December 19, 2022

Roadways

Communities in Motion 2050 (CIM 2050) focuses on four transportation system components—roadways, public transportation, freight, and bicycle/pedestrian (active transportation)—and how they integrate to comprise a complete transportation system.

FUNCTIONAL CLASSIFICATION AND THE COMPLETE NETWORK POLICY

The roadways in Ada and Canyon Counties are classified, designed, and built with intended purposes and objectives defined by who they will serve and how they will support the overall transportation system—an approach called "functional classification."[1] For example, local streets are intended to serve residential areas, not heavy through traffic, while interstate highways are designed for heavy traffic and high speeds. Functional classification is determined based on a range of how a road provides mobility and access (Figure 1).

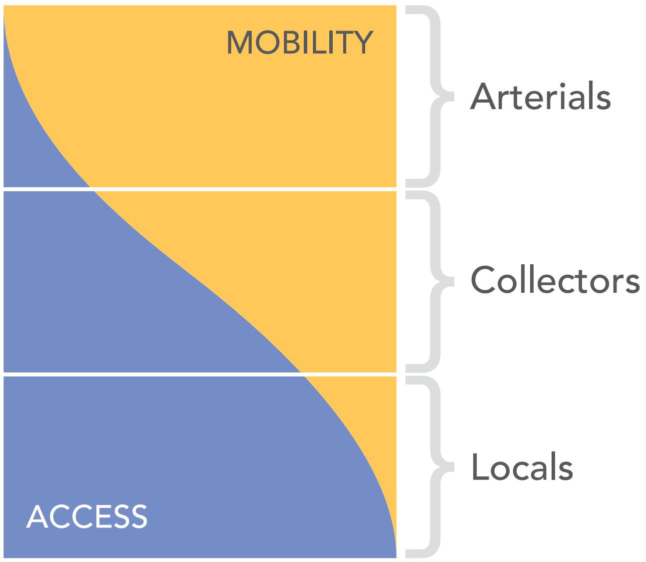

Figure 1. Functional classification is based on a continuum of mobility vs. access.

Mobility is determined by vehicular speed and distance on the roadway without interruptions; its focus is moving travelers from point A to point B in the most efficient way. Arterial roads, highways, and interstates are good examples of roadways with high mobility because they move larger volumes of vehicles, at higher speeds, with fewer access points than other types of roads. Access is determined by the frequency of entry and exit opportunities on a road; local and collector roads typically provide better access because they have more intersections and driveways.

Sixty-six percent of Ada and Canyon Counties' 5,300 centerline roadway miles are local streets (Figure 2). However, over 70% of traffic (in terms of vehicle miles traveled, or "VMT") is on the interstate, state highways, and principal arterials, which account for only 11% of the roadway centerline miles.

Functional classification is a good tool for defining how roadways should serve motor vehicles, but it does not account for other users of the transportation and roadways system. COMPASS' Complete Network Policy[2] is an approach to ensuring that the entire transportation system serves all users (pedestrians, bicyclists, transit users, freight, and motor vehicles). The policy is based on the premise that not all roadways should be intended to be all things to all modes. It defines the expected accommodations, considerations, and safety measures on roadway, pathway, and transit systems to serve each mode with consideration of the surrounding land uses, parallel routes, and potential destinations.

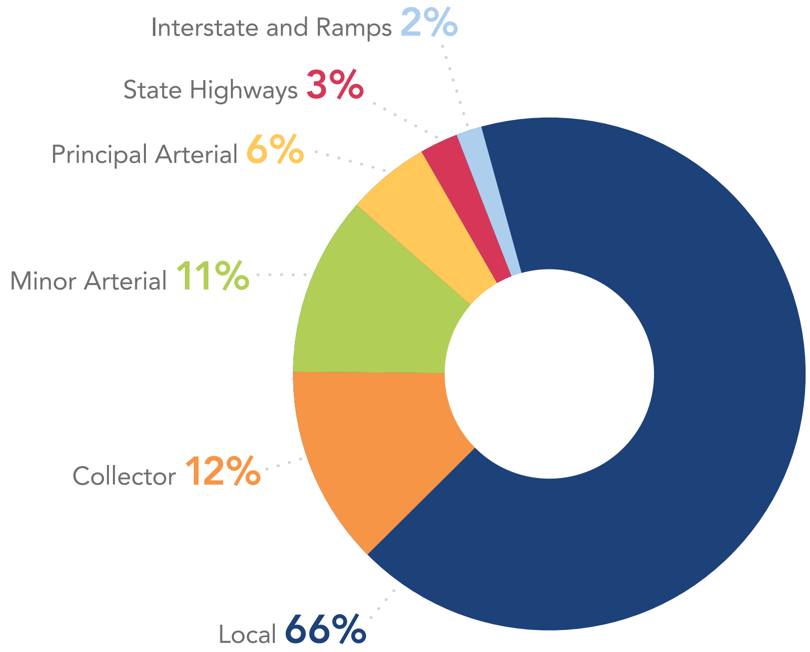

Figure 2. Total centerline miles by classification, Ada and Canyon Counties

ROADWAY USAGE AND THE COVID-19 PANDEMIC

In Ada and Canyon Counties, most traffic is comprised of private vehicles. According to the American Community Survey, over 85% of residents in the area travel to work by auto, and a majority of them (78%) do so by themselves[3] (Table 1).

Table 1. Commute-to-work travel modes, Ada and Canyon Counties

	Ada County		Canyon County	
Drove alone	187,364	78.2%	77,372	78.3%
Carpooled	17,489	7.3%	10,169	10.3%
Public transportation (excluding taxicab)	751	0.3%	197	0.2%
Walked	4,849	2.0%	1,371	1.4%
Other means	6,769	2.8%	2,000	2.0%
Worked at home	22,526	9.4%	7,708	7.8%
Total	239,748	100%	98,817	100%

Source: US Census Bureau, 2015–2020 American Community Survey 5-year estimates

The 2021 roadway system served over 1.8 million passenger vehicle trips on an average weekday and is forecasted to serve almost 3 million per average weekday by 2050. To put this in a different perspective, on the average weekday in 2021, over 150,000 vehicles traveled on Interstate 84 between the Eagle Road interchange and the Flying Wye (Figure 3).

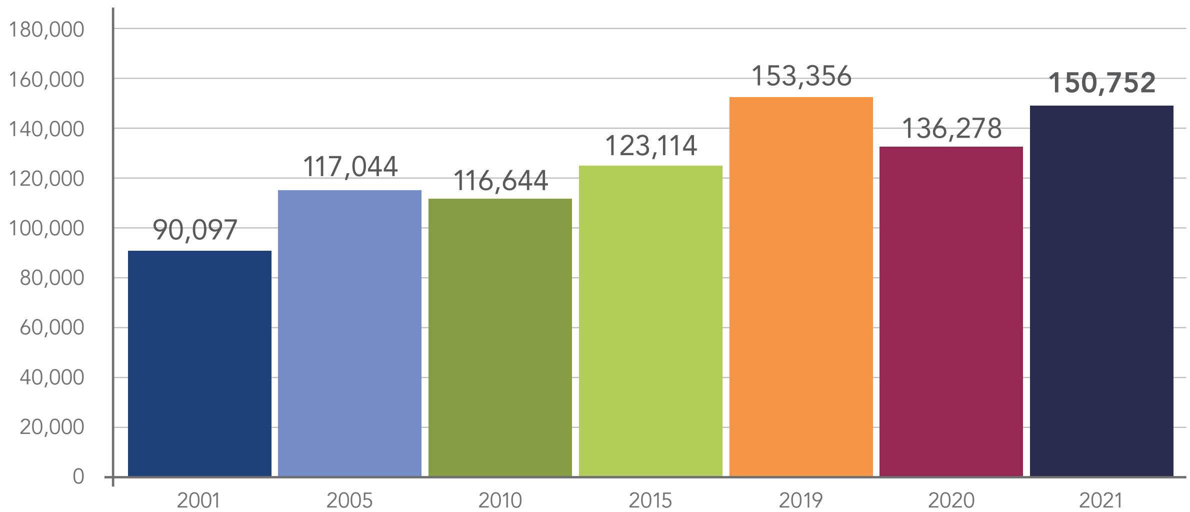

Figure 3. Weekday volumes on I-84 between Eagle Road and the Wye Interchange

In 2020, the COVID-19 pandemic changed how, where, and when people worked, shopped, and socialized. Average weekday traffic volumes across the Treasure Valley dropped significantly during the early months of the pandemic due to work-from-home orders and the shuttering of many dining and retail establishments. The commute to downtown Boise, the largest employment hub in the region, saw the most significant changes in average weekday traffic volumes. State Highway 44/State Street, US Highway 20/26/Chinden Boulevard, and Interstate 84/184 near downtown Boise were the most impacted corridors. At one point, the average weekday volumes on I-184 coming into downtown Boise dropped by nearly 50% (Figure 4). Traffic volumes on I-184 in 2021 trended upward but were still lower than pre-pandemic volumes.

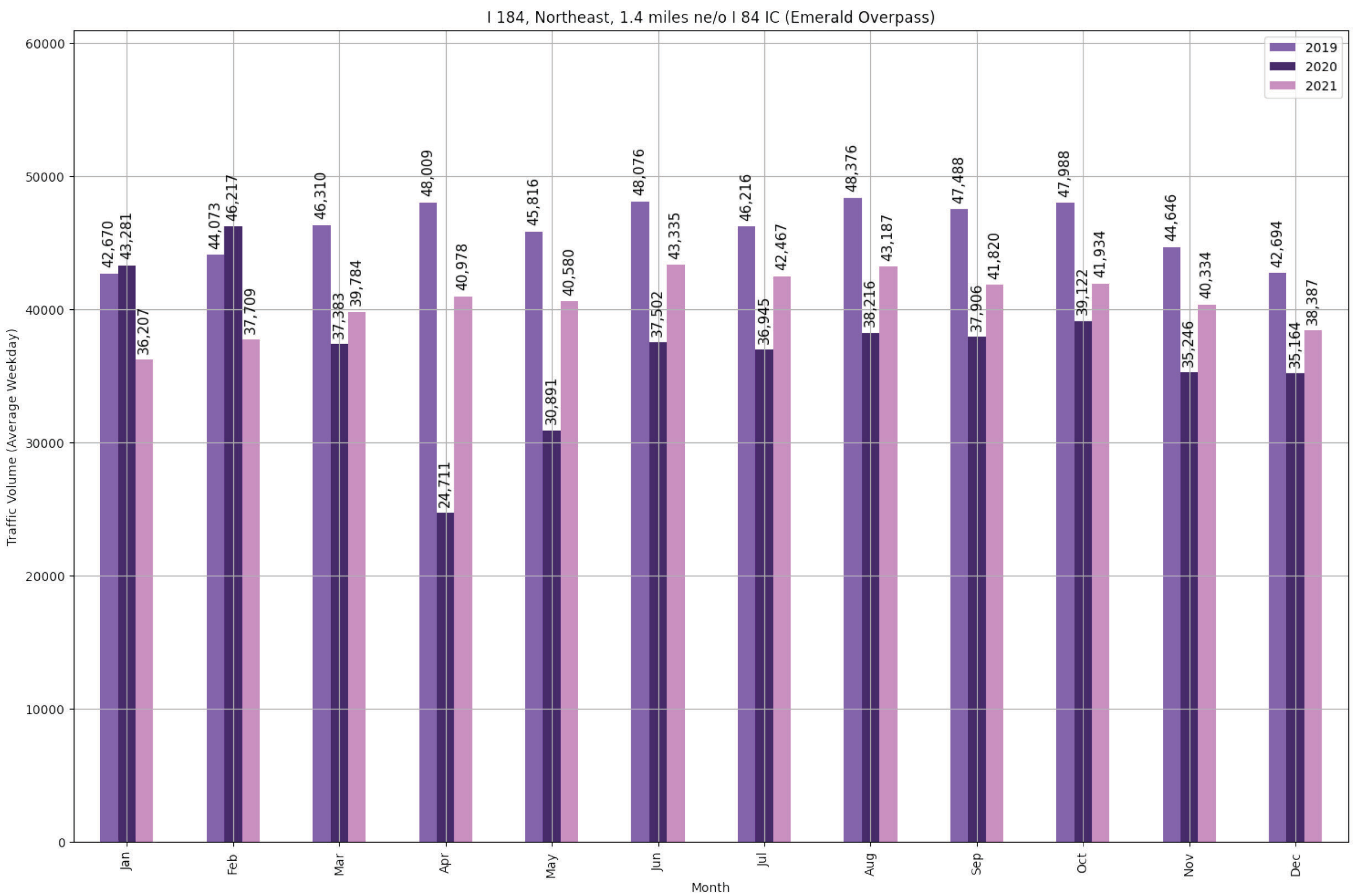

Figure 4: Average weekday traffic Volumes on I-184 northeast of Emerald overpass, 2019-2021

Traffic volumes for state highway and interstate corridors on the western side of the Treasure Valley (State Highway 55/Karcher Road and US Highway 20/26/Chinden Boulevard) experienced the same initial impact as the area near downtown Boise, but quickly returned to or surpassed pre-pandemic levels in early 2021. The average weekday volumes in 2021 on the west end of US Highway 20/26/Chinden Boulevard were 15% higher than 2019 pre-pandemic volumes (Figure 5). This trend is most likely due to the amount of growth in the region.[4]

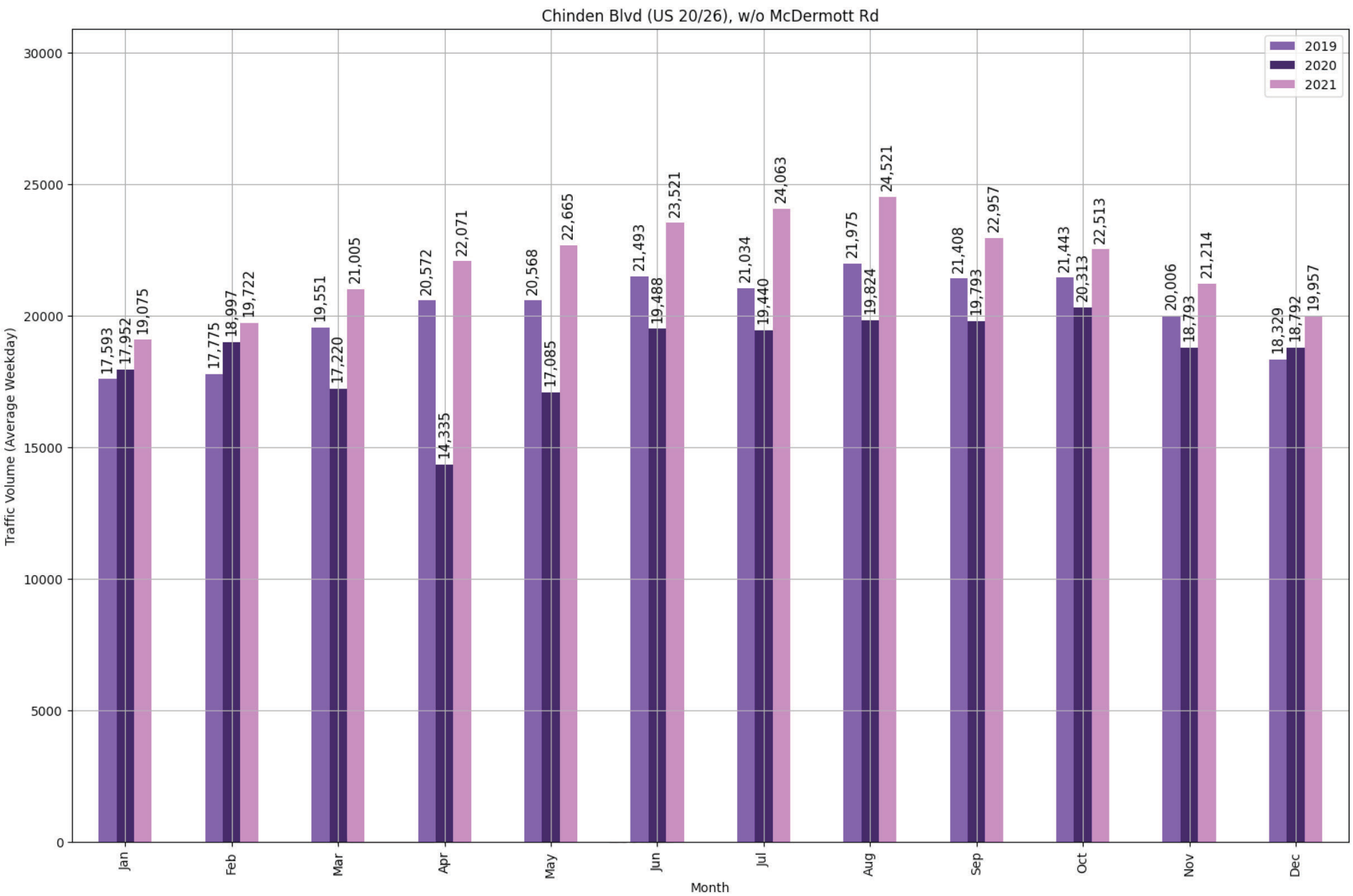

Figure 5: Average weekday traffic volumes on US Highway 20/26/Chinden Boulevard west of McDermott Road, 2019-2021

By 2022, most traffic volumes were returning to or exceeding pre-pandemic levels. Results from the 2021 COMPASS household travel survey showed that only 50% of workers that do not exclusively telework commute to work five days a week. That was down from 63% of workers commuting five days a week pre-COVID. We may see new work commute trends emerge as more people have the option to telework but will most likely continue to see volumes increase across the region as the region's population continues to boom.

ROADWAYS AND CIM 2050 GOALS AND OBJECTIVES

CIM 2050 has four goal areas,[5] each with specific objectives. The following pertain to Treasure Valley roadways:

Goal Area	Roadway-Related Objectives
Safety is a key consideration for providing efficient and reliable roadways for all users.	• Provide a **safe** transportation system for all users. • Support a **resilient** transportation system by anticipating societal, climatic, and other changes; maintaining plans for response and recovery; and adapting to changes as they arise.
Economic Vitality is supported by a reliable and efficient transportation system that provides access to key destinations.	• **Preserve** and maintain existing transportation **infrastructure**. • Provide for a **reliable** transportation system to ensure all users can count on consistent travel times for all modes. • Promote transportation improvements and scenic byways that support the Treasure Valley as a regional hub for **travel and tourism**.
Convenience is important for the traveling public. Land uses that enable roadway connections and appropriate access can help manage congestion.	• Develop a regional transportation system that provides **access and mobility** for all users via safe, efficient, and convenient transportation options. • Develop a transportation system with high **connectivity** that preserves capacity of the regional system and encourages walk and bike trips. • Manage **congestion** with cost-effective solutions to improve **efficiency** of the transportation system.

Goal Area	Roadway-Related Objectives
Quality of Life is served by an efficient and equitable transportation system.	• Develop and implement a regional vision and transportation system that protect and preserve the natural **environment**. • Develop and implement a regional vision and transportation system that enhance **public health**. • Develop and implement a regional vision and transportation system that preserve open space and promote connectivity to **open space** areas, natural resources, and trails. • Promote development patterns and a transportation system that provide for **affordable housing and transportation** options for all residents. • Provide **equitable** access to safe, affordable, and reliable transportation options.

MANAGING CONGESTION

What is Congestion?

Congestion usually relates to an excess of vehicles on a portion of roadway at a particular time, resulting in speeds that are slower—sometimes much slower—than normal or "free flow" speeds.[6] Congestion is characterized as recurring and non-recurring. Recurring congestion is caused by predictable day-to-day traffic patterns and is usually the result of insufficient capacity and high demand on the transportation system. Traffic in Ada and Canyon Counties typically peaks during traditional morning (6:00–9:00 am) and afternoon/evening (3:00–7:00 pm) hours. Some corridors are beginning to experience heavy congestion during the noontime hours in addition to the traditional peak periods due to the nature of the adjacent land uses such as universities, retail/commercial centers, major employment centers, and hospitals. Transportation users generally plan their trips around recurring congestion to account for the expected delays.

Non-recurring congestion is temporary and often unpredictable. Non-recurring congestion is often caused by road construction, traffic crashes, inclement weather, special events, and/or emergencies. This unpredictability is an inconvenience that forces commuters to budget extra time for their commutes.

Congestion is impossible to eliminate, but active management of congestion can help improve reliability, predictability, and dependability, which can allow travelers to more accurately plan the time to reach their destinations.

Although congestion has many negative impacts on fuel consumption, productivity, and the environment, it can also be an indicator of a vibrant economy, as it is a sign that people are commuting to work, shopping, and recreating.

Congestion Management Process

The Congestion Management Process (CMP)—a federal requirement for areas with populations exceeding 200,000—is a systematic, cyclical, and regionally accepted approach for managing congestion. It provides accurate, up-to-date information on transportation system performance, identifies congestion mitigation needs, and offers alternative strategies to mitigate the effects of congestion. The most recent update to the COMPASS CMP[7] was accepted by the COMPASS Board of Directors in April 2022. The updated process includes CIM 2050 goals, objectives, and performance measures, an updated toolbox of congestion management strategies, and new travel time data sets. The CMP outlines how congestion management strategies move toward implementation through projects identified and funded in CIM 2050 and the regional transportation improvement program (TIP).[8]

Congestion Data

In 2016, COMPASS started using the National Performance Management Research Data Set (NPMRDS) and INRIX travel time data to analyze, identify, and report congestion. The NPMRDS covers the National Highway System and is procured by the Federal Highway Administration (FHWA) and made available to state and local governments to assist with performance measure research. The CMP and annual reports refer to this roadway network as Tier 1. COMPASS acquires INRIX travel time data through a partnership with the Idaho Transportation Department (ITD). This dataset covers many of the principal and minor arterials that are not included in the NPMRDS. These additional roadways make up the Tier 2 network in the CMP. Together, these two tiers provide the data that comprise the transportation network analyzed for the CMP (Figure 6).

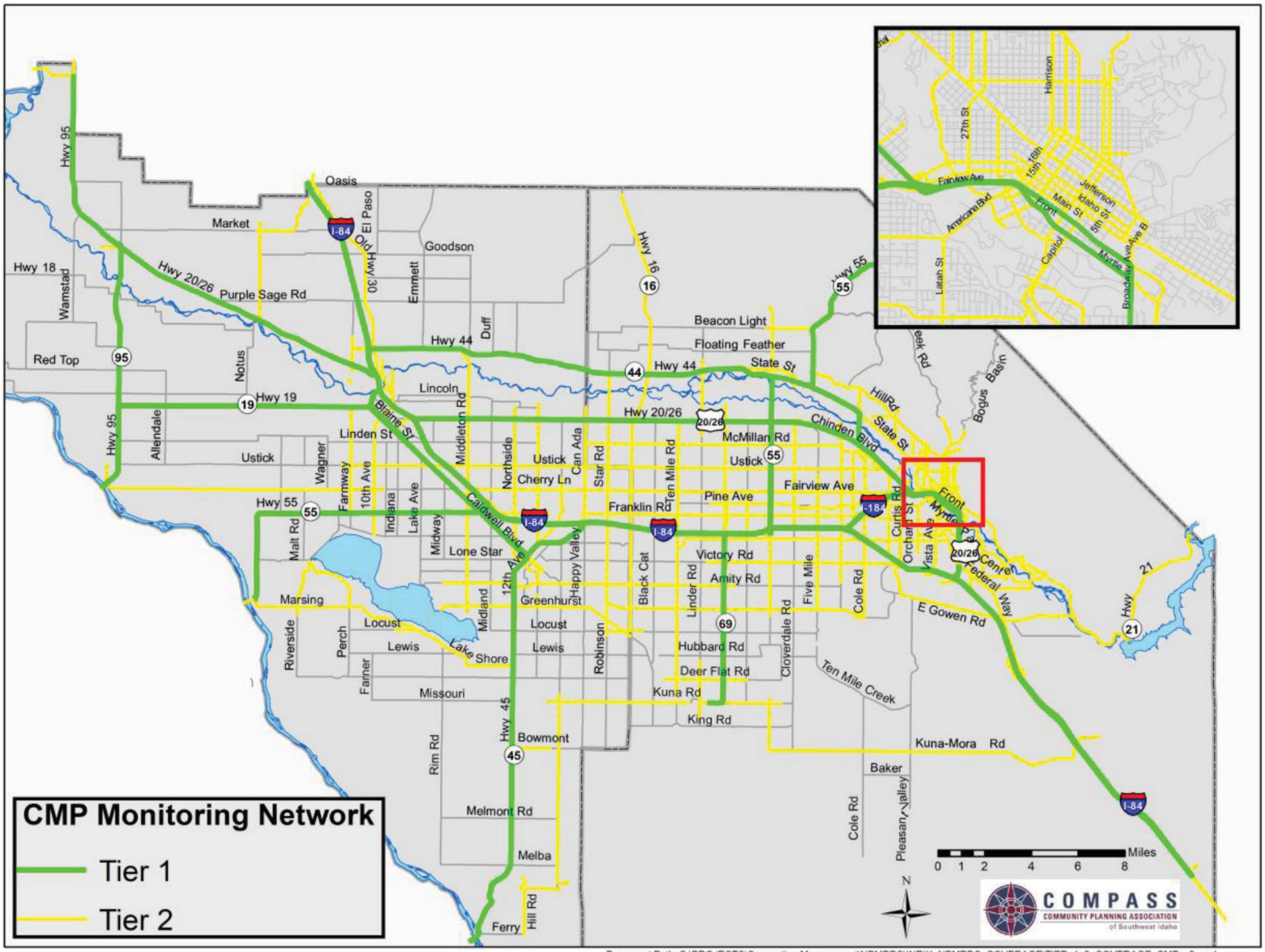

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Figure 6. Tier 1 and Tier 2 data coverage of National Highway System roads

These datasets are comprised of travel time records averaged in five-minute intervals for segments of roads and are collected nationally from millions of cars, trucks, and mobile devices that supply location and movement data. These data are used to identify congestion in the region, monitor progress toward achieving the goals of CIM 2050, and report federal performance measures. A summary of 2017–2021 congestion data can be found in Table 2; archived annual reports[9] are available on the COMPASS website.

Table 2. Miles and percentage of high, medium, and low congestion, Ada and Canyon Counties, on the Tier 1 Congestion Management Network (2017–2021)

Year	High		Medium		Low		Total Miles
	Miles	Percent	Miles	Percent	Miles	Percent	
2021	23.0	5.0%	96.9	21.0%	341.9	74.0%	461.8
2020*	15.1	3.2%	89.8	18.7	374.5	78.1%	479.4
2019	30.6	6.5%	108.5	23.2%	329.5	70.3%	468.6
2018	22.8	6.2%	81.6	22.3%	261.3	71.5%	365.7
2017	23.2	6.3%	108.3	29.6%	234.2	64.1%	365.6

**The percentage of miles of highly congested roadway segments decreased dramatically from 2019 to 2020 due to the COVID-19 pandemic.*

Strategies for Mitigating Congestion

Congestion management is the application of strategies to improve transportation system performance and reliability by reducing the adverse impacts of congestion on the movement of people and goods. Using the travel time data and analyses from the annual CMP report, local transportation agencies can identify areas of high congestion and determine the best strategies to mitigate it. The CMP includes the four categories of congestion management strategies identified in FHWA's *Congestion Management Process: A Guidebook*[10] as well as a fifth strategy to improve the mobility of freight and goods (Table 3). More detail on how these strategies can be implemented is described in Appendix A (CMP Toolkit of Strategies and Tactics) of COMPASS' 2022 CMP.[11]

Table 3. Federal Highway Administration congestion management strategies

Strategy	Description	Examples
Transportation demand management	Providing travelers with more options of how and when they commute in order to reduce the number of trips during congested hours	• Pedestrian/bicycle infrastructure • Ridesharing • Flexible work arrangements • Transit-oriented development
Transportation Systems Management and Operations (TSMO)/Intelligent Transportation Systems (ITS)	Implementing improvements focused on optimizing the current transportation infrastructure	• Optimized signal timing • Intersection improvements • Transit signal priority
Transit operations improvements	Improving transit operations, access, and services to encourage more usage to reduce the number of vehicles on the road	• Bus rapid transit • Expanded frequency/hours of service • Expanded public transportation system
Additional system capacity	Expanding capacity by adding lanes, new roads, or improving intersections	• Add travel lanes • Fill gaps in the street network • Construct overpass/ underpasses
Freight and goods mobility	Strategies specifically aimed toward moving freight and goods more efficiently on the transportation system	• Freight signal priority • Intersection improvements • Designated loading, unloading, and parking zones

Source: Congestion Management Process: A Guidebook

Transportation Systems Management and Operations (TSMO) Plan

As defined by FHWA, TSMO is a set of strategies that focus on operational improvements to maintain, manage, and even restore the performance of the existing transportation system before extra capacity is needed.[12] TSMO strategies are effective and relatively low-cost investments when compared to roadway capacity projects that face larger fiscal, environmental, and right-of-way constraints.

A TSMO plan includes a vision and strategies (projects) for the management and operation of the transportation system. COMPASS' most recent TSMO plan, *Treasure Valley Transportation Systems Management and Operations (TSMO) Strategic Plan 2020-2030 Update*,[13] outlines cost-effective strategies to meet the mobility, safety, environmental, and economic development goals of the region. The timeframe for the plan is 10 years (2020 through 2030), reflecting the near-term focus of operational strategies as well as rapid advancement of transportation technologies.

While some of the strategies in the plan include tangible products such as traffic signals, others focus on behind-the-scenes elements that make the transportation system work, such as technology, communications, and collaboration. TSMO strategies benefitting all modes of transportation are integrated into the planning process to improve efficiency, safety, and reliability.

Intelligent Transportation Systems

Another aspect of management and operations is Intelligent Transportation Systems, or "ITS." The Treasure Valley transportation system is comprised of nearly 1,000 technological devices—individual pieces of the ITS system—that help the transportation system run more efficiently. These devices range from traffic signals, school flashers, cameras, and pedestrian crossing signals to less obvious devices such as roadway weather sensors. These systems are connected through a fiber broadband network and provide transportation operators with real-time conditions, while archived data from these devices help transportation planners analyze historical operational performance. Together, these data help guide impactful decision making for operators and planners alike.

The ITS architecture[14] provides a framework for regional collaboration to guide the planning and deployment of ITS strategies to address transportation challenges. The regional ITS architecture was developed through a cooperative effort by the region's transportation agencies, covering all modes and all roads in the region. It represents how all agencies' systems currently operate and establishes a vision of how these systems will work together in the future to share information and resources to provide a safer, more efficient, and more effective transportation system. A map of the existing ITS inventory is available on the COMPASS website.[15]

I-84 CORRIDOR OPERATIONS PLAN

The I-84 Corridor Operations Plan,[16] a collaborative effort led by COMPASS and ITD, identifies operational challenges and innovative TSMO and ITS solutions to improve safety, maximize reliability/capacity, and improve integrated operations of the interstate corridor in Ada and Canyon Counties. Transportation, law enforcement, emergency response, and land use agencies spanning the corridor collaborated to identify operational challenges, goals, and objectives, and screened and prioritized potential TSMO and ITS strategies for implementation.

The TSMO and ITS strategies in the I-84 Corridor Operations Plan are relatively low-cost options for improving operations and safety on the corridor where additional capacity is not feasible. They can also extend or preserve the benefits of large high-cost capacity projects, such as the widening projects taking place on the corridor between the Cities of Nampa and Caldwell.

The I-84 Corridor Operations Plan outlines the proposed implementation of TSMO/ITS projects that best fit the goals and objectives of the plan, are supported by the project stakeholders, and are technically, fiscally, and politically feasible.

TRANSPORTATION INNOVATION AND TECHNOLOGIES

New technologies and innovations to our roads and vehicles will impact how we live, travel, and build the cities of tomorrow. There isn't always a straight line from idea to implementation; often a labyrinth of economic, political, legal, demographic, and market factors can impede progress. Some of the most promising near-term technologies and innovations are discussed below.

Zero Emission/Electric Vehicles

Electrification of our transportation system is here and gaining momentum each year. Zero emission and electric vehicles (EVs) have several environmental and economic benefits, including reduced emissions, greater efficiency, reduced noise pollution, and lower maintenance costs. The global fleet of passenger EVs and fuel cell vehicles (FCVs) nearly doubled to 12.6 million in the first half of 2021 from 6.9 million in 2019.[17] About 2 million of those vehicles are in use in the US. In 2021, Idaho had approximately 6,000 registered plug-in electric vehicles, including fully electric and hybrid-electric vehicles. That number is expected to grow to nearly 150,000 by 2030[18] to meet a target of 30 million EVs in the US by the year 2030. Automakers have responded to increased demand for EVs by offering new models and shifting their fleets to accommodate more EVs. At the end of 2020, there were 83 different EV/FCV models to choose from in the US; for comparison, in China drivers could select from 355 models.[19] The EV fleet will continue to grow and be a more viable option as technology improves charging times, vehicle ranges, and battery manufacturing.

With the increase in electrification of the vehicle fleet, there will be a need for the infrastructure to support it. In 2022, Idaho had 104 public charging station locations with about 260 charging ports. ITD has identified alternative fuel corridors across the state and is gathering public feedback and other information to determine site placement and types of chargers needed to support these corridors (Figure 7).[20] To support the charging demand of 30 million vehicles in the US by 2030, Idaho will need over 4,000 ports.[21] The 2021 Infrastructure Investment and Jobs Act (IIJA) includes $5 billion to build out a national EV charging network, with $4 million of that dedicated to Idaho.[22] It will take several large investments, such as the one included in the IIJA, as well as smaller investments from state and local jurisdictions, homeowners, and the private sector to meet the EV infrastructure needs.

The services and designs of traditional fueling stations will likely change as the EV fleet continues to grow. Traditional fuel pumps will likely be replaced with chargers, and stations will likely add new and additional services as drivers spend more time recharging their vehicles. EV owners will also have the option to recharge at home rather than going to a fueling station. The need to travel to a fueling station will dwindle as retailers, shopping malls, restaurants, and large employers offer vehicle charging stations in their parking lots.

Several municipalities, states, and countries have adopted policies to phase out the sale of new internal combustion vehicles within the next 10 to 30 years; Washington state has set one of the most aggressive goals in the US with a target to end sales by 2030.[23] We will also likely see a shift in policy regarding taxation of road use. The current taxation model relies on taxes paid at the fuel pump. A shift to a tax based on vehicle miles traveled is one of the most popular of many ideas to make up this shortfall.

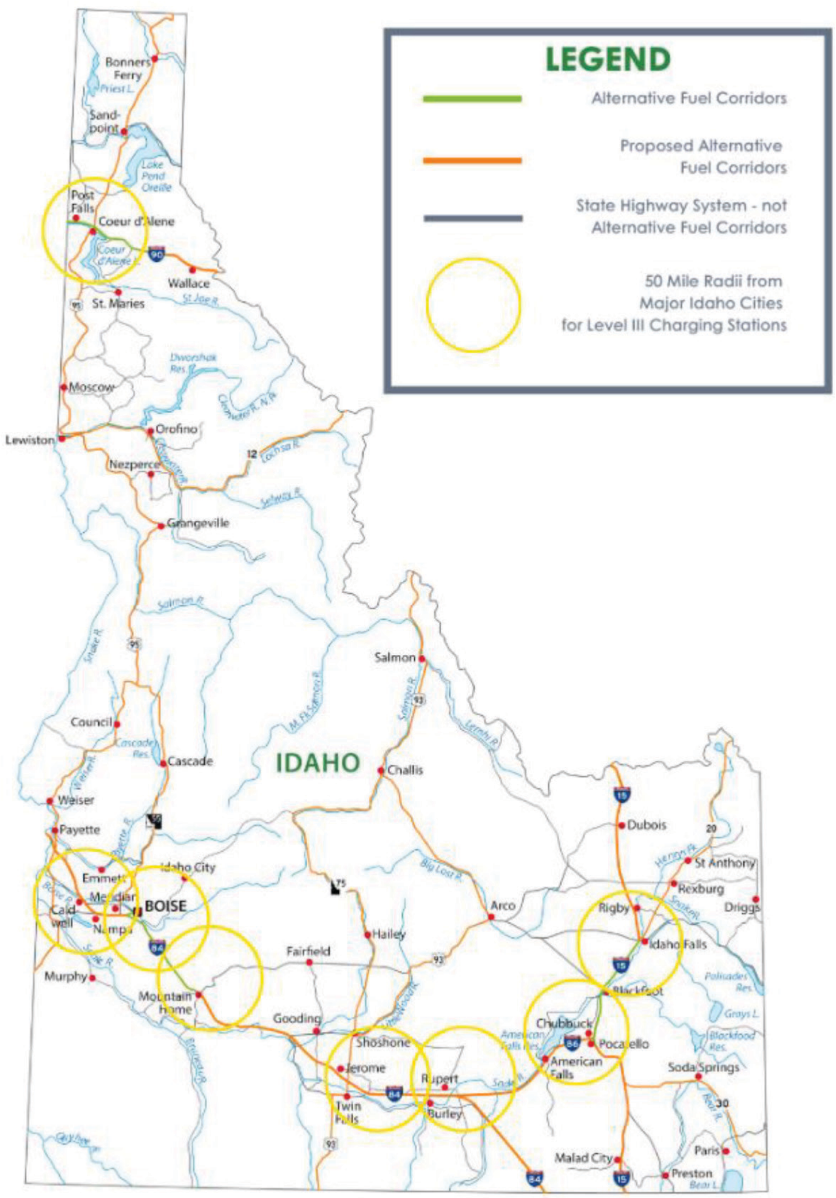

Figure 7. Current and proposed Idaho alternative fuel corridors[24]

Connected and Autonomous Vehicles

Connected and autonomous vehicles are already in use to some extent and evolving quickly. Connected vehicles use communications technologies to receive and send information to a driver, surrounding vehicles, roadside infrastructure, cell phones, and other devices to make traveling safer, more reliable, and more efficient. Several connected vehicle features are offered in vehicles today, including connection to GPS systems to relay directions and traffic conditions, connection to cell phones for hands-free use and infotainment, remote vehicle diagnostics, and remote vehicle start and entry.

The vision for connected vehicle technologies is to transform surface transportation systems to create a future where

- highway crashes and their tragic consequences are significantly reduced;
- traffic managers have data to accurately assess transportation system performance and actively manage the system in real time;
- travelers have continual access to accurate travel time information about mode choice and route options, and the potential environmental impacts of their choices; and
- vehicles can talk to traffic signals to eliminate unnecessary stops and help drivers operate vehicles for optimal fuel efficiency.[25]

Connected vehicle technologies rely on a network-based architecture that needs to be reliable and fast. Advances in cellular communications technologies such as the 5G network could be used to support connected vehicles in the near future.

Autonomous vehicles can drive themselves or take on certain aspects of driving in "autopilot" mode using various in-vehicle technologies and sensors. There are currently no fully autonomous vehicles available to consumers, but several models offered today include automated features such as automatic emergency braking, parking and lane assist, adaptive cruise control, and lane departure and blind spot warnings. Autonomous vehicles have the potential to increase safety, mobility, and efficiency of travel for all modes by reducing crashes caused by human error. However, several infrastructure, legal, and regulatory barriers must be overcome before implementing fully autonomous vehicles.

Future Roadway Features and Composition

As vehicles become more connected, electrified, and autonomous, the design and composition of roads will likely shift to accommodate these technologies. Sensors embedded in or along the roadway can provide connected vehicles with instructions and information, potentially replacing or supplementing traditional visual cues such as signage or signals. Lane sizes may shrink and the need for less right-of-way is a real possibility as vehicle automation evolves.[26] Concepts of an electric priority lane that could enable EVs to charge wirelessly while traveling are currently being tested by researchers around the world.[27]

As more extreme weather patterns impact infrastructure, the need to develop more resilient roads is critical to avoiding severe economic costs. There are several innovations and efforts underway that include improved drainage on roadways, using recycled materials as asphalt alternatives, and even research to develop "self-healing" roads.[28] The Minnesota Department of Transportation has implemented a de-icing technology that consists of an overlay that acts like a sponge, storing de-icing chemicals and automatically releasing them as snow and ice develop to help mitigate weather-related crashes.[29] Luminescent striping and marking of roadways can improve safety and awareness and is currently being implemented on roadways across the world.[30]

VISITORS TO THE VALLEY

The Treasure Valley attracts visitors from around the globe for business and pleasure alike. In addition, the region is the "jumping off point" for accessing many of Idaho's outdoor recreational areas and activities. These visitors provide a boon to the region's economy; however, they also bring additional transportation needs.

To help inform *Communities in Motion 2050* and ensure that COMPASS is considering the transportation needs of the travel and tourism industry, COMPASS convened a discussion group of regional tourism leaders in February 2020.

The group identified and ranked transportation challenges faced by their industry, as well as solutions to those challenges. The top challenge identified by the group was the bottlenecks that occur at events and tourist destinations, hindering access and egress. To exacerbate this issue, many of these locations are at or near locations with recurring traffic congestion.

Many of the projects funded through this plan, or identified as high-priority needs, will help alleviate this congestion. In addition, the Congestion Management Process provides a toolkit of strategies, many of which are relatively easy and inexpensive to implement, that can alleviate event-related congestion to support the travel and tourism industry.

Additional top challenges identified included lack of air service to the East Coast and insufficient public transportation. While air service is beyond the scope of CIM 2050, plans are in place to bolster public transportation. These are addressed in *Public Transportation*[31]; however, a lack of dedicated funding to support those improvements remains a barrier.

Learn more about the discussion group, including the full list of the group's identified challenges and solutions, in *Public Participation*.[32]

SUMMARY

Roadways are the backbone of the transportation system in Ada and Canyon Counties. Buses, commuter vans, and freight vehicles run on them, while bike lanes and sidewalks along roadways provide a significant portion of the local bicycle and pedestrian network. CIM 2050 focuses on integrating all transportation system components to better plan for a future transportation system that can meet demands of growth and changing travel patterns. We are using more and better tools to evaluate and manage congestion, make investments in smart technology, and provide safe and complete roads and streets for all users.

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