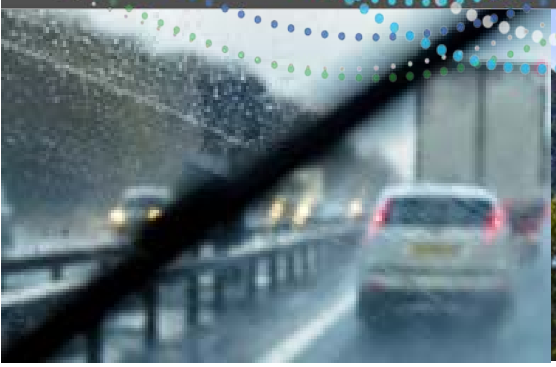
Mountain Area Transportation Study

Mobility Issue Identification, Solution, and Implementation Plan | Draft



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ABBREVIATIONS

ADT	Average Daily Traffic
App	Mobile device application
BID	Business Improvement District
Caltrans	California Department of Transportation
CFD	Community Facilities Districts
CHP	California Highway Patrol
CMAQ	Congestion Mitigation and Air Quality
CMP	Congestion Management Plan
CMS	Changeable Message Sign
CRF	Crash Reduction Factor
CTP	Countywide Transportation Plan
DLA	Division of Local Assistance
DOT	Department of Transportation
FAST ACT	US DOT Fixing America's Surface Transportation Act
FTA	Federal Transit Authority
HAR	Highway Advisory AM Radio
HBO	Home-Based Other
HBW	Home-Based Work
HSIP	Highway Safety Improvement Program
ITS	Information Technology Services
JPA	Joint Power Authority
MATS	San Bernardino County Mountain Area Transportation Study
MPH	Miles per Hour
NAAQS	National Ambient Air Quality Standards
NHB	Non-Home Based
NVUM	National Visitor Use Monitoring
OHV	Off-Highway Vehicles
PM	Post Mile
PMS	Permanent Message Sign
SANBAG	San Bernardino Association of Governments
SB1	Senate Bill 1
SBCTA	San Bernardino County Transportation Authority
SBTAM	San Bernardino Transportation Analysis Model
SCAG	Southern California Association of Governments
SED	Socioeconomic Data
SR	State Route
STBG	Surface Transportation Block Grant
SWITRS	Statewide Integrated Traffic Records System
TAZ	Transportation Analysis Zone
TIMS	Transportation Injury Mapping System
TWLTL	Two-Way Left Turn Lane

US	United States
USFS	United States Forest Service

1.0 EXECUTIVE SUMMARY

Understanding existing conditions is the basis of developing future forecasts and developing recommended projects and approaches to solving existing problems. This document summarizes the existing conditions, data collection, identified issues, and future conditions needs assessment for the Mountain Area Transportation Study (MATS).

Stakeholders were involved throughout the existing conditions data collection and needs assessment process. Stakeholders include the County of San Bernardino, the City of Big Bear Lake, Caltrans, San Bernardino County Transportation Authority (SBCTA), Southern California Association of Governments (SCAG), the California Highway Patrol (CHP), and the United States (US) Forest Service.

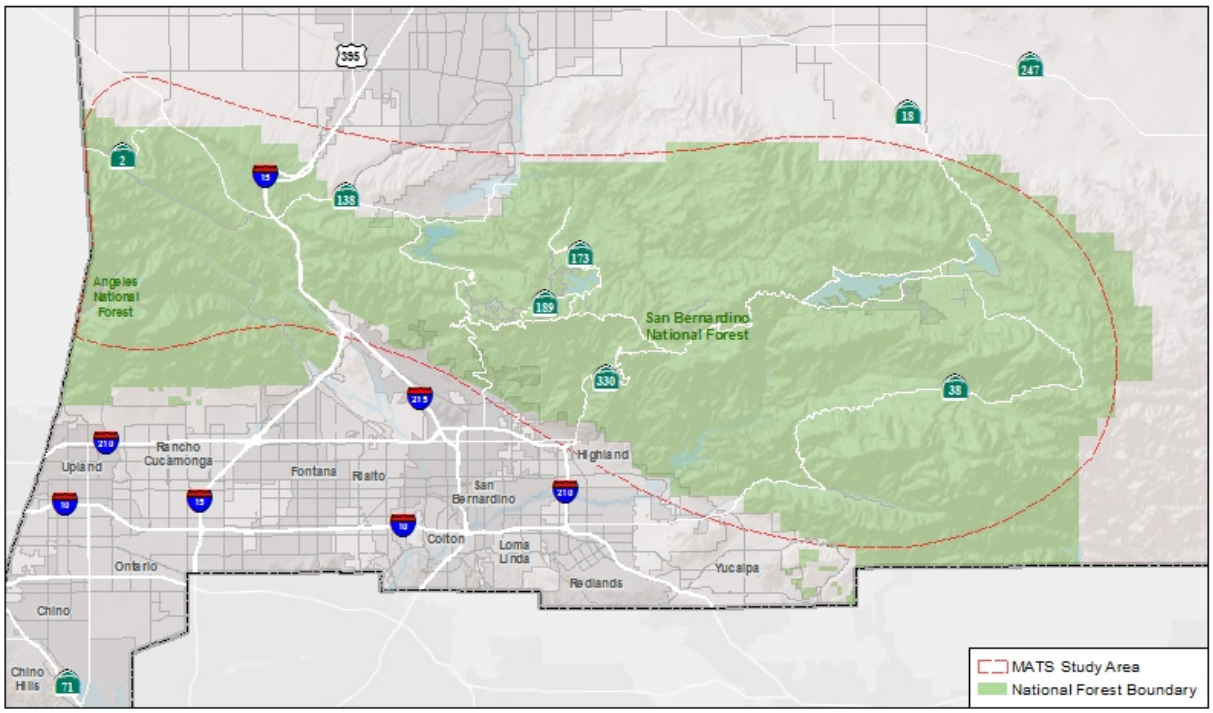
1.1 Purpose and Need

Visitors to the mountain area make up a large portion of the needs assessment, as the full-time population and associated employment are relatively low. Peak winter and summer months experience a substantial increase in traffic congestion for extended periods of time as visitors and associated additional employees access the mountain communities. In addition, the traffic congestion caused by visitors has the potential to discourage would-be visitors, hindering the local economy.

As an example of the larger study area, recent studies show that in 2012, the City of Big Bear Lake had a full-time population of 5,100 in approximately 2,200 households with a year-long employment of 3,800. In 2012, the City of Big Bear Lake served approximately 10,000 visitors on a typical day. However, during a peak season weekday for 2012, the City of Big Bear Lake had employment of approximately 5,800 while serving nearly 60,000 visitors. In 2040, visitors are expected to increase to over 76,000 (an increase of over 25 percent).

The geographic study area for the MATS is shown in **Figure E-1**.

Figure E-1: Study Area



1.2 Existing Conditions

The existing conditions within the MATS area show that during typical roadway conditions, and during average weekday travel, that the system operates adequately in a majority of locations. The status of the system identifies that during peak periods, or peak season travel periods, there are multiple intersections and segments of roadway operating at less than ideal levels of service.

This area has been studied previously, including the Big Bear 1996 Highway Transit Improvement Alternative, the recent Big Bear Modal Study, and the 2015 San Bernardino Countywide Transportation Plan. All previous studies have shown that there are existing transportation system needs within the MATS area. Solutions include implementing additional modes of transportation, realignment of existing facilities, adequate signage, and various other congestion relief measures.

1.2.1 Transportation System

The primary access roadways within the MATS area are State Route (SR)-2, SR-18, SR-38, SR-138, and SR-330. Each of these roadways experience unique traffic patterns associated with visitors to the area. All of the state highways within the MATS area were included, as well as some key local facilities. Secondary roads include major facilities within the mountain area that are heavily used by residents and visitors.

The existing transit system consists primarily of Mountain Transit and Victor Valley Transit Authority. Mountain Transit runs six fixed-routes and various other services for MATS residents and visitors, and

Victor Valley Transit Authority runs one fixed-route to the Community of Wrightwood. Supplemental service within the MATS area consists of Dial-a-Ride Service for seniors and persons with disabilities, weekend trolley service in and around the Community of Big Bear and the City of Big Bear Lake on Saturdays and Sundays, and the occasional Rally Bus ride-sharing which is a crowd-powered service.

In the existing transportation setting, non-motorized transportation (including bicycles and pedestrian activity) is encouraged, but the system lacks infrastructure, which can be a problem for mobility. The City of Big Bear Lake has an Active Transportation Plan, and the Lake Arrowhead community is currently preparing on an Active Transportation Plan. In addition, there has been recent coordination between the City of Big Bear Lake, the County of San Bernardino, and the Big Bear Valley Trails Foundation in obtaining a Caltrans grant to assist in the development and planning for future road and trail resources with connections to lakes and other mountain amenities.

1.2.2 Data Collection

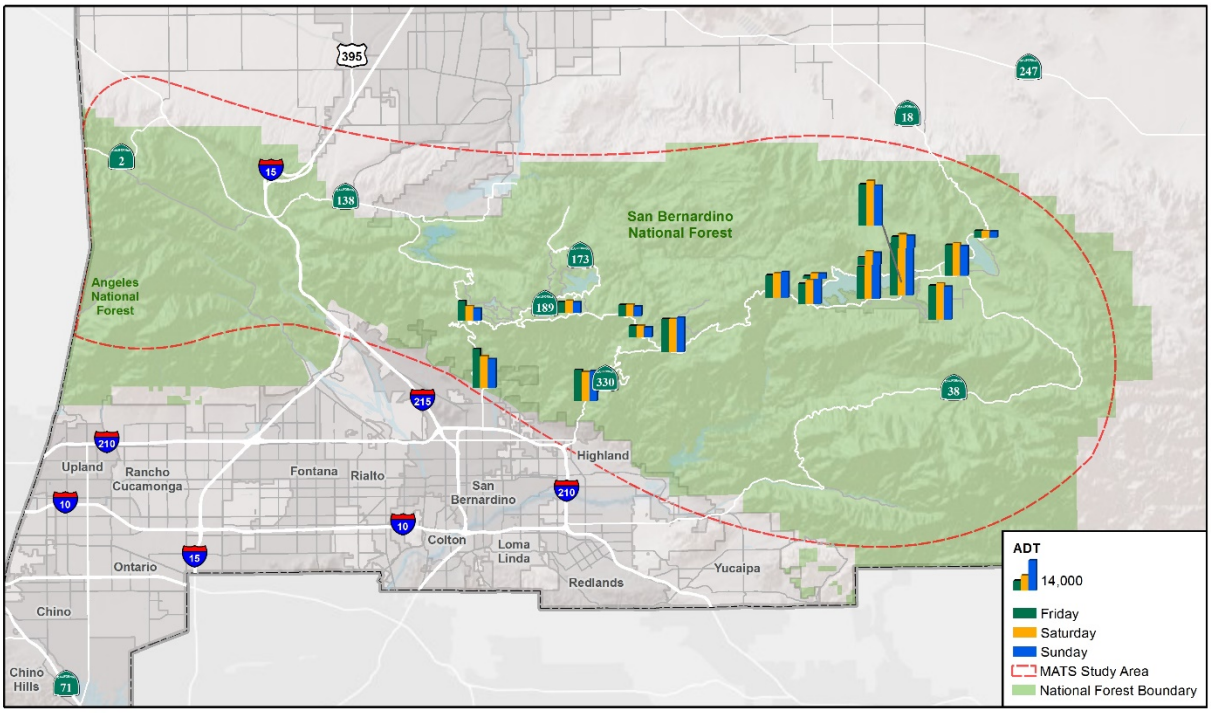
The existing conditions analysis was completed using information from multiple sources:

- Average Daily Traffic (ADT) traffic information from peak season data collection for Fridays, Saturdays, and Sundays.
- Transportation system speed data from iPeMS, the web-based tool developed for the SBCTA Congestion Management Plan (CMP).
- Existing turnout location and geometric information from aerial investigation and site visits.
- Chain-up area information.

Data

The primary direction of travel on Friday and Saturday is eastbound/northbound while the primary direction of travel on Sunday is westbound/southbound. This indicates a higher influx of vehicles into the mountain area on Friday and Saturday with an outflow of traffic on Sundays. **Figure E-2** presents the average daily traffic counts for Friday, Saturday, and Sunday travel on state routes within the mountain area.

Figure E-2: Average Daily Traffic Count Locations



1.3 Identification of Mobility Issues

Mobility issues within the MATS area were identified primarily using Stakeholder outreach via in-person meetings and by using the project web tool developed by SBCTA for this project. Mobility issues were also identified by reviewing the travel model tool results.

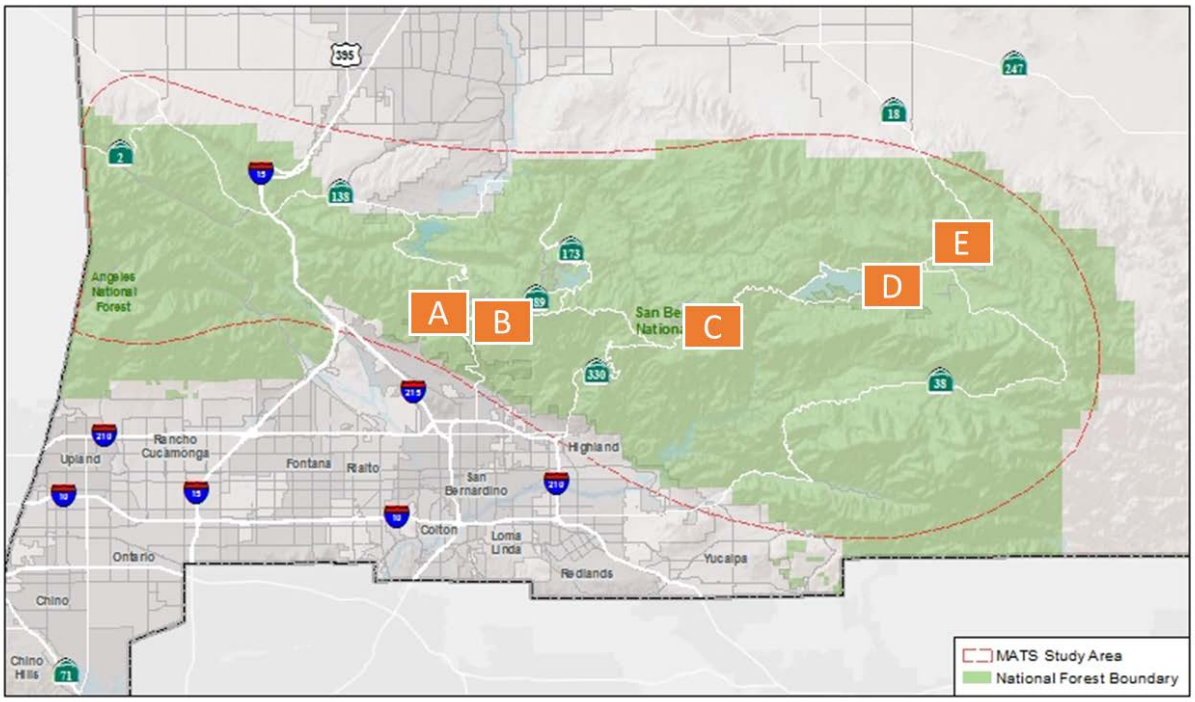
Stakeholders include the County of San Bernardino, the City of Big Bear Lake, Caltrans, SBCTA, SCAG, the CHP, and the US Forest Service. From the stakeholder meetings, many of the mobility problems that were identified can be summarized into the following need categories:

- **Traffic Control:** Bottleneck due to existing, non-existent, or poor location of traffic control device. (Example is a stop sign located on a high-volume road).
- **Signage:** Bottleneck due to non-existent or lack of signage, often resulting in poor circulation patterns, or confused drivers.
- **Traffic Volume:** Congestion and slow-moving traffic due to peak traffic volumes in excess of existing roadway capacity.
- **Cut-through Traffic:** Peak conditions (related to traffic congestion and weather) often result in cut-through traffic on local roads.

- **Roadway Geometry:** Bottleneck due to curves and topography (which result in a lack of sight distance), often caused by slow-moving vehicles. Other roadway design issues, including lack of center turn lanes or left turn pockets, also creates driver confusion and congestion.
- **Chain Installation and Control:** Bottleneck due to operations and procedures for chain installation. Additionally, chain control locations often encourage visitors to travel on local arterials to avoid chain installation.
- **Roadway Maintenance:** There are existing issues with roadway maintenance, including maintaining striping and snow removal.
- **Illegal Parking:** Traffic congestion and friction on state routes due to vehicles parked in "No Parking" zones. This is often the case in winter and summer peak months near popular snow play and hiking locations.
- **Pedestrian or Bicycle Conflicts:** Conflicts between vehicles and non-motorized person trips due to pedestrians walking along side of road, heavy pedestrian crossing volumes, or narrow road with no shoulder or lane for bicycles. These conflicts often result in traffic congestion, and can be unsafe for pedestrians and bicycles.
- **Alternate Modes:** The increase in residents and visitors allows for the potential for increasing use of transit services, including shuttle and trolley service along with improving the existing fixed-route services.
- **Information Technology Services (ITS) Opportunity:** Information for drivers is beneficial to the overall transportation circulation, and could be better improved with real-time Changeable Message Signs (CMS) at key locations throughout the mountain area.
- **Coordination between Jurisdictional Agencies:** There are multiple agencies and jurisdictions involved related to maintenance and control during major events. Agencies include Caltrans, County, City, Sheriff, and CHP. Lack of coordination can result in conflicting information, making it unclear what road conditions are, or what traffic congestion is currently occurring.
- **Existing Right-Of-Way:** It appears that many of the existing roadways are overlayed, or repaved, to existing roadway width, or even narrower in locations. In some locations, it appears or is known, that there is additional right-of-way that could be paved for better utilization.
- **Regional and Local Economic Impacts:** The location of the mountain area, as a desirable destination for visitors from the Southern California region, and beyond. According to the Big Bear Housing Element, there are over 30,000 "second homes" in the mountain area, resulting in vacationers spending property tax money, as well as money on goods and entertainment, within the mountain area. As a part of San Bernardino County, the traffic and transportation within the mountain area could be a deterrent to visitors, resulting in a regional and local economic loss.

In addition to stakeholder data gathering related known mobility issues, the project team used travel demand model tool results, to identify five locations along state routes that result in the highest areas of congestion and bottlenecks. **Figure E-4** identifies the five locations that were identified as locations considered with an opportunity to improve mobility and reduce congestion. All five locations are located on SR-18 (and briefly SR-38 in the City of Big Bear Lake), but these locations may serve as indicators to other areas along State Routes within the mountain area with similar characteristics.

Figure E-3: State Route Congestion and Mobility Locations



1.4 Recommendations

The identification of mobility issues was completed using stakeholder information and by reviewing travel model tool forecast results. Mobility issues identified include operational, geometric, and informational issues.

Mobility issues identified during stakeholder comments were evaluated for feasibility of improvement, resulting in several of the identified mobility issues having no recommended improvement identified in this plan.

- Operational mobility issue recommendations consist of alleviating mobility issues by improving the operational aspects of the issues. Operational issues are related to traffic control, roadway maintenance, and availability of multiple transportation modes.
- While it is not preferred that this study recommends increases in capacity on State Routes, it was a recurring comment during stakeholder meetings and the needs assessment data collection phase of this project. There are many locations with congestion related to inadequate roadway capacities, poor roadway geometries, and inadequate use of existing right-of-way.
- Informational recommendations, including signage and real-time messages, were identified as having potential to alleviate many of the mobility issues identified in *Section 6.0* of this report. Many of the mobility issues identified noted poor circulation patterns or confusion to drivers, which can be remedied efficiently by providing better information to drivers.

1.5 Implementation

Transportation plays an important role in the mountain area. The efficient movement of people and goods is the foundation upon which a healthy economy and high quality of life is built. Yet, the entire transportation system and the role municipal government plays in its maintenance, operations, and development over time are not always well understood. The goal of the MATS implementation plan is to set a course for future decision-making. The purpose of the MATS implementation plan is to serve as a tool in the decision-making process regarding which projects should be advanced given the limitations of funding sources.

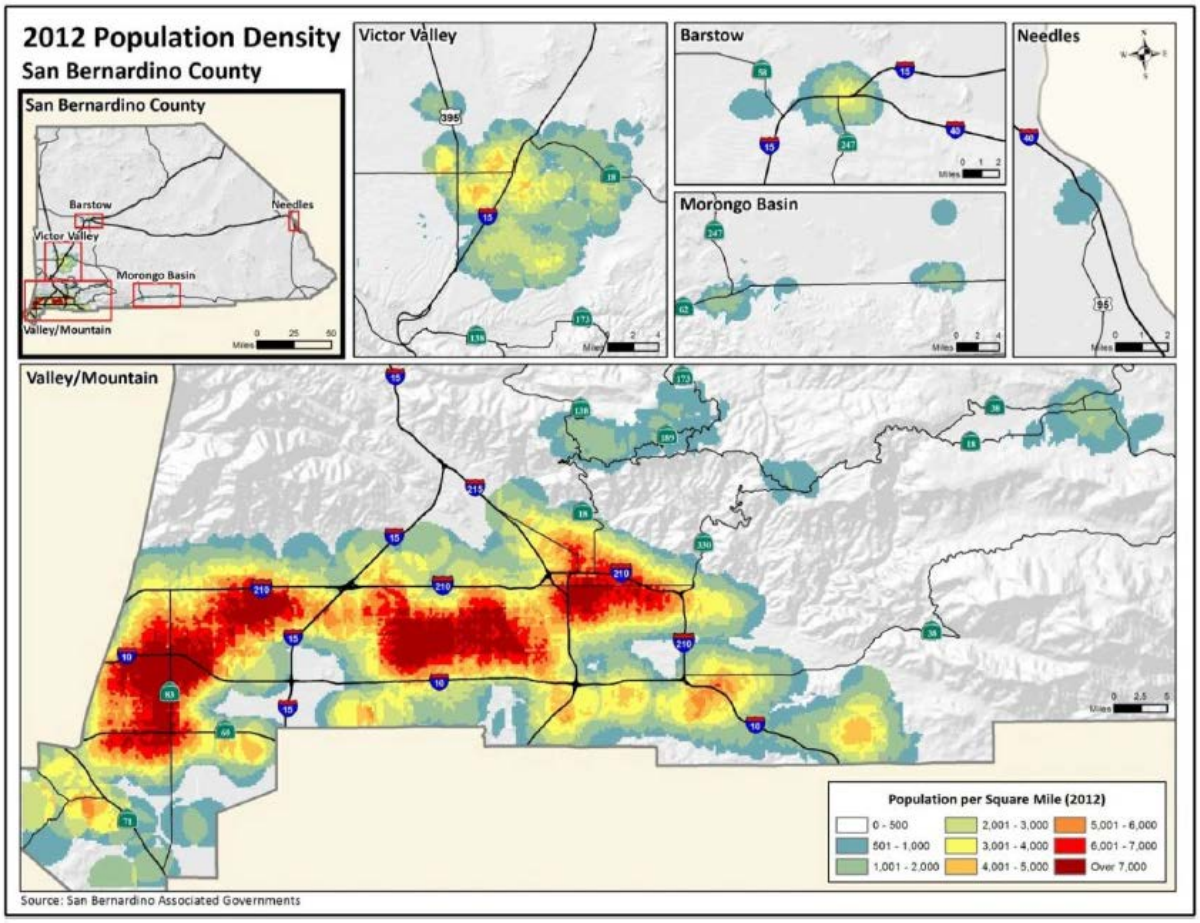
The implementation plan lays forth low, medium, and high priority projects, as well as agency responsibilities and funding resources.

2.0 INTRODUCTION

The Mountain Area Transportation Study (MATS) is located solely within San Bernardino County, and is comprised of many communities. The mountain area of San Bernardino stretches from the Los Angeles County Line on the west to the Lucerne Valley on the east. The Communities within the MATS area include: Mount Baldy, Lytle Creek, Wrightwood, Crestline, Blue Jay, Lake Arrowhead, Running Springs, Green Valley Lake, Arrowbear, Big Bear, and the City of Big Bear Lake.

The mountain area of San Bernardino County is traditionally a recreation and tourist area for Southern California (and beyond). The permanent residents of the mountain area make up less than five percent (5%) of the population of San Bernardino County. **Figure 2-1** illustrates the population densities for San Bernardino County, documented in the 2015 San Bernardino Countywide Transportation Plan. This difference in demand (visitors) and available service (residents) creates a unique challenge for providing adequate transportation services to meet the needs of both visitors and residents, not to mention that the visitor needs are seasonal and resident needs are year-round.

Figure 2-1: San Bernardino County Population Density



2.1 Project Objective and Tasks

The primary objective of the MATS project is to conduct a transportation needs study for the San Bernardino mountain area that identifies key projects that address both existing and forecast transportation deficiencies during peak summer and winter seasons. Based on an analysis of potential improvements, an implementation plan will be developed for future improvements considering implementation timeframe, prioritization, and potential funding sources. The key tasks of the project include:

- **Assessment of Existing Conditions.** Define the existing transportation setting in terms of infrastructure and performance.
- **Development of Refined Traffic Forecasts.** Develop a modelling tool to ensure reasonable future traffic volume forecasts throughout the mountain area.
- **Identification and Costing of Transportation Projects.** Identify improvement projects to address existing and future problem locations throughout the mountain area.
- **Analysis of Transportation Projects.** Evaluate future transportation conditions under peak weekday and weekend seasonal traffic volumes.
- **Recommendations and Implementation Plan.** Generate recommended future infrastructure improvements based on the needs assessment.

2.2 Study Purpose and Need

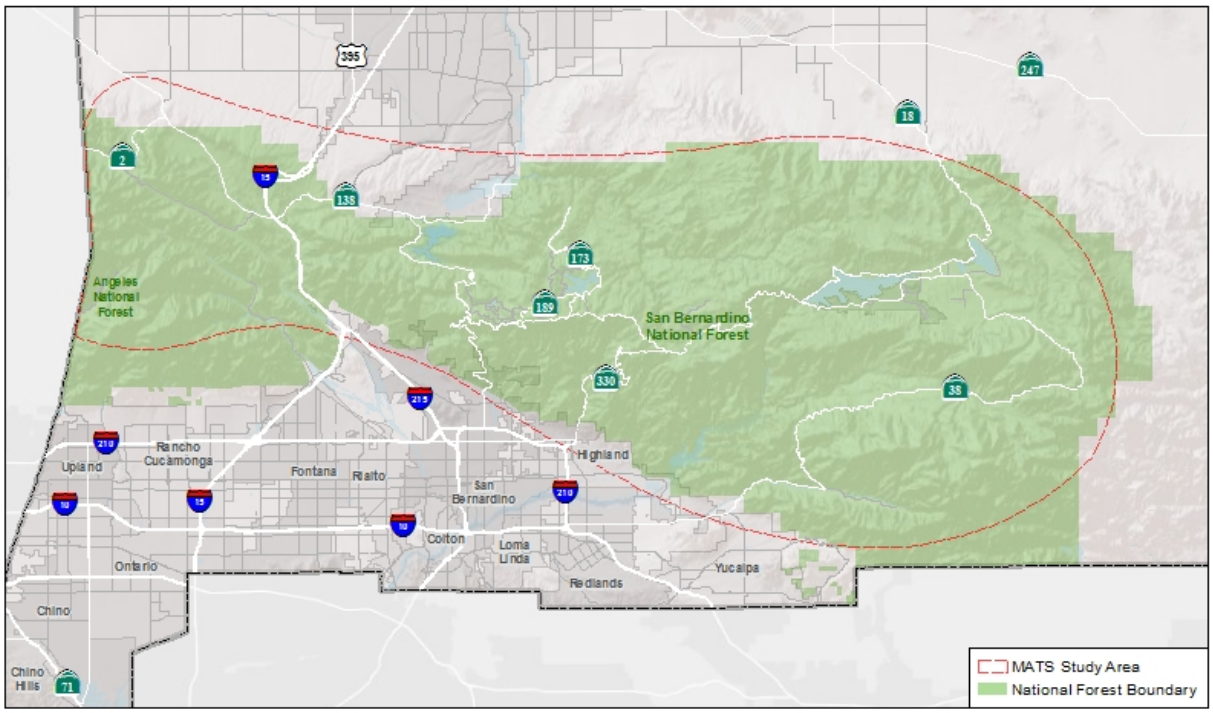
Visitors to the area make up a large portion of the needs assessment, as the full-time population and associated employment are relatively low. Peak winter and summer months experience a substantial increase in traffic congestion for extended periods of time as visitors and associated additional employees access the MATS communities. In addition, the traffic congestion caused by visitors has the potential to discourage would-be visitors, hindering the local economy.

As an example of the larger study area, recent studies show that in 2012, the City of Big Bear Lake had a full-time population of 5,100 in approximately 2,200 households with a year-long employment of 3,800. In 2012, the City of Big Bear Lake served approximately 10,000 visitors on a typical day. However, during a peak season weekday for 2012, the City of Big Bear Lake had employment of approximately 5,800 while serving nearly 60,000 visitors. In 2040, visitors are expected to increase to over 76,000 (an increase of over 25 percent).

2.3 Study Area

The geographic study area for the MATS is presented in **Figure 2-2**. In general, the mountain area encompasses the entire populated area of the San Bernardino National Forest, including the communities of Mount Baldy, Lytle Creek, Wrightwood, Crestline, Blue Jay, Lake Arrowhead, Running Springs, Green Valley Lake, Arrowbear, Big Bear, and the City of Big Bear Lake.

Figure 2-2: Study Area



2.4 Stakeholders

Stakeholders were involved throughout the existing conditions data collection and needs assessment process. Stakeholders include the County of San Bernardino, the City of Big Bear Lake, Caltrans, SBCTA, SCAG, the California Highway Patrol (CHP), and the United States (US) Forest Service. There were six meetings held at various locations and with various stakeholders:

- **December 1, 2015:** The first stakeholder meeting included representatives from all stakeholder groups, and provided an introduction to the project team, the project, and also included a working session to identify needs.
- **January 21, 2016:** The second stakeholder meeting was held with representatives from the City of Big Bear Lake, and included a working session discussing needs of the City.
- **January 28, 2016:** The third stakeholder meeting was held with County of San Bernardino staff and included a working session/discussion of known mobility problems and hot spots. Solutions and known projects were also discussed.
- **February 22, 2016:** The fourth stakeholder meeting was held at Caltrans offices with Caltrans staff and included a working session/discussion of known mobility problems and hot spots. Solutions and known projects were also discussed.
- **May 12, 2016:** The fifth stakeholder meeting was held at SBCTA offices and included a review of the assessment needs collected to date, as well as a summary of the existing traffic data and trends, and an update on the status of the travel demand model.

2.5 Organization of Report

This report is organized to first briefly discuss the previous studies and historical planning documents that have been completed. A thorough discussion of stakeholder input will follow the previous studies. An existing conditions analysis, including an identification of mobility issues (as identified through the stakeholder process) will follow, as well as future conditions based on the travel demand model tool. The report concludes with a discussion about study recommendations and solutions to mobility issues.

3.0 BACKGROUND INFORMATION

The MATS area is unique in regards to travel. There are several traditional reasons why residents and visitors travel to the MATS area, primarily ski areas, lake recreational areas, and resorts, as well as US Forest Service areas.

3.1 Ski Areas/Resorts

The ski areas and resorts within the MATS study area are major visitor attractions, and help to build the local economies. These resorts are opened all year long, with both winter and summer activities. It is important to identify these locations in this existing conditions report, because their attractiveness to visitors has the potential for negatively impacting the level of service of the transportation facilities within the study area. The following ski areas and resorts are located within the study area:

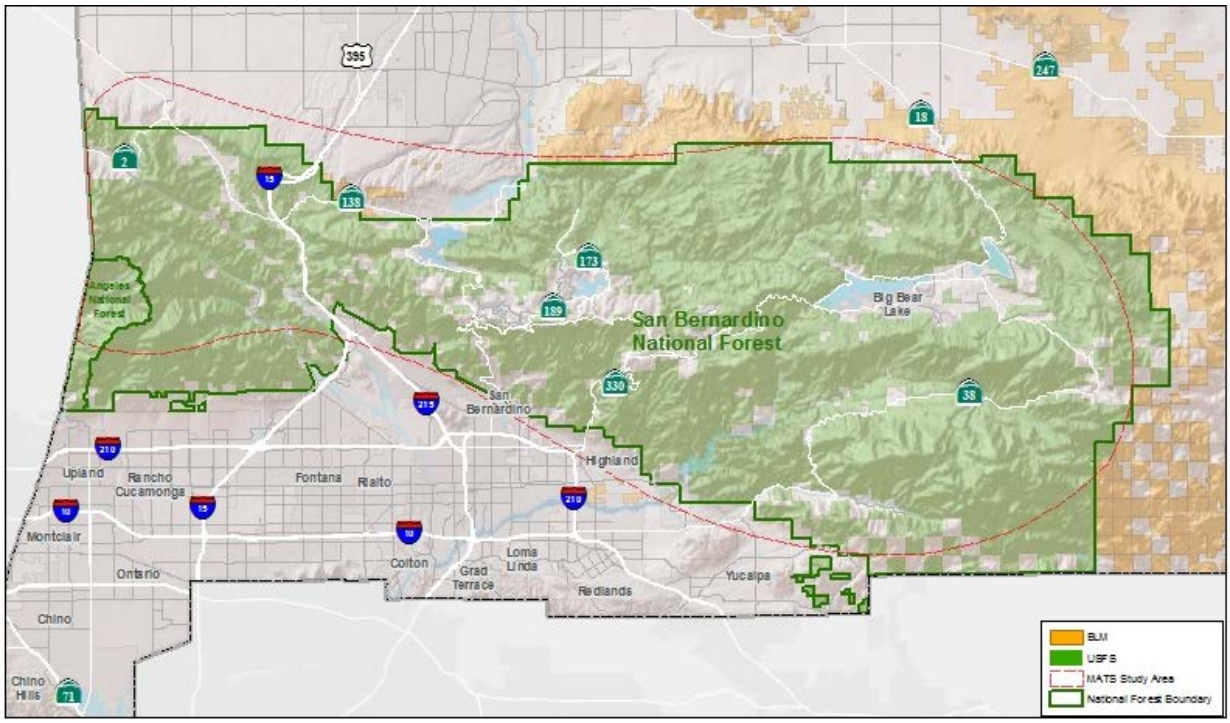
- **Bear Mountain Resort:** The resort is home to Southern California's highest-lifted peak at 8,805 feet and only half-pipes. The resort also consists of terrain parks and in the summer visitors can to golf at the resort's 7,200 feet Bear Mountain golf course. Located southeast of SR-18, south of Moonridge Road, bordered by Moonridge Road, Goldmine Drive, and Club View Drive in the City of Big Bear Lake.
- **Snow Summit Ski Resort:** Opened year round, the ski resort is located in the San Bernardino Mountains. Ski and snowboarding activities in the winter and hiking and mountain biking during the summer. The resort is home to Southern California's only lift-served hiking and mountain biking. Located south of the SR-18 between Thrush Drive and Summit Boulevard in the City of Big Bear Lake.
- **Snow Valley Mountain Resort:** The ski resort's highest elevation is at 7,841 feet. Located south of SR-18 and between Green Valley Trail and Siberia Creek Trail in Running Springs.
- **Rim Nordic Ski Area:** Rim Nordic Ski Area is the only cross country ski area in Southern California. Other activities include mountain biking on the Rim Nordic Bike park trial system, mountain bike racing and trail runs events and annual Pine Cone Festival. Located north of SR-1 and between Green Valley Trail and Siberia Creek Trail in Running Springs.
- **Mountain High Resort:** Located in Wrightwood, CA, Mountain High Resort is one of Southern California's closest winter resorts with no mountain driving. Located just an hour and a half from Los Angeles and Orange County, Mountain High Resort is located in the Los Angeles National Forest under special use permit from the US Forest Service.

3.2 US Forest Service

The MATS study area falls within the San Bernardino National Forest, which is a part of the US Forest Service. The San Bernardino National Forest is made up with the wild lands of the San Bernardino and San Jacinto Mountain Ranges that spans to approximately 679,380 acres. **Figure 3-1** identifies the location of the San Bernardino National Forest, and **Figure 3-2** identifies the two ranger districts, Mountaintop Ranger District and part of the Front Country Ranger District, that is within our study area. There are three visitor centers; the Big Bear Discovery Center, the Grassy Hollow Visitor Center in Wrightwood, and the Barton Flats Visitor Center. There are two wilderness areas; one northeast of the

Community of Big Bear and the other south of SR-38 that occupies the east portion of the Front Country Ranger District.

Figure 3-1: San Bernardino National Forest Locality Map



The San Bernardino National Forest has many "special places". Special places include a National Monument, designated Wilderness Areas, Wild & Scenic Rivers, and other locales. The wilderness areas in San Bernardino County are San Gorgonio, Cucamonga, Bighorn Mountain, and Sheep Mountain. A few of the special places are described below:

- **Rim of the World Snow Play Area:** A location where visitors can participate in various types of snow play. There are three primary areas identified for snow play, including: SR-18 between Crest Park Picnic Area and Switzer Picnic Area, SR-18 east of SkyPark at Santa's Village to east of Heaps Peak/Allison Ranch Road, and SR-18 between Green Valley Lake Road and Lakeview Point.
- **Heaps Peak Arboretum Day Use Area:** Open year-round and free to the public but requiring an Adventure Pass for parking, the arboretum is located on SR-18 west of Skyforest. Attractions include gardens, "animal tracks trail," a mini-gift booth, and other educational programs. Located at 6,000 feet, the arboretum and botanical gardens include a diversity of native plants.
- **Rim of the World Scenic Byway:** The year round route passes through the rim of the San Bernardino Mountains from Cajon Pass to San Gorgonio Pass that includes SR-138, SR-18, and SR-38. The Byway offers vistas and panoramas with some areas with snowfall in the winter and views of the Sand and Snow National Monument near the route between Mill Creek and Onyx Summit.
- **Sand to Snow National Monument:** The 154,000-arce monument is managed by the US Forest Service and the Bureau of Land Management. The area offers a variety of recreational activities to explore the diversity of land and wildlife.

Appendix A includes the 2014-2015 and 2016-2017 Visitors' Guides to the San Bernardino Mountains. The National Forest offers a wide range of outdoor activities which includes hiking and backpacking, trail horseback riding, biking, off-highway vehicles, camping, picnicking, fishing, and winter activities such as skiing, snowboarding, and snowshoeing. Some of the recreational areas within the MATS study area are:

- **1N09 Recreational Shooting Sites:** Located in the Mill Creek Area on Old City Creek Road, these shooting sites are designated for target shooting and are only opened during certain times of year.
- **Applewhite Campground:** Located north of the Lytle Creek Ranger Station, northeast of Lytle Creek Road, and southeast of Applewhite Road. The campground is surrounded by trees and stretches across the street at Applewhite Picnic Area.
- **Applewhite Picnic Area:** Located south of Lytle Creek Road and between Sheep Canyon Road and Applewhite Road. The area is a family-friendly picnic area that provides parking spaces to up to 184 vehicles and closes once the site is full, usually on busy summer weekends.
- **Arrastre Recreational Shooting Site 1:** Located southeast of SR-18, along Burns Canyon Road, and west of the Arrastre Creek near the Community of Big Bear. The site is a designated target shooting site and is only open during certain times of year.
- **Arrastre Recreational Shooting Site 2:** Located southeast of SR-18, along Burns Canyon Road, and east of the Arrastre Creek near Community of Big Bear. The site is a designated target shooting site and is only opened during certain times of year.

- **Aspen Grove Trail:** Located south of SR-38, east of the Barton Flats Visitor Center. The trail passes through a grove of Quaking Aspens which is only found in one other location in California.
- **Baldy Mesa (Trestles) Off-Highway Vehicle (OHV) Staging Area:** Located north of SR-138 and east of I-15 on Santa Fe Road. The staging area with toilets and picnic areas is for Red/Green sticker OHV's and High-clearance 4WD vehicles with license plates.
- **Baldy Mesa OHV Road 3N21:** The road runs from the Baldy Mesa (Trestles) OHV Staging Area to the Desert Front OHV Road 3N24 which heads west to Baldy Mesa in the west Cajon valley.
- **Barton Flats Campground:** Located north of SR-38 and east Barton Flats Road. The campground is bordered by the Rio Monte hiking trail with Jenks Lake and Santa Ana River nearby.
- **Big Bear Valley Sportsman's Club - Shooting Range:** Located north of SR-38 and west of the intersection Division Drive and SR-38. The shooting rage is upon to the public and is only open on the weekends.
- **Big Bear Yellow Post Sites:** These thirteen yellow post sites are individual camping site on dirt roads, nine sites located north and four south of Big Bear Lake.
- **Big Pine Flat Family Campground:** The campground is located south of Coxey Road and west of 3N16 which is northwest of Big Bear Lake and northeast of Redonda Ridge.
- **Big Pine Flat Recreational Shooting Site #1, #2, and #3:** The shooting sites are located along Coxey Road southeast of Big Pine Flat Family Campground. The designated shooting sites are only opened during certain times of year.
- **Butler Peak Fire Lookout:** Located in the San Bernardino Mountains between the towns of Green Valley Lake and Fawnskin. The lookout offers views of the San Gorgonio Peak, the Big Bear Valley, Lake Arrowhead, Apple Valley, and the Inland Empire.
- **Buttercup Group Campground:** Located on the south side of Big Bear Lake near Pineknot Family Campground and Snow Summit Ski Resort.
- **Cleghorn Ridge OHV Road 2N47:** Located east of I-15 on Cajon Boulevard. The route is open to OHV vehicles runs from the Cleghorn off-ramp on Interstate 15 in Cajon Pass over Cleghorn Ridge to State Highway 138 at Lake Silverwood.
- **Coon Creek Cabin Group Campground:** Located southeast of SR-38 and east of the Coon Creek. The campground can accommodate up to 25 people and 10 vehicles.
- **Coon Creek Yellow Post Sites:** These nineteen yellow post sites are individual camping site on dirt roads, nine sites are located near the Pacific Crest Trail and the Coon Creek.
- **Crab Flats Family Campground:** Located north of SR-18 and northeast of the Green Valley Lake.
- **Desert Front OHV Road 3N24:** Located north of I-15 where Baldy Mesa Road and Forest Route 3N21 meets. The route is commonly called "Baldy Mesa" and runs from the junction of Baldy Mesa OHV Road 3N21 to State Highway 138 in west Cajon valley.
- **Dogwood Family Campground:** Located north of SR-18 and east of Daley Canyon Road. The campground has 87 sites.
- **Falls Picnic Area**: Located southeast of SR-38 and north of the Forest Falls community. Vivian Creek Trail to the San Gorgonio Wilderness starts here and the Momyer Trailhead is nearby.
- **Fish Creek Trail 1W07:** Located south of SR-38 and east of Fish Creek. The trail runs along the Fish Creek Trail Camp, Fish Creek Saddle, Mineshaft Saddle, Sky High Trail, summit of San Gorgonio, and the site of the wreckage from a C-47 airplane that crashed in 1953.

- **Forsee Creek Trail 1E06:** Located southeast of SR-38, south of Jenks Lake Road West, and along Forsee Creek Road. The trail runs along the Cut-off for John's Meadow, Jackstraw Camp, Trail Fork Springs Camp, Peak Divide Trail, Anderson Flat, Shields Flat, Trail Fork, High Meadow Spring, Jackstraw Spring Camp, and Trail Fork Spring Camp.
- **Gray's Peak Group Campground:** Located northwest of SR-38 and Big Bear Lake off 2N13. The campground can accommodate up to 40 people and 8 vehicles.
- **Gray's Peak Trail 1W06:** Located west of SR-38, north of Big Bear Lake, and south of Fawnskin across the Grout Bay Picnic Area. The trailhead is in the center of a bald eagle wintering habitat area and is closed to all public use from December 1 to April 1 and runs along Forest Road 2N04X, US Forest Service Road 2N70, and Gray's Peak.
- **Green Spot Equestrian Group:** Located south of Sugarloaf and SR-38, and the east end of Big Bear Valley. There are five horse corrals with a capacity of 10 horses. The campground can accommodate up to 25 people and 8 vehicles.
- **Green Valley Family Campground:** Located in the mountains north of Arrowbear, the midway point between the communities of Lake Arrowhead and Big Bear. The campground has 37 sites.
- **Grout Bay Picnic Area:** Located on the scenic north shore of Big Bear Lake. The Gray's Peak trailhead is across the highway from the picnic area.
- **Hanna Flat Family Campground:** Located north of SR-38 and north of the community of Fawnskin and the City of Big Bear Lake. The campground has 80 sites.
- **Heart Bar Equestrian Group Campground:** Located in the Heart Bar Campground Complex just outside the Sand to Snow National Monument south of SR-38. There are 46 corrals and 11 wood tables and only campers with horses are permitted to camp at Heart Bar Equestrian Campground.
- **Heart Bar Family Campground:** Located south of SR-38 and north of Heart Bar Equestrian Group Campground. The campground has 26 sites.
- **Holcomb Valley Campground:** Located north of SR-38 and Big Bear Lake and off 3N16. The campground has 19 sites.
- **Jenks Lake Day Use Area:** Located north of SR-38, east Barton Flats Road, and west of Jenks Lake. There is a picnic area for day use only.
- **Juniper Springs Group Campground:** Located east of SR-38 and north of Onyx Peak. The campground can accommodate up to 40 people and 8 vehicles.
- **Keller Peak Yellow Post Sites:** These nine yellow post sites are individual camping site located south of SR-18 and southeast of Arrowbear Lake. Each campground can accommodate up to 8 people and 2 vehicles.
- **Lobo Group Campground:** Located north of SR-38 and south of the Santa Ana River and Rattlesnake Creek. The campground can accommodate up to 75 people and 15 vehicles.
- **Lost Creek Trail 1E09:** Located north of SR-38 and south of the Santa Ana River along Seven Oaks Road. The trail runs along Santa Ana River Trail, Grinnell Ridge Camp, South Fork Meadows, and South Fork Trail with views of Santa Ana Canyon and Sugerloaf Peak.
- **Lost Lake Day Use Area:** Located north of Cajon Boulevard and Lone Pine Canyon along Swarthout Canyon Road. There is a picnic area for day use only.

- **Mission Springs PCT Trail Camp:** Located south of SR-38 along Pacific Crest Trail and north of Mission Springs Campground. The site has four horse corrals for equestrian use and 2 camp sites.
- **Momyer Creek Trail 1E06:** Located east of SR-38 and Forest Falls along Valley of the Falls Drive. The trail starts at the Mill Creek and runs across the creek and near Alger Creek Camp, Dobbs Camp, Saxon Camp, and Dollar Lake Saddle.
- **North Shore Campground:** Located east of SR-173 and Lake Arrowhead and north of the Mountain Community Hospital off Sawmill Road. The campground has 28 sites.
- **Oso Group Campground:** Located north of SR-38, south of the Santa Ana River and Rattlesnake Creek, and southwest of Lobo Group Campground. The campground can accommodate up to 100 people and 20 vehicles.
- **Pacific Crest Trail:** The trail enters the San Bernardino National Forest in its southern end in the Santa Rosa Mountains. It exits in the northwest part of the forest at Boundary Ridge near Wrightwood.
- **Pineknot Family Campground:** Located south of SR-18 off US Forest Service Road and east of Snow Summit Ski Resort. The campground has 47 sites.
- **San Bernardino Peak Trail 1W07:** Located east of SR-38 from Angelus Oaks along Manzanita. The trail is near Columbine Camp, Manzanita Flats, Columbine Springs Junction, Limber Pine Bench Camp, San Bernardino Peak Divine Trail, San Bernardino East Peaks, and Trail Fork Springs.
- **San Gorgonio Family Campground:** Located north of SR-38 and between Barton Flats Campground and Oso Group Campground. The campground has 54 sites.
- **Santa Ana River Trail 2E03:** Located south of SR-38 and north of Coon Creek and Heart Bar State Park. The trail begins in the Sand to Snow National Monument, at the Pacific Crest Trail near Heart Bar, crossing the National Forest towards Morton Peak.
- **Serrano Campground:** Located south of SR-38 just north of Big Bear Lake. The campsite has 93 sites.
- **South Fork Family Campground:** Located south of SR-38 between Seven Oaks Road and Front Line Road. The campsite has 24 sites that can accommodate up to 8 people per a site.
- **South Fork Trail 1E04:** Located south of SR-38 and Frog Creek, east of Jenks Lake, and north of Jenks Lake Road West. The trail passes through Horse Meadow, San Gorgonio Wilderness boundary South Fork Meadows, and the trail forks to Dry Lake and Dollar Lake.
- **Summit OHV Staging Area:** Located south of SR-138 and west of where Cleghorn Road and Forest Route 3N66. The staging area is for Red/Green sticker OHV's and High-clearance 4WD vehicles with license plates.
- **Thurman Flats Picnic Area:** Located along SR-38 and west of Kilkare Road and Mountain Home Village. This is one of the best bird watching areas on the Forest with a picnic area.
- **Vivian Creek Trail 1E08:** Located east of SR-38 and Forest Falls, northeast of Falls Picnic Area, west of Camp Creek, and along Falls Road. The trail passes through Vivian Creek Camp, Halfway Camp, High Creek Camp, the summit of San Gorgonio, High Creek, and ends with views of Yucaipa Ridge, Galena Peak and Mt. San Gorgonio.

- **Wild Horse Equestrian Campground:** Located south of SR-38 and the Heart Bar Campground and northwest of Coon Creek. The campground has 8 single and 3 double sites, thirty horse corrals, and only campers with horses are permitted to camp at this location.

The National Visitor Use Monitoring (NVUM) program (sourced by the US forest Service at the website: *http://www.fs.fed.us/recreation/programs/nvum/*) is a tool that the US Forest Service uses to manage its recreational facilities. There are nine regions within the National Forest Systems; Northern, Rocky Mountain, Southwest, Intermountain, Pacific Southwest, Pacific Northwest, Southern, Eastern, and Alaska Region. For our study area, the San Bernardino National Forest is within the National Forest Pacific Southwest region. According to the NVUM 2012 National Report, the regional annual visitation estimates for the Pacific Southwest region is 24,601,000.

4.0 PREVIOUS STUDIES

The challenges related to transportation in the mountain area are not new, thus there have been multiple studies of transportation in the mountain area over the past twenty years. This section is not fully conclusive of all studies, and does not include small traffic studies. However, it does include several larger and more recent studies that have resulted in transportation recommendations that are relevant to this study.

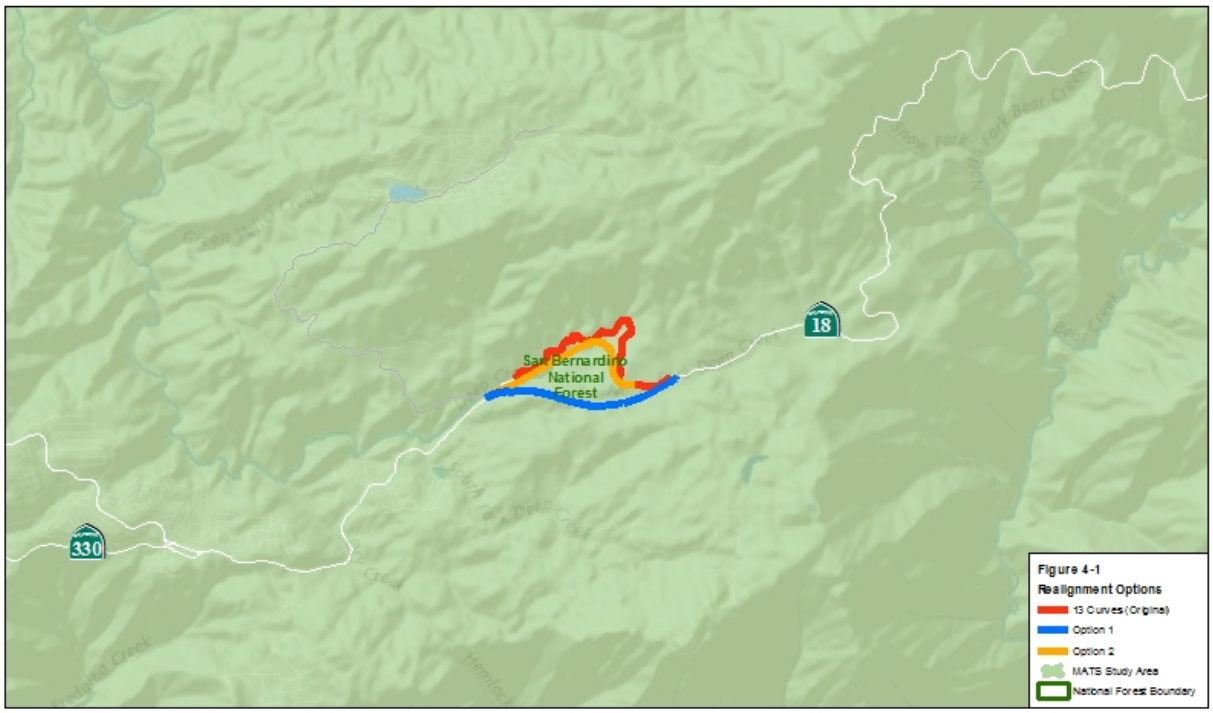
4.1 Big Bear 1996 Highway Transit Improvement Alternative

In 1994, a highway transit improvement alternatives study was completed for the San Bernardino mountain area. Recommendations from this study include a new alignment bypassing "13 Curves", a parking facility along SR-18 near Snow Valley, park and ride lots, as well as other improvements that serve as potential solutions to issues identified in the needs assessment for this project.

4.1.1 "13 Curves" Realignment

A notable location on SR-18 is the "13 Curves" area located near snow valley. Due to the non-conforming geometric alignment of the roadway, this location frequently experiences congestion. Several options were identified and shown in **Figure 4-1**.

Figure 4-1: "13 Curves" Realignment Alternatives



4.1.2 Parking Facility along SR-18 East of Snow Valley

Many visitors are attracted to the segment of SR-18 east of the Snow Valley ski area. This is a highly popular snow play area, with no dedicated parking. Currently sight distance and roadway grades exacerbate the problem, because visitors tend to park on the highway shoulder despite "No Parking" signs. The recommendation from this study was to provide a dedicated parking area for 100 vehicles at this location.

4.1.3 Park and Ride Lots

This study recommended two new park-and-ride lots; one in Highland and one in Running Springs. The purpose for these park-and-ride lots was to provide sheltered areas that are served by the existing Mountain Transit fixed-route service. The location of the park-and-ride lot in Running Springs was recommended due to the elevation of Running Springs, and the knowledge that chains are often required to access SR-18 east of Running Springs in winter months. It was also recommended that MARTA service be modified in peak winter and summer months to accommodate recreational demands.

4.1.4 Signage and Flashers

Advisory signs and flashers were identified as a way to allow for better operations on the roadway system. The recommendations included additional signage and flashers throughout the SR-330/SR-18 corridor, with particular attention to areas of heavy traffic.

4.2 Big Bear Modal Study

The Big Bear Model Alternatives Analysis, commissioned by SCAG, SANBAG (now referred to as SBCTA), and the Inland Valley Development Agency and completed in 2011, explored the feasibility of non-roadway alternatives for future transportation of people and goods between the San Bernardino and Big Bear Valleys. The study documented the traffic congestion and road closure problems that indicate a clear need for additional transportation capacity to accommodate future growth in travel to and from the mountains. An alternative transportation system offers several benefits when compared to roadway improvements – the ability to transport people and goods in all types of weather, an alternative way of moving people during emergencies, a smaller environmental "footprint" than road improvements, and improved access to mountain recreation areas without proportional expansion of roadway and parking capacity.

The key transportation system constraints were summarized as follows:

- The mountain highway routes that provide access to the Big Bear Valley experience traffic congestion on weekends throughout the year, and experience high levels of congestion for extended periods of time on holiday weekends and winter weekends with good snow conditions.
- The mountain access roads are increasingly vulnerable to closure or restriction because of adverse weather, traffic accidents, rock fall, landslides, or wildfire.
- These impediments to mountain access act as constraints to growth and development in the Big Bear Valley, and to the Southern California Region's ability to take advantage of the mountain area's four-season recreational assets.
- The feasibility of adding significant capacity to existing highways or constructing a new road facility is doubtful because of both environmental and financial constraints.

The study identified and evaluated a range of technological options for an alternative mode, as well as several alternative routes for it between San Bernardino and the City of Big Bear Lake. The new system was estimated to cost between $2.8-9.6 billion to build, with an annual operating cost of $11.8-13.8 million. Estimated revenues from passengers and freight, combined with other plausible revenue sources, would not be sufficient to pay for the capital and operating costs without a substantial (estimated at $3.8 billion) grant of public funds.

The constraints identified above still represent key challenges to circulation through the mountain areas of San Bernardino County, and the low likelihood of significantly increasing roadway capacity is the main reason that this MATS focuses on identifying and improving key bottleneck locations.

4.3 2015 San Bernardino Countywide Transportation Plan

In September of 2015, SANBAG (now referred to as SBCTA) published a Countywide Transportation Plan (CTP) with a purpose of laying out a strategy for long-term investment in and management of San Bernardino County's transportation assets. Key Issues for the CTP included the following:

- Transportation Funding
- Congestion Relief and Economic Competitiveness
- System Preservation and Operations

- Land Use
- Transit System Interconnectivity
- Attainment of Air Quality Standards
- Sustainability and Greenhouse Gas Reduction

The CTP proposed many strategies for the County for modal, functional, and geographic improvements. **Table 4-1** summarizes the proposed strategies related to the mountain area.

Table 4-1: 2015 SANBAG CTP Proposed Strategies

Category	Challenge	Strategy
Arterials	Arterial project construction has lagged original expectations.	Encourage jurisdictions to accelerate arterial improvement projects and continue policy flexibility for funding development shares. SANBAG will identify arterial improvements that are particularly important to route continuity.
Active Transportation	Large funding needs for building out the cycling/walking network.	Continue to submit competitive grant applications to support implementation of the Non-Motorized Transportation Plan (NMTP) Maintain and update the NMTP Identify and pursue grant funding opportunities to expand cycling and walking infrastructure
Transit Integration and Inter-Connectivity	Transit services could be better coordinated across systems in terms of ease of transfers, fare media, and first/last mile connections. This will be even more important as the system grows.	Take a more integrated, customer-focused approach to the provision of transit services. Facilitate seamless ticketing and better connection at existing transit centers and connection points.
Highway Maintenance and Operations	Highways are facing serious future maintenance funding shortfalls. Local jurisdictions are responsible for arterial maintenance while Caltrans is responsible for freeway and state highway maintenance.	Conduct a strategic planning study with Caltrans and regional agencies to assess maintenance/operations funding needs and approaches to managing costs.
Rural Highway Needs	Rural areas require unique maintenance/safety/funding consideration.	Focus on cost effective maintenance and support for funding streams that the County and Caltrans can utilize to maintain these rural highways.
Transit System Maintenance and Operations	Existing transit systems are facing potentially serious future operations funding shortfalls.	Optimize transit operations and identify mechanisms to fund future system operations and expansion.
Air Quality	Although air quality has dramatically improved over the last several decades, attainment of the next set of ozone standards will be extraordinarily challenging and costly.	Work with regional and state agencies and the private sector to meet attainment standards on an achievable timeline that does not adversely impact the economy. Advocate for state/federal investment that facilitates this progress. Focus on market-based mobile source technology improvements and fleet turnover as a win-win approach.
Health	Public health is being integrated into policy frameworks throughout state, regional, and local governments. The challenge in the transportation arena is to determine how to incorporate health considerations into decision-making frameworks.	Continue to build on health partnerships already established. Continue focus on transit mobility and developing the active transportation network to promote cycling and walking.

Category	Challenge	Strategy
Mountain/Desert Strategies		
Mountain/Desert Fixed Route Transit	Funds are limited for route expansion and adjustment as the Victor Valley grows.	Study the challenges of the trajectory of transit operations funding, and jointly develop solutions between SANBAG and the Mountain/Desert transit agencies.
Mountain/Desert demand-responsive bus service	Demand-responsive service is the highest cost form of transit, but important in serving certain senior and disabled transit riders.	Continue assistance programs, such as helping demand-responsive riders use fixed-route systems and coordination with non-profit entities while also maintaining demand-responsive service.
Mountain Subarea	Though baseline population is small, major congestion occurs on weekends, particularly winter weekends, limiting economic growth.	Conduct a study of bottleneck locations and lower-cost improvements that could reduce weekend congestion levels and prioritize funding for those projects.

5.0 EXISTING CONDITIONS

This section focuses on the existing conditions of the facilities within the mountain area. Iteris worked with SBCTA staff and the stakeholders group to identify the transportation system that forms the basic network for this study.

5.1 Roadway

The primary access roadways within the MATS area are State Route (SR)-2, SR-18, SR-38, SR-138, and SR-330, and each experience unique traffic patterns associated with visitors to the area. All of the state highways within the MATS area were included, as well as some key local facilities. Secondary roads include major facilities within the Mountain area that are heavily used by residents and visitors. **Table 5-1** summarizes the primary roadway network within the MATS area. **Table 5-2** summarizes the secondary roadway network within the MATS area.

Table 5-1: Primary Roadway Network

Segment	Typical Lane Configuration	Intersection Control Type	Passing Lane
SR-2 (State Route)			
From SR-138 through Wrightwood	2-lane, Undivided	Two-way stop controlled intersections for local streets. Four way stop controlled intersection at Willow Road.	Not Applicable
SR-18 (State Route)			
Smarts Ranch Road to SR-38/ Greenway Drive/North Shore Drive	2-lane, Undivided	Two-way stop controlled intersections for local streets.	Not Applicable
SR-38/Greenway Drive/North Shore Drive to SR-38/Big Bear Boulevard	2-lane, Undivided	Two-way stop controlled intersections for local streets. Signalized Intersection: • Greenway Drive at Big Bear Boulevard	Not Applicable
SR-38/Big Bear Boulevard to Stanfield Cut-off/Starvation Flats Road	2-lane, Undivided	Two-way stop controlled intersections for local streets. Signalized Intersections: • Greenway Drive at Big Bear Boulevard • Big Bear Boulevard at Division Drive • Big Bear Boulevard at Stanfield Cut-off	Not Applicable

Segment	Typical Lane Configuration	Intersection Control Type	Passing Lane
Stanfield Cut-off to Pine Knot Ave	4-lane, Undivided With Two-Way Left Turn Lane	Two-way stop controlled intersections for local streets. Signalized Intersections: • Big Bear Boulevard at Interlaken Shopping Center • Big Bear Boulevard at Fox Farm Road • Big Bear Boulevard at Moon Ridge Road/Garstin Drive • Big Bear Boulevard at Summit Boulevard • Big Bear Boulevard at Georgia Street • Big Bear Boulevard at Pine Knot Avenue	Not Applicable
Pine Knot Avenue to Village Drive	2-lane, Undivided With Two-Way Left Turn Lane	Two-way stop controlled intersections for local streets. Signalized Intersections: • Big Bear Boulevard at Pine Knot Avenue • Big Bear Boulevard at Village Drive	Not Applicable
Village Drive to SR-38 (at Bear Creek)	2-lane, Undivided	Two-way stop controlled intersections for local streets. Signalized Intersections: • Big Bear Boulevard at Village Drive • SR-18/Big Bear Boulevard at SR-38/North Shore Drive	Not Applicable
SR-38 (at Bear Creek) to SR-330	2-lane, Undivided	Two-way stop controlled intersections for local streets. No stop control at pull-outs and view-points.	Passing lanes exists both eastbound and westbound for approximately 1.5-mile segments.
SR-330 to SR-138	2-lane, Undivided	Two-way stop controlled intersections for local streets. No stop control at pull-outs and view-points. Signalized Intersections: • SR-18 at Lake Gregory Drive	Not Applicable
SR-138 to Arrowhead Springs Road/Old Waterman Canyon Road	4-lane, Undivided	Two-way stop controlled intersections for local streets. No stop control at pull-outs and view-points.	Not Applicable
SR-38 (State Route)			
South of Sugarloaf to SR-18/Greenway Drive/Big Bear Boulevard	2-lane, Undivided	Two-way stop controlled intersections for local streets. Signalized Intersections: • Big Bear Boulevard at Maple Lane • Big Bear Boulevard at Greenway Drive	Passing lanes exists both eastbound and westbound for approximately 0.25-mile segments

Segment	Typical Lane Configuration	Intersection Control Type	Passing Lane
SR-18/Greenway Drive/Big Bear Boulevard to SR-18/SR-38 (at Big Bear Creek)	2-lane, Undivided	Two-way stop controlled intersections for local streets. Signalized Intersections: • Big Bear Boulevard at Greenway Drive • SR-18/Big Bear Boulevard at SR-38/North Shore Drive	Not Applicable
SR-330 (State Route)			
SR-18/SR-330 to City Creek near Highland Avenue	2-lane, Undivided	Two-way stop controlled intersections for local streets. No stop control at pull-outs and view-points.	Passing lanes exists both northbound and southbound for approximately 0.5-mile segments.
SR-138 (State Route)			
SR-18 to SR-173	2-lane, Undivided	Two-way stop controlled intersections for local streets. All-way stop control: • SR-138 at Crest Forest Drive • SR-138 at Knapps Cut-off • SR-138 at Waters Drive	Not Applicable
SR-173 to I-15	2-lane, Undivided	Two-way stop controlled intersections for local streets.	Passing lanes exists both northbound and southbound for approximately 1.0-mile segments before I-15.
West of I-15 to North of SR-2	2-lane, Undivided	Two-way stop controlled intersections for local streets.	Passing lanes exists both northbound and southbound for approximately 0.3-mile segments after I-15, and from Lisa Lane to SR-2.
I-15 (Interstate)			
Through MATS Area	8-lane, Divided	Not applicable	Not applicable
I-215 (Interstate)			
Through MATS Area	4-lane, Divided	Not applicable	Not applicable

Table 5-2: Secondary Roadway Network

Roadway	Segment	Typical Lane Configuration	Intersection Control Type
Arosa Drive	Between Lake Drive and N Road in the community of Lake Gregory	1 lane each direction	• Stop control at 5-way intersection with Lake Drive/Delle Drive/Dart Canyon Road/Arosa Drive/San Moritz Drive • 1-way stop control at intersection with N Road

Roadway	Segment	Typical Lane Configuration	Intersection Control Type
Daley Canyon Road	Between SR-18 and SR-189 west of Rim of the World High School	1 lane each direction	• 1-way stop controlled at both ends • Daley Canyon is stop controlled
Division Drive	Between SR-38 and SR-18 in the community of Big Bear	1 lane each direction	• 1-way stop controlled on the south end with SR-18 • 2-way stop controlled on the north end with SR-38
Stanfield Cut-off	Between SR-38 and SR-18 in the community of Big Bear	1 lane each direction	• Signalized on the south end with SR-18 • 1-way stop controlled on the north end with SR-38
Greenway Drive	Between SR-38 and SR-18 in the community of Big Bear	1 lane each direction	• 1-way stop controlled on the south end with SR-18 • 2-way stop controlled on the north end with SR-38
Lake Drive	Between SR-138 and Lake Gregory in the community of Crestline	1 lane each direction	• No control at intersection with SR-138 • 2-way stop controlled intersection at Lake Gregory Drive • Stop control at 5-way intersection with Lake Drive/Delle Drive/Dart Canyon Road/Arosa Drive/San Moritz Drive
Lake Gregory Drive	Between Lake Drive and SR-18 in the communities of Crestline/Skyland	1 lane each direction	• Signalized intersection with SR-18 • 2-way stop controlled intersection with Lake Drive
Old Mill Road	Between Lake Drive and SR-138 in the community of Crestline	1 lane each direction	• 1-way stop controlled intersection at Lake Drive • 1-way stop controlled intersection at SR-138
N Road	Between Lake Gregory Drive in the community of Crestline and Grandview Road in the community of Twin Peaks	1 lane each direction	• 1-way stop controlled intersection at Lake Gregory Drive • No stop at Arosa Drive • 1-way stop controlled intersection at Grandview Road
Grass Valley Road	Between SR-189 and SR-173 in the community of Lake Arrowhead	1 lane each direction	• 1-way stop controlled intersection at SR-189 • 1-way stop controlled intersection at SR-173
Lone Pine Canyon Road	Between SR-138 and SR-2 entering the community of Wrightwood	1 lane each direction	• 1-way stop controlled intersection at SR-138 • No control at the intersection with Sheep Creek Drive

5.2 Transit

Two transit agencies serve the MATS area: Mountain Transit and Victor Valley Transit Authority.

Mountain Transit currently runs six fixed-routes and various other services to MATS residents and visitors.

- **Big Bear Route 1:** Routed on SR-18 and SR-38 between Boulder Bay, Moonridge, Lake Erwin, and Sugarloaf. Route 1 runs Monday through Sunday with 60 minute headways.

- **RIM Route 2:** Routed on SR-138, SR-189, and SR-18 between Cedar Pines, Valley of Enchantment, Crestline, Twin Peaks, Blue Jay, and Lake Arrowhead. Route 2 runs Monday through Friday with approximately 60 minute headways.
- **Big Bear Route 3:** Routed on SR-18 and SR-38 between Mountain Meadows and Gold Mountain. Route 3 runs Monday through Friday with 60 minute headways.
- **RIM Route 4:** Routed on SR-173 and SR-18 between Cedar Glen, Lake Arrowhead, Crest Park, and Running Springs. Route 4 runs on Monday through Friday with approximately 90 minute headways.
- **Big Bear Off the Mountain:** Routed from downtown Big Bear to San Bernardino, with a connection in Running Springs. The Big Bear off-the-mountain route operates Monday through Sunday at approximately 4.5 hour headways.
- **RIM Off the Mountain:** Routed on SR-18 between Blue Jay, Crestline, and San Bernardino. The RIM off-the-mountain route operates Monday through Saturday at approximately 3 hour headways.

Victor Valley Transit Authority currently runs one fixed-route service to MATS residents and visitors, with a destination in Wrightwood at the Wrightwood Community Center.

- **Route 20:** Routed primarily on SR-2 and SR-138 within the study area, between Phelan and Pinon Hills and Wrightwood. Route 20 runs Monday through Saturday with 90 minute headways.

5.2.1 Dial-A-Ride Service

Mountain Transit provides Dial-a-Ride service for seniors and persons with disabilities, as well as anyone who lives more than ¾ mile from a Mountain Area Transit fixed-route stop who is also within the Dial-a-Ride service area.

5.2.2 Weekend Trolley

Mountain Transit provides service for a Big Bear Weekend Trolley. The weekend trolley has service to the Alpine Slide, Village, Moonridge Zoo/Bear Mountain, Interlaken Shopping Center, and many of the local hotels and restaurants. The weekend trolley is only available on Saturday and Sunday, and operates at 60 minute headways.

5.2.3 Rally Bus

Both Snow Summit and Bear Mountain (the two major ski/snowboarding resorts) utilize Rally Bus services, which is an example of ride-sharing. Rally Bus is a crowd-powered shared-ride service that is often developed for event travel. Information about the Rally Bus is shared through social media, and is not booked or billed until the number of seats occupied is over 25. For more information on Rally Bus, please see http://rallybus.net/ or http://rallybus.net/FAQ.

5.3 Non-Motorized Transportation

In the existing transportation system, non-motorized transportation (including bicycles and pedestrian activity) is encouraged, but the system lacks infrastructure, which can be a problem for mobility. The City of Big Bear Lake has an Active Transportation Plan, and the Lake Arrowhead community is currently

preparing an Active Transportation Plan. In addition, there has been recent coordination between the City of Big Bear Lake, the County of San Bernardino, and the Big Bear Valley Trails Foundation in obtaining a Caltrans grant to assist in the development and planning for future development of road and trail resources with connections to lakes and mountain amenities. The goal of the plan is to use community involvement to identify valley-wide needs by integrating land use with transportation and economic development goals. The end result of the plan will be to construct new bicycle lanes, sidewalks, and non-motorized trails inclusive of trail heads and other trail amenities.

5.4 Data Collection

Data collection for MATS study was extensive, and included traffic count data, speed collection, , and visitor attractions.

5.4.1 Average Daily Traffic – ADT Count Data

Average Daily Traffic (ADT) count data was obtained at 29 locations throughout the MATS study area for Friday through Sunday travel. **Figure 5-1** illustrates the locations of ADT count data, and **Table 5-3** summarizes the collected ADT for Friday, Saturday, and Sunday travel. The primary direction of travel on Friday and Saturday is EB/NB while the primary direction of travel on Sunday is WB/SB. This indicates a higher influx of vehicles into the mountain area on Friday and Saturday with an outflow of traffic on Sundays.

Figure 5-1: Average Daily Traffic Count Locations

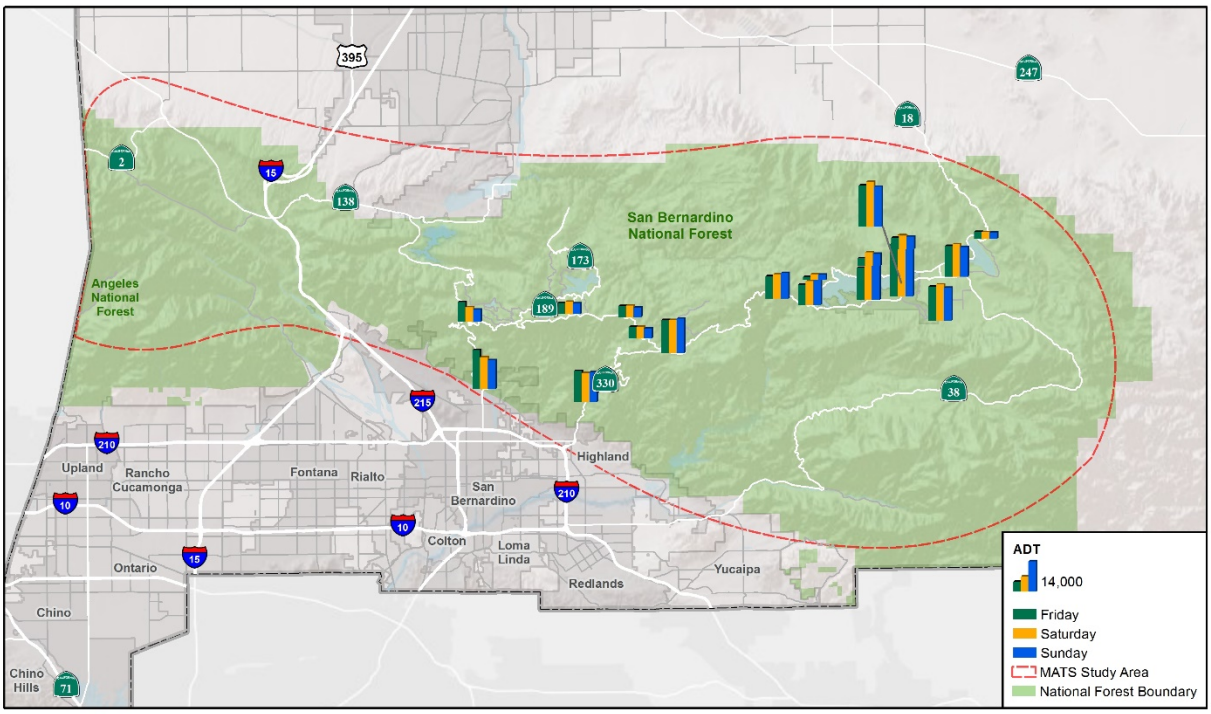


Table 5-3: Average Daily Traffic

Route	Location	Friday		Saturday		Sunday	
		EB/NB	WB/SB	EB/NB	WB/SB	EB/NB	WB/SB
SR-138	West of SR-173	883	1,384	1,150	938	1,109	955
SR-18	North of Sierra Way / Arrowhead Road	10,602	7,026	8,042	6,429	5,818	7,237
SR-18	East of Soutar Drive	9,956	4,853	8,729	6,112	6,315	9,098
SR-18	West of Nob Hill Drive	2,610	2,599	2,663	2,654	2,279	2,276
SR-330	North of Highland Avenue Ramps	9,737	4,254	7,904	5,076	5,380	7,957
SR-38	East of Bryant Street	3,837	2,291	3,608	2,841	2,559	3,723
SR-18	West of SR-38	7,437	2,646	6,755	4,315	4,557	7,070
SR-38	North of SR-18	1,023	526	1,564	1,052	986	1,499
SR-18	East of SR-38	6,776	2,489	6,329	4,428	4,588	6,611
SR-18	East of Delta Avenue	1,390	1,821	1,388	1,660	1,527	1,295
Big Bear Boulevard	East of Bonanza Trail	8,305	6,254	6,728	8,699	6,622	9,586
Big Bear Boulevard (SR-18)	East of Moon Ridge Road	12,048	11,670	14,110	13,556	12,145	12,009
Big Bear Boulevard (SR-18)	East of Moon Ridge Way	-	-	14,834	13,989	13,900	13,748
Big Bear Boulevard (SR-18)	East of Stanfield Cut-off	9,725	9,026	10,827	9,556	9,595	8,536
Big Bear Boulevard (SR-18)	West of Greenway Drive	7,318	8,037	8,007	8,271	7,605	7,112
East Big Bear Boulevard	East of Shore Drive	6,660	7,160	7,278	7,347	6,974	6,423
SR-38	West of Stanfield Cut-off	1,820	1,539	3,185	2,886	2,567	2,813
SR-38	East of Stanfield Cut-off	2,387	2,818	2,697	3,422	2,405	3,273
East Arrowbear Drive	South of SR-18	329	273	300	308	317	254
West Arrowbear Drive	South of SR-18	162	296	149	253	161	251
Running Springs School Road	South of SR-18	622	634	317	324	325	323
Live Oak Annex	South of SR-18	913	901	809	754	599	623
Rim of the World Highway (SR-18)	West of Ongo Camp Drive	2,518	2,473	2,597	2,590	2,209	2,224
Kuffel Canyon Road	North of Rim of the World Highway (SR-18)	1,441	1,324	1,427	1,271	1,120	1,201
SR-173	North of Holly Lane	2,793	2,264	3,036	2,578	2,347	2,539
Rim of the World Drive	North of Rim of the World Highway (SR-18)	618	636	561	521	527	561
SR-189	East of Lake Gregory Drive	2,109	1,950	1,724	1,636	1,435	1,636
Lake Gregory Drive	North of N Road	3,032	3,115	2,682	2,742	3,819	529
SR-138	North of Rim of the World Highway (SR-18)	5,304	3,710	3,482	3,192	2,698	2,975
Directional Percentage		**56.6%**	**43.4%**	**52.7%**	**47.3%**	**47.5%**	**52.5%**

5.4.2 Speeds – iPeMS

iPeMS software is a tool designed to measure performance of the transportation network. Information provided by iPeMS software provides a user with reliable measurement of the transportation network, a benefit/cost analysis of delay and congestion, ability to complete before and after analytics, and bottleneck reporting and visualization. The iPeMS instalment at SBCTA, which is used for the Congestion

Management Plan, provides the user with historical and real-time speed information on San Bernardino County state routes and freeways.

Speed data obtained from iPeMS was useful in identifying travel trends and patterns in different geographies. Average speed data were obtained for the months of May 2015 to April 2016. **Figure 5-2** illustrates the nine locations where roadway segment average speeds were identified:

- Location 1: SR-18 Between SR-138 and SR-189
- Location 2: SR-18 Between SR-173 and SR-330
- Location 3: SR-330 Between SR-210 and SR-38
- Location 4: SR-18 Between SR-330 and SR-38
- Location 5: SR-18 Between SR-210 and SR-138
- Location 6: SR-38 Between Yucaipa and City of Big Bear Lake
- Location 7: SR-18 Between SR-38 and Stanfield Cut-off
- Location 8: SR-2 West of SR-138
- Location 9: SR-138 Between SR-2 and I-15

Location data is summarized by season:

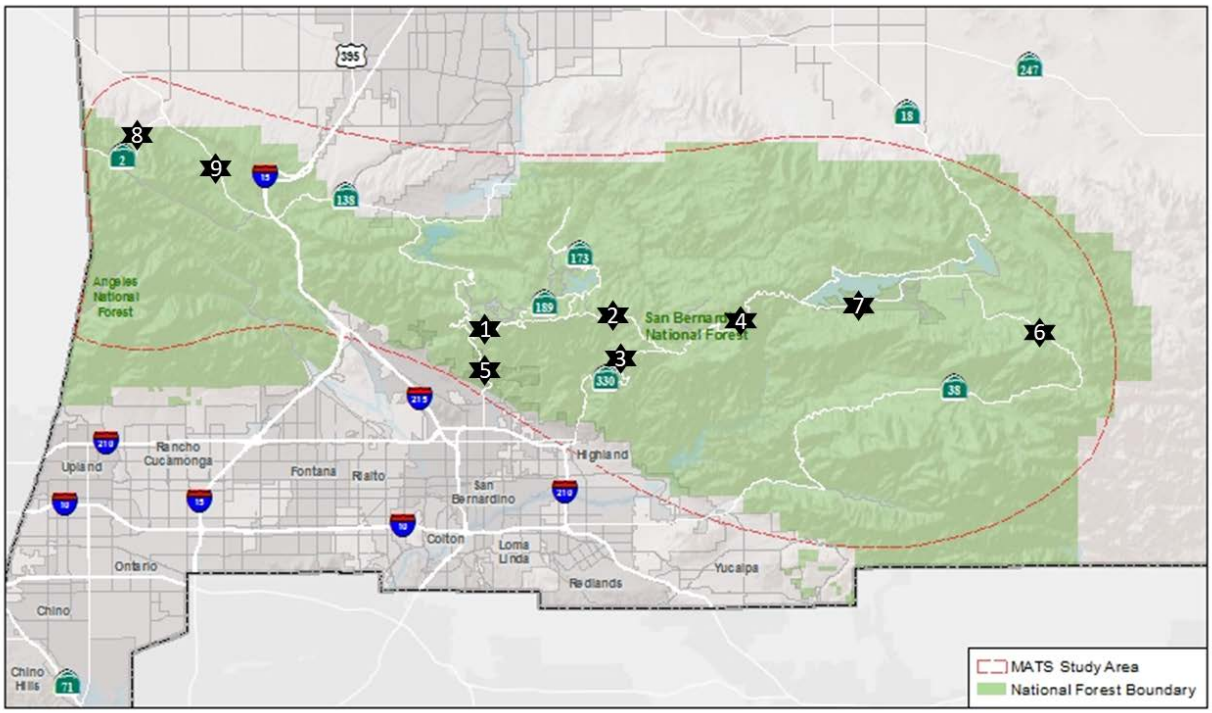
- Spring = March 20 through June 20
- Summer = June 21 through September 24
- Fall = September 22 through December 20
- Winter = December 21 through March 19

Location data is also summarized for a combined "Holiday", which is a combination of the following holiday dates:

- Memorial Day (5/25/2015)
- Fourth of July (7/4/2015)
- Labor Day (9/7/2015)
- Thanksgiving (11/26/2015-11/27/2015)
- Christmas (12/25/2015)
- New Year's Day (1/1/2016)
- President's Day (2/15/2016)

In addition to looking at the seven identified locations, an in-depth investigation into the speeds on the SR-18/SR-38 couplet around Big Bear Lake. Additional speed and iPeMS data is included in **Appendix B**.

Figure 5-2: iPeMS Speed Data Collection Locations



5.4.3 iPeMS Roadway Segment Average Speeds

Average speeds were collected using iPeMS and separated by season and categorized by weekday, weekend, and holiday. **Figure 5-3** through **Figure 5-11** summarize the average speeds for seven select locations: SR-18 between SR-138 and SR-189, SR-18 between SR-173 and SR-330, SR-330 between SR-210 to SR-18, SR-18 between SR-330 to SR-38, SR-18 between SR-210 and SR-138, SR-38 between Yucaipa and City of Big Bear Lake, SR-18 between SR-38 and Stanfield Cut-off, SR-2 west of SR-138, and SR-138 between SR-2 and I-15.

Figure 5-3 illustrates the average speeds for the segment of SR-18 between SR-138 to SR-189. In general, the average speeds are lower for the weekends and higher for weekdays for all seasons. This segment of roadway is south of Lake Gregory Regional Park, west of Strawberry Peak, southwest of the community of Twin Peaks. The lower average speeds during the weekend can be attributed to an increase of visitors. In general, speeds on this segment range between 33 and 36 Miles per Hour (MPH).

Figure 5-3: SR-18 between SR-138 to SR-189 Average Speeds

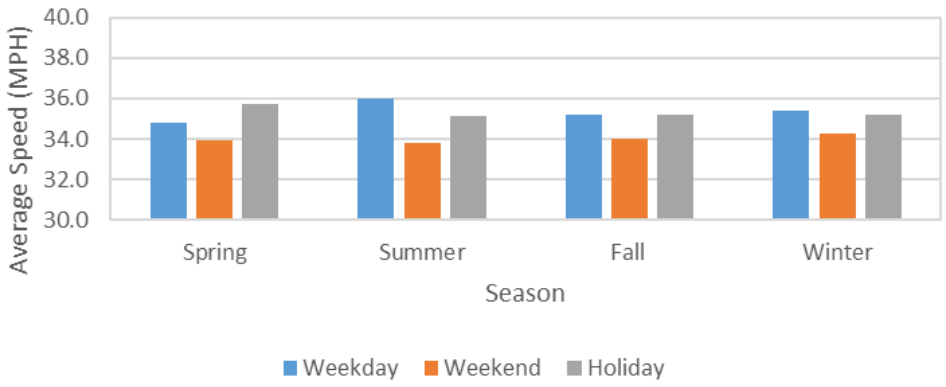


Figure 5-4 illustrates the average speeds for the segment of SR-18 between SR-173 to SR-330. In the spring and summer months there is a clear difference between weekday and weekend travel, with weekend speeds being slightly lower. In the fall and winter, however, the weekend and holiday speeds are nearly the same, with the weekday speeds only slightly higher. The lower spring and summer weekend average speeds is likely attributed to higher visitor travel. The segment is between the community of Skyforest and Running Springs. In general, speeds on this segment range between 35 and 38 MPH.

Figure 5-4: SR-18 between SR-173 to SR-330 Average Speeds

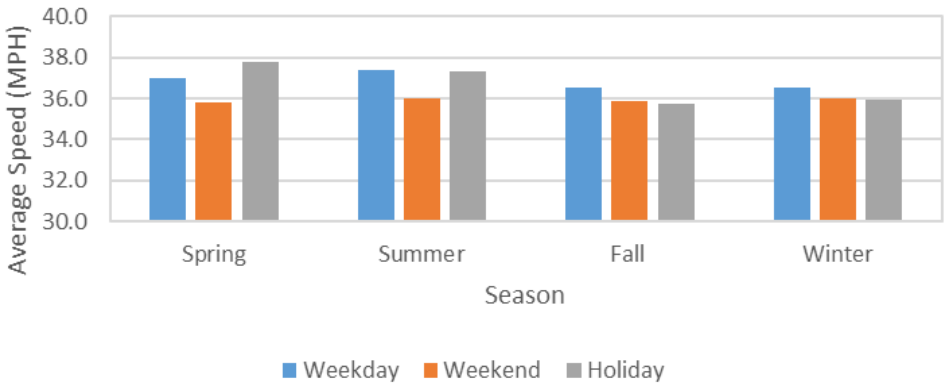


Figure 5-5 illustrates the average speeds for the segment of SR-330 between SR-210 and SR-18. The spring and summer seasons have similar average speeds for weekday, weekend, and holiday travel, with the weekends being slightly slower. The fall and winter seasons have a higher average speed during the weekday, with a slightly lower speed during the weekend, and an even lower speed during holidays. The fall and winter seasons have slightly lower speeds than the spring and summer seasons, which can be attributed to visitor travel as well as weather and roadway geometry. The segment is located north of the City of Highland and south of the community of Running Springs. In general, speeds on this segment range between 32 and 42 MPH.

Figure 5-5: SR-330 between SR-210 to SR-18 Average Speeds

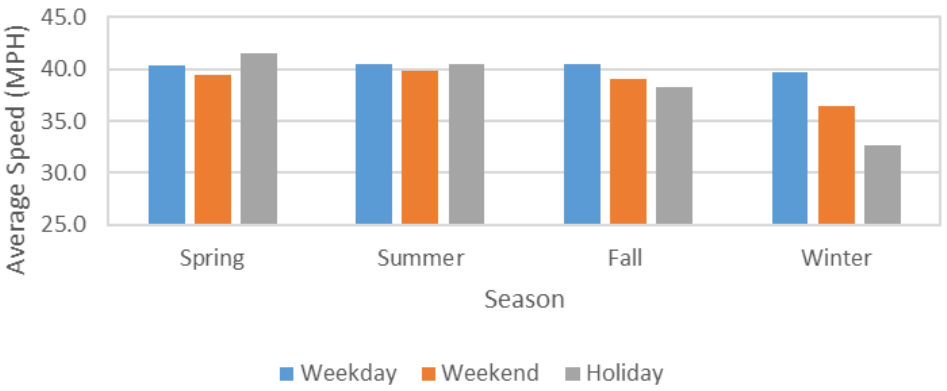


Figure 5-6 illustrates the average speeds for the segment of SR-18 between SR-330 to SR-38. In general, the fall and winter seasons have lower speeds than the spring and summer seasons. The winter season has a large difference in weekday and weekend speed, with the weekend speeds being the lowest. This can be attributed to snow play and ski resort visitors in this location. This segment of roadway is located south of Green Valley Lake, between the community of Running Springs and the City of Big Bear Lake, with access to Snow Valley Mountain Resort. In general, speeds on this segment range between 30 and 35 MPH.

Figure 5-6: SR-18 between SR-330 to SR-38 Average Speeds

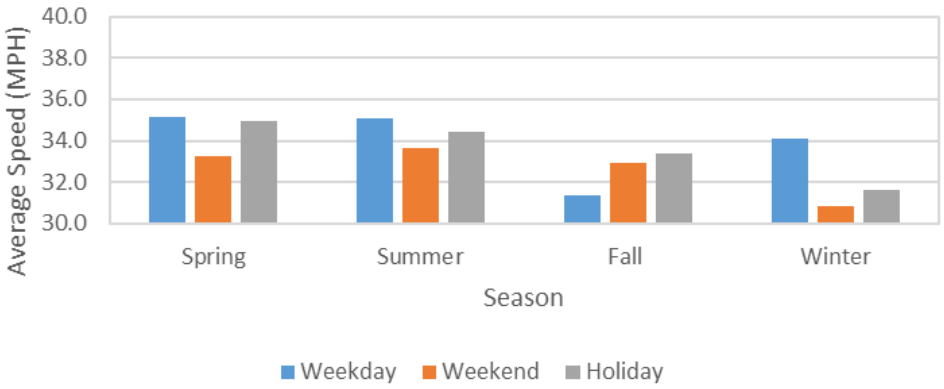


Figure 5-7 illustrates the average speeds for the segment of SR-18 between SR-210 to SR-138. In general, all seasons have similar average speeds, and show the weekend travel at a slower speed than weekday travel. This segment of roadway begins in the City of San Bernardino, with access to Crestline, Lake Gregory, and Lake Arrowhead. In general, speeds on this segment range between 41 and 44 MPH.

Figure 5-7: SR-18 between SR-210 to SR-138 Average Speeds

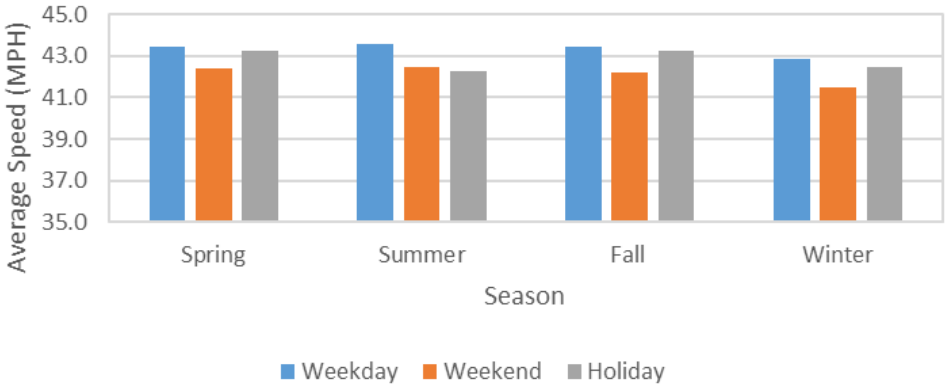


Figure 5-8 illustrates the average speeds for the segment of SR-38 between Yucaipa and the City of Big Bear Lake. In general, all seasons have similar speeds, with weekend speeds being the same or slightly lower than weekday speeds. This segment of roadway has access to several campgrounds and trails. In general, speeds on this segment range between 44 and 47 MPH.

Figure 5-8: SR-38 between Yucaipa and City of Big Bear Lake Average Speeds

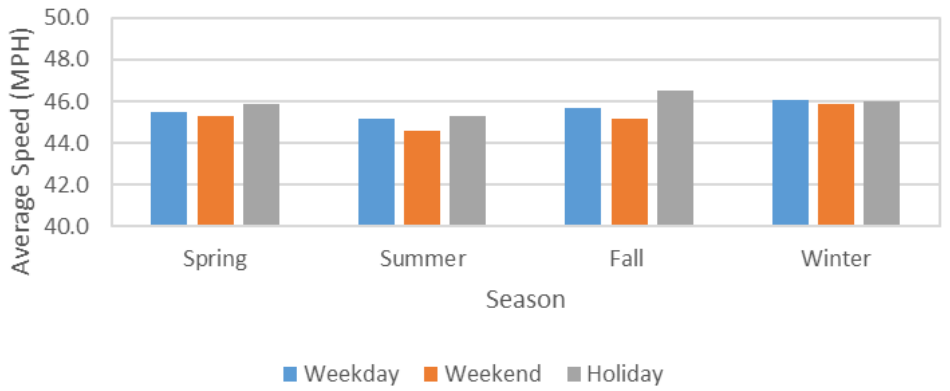


Figure 5-9 illustrates the average speeds for the segment of SR-18 between SR-38 and Stanfield Cut-off. The spring and summer months show significantly lower speeds than the fall and winter months. This is primarily due to visitor influx during the summer months. This segment of roadway is essentially Big Bear Boulevard through the City of Big Bear Lake and Community of Big Bear. In general, speeds on this segment range between 25 and 32 MPH.

Figure 5-9: SR-18 between SR-38 and Stanfield Cut-off Average Speeds

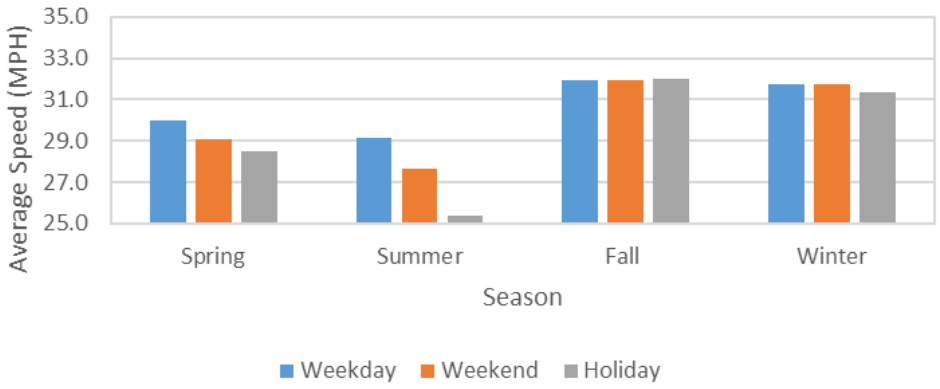


Figure 5-10 illustrates the average speeds for the segment of SR-2 west of SR-138 in Wrightwood. Most notably, the weekend speeds are higher than the weekday and holiday speeds. The fall and winter holiday speeds result in the lowest speeds overall, attributed to weather and visitor influx. In general, speeds on this segment range between 42 and 48 MPH.

Figure 5-10: SR-2 West of SR-138

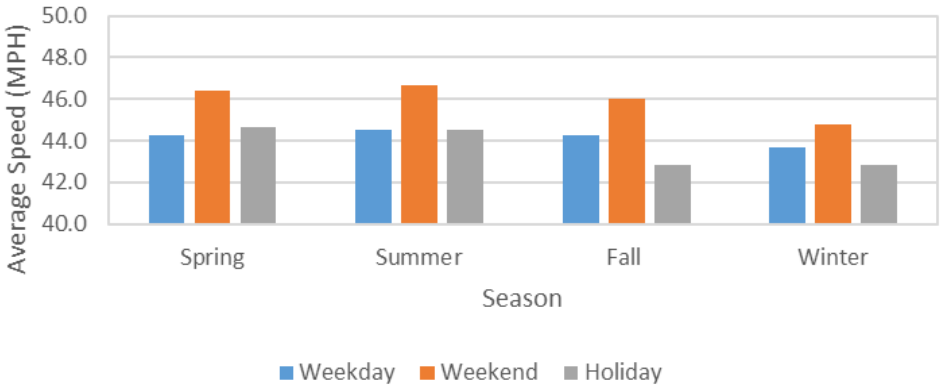
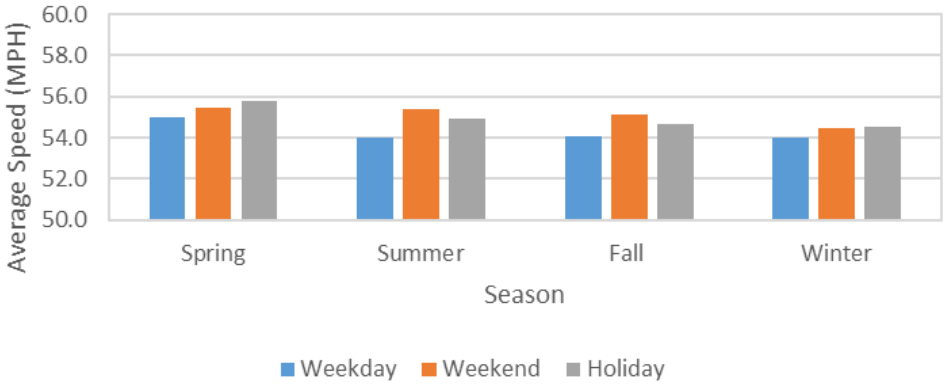


Figure 5-11 illustrates the average speeds for the segment of SR-138 between SR-2 and I-15 east of Wrightwood. Speeds during all seasonal time periods range above 50 mph, with the weekday speeds lower than the weekend and holiday speeds.

Figure 5-11: SR-138 between SR-2 and I-15



5.4.4 iPeMS Average Speeds Around Big Bear Lake Couplet (SR-18/SR-38)

The couplet of SR-18 and SR-38 around Big Bear Lake is a location that attracts a significant number of both summer and winter visitors. On the south side of the lake, there are two ski-resorts which are used year-round, and on the north side of the lake there is a boat launch that is used extensively in summer months. Surrounding the entire lake are campsites and trailheads. **Figure 5-12** and **Figure 5-13** illustrate the average speeds by time of day for an entire year. For the northbound/eastbound direction, the south side, SR-18, presents lower average speeds compared to the north side, SR-38. The figures illustrate that the lowest average speeds occur around the winter seasons for both routes which is consistent with stakeholder comments pertaining to high seasonal activity and congestion. Similarly, for the southbound/westbound direction, the south side, SR-18, experiences lower average speeds compared to the north side, SR-38. The lowest average speeds occurred in the months of January and February which is during the area's snow season. Overall, the northbound/eastbound direction average speeds are than southbound/westbound.

Figure 5-12: Northbound/Eastbound Average Speeds

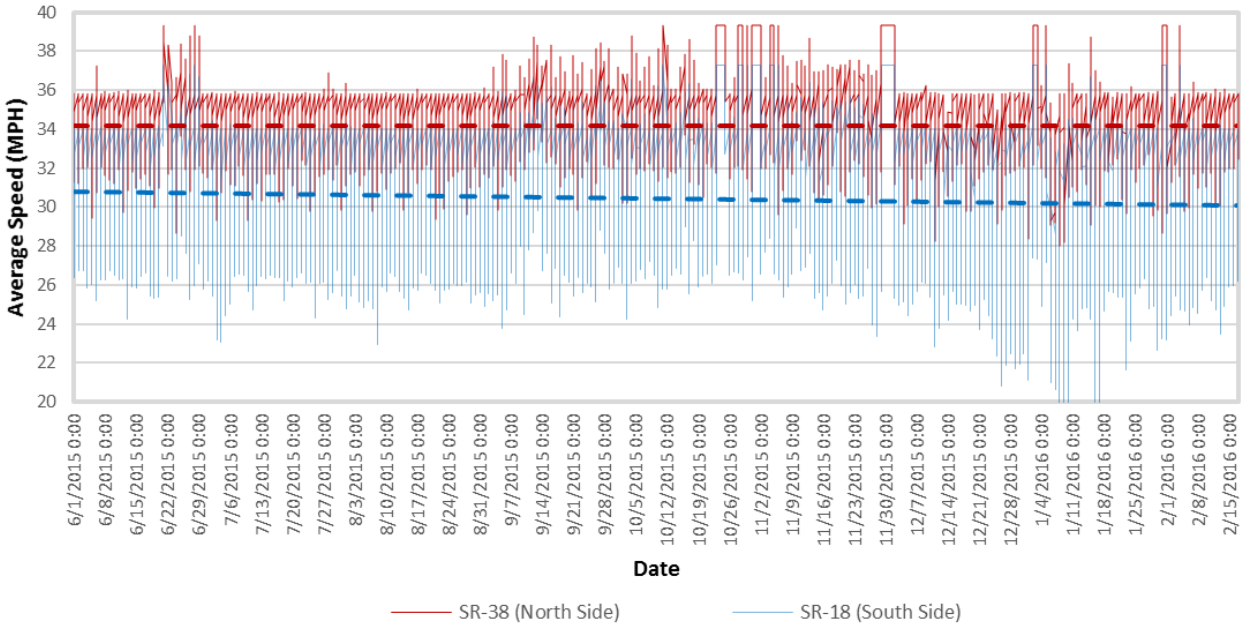
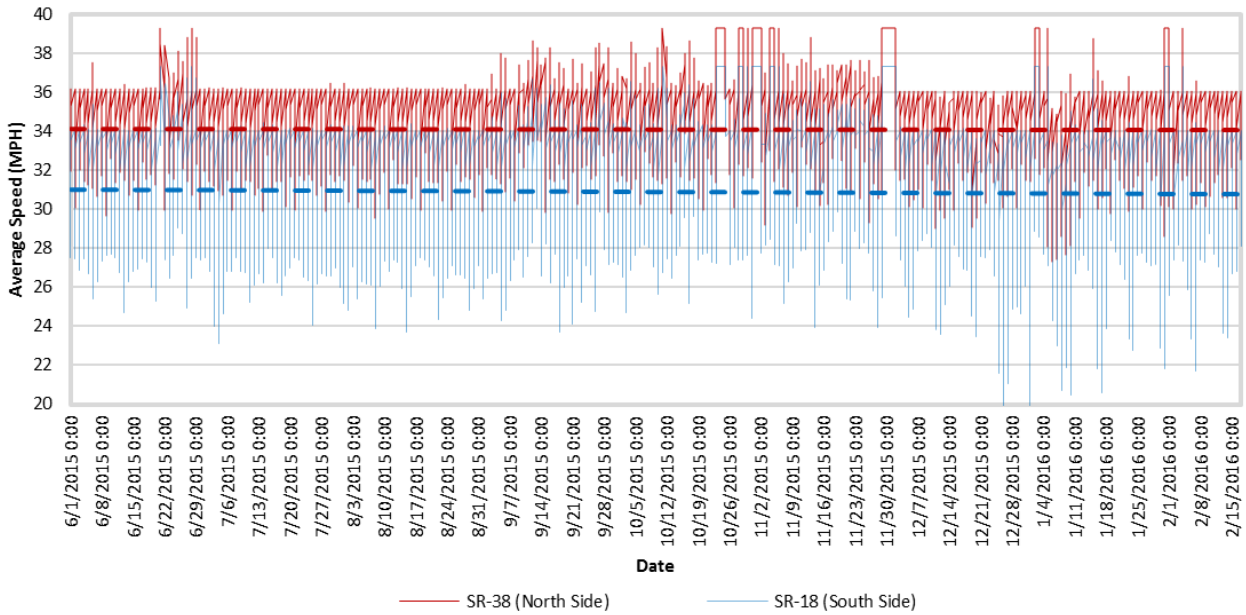


Figure 5-13: Southbound/Westbound Average Speeds



5.4.5 Peak Period Identification

Peak period travel within the MATS area is important due to seasonal visitor travel. In 2014, Iteris was contracted by SBCTA to develop a web based Congestion Monitoring Tool using third-party HERE data. The Iteris team used the SBCTA Congestion Monitoring Tool to review general trends on SR-330, SR-18

and SR-38 to identify the peak periods. **Table 5-4** summarizes the weekday and weekend peak periods. In addition, Iteris identified days during winter months when traffic performance was poor due to inclement winter conditions. During the winter months, there were a few days that experienced traffic congestion that may have been attributed to winter conditions which are listed in **Table 5-5**. **Table 5-6** and **Table 5-7** summarize the summer season and Thanksgiving arrival and departure peak periods.

Therefore, in addition to normal weekends, the team considered the impacts of special weekends. Special weekends were identified as those occurring during public holidays and school holiday periods which attract large numbers of tourists to the mountain area. **Table 5-8** presents the peak periods for 4th of July and Christmas holiday.

Table 5-4: Weekday and Weekend Peak Hours

Segment	Weekday			Weekend Peak
	AM Peak Period	Mid-Day Period	PM Peak Period	
SR-330 Between SR-210 to SR-18	7-8AM	11AM-1PM	5-6PM	7-9AM
SR-38 (North Big Bear)	9AM-2PM		5-11PM	11AM-2PM
SR-18 (South Big Bear)	8-9AM	12-7PM		12-3PM

Table 5-5: Traffic Congestion Due to Winter Conditions

Segment	Traffic Congestion
SR-330 Between SR-210 to SR-18	Saturday, 1/9/2016
SR-38 (North Big Bear)	Wednesday, 1/6/2016
SR-18 (South Big Bear)	Sunday, 1/17/2016

Table 5-6: Summer Season Arrival/Departure Peak Periods

Segment	Summer Season		
	Friday Arrivals	Saturday Arrivals	Sunday Departures
SR-330 Between SR-210 to SR-18	5-6PM	11AM-1PM	11AM-1PM
SR-38 (North Big Bear)	2-2PM	1-2PM	12-2PM
SR-18 (South Big Bear)	3-4PM	2-3PM	11AM-12PM

Table 5-7: Thanksgiving Holiday Arrival/Departure Peak Periods

Segment	Holiday (Thanksgiving)	
	Wednesday Arrivals	Friday Departures
SR-330 Between SR-210 to SR-18	5-6PM	7-8AM
SR-38 (North Big Bear)	2-3PM	2-4PM
SR-18 (South Big Bear)	2-6PM	2-4PM

Table 5-8: Holiday Peak Periods

Segment	Holiday (Fourth of July)	Holiday (Christmas)
SR-330 Between SR-210 to SR-18	12-1PM	7-9AM
SR-38 (North Big Bear)	12-2PM	2-3PM
SR-18 (South Big Bear)	12-1PM	4-6PM

5.4.6 Turnouts

Throughout the MATS area, there are a number of locations which could be interpreted as "turnouts". The purpose of useable turnouts along the State Routes in the MATS area is to provide a safe area for trucks and slow vehicles to pull over and allow for faster vehicles to pass. The importance of turnouts along State Routes is in the location and usability of turnouts, and no the frequency. In the existing conditions, there are a significant number of places which could behave as a turnout, but are not signed as such. The lack of signage and typical designs for turnouts results in trucks and slower vehicles bypassing turnouts and not using them.

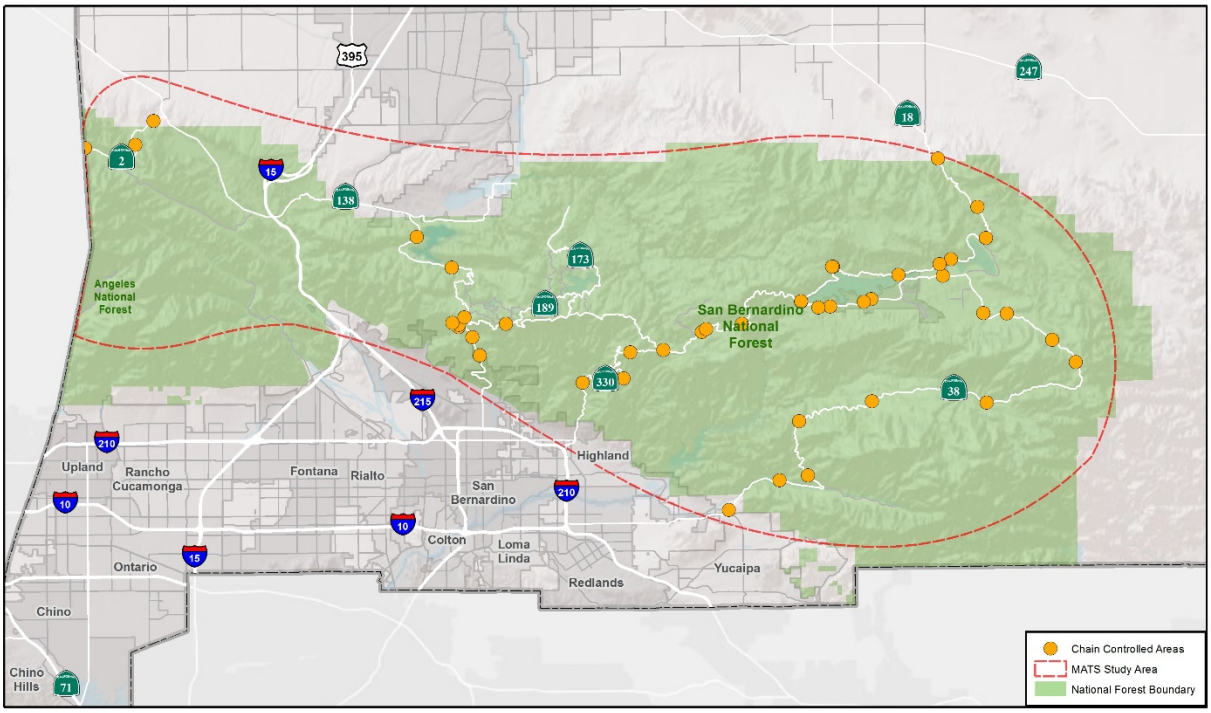
In addition to true vehicle turnouts, there are Vista Points located along many of the State Routes. Vista points are informal turnouts (or "pullouts") where motorists can safely view scenery, or park and relax.

5.4.7 Chain-up Areas

The MATS area includes State Routes that traverse mountains. Chain up locations are typically dependent on elevation. Up-to-date information can be found on the Caltrans District 8 webpage, which has a live link to chain required locations.

Figure 5-19 was created during a peak snow event using the Caltrans Website (http://www.dot.ca.gov/dist8/tmc/#).

Figure 5-14: Chain-Up Areas



6.0 IDENTIFICATION OF MOBILITY ISSUES

Mobility issues (whether operational, geometric, or informational) were identified by receiving stakeholder comments and by reviewing the travel model results.

6.1 Stakeholder Input

Stakeholder input was extensive and instrumental in capturing all of the transportation related system needs within the mountain area. Stakeholders include the County of San Bernardino, the City of Big Bear Lake, Caltrans, SBCTA, SCAG, the CHP, and the US Forest Service. From the stakeholder meetings, many of the problems identified can be summarized into the following need categories:

- **Traffic Control:** Bottleneck due to existing, non-existent, or poor location of traffic control device. (Example is a stop sign located on a high-volume road).
- **Signage:** Bottleneck due to non-existent or lack of signage, often resulting in poor circulation patterns, or confused drivers.
- **Traffic Volume:** Congestion and slow-moving traffic due to peak traffic volumes in excess of existing roadway capacity.
- **Cut-through Traffic:** Peak conditions (related to traffic congestion and weather) often result in traffic traveling on local roads rather than on major arterials and state routes.
- **Roadway Geometry:** Bottleneck due to curves and topography (which result in a lack of sight distance), often caused by slow-moving vehicles. Other roadway design issues, including lack of center turn lanes or left turn pockets, also creates driver confusion and congestion.
- **Chain Installation and Control:** Bottleneck due to operations and procedures for chain installation. Additionally, chain control locations often encourage visitors to travel on local arterials to avoid chain installation.
- **Roadway Maintenance:** There are existing issues with roadway maintenance, including maintaining striping and snow removal.
- **Illegal Parking:** Traffic congestion and friction on state routes due to vehicles parked in "No Parking" zones. This is often the case in winter and summer peak months near popular snow play and hiking locations.
- **Pedestrian or Bicycle Conflicts:** Conflicts between vehicles and non-motorized person trips due to pedestrians walking along side of road, heavy pedestrian crossing volumes, or narrow road with no shoulder or lane for bicycles. These conflicts often result in traffic congestion, and can be unsafe for pedestrians and bicycles.
- **Alternate Modes:** The increase in residents and visitors allows for the potential for increasing use of transit services, including shuttle and trolley service along with improving the existing fixed-route services.
- **Information Technology Services (ITS) Opportunity:** Information for drivers is beneficial to the overall transportation circulation, and could be better improved with real-time Changeable Message Signs (CMS) at key locations throughout the mountain area.
- **Coordination between Jurisdictional Agencies:** There are multiple agencies and jurisdictions involved related to maintenance and control during major events. Agencies include Caltrans,

County, City, Sheriff, and CHP. Lack of coordination can result in conflicting information, making it unclear what road conditions are, or what traffic congestion is currently occurring.

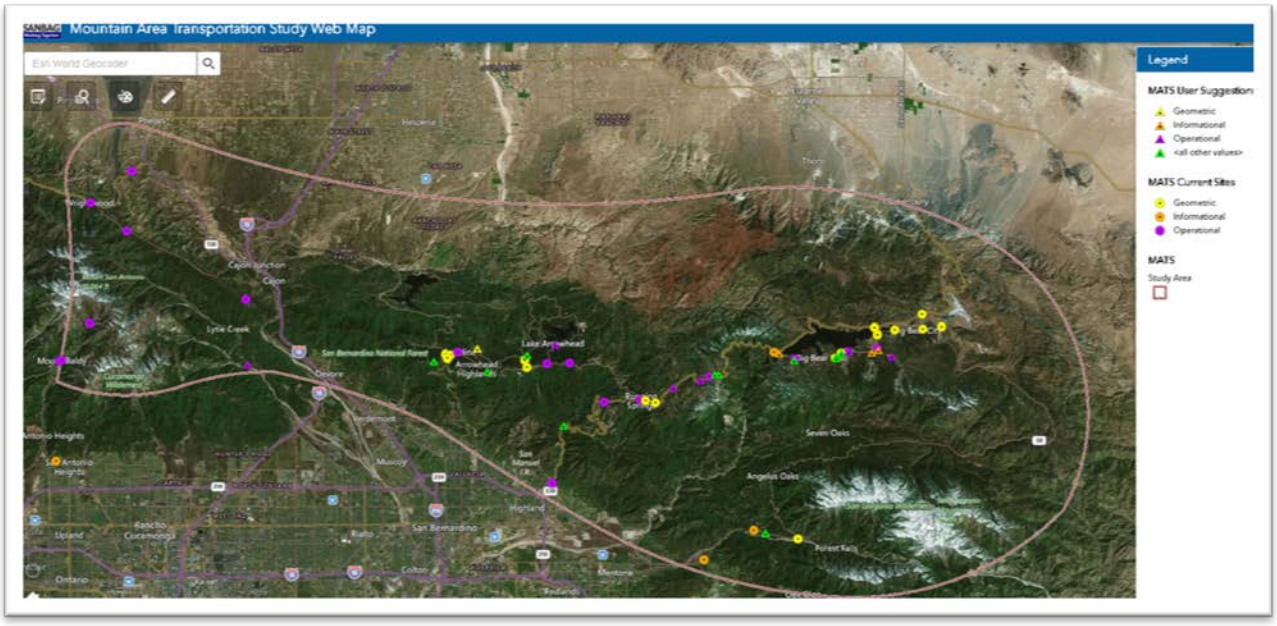
- **Existing Right-Of-Way:** It appears that many of the existing roadways are overlayed, or repaved, to existing roadway width, or even narrower in locations. In some locations, it appears or is known, that there is additional right-of-way that could be paved for better utilization.
- **Regional and Local Economic Impacts:** The location of the mountain area is a desirable destination for visitors from the Southern California region, and beyond. According to the Big Bear Housing Element, there are over 30,000 "second homes" in the mountain area, resulting in vacationers spending property tax money, as well as money on goods and entertainment, within the mountain area. As a part of San Bernardino County, the traffic and transportation within the mountain area could be a deterrent to visitors, resulting in a regional and local economic loss.

6.1.1 Project Web Tool

To assist in collecting information from the stakeholders, a web tool was developed. The web tool is an online portal and Geographic Information System (GIS) mapping tool developed to solicit input. **Figure 6-1** identifies the project study area and location of identified project needs.

All needs identified through the Web Tool were categorized into geometric, informational, operational, and "other" categories. The information shown in **Figure 6-1** will be discussed in *Section 6.2* of this report.

Figure 6-1: MATS Web Tool



6.1.2 Stakeholder Meetings

During the stakeholder meetings, many issues were identified. The issues were discussed in length, and organized into two categories: general issues and location issues.

6.1.3 General Issues Identified

There were many issues identified that related to transportation throughout the mountain area. **Table 6-1** summarizes general MATS area issues.

Table 6-1: General Issues

Issue	Discussion
Bike Riders on State Routes up Mountains	Bicycle riders often travel along SR-18 and SR-330. Although these bicycle riders typically have escorts, bottlenecks occur with and without escorts.
Count Data Collection	The current methodology for collecting count data is to collect when data is needed, as a reaction.
US Forest Service Campsites	A comment was raised that US Forest Service camping locations are closed during winter months.
Chain Installation and Control	Several issues were identified related to chain-up areas, installation, and control. It is a known problem that people often do not stop and obey required chain-up locations. It is also noted that there are no chain-up areas on SR-2 in Wrightwood.
Changeable Message Signs (CMS)	There are several existing changeable message signs at the base of the mountain (one located at Baseline and SR-210). Portable message signs have been used in the past, and the concern of power issues (e.g., solar batteries often run out when a panel is covered with snow). Another issue with portable message signs is that drivers believe them to be construction related, and have a tendency to ignore them.
Portable Message Signs (PMS)	While not desirable for permanent locations, the availability of portable message signs is low, and they could be useful during special events.
Park and Ride	Mass transit in the mountain area is underutilized, leaving the potential for park and rides or shuttle services.
Parking on State Routes	A common traffic congestion problem on state routes is related to people parking in “no parking” locations, at turnouts, and within the travelled way. People often park at these locations for snow play or hiking, and create problems throughout the mountain area.
Passing Lanes on State Routes	The existing passing lanes on state routes are helpful in easing congestion following slow vehicles. The addition of passing lanes, where possible, would be beneficial.
Roadway Capacity	On an average day, roadway capacity is not a problem in the mountain area. Roadway capacity is only an issue during select events during both winter and summer peak season.
Roadway Design Elements	There are many locations on the State Routes within the MATS area that have slope changes or significant curvature of the roadway, which result in bottlenecks.
Trucks	Trucks can be restricted on Caltrans facilities if the roadway conditions are poor. The current method for sending out this information is either on Facebook or Twitter, so companies would need to be connected to the Caltrans informational sources to obtain information about truck restrictions.
Mount Baldy Community Coordination	Major coordination issues between LA County and San Bernardino County, with recent snow clearing issues. Community is located in both San Bernardino and Los Angeles Counties. Can agreements be reached to have SB maintain access road?

6.1.4 Location Issues Identified

There were many issues identified that related to transportation throughout the mountain area. **Table 6-2** summarizes general MATS area issues.

Table 6-2: Location Issues

Location ID	Facility Name	Location	Issue(s)
Wrightwood/Mount Baldy/Lytle Creek			
1	SR-2 (Big Pines Highway)	Willow Road	• The stop sign at Willow Road presents a huge bottleneck in town during peak seasons • The businesses in town hire an officer for traffic control during peak seasons
2	SR-2 (Big Pines Highway)	Wrightwood	• No chain-up areas on SR-2 and there are no lights. In the winter, there are many times when chains are not required, but probably should be • CHP does not enforce chains on SR-2
3	Glendora Ridge Road	Entire Route Through Los Angeles County	• Typically closed in winter months
4	Lone Pine Canyon Road	Between SR-138 and SR-2 in Wrightwood	• County Road that CHP controls • Chain control is not enforced, even though Lone Pine Canyon acts as a cut-through to the Wrightwood
5	Lytle Creek Road	North of I-15	• Popular road for cyclists, but there is no shoulder or bike lane
6	Swarthout Canyon Road	South of Lone Pine Canyon Road	• Used as a cut-through when I-15 is congested • There are some unpassable areas on this facility for certain autos, including some stream crossings
Crestline/Lake Arrowhead			
7	SR-138	Seeley Way	• Sight distance issues • Seeley used as a cut-through route
8	SR-138	Crest Forest Drive/Lake Drive "Top Town"	• Confusing, off-set 5-legged intersection, with grade issues • Inadequate sight distance for turning
9	SR-173	SR-18	• Poor traffic control, and confusing intersection • There is potential for more of an issue with additional planned development
10	SR-18	SR-138	• SR-18 drops from 4 lanes to 2 lanes, resulting in vehicles speeding up to pass
11	SR-18	Daley Canyon Road	• Strange and confusing existing geometric • There is no room for a right turn • The land is owned by the US Forest Service • Steep grade on Daley Canyon Road approaching SR-189
12	SR-18	SR-330	• Southbound Arrowhead traffic to SR-330 west is a year-long issue with major back-up of traffic during peak periods
13	SR-18	Running Springs to Big Bear Lake	• Cars pull over for snow play, picnics, etc. • There is no regard to the many signs that indicate no parking along the narrow stretches of the road
14	SR-18	Running Springs School Road	• Northbound west turn is difficult during peak and off-peak periods

Location ID	Facility Name	Location	Issue(s)
15	SR-18	Snow Valley and Snow Valley Snow Play Area (approximately 1 mile west of Snow Valley parking lot entrance)	• Limited parking stalls open to the public at snow play location • Coordination with Snow Valley resort needed for parking for snow play • People entering and leaving the snow play area block eastbound traffic
16	SR-18	Entire State Route	• Truck issue due to curves and topography
17	SR-189	Daley Canyon Road	• Inadequate sight distances for right turn from SR-189 to Daley Canyon Road • Northbound SR-189 has a stop on a downhill profile that is difficult to make in winter conditions
18	SR-189	Blue Jay Cut-off	• Left turn from northbound SR-189 onto Blue Jay cut-off is skewed • It is unclear that access to Twin Peaks (Golf Course, Conference Centers, etc.) needs to be made from the intersection of Daley Canyon Road with SR-189
19	SR-330	City Creek US Forest Service Station	• No left turn pocket for vehicles turning into US Forest Service Station parking lot
20	SR-330	Live Oak	• People tend to use Live Oak as a cut-through to avoid chain control
21	SR-18	Hilltop Boulevard	• Southbound SR-18 (Lake Arrowhead) traffic turning left onto SR-330 is a year-long issue with major queuing of traffic during peak periods • Poor local Running Springs traffic circulation along SR-18 between SR-330 and Soutar Drive
22	Crest Forest Drive	Valley View Drive	• Poor visibility and skewed approach at intersection
23	Lake Arrowhead Village Area		• Weekend traffic issues in peak months related to visitors • Inadequate parking areas where visitors can park and ride public transportation
24	Lake Drive	Fern Drive	• Sight distance issues, partially due to steep grade on Fern Drive • Queuing at stop sign in winter months • Cannot include stop sign on north leg due to grade constraints
25	Lake Drive	Wild Rose Lane	• Issue with traffic control devices during peak seasons • There is a monthly meeting at this location which creates traffic congestion
26	SR-330	Highland Ave	• Potential for Park and Ride Facility
Big Bear/Angeles Oaks			
27	SR-18	SR-38	• Need to encourage traffic to take SR-38 off of the mountain instead of SR-330
28	SR-18 (Big Bear Boulevard)	Castle Rock Trail Head	• Heavily used trail with limited street parking on Big Bear Boulevard and no parking on adjoining streets

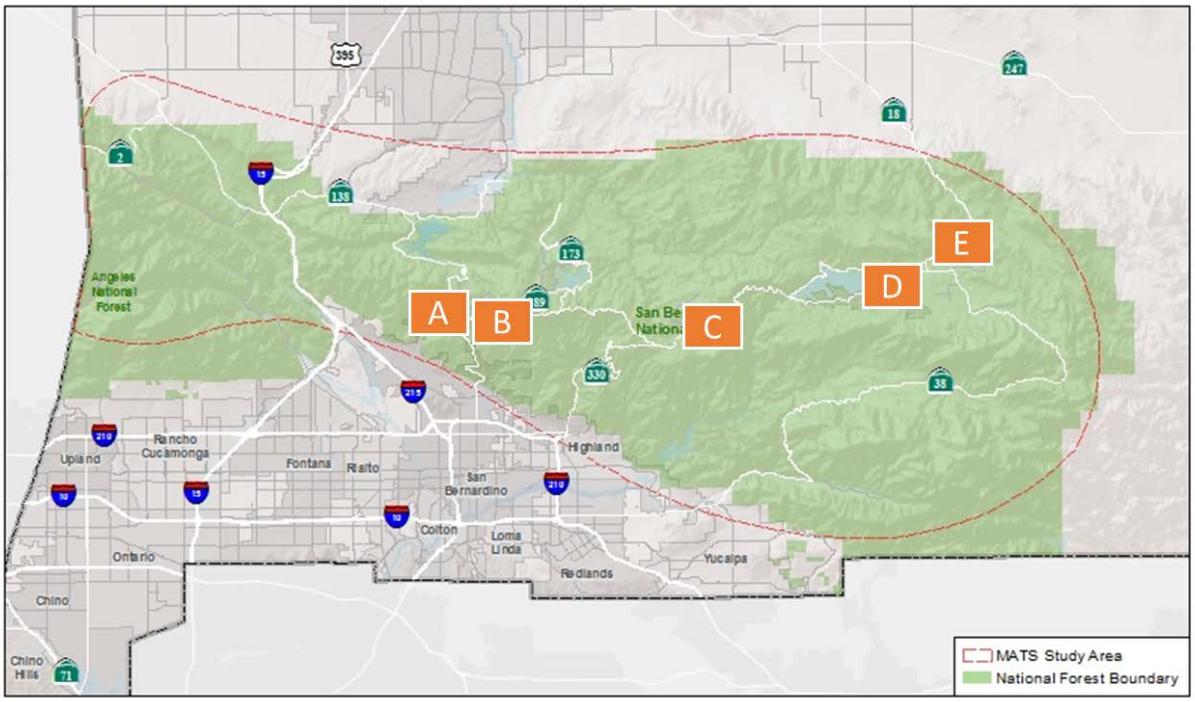
Location ID	Facility Name	Location	Issue(s)
29	SR-18 (Big Bear Boulevard)	Mill Creek Road	• Secondary arterial with access to the Aspen Glen Picnic area, a heavily used US Forest Service day facility • This is a skewed intersection on a fairly steep incline at a nearly blind corner, with no left turn lane onto Mill Creek Road going westbound on SR-18 • Problem in winter and summer peak months • Ice and snow make the left turn from SR-18 onto Mill Creek Road difficult
30	SR-18 (Big Bear Boulevard)	Wild Rose Lane	• Major congestion in winter months caused by cars entering and exiting snow play area • Westbound left turn pocket is too short for queued vehicles
31	SR-18 (Big Bear Boulevard)	Lakeview Drive/Paine Court	• Lakeview Drive is a secondary arterial serving most of the residential homes and businesses on the west side of the City of Big Bear Lake. The left turn at SR-18 is often difficult • A boat launching ramp is located off of Paine Court which complicates turning movements at the intersection for boat trailers • This is a problem in both winter and summer peak months • Lakeview Drive and Paine Court meet at an acute angle at SR-18 which causes confusion as to right of way movement
32	SR-18 (Big Bear Boulevard)	Village Drive	• The westbound right turn is a sharp right angle, resulting in vehicles slowing down or stopping to make the right hand turn • Narrow and/or tight turning radius for vehicles traveling eastbound on SR-18 to make a smooth transition going northbound
33	SR-18 (Big Bear Boulevard)	Pine Knot Avenue	• Through movement on Big Bear Boulevard difficult during winter and summer months
34	SR-18 (Big Bear Boulevard)	Knickerbocker Creek	• There is a public walkway called Knickerbocker Trail running north and south from Village Drive to SR-18 approximately 100 feet east of Pine Knot Drive • Pedestrian traffic on this facility use the signalized intersection at Pine Knot and SR-18 to travel between the retail shopping area and the lake, which often causes delay and congestion during the summer months
35	SR-18 (Big Bear Boulevard)	Moonridge Road	• Traffic congestion and circulation problems in winter and summer
36	SR-18 (Big Bear Boulevard)	Stanfield Cut-off	• Travel lanes going eastbound are forced to merge into a single lane • There are two receiving westbound lanes for travel, but only one westbound approach lane • Queue and delay at this intersection during all months of the year, often resulting in a three or four traffic signal cycle wait
37	SR-18 (Big Bear Boulevard)	Division Drive to Paradise Way	• There is no shoulder, no drainage control, or center turn lanes the bulk of this segment • There are numerous businesses along this section that do not have defined driveways, making entering and exiting driveways difficult • Vehicles going both directions experience long delays when making left-turns
38	SR-38	Mountain Home Village	• Visitor traffic often cuts through Mountain Home Village during peak congestion
39	SR-38	Valley of the Falls Drive	• Geometric issue

Location ID	Facility Name	Location	Issue(s)
40	SR-38	Forest Falls Turnoff	• Difficult uphill travel for trucks and heavy vehicles
41	SR-38 (Big Bear Boulevard)	Greenspot Boulevard/Shay Road "Square Turn"	• Confusing intersection • Eastbound traffic staying on SR-38 has a separate lane/channel and drivers often miss the channel and turn right at the 4-way intersection • Westbound traffic staying on SR-38 must make a left turn at the 4-way intersection but is not required to stop; the other three approaches are stop sign controlled
42	SR-38 (Big Bear Boulevard)	Stanfield Cut-off	• Stop controlled on north/south legs, resulting in difficult northbound left due to the boat launch during the summer months • The north/south legs of the intersection are offset, creating confusion • Inadequate queue storage length for northbound Stanfield cut-off vehicles • There is a crosswalk from the school to the bike path, and neither side is ADA compliant
43	Moonridge Road	Club View Drive "Moonridge Y"	• Congestion due to winter ski-area traffic, often due to stuck vehicles, collisions, or chain installation • Decision point location for drivers determining how to exit the mountain
44	Stanfield Cut-off	Eagle Nest Road	• There is an existing driveway to Eagles Nest Road (an RV Park) that has conflicting movements with Stanfield Drive and impedes the intersection operation

6.2 Geometric Issues

It is known that the State Routes in the MATS area are winding and designed differently than interstates and freeways throughout the remainder of San Bernardino County. The data that was used for the speed and congestion analysis was also used to identify areas of geometric concern on the state routes in the mountain area. The locations discussed in this section were identified using the assumption that locations of slow speed and traffic congestion could be related to poor geometric design (due to poor sight distance and need to reduce speed due to roadway geometry). **Figure 6-2** identifies five locations that were identified as locations considered with an opportunity to improve mobility and reduce congestion. All five locations are located on SR-18 (and briefly SR-38 in the City of Big Bear Lake), but these locations may serve as indicators to other areas along State Routes within the mountain area with similar characteristics.

Figure 6-2: State Route Bottlenecks and Congestion



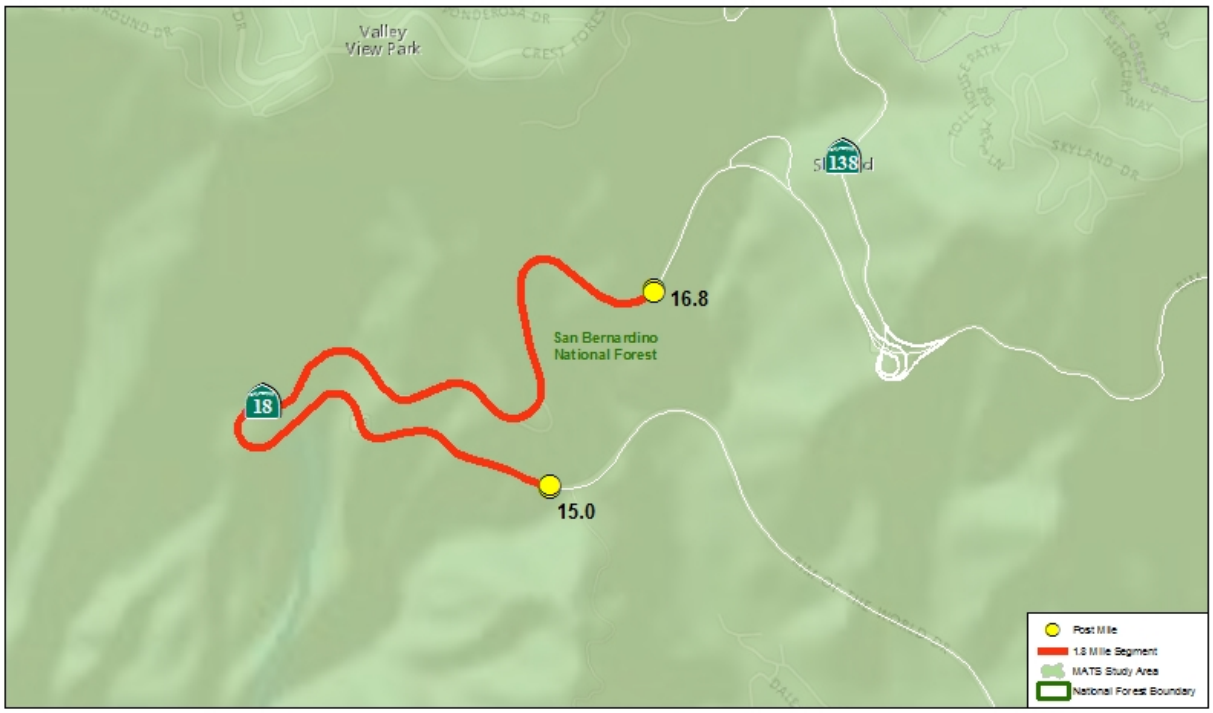
6.2.1 Location A: SR-18 – Post Mile 15.0 to 16.8

Location A was selected due to the congestion in the 1.8-mile segment. The existing roadway section is a four-lane section (2-lanes in each direction) with a centerline buffer separating the opposing directions of travel. The centerline buffer consists of double-double yellow pavement markings, a ground in rumble strip, and increased visibility with surface mount delineators which clearly separate opposing travel directions. The pavement delineation enhanced with surface mount delineators precludes left turns within the entire segment. This enhanced delineation restricts access to turnouts on the opposite side of the roadbed and eliminates crossing movements of vehicles. Isolated turnouts occur along the segment: one large turnout and one small turnout in the eastbound (uphill) direction of travel exist, and four small turnouts in the westbound (downhill) direction of travel. Paved shoulders of varying width exist along the entire segment and guardrail systems are installed at the back of shoulders where steep fill slopes occur. Approximately 10 horizontal curves occur within this segment and two bridges exist. The general elevation for this segment is 4,000 feet and the posted speed limit is 55 MPH. Warning signs are posted to recommend reduced speeds in advance of many curves. Additionally, a series of arrow signs exist to heighten awareness and guide drivers through longer curve lengths. Existing Call Boxes are located near PM 15.9 with one on each side of the roadway to assist motorists in case of emergencies or to obtain roadside assistance. **Figure 6-3** illustrates the segment of SR-18 from PM 15.0 to 16.8.

Note: The data used to identify geometric locations was obtained for the years 2012 through 2015. In the summer of 2016, Caltrans fully separated this section of roadway with a thrie-beam barrier. Caltrans

continues to incrementally improve uphill/downhill separation throughout the mountain area, by installing permanent positive barriers along centerline sections of roadway.

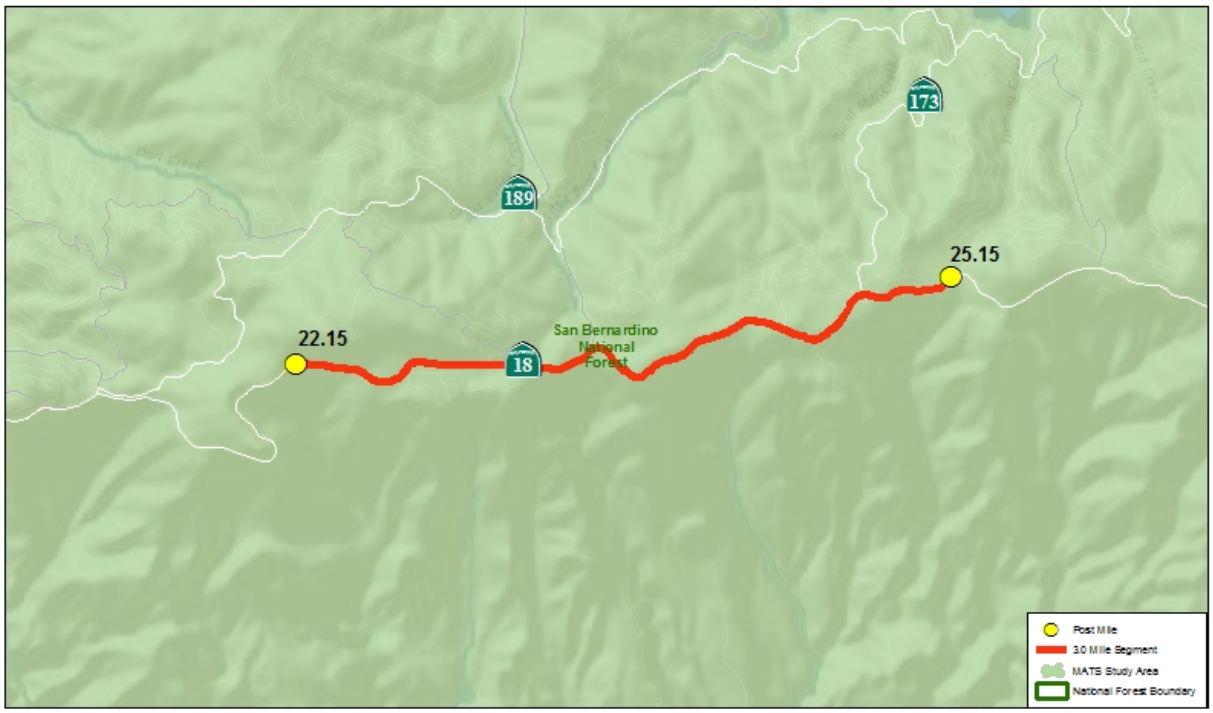
Figure 6-3: SR-18 – Post Mile 15.0 to 16.8



6.2.2 Location B: SR-18 – Post Mile 22.15 to 25.15

Location B was selected due to the congestion) in the 3-mile segment. The existing roadway section is a two-lane section (1-lane in each direction) with a centerline buffer separating the opposing directions of travel. The centerline delineation includes the use of double yellow pavement markings (no passing), recessed reflectors, and a ground in rumble strip. This segment is generally a linear segment with minor curves meandering through the communities of Rimforest and Crest Park. The roadway section has limited shoulder widths. There is an increased concentration of access points primarily due to the number of residential and business properties with local street connections and driveways. Within Rimforest, the use of left turn pockets has been leveraged over a very short length of approximately 500 linear feet to serve cross traffic turns into Pine Avenue and at the intersection of Bear Springs Road and Blackfoot Trail. One major intersection occurs within the east portion of this segment at SR-173 which is destined to Lake Arrowhead, where an eastbound left turn pocket is provided. The general elevation for this segment is 5,600 feet. Posted speed limits range from 55 MPH outside community limits and decreases to 45 MPH within the business district within Rimforest. No turnout locations are identified along this segment of roadway. **Figure 6-4** illustrates the segment of SR-18 from PM 22.15 to 25.15.

Figure 6-4: SR-18 – Post Mile 22.15 to 25.15



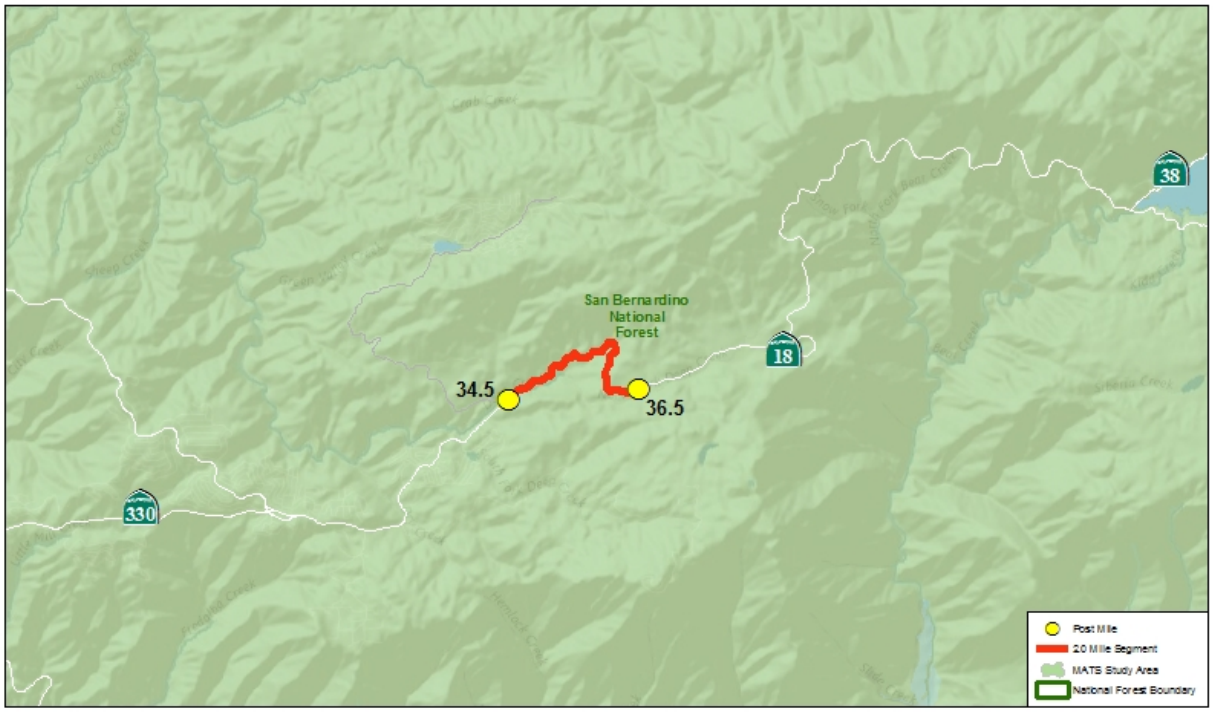
6.2.3 Location C: SR-18 – Post Mile 34.5 to 36.5

Location C was selected due to the congestion in the 2.0-mile segment. The existing roadway section is a two-lane section (1-lane in each direction) with a painted centerline that includes the use of double yellow pavement markings (no passing) and recessed reflectors. This segment is generally a linear segment with a large reverse curve section known as "13-curves" between Green Valley Lake Road and Green Valley Trail. The "13-curves" segment is located between Arrowbear and Snow Valley. Near the Snow Valley snow play park on the east end of this location, the roadway widens to a 4-lane section (2-lanes in each direction). The roadway has limited shoulder widths, with one bridge at Deep Creek, and no local access roadways or driveways. No guardrail is used in this segment of roadway, as slopes are more gradual when compared to other segments of SR-18. The posted speed limit is 40 MPH with some recommended speed reductions for sharper corners. In some locations with sharp corners, additional guidance consisting of roadway signs with arrows exist. One chain requirement sign is located in the segment. The elevation of this segment of roadway is approximately 6,500 feet. Call Boxes exist at two of the three eastbound (uphill) turnout locations. One signed turnout exists in the westbound (downhill) direction of travel.

Some areas along this segment of SR-18 have frequently been used for public snow play areas. There is confusion in roadside signage, stemming from signs denoting "No Parking Any Time" quickly followed by "Forest Adventure Pass Required" with an overlay adding the following statement; "when snow is present". Unclear signage gives the understanding to drivers and snow play enthusiasts that parking may be acceptable for snow play, if a Forest Adventure Pass is displayed. Signage related to no parking

is inconsistent when compared to other areas of state routes within the mountain area. **Figure 6-5** illustrates the segment of SR-18 from PM 34.5 to 36.5.

Figure 6-5: SR-18 – Post Mile 34.5 to 36.5



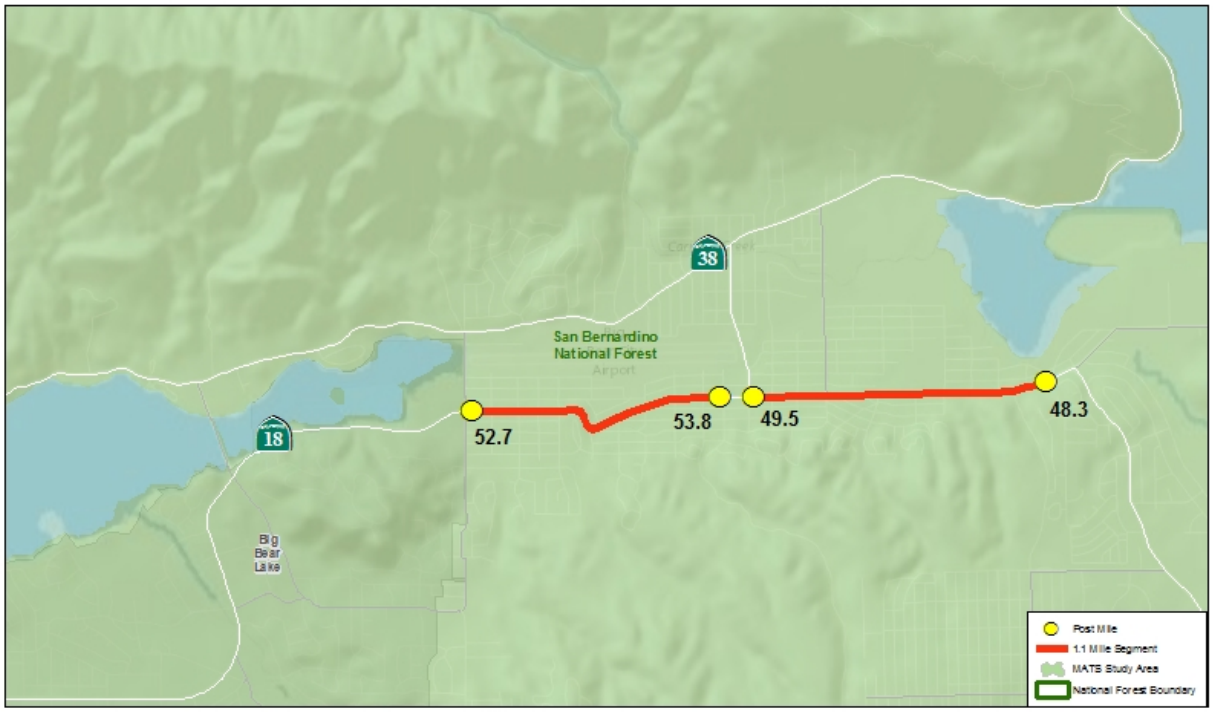
6.2.4 Location D: SR-18 – Post Mile 52.7 to 53.8 and SR-38 Post Mile 49.5 to 48.3

Location D was selected due to the congestion in the 1.1-mile segment. The existing roadway section is a four-lane section (2-lanes in each direction) with a striped median, providing a two-way left turn lane (TWLTL), and recessed reflectors in the median. This segment is in an urban district with two large sweeping curve sections through the downtown area of Big Bear Lake between Summit Road and Stanfield Cut-off. The roadway has curb, gutter, and sidewalk, with no dedicated bike lane. Right-turn lanes are provided at some intersections and driveways. A bus stop is provided east of Summit Road with turnouts to accommodate stopped buses beyond the outer travel lane while other transit stops in this segment are within the outer travel way. There is one bridge at Rathbone Creek, providing the same width as the existing roadway including dual sidewalks.

Throughout most of the section, only 24 feet of the existing 40-foot ROW is paved, with inadequate drainage control. Businesses within this segment typically use the entire property frontage for access and parking which results in vehicles queuing into travel lanes due to confusion. With no defined center-turn lane, vehicles slow to find open parking spaces and cause bottlenecks on SR-18. The lack of adequate drainage also has potential to cause localized flooding and continuous pavement damage. In addition, several residential streets intersect this segment of roadway at acute angles, causing traffic to slow excessively to make required turning movements.

This segment of SR-18 has significant local access points to multiple local streets, roadways, and driveways connecting businesses. There are three signalized intersections as well as the signalized intersections at each end for a total of five signalized intersections. There are approximately 25 eastbound and 25 westbound commercial driveways. These defined driveways are in addition to the local street connections with traffic signals and several stop sign controlled local street intersection. The posted speed limit is 40 MPH for the entire segment. **Figure 6-6** illustrates the segment of SR-18 from PM 52.7 to 53.8 and SR-38 from PM 49.5 to 48.3.

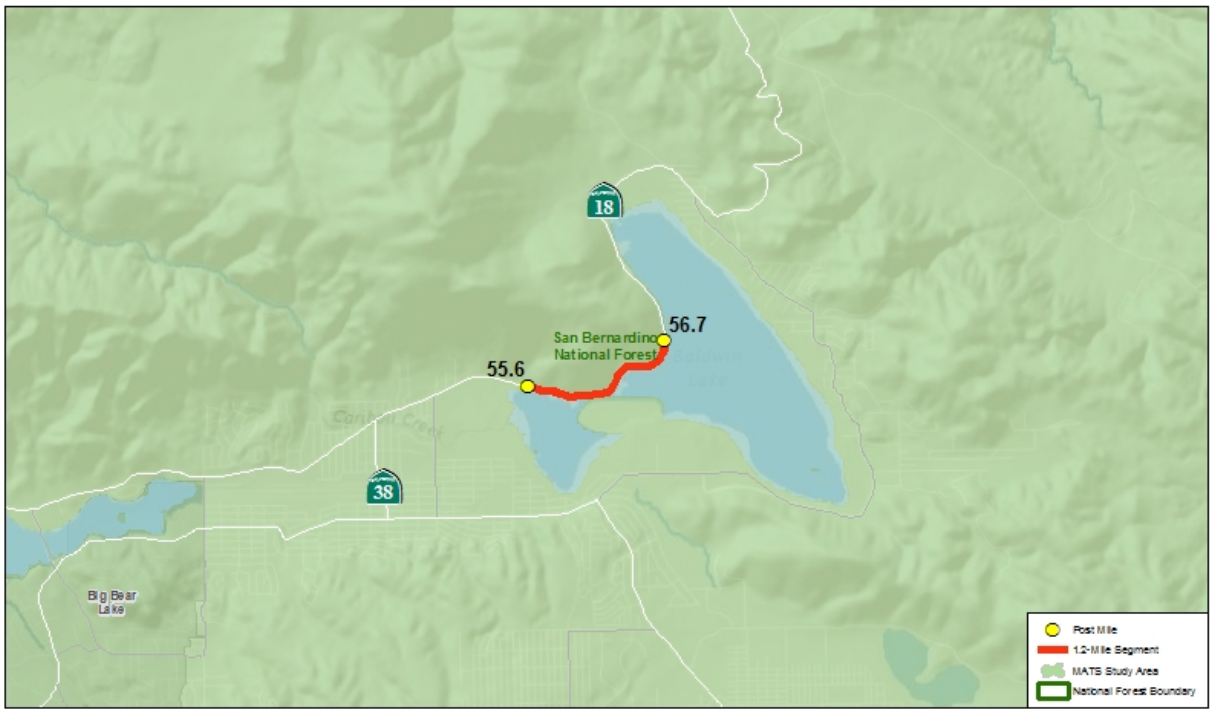
Figure 6-6: SR-18 – Post Mile 52.7 to 53.8 and SR-38 – Post Mile 49.5 to 48.3



6.2.5 Location E: SR-18 – Post Mile 55.5 to 56.7

Location E was selected due to the congestion in the 1.2-mile segment. The existing roadway section is a two-lane section (1-lane in each direction) with a painted centerline that includes double yellow pavement markings (no passing) and recessed reflectors. This segment is generally a linear segment with a large sweeping curve section with a recommended speed of 30 MPH as posted on the existing warning sign. The roadway section has no shoulders and does not serve any local access from the route, with the exception of Gold Mountain Road. Two long guardrail runs exist along the eastbound edge of travel way adjacent to Baldwin Lake. **Figure 6-7** illustrates the segment of SR-18 from PM 55.5 to 56.7.

Figure 6-7: SR-18 – Post Mile 55.5 to 56.7



7.0 TRAVEL DEMAND MODELING TOOL

The purpose of the travel model spreadsheet tool is to provide the ability to forecast areas of hot spot congestion with a known number of visitors. Visitors to the area make up a large portion of the needs assessment, as the full-time population and associated employment are relatively low. Peak winter and summer months experience a substantial increase in traffic congestion for extended periods of time as visitors and associated additional employees access the MATS communities. In addition, the traffic congestion caused by visitors has the potential to discourage would-be visitors, hindering the local economy.

The entire travel demand model documentation is included in **Appendix C**.

7.1 Traffic Forecast Methodology and Tool Development

The geographic study area for MATS is shown in **Figure 2-2**, and is located solely within San Bernardino County, and is comprised of many communities. The MATS area stretches from the Los Angeles County Line on the west to the Lucerne Valley on the east. The communities within the MATS area include: Mount Baldy, Lytle Creek, Wrightwood, Crestline, Blue Jay, Lake Arrowhead, Running Springs, Green Valley Lake, Arrowbear, Big Bear, and the City of Big Bear Lake.

The MATS area is traditionally a vacation area for all residents of Southern California (and beyond), yet the residents of the MATS area make up less than five percent (5%) of the population of San Bernardino County. **Figure 2-1** illustrates the population densities for San Bernardino County, as shown in the 2015 San Bernardino Countywide Transportation Plan. This difference in demand (visitors) and available service (residents) creates a unique challenge for providing adequate transportation services to meet the needs of both visitors and residents, not to mention that the visitor needs are seasonal and resident needs are year-round.

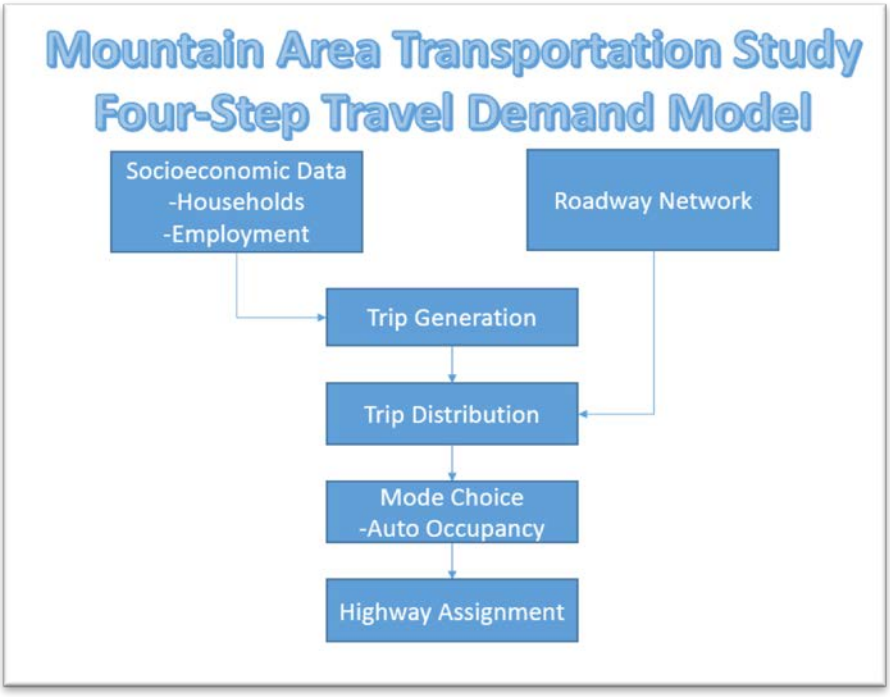
SBCTA maintains a regional model; however, it does not have the ability to accurately forecast peak season conditions, or weekend conditions. This report documents the development of MATS Travel Model Tool (MATS Model). The MATS Model is a focused model which takes a simplistic approach to a traditional four-step travel demand model, and includes only major facilities. The MATS Model is validated to a base year of 2015, and includes a forecast year of 2040. The MATS Model does not include a feedback loop, and takes approximately 5 minutes to complete a full model run. The MATS Model is fully developed within an excel spreadsheet with visual basic macros, and provides a user-friendly interface.

The following list, organized in the traditional four-step modeling process, highlights the various components and sub-components of the MATS Model. Various components are also identified as to their role, type and function (e.g. inputs, process and outputs, etc.).

- Trip Generation
  - Socioeconomic (SED) data (input)
  - Trip production models for Residents, Visitors, and External-Internal/Internal-External Trips
  - Regression trip attraction models based on household and employment data
  - Total person trips stratified into 3 trip purposes
    - Home-Based Work (HBW)
    - Home-Based Other (HBO)
    - Non-Home Based (NHB)
- Trip Distribution
  - Friction factors by trip purpose
  - Gravity model trip distribution by trip purpose
- Trip Assignment
  - External trips from external model (input)

A summary flow chart of the key components of the MATS Model process is presented in **Figure 7-1**.

Figure 7-1: MATS Model Structure Flow Chart



The MATS Model structure is prepared to present daily forecasts for peak and off-peak seasons. The days that are forecast are an average weekday, as well as a typical Friday, Saturday, and Sunday.

The Transportation Analysis Zones (TAZs) within the MATS Model were developed by aggregating San Bernardino Transportation Analysis Model (SBTAM) model TAZs into homogenous TAZs that represent the MATS area with as few TAZs as possible. The MATS Model TAZs were developed to accurately reflect existing and future development patterns, while at the same time reflect different land use levels and type of trip generation and distribution patterns.

Capacity assumptions for the roadway network were obtained from the City of Big Bear Lake General Plan, and are shown in **Table 7-1**. As a note, it is assumed that winter conditions result in a 10 percent reduction in daily capacity when compared to summer months.

Table 7-1: Daily Roadway Capacities

Roadway Type	Travel Lanes	Summer Capacity	Winter Capacity
2-lane Undivided	2U	13,000	11,700
2-lane Undivided (with passing lane)	2U-P	18,000	16,200
2-lane Divided	2D	18,000	16,200
3-lane Divided	3D	21,000	18,900
4-lane Undivided	4U	25,000	22,500
4-lane Divided	4D	37,500	33,800

Figure 7-2 identifies the MATS Model TAZ boundaries. In the MATS Model, there are 8 external stations and 15 internal TAZs.

Figure 7-3 identifies the MATS area highway network.

Figure 7-2: Transportation Analysis Zones

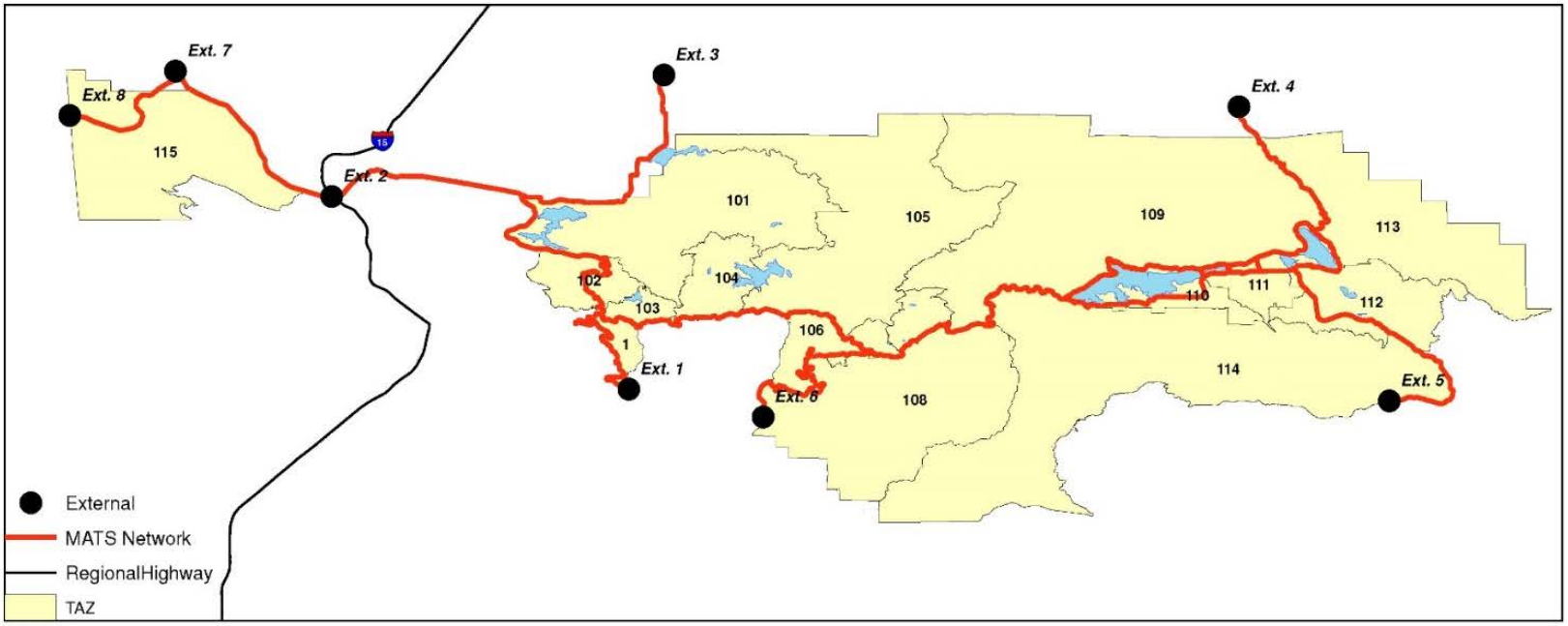
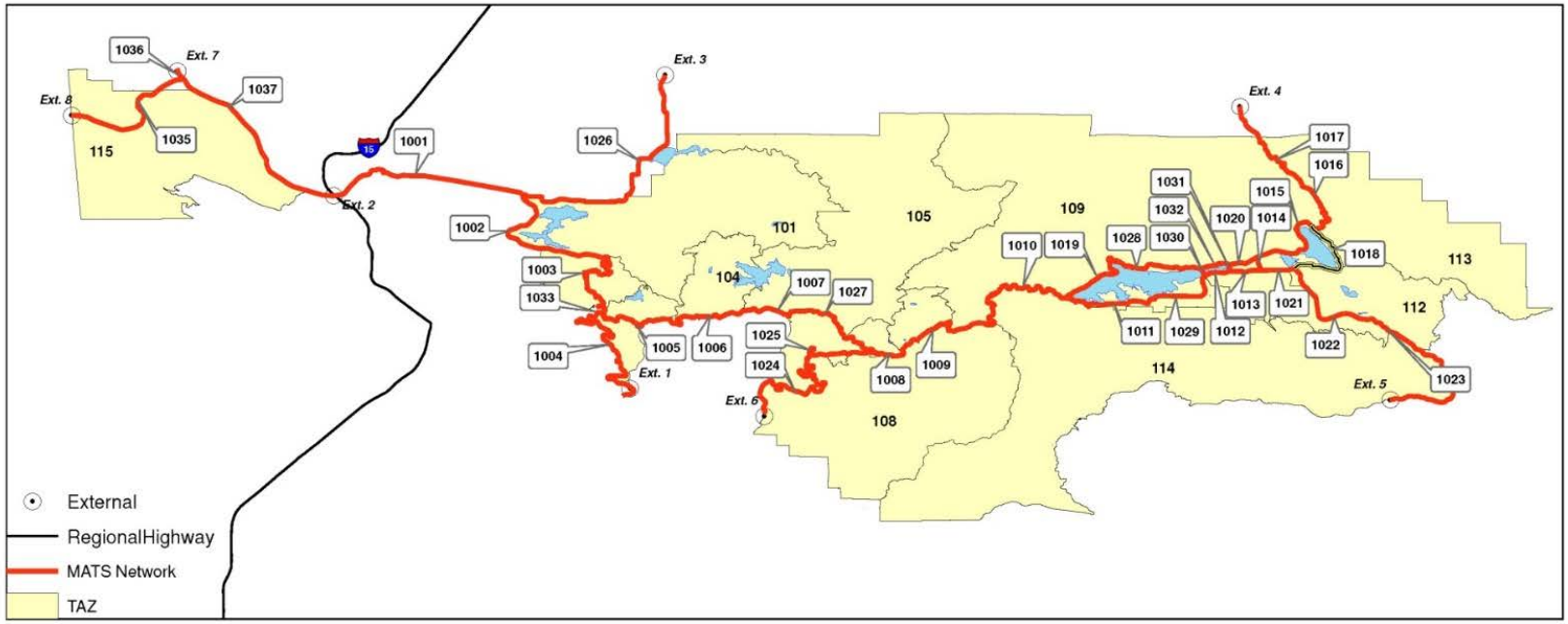


Figure 7-3: MATS Area Highway Network



7.2 Roadway System Performance

The main purpose of the MATS Model is to forecast average daily weekend traffic. The MATS model process primarily follows an average daily weekday model, but has a post-processing component that factors average daily weekday traffic to average weekend (Friday, Saturday, and Sunday) daily traffic. This is completed by using count data that was collected during peak periods, and using a ratio of the peak period traffic to average weekday traffic.

The outputs from the assignment process includes:

- Average Weekday Daily Volume (eastbound or northbound)
- Average Weekday Daily Volume (westbound or southbound)
- Average Weekday Daily Volume (total of both directions)
- Average Weekday Daily Volume/Capacity Ratio (calculated based on total volume)
- Average Friday Daily Volume (eastbound or northbound)
- Average Friday Daily Volume (westbound or southbound)
- Average Friday Daily Volume (total of both directions)
- Average Friday Daily Volume/Capacity Ratio (calculated based on total volume)
- Average Saturday Daily Volume (eastbound or northbound)
- Average Saturday Daily Volume (westbound or southbound)
- Average Saturday Daily Volume (total of both directions)
- Average Saturday Daily Volume/Capacity Ratio (calculated based on total volume)
- Average Sunday Daily Volume (eastbound or northbound)
- Average Sunday Daily Volume (westbound or southbound)
- Average Sunday Daily Volume (total of both directions)
- Average Sunday Daily Volume/Capacity Ratio (calculated based on total volume)

The output model Volume/Capacity ratios are used to define LOS for the arterial network. **Table 7-2** identifies the assumed LOS correlating with roadway segment V/C ratio.

Table 7-2: Volume/Capacity Ratio and Corresponding LOS

V/C Ratio	LOS
>1.0	F
0.91-1.0	E
0.81-0.90	D
0.71-0.80	C
0.61-0.70	B
0-0.60	A

The worst case scenario for traffic within the MATS area is on a peak season winter time period, on an average weekend (Friday, Saturday, and Sunday). For the purposes of this report, the average weekday

for off-peak will be used to identify roadway segments with anticipated changes in condition, thus identifying future mobility issues.

Sections 7.2.1 and *7.2.2* summarize the travel model tool results for off-peak summer season average weekday volume to capacity ratios within the MATS area. *Section 7.2.3* identifies future locations with traffic congestion beyond the existing conditions.

7.2.1 Existing (2015) Roadway System Performance

Table 7-3 summarizes the existing conditions for the average weekday system within the MATS area. In the average off-peak day in 2015, it is assumed that there are 10,000 visitors to the MATS area. These conditions are for summer conditions. As shown in **Table 7-3**, the locations with the highest V/C Ratio are at the following locations:

- SR-18 between SR-330 and Confer Camp Road
- SR-18 Between Stanfield Cut-off and Division Drive
- SR-18 Between Division Drive and Greenway Drive / SR-38
- SR-38 Between Greenway Drive and Shay Road
- SR-138 Between I-15 and SR-2
- SR-138 Between SR-2 and North of SR-2

Table 7-3: Existing Average Weekday Off-Peak Summer Traffic

Link ID	Location	Capacity	Volume	V/C Ratio
1001	SR-138 Between I-15 and SR-173	13,000	4,362	0.34
1002	SR-138 Between SR-173 and Cleghorn Road	13,000	5,396	0.42
1003	SR-138 Between Cleghorn Road and Knapps Cut-off/Lake Drive	13,000	7,200	0.55
1033	SR-138 Between Knapps Cut-off/Lake Drive and SR-18	13,000	9,168	0.71
1004	SR-18 Between Old Waterman Canyon Road and SR-138	25,000	16,162	0.65
1005	SR-18 Between SR-138 and Lake Gregory Drive / SR-189	13,000	8,094	0.62
1006	SR-18 Between Lake Gregory Drive / SR-189 and SR-173	13,000	11,736	0.90
1007	SR-18 Between SR-173 and Live Oak Drive (Running Springs)	13,000	11,702	0.90
1027	SR-18 Between Live Oak Drive (Running Springs) and SR-330	13,000	11,822	0.91
1008	SR-18 Between SR-330 and Conifer Camp Road	13,000	13,688	1.05
1009	SR-18 Between Conifer Camp Road and Snow Valley Driveway	13,000	6,772	0.52
1010	SR-18 Between Snow Valley Driveway and SR-38	18,000	2,982	0.17
1011	SR-18 Between SR-38 and Village Drive	19,000	2,646	0.40
1029	SR-18 Between Village Drive and Stanfield Cut-off	37,500	34,980	0.93
1030	Stanfield Cut-off Between SR-18 and SR-38	13,000	2,640	0.20
1012	SR-18 Between Stanfield Cut-off and Division Drive	13,000	32,342	2.49
1031	Division Drive Between Big Bear Boulevard / SR-18 and North Shore Drive / SR-38	13,000	1,212	0.09
1013	SR-18 Between Division Drive and Greenway Drive / SR-38	13,000	23,236	1.79
1014	SR-18/Greenway Drive Between Big Bear Boulevard / SR-38 and North Shore Drive / SR-38	13,000	3,548	0.27
1015	SR-18/North Shore Drive Between Greenway Drive and Baldwin Lake Road	13,000	3,396	0.26
1016	SR-18/North Shore Drive Between Baldwin Lake Road and Marble Canyon Road	13,000	2,680	0.21
1017	SR-18/North Shore Drive Between Marble Canyon Road and SR-247	13,000	2,680	0.21
1018	Baldwin Lake Road Between SR-38 and SR-18	12,000	2,376	0.20
1019	SR-38 Between SR-18 and Fawnskin	13,000	336	0.03

Link ID	Location	Capacity	Volume	V/C Ratio
1028	SR-38 Between Fawnskin and Stanfield Cut-off	13,000	4,878	0.38
1032	SR-38 Between Stanfield Cut-off and Division Drive	13,000	2,240	0.17
1020	SR-38 Between Division Drive and Greenway Drive	13,000	1,030	0.08
1021	SR-38 Between Greenway Drive and Shay Road	13,000	21,258	1.64
1022	SR-38 Between Shay Road and Balky Horse Canyon Road	13,000	4,918	0.38
1023	SR-38 Between Balky Horse Canyon Road and Santa Ana River	13,000	4,918	0.38
1024	SR-330 Between SR-210 and East Fork City Creek	13,000	10,072	0.77
1025	SR-330 Between East Fork City Creek and SR-18	13,000	10,072	0.77
1026	SR-173 Between SR-138 and Arrowhead Lake Road	13,000	1,124	0.09
1035	SR-2 Between SR-138 and West of Wrightwood	13,000	8,474	0.65
1036	SR-138 Between I-15 and SR-2	13,000	18,022	1.39
1037	SR-138 Between SR-2 and North of SR-2	13,000	14,454	1.11

7.2.2 Future (2040) Roadway System Performance

Table 7-4 summarizes the future conditions for the average weekday system within the MATS area. In the average off-peak day in 2040, it is assumed that there will be 14,000 visitors to the MATS area. These conditions are for summer conditions. As shown in **Table 7-4**, the locations with the highest V/C Ratio are at the following locations:

- SR-138 Between Knapps Cut-off/Lake Drive and SR-18
- SR-18 Between Old Waterman Canyon Road and SR-138
- SR-18 Between SR-138 and Lake Gregory Drive / SR-189
- SR-18 Between Lake Gregory Drive / SR-189 and SR-173
- SR-18 Between SR-173 and Live Oak Drive (Running Springs)
- SR-18 Between Live Oak Drive (Running Springs) and SR-330
- SR-18 Between SR-330 and Conifer Camp Road
- SR-18 Between Village Drive and Stanfield Cut-off
- SR-18 Between Stanfield Cut-off and Division Drive
- SR-18 Between Division Drive and Greenway Drive / SR-38
- SR-38 Between Greenway Drive and Shay Road
- SR-330 Between SR-210 and East Fork City Creek
- SR-330 Between East Fork City Creek and SR-18
- SR-138 Between I-15 and SR-2
- SR-138 Between SR-2 and North of SR-2

Table 7-4: Future Average Weekday Off-Peak Summer Traffic

Link ID	Location	Capacity	Volume	V/C Ratio
1001	SR-138 Between I-15 and SR-173	13,000	6,222	0.48
1002	SR-138 Between SR-173 and Cleghorn Road	13,000	7,682	0.59
1003	SR-138 Between Cleghorn Road and Knapps Cut-off/Lake Drive	13,000	9,468	0.73
1033	SR-138 Between Knapps Cut-off/Lake Drive and SR-18	13,000	18,632	1.43
1004	SR-18 Between Old Waterman Canyon Road and SR-138	25,000	34,170	1.37
1005	SR-18 Between SR-138 and Lake Gregory Drive / SR-189	13,000	17,134	1.32
1006	SR-18 Between Lake Gregory Drive / SR-189 and SR-173	13,000	14,236	1.10

Link ID	Location	Capacity	Volume	V/C Ratio
1007	SR-18 Between SR-173 and Live Oak Drive (Running Springs)	13,000	13,298	1.02
1027	SR-18 Between Live Oak Drive (Running Springs) and SR-330	13,000	13,348	1.03
1008	SR-18 Between SR-330 and Conifer Camp Road	13,000	16,166	1.24
1009	SR-18 Between Conifer Camp Road and Snow Valley Driveway	13,000	8,988	0.69
1010	SR-18 Between Snow Valley Driveway and SR-38	18,000	3,934	0.22
1011	SR-18 Between SR-38 and Village Drive	19,000	3,522	0.40
1029	SR-18 Between Village Drive and Stanfield Cut-off	19,000	42,684	2.25
1030	Stanfield Cut-off Between SR-18 and SR-38	19,000	2,938	0.15
1012	SR-18 Between Stanfield Cut-off and Division Drive	13,000	39,746	3.06
1031	Division Drive Between Big Bear Boulevard / SR-18 and North Shore Drive / SR-38	13,000	1,180	0.09
1013	SR-18 Between Division Drive and Greenway Drive / SR-38	13,000	30,106	2.32
1014	SR-18/Greenway Drive Between Big Bear Boulevard / SR-38 and North Shore Drive / SR-38	13,000	5,620	0.43
1015	SR-18/North Shore Drive Between Greenway Drive and Baldwin Lake Road	13,000	5,550	0.43
1016	SR-18/North Shore Drive Between Baldwin Lake Road and Marble Canyon Road	13,000	4,768	0.37
1017	SR-18/North Shore Drive Between Marble Canyon Road and SR-247	13,000	4,768	0.37
1018	Baldwin Lake Road Between SR-38 and SR-18	12,000	4,898	0.41
1019	SR-38 Between SR-18 and Fawnskin	13,000	414	0.03
1028	SR-38 Between Fawnskin and Stanfield Cut-off	13,000	5,492	0.42
1032	SR-38 Between Stanfield Cut-off and Division Drive	13,000	2,556	0.20
1020	SR-38 Between Division Drive and Greenway Drive	13,000	1,376	0.11
1021	SR-38 Between Greenway Drive and Shay Road	13,000	26,438	2.03
1022	SR-38 Between Shay Road and Balky Horse Canyon Road	13,000	8,186	0.63
1023	SR-38 Between Balky Horse Canyon Road and Santa Ana River	13,000	8,186	0.63
1024	SR-330 Between SR-210 and East Fork City Creek	13,000	15,158	1.17
1025	SR-330 Between East Fork City Creek and SR-18	13,000	15,158	1.17
1026	SR-173 Between SR-138 and Arrowhead Lake Road	13,000	1,624	0.12
1035	SR-2 Between SR-138 and West of Wrightwood	13,000	12,062	0.93
1036	SR-138 Between I-15 and SR-2	13,000	27,902	2.15
1037	SR-138 Between SR-2 and North of SR-2	13,000	23,132	1.78

7.2.3 Identification of Additional Locations with Mobility Issues

Table 7-5 summarizes in the existing and future conditions that are forecast to have a V/C ratio greater than 1.0 (meaning that there is more volume than available capacity). This table assists in identifying future locations with mobility issues. As shown in **Table 7-5**, there are fifteen (15) locations identified with less than adequate V/C ratios in the future scenario. Of these 15 locations, six (6) are operating at a V/C ratio greater than 1.0 in the existing conditions, and another four (4) of these locations are approaching a V/C ratio of 1.0 in the existing conditions. The remaining five (5) locations that operate at adequate V/C ratios in existing but not in the future are:

- SR-138 Between Knapps Cut-off/Lake Drive and SR-18
- SR-18 Between Old Waterman Canyon Road and SR-138
- SR-18 Between SR-138 and Lake Gregory Drive / SR-189
- SR-330 Between SR-210 and East Fork City Creek
- SR-330 Between East Fork City Creek and SR-18

These five roadway segments are forecast to operate at less than ideal conditions in the future, and may require capacity or geometric modifications. **Figure 7-4** and **Figure 7-5** illustrate the over-capacity roadway segments for 2015 and 2040.

Table 7-5: Comparison of Existing and Future Average Weekday Off-Peak Summer Traffic

Link ID	Location	2015 V/C Ratio	2040 V/C Ratio
1033	SR-138 Between Knapps Cut-off/Lake Drive and SR-18	0.71	1.43
1004	SR-18 Between Old Waterman Canyon Road and SR-138	0.65	1.37
1005	SR-18 Between SR-138 and Lake Gregory Drive / SR-189	0.62	1.32
1006	SR-18 Between Lake Gregory Drive / SR-189 and SR-173	0.90	1.10
1007	SR-18 Between SR-173 and Live Oak Drive (Running Springs)	0.90	1.02
1027	SR-18 Between Live Oak Drive (Running Springs) and SR-330	0.91	1.03
1008	SR-18 Between SR-330 and Conifer Camp Road	1.05	1.24
1029	SR-18 Between Village Drive and Stanfield Cut-off	0.93	2.25
1012	SR-18 Between Stanfield Cut-off and Division Drive	2.49	3.06
1013	SR-18 Between Division Drive and Greenway Drive / SR-38	1.79	2.32
1021	SR-38 Between Greenway Drive and Shay Road	1.64	2.03
1024	SR-330 Between SR-210 and East Fork City Creek	0.77	1.17
1025	SR-330 Between East Fork City Creek and SR-18	0.77	1.17
1036	SR-138 Between I-15 and SR-2	1.39	2.15
1037	SR-138 Between SR-2 and North of SR-2	1.11	1.78

Figure 7-4: Existing Over-Capacity Roadway Segments

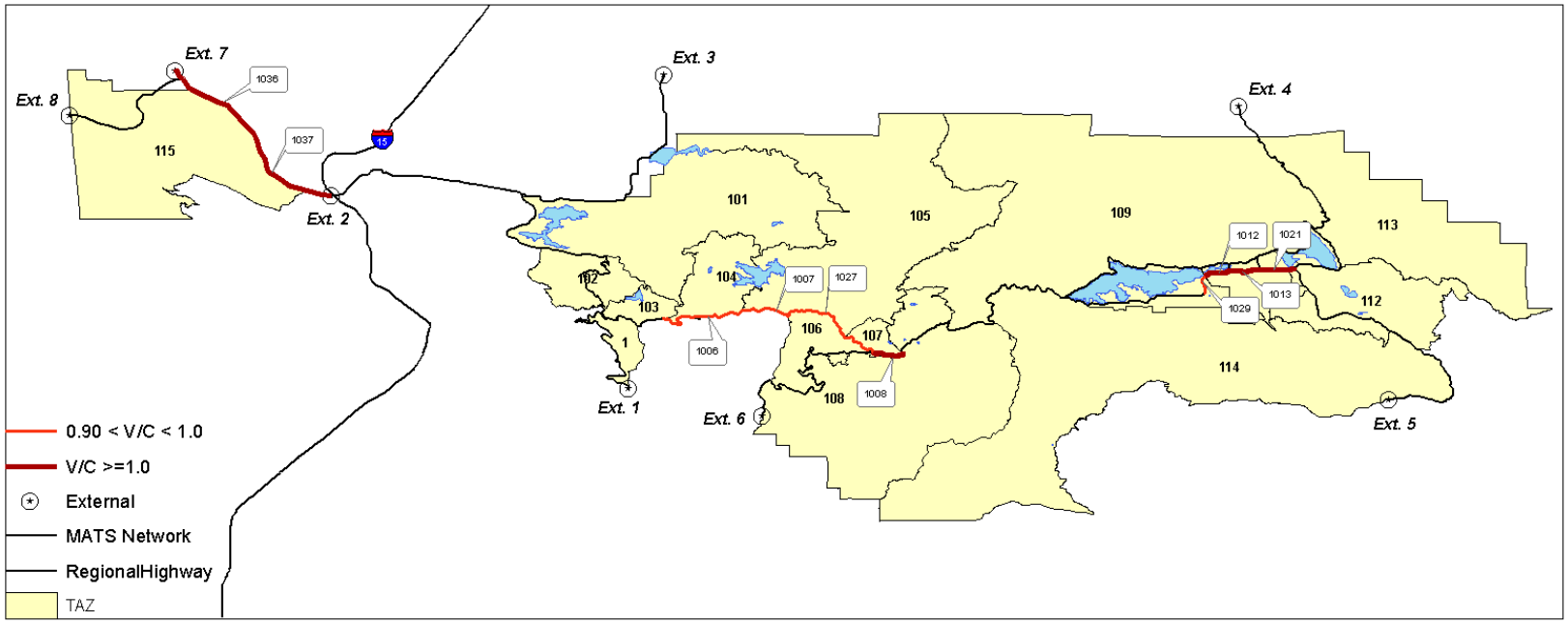
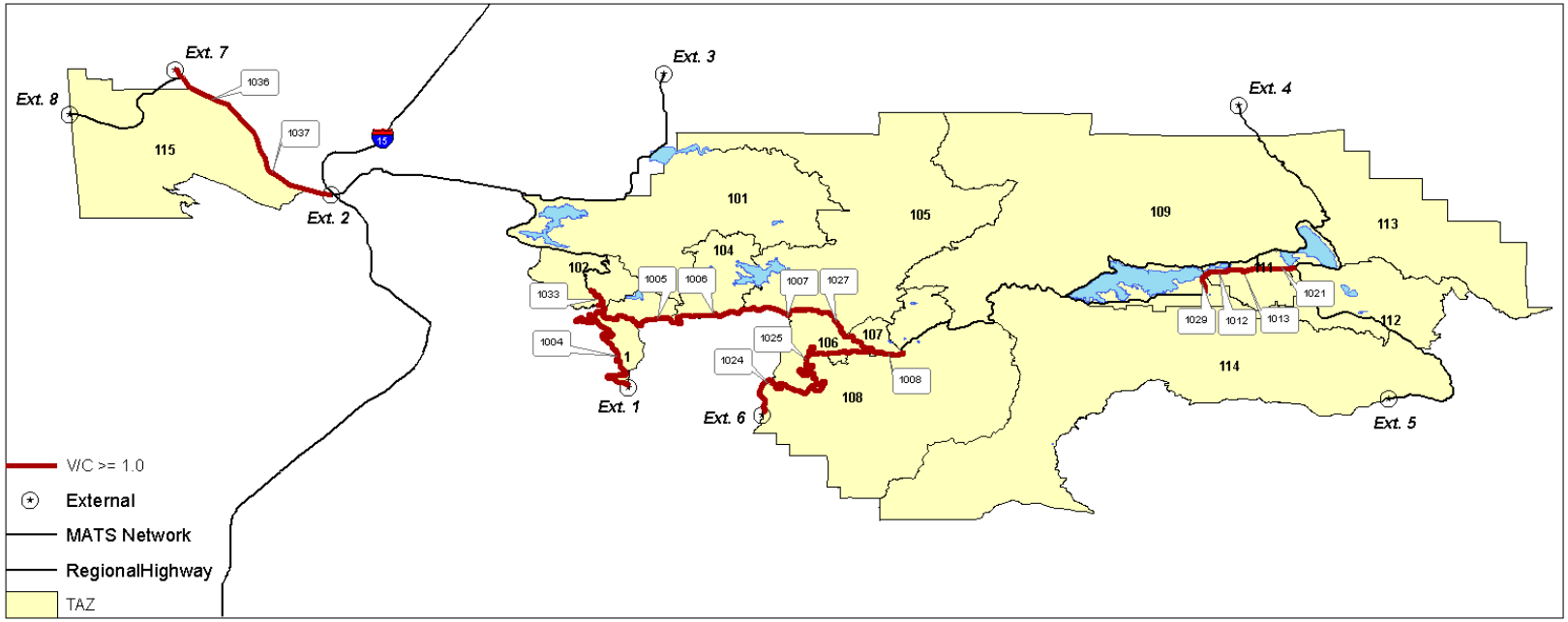


Figure 7-5: Future Year Over-Capacity Roadway Segments



8.0 RECOMMENDATIONS

The identification of mobility issues was completed using stakeholder input, a geometric location analysis using available crash data, and through a review of travel model tool forecast results. Mobility issues identified included operational, geometric, and informational issues.

8.1 Location Issues Recommendations

Following the stakeholder meetings, location issues were reviewed and solutions were identified by the project team. **Table 8-1** summarizes the locations, identified issues, and preferred solution. In several locations, no feasible solution is recommended, due to various reasons, as described in **Table 8-1**.

Table 8-1: Location Issues and Solutions

Location ID	Location	Issue(s)	Solution
Wrightwood/Mount Baldy/Lytle Creek			
1	SR-2 (Big Pines Highway) at Willow Road	• The stop sign at Willow Road presents a huge bottleneck in town during peak seasons • The businesses in town hire an officer for traffic control during peak seasons	• No solution recommended as the stop sign was put in place due to local complaints of high speeds.
2	SR-2 (Big Pines Highway) at Wrightwood	• No chain-up areas on SR-2 and there are no lights. In the winter, there are many times when chains are not required, but probably should be • CHP does not enforce chains on SR-2	• Develop chain-up area[1] on SR-2
3	Glendora Ridge Road at Mount Baldy Rd.	• Typically closed in winter months	• No solution recommended • There is no significant demand to open Glendora Ridge Road during winter months • Additionally, the cost for maintaining and enforcing law on Glendora Ridge Road during winter months would be exceedingly high
4	Lone Pine Canyon Road at Between SR-138 and SR-2 in Wrightwood	• County Road that CHP controls • Chain control is not enforced, even though Lone Pine Canyon acts as a cut-through to the Wrightwood	• Provide a chain-up area[1] and enhance CHP enforcement of chain control on Lone Pine Canyon Road
5	Lytle Creek Road at North of I-15	• Popular road for cyclists, but there is no shoulder or bike lane	• Install "Share the Road" signage[2]

Location ID	Location	Issue(s)	Solution
6	Swarthout Canyon Road at South of Lone Pine Canyon Road	• Used as a cut-through when I-15 is congested • There are some unpassable areas on this facility for certain autos, including some stream crossings	• No solution recommended • The existing signage on Swarthout Canyon Road was installed to discourage use as a through route
Crestline/Lake Arrowhead			
7	SR-138 at Seeley Way	• Sight distance issues • Seeley used as a cut-through route	• No long-term solution recommended • Positive improvement with maintenance and reduced vegetation on the curve of SR-138 to greatly improve sight distance
8	SR-138 at Crest Forest Drive/Lake Drive "Top Town"	• Confusing, off-set 5-legged intersection, with grade issues • Inadequate sight distance for turning	• No solution recommended • Realigning the intersection would require extensive ROW impacting Top Town businesses and would be cost prohibitive
9	SR-173 at SR-18	• Poor traffic control, and confusing intersection • There is potential for more of an issue with additional planned development	• Revise intersection configuration • Use adjacent paved area to increase curve radius and improve turn pocket • Increase local street separation from SR-18
10	SR-18 at SR-138	• SR-18 drops from 4 lanes to 2 lanes, resulting in vehicles speeding up to pass	• No solution recommended • SR-18 south of this junction has recently been improved to have physical barriers separating the two directions of travel
11	SR-18 at Daley Canyon Road	• Strange and confusing existing geometric • There is no room for a right turn • The land is owned by the US Forest Service • Grade on Daley Canyon Road approaching SR-189	• Improve route guidance signage in advance of intersection
12	SR-18 at SR-330	• Southbound Arrowhead traffic to SR-330 west is a year-long issue with major back-up of traffic during peak periods	• Include an acceleration lane and left turn pocket west of Hilltop
13	SR-18 at Running Springs to Big Bear Lake	• Cars pull over for snow play, picnics, etc. • There is no regard to the many signs that indicate no parking along the narrow stretches of the road	• Update and make turnout signage[3] consistent • Separate turnout areas[3] for slow moving vehicles from sightseer parking areas
14	SR-18 at Running Springs School Road	• Northbound west turn is difficult during peak and off-peak periods	• Widen intersection to provide westbound left-turn lane and westbound acceleration lane to receive left turns on SR-18

Location ID	Location	Issue(s)	Solution
15	SR-18 at Snow Valley and SR-18 at Snow Valley Snow Play Area (approximately 1 mile west of Snow Valley parking lot entrance)	At Snow Valley: • Traffic control at the intersection of SR-18 and the main parking lot stops westbound SR-18 traffic on peak weekends to allow for a left turn onto SR-18 from the parking lot. At Snow Play Area: • Coordination with Snow Valley resort needed for parking for snow play • Limited parking stalls open to the public at snow play location • People entering and leaving the snow play area block eastbound traffic	At Snow Valley[4]: • Re-stripe Snow Valley parking lot intersection with SR-18 to provide one westbound through lane plus an acceleration lane for left-turning traffic going west on SR-18 At Snow Play Area[5]: • Install adequate signage to direct visitors to parking locations
16	SR-18 at Entire State Route	• Truck issue due to curves and topography	• Study the existing right-of-way to determine areas where paving can be extended and where turnouts may be implemented
17	SR-189 at Daley Canyon Road	• Inadequate sight distances for eastbound right turn from SR-189 to Daley Canyon Road • Northbound Daley Canyon has a stop on a downhill profile that is difficult to make in winter conditions	• Stripe edge of travelled way going around curve on southwest corner • Consider better signage, including a flashing signal approaching the intersection for northbound Daley Canyon Road • No solution for sight distance, as it appears to be not a significant issue since it's a three-way stop T-intersection
18	SR-189 at Blue Jay Cut-off	• Left turn from northbound SR-189 onto Blue Jay cut-off is skewed • It is unclear that access to Twin Peaks (Golf Course, Conference Centers, etc.) needs to be made from the intersection of Daley Canyon Road with SR-189	• Revise profile of Blue Jay Cut-off for approximately 200 feet and improve the grade and connection with SR-189
19	SR-330 at City Creek US Forest Service Station	• No left turn pocket for vehicles turning into US Forest Service Station parking lot	• Restripe existing roadway to include left-turn pocket on SR-330 • Potential need for minor widening within existing ROW north of the parking lot
20	SR-330 at Live Oak	• People tend to use Live Oak as a cut-through to avoid chain control	• Install “Local Traffic Only” sign[6] on Live Oak • Install “Steep Grade” sign[7] on steep slope section of Live Oak to deter cut-through traffic

Location ID	Location	Issue(s)	Solution
21	SR-18 at Hilltop Boulevard	• Southbound SR-18 (Lake Arrowhead) traffic turning left onto SR-330 is a year-long issue with major queuing of traffic during peak periods • Poor local Running Springs traffic circulation along SR-18 between SR-330 and Soutar Drive	• Study installation of westbound SR-330 receiving lane for traffic turning left from SR-18 • Install left turn pockets on SR-18 at Soutar Drive and Hunsaker Way
22	Crest Forest Drive at Valley View Drive	• Poor visibility and skewed approach at intersection	• No solution recommended • All identified solutions are estimated to be infeasible and exceedingly costly • Sight distance seems passable for first car behind stop line on Valley View Drive
23	Lake Arrowhead Village Area	• Weekend traffic issues in peak months related to visitors • Inadequate parking areas where visitors can park and ride public transportation	• Develop a smart parking system with signage and an app to communicate parking occupancy • Preclude cars from entering full parking lots
24	Lake Drive at Fern Drive	• Sight distance issues, partially due to steep grade on Fern Drive • Queuing at stop sign in winter months • Cannot include stop sign on north leg due to grade constraints	• No solution recommended • Due to geographies, there is no feasible way to add stop signs to the southbound approach on Lake drive or on the northbound approach on Fern Drive
25	Lake Drive at Wild Rose Lane	• There is a monthly meeting at this location which creates traffic congestion	• Recommend the Community of Crestline and San Bernardino County continue to study traffic circulation for large events at this location • Potential for stop signs to be located on Lake Drive at Wild Rose Lane • Potential for two-lane exit driveway from USPS parking lot • Recommendation to remove pilaster with no parking sign from middle of USPS entry driveway
26	SR-330 at Highland Ave	• Potential for Park and Ride facility	• Implement a Park and Ride Facility[8]
Big Bear/Angeles Oaks			
27	SR-18 at SR-38	• Need to encourage traffic to take SR-38 off of the mountain instead of SR-330	• Install a "real time traffic management" sign[9] at this location, approximately 100 yards east of Big Bear Dam

Location ID	Location	Issue(s)	Solution
28	SR-18 (Big Bear Boulevard) at Castle Rock Trail Head	• Heavily used trail with limited street parking on Big Bear Boulevard and no parking on adjoining streets	• Raise SR-18 through the bend and gain area to include parking spots for trailhead; retaining wall. Provide pedestrian path to Boulder Bay Park.[10]
29	SR-18 (Big Bear Boulevard) at Mill Creek Road	• This is a skewed intersection on a fairly steep incline at a nearly blind corner • There is no westbound left turn lane onto Mill Creek Road from SR-18 • Problem in winter and summer peak months • Ice and snow make the left turn from SR-18 onto Mill Creek Road difficult	• Widen Big Bear Boulevard to provide westbound left turn lane between Wild Rose Lane and Mill Creek Road *(Related to location issue #30)*
30	SR-18 (Big Bear Boulevard) at Wild Rose Lane	• Major congestion in winter months caused by cars entering and exiting snow play area • Westbound left turn pocket is too short for queued vehicles	• Widen Big Bear Boulevard to provide westbound left turn lane between Wild Rose Lane and Mill Creek Road *(Related to location issue #29)*
31	SR-18 (Big Bear Boulevard) at Lakeview Drive/Paine Court	• Lakeview Drive is a secondary arterial serving most of the residential homes and businesses on the west side of the City of Big Bear Lake. The left turn at SR-18 is often difficult • A boat launching ramp is located off of Paine Court which complicates turning movements at the intersection for boat trailers • This is a problem in both winter and summer peak months • Lakeview Drive and Paine Court meet at an acute angle at SR-18 which causes confusion as to right of way movement	• Convert the intersection into a roundabout

Location ID	Location	Issue(s)	Solution
32	SR-18 (Big Bear Boulevard) at Village Drive	• The westbound right turn is a sharp right angle, resulting in vehicles slowing down or stopping to make the right hand turn • Narrow and/or tight turning radius for vehicles traveling eastbound on SR-18 to make a smooth transition going northbound	• Reconfigure intersection, including moving eastbound through stop bar further east • Obtain ROW from NW corner lot to modify intersection
33	SR-18 (Big Bear Boulevard) at Pine Knot Avenue	• Through movement on Big Bear Boulevard difficult during winter and summer months	• Extend WB merge further west to Simonds Road • Study workable alternatives • Rework/Modify parking lot to allow easier entrance and exit
34	SR-18 (Big Bear Boulevard) at Knickerbocker Creek	• There is a public walkway called Knickerbocker Trail running north and south from Village Drive to SR-18 approximately 100 feet east of Pine Knot Drive • Pedestrian traffic on this facility use the signalized intersection at Pine Knot and SR-18 to travel between the retail shopping area and the lake, which often causes delay and congestion during the summer months	• Implement undercrossing for bicycles and pedestrians
35	SR-18 (Big Bear Boulevard) at Moonridge Road	• Traffic congestion and circulation problems in winter and summer	• Improve signal timing along SR-18
36	SR-18 (Big Bear Boulevard) at Stanfield Cut-off	• Travel lanes going eastbound are forced to merge into a single lane • There are two receiving westbound lanes for travel, but only one westbound approach lane • Queue and delay at this intersection during all months of the year, often resulting in a three or four traffic signal cycle wait	• No solution recommended • Widen the westbound approach to have two through lanes. *(Note: During the development of this report a grant was awarded to the City of Big Bear Lake to widen the westbound approach to include two through lanes. Therefore, no solution is required to be implemented as a part of this report.)* • No solution was identified to address the eastbound merge into a single lane, because it is better to merge into a single lane prior to the intersection rather than immediately following the intersection. Additionally, widening the roadway eastbound beyond Stanfield Cut-off was determined to be infeasible due to existing right-of-way.

Location ID	Location	Issue(s)	Solution
37	SR-18 (Big Bear Boulevard) at Division Drive to Paradise Way	• There is no shoulder, no drainage control, or center turn lanes the bulk of this segment • There are numerous businesses along this section that do not have defined driveways, making entering and exiting driveways difficult • Vehicles going both directions experience long delays when making left-turns	• Develop a center turn lane and adequate drainage
38	SR-38 at Mountain Home Village	• Visitor traffic often cuts through Mountain Home Village during peak congestion	• Install "Local Access Only" sign[6] on access road on north side of SR-38
39	SR-38 at Valley of the Falls Drive	• Geometric issue	• Restripe or widen SR-38 to accommodate a left turn lane from SR-38 to Valley of the Falls Drive • Add receiving lane for left turns from Valley of the Falls Drive onto SR-38
40	SR-38 at Forest Falls Turn-off	• Difficult uphill travel for trucks and heavy vehicles	• Widen SR-38 to add uphill truck climbing lane or passing lane • Note that the addition of a truck climbing lane will involve widening SR-38, as restriping would eliminate existing shoulders
41	SR-38 (Big Bear Boulevard) at Greenspot Boulevard/Shay Road "Square Turn"	• Confusing intersection • Eastbound traffic staying on SR-38 has a separate lane/channel and drivers often miss the channel and turn right at the 4-way intersection • Westbound traffic staying on SR-38 must make a left turn at the 4-way intersection but is not required to stop; the other three approaches are stop sign controlled	• Maintain continuity for vehicles on SR-38 by realigning to make SR-38 a continuous curve through the intersection • Close off access to Greenspot Road north of Shay Road, and bring Shay Road into SR-38 as a T-intersection

Location ID	Location	Issue(s)	Solution
42	SR-38 (Big Bear Boulevard) at Stanfield Cut-off	• Stop controlled on north/south legs, resulting in difficult northbound left due to the boat launch during the summer months • The north/south legs of the intersection are offset, creating confusion • Inadequate queue storage length for northbound Stanfield cut-off vehicles • There is a crosswalk from the school to the bike path, and neither side is ADA compliant	• Convert the intersection into a roundabout
43	Moonridge Road at Club View Drive"Moonridge Y"	• Congestion due to winter ski-area traffic, often due to stuck vehicles, collisions, or chain installation • Decision point location for drivers determining how to exit the mountain	• Create a roundabout at Rathbun Drive/ Club View Drive at Moonridge Road
44	Stanfield Cut-off at Eagle Nest Road	• There is an existing driveway to Eagles Nest Road (an RV Park) that has conflicting movements with Stanfield Drive and impedes the intersection operation	• Stripe the portion of Stanfield Cut-off in front of Eagles Nest with KEEP CLEAR

[1] See additional discussion on chain-up areas and enforcement in Section 8.2.1 of this report
[2] See an example of Share the Road signage in Figure 8-1
[3] See additional discussion on turnout signage and design in Section 8.2.4 of this report
[4] See discussion on Snow Valley Resort Main Entrance in Section 8.2.1 of this report
[5] See additional recommendation for parking and snow play on SR-18 between Running Springs and Big Bear Lake in Section 8.2.1 of this report
[6] See discussion on cut-through traffic in Section 8.2.1 of this report
[7] See an example of “Steep Grade” signage in Figure 8-2
[8] See discussion on transportation modes and park and ride facilities in Section 8.2.3 of this report
[9] See discussion on Permanent Changeable Message Signs for permanent signs at this location as identified by Caltrans District 8 in Section 8.4.1 of this report
[10] See Geometric recommendation in Section 8.3 of this report

Figure 8-1: Share the Road Signage Examples

Figure 8-2: Steep Grade Signage Examples

8.2 Operational Recommendations

Operational mobility issue recommendations consist of alleviating mobility issues by improving the operational aspects of the issues. Operational issues are related to traffic control, roadway maintenance, and availability of multiple transportation modes.

8.2.1 Traffic Control

Traffic control can refer to multiple solutions, including traffic signals or control devices, where traffic routes during peak periods, or even how traffic is managed during peak events. For example, stakeholder meetings consistently mentioned that bottlenecks occur in the existing transportation system due to non-existent or poorly located traffic control devices, and several locations discussed cut-through traffic on local only roads during peak periods.

Recommendations for improved traffic control within the MATS area include:

- **Cut-through Traffic:** It is recommended that the effect of cut-through traffic on local facilities throughout the MATS area be studied further. Cut-through traffic can occur for several reasons: first, because the travel time is shorter than using a primary route, and second, because a traveler is attempting to avoid chain control or other requirement. In addition to local traffic taking cut-throughs for trips, new apps are directing people into areas that should only be used

for local traffic, when they would have otherwise stayed on state routes. One potential solution for reducing cut-through traffic on local roads is to install "Local Traffic Only" or "No Thru Traffic" signs, examples of which are shown in **Figure 8-3**.

Figure 8-3: Local Access Signage Examples

- **Right-turn Only Event Management:** The City of Big Bear Lake has developed an event traffic plan for the Fourth of July which results in disallowing left turns at non-signalized intersections during peak events. This type of event management requires locations to be controlled by a CHP officer. Right-turn only event management has proven to be an effective tool for residents and visitors, and it is recommended to continue to implement this type of management during peak events.
- **Chain Installation and Control:** Many issues related to chain installation create bottlenecks. The bottlenecks at chain installation locations are often due to operations and procedures for chain installation, resulting in perceived excessive delays. It is recommended to coordinate with CHP in developing more standardized chain control operations, inclusive of adequate resources available for mandating conformance with requirements and managing chain control installation. In addition, it is recommended to study allowing cars to proceed under R-1 conditions (requiring snow tires without chains during some conditions). It is also recommended to identify an adequate location for chain control along SR-2 near Wrightwood.
- **Parking and Snow Play on SR-18 between Running Springs and Big Bear Lake:** In the general area of Snow Valley on SR-18, there is a seasonal mobility issue related to vehicles parking along the edge of roadway and encroaching into the lanes of travel in order to access desired snow play locations. Illegal parking occurs at turnouts, and in no-parking zones, with little repercussion. While there are several stalls open to the public at Snow Valley and at the neighboring Nordic track parking lot, parking illegally remains an issue. It is recommended that there be one identified parking location which is clearly signed and enforced for Snow Valley snow play and coordination with Snow Valley Ski Hill to investigate allowing snow players to pay for parking. Additionally, the east end of the passing lane should be re-striped so that cars making a left out of the Snow Valley parking lot can turn into an acceleration lane and not interfere with westbound traffic. An example showing potential restriping for SR-18 at the main entrance to Snow Valley Resort is shown in **Figure 8-4**.

Figure 8-4: SR-18 Restriping at Snow Valley Resort Main Entrance

8.2.2 Roadway Maintenance

Roadway maintenance within the MATS area was mentioned multiple times during stakeholder meetings, highlighting an existing issue with roadway maintenance related to striping and snow removal. The primary recommendation related to roadway maintenance is increased coordination between jurisdictional agencies. Currently, there are multiple agencies and jurisdictions involved related to maintenance and control during major events (whether weather or event related). In addition, when roads are re-paved or overlaid, they do not routinely pave existing paved shoulder areas, resulting in smaller paved roadway widths after an overlay.

Recommendations for improved traffic control within the MATS area include:

- **Conflicting Information:** With various agencies involved in relaying traffic congestion information or roadway conditions information (including Caltrans, San Bernardino County, City of Big Bear Lake, Sheriff, US Forest Service, and CHP), it is often unclear as to actual road conditions. It is recommended to study and develop a clearinghouse location for traffic and transportation related information for the MATS area.
- **Mount Baldy Road Coordination:** The only winter access into Mount Baldy is maintained by both San Bernardino and Los Angeles Counties. Winter maintenance for this facility is often overlooked by Los Angeles County, and it recommended that the County of San Bernardino coordinate with Los Angeles County maintenance and develop agreements to Mount Baldy Road during snow events.

8.2.3 Transportation Modes

Within the MATS area, the personal automobile is the primary mode of travel. However, a recurring theme among stakeholders was related to alternative modes of travel and their availability.

Recommendations for improved availability of transportation modes within the MATS area include:

- **Pedestrian or Bicycle Conflicts:** The facilities within the MATs area are traditionally designed for automobiles, without adjacent facilities for non-motorized person trips. It is recommended to install signage at locations with known conflicts between non-motorized persons with vehicles, and to include these locations into currently on-going bicycle and pedestrian plans. Examples of signage encouraging sharing the roadway is shown in **Figure 8-1**.
- **Park and Ride Facilities:** With few dense attraction destinations, and multiple locations for visitors to reside, it is difficult to fully utilize mass transit within the MATS area. However, there is a potential for shuttle service coordination with the San Manuel Indian Casino for MARTA to pick up visitors on weekends. It is recommended to investigate demand for park and ride or shuttle services for visitors entering the MATS area which are destined to several of the large ski resorts during peak winter months.
- **Alternate Modes:** The increase in residents and visitors allows for the potential for increasing use of transit services, including shuttle and trolley service along with improving the existing fixed-route services. It is recommended to continue to investigate non-fixed route services within resort destinations and during events within MATS communities, to improve the visitor experience and to alleviate traffic congestion.

8.2.4 Turnouts

In addition to traffic operational deficiencies within MATS communities, there is potential for improving the uphill turnout usage by slow-moving vehicles. Turnouts located in the uphill direction of travel appear to be underutilized by slow-moving vehicles, adding to the delay and frustration for vehicles traveling at a rate consistent with posted speed limits.

Current California Motor Vehicle Code 21656 states that “on a two-lane highway where passing is unsafe because of traffic in the opposite direction or other conditions, a slow-moving vehicle, including a passenger vehicle, behind which five or more vehicles are formed in a line, shall turn off the roadway at the nearest place designated as a turnout…” The California Motor Vehicle Code states that acceptable turnouts are typically indicated by a sign that states “Slower Traffic Use Turnouts”.

Recommendations for improved usage of turnouts within the MATS area include:

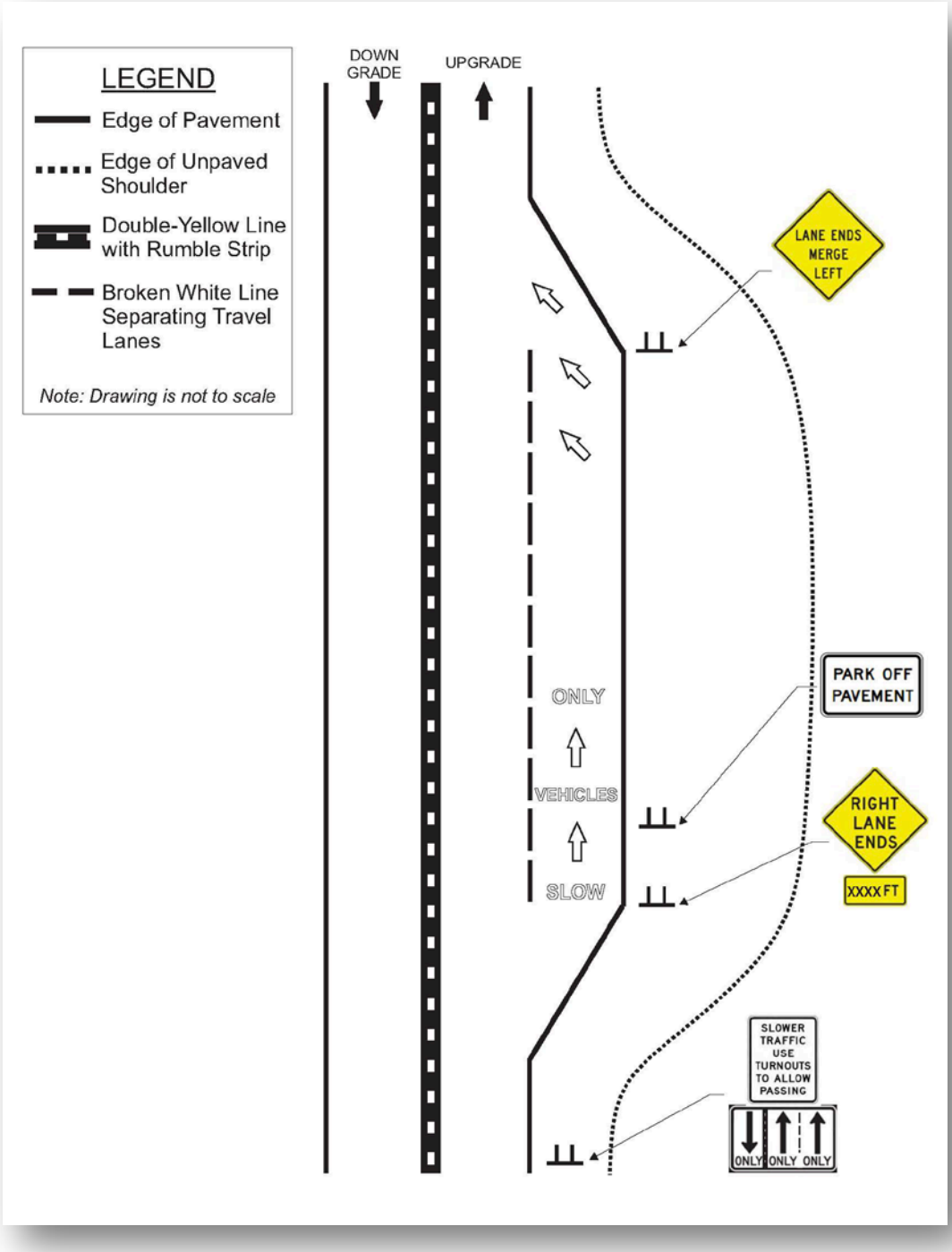
- **Signage:** Early advance warning for turnouts, including “Slower Traffic Use Turnouts” or “Turnout ¼ Mile”. Without adequate signage, there is a perception to the driver of the slow moving vehicle that they will not be able to easily transition back into moving traffic, resulting in resistance to use unsigned turnouts. Examples of turnout signage are illustrated in **Figure 8-5**. An example of a useable slow-vehicle turnout design including adequate signage is shown in **Figure 8-6**.

Figure 8-5: Examples of Turnout Signage

- **Lane Configuration Diagram (Signage):** Signage at turnouts is imperative to inform vehicles of the true use of the turnout. Upon initiation of a turnout that is designed for both stopping vehicles and slow-moving vehicle lanes, a lane configuration diagram should be presented for a visual reference. Turnouts designed primarily for slow-moving vehicles should include a sign that defines the length of the lane for slow-moving vehicles, so drivers of slow-moving vehicles can determine acceptable speed prior to re-entering the single uphill lane of traffic. An example of a useable slow-vehicle turnout design including a lane configuration diagram is shown in **Figure 8-6**.
- **Lane Markings:** Lane markings are important to be included in the design of turnouts designed for slow-moving vehicles. Enhanced lane and edge of travel way stripes should be placed to define a drivable slow vehicle lane that will not be obstructed by stopped vehicles. Enhanced delineation will provide clear definition of paved areas to be used as "rolling turnouts" allowing slow-moving vehicles to maintain momentum. An example of a useable slow-vehicle turnout design including lane markings denoting the slow moving vehicle lane is shown in **Figure 8-6**.

The recommendation is to focus on the usability of existing turnouts, and not the frequency of them. There are ample locations that could behave as a turnout for vehicles to stop, but are not turnouts for trucks and slower vehicles to use in order to let faster vehicles pass.

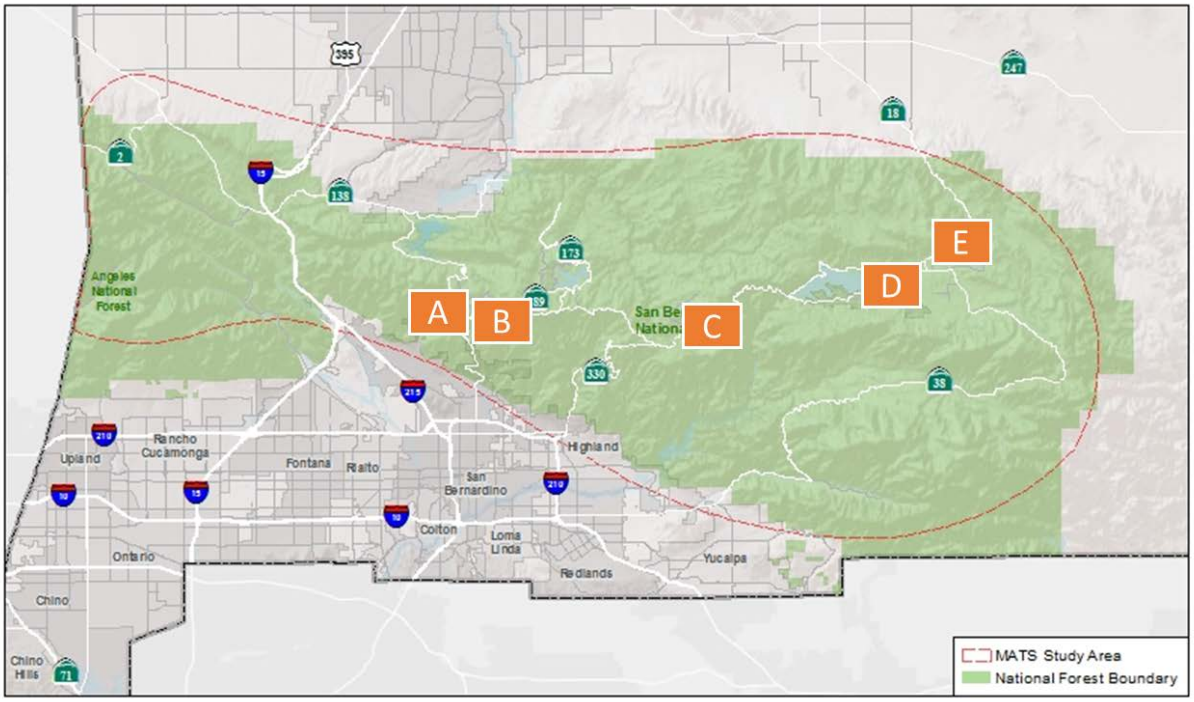
Figure 8-6: Example of Useable Slow-Vehicle Turnout Design



8.3 Geometric Recommendations

While the purpose of this study was not to focus on increasing capacity on the primary access routes to the MATS area, a recurring theme during stakeholder meetings and the needs assessment data collection phase was the limitation of the MATS area infrastructure due to insufficient capacity. There are many locations with congestion related to inadequate roadway capacities, poor roadway geometries, and inadequate use of existing right-of-way. However, it is infeasible to significantly increase capacity on primary access routes. **Figure 8-7** identifies five locations that were identified as locations considered with an opportunity to improve mobility. A more extensive discussion of roadway geometry and section description is included in *Section 6.2* of this report.

Figure 8-7: State Route Bottlenecks and Congestion



Recommendations for improved roadway geometry within the MATS area include:

- **SR-18 – Post Mile 15.0 to 16.8 (Location A):** The existing roadway section is a four-lane section (2-lanes in each direction) with a thrie beam guardrail separating the opposing directions of travel. There are isolated turnouts along this segment with paved shoulders and occasional guardrail systems where steep fill slopes are located. **Figure 6-3** illustrates the segment of SR-18 from PM 15.0 to 16.8.
    - It is recommended that a review of existing turnouts be considered to improve separation distance between stopped vehicles and the outside edge of travel way. If possible, it is recommended to design existing turnouts to include capability for stopped vehicles in addition to a slow-moving vehicle through lane. This added shoulder

delineation or guidance could be employed at locations where turnouts or scenic overlooks attract sightseers to increased separation between stopped and moving vehicles.
    - Additionally, a review of signing is recommended to be accomplished at turnouts for consistency with traffic flow direction.
- **SR-18 – Post Mile 22.15 to 25.15 (Location B):** The existing roadway section is a two-lane section (1-lane in each direction) with a buffer separating the opposing directions of travel. The roadway section has limited shoulder widths and experiences an increased number of local roadway access points (residences and small businesses) compared to adjacent segments of SR-18. **Figure 6-4** illustrates the segment of SR-18 from PM 22.15 to 25.15.
    - It is recommended that a comprehensive review of turnout design be completed to improve uphill movements and relieve queuing behind slow moving vehicles.
    - It is also recommended to study the benefit of intersection improvements at the junction of SR-18 with SR-173. If excess State right-of-way is available for minor roadway improvements, it could potentially serve as a cost effective improvement to reduce congestion during peak periods and improve intersection efficiency, while limiting impacts to the area.
- **SR-18 – Post Mile 34.5 to 36.5 (Location C):** The existing roadway section is a two-lane section (1-lane in each direction) with a painted centerline and recessed reflectors. The segment of roadway known as "13-curves" is located within this location. One signed turnout exists in the downhill (westbound) direction of travel. Signage related to no parking is inconsistent when compared to other mountain areas within a very short distance. **Figure 6-5** illustrates the segment of SR-18 from PM 34.5 to 36.5.
    - It is recommended that a review of the signage be completed to implement consistency in the signing of no parking areas. The clarity new signs bring would be beneficial for all users, including parking enforcement officers. Increased separation would likely improve the flow of vehicles with fewer potential obstacles lining the roadway.
- **SR-18 – Post Mile 52.7 to 53.8 and SR-38 Post Mile 49.5 to 48.3 (Location D):** The existing roadway section is a four-lane asphalt section (2-lanes in each direction). This segment is located in the downtown area of Big Bear Lake between Summit Road and Stanfield Cut-off. **Figure 6-6** illustrates the segment of SR-18 from PM 52.7 to 53.8 and SR-38 from PM 49.5 to 48.3.
    - It is recommended that site-specific improvements traffic operations improvements be developed and studied within this section of roadway to enhance traffic operations.
- **SR-18 – Post Mile 55.5 to 56.7 (Location E):** The existing roadway section is a two-lane section (1-lane in each direction). **Figure 6-7** illustrates the segment of SR-18 from PM 55.5 to 56.7.
    - It is recommended to make improvements within this section of roadway to more efficiently utilize the 40-foot ROW to allow for a continuous center-turn lane the entire segment. This geometric recommendation is in addition to the operational recommendation in *Section 8.2* of this report.
    - It is also recommended to improve drainage within this section of roadway.
- **SR-18 at Castle Rock Trail:** The Castle Rock Trailhead is popular amongst residents and visitors, and is located along Big Bear Boulevard. At this location, Big Bear Boulevard dips down into the

canyon to the trailhead and then rises again. There is potential for straightening out this segment of SR-18 to no longer include the vertical or horizontal curves at this location, allowing for a direct connection of Big Bear Boulevard, avoiding the Castle Rock trailhead. The property owner for the required right-of-way is the National Forest, as well as private ownership. While this project would take significant resources to study and build, it is a recommendation of this report to continue discussions amongst property owners to further study and evaluate an alternative alignment of SR-18 through this section. This geometric recommendation is in addition to the operational recommendation in *Section 8.2* of this report.

8.4 Informational Recommendations

Informational recommendations, including signage and real-time messages, were identified as having the potential to alleviate many of the mobility issues identified in *Section 6.0* of this report. Many of the mobility issues identified noted poor circulation patterns or confusion to drivers, which can be remedied efficiently by providing better information to drivers.

Recommendations for improved roadway operations within the MATS area include:

- **Chain Installation and Control:** Issues related to chain installation and control are due to multiple factors, including; bottlenecks, spacing of chain control locations, chain enforcement, and information related to chain requirements. Information related to chain control is available on the Caltrans website, but is not readily available to drivers. It is recommended that permanent locations for chain installation and removal be identified and adequately designated. There was a potential solution developed by stakeholders to work with the CHP and chain-exempt vehicles to shorten queue at chain control locations. It is recommended to initiate discussions with CHP on the potential for pre-approving vehicles through chain control stations.
- **Illegal Parking:** Traffic congestion and friction exist on state routes due to vehicles parked in "No Parking" zones. This is often the case in winter and summer peak months near popular snow play and hiking locations. It is recommended that standardized signage for off-street (off State Route) parking and no-parking zones be developed. It is also recommended to develop a more efficient and effective method for parking enforcement (perhaps utilizing newer technology and standardized ticketing), as procedures are time prohibitive and not a beneficial use of time for the enforcement officer.
- **Information Technology Services (ITS):** Information for drivers is beneficial to the overall transportation circulation, and could be better improved with real-time Changeable Message Signs (CMS) at key locations throughout the MATS area. It is recommended to continue supporting discussions for CMS signs with Caltrans District 8, who have already initiated the process. A discussion on the recommendation for CMS signs is included in *Section 8.4.1* of this report. Alternatively, portable message signs (PMS) and other portable traffic control devices could prove to be helpful for special events, and it is the recommendation of this report for agencies to come to agreement for shared-use of PMS signs when available.

One of the most efficient methods in providing information to a driver is by use of real-time information. Access to real-time information can help travelers choose their travel route, especially when the mountain roads get congested during peak visiting periods. Access to real-time information could also help travelers make choices that help improve the efficiency of the mountain area circulation system. For example, if travelers could be provided with information about parking occupancy at key resort locations and information about remote parking opportunities or alternate mode options, they could choose one of the options rather than driving directly to (and further congesting) a highly-congested resort destination. Different technologies may be appropriate for putting out information.

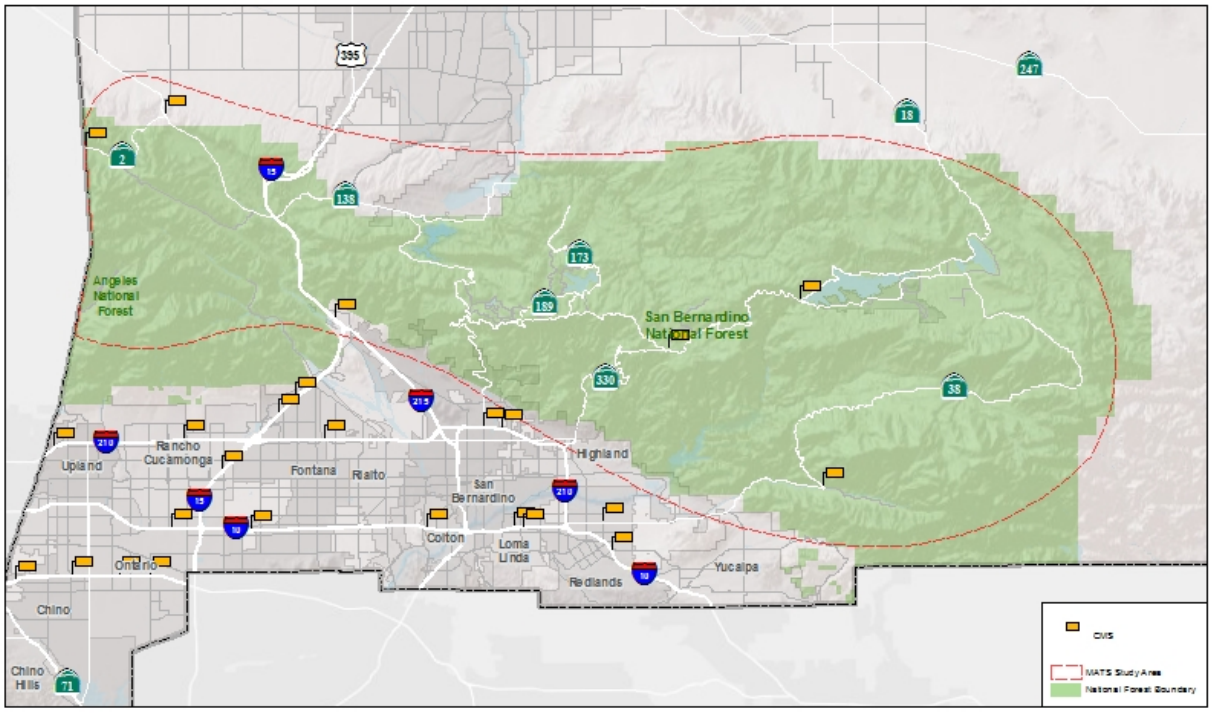
8.4.1 Permanent Changeable Message Signs

A permanent CMS should be strategically located to present information related to travel time, known detours, and other valuable topics. One of the benefits of installing permanent CMS signs, rather than relying on portable signs, is that drivers are more likely to believe a permanent sign, and often mistake portable signs as "construction related" or assume the signs are out-of-date and not current.

Caltrans District 8 maintains a website with real-time information with message signs (http://www.dot.ca.gov/dist8/tmc/). **Figure 8-9** identifies the location of "Message Signs" within the MATS area as identified by Caltrans on March 27th, 2017. At the time this figure was obtained, there were message signs located on SR-2 outside of Wrightwood, in San Bernardino at the south end of SR-18, in Running Springs, and at the junction of SR-18 and SR-38 in Big Bear Lake.

To make CMS signs as efficient as possible, CMS signs should be located in place to allow drivers time to make a decision. For example, CMS signs at the bottom of the mountain need to be located before the last exit. The importance of early signage is evident when chains are required. For example, if a vehicle had a need to buy chains, they need to know before their last opportunity to turn around.

Figure 8-8: Existing Caltrans District 8 Real-Time Message Signs



Recommendations from stakeholders fell in line with current planning developed by Caltrans District 8, which has identified several locations for CMS signs.

- SR-2, Westbound, West of SR-138
- SR-2, Eastbound, East of Lone Pine Canyon Road
- SR-18, Northbound/Eastbound, West of SR-38 (at Dam)
- SR-18, Southbound/Westbound, East of SR-38 (at Dam)
- SR-18, Northbound, North of E. 40th Street
- SR-18, Southbound, at Bear Valley Road
- SR-18, Northbound, South of Snow Valley
- SR-138, Eastbound, West of SR-173
- SR-210, Eastbound, West of H Street
- SR-259, Northbound, at Highland Avenue
- SR-38, Eastbound, West of Bryant Street (in Yucaipa)

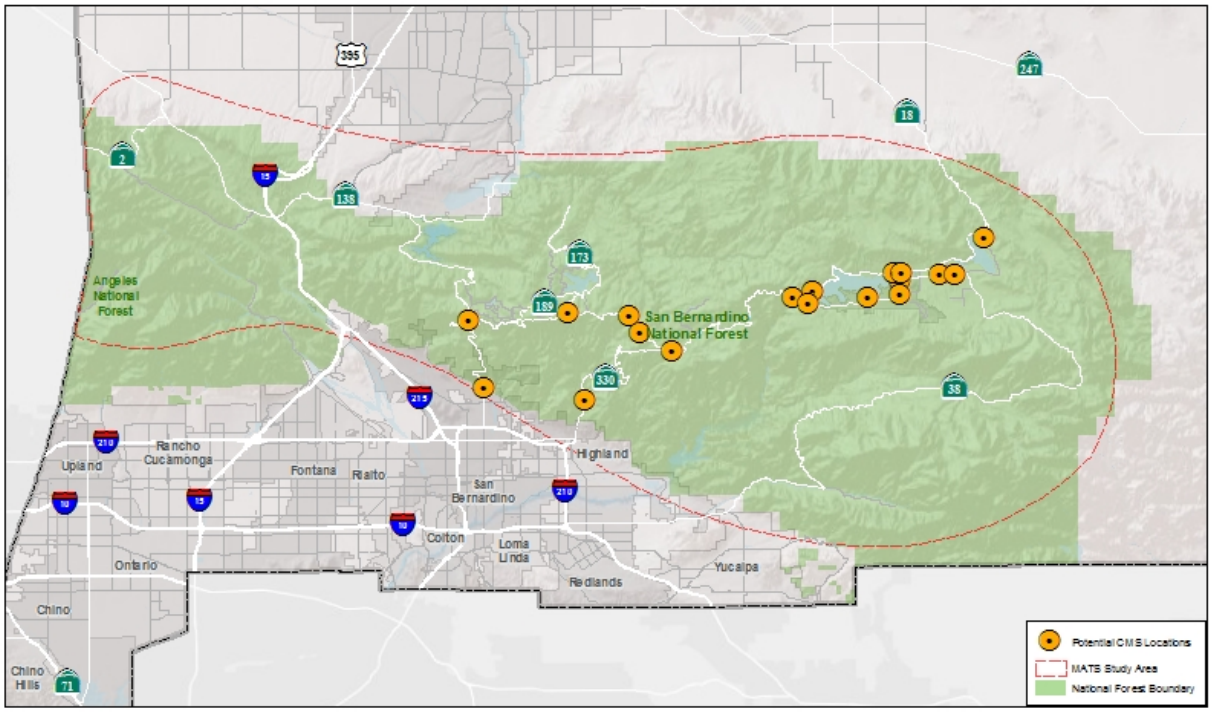
It is recommended to include all identified CMS signs at the locations identified by Caltrans District 8, and to investigate the inclusion of the following list of CMS signs identified by stakeholders:

- SR-330 approaching Highland Avenue
- Summit Boulevard approaching SR-18
- Moonridge Road approaching SR-18

- Stanfield Cut-off at North Shore Drive
- Mt. Baldy Road at Mountain Avenue

It is also recommended that all mountain area CMS signs show chain requirements prior to drivers beginning their trip up the mountain, and real-time parking occupancy at key resort locations on CMS signs at key junctions leading to the resorts. **Figure 8-10** illustrates the location of the 11 CMS signs identified by Caltrans District 8, as well as the 5 additional locations for CMS signs identified by stakeholders.

Figure 8-9: Caltrans District 8 Potential CMS Locations



8.4.2 Wide-Area Dissemination of Information

Changeable message signs (CMS) can be helpful for drivers at key decision points (entry points to the mountains or key roadway junctions), but wide-area dissemination of information can reach a broader audience of travelers. A mountain area traveler app could provide information for many traveling through the mountains, but in some areas (for example, the canyon leading up to Mt. Baldy) online information may not be accessible and an AM radio transmission could be used where effective considering placement of the transmitter relative to terrain and existing roadways.

Recommendations for improved dissemination of information within the MATS area include:

- Development of a mountain traveler information app; include real-time traffic and travel time information, chain requirements, parking occupancy at key resorts, alternate modes information, etc.
- Provide AM radio transmission of traveler information for key mountain travel corridors where web access is not available (for example, Mt. Baldy area). With AM radio transmission, it is imperative that there is signage at entry points into the mountain area. Examples of signage for AM radio transmission are illustrated in **Figure 8-11**.

Figure 8-10: AM Radio Traveler Information Signage Example

9.0 IMPLEMENTATION STRATEGY

Transportation plays an important role in the San Bernardino County's mountain area. The efficient movement of people and goods is the foundation upon which a healthy economy and high quality of life are built. Yet, the entire transportation system and the role municipal government plays in its maintenance, operations, and development over time are not always well understood. The overall goal of the MATS implementation plan is to set a course for future decision-making regarding the transportation and circulation system in the area. The purpose of the MATS implementation plan is to serve as a tool in the decision-making process regarding which projects should be advanced given the limitations of funding sources and identify agency roles.

9.1 Project Implementation Methodology

For the purposes of the MATS study, a set of evaluation or performance criteria were developed as follows:

1. ***Project benefits***: Expected effectiveness of a project in reducing congestion, improving mobility or elimination of bottlenecks.
2. ***Ease of project implementation***: Expected ease of institutional or administrative implementation of the project.
3. ***Project cost***: Expected expense to implement the project.

For each of the above categories a "scoring" methodology was developed where a higher score translates into a greater improvement value at the regional level. The scoring is intended as a general guide for technical staff and policy-makers. The actual selection of projects for funding and implementation occurs through the policy committee structure established by the SBCTA Board of Directors. The Measure I 2010-2040 Mountain/Desert Expenditure Plan states under the Major Local Highway Projects program that:

> *"Expenditure of Major Local Highway Projects funds shall be approved by the Authority Board of Directors, based upon a recommendation of subarea representatives and the Mountain/Desert Committee."*

Figure 9-1 illustrates the San Bernardino County subareas, which are commonly referred to as the Mountain/Desert subareas. The MATS study is included within two of the Measure I subareas: The Mountain Subregion and the Victor Valley subarea. Each subarea has its own set of representatives. The majority of the MATS area is included within the Mountain Subregion, and the representatives include the Second and Third District Supervisors along with the Board member from the City of Big Bear Lake. The Wrightwood area is part of the Victor Valley subarea, represented by the First District Supervisor, plus representatives of the City of Adelanto, Town of Apple Valley, City of Hesperia, and City of Victorville.

Figure 9-1: San Bernardino County Subareas

Although each subarea has flexibility in how the representatives designate projects, generally an overall project list is developed and projects are identified for implementation as funds become available. Recommendations are made by the subarea representatives for consideration by the Mountain/Desert Committee and on to adoption by the full SBCTA Board. Funding can involve not only Measure I funds, but funds from a variety of state sources as well. The project scoring is one input to this decision-making process for the allocation of these funds.

9.1.1 Criteria Score Definitions

Evaluation criteria for ***project benefits*** are summarized in **Table 9-1**, and ranges from a low score of 1 (resulting in little effect on bottlenecks) to a high score of 5 (resulting in substantial improvement of a regional bottleneck).

Table 9-1: Benefits Criteria and Evaluation Score

Score	Description
5	Substantial improvement of a regional route bottleneck
4	Moderate improvement of a regional route bottleneck; or Opportunity for substantial diversion of people to alternate routes
3	Modest improvement of a regional route bottleneck Substantial improvement of a localized bottleneck
2	Little improvement of a regional route bottleneck Modest improvement of a localized bottleneck
1	Little effect on bottleneck / congestion

Evaluation criteria for ***ease of project implementation*** are summarized in **Table 9-2**, and ranges from a low score of 1 (requiring in a major acquisition of ROW and coordination between multiple agencies) to a high score of 5 (represented by a project that is anticipated to be easy to implement, such as a signing or striping project).

Table 9-2: Ease of Implementation Criteria and Evaluation Score

Score	Description
5	Easy to implement; signing and striping
4	No ROW required; little or no agency coordination
3	Minimal ROW required
2	Moderate ROW required
1	Major ROW required; multiple agency coordination required

For the purposes of the MATS study, order-of-magnitude cost estimate for identified types of improvements have been developed. Evaluation criteria for ***project cost*** are summarized in **Table 9-3**, as well as a description of the types of improvements that fall within each category. Cost categories range from a low score of 1 (representing an investment greater than $5,000,000) to a high score of 5 (representing an investment typically less than $50,000).

Table 9-3: Cost Criteria and Evaluation Score

Score	Cost Range	Description of Improvements
5	Very Low – Low ($0 - $50,000)	minor signing and striping revisions
4	Low ($50,000 – $250,000)	traffic signal upgrade or installation at an existing intersection (no roadway work involved)
3	Medium ($250,000 - $800,000)	minor roadway or intersection work including traffic signals, signage, turn pockets
2	Medium/High – High ($800,000 - $5,000,000)	minor roadway or intersection work and traffic signals improvements with limited partial ROW takes required
1	Very High – Major Investment (>$5,000,000)	major roadway or intersection improvements requiring full ROW takes due to grading limits and utility work

9.1.2 Project Scoring Methodology

A scoring scale was developed that would yield a maximum of 100 points for each project. However, since each of three evaluation criteria has a different level of significance to the overall project implementation process, it was decided that each criterion would be weighted differently, as shown below:

- Project Benefits weighted at 60% of the overall score
- Ease of Project Implementation weighed at 30% of the overall score
- Project Cost weighted at 10% of the overall score

Each project would receive a score between 1 and 5 based on how they are expected to perform under each criterion. The scores for each criterion were combined by the corresponding criteria weight according to the formula depicted in **Figure 9-1**.

Figure 9-2: Evaluation Score Calculation

$$Total\ Evaluation\ Score = \frac{\left((0.6 * Benefit\ Score) + (0.3 * Ease\ of\ Implementation\ Score) + (0.1 * Cost\ Score)\right)}{5} \times 100$$

An example of the scoring is a project that has a ***project benefit*** score of 3 (modest improvement of a regional bottleneck, or a substantial improvement of a localized bottleneck), an ***ease of project implementation*** score of 4 (no ROW required, with little or no agency coordination), and a ***project cost*** score of 2 (medium to high cost ranging between $800,000 to $5,000,000). In this example, the ***total*** evaluation score is calculated as 64, and is shown in **Figure 9-2**.

Figure 9-3: Evaluation Score Example Calculation

$$\frac{(0.6 * 3) + (0.3 * 4) + (0.1 * 2)}{5} \times 100 = \mathbf{64}$$

9.1.3 Priority Methodology

In the next step, a generalized prioritization process was completed to determine if a project would be of relatively "low," "medium," or "high" priority for implementation. Using the scoring methodology established in *Section 9.1.2* of this report, an equal distribution of projects based on scores was used to determine scoring ranges for relative priorities. The project priority scoring is ranked as follows:

- "Low Priority": projects with score less than 55 points
- "Medium Priority": projects with score between 55 points and 65 points
- "High Priority": projects with score 65 points and higher

9.2 Scoring and Ranking for Project Recommendations

This section of the report summarizes the project recommendations from *Section 8.0* based on the methodologies defined in *Section 9.1*.

9.2.1 Location Issue Implementation Plan

The methodologies and scoring values identified in this section of the report were applied directly to the location issues and recommendations identified in **Table 8-1**. **Table 9-4** summarizes the locations, preferred solution, evaluation criteria, and resulting total score. It should be noted that locations with no recommended improvement are not included in **Table 9-4**.

Of the location issues identified in *Section 6.0* of this report, 37 projects were evaluated and prioritized. Weighted scores range between 40 and 94 points, out of a possible range of 20 to 100 points for each

project. As detailed in **Table 9-4**, based on the three ranges discussed above, there are 12 "High Priority" projects, 10 "Medium Priority" projects, and 14 "Low Priority" projects.

Table 9-4: Location Issues, Evaluation Criteria, and Associated Score

Location ID	Location	Solution	Political Jurisdiction	Location	Evaluation				Priority
					Benefit	Implementation	Cost	Weighted Score	
Wrightwood/Mount Baldy/Lytle Creek									
1	SR-2 (Big Pines Highway) at Willow Road	• No solution recommended *(See Table 8-1 for discussion on recommendation)*	Caltrans	San Bernardino County	5	4	5	94	
2	SR-2 (Big Pines Highway) at Wrightwood	• Develop chain-up area[1] on SR-2	Caltrans	San Bernardino County	3	3	4	62	MEDIUM
3	Glendora Ridge Road at Entire Route Through San Bernardino County	• *No solution recommended (See Table 8-1 for discussion on recommendation)*	San Bernardino County	San Bernardino County					
4	Lone Pine Canyon Road at Between SR-138 and SR-2 in Wrightwood	• Provide a chain-up area[1] and enhance CHP enforcement of chain control on Lone Pine Canyon Road	San Bernardino County	San Bernardino County	2	3	4	50	LOW
5	Lytle Creek Road at North of I-15	• Install "Share the Road" signage[2]	San Bernardino County	San Bernardino County	1	5	5	52	LOW
6	Swarthout Canyon Road at South of Lone Pine Canyon Road	• *No solution recommended (See Table 8-1 for discussion on recommendation)*	San Bernardino County	San Bernardino County					
Crestline/Lake Arrowhead									

Location ID	Location	Solution	Political Jurisdiction	Location	Evaluation				Priority
					Benefit	Implementation	Cost	Weighted Score	
7	SR-138 at Seeley Way	• No long-term solution recommended • Positive improvement with maintenance and reduced vegetation on the curve of SR-138 to greatly improve sight distance	Caltrans	San Bernardino County	1	5	5	52	LOW
8	SR-138 at Crest Forest Drive/Lake Drive "Top Town"	• *No solution recommended (See Table 8-1 for discussion on recommendation)*	Caltrans	San Bernardino County					
9	SR-173 at SR-18	• Revise intersection configuration • Use adjacent paved area to increase curve radius and improve turn pocket • Increase local street separation from SR-18	Caltrans	San Bernardino County	2	3	2.5	47	LOW
10	SR-18 at SR-138	• *No solution recommended (See Table 8-1 for discussion on recommendation)*	Caltrans	San Bernardino County					
11	SR-18 at Daley Canyon Road	• Improve route guidance signage in advance of intersection	Caltrans	San Bernardino County	1	5	5	52	LOW
12	SR-18 at SR-330	• Include an acceleration lane from west of Hilltop, including a left turn pocket west of Hilltop	Caltrans	San Bernardino County	4	3	2	70	HIGH

Location ID	Location	Solution	Political Jurisdiction	Location	Evaluation				Priority
					Benefit	Implementation	Cost	Weighted Score	
13	SR-18 at Running Springs to Big Bear Lake	• Update and make turnout[3] signage consistent • Separate turnout[3] areas for slow moving vehicles from sightseer parking areas	Caltrans	San Bernardino County	4	1	3	60	MEDIUM
14	SR-18 at Running Springs School Road	• Widen intersection to provide westbound left-turn lane and westbound acceleration lane to receive left turns on SR-18	Caltrans	San Bernardino County	2	3	3	48	LOW
15	SR-18 at Snow Valley and SR-18 at Snow Valley Snow Play Area (approximately 1 mile west of Snow Valley parking lot entrance)	At Snow Valley[4]: • Re-stripe Snow Valley parking lot intersection with SR-18 to provide one westbound through lane plus an acceleration lane for left-turning traffic going west on SR-18 At Snow Play Area[5]: • Install adequate signage to direct visitors to parking locations	Caltrans	San Bernardino County *	3	5	4	74	HIGH
16	SR-18 at Entire State Route	• Study and develop turnout facilities[3] where needed	Caltrans	San Bernardino County	5	1	1	68	HIGH

Location ID	Location	Solution	Political Jurisdiction	Location	Evaluation				Priority
					Benefit	Implementation	Cost	Weighted Score	
17	SR-189 at Daley Canyon Road	• Stripe edge of travelled way going around curve on southwest corner • Consider better signage, including a flashing signal approaching the intersection for northbound Daley Canyon Road • No solution for sight distance, as it appears to be not a significant issue since it's a three-way stop T-intersection	Caltrans	San Bernardino County	2	5	5	64	MEDIUM
18	SR-189 at Blue Jay Cut-off	• Revise profile of Blue Jay Cut-off for approximately 200 feet and improve the grade and connection with SR-189	Caltrans	San Bernardino County	2	4	3	54	LOW
19	SR-330 at City Creek US Forest Service Station	• Restripe existing roadway to include left-turn pocket on SR-330 • Potential need for minor widening within existing ROW north of the parking lot	Caltrans	San Bernardino County	3	4	4	68	HIGH
20	SR-330 at Live Oak	• Install "Local Traffic Only" sign[6] on Live Oak • Install "Steep Grade" sign[7] on steep slope section of Live Oak to deter cut-through traffic	Caltrans	San Bernardino County	1	5	5	52	LOW

Location ID	Location	Solution	Political Jurisdiction	Location	Evaluation				Priority
					Benefit	Implementation	Cost	Weighted Score	
21	SR-18 at Hilltop Boulevard	• Study installation of westbound SR-330 receiving lane for traffic turning left from SR-18 • Install left turn pockets on SR-18 at Soutar Drive and Hunsaker Way	Caltrans	San Bernardino County	4	5	5	88	HIGH
22	Crest Forest Drive at Valley View Drive	• *No solution recommended (See Table 8-1 for discussion on recommendation)*	San Bernardino County	San Bernardino County					
23	Lake Arrowhead Village Area	• Develop a smart parking system with signage and an app to communicate parking occupancy • Preclude cars from entering full parking lots	San Bernardino County	San Bernardino County	2	4	2	52	LOW
24	Lake Drive at Fern Drive	• *No solution recommended (See Table 8-1 for discussion on recommendation)*	San Bernardino County	San Bernardino County					

Location ID	Location	Solution	Political Jurisdiction	Location	Evaluation				Priority
					Benefit	Implementation	Cost	Weighted Score	
25	Lake Drive at Wild Rose Lane	• Recommend the Community of Crestline and San Bernardino County continue to study traffic circulation for large events at this location • Potential for stop signs to be located on Lake Drive at Wild Rose Lane • Potential for two-lane exit driveway from USPS parking lot • Recommendation to remove pilaster with no parking sign from middle of USPS entry driveway	San Bernardino County	San Bernardino County	2	4	1	50	LOW
26	SR-330 at Highland Ave	• Implement a Park and Ride Facility[8]	Caltrans	San Bernardino County	2	3	4	50	LOW
Big Bear/Angeles Oaks									
27	SR-18 at SR-38	• Install a "real time traffic management" sign[9] at this location, approximately 100 yards east of Big Bear Dam	Caltrans	San Bernardino County	4	4	3	78	HIGH
28	SR-18 (Big Bear Boulevard) at Castle Rock Trail Head	• Raise SR-18 through the bend and gain area to include parking spots for trailhead; retaining wall. • Provide pedestrian path along SR-18	Caltrans	City of Big Bear Lake	3	3	2	58	MEDIUM

Location ID	Location	Solution	Political Jurisdiction	Location	Evaluation				Priority
					Benefit	Implementation	Cost	Weighted Score	
29	SR-18 (Big Bear Boulevard) at Mill Creek Road	• Widen Big Bear Boulevard to provide westbound left turn lane between Wild Rose Lane and Mill Creek Road *Related to location issue #30*	Caltrans	City of Big Bear Lake	3	3	3	60	MEDIUM
30	SR-18 (Big Bear Boulevard) at Wild Rose Lane	• Widen Big Bear Boulevard to provide westbound left turn lane between Wild Rose Lane and Mill Creek Road *Related to location issue #29*	Caltrans	City of Big Bear Lake	3	3	2	58	MEDIUM
31	SR-18 (Big Bear Boulevard) at Lakeview Drive/Paine Court	• Convert the intersection into a roundabout	Caltrans	City of Big Bear Lake	5	2	2	76	HIGH
32	SR-18 (Big Bear Boulevard) at Village Drive	• Reconfigure intersection, including moving eastbound through stop bar further east • Obtain ROW from NW corner lot to modify intersection	Caltrans	City of Big Bear Lake	4	3	2	70	HIGH
33	SR-18 (Big Bear Boulevard) at Pine Knot Avenue	• Extend WB merge further west to Simondss Road • Study workable alternatives • Rework/Modify parking lot to allow easier entrance and exit	Caltrans	City of Big Bear Lake	4	3	2	70	HIGH

Location ID	Location	Solution	Political Jurisdiction	Location	Evaluation				Priority
					Benefit	Implementation	Cost	Weighted Score	
34	SR-18 (Big Bear Boulevard) at Knickerbocker Creek	• Implement undercrossing for bicycles and pedestrians	Caltrans	City of Big Bear Lake	2	3	2	46	LOW
35	SR-18 (Big Bear Boulevard) at Moonridge Road	• Improve signal timing along SR-18	Caltrans	City of Big Bear Lake	3	5	5	76	HIGH
36	SR-18 (Big Bear Boulevard) at Stanfield Cut-off	• *(See Table 8-1 for discussion on recommendation)*	Caltrans	City of Big Bear Lake					
37	SR-18 (Big Bear Boulevard) at Division Drive to Paradise Way	• Develop a center turn lane and adequate drainage	Caltrans	San Bernardino County *	5	3	2	82	HIGH
38	SR-38 at Mountain Home Village	• Install "Local Access Only" sign[6] on access road on north side of SR-38	Caltrans	San Bernardino County	1	5	5	52	LOW
39	SR-38 at Valley of the Falls Drive	• Restripe or widen SR-38 to accommodate a left turn lane from SR-38 to Valley of the Falls Drive • Add receiving lane for left turns from Valley of the Falls Drive onto SR-38	Caltrans	San Bernardino County	3	3	2	58	MEDIUM
40	SR-38 at Forest Falls Turn-off	• Widen SR-38 to add uphill truck climbing lane or passing lane • Note that the addition of a truck climbing lane will involve widening SR-38, as restriping would eliminate existing shoulders	Caltrans	San Bernardino County	3	3	1	56	MEDIUM

Location ID	Location	Solution	Political Jurisdiction	Location	Evaluation				Priority
					Benefit	Implementation	Cost	Weighted Score	
41	SR-38 (Big Bear Boulevard) at Greenspot Boulevard/Shay Road "Square Turn"	• Maintain continuity for vehicles on SR-38 by realigning to make SR-38 a continuous curve through the intersection • Close off access to Greenspot Road north of Shay Road, and bring Shay Road into SR-38 as a T-intersection	Caltrans	San Bernardino County	3	3	3	60	MEDIUM
42	SR-38 (Big Bear Boulevard) at Stanfield Cut-off	• Convert the intersection into a roundabout	Caltrans	San Bernardino County *	5	2	2	76	HIGH
43	Moonridge Road at Club View Drive"Moonridge Y"	• Create a roundabout at Rathbun Drive/ Club View Drive at Moonridge Road	City of Big Bear Lake	City of Big Bear Lake	2	2	2	40	LOW
44	Stanfield Cut-off at Eagle Nest Road	• Stripe the portion of Stanfield Cut-off in front of Eagles Nest with KEEP CLEAR	City of Big Bear Lake	City of Big Bear Lake	2	5	5	64	MEDIUM

[1] See additional discussion on chain-up areas and enforcement in Section 8.2.1 of this report.
[2] See an example of Share the Road signage in Figure 8-1
[3] See additional discussion on turnout signage and design in Section 8.2.4 of this report
[4] See discussion on Snow Valley Resort Main Entrance in Section 8.2.1 of this report
[5] See additional recommendation for parking and snow play on SR-18 between Running Springs and Big Bear Lake in Section 8.2.1
[6] See discussion on cut-through traffic in Section 8.2.1 of this report
[7] See an example of "Steep Grade" signage in Figure 8-2
[8] See discussion on transportation modes and park and ride facilities in Section 8.2.3 of this report
[9] See discussion on Permanent Changeable Message Signs for permanent signs at this location as identified by Caltrans District 8 in Section 8.4.1 of this report
* Though these projects are located within the unincorporated area of San Bernardino County the City of Big Bear Lake will be the project proponent

9.2.2 Operational Implementation Plan

Operational mobility recommendations consist primarily of alleviating mobility issues by improving the operational aspects of traffic flow. All of the operational recommendations are considered to be MEDIUM to HIGH priority issues, and should be implemented in accordance with, and in coordination with, the location-specific recommendations in this plan.

Recommendations for operational issues are as follows:

- **Traffic Control** *(see Section 8.2.1)*
  - Study the effect of cut-through traffic on local facilities throughout the MATS area. Examples of signage aimed to reduce cut-through traffic are illustrated in **Figure 8-3**.
  - Continue to implement right-turn only event management during peak events.
  - Coordinate with CHP in developing more standardized chain control operations.
  - Identify parking location for Snow Valley snow play, and restripe east end of passing lane for cars making a left turn out of Snow Valley parking lot. An example of restriping of SR-18 at the Snow Valley snow play parking lot is illustrated in **Figure 8-4**.
- **Roadway Maintenance** *(see Section 8.2.2)*
  - Study and develop a clearinghouse location for traffic and transportation related information.
  - County of San Bernardino to coordinate with Los Angeles County maintenance and to develop agreements for Mount Baldy Road during snow events.
- **Transportation Modes** *(see Section 8.2.3)*
  - Install signage at locations with known conflicts between non-motorized persons and vehicles and include these locations into currently on-going bicycle and pedestrian plans.
  - Investigate demand for park and ride or shuttle services for visitors entering the MATS area which are destined to several of the large ski resorts during peak winter months.
  - Continue to investigate non-fixed route (transit or shuttle) services within resort destinations and during special events.
- **Turnouts** *(see Section 8.2.4)*
  - Install early advance warning signs for turnouts. Examples of advanced turnout warning signs are illustrated in **Figure 8-5**.
  - Design and install lane configuration diagram upon initiation of a turnout. An example of a lane configuration diagram is included in **Figure 8-6**.
  - Paint lane markings and enhanced lane and edge of travel way strips at existing turnouts. An example of lane markings is included in **Figure 8-6**.

9.2.3 Geometric Implementation Plan

Geometric mobility issue recommendations consist primarily of realigning existing roadways in order to improve the operational aspects of traffic flow. All of the geometric recommendations are considered to be MEDIUM to HIGH priority issues, and should be implemented along with other recommendations in this plan.

Recommendations for geometric issues are as follows:

- **Location A: SR-18 – Post Mile 15.0 to 16.8** *(see **Figure 6-3**)*
  - Review the existing turnouts, including consideration for enhanced delineation with definition of shoulder areas. Vehicles stopping for pleasure should be guided away from the defined shoulder and outside edge of travel way to preserve a shoulder area. The

preservation of the shoulder should also provide a recovery area beyond the defined travel way on curves.
    - Review of existing signing is recommended to be accomplished at turnouts.
- **Location B: SR-18 – Post Mile 22.15 to 25.15** *(see **Figure 6-4**)*
    - Complete a comprehensive review of turnout development to improve uphill movements and relieve queuing behind slow moving vehicles.
    - Study the benefit of intersection improvements at the junction of SR-18 with SR-173.
- **Location C: SR-18 – Post Mile 34.5 to 36.5** *(see **Figure 6-5**)*
    - Complete a review of the signage to implement consistency in the signing of no parking areas.
- **Location D: SR-18 – Post Mile 52.7 to 53.8 and SR-38 Post Mile 49.5 to 48.3** *(see **Figure 6-6**)*
    - Develop and study site-specific traffic operations improvements within this section of roadway to enhance traffic operations.
- **Location E: SR-18 – Post Mile 55.5 to 56.7** *(see **Figure 6-7**)*
    - Make improvements to more efficiently utilize the 40-foot ROW to allow for a continuous center-turn lane through the entire segment. This geometric recommendation is in addition to the operational recommendation in *Section 8.2* of this report.
    - Improve drainage within this section of roadway.
- **SR-18 at Castle Rock Trail** *(see **Figure 8-8**)*
    - Continue discussions amongst property owners to further study and evaluate an alternative alignment of SR-18 through this section. This geometric recommendation is in addition to the operational recommendation in *Section 8.2* of this report.

9.2.4 Informational Implementation Plan

Informational recommendations consist primarily of relaying accurate and timely local and regional traveler information to users of the transportation system, with the goal of alleviating mobility difficulties related to dissemination of real-time traffic information. All of the informational recommendations are considered to be 

to 

priority, and should be implemented along with other recommendations in this plan.

Recommendations to address informational issues are as follows:

- **General Informational Issues:**
    - **Chain Installation and Control:** Identify and designate permanent locations for chain installation.
    - **Illegal Parking:** Standardized signage for off-street (off State Route) parking and develop “no-parking” zones. Develop a more efficient and effective method for parking enforcement (perhaps utilizing newer technology and standardized ticketing methods).
    - **Information Technology Services (ITS):** Continue supporting discussions for CMS signs with Caltrans District 8. Create agreement between agencies for shared-use of PMS signs when available and appropriate.
- **Implement CMS Signs at the following locations*** *(see **Figure 8-10**)*:

- SR-2, Westbound, West of SR-138
- SR-2, Eastbound, East of Lone Pine Canyon Road
- SR-18, Northbound/Eastbound, West of SR-38 (at Dam)
- SR-18, Southbound/Westbound, East of SR-38 (at Dam)
- SR-18, Northbound, North of E. 40th Street
- SR-18, Southbound, at Bear Valley Road
- SR-18, Northbound, South of Snow Valley
- SR-138, Eastbound, West of SR-173
- SR-210, Eastbound, West of H Street
- SR-259, Northbound, at Highland Avenue
- SR-38, Eastbound, West of Bryant Street (in Yucaipa)
- SR-330 approaching Highland Avenue
- Summit Boulevard approaching SR-18
- Moonridge Road approaching SR-18
- Stanfield Cut-off at North Shore Drive
- Mt. Baldy Road at Mountain Avenue

  **Note: The implementation of CMS signs should be considered as funds become available, and in coordination with the Caltrans CMS plan. Prior to implementation, it must be ensured that plans are in place for specific uses of the signs and the conditions under which specific messages are displayed.*

- **Wide-Area Dissemination of Information**
  - Development of a mountain traveler information mobile device application (App); include real-time traffic and travel time information, chain requirements, parking occupancy at key resorts, alternate modes information, etc.
  - Provide Highway Advisory (AM) Radio (HAR) transmission of traveler information for key mountain travel corridors where web access is not available (for example, Mt. Baldy area).

9.3 Agency Responsibilities

The transportation network throughout the MATS study area in the San Bernardino National Forest is unique in that most of the major facilities are state routes under the jurisdiction of the California Department of Transportation (Caltrans). In addition, the majority of lane miles in the roadway system are constructed on United States Forest Service (USFS) land or right of way. Conversely, the primary users of this transportation network are visitors from throughout the entire Southern California region and outside, while local residents, due to their smaller numbers and familiarity with the system, minimally impact the system on a daily basis. This creates a paradox in which the other two main agencies with local presence, the County of San Bernardino and the City of Big Bear Lake, are often called upon by residents to solve local traffic congestion problems. However, the ability for these two jurisdictions to facilitate capital improvements on the State highway system is limited.

It is important for the responsible agencies identified above to continue to collaborate on each of the projects identified in the MATS Implementation Plan, as guided by SBCTA subarea representatives as discussed earlier.

All of the state routes within the San Bernardino National Forest should be viewed as one integral transportation network, operating as a system. A bottleneck in one location can result in traffic congestion extending miles downstream. The proposed improvements within this plan are largely focused on attempting to eliminate or mitigate traffic bottlenecks. It is noted that while making these bottleneck improvements, additional traffic stresses may occur in other locations within the system.

As reported in the San Bernardino County Transportation Authority's *Countywide Transportation Plan* (2015), regional traffic volumes are anticipated to increase by nearly 50% in the Inland Empire. Although growth is slower in the MATS area, traffic flow on the transportation network within the San Bernardino National Forest is further complicated by the unique issues related to seasonal, visitor, part time and recreational travel to this region.

It is recommended that a Memorandum of Understanding (MOU) be considered for execution. The MOU would clarify roles and responsibilities for implementation of the Plan. The MOU is a way to communicate the intent of the agencies to collaborate and to coordinate project implementation schedules and funding at the local, state, and federal levels. The MOU would not contain specific commitments to funding, permitting, or scheduling. However, it could be a vehicle for providing continuity as personnel changes occur. An intent to meet on a quarterly basis to discuss progress could be an element reflected in the MOU. However, this type of coordination could occur even prior to drafting an MOU.

9.4 Funding

The projects, strategies, and policies identified in this plan can be supported by a wide variety of available funding sources. Federal and State transportation funding sources provide grant funding available to support a variety of transit, streetscape, mobility, multi-modal, and active transportation projects.

This section summarizes several Federal, State, and County funding sources. Following the brief description of funding sources, **Table 9-5** through **Table 9-7** identifies the general applicability of each of the above funding sources to the various improvement categories identified in this study. It should be noted that this is a preliminary assessment and the eligibility of projects in each case should be investigated in more detail as the specific project is refined and designed for implementation.

9.4.1 Federal Funding Sources

Several potential federal funding sources are available through the Federal Transit Authority (FTA) and the United States Department of Transportation (US DOT). **Table 9-5** identifies two potential funding sources, and which improvements from the implementation plan the funding sources may apply to. A brief discussion of the funding sources follows the table.

Table 9-5: Potential Federal Funding Sources

Improvements (Projects, Strategies, and Policies)	FTA - Section 5310 Mobility for Seniors & Disabled	Regional Surface Transpiration Program	Federal Lands Access Program
Location Implementations		X	X
Operational Implementations	X		X
Geometric Implementations		X	X
Informational Implementations			

9.4.1.1 FTA Section 5310 – Enhanced Mobility of Seniors & Individuals with Disabilities

The goal of the Federal Transit Authority's (FTAs) Section 5310 program is to improve mobility for seniors and individuals with disabilities. Eligible projects include the following examples:

- buses and vans
- wheelchair lifts, ramps, and securement devices
- transit-related information technology systems, including scheduling/routing/one-call systems
- mobility management programs
- acquisition of transportation services under a contract, lease, or other arrangement
- travel training
- volunteer driver programs
- building an accessible path to a bus stop, including curb-cuts, sidewalks, accessible pedestrian signals or other accessible features
- improving signage, or way-finding technology
- incremental cost of providing same day service or door-to-door service
- purchasing vehicles to support new accessible taxi, rides sharing and/or vanpooling programs
- mobility management program

Source: https://www.transit.dot.gov/funding/grants/enhanced-mobility-seniors-individuals-disabilities-section-5310

9.4.1.2 US DOT Fixing America's Surface Transportation Act

The US DOT Fixing America's Surface Transportation Act (FAST ACT) aims to provide states and communities with funding for building roads, bridges, and transit systems.

Source: https://www.fhwa.dot.gov/fastact/

The Surface Transportation Block Grant (STBG) program under the FAST ACT promotes flexibility in state and local transportation decisions, and aims to provide flexible funding to address identified transportation needs. The State's STBG apportionment is obligated to proportion a relative share of funds to areas with population of 5,000 or less, as well as areas with population greater than 5,000 but no more than 200,000.

Source: http://www.dot.ca.gov/hq/transprog/federal/rstp/Official_RSTP_Web_Page.htm

The Congestion Mitigation and Air Quality (CMAQ) program under the FACT ACT is to fund transportation projects or programs that will contribute to attainment or maintenance of the National Ambient Air Quality Standards (NAAQS) for ozone, carbon monoxide, and particulate matter.

Source: http://www.dot.ca.gov/hq/transprog/federal/cmaq/Official_CMAQ_Web_Page.htm

The Highway Safety Improvement Program (HSIP), under the FAST ACT is a core federal-aid program to States for the purpose of achieving a significant reduction in fatalities and serious injuries on all public roads. The Division of Local Assistance (DLA) manages California's local agency share of HSIP funds. California's Local HSIP focuses on infrastructure projects with nationally recognized crash reduction factors (CRFs). Local HSIP projects must be identified on the basis of crash experience, crash potential, crash rate, or other data-supported means.

Source: http://www.dot.ca.gov/hq/LocalPrograms/hsip.html

9.4.1.3 Federal Lands Access Program (FLAP)

The Federal Lands Access Program (Access Program) was established to improve transportation facilities that provide access to, are adjacent to, or are located within Federal lands. The Access Program supplements State and local resources for public roads, transit systems, and other transportation facilities, with an emphasis on high-use recreation sites and economic generators. The Program is designed to provide flexibility for a wide range of transportation projects and is funded by contract authority from the Highway Trust Fund and subject to obligation limitation. Funds will be allocated among the States using a statutory formula based on road mileage, number of bridges, land area, and visitation.

Source: https://flh.fhwa.dot.gov/programs/flap/

9.4.2 State Funding Sources

Several potential state funding sources are available. **Table 9-6** identifies three potential funding sources, and which improvements from the implementation plan the funding sources may apply to. A brief discussion of the funding sources follows the table.

Table 9-6: Potential State Funding Sources

Improvements (Projects, Strategies, and Policies)	Cap-and-Trade Program	State Transportation Improvement Program	State Highway Operation and Protection Program	Active Transportation Program
Location Implementations		X	X	X
Operational Implementations	X	X	X	X
Geometric Implementations	X	X	X	
Informational Implementations	X		X	

9.4.2.1 Cap-and-Trade Program

The California Environmental Protection Agency (EPA) Air Resources Board(ARB) cap-and-trade program should be researched for usability for projects, strategies, and policies identified in this plan. The cap-and-trade program is market based regulation designed to reduce greenhouse gases (GHGs) by creating incentives to reduce GHGs below allowable levels through investments in clean technologies. With a carbon market, a price on carbon is established for GHGs. These funds could potentially be available for identified multi-modal strategies and projects.

Source: https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm

9.4.2.2 State Transportation Improvement Program

The State Transportation Improvement Program (STIP) includes transportation projects on and off the State Highway System. The STIP Includes the Regional Transpiration Improvement Program (RTIP) where projects are nominated by the RTPA and the Interregional Transportation Improvement Program (ITIP) where projects are nominated by Caltrans. Proposed projects are adopted by the California Transportation Commission (CTC). To be eligible for STIP funds, local agencies are required to work through their Regional Transportation Planning Agency (RTPA) to nominate projects for inclusion in the STIP.

Source: http://dot.ca.gov/hq/LocalPrograms/STIP.htm

9.4.2.3 State Highway Operation and Protection Program (SHOPP)

Caltrans develops and manages the State Highway Operation and Protection Program (SHOPP). The purpose of the SHOPP is to maintain and preserve the State Highway System and its supporting infrastructure. Projects in the SHOPP are limited to capital improvements relative to maintenance, safety and rehabilitation of State highway and bridges, capital improvements that do not add capacity to the system

Source: http://www.catc.ca.gov/programs/shopp.htm

9.4.2.4 Active Transportation Program (Federal and State funded)

The California Department of Transportation created the Active Transportation (ATP), which consolidates the following previous programs:

- Transportation Alternatives Program
- Bicycle Transportation Account
- State Safe Routes to School

This program intends to increase active non-motorized trips, increase mobility and safety, and enhance public health.

Source: https://www.arb.ca.gov/cc/capandtrade/capandtrade.htm

9.4.2.5 The Road Repair and Accountability Act of 2017 (SB1)

Senate Bill 1 (SB1) creates the Road Maintenance and Rehabilitation Account and the Road Maintenance and Rehabilitation Program. Programs funded by this account include the Local Partnership Program, the Active Transportation Program, the State Highway Operation and Protection Program (SHOPP), and Local Streets and Roads apportionments. Specific guidelines for each program is being developed and the California Transportation Commission (CTC) plays a significant role in SB1 program including guideline development, evaluating projects and program funding.

> *Source: http://www.catc.ca.gov/meetings/agenda/2017Agenda/2017-05/Yellows/Tab_15_4.6.pdf*

SB1 identifies a Local Partnership Program, which is available "for counties that have sought and received voter approval of taxes or that have imposed fees, including uniform developer fees."

- "Eligible projects… include but are not limited to, sound walls for a freeway that was built prior to 1987 without sound walls and with or without high occupancy vehicle lanes if the completion of the sound walls has been deferred to lack of available funding for at least twenty years and a noise barrier scope summary report has been completed within the last twenty years."
- Funds are appropriated "for allocation to each eligible county and city in the county for road maintenance, rehabilitation, and other roadway improvement purposes."

SB1 identifies a Local Streets and Roads Program, which provides an increase of $1.5 billion annually, beginning in November 2017. Prior to SB 1, the Commission had no role in the Local Streets and Roads apportionment program. SB 1 creates new responsibilities for the Commission relative to this funding, including development of guidelines, review of project lists submitted by cities and counties, reporting to the State Controller, and receiving reports on completed projects.

SB1 identifies a Solutions for Congested Corridors Program, which creates this new $250 million per year program beginning 2017-18. Commission responsibilities include developing guidelines, holding public hearings, reviewing corridor plans, scoring project nominations, programming projects, allocating funds to projects, monitoring program delivery, and reporting to the Legislature.

SB1 identifies a Trade Corridor Enhancement, which allows for $300 million per year account to fund corridor based freight projects nominated by local agencies and the state. Trailer bill language was recently released to incorporate this funding and federal freight funding into a single program. Because these changes would significantly impact the guidelines for the California Freight Investment Program (CFIP) that are being presented under a separate agenda item, staff will withdraw the CFIP guidelines and initiate additional workshops to revise the guidelines before bringing them to the Commission for approval.

9.4.3 Local Funding Sources (County and City)

Several potential local funding sources are available. **Table 9-7** identifies four potential funding sources, and which improvements from the implementation plan the funding sources may apply to. A brief discussion of the funding sources follows the table.

Table 9-7: Potential Local (County and City) Funding Sources

Improvements (Projects, Strategies, and Policies)	Measure I	Community Facilities Districts	Benefit Assessment Districts	Business Improvement District
Location Implementations	X	X	X	X
Operational Implementations	X	X		
Geometric Implementations	X			
Informational Implementations				

9.4.3.1 Measure I Funds

Measure I is the half-cent sales tax collected throughout San Bernardino County for transportation improvements. San Bernardino County voters first approved the measure in November 1989 to ensure that needed transportation projects were implemented countywide through 2010. In 2004, San Bernardino County voters overwhelmingly approved the extension of the Measure I sales tax, with 80.03% voting to extend the measure through 2040.

SBCTA administers Measure I revenue and is responsible for determining which projects receive Measure I funding, and ensuring that transportation projects are implemented. Measure I funds are allocated based on a strategic plan. Fiscal and institutional issues associated with administering Measure I are different between the San Bernardino Valley, Mountain and Desert areas, the County was divided into five distinct “subareas”.

Source: http://www.gosbcta.com/sbcta/plans-projects/funding-measureI.html

9.4.3.2 COMMUNITY FACILITIES DISTRICTS (CFD)

CFD's may be a possible financial tool to help finance the infrastructure improvements in the MATS area. This potential funding source would require development, and should be investigated. CFD's are often used for greenfield development that is in the hands of only a few owners, with the 2/3-majority vote requirement, a benefit assessment may be a more expedient funding tool than the CFD.

The Mello-Roos Community Facilities Act of 1982 allows any county, city, special district or joint powers authority to establish a Mello-Roos Community Facilities District (CFD). A CFD can be used for the financing of public improvements and services. The CFD requires 2/3-majority vote of residents living within the boundaries of the district. If there are fewer than 12 residents, the vote is conducted of current landowners. Special taxes are charged based on a formula that cannot be directly based on the value of property.

Special taxes are charged annually until initial bonded indebtedness is repaid and, after bonds are paid off, a CFD may continue to charge a fee to maintain improvements and services.

9.4.3.3 Benefit Assessment Districts

Municipalities, counties, and special districts can levy benefit assessments on properties directly benefiting from financed services or improvements, above and beyond citywide general benefits. Benefit assessment districts must be approved by a majority of property owners (weighted by their share of the assessment) and each district includes a benefit formula in which each parcel in the service area is assessed according to the benefit it receives. Parking authorities and parking benefits districts are similarly able to levy assessments to support improvements with similar requirements as those noted above.

9.4.3.4 Business Improvement District (BID)

Supported with a stable income, business improvement districts (BIDs) can better help to focus marketing, branding, programming and public realm maintenance efforts than other organizations that must also focus on fundraising. A BID can be a useful collaborative public and private forum for property owners and the City to work together. In the long term, studies within the MATS area may want to establish individual BIDs to further revitalization efforts in their downtowns and station areas.

A property owner BID is a public/private entity that is directed by businesses and property owners to provide improvements within a specific district. The BID is funded through special assessments paid by property owners within the district, often based on the size of the property and location. The purpose of the BID is to provide special services beyond standard municipal services within their district boundaries. BIDs typically provide services such as maintenance and cleaning for sidewalks, parks and open space as well as private security and can provide improvements such as parking facilities, parks, fountains, benches, trash cans, street lighting and decorations.

APPENDIX A

San Bernardino National Forest Visitors Guide

APPENDIX B

iPeMS Speed Data

APPENDIX C

Mountain Area Transportation Study Model Methodology and Assumptions Memo