Transportation Safety and Security

In 2020 in the State of Idaho, someone—a driver, passenger, pedestrian, or cyclist—was injured in a traffic crash every 46 minutes.[1] In Ada and Canyon Counties alone, 50,436 traffic crashes (including crashes involving bicyclists and pedestrians) occurred from 2016 to 2020. As a result of those crashes, 2,478 people were seriously injured and 258 were killed.[2]

Crashes not only have societal impacts, but they also place a large financial burden on drivers and the public through increased insurance premiums, taxes, and healthcare costs.[3] The cost of the 50,000-plus crashes involving over 130,000 people in Ada and Canyon Counties during 2016–2020 totaled $6.6 billion.[4] Serious and fatal crashes made up more than three-fifths of those economic impacts (Table 1). COMPASS and its member agencies work to reduce the number and impacts of crashes through driver education, roadway/infrastructure design, and enforcement of traffic laws.

Table 1. Economic Impacts to Persons Involved in Crashes in Ada and Canyon Counties (2016-2020)[5]

	2016	2017	2018	2019	2020	Total
Estimated economic impact of fatal injuries	$536.8 million	$536.8 million	$609.0 million	$516.1 million	$464.5 million	$2.7 billion
Estimated economic impact of serious injuries	$280.9 million	$275.5 million	$271.0 million	$219.2 million	$176.7 million	$1.2 billion
Estimated economic impact of other outcomes	$574.5 million	$546.7 million	$569.6 million	$586.2 million	$466.1 million	$2.7 billion
TOTAL	$1.4 billion	$1.4 billion	$1.4 billion	$1.3 billion	$1.1 billion	$6.6 billion

Note: Financial impacts are calculated for each occupant involved in a crash.

Transportation security is closely related to transportation safety as both aim to protect the welfare of system users, but there is some distinction between the two:[6]

- Safety is the protection of persons or property from unintentional damage or destruction caused by accidental or natural events.
- Security is the protection of persons or property from intentional damage or destruction caused by vandalism, criminal activity, or terrorist events.

Federal, state, county, and local law enforcement and emergency response agencies coordinate and plan for significant public safety and security risks. COMPASS addresses safety and security through roles of planner, facilitator, expert, and implementer (Table 2).

Table 2. COMPASS' Roles in Transportation Safety and Security

Role	Responsibilities
Planner	• Research and identify transportation safety and security strategies and countermeasures • Support the development of regional transportation safety and security policies
Facilitator	• Identify regional transportation safety and security needs by working with COMPASS stakeholders and workgroups • Promote transportation safety and security strategies through public outreach and communication campaigns • Provide opportunities for peer exchange and education regarding transportation safety and security
Expert	• Perform safety data analyses • Develop new and additional tools to analyze safety data • Disseminate safety data to member agencies • Develop transportation safety and security measures and targets
Implementor	• Prioritize safety and security projects in CIM 2050 and the transportation improvement program (TIP)[7] • Identify funding sources for safety and security projects

Federal regulations state that regional transportation plans such as *Communities in Motion 2050* (CIM 2050) shall "increase the safety of the transportation system for motorized and non-motorized users" and "should be consistent with other safety and security planning and review processes, plans, and programs, as appropriate".[8] Similarly, the metropolitan planning process must provide for consideration and implementation of projects, strategies, and services that will increase the security of the transportation system for all modes and users.[9]

COMPASS works closely with its member agencies through workgroups and committees to ensure consistency among safety goals, objectives, and planning efforts in the region. COMPASS is also frequently consulted by other transportation agencies during their safety planning efforts to strengthen this consistency.

STRATEGIC HIGHWAY SAFETY PLAN

A Strategic Highway Safety Plan (SHSP) is a federally mandated safety plan that coordinates goals and highway safety programs across the state to reduce fatalities and serious injuries on roadways.

Idaho's SHSP[10] is developed and maintained by the Idaho Office of Highway Safety of the Idaho Transportation Department (ITD); COMPASS and federal, state, local, and private stakeholders provide input during the planning process. The SHSP integrates the "4 Es" of safety: engineering, education, enforcement,

and emergency medical services. It also establishes goals, emphasis areas, performance measures, and strategies to reduce or eliminate fatalities and serious injuries. Idaho's 2021–2025 SHSP vision statement is to "continue to move toward zero deaths on all roadways in Idaho." Table 3 outlines the 2021–2025 SHSP's vision, mission, and goals.

Table 3. Vision, Mission, and Goals of Idaho's 2021–2025 SHSP[11]

Vision	Continue to move Toward Zero Deaths on all roadways in Idaho.
Mission	Provide the safest transportation system possible.
Goals	Primary • Reduce number of traffic deaths to 230 or fewer Secondary • Reduce the fatality rate to 1.26 per 100 million annual VMT • Reduce the number of serious injuries to 1,219 or fewer • Reduce the serious injury rate to 6.60 by 100 million VMT

Data analysis, guidance from the National Highway Traffic Safety Administration (NHTSA), and input from stakeholders all help identify the most critical traffic safety problems in the state. ITD examines the severity and economic impacts of these issues, resulting in the selection of several safety focus areas for the SHSP; COMPASS then analyzes crash data related to these focus areas in Ada and Canyon Counties to better understand regional safety trends (Table 4). ITD's strategies to meet statewide goals are outlined in the SHSP; COMPASS' actions to help achieve a safer transportation system can be found in "Advancing Transportation Safety" below.

Table 4. SHSP Focus Areas[12] and Regional Safety Trends

Focus Area	Definition	Regional Trends in Ada and Canyon Counties (2016-2020)[13]
Aggressive driving	Aggressive driving is when an individual commits a combination of moving traffic offenses so as to endanger other persons or property.	40% of fatal accidents were aggressive driver related. Failure to yield, an aggressive driving behavior, was a contributing factor in over 20% of fatal and serious injury crashes.
Distracted driving	Inattention that occurs when drivers divert their attention away from the driving task to focus on another activity instead. The distracting tasks can affect drivers in different ways and can be categorized into the following types: visual distraction, manual distraction, cognitive distraction.	17% of fatal crashes were distracted driving related. Electronic communication devices were the most common type of distraction documented in fatal and serious injury crashes.
Impaired driving	Driving while impaired can refer to operating a motor vehicle while under the influence of alcohol, drugs, or both.	39% of all fatal crashes were impaired driving related. Overturn and pedestrian-related events were the most harmful events in impaired driving crashes.
Occupant protection	Idaho's seat belt use law requires seat belt use for all seating positions and has enhanced penalties for drivers younger than 18 years of age. Drivers and occupants, 18 years of age and older, receive separate tickets.	31% of all fatalities were persons who were unbelted. Over 20% of unbelted fatalities were people under the age of 20.
Vulnerable roadway users: bicycles and pedestrians	Bicyclists and other cyclists include riders of two-wheel non-motorized vehicles, tricycles, and unicycles powered solely by pedals, also known as pedalcyclists. A pedestrian is a person on foot, walking, running, jogging, hiking, sitting or lying down who is involved in a motor vehicle traffic crash where at least one vehicle was in transport and the crash originated on a public traffic way.	14% of all fatal crashes were pedestrian related. Alcohol was involved in over 25% of fatal and serious injury pedestrian-related crashes. 34% of percent of fatal and serious injury crashes involving a pedestrian involved a driver under the age of 20. 16% of bicycle-related crashes resulted in a fatality or serious injury.

Focus Area	Definition	Regional Trends in Ada and Canyon Counties (2016-2020)[13]
Vulnerable roadway users: mature drivers	Mature drivers are age 65 or older and make up 16% of all licensed drivers.	26% of fatal crashes were mature driver related.
Vulnerable roadway users: motorcycles	A motorcycle is a motor vehicle having a seat or saddle for the use of the rider designed to travel on not more than three wheels in contact with the ground, but excluding a tractor and moped. Idaho law requires all motorcycle operators and passengers under the age of 18 to wear a helmet.	14% of fatal and serious injury crashes were motorcycle related.
Vulnerable roadway users: youthful drivers	Youthful driver crashes are those where the driver is 15 through 20 years old.	16% of fatal crashes were youthful driver related.
Vulnerable roadway users: commercial motor vehicles	For the purpose of crash reporting, commercial motor vehicles are buses, truck tractors, tractor-trailer combinations, trucks with more than two axles, trucks with more than two tires per axle, or trucks exceeding 10,000 pounds gross vehicle weight. This also includes pickups with dual rear wheels and smaller vehicles that are carrying hazardous materials.	8% of fatal and serious injury crashes involved a commercial motor vehicle.
Infrastructure: intersections	A crash involving roadway users at or related to a public road intersection.	Over 50% of fatal and serious injury crashes were intersection related.
Infrastructure: lane departures	A lane departure crash is defined as a non-intersection-related crash which occurs after a vehicle crosses an edge line, a center line, or otherwise leaves the anticipated travel lane. Lane departure crash incidents primarily include single-vehicle run-off-road, head-on, and side-swipe crashes.	14% of fatal and serious injury crashes were lane departure crashes.

CIM 2050 SAFETY GOAL AND OBJECTIVES

Reducing the number and rate of fatal and serious injuries for all modes of transportation (auto, bicycle, freight, pedestrian, transit) is a primary consideration throughout the transportation planning process.

To that end, safety, which includes transportation security and resiliency, is one of CIM 2050's four primary goal areas.[14] Three objectives further define this goal:

- Provide a safe transportation system for all users.
- Proactively assess risks and safeguard the security of all transportation users and infrastructure.
- 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.

Both safety and security are discussed in more detail below, while additional information on resilience can be found in *Environmental Issues*.[15]

REGIONAL PERFORMANCE MEASURES AND TRENDS

The Fixing America's Surface Transportation Act (FAST Act)[16] of 2015 and the Infrastructure Investment and Jobs Act[17] of 2021 emphasize performance management as a key facet in transportation planning. Metropolitan planning organizations are required to report five-year safety performance measures for all public roads and adopt either their own safety targets or support targets established by the state across five categories:

- Number of serious injuries
- Rate of serious injuries (per 100 million vehicles miles of travel [VMT])
- Number of fatalities
- Rate of fatalities (per 100 million VMT)
- Number of non-motorized serious injuries and non-motorized fatalities

ITD and COMPASS are responsible for setting the targets and reporting these safety performance measures to the Federal Highway Administration. In 2021, the COMPASS Board of Directors agreed to support ITD's statewide safety targets as well as set regional aspirational targets for CIM 2050 safety performance measures.[18] These targets are used to measure progress toward achieving the safety goal of CIM 2050 as well as the statewide safety goals established in accordance with the FAST Act (Table 5).

Table 5. Compass Regional and ITD Statewide Safety Performance Measures and Targets 2016-2020 (5-year rolling averages)

Performance Measure		2013-2017	2014-2018	2015-2019	2016-2020	State and Regional Safety Targets
Number of auto fatalities	ITD	222.80	226.80	234.40	234.00	<247.00 (FY2021)
	COMPASS	45.0	49.0	52.2	51.6	<13.1 (2030)
Number of auto serious injuries	ITD	1,303.00	1,297.40	1,269.40	1,217.00	<1,285.00 (FY2021)
	COMPASS	542.0	553.2	542.6	495.6	<123.9 (2030)
Ratio of auto fatalities per 100 million VMT*	ITD	1.34	1.33	1.35	1.34	<1.38 (FY2021)
	COMPASS	1.03	1.10	1.16	1.11	TBD
Ratio of auto serious injuiries per 100 million VMT	ITD	7.76	7.59	7.29	6.94	<7.21 (FY2021)
	COMPASS	12.47	12.51	12.09	10.73	TBD
Non-motorized fatalities and serious injuries	ITD	118.40	121.80	121.20	120.60	<120.00 (FY2021)
	COMPASS	64.80	66.80	67.00	63.00	<21.90 (2030)

**Vehicle miles traveled*

As assessing transportation security is more qualitative in nature, no specific performance measures or targets have been established to address security. Instead, COMPASS will prepare periodic fact sheets to highlight regional security issues, trends, challenges, and solutions to ensure security is consistently considered in the planning process.

SAFETY IN CIM 2050 PROJECT PRIORITIZATION

Safety was one of several criteria used to prioritize roadway projects[19] for CIM 2050. Identified projects were analyzed and scored using the most recent five years of crash data to determine the number of auto and non-motorized fatalities and serious injuries recorded in the project area. That information was averaged with scores from the other goal areas (economic vitality, quality of life, and convenience) to develop a project score reflecting all four CIM 2050 goal areas. These scores, along with additional qualitative and quantitative information, were used by the Regional Transportation Advisory Committee to prioritize projects for funding.

ADVANCING TRANSPORTATION SAFETY

A critical component of regional transportation planning is reviewing data and monitoring the performance of implemented policies, such as the Complete Network Policy,[20] and projects from Communities in Motion and the transportation improvement program (TIP),[21] a budget of federally funded and regionally significant transportation projects. The COMPASS Change in Motion Scorecard[22] is a reporting tool that highlights progress made toward meeting the goals and objectives of CIM.

In spring 2021, a subcommittee of the Regional Transportation Advisory Committee reviewed the results of the 2020 Change in Motion Scorecard[23] to prioritize a subset of underperforming measures for deeper analysis. Safety measures, especially those related to the number and rate of serious and fatal injuries, were identified as top priorities. The subcommittee discussed current projects, policies, plans, and actions targeted at decreasing the number and rate of serious and fatal injuries in the region and regional trends that may potentially be contributing to more serious injuries and fatalities. It also identified potential actions that COMPASS could take to further improve the safety measures for CIM 2050.

The subcommittee organized the recommended actions to align with COMPASS' four roles: planner, facilitator, expert, and implementer. Table 6 lists the recommended actions that COMPASS will further review for near-term implementation.

Table 6. Recommended actions to improve regional transportation safety

Plan	• Develop a Regional Safety Action Plan • Discuss the potential of adopting a Vision Zero goal/policy and adopting the Federal Highway Administration's safe systems approach to transportation safety • Focus on regional crash and safety trends to support long-range planning
Implement	• Prioritize safety projects in COMPASS' Project Development Program and *Communities in Motion* Implementation Grant program • Fund safe routes to school with off-the-top federal funding
Provide technical expertise	• Make crash data, statistics, and analyses more easily accessible to member agencies to use in their planning and decision making • Work with member agencies and safety experts to further analyze safety data to identify regional trends and solutions • Acquire useful data and analyses to support member agencies and COMPASS planning efforts
Facilitate	• Conduct public outreach, such as hosting transportation safety-related speakers and training, sponsoring bicycle safety public service announcements, and raising awareness of safety issues through social media

COMPASS continues to work toward creating a safe transportation system for all users by supporting safety planning efforts, developing safety policies, providing technical expertise to identify safety issues/trends, educating the public about safety laws and best practices, and prioritizing projects in the TIP and CIM 2050 that improve safety for all users.

TECHNOLOGICAL ADVANCES SUPPORTING TRANSPORTATION SAFETY

New and emerging transportation technologies can improve the safety of the transportation system for all modes. The ever-growing network of connected infrastructure, assets, and vehicles on our system provides more information than ever before—on roadways and in our vehicles—about real-time conditions. The information generated through this connectedness, or "internet of things," enables faster or automated responses to hazardous roadway conditions.

Intelligent Transportation Systems

The *Treasure Valley Transportation Systems Management and Operations (TSMO) Strategic Plan*[24] presents a cooperative approach to managing and operating the region's multimodal transportation system to maximize the safety, efficiency, and reliability of existing transportation facilities and infrastructure. TSMO encompasses a very broad set of active and passive strategies that rely on advanced transportation technologies, personnel, coordinated plans, supportive policies, and collaboration among agencies to proactively operate the transportation system. The *Treasure Valley TSMO Strategic Plan* identifies several different TSMO strategies, including intelligent transportation systems (ITS) that are currently implemented, planned, or desired in the region.

Several of the TSMO and ITS strategies identified in the plan focus on informing travelers ahead of time of hazardous road conditions, roadway construction, or traffic incidents. Broadcasting warnings of crashes, roadway debris, severe weather, and the like through digital message signs, mobile alerts, and traveler information applications can help travelers make safer decisions both during and before their trips. Other TSMO strategies rely more heavily on physical assets and technologies to alert travelers of mode conflicts, intersections, road features, and potential hazards using devices such as rectangular rapid flashing beacons, high-intensity activated crosswalk beacons, traffic signals, and digital messaging signs.

TSMO strategies can also help support emergency services in their response to crashes. Closed-circuit television cameras can enhance both crash detection and response by providing responders with critical information ahead of a response, and traffic signal preemption can help response vehicles reach the crash scene more quickly. TSMO also includes developing plans and training for quick, safe, coordinated responses to support first-responder safety and prevent secondary crashes.

TSMO and ITS will likely play a larger role in transportation safety in the mid- to long-term future. Emerging technologies suggest that widespread capabilities to connect transportation infrastructure to vehicles, vehicles to surrounding vehicles, and even vehicles/infrastructure to mobile or wearable devices aren't far off. These capabilities will likely lead to innovative and effective safety solutions for all modes of travel.

Connected and Autonomous Vehicles

Connected vehicles have the capability to send and receive information from surrounding vehicles, infrastructure, and devices via a wireless network (Figure 1). This communication enables quicker detection of traffic conditions and safety hazards, allowing more time for an automated or driver-induced response. These systems operate in the background and notify the driver only when a safety hazard is detected.

Figure 1. Connected vehicles concept from the Treasure Valley TSMO plan

The US Department of Transportation has outlined several safety features that could be leveraged by connected vehicles (Figure 2):[25]

- Do not pass warning
- Emergency electric brake light warning
- Intersection movement assist
- Lane change warning/blind spot warning
- Forward collision warning
- Truck forward collision warning
- Left turn across path
- Vehicle turning right in front of bus
- Red light violation warning
- Stop sign gap assistance
- Work zone warning
- Curve speed warning
- Pedestrian in signalized crosswalk
- Connected vehicle safety for safety railway
- Transit bus stop pedestrian warning

Figure 2. Connected-vehicle technologies can improve transportation safety for drivers and pedestrians. Image: US Department of Transportation

Another safety benefit of connected vehicles is the ability to capture and archive events—such as harsh braking maneuvers, excess speeding, or near misses—that often go unreported because they did not result in a reportable incident such as a crash. These data could help inform planners and engineers of safety issues before a fatal or serious injury occurs.

According to NHTSA, 94% of serious crashes are due to dangerous choices or errors people make behind the wheel.[26] Most newer vehicles on the road today incorporate varying degrees of automation that help remove human error when reacting to hazardous events or conditions. These systems include lane keeping assist, adaptive cruise control, rear cross traffic alert, automatic emergency braking, blind spot detection, and lane departure warning.

Fully autonomous, or self-driving, cars are currently not available on the market, but several automotive manufacturers and technology companies are pursuing research and development to make them a reality. This evolution of vehicle automation promises to deliver even more safety benefits for all road users.[27]

To accommodate these emerging technologies, transportation agencies should continue to

- perform regular roadway maintenance activities—such as high-visibility signage and striping—that benefit all users, including autonomous vehicles; and
- expand the regional communications backbone that enables connected vehicle safety applications.

It's also important for regional stakeholders to continue to stay abreast of technology advances and related federal, state, and local regulatory activities.

ADVANCING TRANSPORTATION SECURITY

As noted above, the metropolitan planning process must consider and implement projects, strategies, and services that increase the security of the transportation system. Ada and Canyon Counties have developed all-hazard mitigation plans[28] to identify risks and mitigation strategies for a range of threats, from natural disasters to human-caused hazards. COMPASS supports these planning efforts by participating as a transportation stakeholder and by providing data to identify and analyze risks on the transportation system. Security hazards in these plans include terrorism, cyberterrorism, and civil unrest. Planning efforts around natural disasters are described in *Transportation Resilience*.[29]

Transit providers in the region, including Valley Regional Transit (VRT), Boise State University, Ada County Highway District Commuteride, and Treasure Valley Transit, include passenger and operator security measures in their planning and operating procedures. Security measures in these processes include selecting and designing safe transit stop locations, providing lighting at transit stops, requiring badge access for employee-only areas, placing cameras on buses and at facilities (including some park and ride lots), providing security staff at transit stations, and implementing processes to report and assess safety and security concerns or incidents.

VRT has a close working relationship with the City of Boise Police Department. Its Main Street Station transit hub in downtown Boise has a designated police substation, and VRT staff work with the Boise Police Department's Gang Unit when facilities have been vandalized by gang-related activities.

Several physical security countermeasures can and should be incorporated into transportation infrastructure projects to protect people from physical harm from malicious actors as well as protect transportation facilities and infrastructure from vandalism, destruction, or damage (Figure 3). Depending on the types of risks associated with the infrastructure, these measures could include but are not limited to:[30]

- Signage
- Fencing
- Barriers, including fencing, bollards, cables, and landscaping
- Emergency phones, duress alarms, assistance stations
- Key control and locks, including electronic control systems
- Lighting
- Alarm systems
- Surveillance systems

Figure 3. Physical security measures can deter vandalism and other damage to facilities and infrastructure

Cybersecurity

A good working definition of cybersecurity for transportation is "electronic security"; its compromise could result in any or all the following situations:[31]

- Endangerment of public or employee safety
- Loss of public confidence
- Violation of regulatory requirements
- Loss of proprietary or confidential information
- Economic loss
- Impact on national security

Today's roadways and vehicles are more integrated and connected than ever and offer a range of advanced technologies that improve safety, increase efficiency, and reduce environmental impacts. However, these advances also create new cybersecurity vulnerabilities, as hackers have more opportunities to breach these transportation systems. In the Treasure Valley, ITS investments on roadways include over 545 miles of fiber, advanced traffic management system software, a traffic management center, emergency vehicle and transit preemption software, closed-circuit television cameras, dynamic and variable message signs, 16 road/weather information stations, and a range of traffic monitoring sensors.[32] COMPASS and its member agencies also manage troves of transportation data. If compromised by a cyber-attack, some of these systems and data have the potential to endanger public safety, cause economic loss, or impact national security.

There are several resources, practices, and technologies available for mitigating the risks of cyber-attacks. The National Institute of Standards and Technology has developed a framework that provides a common organizing structure for multiple approaches to cybersecurity by assembling standards, guidelines, and practices that are working effectively today.[33] The US Department of Transportation Intelligent Transportation Systems Joint Program Office continues to develop and maintain references and guides on implementation and research of cybersecurity as it pertains to ITS.[34] COMPASS will continue to work with its member agencies to ensure cybersecurity best practices are considered and incorporated in the planning and development of ITS projects.

CONCLUSION

Safety and security incidents on our transportation system have significant impacts on Treasure Valley residents. Planners, engineers, emergency responders, and law enforcement work together to proactively identify risks to public safety and security. COMPASS will continue to work toward meeting the safety targets identified in CIM 2050 by identifying safety/security risks and implementing proven countermeasures categorized in the "4 Es" of the Idaho SHSP (engineering, education, enforcement, emergency response).

Moreover, COMPASS will continue to look for opportunities to take advantage of new and emerging technologies that can be used to improve safety and security. Transportation projects that exemplify established safety and security countermeasures and promote innovative technologies will be prioritized in CIM 2050 to help ensure a safer tomorrow.

ENDNOTES

1 Idaho Traffic Crashes 2020, Idaho Transportation Department, Office of Highway Safety, https://apps.itd.idaho.gov/Apps/OHS/Crash/20/Analysis.pdf

2 ITD Numetric Safety Dashboard, https://itd.aashtowaresafety.net/itd-safety-dashboards#/

3 See note 1.

4 Ibid.

5 US Department of Transportation memorandum: Guidance on Treatment of the Economic Value of a Statistical Life (VSL) in US Department of Transportation Analyses – 2014 Adjustment, www.transportation.gov/sites/dot.gov/files/docs/VSL_Guidance_2014.pdf

6 Incorporating Security into the Transportation Planning Process, National Cooperative Highway Research Program; Transportation Research Board; and National Academies of Sciences, Engineering, and Medicine, www.trb.org/NCHRP/Blurbs/155903.aspx

7 Transportation improvement program (TIP), COMPASS, www.compassidaho.org/prodserv/transimprovement.htm

8 "Scope of the metropolitan transportation planning process," Code of Federal Regulations, Title 23, 450.306 (a), (h). www.ecfr.gov/current/title-23/chapter-I/subchapter-E/part-450#450.306

9 "Scope of the metropolitan transportation planning process," Code of Federal Regulations, Title 23, 450.306 (b)(3). www.ecfr.gov/current/title-23/chapter-I/subchapter-E/part-450#450.306

10 Strategic Highway Safety Plan Idaho: 2021-2025, Idaho Transportation Department, Office of Highway Safety, https://apps.itd.idaho.gov/Apps/OHS/Plan/SHSP_2021-2025.pdf

11 Ibid.

12 Ibid.

13 ITD Numetric Safety Dashboard, https://itd.aashtowaresafety.net/itd-safety-dashboards

14 CIM 2050 goals, https://cim2050.compassidaho.org/cim-2050-goals/

15 Environmental Issues, CIM 2050, https://cim2050.compassidaho.org/Environment.pdf

16 Fixing America's Surface Transportation Act (Fast Act), www.govinfo.gov/content/pkg/PLAW-114publ94/pdf/PLAW-114publ94.pdf

17 Infrastructure Investment and Jobs Act, https://www.fhwa.dot.gov/bipartisan-infrastructure-law/

18 CIM 2050 safety performance measures, https://cim2050.compassidaho.org/wp-content/uploads/2022/07/CIM_2050_Performance_Measures_Final.pdf

19 Prioritization, CIM 2050, https://cim2050.compassidaho.org/Prioritization.pdf

20 Complete Network Policy, www.compassidaho.org/documents/people/policies/CompleteNetworkPolicy_Final_Dec2021_2022-01.pdf

21 See note 7.

22 Change in Motion scorecards, COMPASS, www.compassidaho.org/prodserv/gtsm-perfmonitoring.htm

23 2020 Change in Motion Scorecard, COMPASS, www.compassidaho.org/documents/prodserv/reports/Change_in_motion_2020_final.pdf

24 Treasure Valley Transportation Systems Management and Operations (TSMO) Strategic Plan 2020-2030 Update, COMPASS, www.compassidaho.org/documents/prodserv/tsmo/COMPASSTSMOPlan_FINAL.pdf

25 Connected Vehicle Basics, USDOT Intelligent Transportation Systems Joint Program Office, www.its.dot.gov/cv_basics/cv_basics_how_used.htm

26 Traffic Safety Facts: Crash Stats, NHTSA's National Center for Statistics and Analysis, https://crashstats.nhtsa.dot.gov/Api/Public/ViewPublication/812115

27 Automated Vehicles for Safety, NHTSA, www.nhtsa.gov/technology-innovation/automated-vehicles-safety

28 2021 Canyon County All-Hazard Mitigation Plan, Canyon County Emergency Management, www.canyonco.org/elected-officials/sheriff/emergency-management; 2017 Ada County Multi-Hazard Mitigation Plan, Ada County Emergency Management & Community Resilience, adacounty.id.gov/emergencymanagement/mitigation

29 Transportation Resilience, CIM 2050, https://cim2050.compassidaho.org/Resilience.pdf

30 Update of Security 101: A Physical Security and Cybersecurity Primer for Transportation Agencies, National Cooperative Highway Research Program, www.trb.org/NCHRP/Blurbs/179516.aspx

31 Ibid.

32 See note 24.

33 Framework for Improving Critical Infrastructure Cybersecurity, Version 1.1, National Institute of Standards and Technology, https://nvlpubs.nist.gov/nistpubs/CSWP/NIST.CSWP.04162018.pdf

34 ITS Cybersecurity Research Program, US Department of Transportation, www.its.dot.gov/research_areas/cybersecurity/index.htm