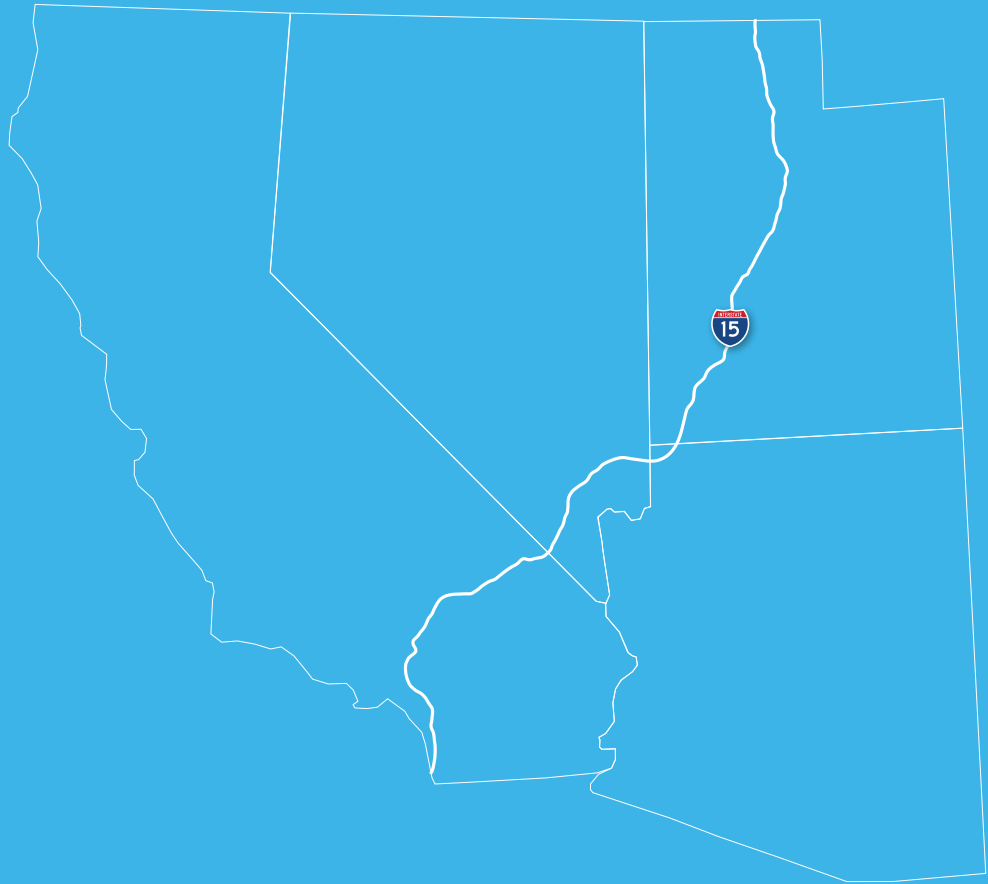
- 1,434 miles of interstate highway
- Traverses the Nation's fastest growing regions: Arizona, Nevada, and Utah ranked in the top 10 fastest growing states in the U.S. in 2015
- Serves as primary access route for interstate tourism between Southern California and Las Vegas
- Transports \$95 billion of commerce annually to and from local communities and the global marketplace (FAF04, 2015)
- Links 4 of the nation's top 20 airports including top international gateways of Los Angeles International Airport and McCarran International Airport

This document is an update to the initial 2012 Master Plan, with the goal of continually updating and capturing the changes as the corridor improves and evolves.

This Master Plan only covers the portion of I-15 through the states of California, Nevada, Arizona, and Utah. It is hoped and anticipated that future revisions will extend the corridor and expand the Alliance partnership north to the Canadian border.



I. ECONOMIC LIFELINE





BACKGROUND

In the western United States (U.S.), the I-15 Corridor is the spine of a transportation network extending more than 1,470 miles through the states of California, Nevada, Arizona, Utah, Idaho, and Montana. I-15 is a unique, diagonally oriented artery linking coastal ports to inland population centers and connecting with major east-west corridors that serve the entire U.S.

For much of its path, I-15 was constructed along old US Route 91, which served as an international commerce route from Long Beach, California to Canada via Sweetgrass, Montana. US 91 was routed on the main streets of most of the communities it served, including Las Vegas Boulevard in Las Vegas and State Street in Salt Lake City. I-15 began construction as an interstate highway in 1957, with the segment between Los Angeles and Las Vegas opening to traffic in 1966. Much of the corridor was constructed throughout the 1970s, with the final segment bypassing Plymouth, Utah opening in 1990.

Today, the I-15 transportation corridor links the San Diego metropolitan area with the Riverside-San Bernardino metropolitan area, and several other suburban communities between them. Due to rapid population growth in recent years in the California Mojave Desert region, I-15 has become a heavily traveled commuter route between metropolitan Southern California and the communities of Victorville, Barstow, Hesperia, Apple Valley and Adelanto.

It is also the primary access route between Southern California and Las Vegas with more than 25 million people driving this corridor annually (FHWA, 2014). In Nevada, I-15 is the single most important tourism and freight corridor and is essential for southern Nevada's economy. In Utah, I-15 is the primary transportation corridor, connecting the major population centers and serving the majority of the residents.

Critical to the economic vitality of the Western United States, the I-15 Corridor moves people and goods to and from major trade gateways, tourist destinations, and population centers from Mexico in the south to Canada in the north.







But, I-15 can be a victim of its own success. I-15 is a major tourism and trade corridor, moving more than 46 million vehicles annually, including 2 million tons of freight valued at \$108 billion (FAF04, 2015). Without continued improvement however, the success of the corridor can overrun the functionality.



I-15 is frequently impacted by congestion, which harms our economies.

Population and employment growth in communities along I-15 is expected to double traffic volumes by 2040 – exacerbating current congestion issues (FAF03, 2010).

I-15 becomes a bottleneck between Southern California and Las Vegas on weekends. Average travel time between San Bernardino and Las Vegas is 3.5 hours (NPMRDS, 2013). On Sunday afternoons, this southbound trip might range up to 7 hours, with bottlenecks near Primm and Barstow.

The segment with the highest traffic fatality rate is between Las Vegas and the Arizona state line, which experienced 11 deaths in 2013 (NHTSA, 2014).

The total cost of congestion on I-15 equates to \$6.2 billion per year, with more than half of that due to chokepoints in Los Angeles and Las Vegas and between (TTI, 2015).

A lack of alternative routes to I-15 exist. Major incidents that close I-15 cripple traffic, causing added congestion and lost economic dollars.



I-15 flood damage, September 2014



Fire closes I-15 at Cajon Pass, July 2015

Source: San Bernardino Fire Department

The **2014 Moapa flood** forced the closure of 50 miles of I-15, requiring a 223-mile detour for truck traffic bound from Las Vegas to Utah – more than doubling the travel time. This resulted in an extra daily cost of \$667,000 - \$790,000 in trucking operations, not including the economic impact of delayed freight deliveries (ATRI, 2015).

The **July 2015 Cajon Pass** fire swept across I-15, resulting in more than 30 destroyed vehicles. Detour options exist, although none are direct and all pose additional hazards, ranging 20 to 50 miles out of direction on rural forest service roads. The Cajon Pass was closed again in August 2016 due to the Blue Cut Fire.



ECONOMIC LIFELINE CORRIDOR

The prestigious designation given to I-15 in 2007 as a Corridor of the Future recognizes that the health of the corridor directly impacts the wealth and welfare of the region it serves.

The critical economic importance of I-15 is federally recognized via various designations. From San Diego, California to Mesquite, Nevada via the Inland Empire and Las Vegas, I-15 from San Diego, California to Utah/Idaho boarder was chosen as 1 of 6 Corridors of the Future and is known as the Economic Lifeline Corridor. The section of I-15 from Las Vegas to Sweetgrass, Montana, is part of FHWA's High Priority Corridor 26: CANAMEX Corridor. And between Great Falls and Sweetgrass, the freeway is also part of High Priority Corridor 27: Camino Real.

While these designations come with no funding for improvements, they do recognize the importance of the corridor at a key linkage in the nation's interstate highway system, with a priority on developing innovative national and regional approaches to reduce congestion and improve the efficiency of freight delivery.

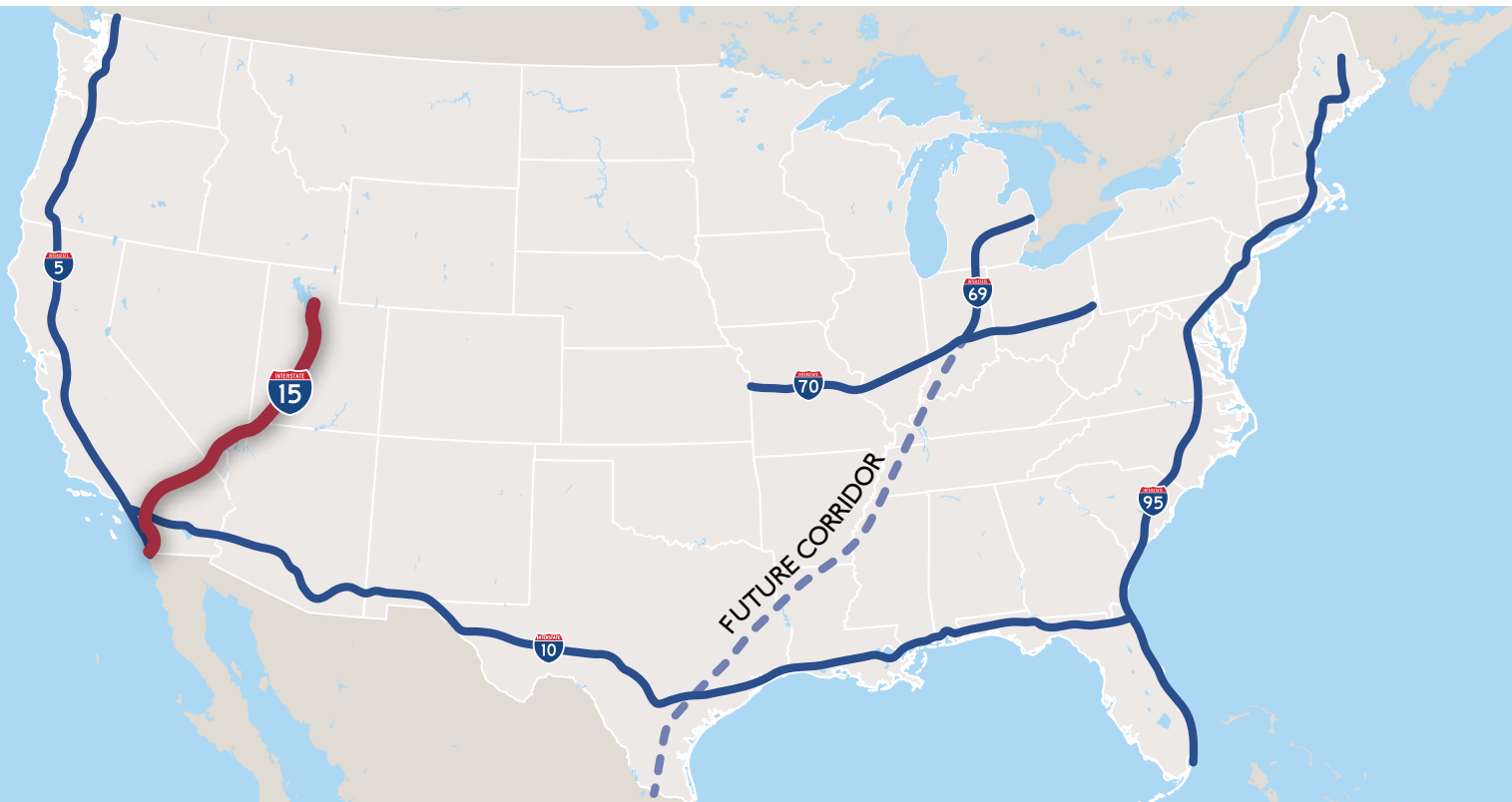


EXHIBIT I-1. Federally-Designated Corridors of the Future



ECONOMIC PROFILE

Some of the largest economic and population centers in the U.S. rely on the I-15 Corridor. Anchored in the south by Southern California, one of the ten largest economies in the world in its own right, the I-15 Corridor cuts across a diverse geography and is critical to this area's continued ability to grow and thrive.

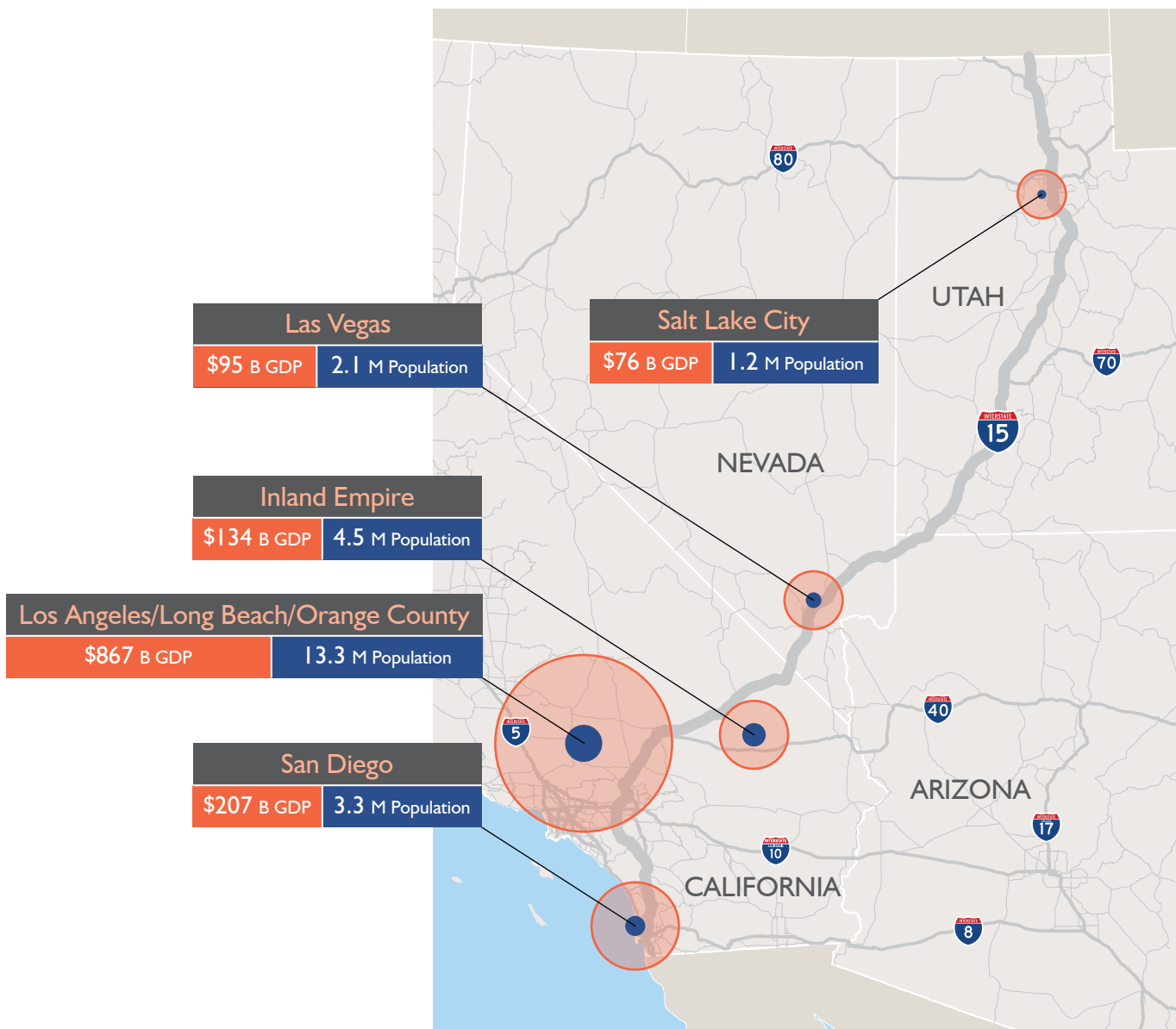


EXHIBIT I-2. Economic Centers along the I-15 Corridor

Source: U.S. Census Bureau, 2014; Bureau of Economic Analysis, 2015



The I-15 Corridor serves a growing region and provides the avenue to work and play for the population surrounding it. It also acts as a natural avenue for truck movements out of the ports and agricultural regions of Southern California and onward to major cities such as Las Vegas and Salt Lake City. I-15 helps connect the region to the rest of the U.S., and goods traveling to the Southeast, Midwest, Great Lakes, and Northeast states travel north along I-15 before heading east on I-10, I-40, I-70, or I-80.

The I-15 Corridor traverses some of the most densely populated and fastest growing counties in the U.S., including the urban and/or suburban areas of San Diego, Los Angeles, Riverside, and San Bernardino counties, Las Vegas, and Salt Lake City. Population in the metropolitan areas located along the I-15 Corridor accounted for just under 8 percent of total U.S. population in Exhibit I-5 (U.S. Census Bureau, 2015). Significant growth is expected in these communities in the future. In fact, Nevada, Arizona, and Utah were some of the fastest growing states in the U.S. in 2015, and it is anticipated that populations in the Las Vegas and Ogden regions will almost double by 2050, while Southern California will add nearly 7 million more people.

The I-15 Corridor is the thread that ties 28 million people together economically, culturally, and socially.

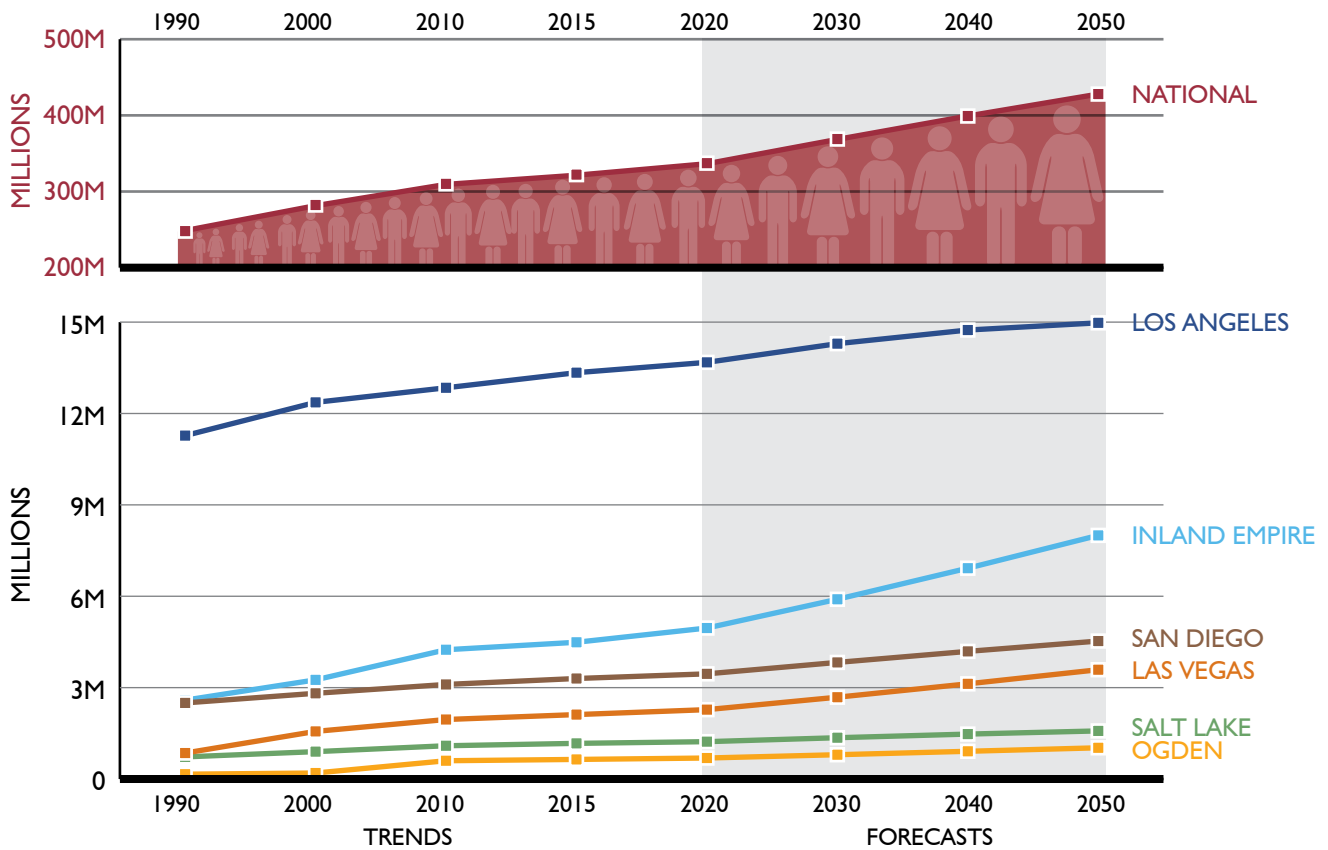
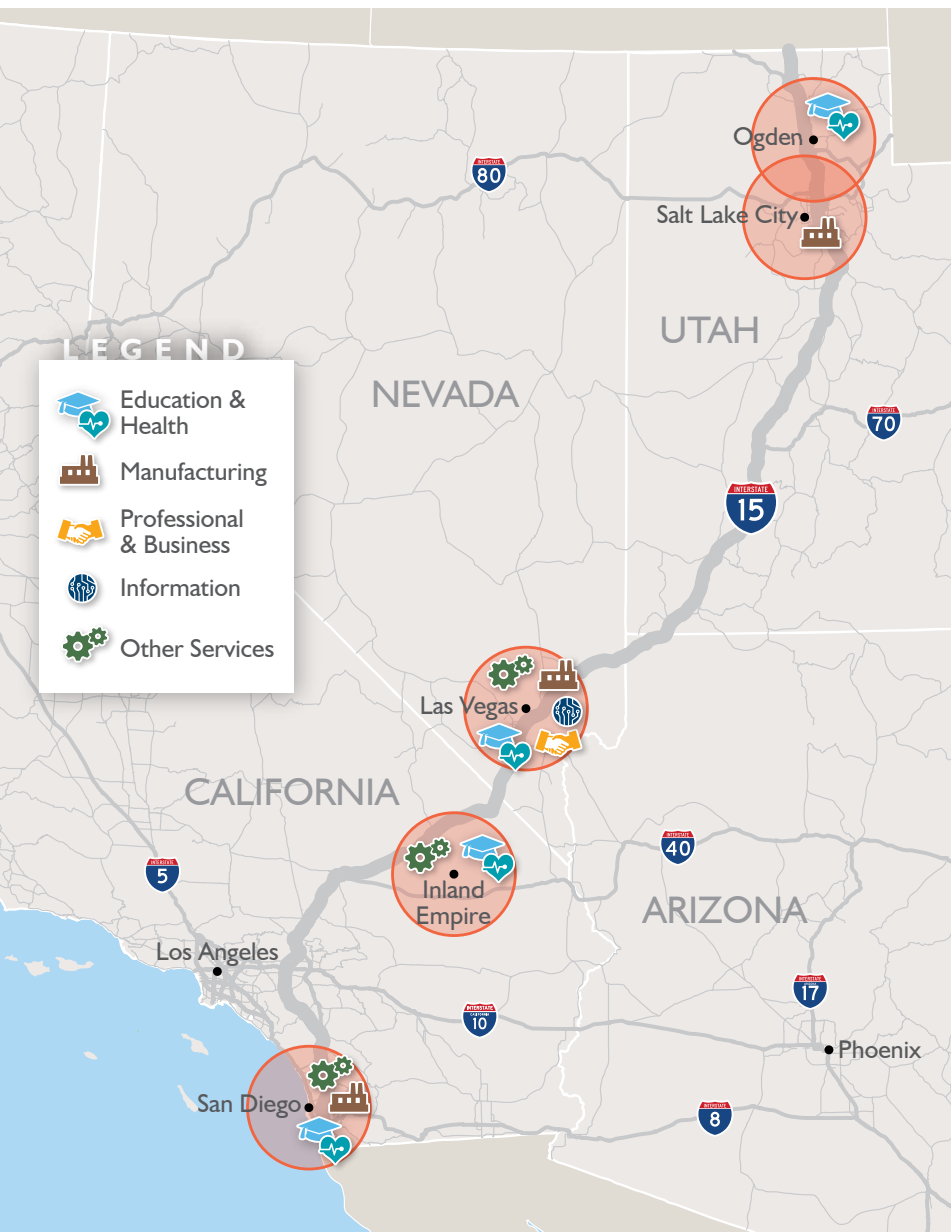


EXHIBIT I-3. Population Trends in Corridor Metropolitan Areas

Source: U.S. Census Bureau, 2015; Woods & Poole Economics, 2015



Of the top 25 industries in the study area, several industries rely heavily on transportation networks, including hospitality and tourism, business and financial services, and transportation and logistics. Each of these industries along the I-15 corridor had higher employment concentrations than the national average (BLS, 2005-2015). The strength and size of these industries determines the amount of inter-regional activity that occurs on the Corridor and will continue to impact travel demand trends along I-15.



Each metropolitan area bears a different set of economic industry strengths, dependent on their trade activities (BLS, 2005-2015). In San Diego, the hospitality and tourism, business services, other services, and education and health services categories continue to strengthen and become more specialized. The Inland Empire sees a high degree of construction, hospitality and tourism, and transportation and logistics employment growth – surpassing the national average. Hospitality and tourism remain Las Vegas’ greatest asset. Salt Lake City and Ogden mirror each other, with diverse economies in financial services, construction, information technology, hospitality and tourism, natural resources and mining, and transportation and logistics.

Exhibit I-4 illustrates those industry clusters taking hold and emerging within the I-15 metropolitan areas, offering the potential to further expand and diversify these economies.

EXHIBIT I-4. Emerging Industries along the I-15 Corridor



One of the strongest economic industries shared among all I-15 communities is leisure and hospitality. Tourism is heavily dependent on the transportation system to deliver visitors to and from regional destinations, and I-15 strongly contributes to the movement of people between corridor communities.

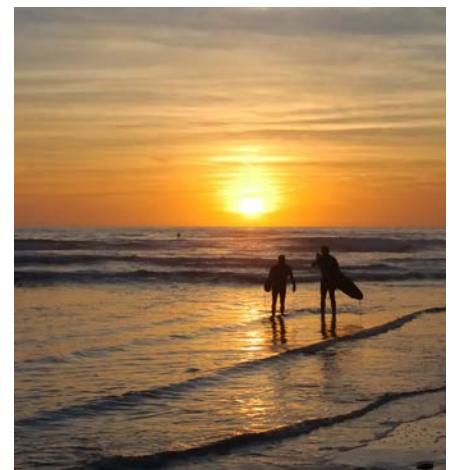
For Nevada, I-15 is the single most important tourism corridor and is essential for Southern Nevada's economy. It is the primary access route for interstate tourism between Southern California and Las Vegas, for which Las Vegas attracts 9.8 million Southern California visitors annually via I-15 (LVCVA, 2015). A plethora of theme parks, white sand beaches, and cultural and historical sites attract tourism to Southern California, while most of Utah's spectacular skiing, national parks, and other attractions are accessed via I-15 including Zion National Park, Utah Olympic Park, and Alta Ski Area.

From the beaches of San Diego to the resort corridor in Las Vegas and beyond to the natural wonders of Utah, the I-15 Corridor takes residents of the West on vacation, and delivers \$52 billion in tourism revenue to local communities.

Metropolitan Statistical Area (MSA)	GDP All Industries (\$M)	GDP Leisure & Hospitality Industry (\$M)	% of Total GDP
San Diego	\$206,817	\$8,662	4%
Inland Empire	\$133,983	\$5,438	4%
Los Angeles	\$866,745	\$41,537	5%
Las Vegas	\$94,521	\$19,726	21%
Salt Lake	\$75,672	\$2,131	3%
Ogden	\$23,862	\$610	3%

EXHIBIT I-5. Tourism Industry along the I-15 Corridor

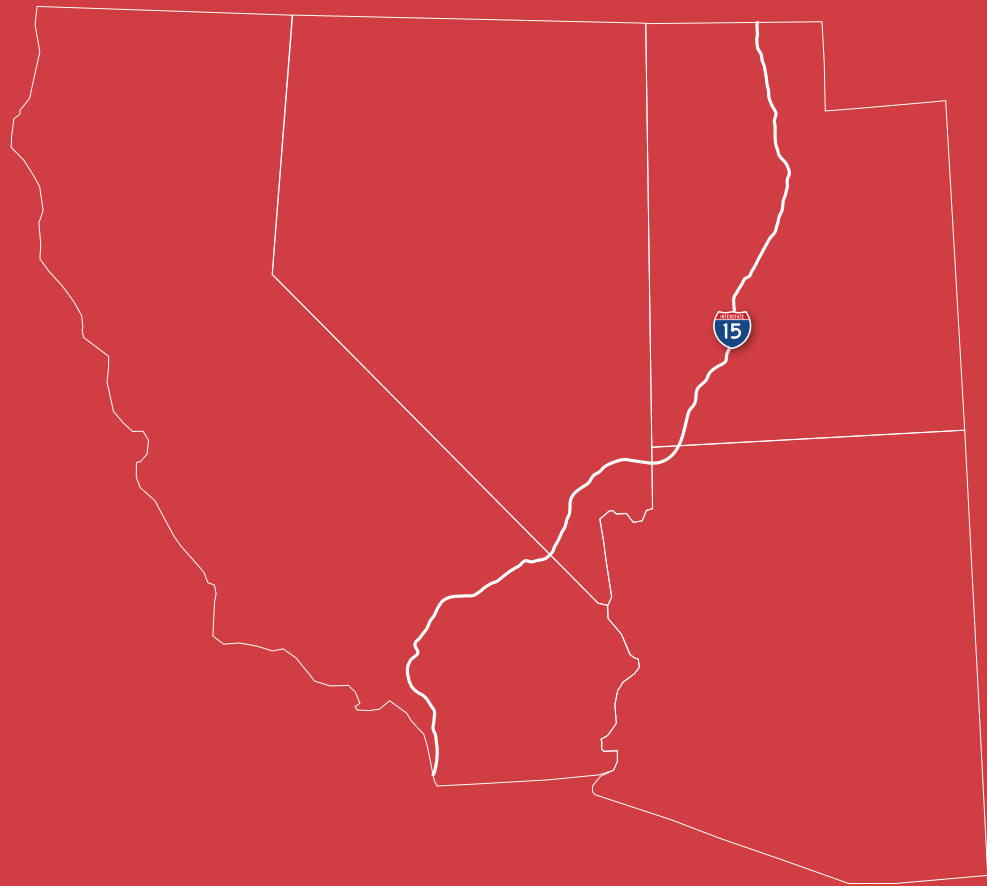
Source: Bureau of Economic Analysis, 2015b





2.

MOVING PEOPLE





HIGHWAY TRAVEL

I-15 is a major transcontinental north-south highway in the western United States that extends more than 1,470 miles through the states of California, Nevada, Arizona, Utah, Idaho, and Montana. It is the principal artery linking coastal ports to inland population centers and connects with the nation's three coast-to-coast east-west highways: I-10, I-80, and I-90 in addition to other east-west interstates including I-40, I-70, I-84, and I-86.

Improving and maintaining existing infrastructure is an important national priority as the U.S. seeks more trade and exports. Failure to establish adequate infrastructure to move people and goods around the country could significantly constrain future economic growth. As an interstate corridor, the ability for cars and trucks to travel reliably between corridor destinations is critical.

Within the I-15 Mobility Alliance states, the corridor extends 843 miles through the four-state region, with approximately 320 miles through urban areas.

Currently, the primary obstacle for seamless movement on I-15 is congestion, which can be caused by commute traffic, safety incidents, emergency conditions, natural disasters, and numerous other factors. Annual average daily traffic (AADT) volumes for the I-15 corridor were obtained from FHWA Highway Performance Monitoring System (HPMS) and Freight Analysis Framework (FAF) datasets, as they are nationally-recognized datasets and periodically maintained. Currently, the average daily traffic throughout the entire corridor is about 65,000 vehicles per day, with a maximum of 299,000 vehicles per day in San Diego just north of the I-8 interchange (FHWA, 2014). On any given day, up to 15 percent of this traffic may include trucks.

	California	Nevada	Arizona	Utah
Center Line Miles	288	124	30	401
Number of Lanes	4 to 12	4 to 10	4	4 to 12
Maximum Annual Average Daily Traffic	299,000	267,000	23,500	268,900
Minimum Annual Average Daily Traffic	32,000	16,500	18,500	9,400*
Speed Limit	65 to 70	65 to 75	75	65 to 80
Rest Areas	4	5	0	6

EXHIBIT 2-1. I-15 Travel Characteristics

Source: FHWA, 2014. | * 2013 HPMS data



Exhibit 2-2 shows existing AADT volumes along I-15, paired with potential future traffic volumes, if no improvements are made. Green lines represent free flowing traffic, whereas red lines represent congestion. As displayed, most of the urban areas along I-15 experience congestion today, and that is expected to worsen in the future. San Diego, portions of San Bernardino County, Las Vegas and Salt Lake City all experience AADTs over 200,000.

Even with planned improvements in place, congestion delay during peak times on I-15 between Southern California and Las Vegas is projected to grow from 3.19 hours per vehicle in 2012 to 7.03 hours in 2022.



EXHIBIT 2-2. I-15 Average Annual Daily Traffic
Source: FAF03 2010, FHWA 2014



The Southwest network could provide rail access to more than **92%** of all Californians, Nevadans, and Arizonans

The Southwest network could alleviate future demand for the highway system, equivalent to:

2 lanes on I-5 from Los Angeles to San Francisco - or - **6 billion** vehicle miles traveled per year by 2050

Source: FRA, 2014

PASSENGER RAIL

Demand for passenger rail is expected to grow as highway and aviation systems reach their capacities. In particular, California has one of the busiest air markets and some of the most congested highways in the nation, making it a prime candidate for high-speed rail. Various passenger rail systems operate within the metropolitan regions served by I-15; however, no system currently connects the regions.

The Southwest Multi-State Rail Planning Study, led by Federal Railroad Administration (FRA), was completed in 2014 and included the states of Arizona, California, and Nevada. This study provides a model baseline for other regions of the U.S. to use for illustrating current conditions, a multimodal context, and rail market potential as a baseline input to a FRA Regional Rail Plan for the entire U.S.

Conceptual planning analysis performed in the study indicates there are several multi-state corridors in the Southwest that could address increasing constraints on the transportation network and thus warrant further study in advance of possible new rail investments (Exhibit 2-3). The link between San Diego and Las Vegas through the Inland Empire is considered a high-priority route, with an eventual extension to Salt Lake City and Ogden, paralleling the I-15 corridor.

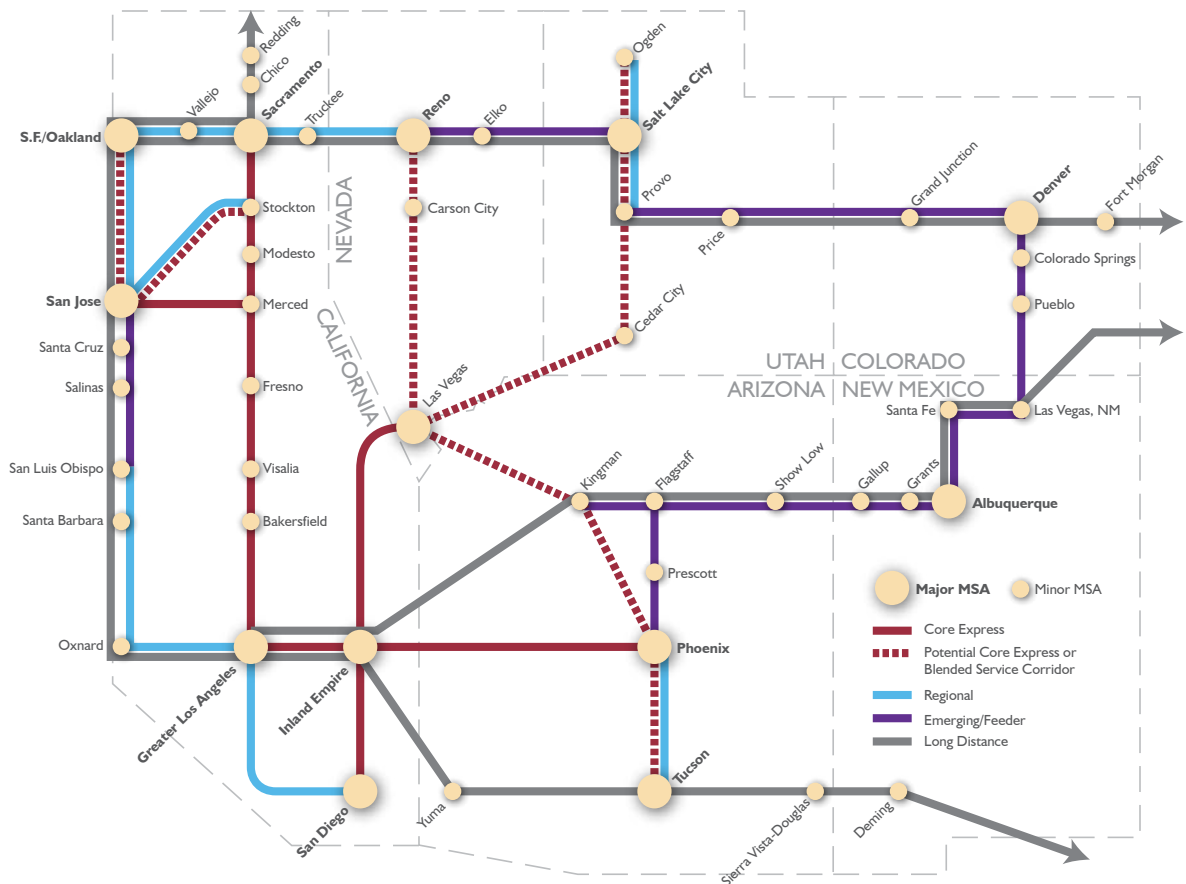


EXHIBIT 2-3. Southwest Corridors for Further Consideration

Source: FRA, 2014



On July 8, 2011, the FRA issued a Record of Decision for a project-level Environmental Impact Statement (EIS) for the XpressWest (formerly DesertXpress), a 200-mile high-speed rail line that would provide non-stop service between Victorville, California, and Las Vegas, Nevada, along the I-15 corridor. Operating at 150 miles per hour, the trains are estimated to travel the corridor in about 80 minutes, with potential for non-stop service. A future link between Victorville and Palmdale, California, would connect it to the existing Metrolink commuter rail system and planned California High-Speed Rail network, with Southern California stations planned in Los Angeles, Orange, San Diego, and San Bernardino counties.

A lack of long-distance travel options in the U.S. has led to increased highway congestion and airport delays. Conventional service and high-speed rail options could provide relief to the demand on I-15.

If federal loans are approved or other funding secured, the new rail corridor could significantly reduce congestion on I-15 between California and Las Vegas by offering travelers a fast, low stress, and price-competitive mode of travel. It is estimated that the project will divert approximately 3 million automobile trips from I-15 each year.

To maintain momentum for this corridor, in 2015, Nevada Governor Brian Sandoval signed a law creating the Nevada High Speed Rail Authority with the mission to support implementation of high speed rail between Las Vegas and Southern California, for which they selected XpressWest as the partner to lead construction for Phase I efforts: Las Vegas to Victorville. Phase 2 efforts are also underway, with the completion of the final environmental work required for the development of the line connecting the project to Los Angeles through Victorville and Palmdale, California expected in late 2016 and defining that segment's project design. The California High Speed Rail Authority is completing the EIS/EIR for Phase 3, the connection to Los Angeles and Anaheim.

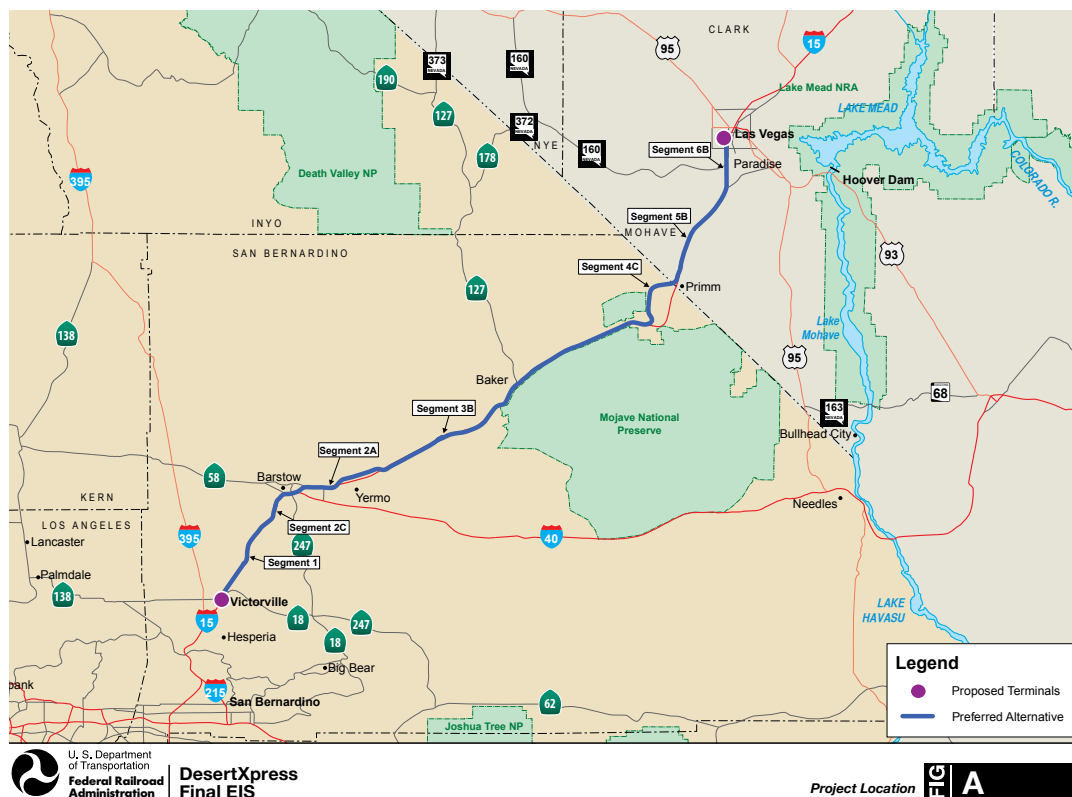


EXHIBIT 2-4. Phase I XpressWest Connection between Victorville, CA and Las Vegas, NV

Source: FRA, 2011



LOCAL TRANSIT

Building supportive local transit systems to I-15 has been tremendously successful in removing short distance trips from the highway, both providing an alternative transportation option for local residents and freeing up capacity on the interstate, thereby providing additional benefits such as reduced greenhouse gases, less congestion, and improved safety.

All the major metropolitan areas along the I-15 Corridor have regional transit systems in place, maximizing mobility within urban centers and strengthening the success of I-15 as an interregional corridor. Public transit is one component of a successful and comprehensive multimodal transportation system. It connects people to jobs, supports business development, saves households money, and generates employment with every dollar invested. It is also a form of environmental stewardship, reducing carbon emissions by 37 million metric tons of carbon dioxide each year across the US – saving the equivalent of 4.2 billion gallons of gasoline annually (APTA, 2016).



Public transit also provides additional benefits for people who do not use it. It makes the entire transportation system work more efficiently. Every 10 people on a bus or train in your community during rush hour means there are nine fewer cars on the roads. By providing additional capacity, public transit use can move more people around, thereby increasing the efficiency of the entire transportation network. That means less traffic congestion, fewer carbon emissions, and a safer community for all.

PUBLIC TRANSPORTATION SAVES FUEL, REDUCES CONGESTION

- Public transportation has a proven record of reducing congestion.
- In 2011, U.S. public transportation use saved **865 million hours** in travel time and **450 million gallons** of fuel in 498 urban areas.
- Without public transportation, congestion costs in 2011 would have risen by **nearly \$21 billion** – or 18% - in 498 urban areas.

PUBLIC TRANSPORTATION REDUCES CARBON FOOTPRINT

- Public transportation use in the United States reduces our nation's carbon emissions by **37 million metric tons annually**.
- A single commuter switching their commute to public transportation can reduce a household's carbon emissions by **10 percent, and up to 30 percent** if a second car is eliminated.
- Households near public transit drive an average of **4,400 fewer miles** than households with no access to public transit.

Source: APTA, 2016



SAN DIEGO AND SALT LAKE CITY HAVE TRANSIT CORRIDORS THAT DIRECTLY SERVE OR PARALLEL I-15



I-15 Corridor Bus Rapid Transit (San Diego)

As part of a suite of improvements to improve capacity and congestion on I-15 in San Diego County, the 20-mile I-15 Express Lanes Corridor (SR 78 in Escondido to SR 163 in San Diego) was built in the center of the freeway to improve reliability for those traveling longer distances and not requiring local access. The goal of the project was to improve commute times, foster public transit, and encourage shared ridership. Carpools/vanpools have no entry fee to utilize the Express Lanes, and in mid-2014, a new Bus Rapid Transit (BRT) service called Rapid began using the Express Lanes as well. Rapid is a high-frequency, limited stop bus service that serves travelers all day long, and connects with residential areas, employment centers, and leisure destinations. The Express Lanes are connected to direct access ramps that allow transit services to be a reliable, timely, and predictable way to travel.

Because of the success in managing traffic along I-15, construction is currently underway on the State Route 15 Mid-City BRT project to build transit-only lanes in the center of the freeway corridor, south of I-8 (Exhibit X). The environmental review required under state law and completed in 2011 projected that implementation of this corridor will reduce traffic volumes on SR 15, improving the freeway's traffic operations (Caltrans, 2011).



Front Runner System Improvements (Salt Lake City)

The FrontRunner commuter rail line is operated by the Utah Transit Authority (UTA) and runs 89 miles from Provo to Pleasant View serving a total of 16 stations in Weber, Davis and Salt Lake Counties. FrontRunner parallels I-15 for the majority of the route and operates primarily on single track with double track at stations and other locations along the route to allow for trains to pass one another. It operates on UTA-owned track which parallels the Union Pacific (UP) tracks from Provo until Ogden, and then UP and UTA share the remaining mileage to Pleasant View. The 16 stations provide riders with connections/transfers to TRAX, UTA's light rail system, and bus routes. UTA's primary goal in continuing to expand the FrontRunner system is to provide increased transportation opportunities to those living along the Wasatch Front and to decrease traffic congestion caused by the transportation needs of a growing population. Future extensions are envisioned that would eventually encompass over 135 miles (UTA, 2016).



AVIATION

Airports within the study area serve as major national and international gateways for leisure and business activities as well as significant hubs for goods movement.

Eleven major airports connect the metropolitan areas between Southern California and Northern Utah. I-15 provides access to four of the nation's top 25 airports including top international gateways Los Angeles International Airport (LAX) and McCarran International Airport (LAS). LAX, LAS, and Phoenix Sky Harbor International Airport (PHX) all ranked among the top 10 busiest airports in the U.S., and Salt Lake City International (SLC) and San Diego International (SAN) were ranked in the top 30 (FAA, 2016).

Within the southwest region, the busiest air travel corridors exist between metropolitan areas and are consistent with travel along the I-15 corridor. Most of these metropolitan areas are separated by 300 to 500 miles. The long distances between major markets and lack of competitive service for this distance offered by the existing passenger rail network have led to a disproportionate reliance on short-haul flights for travel within the region. The busiest air travel corridor is between Los Angeles and Las Vegas.





Airport	State	Rank	2014 Enplanements
Los Angeles International	California	2	34,314,197
McCarran International	Nevada	9	20,620,248
Phoenix Sky Harbor International	Arizona	10	20,344,867
Salt Lake City International	Utah	25	10,139,065
San Diego International	California	28	9,333,152
John Wayne Airport-Orange County	California	40	4,584,147
Ontario International	California	59	2,037,346
Long Beach/Daugherty Field	California	77	1,368,923

EXHIBIT 2-5. I-15 Corridor Air Travel

Source: FAA, 2016

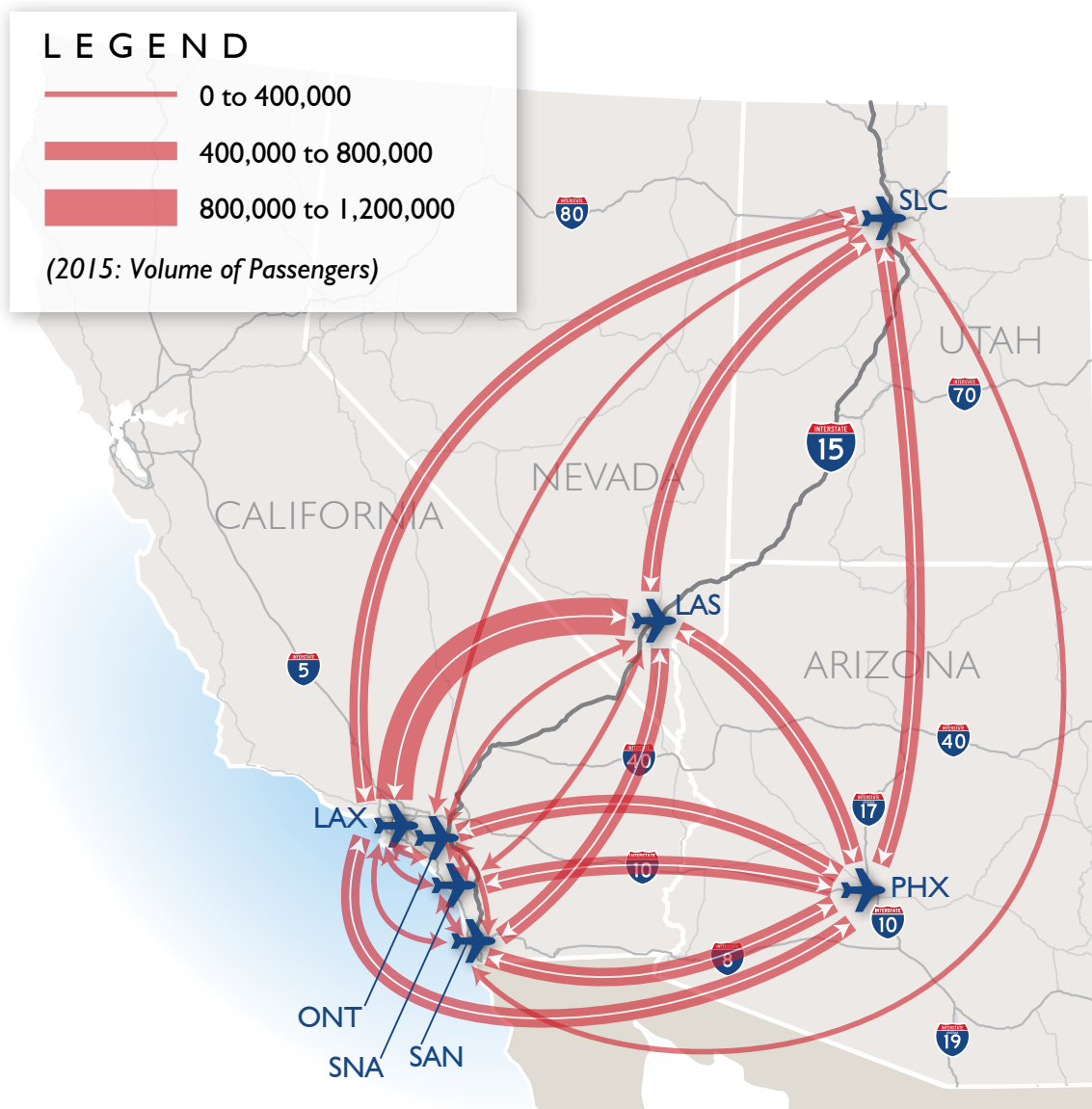


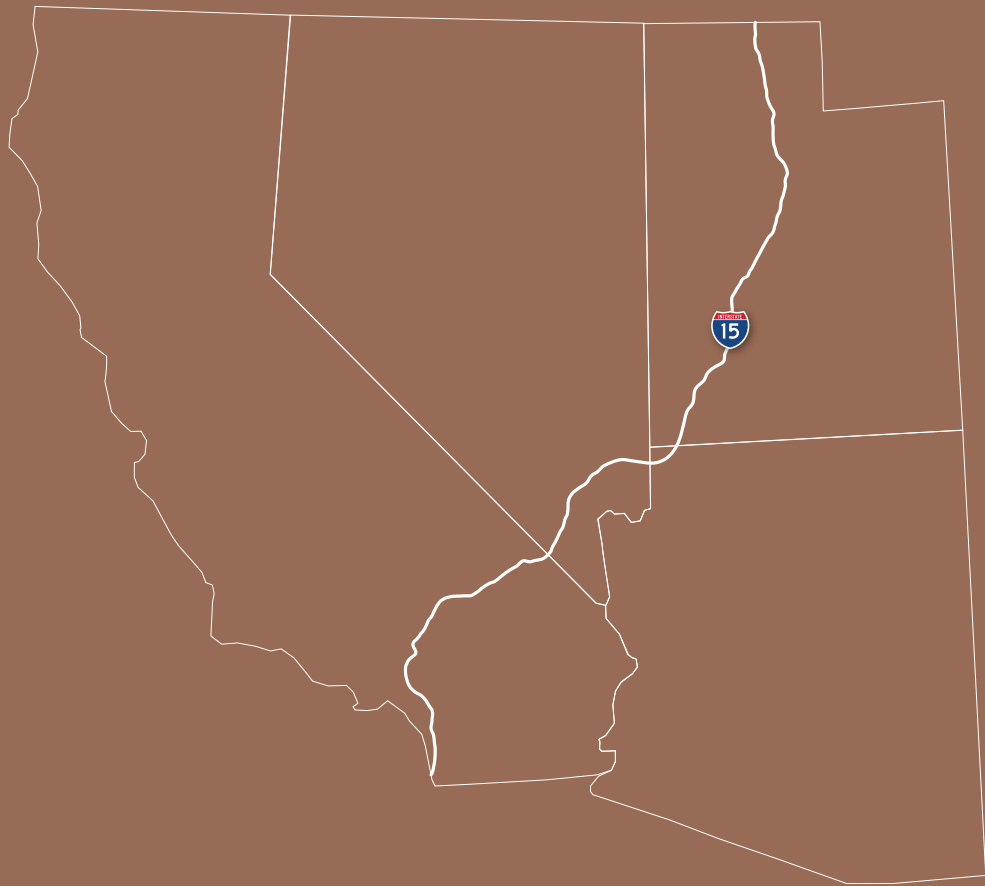
EXHIBIT 2-6. Popular Air Travel Corridors

Source: FAA 2016b



3.

MOVING GOODS





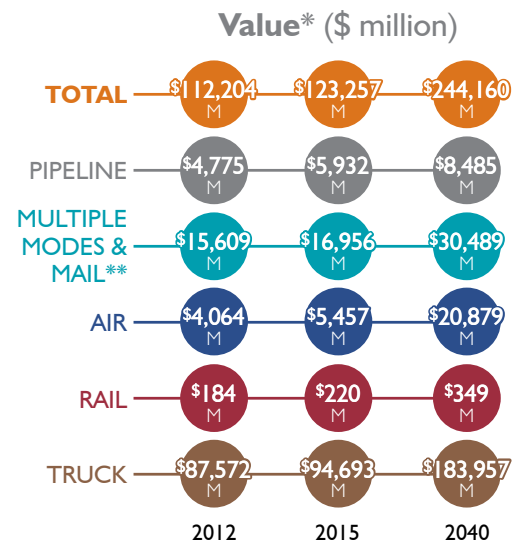
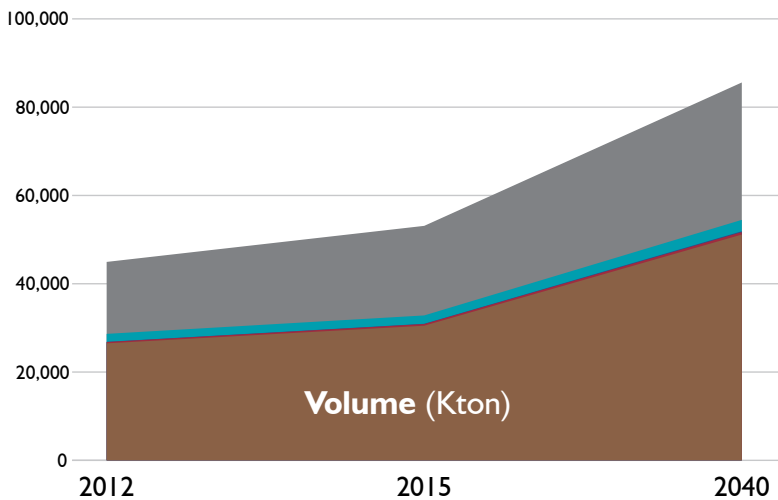
FREIGHT OVERVIEW

Globalization, evolving trade relationships, and technological advances continue to change economies around the world. Each of these factors has an effect on the transportation network that serves the region and the ability to meet the changing demands for freight.

An estimated 86 million tons of goods worth \$244 billion are expected to travel along the I-15 corridor annually by 2040.

Many of these changes will affect commodity flows along the I-15 Corridor. The I-15 Corridor is a national asset with global impacts and enormous value when considering transport of every type and mode. Freight and goods movements are vital to a healthy economy. A reliable transportation network is essential to move freight between states by truck, rail, aviation, or any other mode. The 2008 economic downturn has limited the spending capability of U.S. consumers, thus lowering the demand of goods. However, demand for goods is recovering, and goods movement continues to be essential to support the growing population of the U.S.

Approximately 53 million tons of goods, valued at \$123 billion, originated and terminated within the four Alliance states along the I-15 corridor transportation network on all transportation modes. This is only a portion of the total goods moved through this corridor destined for points beyond, and is estimated to increase to 86 million tons by 2040 with a projected value of \$244 billion (FAF04, 2015).



* in 2012 dollars

** Multiple Modes and Mail refers to commodities that move by more than one mode, in particular, parcel delivery services.

EXHIBIT 3-1. I-15 Corridor Freight Summary

Source: FAF04, 2015



The reliability of freight movement continues to play a major role in determining how goods are moved across North America, and to and from global markets.



TRUCKING

The I-15 Corridor is an avenue for truck movements out of the ports and agricultural regions of Southern California and onward to major cities such as Las Vegas and Salt Lake City.

As a major trade route, I-15 moves approximately 30 million tons by truck valued at approximately \$95 billion (FAF04, 2015). Considering the continued growth of port traffic, without improvements, the roadways supporting the ports will be congested and will experience greater delays in the future. Furthermore, safety and congestion issues within metropolitan areas along I-15 will continue to slow traffic and degrade reliability of goods shipment along this corridor.



COST OF CONGESTION

The cost of congestion in lost time, money, opportunity, and lives can be significant. In the 2012 Corridor System Master Plan, it was reported that the I-15 corridor hosted five of the nation's worst trucking bottlenecks, according to the American Research Institute (ATRI). ATRI's latest report (2014) shows that only three locations remain on this list, which shows that corridor efforts to improve I-15 on a regional scale are succeeding.

The I-15/I-215 interchange in Salt Lake City has been removed from the ATRI list, which encompassed two prior rankings. Due to recent improvements, I-15 through Las Vegas and San Bernadino have dropped significantly in their rankings. The Corona, California location at I-15/SR 91 however, has gotten worse.

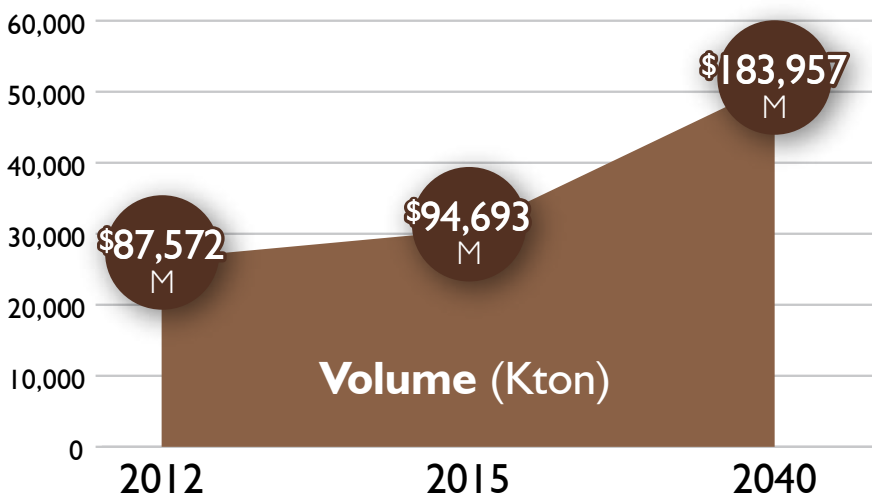


EXHIBIT 3-2. Volume and Value of I-15 Freight by Truck

Source: FAF04, 2015



EXHIBIT 3-3. Average Annual Daily Truck Traffic

Source: FAF03 2010, FAF04 2015



FREIGHT RAIL

Without improvements, demand is expected to exceed both freeway and rail capacity, resulting in costly shipping delays.

The two largest U.S. Class I railroads, BNSF Railway (BNSF) and Union Pacific (UP), are the only Class I railroads that operate in the study area. BNSF service starts in San Diego, California and proceeds north along the coastal rail corridor to Los Angeles and then to points north and east across Arizona, New Mexico, and Texas.

UP provides service to a large portion of the region, and one segment of the UP track parallels I-15 from Los Angeles to Salt Lake City—both critical hubs in UP's network. Approximately 400,000 tons of goods, valued at \$220 million, originated and terminated within the four Alliance states along the I-15 corridor. This constitutes a small fraction of the total goods moved by rail through this corridor destined for points beyond (FAF04, 2015).

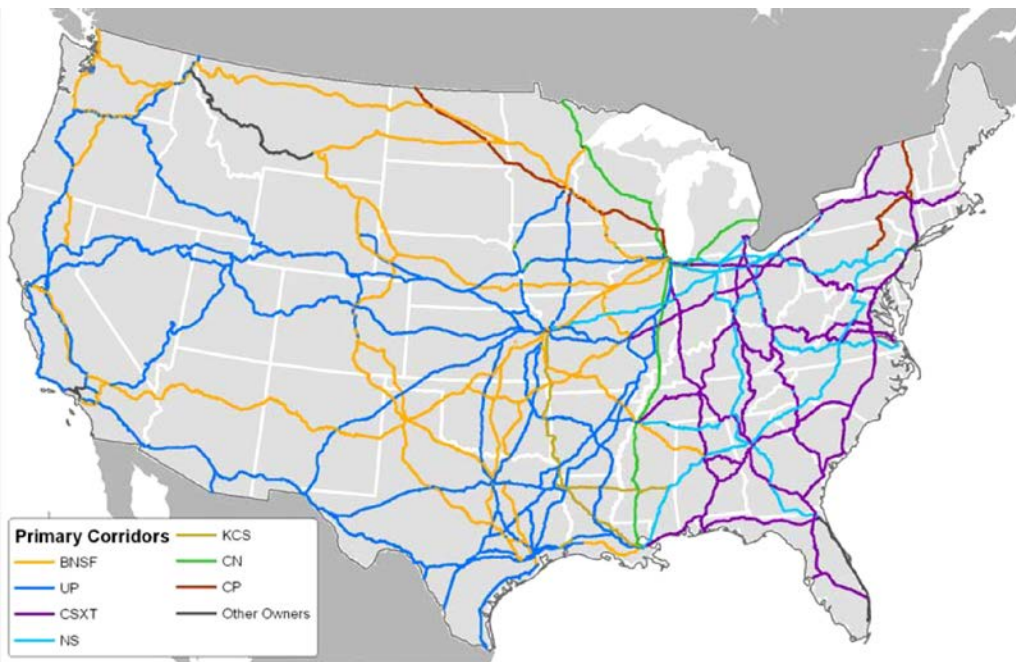


EXHIBIT 3-4. Primary U.S. Freight Rail Corridors

Source: Cambridge Systematics, Inc.

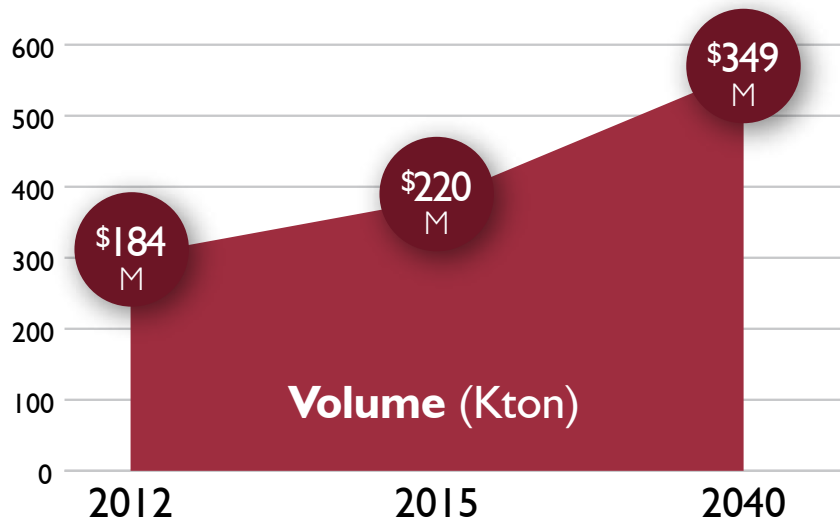


EXHIBIT 3-5. Volume and Value of I-15 Freight by Rail

Source: FAF04, 2015





AIR CARGO

Most air cargo has a high value and is transferred to trucks for quick delivery to its final destination.

The I-15 corridor moves approximately 52,000 tons by air valued at approximately \$5 billion (FAF04, 2015). Some of the major air cargo airports along the corridor include Los Angeles International (LAX), McCarran International Airport (LAS), and Salt Lake City International (SLC).

LAX ranks in the top 6 airports in the world for total air cargo traffic (FAA, 2016a). In terms of landed weight in in the U.S., LAX and PHX rank in the top 20 airports, with LAS ranked at 64 in 2015 (FAA, 2016).

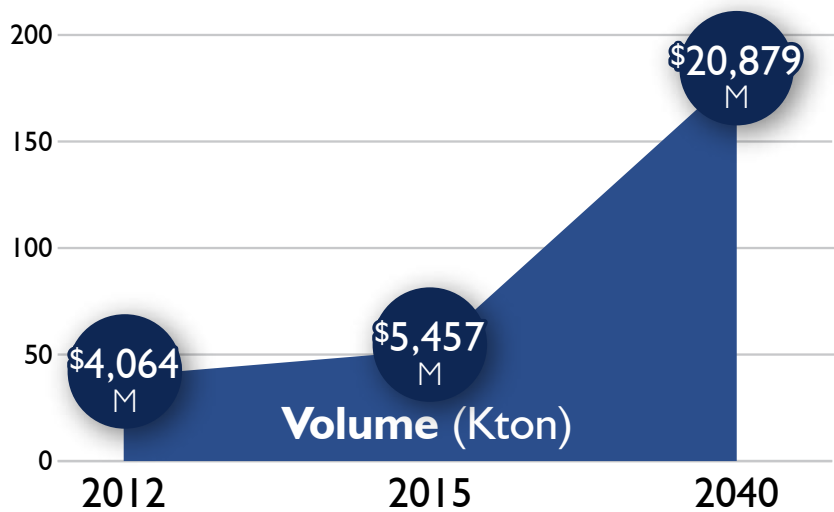


EXHIBIT 3-6. Volume and Value of I-15 Freight by Air
Source: FAF04, 2015





PORTS OF ENTRY

The reliability of the network to transport goods from the Ports of Entry through inland distribution centers and on to the end consumer underlines the very nature of this Master Plan and the importance of the I-15 Corridor to the region, nation, and world.

Together, the Ports of Los Angeles and Long Beach rank as the 9th busiest port complex in the world. As demand for warehousing moves further out of the Los Angeles Basin, connecting corridors like I-15 will become stressed.

The Port of Los Angeles and Port of Long Beach have worldwide significance, and are the busiest ports in the U.S. for container traffic. If combined, they would be ranked ninth worldwide for container traffic according to the American Association of Port Authorities statistics on World Port Rankings in 2014. Combined, they account for approximately 32 percent of goods transported in and out of the U.S. (AAPA, 2014b).

The ports are major economic drivers for California and the region. The ports of California are the primary gateways to manufactured goods from the Asian markets and the most cost-effective way to deliver goods to North American markets. The expansion of the Panama Canal which was inaugurated on June 26, 2016, may shift some traffic from West Coast to East Coast and Gulf ports as the all-water route from Asia to the eastern U.S. through the Panama Canal becomes more economical. Maintaining I-15's capacity to move goods will help maintain the viability of California's deep-water ports, strengthening the economy of the entire region.

The I-15 Corridor serves as a primary goods movement route serving California and Mexican ports, including portions of the CANAMEX Corridor. As a primary collector-feeder route between Southern California, Mexico, and Canada, the U.S. relies on goods moving on the I-15 Corridor, because it provides an efficient connection between primary east-west trade corridors, specifically, I-8, I-10, I-40/SR 58, I-70, I-80, I-84, I-86, and I-90.



EXHIBIT 3-7. International Trade Entry Points



While the ports of Los Angeles and Long Beach process the greatest share of goods moving in and out of the study region, border crossings also play an important role in international freight movements. Maintaining I-15's capacity and reliability to move goods will help maintain the viability of the Southern California ports and the economy of the region.

Total Cargo Volume at Southern CA Ports

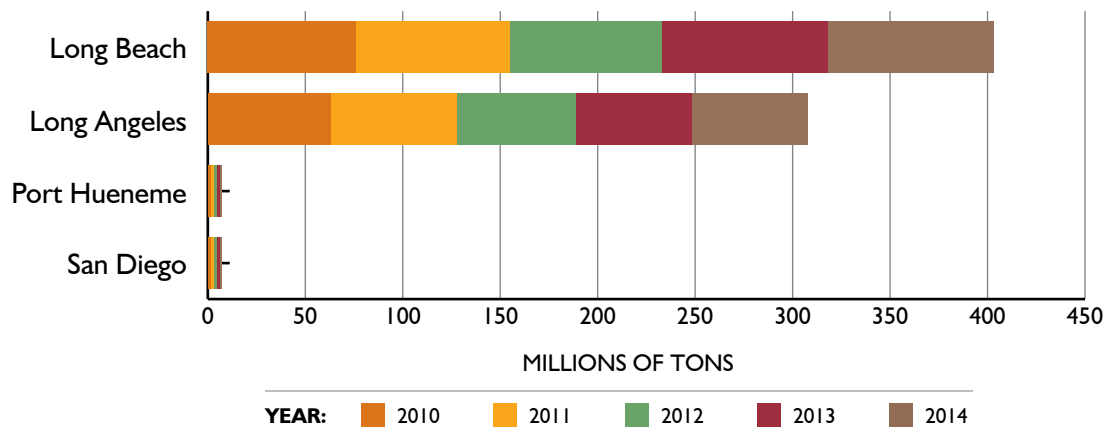


EXHIBIT 3-8. Total Cargo Volume at Southern California Ports (Tons)

Source: AAPA, 2014a



The I-15 Mobility Alliance states must compete nationally and globally for the investments and jobs needed for a thriving economy. The reliability of freight movement will play a major role in deciding how goods are moved from Asian and Mexican manufacturers to markets throughout North America. Maintaining I-15's capacity to move goods will help maintain the viability of both deep-water ports and land ports of entry, strengthening the economy of the entire region.

EXPRESS LANES 

MINIMUM TOLL: \$ **0.50**

	\$ 0.50	7 MINS
	\$ 0.80	14 MINS

EXIT 27

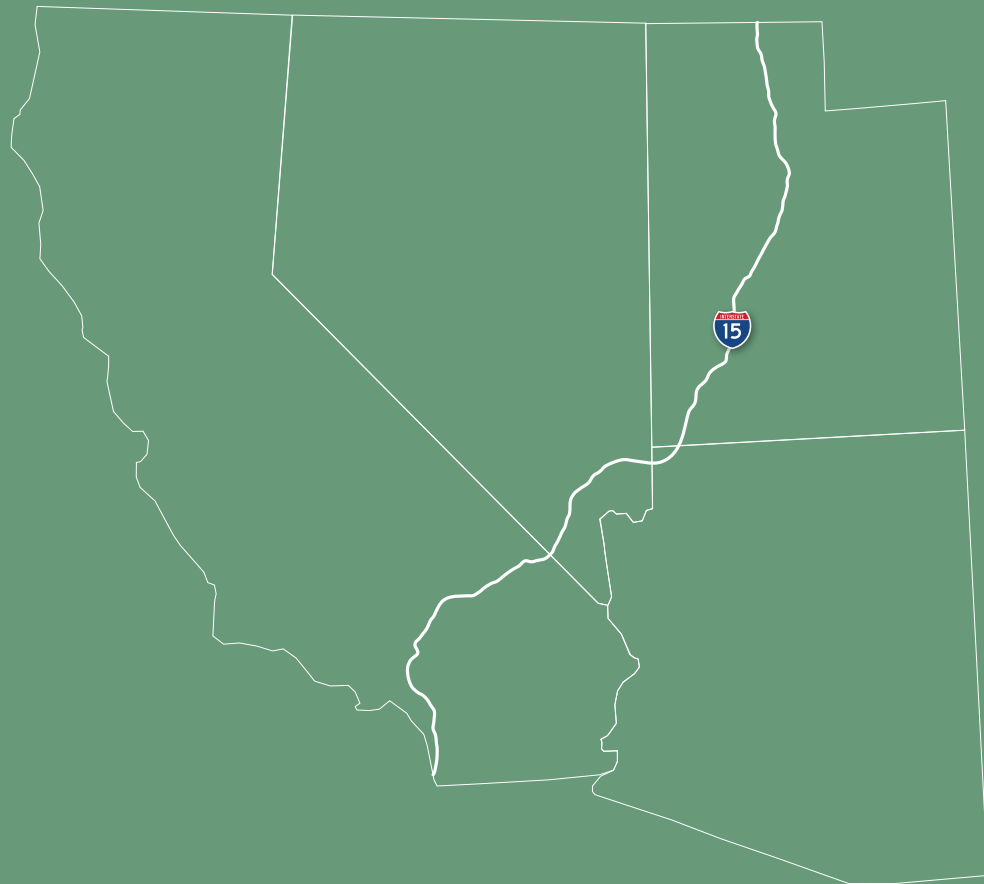
Via Rancho Pkwy

EXIT ↓ ONLY



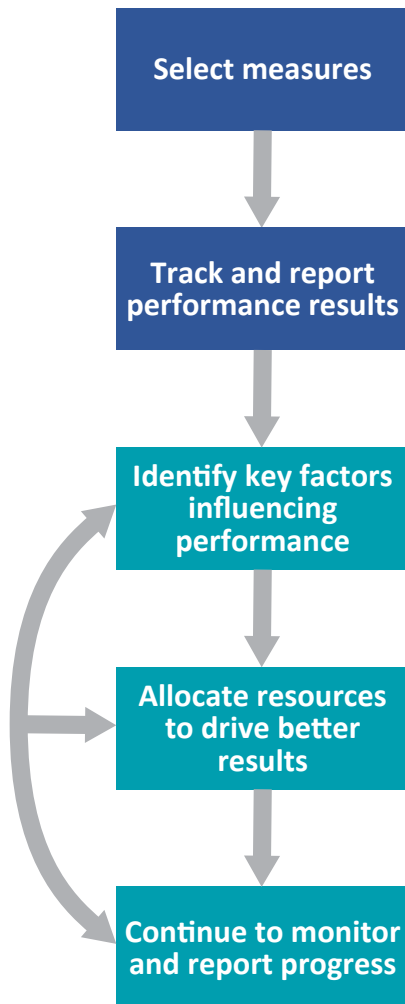
4.

PERFORMANCE MEASURES





MEASURING PROGRESS THROUGH PERFORMANCE MEASURES



State and Federal transportation agencies have long used asset and performance management techniques to assess, measure, and gauge infrastructural and operational capabilities of their systems. However, maintaining a performance management system has become more important in the recent past, as it has become one of several evaluation criteria used to award federal grant monies.

In the case of I-15, the I-15 Mobility Alliance has decided to establish a series of performance measures to understand the major factors that impact travel on I-15:

- **Congestion**
- **Safety**
- **Infrastructure Condition**

Monitoring progress on an annual basis allows the Alliance to track change along the Corridor and understand the impact of improvements on a regional scale, serving as a touchstone by which to gauge the success of these efforts. Additionally, the data allows the Alliance to prioritize improvements and grant opportunities in the areas of greatest need.



In subsequent updates of the CSMP, illustrative gauges will show the progress of these measures as improvements continue to be constructed and traffic conditions evolve.



CONGESTION



INFRASTRUCTURE CONDITION



CONGESTION

Projected growth in trade, population and employment in counties along the corridor will increase congestion on I-15. The existing Annual Average Daily Traffic (AADT) for the entire I-15 Corridor is expected to double by 2040, substantially exacerbating already apparent performance problems. The economic competitiveness of the region depends on the free-flow movement of people and goods.

PERFORMANCE GOAL

Maintain travel speeds at a minimum of 40 mph at all points throughout the day.

PERFORMANCE CRITERION

National Performance Management Research Data Set (NPMRDS) Speed Data: Peak period travel speed data tracks average speeds for passenger and freight vehicles, per direction, with results approximately every one mile.

RESULTS

Several chokepoints exist along the corridor as summarized in Exhibit 4-2. Many chokepoints are located in heavily populated urban areas, at junctions with other interstates or major state highways, or within areas of steep terrain. Some of these chokepoints are likely due to temporary construction projects.

State	Total Chokepoints	General Location along I-15	Typical Speed
CA	6	I-8	15 mph
		I-215/Temecula	38 mph
		SR 91/Corona	20 mph
		SR 60/Mira Loma	25 mph
		SR 18/Victorville	25 mph
		Barstow vicinity	25 mph
NV	2	Tropicana Ave	32 mph
		US 95/Spaghetti Bowl	25 mph
AZ	0		
UT	3	I-215 (north)/Salt Lake City	30 mph
		SR 30	20 mph
		I-84/Ogden	18 mph

Note: Chokepoints are represented by areas that have average speeds below 40 mph. Speed data is gathered over multiple points in time to gather typical conditions, organized by vehicle type (passenger, freight) and direction (northbound, southbound). Therefore, typical speeds noted are approximate averages and may not necessarily correspond to each condition.

EXHIBIT 4-1. I-15 Corridor Traffic Chokepoints

Source: NPMRDS Travel Times, 2013



EXHIBIT 4-2. I-15 Corridor Congestion Chokepoints

Source: NPMRDS Travel Times, 2013



SAFETY

Traffic incidents contribute to significant delays for both passenger and freight travel as well as costs to the public. Even one life lost is too many.

PERFORMANCE GOAL

Maintain a fatal accident rate below 0.003.

PERFORMANCE CRITERION

National Highway Traffic Safety Administration (NHTSA) Fatality Analysis Reporting System (FARS) Data: Fatal crashes per million vehicle miles traveled.

RESULTS

The I-15 corridor was broken into 14 segments for analysis purposes. All segments experienced at least one fatal crash in 2013. The segments with the highest traffic fatality rates are:

- **Segment 8:** Las Vegas metro area to Arizona state line
- **Segments 9, 10, and 11:** Arizona state line to US 6 in Utah
- **Segment 5:** I-40 to Nevada state line

Segment	Start	Finish	Length	Fatal Crashes (2013)	Fatal Crash Rate (2013) MVMT
1	I-5	I-215	62.78	7	0.002
2	I-215	SR 91	33.17	8	0.005
3	SR 91	I-215	27.11	6	0.004
4	I-215	I-40	58.43	17	0.009
5	I-40	NV-SL	112.01	16	0.01
6	NV-SL	SR 146	27.6	3	0.007
7	SR 146	CC 215	24.33	9	0.007
8	CC 215	AZ-SL	71.99	11	0.021
9	AZ-SL	SR 7	33.28	3	0.012
10	SR 7	SR 9	13.9	3	0.015
11	SR 91	US 6	229.12	14	0.01
12	US 6	SR 154	45.05	1	0.001
13	US 154	US 89	34.47	5	0.002
14	ES 89	ID-SL	76.31	4	0.003

EXHIBIT 4-3. I-15 Corridor Fatal Crash Rates by Segment

Source: NHTSA FARS, 2014



EXHIBIT 4-4. I-15 Corridor Fatal Crash Rates

Source: NHTSA FARS, 2014



INFRASTRUCTURE CONDITION

Poor infrastructure conditions create unreliable transportation facilities leading to additional miles traveled, increased travel times, increases in vehicle operating costs, and additional costs imposed on travelers and businesses. The cost of pavement and bridge deficiencies on travelers is estimated to be \$58 per person by 2020 and over \$650 by 2040 (ASCE, 2013).

Bridge conditions are assessed annually, at a minimum, with detailed tracking of conditions and improvement projects. The Alliance states have pavement management systems in place that include pavement maintenance and rehabilitation plans to continually prioritize needs through routine improvement projects.

PERFORMANCE GOAL

Eliminate the number of structurally-deficient and functionally obsolete bridges along I-15.

PERFORMANCE CRITERION

National Bridge Inventory (NBI) Database: Compilation of bridge data supplied by the each state to the FHWA for bridges located on public roads.

RESULTS

Structurally deficient bridges have structural defects or significant load-carrying elements that are found to be in poor or worse condition due to deterioration and/or damage. Functionally obsolete bridges are substandard or are no longer to conform to the design standards in place at the time they were designed.

Each I-15 corridor state has several structurally deficient and functionally obsolete bridges along I-15. While I-15 only traverses Arizona for 29 miles, the majority of this area passes through the Virgin River Gorge, which involves a series of major bridge structures, all of which have been recently or are planned to be replaced/improved.

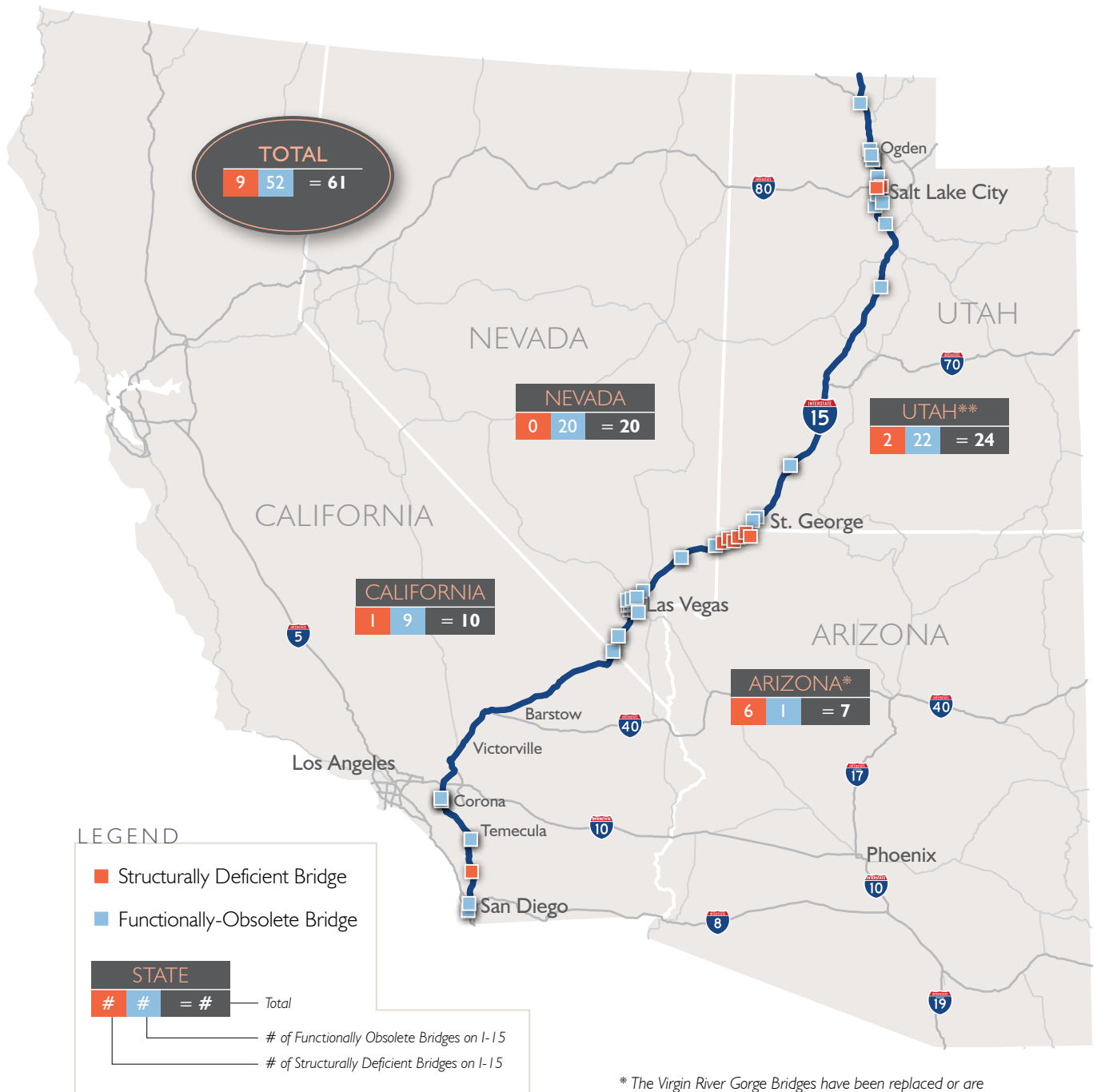


EXHIBIT 4-5. I-15 Corridor Infrastructure Conditions

Source: NBI Database, 2015; Peterson, pers. comm. 2017; Yaqub, pers. comm. 2016

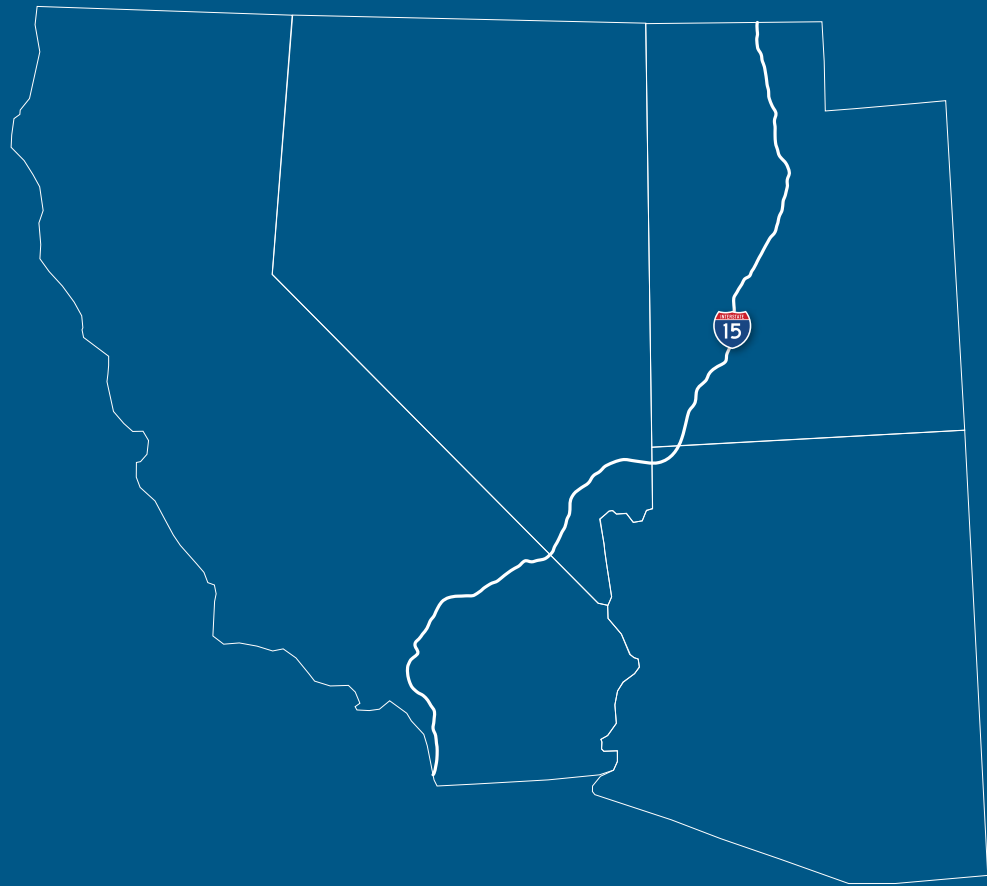
* The Virgin River Gorge Bridges have been replaced or are planned to be replaced/improved. These bridges are not in the national bridge inventory database. Bridge condition data for Arizona segment of I-15 received from ADOT.

** Several I-15 bridges have been recently replaced through the I-15 Corridor Reconstruction (CORE) Project. Updated bridge condition data for Utah received from UDOT.



5.

I-15 MOBILITY ALLIANCE





I-15 MOBILITY ALLIANCE

THE ALLIANCE GOALS INCLUDE:

- Reduce or eliminate congestion impacting the interregional movement of people or goods
- Improve interregional travel time reliability of people or goods movement
- Improve the safety of the interregional movement of people or goods
- Construct projects in a manner that respects and honors the unique goals/objectives/standards of each sponsoring community/entity

The I-15 Mobility Alliance developed the first I-15 Corridor System Master Plan in 2012 to provide policy and decision makers with a strategic action plan that defines future transportation infrastructure, and supports national, regional, and local approaches to improve freight delivery, and relieve congestion for years to come. Individuals within the four states and beyond invested their time and resources to keep this economic artery of the West flowing.

The Alliance partners come from state and local transportation agencies, local and interstate commerce, port authorities, departments of aviation, freight and passenger rail authorities, freight transportation services, providers of public transportation services, environmental and natural resource agencies, and others. The I-15 Mobility Alliance partners provided invaluable data, resources, and assistance in capturing, analyzing, and summarizing the technical data in the Master Plan.

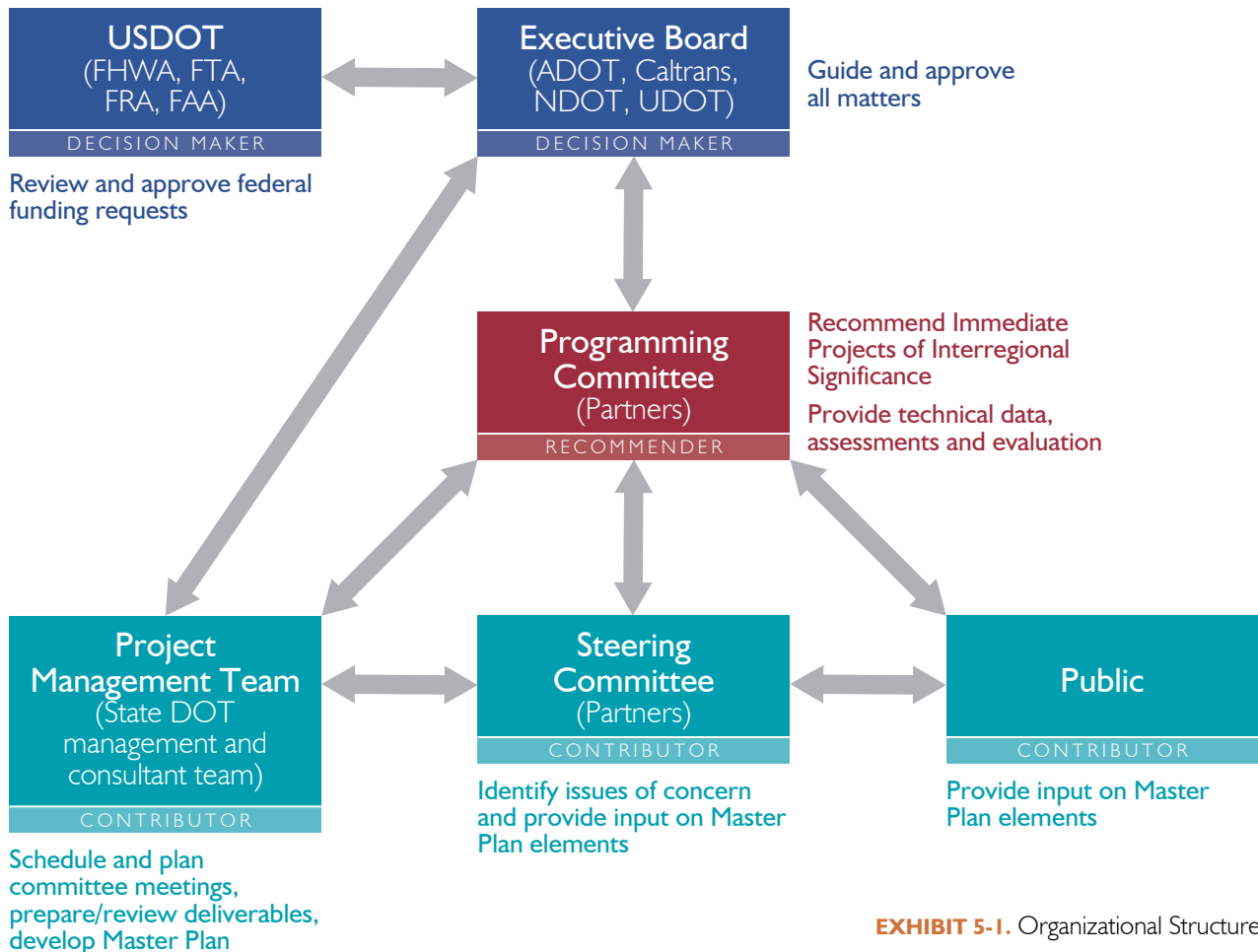


EXHIBIT 5-1. Organizational Structure

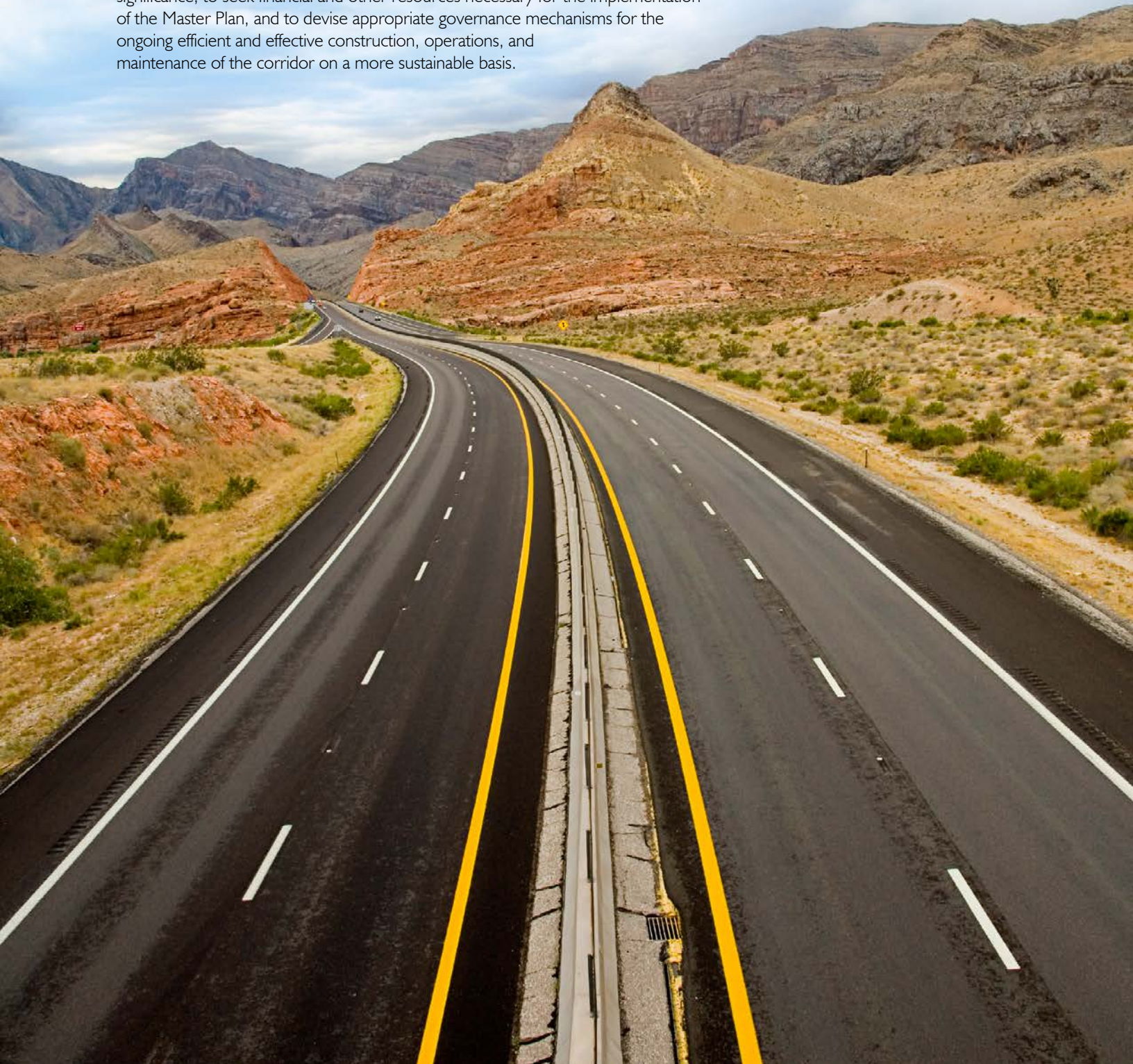


MISSION STATEMENT

The I-15 Mobility Alliance transcends traditional transportation thinking by advancing innovation, long-range planning, investment, and implementation of multimodal systems; including not only increased mobility of people and goods through highways, freight rail, transit, and high-speed passenger rail, but also forward-looking technologies for the transport of energy, data, and communications.

The I-15 Corridor is a vital linkage in the economy not only of the western U.S., but of the entire nation. Projected increases in commodity flows from the western U.S. and Mexican ports, and population growth will result in the impacted segments of I-15 experiencing severe congestion thus impeding commerce, hindering mobility, and degrading the quality-of-life of the people served by the corridor.

The mission of the Alliance and its members is to develop, in partnership with public and private sectors, a comprehensive, multimodal Master Plan for the I-15 Corridor, to prioritize projects and policies of interregional significance, to seek financial and other resources necessary for the implementation of the Master Plan, and to devise appropriate governance mechanisms for the ongoing efficient and effective construction, operations, and maintenance of the corridor on a more sustainable basis.





IMMEDIATE PROJECTS OF INTERREGIONAL SIGNIFICANCE

The I-15 Mobility Alliance maintains a list of Immediate Projects of Interregional Significance. In February 2011, the I-15 Mobility Alliance endorsed high priority projects for their ability to get people and goods to their destinations safely and on time. Since that time, 24 projects have progressed in some fashion - from completion of environmental documentation to initiation of construction of some or all phases of the program - with 8 successfully receiving Federal discretionary funding.

This list has been updated every two years to reflect the latest projects that: (1) have community support, (2) have environmental clearance activities complete or underway, and (3) have substantial commitment of state and local funding. With additional federal investment, these projects can:

- Be substantially implemented within 2 – 5 years
- Create tens of thousands of jobs
- Boost the productivity of business and sustain the quality of life of our communities by reducing the drag of congestion on goods and people

Currently, 28 projects are on the Immediate Projects of Interregional Significance list, divided into six categories:

- Highway/Bridge
- Tolling and Congestion Pricing
- Intermodal Freight Distribution
- Transit and Rail
- Intelligent Transportation/Active Traffic Management Systems (ITS/ATMS)
- Interstate Strategic Corridor Investments

The Interstate Strategic Corridor Investments category differs from the other project categories in that this grouping captures longer-range or visionary projects for the I-15 Corridor that involve multiple states. These are not likely to see construction in the 2-5 year timeframe, but relevant planning, environmental, and design activities should be advanced.



Highway/Bridge Projects of Regional and National Significance (HB)

- 1 I-15: Virgin River Gorge Bridges.....AZ
- 2 I-15/French Valley Parkway Interchange.....CA
- 3 I-10 Express Lanes.....CA
- 4 I-15 HOV Improvements, Blue Diamond Rd to I-515.....NV
- 5 I-15 Improvements: Utah MP 0 to I6.....UT
- 6 I-15/Provo 820 North Interchange.....UT



Tolling and Congestion Pricing (TCP)

- 1 I-15: Toll Express Lanes from Cajalco Rd to State Route 210CA
- 2 I-15: HOV/HOT Lanes, Layton to RiverdaleUT



Intermodal Freight Distribution (IFD)

- 1 Port of San Diego Freeway Access Improvements ...CA
- 2 SR-11/Otay Mesa East Port of Entry Project.....CA
- 3 I-15 Improvements from Apex Economic Development District to CC-215NV
- 4 I-15 Truck Climbing Lanes (various locations).....UT
- 5 5600 W. Access to Intermodal FacilityUT



Transit and Rail (TR)

- 1 XpressWest High-Speed Rail Connection between Las Vegas, NV and Victorville, CA.....CA/NV
- 2 Front Runner System Improvements.....UT
- 3 Front Runner System First/Last Mile ConnectionsUT



Intelligent Transportation/Active Traffic Management Systems (ITS/ATMS)

- 1 I-15 Integrated Corridor Management; SR 163 to SR 78.....CA
- 2 I-15 from Las Vegas Valley to Mesquite, FAST Package H.....NV
- 3 Expansion of ITS Digital Backbone on I-15UT
- 4 Managed MotorwaysUT
- 5 I-15 Dynamic Mobility Project: Multi-State ITS ArchitectureAZ/CA/NV/UT



Interstate Strategic Corridor Investments

- 1 Southwest Passenger Rail PlanningCA/NV/UT
- 2 I-15 Mobility Alliance Planning.....CA/NV/AZ/UT
- 3 I-11 Corridor, Arizona & Nevada.....AZ/NV
- 4 I-15 Alternative Route Implementation.....CA/NV/UT
- 5 Smart Truck Parking StudyCA/NV/UT
- 6 Alternative Fuel Corridor ImplementationCA/NV/AZ/UT
- 7 Hyperloop, Las Vegas to Ports of LA/LBCA/NV



- # Specific Projects
- ITS - ITS/ATMS
- ⚓ Ports
- Border Crossing

LEGEND



ACCOMPLISHMENTS

Over the past six years since the I-15 Mobility Alliance was established, the group has developed partnership with over 72 public and private sector agencies; developed a comprehensive, multimodal Master Plan for the I-15 Corridor, and prioritized Projects of Interregional Significance.

Since 2011, 23 improvements on the current and past list of "Immediate Projects of Interregional Significance" have been completed or are under construction.

List of project accomplishments by the I-15 Mobility Alliance since the 2012 CSMP

HIGHWAY/BRIDGE

	Sponsor	Project Name
AZ	ADOT	I-15: Virgin River Gorge Bridges
CA	Caltrans	I-15/French Valley Parkway Interchange
CA	RCTC	I-15/SR-91 Interchange
CA	SANBAG	I-15/I-215 (Devore) Interchange Reconstruction
CA	SANDAG	I-15/SR 76 East
NV	NDOT	Project NEON Phase I: I-15 from Sahara Ave to I-15/US 95 Interchange (Spaghetti Bowl)
UT	UDOT	I-15 Improvements from Lehi to Draper



TOLLING AND CONGESTION PRICING

	Sponsor	Project Name
UT	UDOT	I-15: HOV/HOT Lanes I-215 to Riverdale Phase I



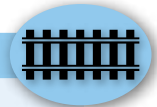
INTERMODAL FREIGHT DISTRIBUTION

	Sponsor	Project Name
CA	SANDAG	Port of San Diego Freeway Access Improvements
CA	SANDAG	State Route 11/Otay Mesa East Port of Entry Project



TRANSIT AND RAIL

	Sponsor	Project Name
CA	SANDAG	Mid-City Transit Projects/I-15 Corridor BRT
NV	RTCSNV	Flamingo BRT, Boulder Highway to Bruce Woodbury Parkway
NV	RTCSNV	I-15 Park and Ride Facilities, Various Locations
UT	UTA	I-15 Park & Ride Facilities, Various Locations
UT	UTA	Front Runner System Improvements
UT	UTA	Provo/Orem BRT via University Parkway and University Avenue



ITS/ATMS

	Sponsor	Project Name
CA	Caltrans	I-15 Integrated Corridor Management Project
NV	NDOT/FAST	I-15 from Craig Road to SR 604, FAST Package D
UT	UDOT	Expansion of ITS Digital Backbone on I-15
CA, NV, AZ, UT	I-15 Mobility Alliance	I-15 Dynamic Mobility Project



INTERSTATE STRATEGIC CORRIDOR INVESTMENTS

	Sponsor	Project Name
CA, NV, AZ, UT	FRA	Western High-Speed Rail Feasibility Study
NV, AZ	ADOT/NDOT	I-11 and Intermountain West Corridor Planning, Arizona to Nevada
UT	Dixie MPO	Utah I-15 MP 0 to 16 Environmental Assessment





MULTISTATE I-15 DYNAMIC MOBILITY PROJECT

The I-15 Mobility Alliance was selected as one of six Corridor Coalitions nationwide to receive funding under the Multistate Corridor Operations and Management (MCOM) Program in 2012. The \$1,250,000 funding the I-15 Mobility Alliance received will help to execute and accelerate the delivery of the I-15 Dynamic Mobility Project and continue to bring national attention to this critical corridor.

The Multistate I-15 Dynamic Mobility Project (I-15 DMP) seeks to obtain, exchange, and disseminate real-time data on all segments of I-15 and all modes, to create a seamless intelligent transportation system (ITS) backbone from San Diego, CA, to the Utah/Idaho border. An important goal of the project is to improve agency coordination when incidents, weather and closures affect the I-15. This coordination will ultimately translate into improved advanced warnings and consistent information provided to travelers along I-15.

The project team is working with each state to identify their priorities for corridor information: what information do neighboring states need? How will that information be used to improve alerts and notifications to travelers? What level of coordination is needed for different types of events? Where are there gaps in information that this project could help to address?



EXHIBIT 5-2. Existing Traffic Management Centers along the I-15 Corridor



By facilitating interstate coordination among I-15 Alliance states, this project can result in:

- More consistent and timely information about real-time travel conditions
- Improved information dissemination about future, planned travel conditions
- Accurate information about emergency detours implemented on the corridor
- Faster and more efficient incident or event response, especially at state borders
- Improved interstate cooperation on ITS planning, operations and sharing of best practices
- Improved travel time reliability

Additionally, the outcomes and lessons learned from this project can benefit other key corridors in the region, such as I-80, which have similar needs with respect to interstate coordination and communication and involve many of the same partnering states.

Technology helps to maximize existing infrastructure by better managing the demand and flow of traffic.



DETOUR OPTIONS

One of the key issues that the I-15 Dynamic Mobility Project will also address is defining I-15 detour routes. Much mountainous terrain and vacant, open desert traverse the corridor, providing minimal alternative routes in times of interstate closures or extreme congestion.

Existing interstate or state highway alternatives may require drivers to travel between 30 and 290 miles out of direction.



EXHIBIT 5-3. I-15 Detour Options



LOOKING TO THE FUTURE: EMERGING TECHNOLOGIES

Each of the following has application within the I-15 Corridor now or in the lifetime of the Master Plan, and is already being piloted in other U.S. and European corridor programs.

- Automated Snow Plow Routing
- **Autonomous/Connected Vehicles**
- Biofuels Based Pavements
- Carbon-neutral Roadways
- Electrified Freight Railways
- **Electric Vehicles (EVs) and Car Plug-in Stations**
- Glass Highways
- High-speed Rail Passenger Systems
- Heated Bridge Decks
- Hydrogen Highway
- **Hyperloop**
- Improvements to Reduce Rolling Resistance for Pavements
- Inherently Low Emission Vehicles (ILEV)
- Innovative Concrete Materials
- Technologies for Traffic Management
- Natural Gas and/or Biofuel Fueling Stations
- Pavement Heat Exchangers
- **Solar Highways**
- Solar/Roadway Lighting, Markings, and Signs
- Solar/Wind Power in Jersey Barriers
- Sustainable Roadway Rest Stops

In times of diminishing economic and natural resources, using sustainable approaches in transportation allows us to continue to enhance quality of life and serve the transportation needs of the present without compromising the ability of future generations to meet their needs.

The I-15 Dynamic Mobility Project will explore options to integrate technology into our transportation system to increase efficiency and reliability of the movement of both people and goods, but also facilitate better information gathering and response times to incident situations.

Thinking more broadly though, we need to start thinking today about the future. How might travel change? What does that mean for our current transportation system? How can we plan today to adapt for tomorrow? This region is known to take risks and push boundaries. It is just a matter of time before emerging developments in technology and changes in traveler demand will shift how we move from Point A to Point B.

Autonomous/Connected Vehicles:

An autonomous car – also known as an uncrewed vehicle, driverless car, self-driving car and robotic car – is capable of fulfilling the main transportation capabilities of a traditional car without human input. Future vehicles will be equipped to communicate with each other and the infrastructure around them. Combined with in-car automation and control technologies, these vehicle-to-vehicle and vehicle-to-infrastructure capabilities will change how vehicles travel and interact with each other on the roadway.

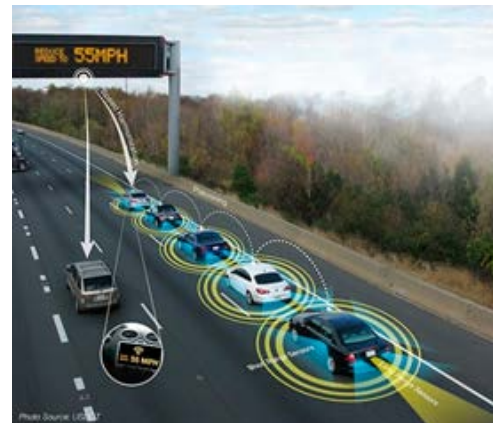


Photo source: USDOT

For instance, connected vehicles will allow automated cars to synchronize their movements, accelerating and braking as a unit instead of many individual vehicles. By eliminating the element of human error and reaction times, this enables vehicles to drive at higher speeds and closer together, thereby maximizing traffic capacity of highways and streets. This applies to passenger vehicles, as well as freight trucks, with the latter referred to as “truck platooning.” Synchronized vehicles would also improve safety, as their sensors and computer controls would help prevent traffic collisions. The Insurance Institute for Highway Safety (IIHS) estimated that if all vehicles had forward collision and lane departure warning systems, sideview (blind spot) assist, and adaptive headlights, nearly a third of crashes and fatalities could be prevented (IIHS, 2010).



Solar Highways: The concept of “solar highways” originated with the installation of photovoltaic panels along undeveloped highway right-of-way. The energy created by the solar panels can be used to power different elements of the highway, such as night time illumination, road signs, emergency telephones, and ventilation systems for tunnels.

This concept is evolving to construct roadways out of solar panels, or rather a new road material that houses solar cells to collect energy. This technology is under development by the USDOT and could pay for the cost of the panel, thereby creating a road that would pay for itself over time. From here, lights could be added to “paint” the road lines from beneath, lighting up the road for safer night time driving and easily allowing changes in striping to respond to construction activities, incidents, or demand-based changes to manage traffic during peak commuting periods. Alternatively, the road could change colors as a warning symbol, such as for wildlife crossings or the notification of emergency vehicles. In addition, the preserved solar energy could be used to heat the road to melt ice or snow. Further, as vehicle-to-infrastructure communication evolves, roadways may “speak” to cars to warn of oncoming obstacles, like crashes or construction zones.

Electric Vehicles (EVs) and Car Plug-in Stations:

EVs are becoming more popular among vehicle manufacturers, and the allowable driving distance on one charge continues to lengthen. However, charging stations at reasonable intervals can strengthen the ability for long-distance travel. Fast charge technology allows vehicles to recharge in 30 minutes or less, allowing EV drivers to grab a cup of coffee or shop while charge up their vehicles at shopping centers, fueling stations and near highway interchanges.

This has already been put into place via the “West Coast Electric Highway,” an extensive network of EV fast charging stations located every 25 to 50 miles along Interstate 5 and other major roadways in the Pacific Northwest.

Hyperloop: Elon Musk’s proposed Hyperloop system offers travel speeds that challenge current aviation and ground transportation technologies. The Hyperloop involves an enclosed surface vacuum to right-of-way that would enable the pods inside it to move at ground speeds up to 745 miles an hour in a way that would minimize energy use and drastically reduce travel time between city pairs within its system. The project developer, Hyperloop Technologies, Inc., proposes to have a commercially viable system in operation by 2020 despite the skepticism of many in the scientific community (Deutchmann, 2015). Hyperloop began testing in Nevada in early 2016 at a 50-acre site in North Las Vegas and successfully conducted its highly anticipated Propulsion Open Air Test on May 11, 2016 (Thompson, 2016).



Photo source: USDOT



Photo source: Washington State DOT



Photo source: Hyperloop One



AWARDED GRANTS INCLUDE:

\$1.25M – I-15 Mobility Alliance:
Dynamic Mobility Project (MCOM 2012)

\$21.6M – ADOT: I-15 Virgin River Gorge Bridge (TIGER 2012)

\$13.3M – RTC of Southern Nevada:
Flamingo Corridor Improvements (TIGER 2012)

\$421M – RCTC: SR 91 Corridor Improvements (TIGER 2011)

\$49.3M – Caltrans: SR-11 Segment 2 and Southbound Connectors (FASTLANE 2016)

\$10M – Port of San Diego: 10th Ave Marine Terminal Modernization (TIGER 2015)

\$820,000 – Wasatch Front Regional Council: The Pioneer Corridor Plan (TIGER 2014)

\$200,000 – UDOT and UTA:
Salt Lake City Metropolitan Area Transportation Improvements (Integrated Corridor Management Grant 2015)

FUNDING AND FINANCING: MAKING THE VISION A REALITY

The Alliance's objective is to support efforts to identify and obligate the necessary financial resources to implement worthwhile improvements (projects and services) in the I-15 Corridor; operate and maintain these improvements; and ultimately adapt and renew them at the end of each successive life cycle, so that the corridor is resilient and relevant for this and future generations.

While financing is important, the key to financial sustainability of the corridor is the availability of reliable and adequate funding.

The funding constraints facing the region and nation demand that we use all tools and modes at our disposal to address these challenges.

Even with traditional federal, state and local funding streams, there is still a funding gap to deliver transportation improvements. In other states and on a national level, additional funding mechanisms are being considered to further close this gap. A few examples of such measures include Road User Fees or Vehicle Miles Traveled (VMT) fees, Local Transportation Corridor Preservation Funding, Lottery Funding, and Congestion Districts.

Historically, the most widely used financing mechanism used to build transportation improvements has been through the issuance of debt instruments such as municipal bonds. Recently, there has been the introduction of private sector financing into the transportation infrastructure arena principally coupled with long-term agreements to design, build, operate, and maintain facilities or services. This type of investment by the private sector is commonly referred to as a public-private partnership and typically features revenue streams, such as charging a toll to use the facility.

To date, the I-15 Mobility Alliance has utilized various funding and financing opportunities offered through the federal government, such as Transportation Investment Generating Economic Recovery (TIGER), Transportation Infrastructure Finance and Innovation Act (TIFIA), Multistate Corridor Operations and Management (MCOM) program, and Fostering Advancements in Shipping and Transportation for the Long-Term Achievement of National Efficiencies (FASTLANE) grants.

The I-15 Alliance comes together to determine funding priorities (based on the IPIRS list) and supports each state in developing grant responses. For each funding opportunity available, various projects are considered and any decision to use a specific funding mechanism depends on the opportunity.

Current funding constraints require that we use all tools and modes at our disposal to address our transportation challenges.



Port of San Diego – 10th Avenue Marine Terminal Modernization (California)



Virgin River Gorge Bridges Reconstruction (Arizona)





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