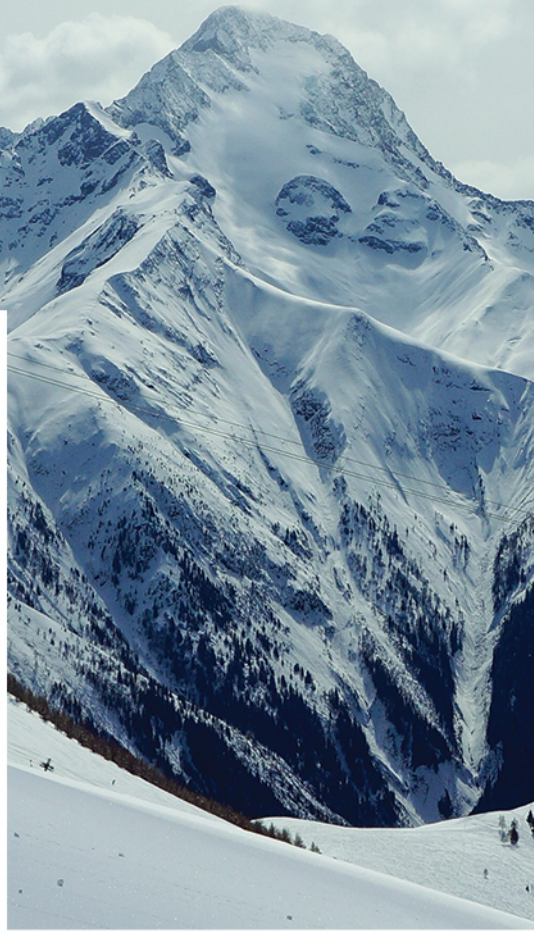
COLORADO ASSOCIATION OF SKI TOWNS

MULTI-MODAL TRANSPORTATION BEST PRACTICES

AUGUST 2018



Colorado Association of Ski Towns

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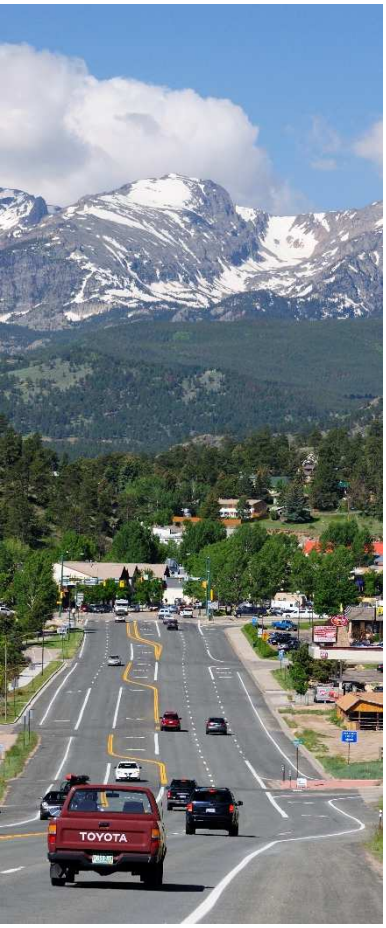
APPENDICES

(in separate attachment)

PROJECT BACKGROUND

The Colorado Association of Ski Towns (CAST) is a non-profit membership organization comprised of representatives from 40 communities located in the resort areas of Colorado, Wyoming, Utah, Idaho, and British Columbia. CAST brings its members together to share their knowledge and experience about the unique challenges experienced by resort communities that largely depend on tourism. CAST is committed to helping member communities meet their goals and understands that smart, efficient, and sustainable multi-modal transportation is a critical component of a successful resort community.

CAST member communities experience transportation challenges unique to locations in and adjacent to popular recreation areas and visitor destinations, including:



- A wider variation in travel demand that is seasonal compared to typical communities. This demand can be highly directional with peaks inbound in the morning and outbound in the afternoon. This challenge makes it difficult to "right size" transportation solutions and requires balancing peak travel demand needs with congestion, capital investments, and land use/community impacts.
- A larger proportion of travelers who are visitors and unfamiliar with the road network, parking locations, and multi-modal alternatives.
- Resort employees who often locate further away from resorts to access affordable housing and have varying work shifts throughout the day, resulting in long commutes and travel times that do not always coincide with typical travel patterns.
- Peak parking demand that often exceeds supply. This can result in frustrated visitors, illegal parking, and additional traffic as people circulate for an open spot. Additionally, areas without time limits and parking policies sometimes find that employees park in the prime locations for long periods of the day.
- A desire to provide a positive, high-quality visitor experience, which includes transportation. Because the economic livelihood of resort communities relies on tourism, providing a great experience is imperative and supports repeat visitation.
- A desire to preserve the natural environment, including air quality and land development near sensitive environmental resources. CAST communities are located in beautiful areas surrounded by our nation's natural treasures. Preserving these areas and providing context sensitive solutions are important.

Given the unique needs of resort communities and the ever-changing landscape of multi-modal transportation, CAST members identified the need to conduct a research study to better understand successful multi-modal transportation programs, services, technologies, and infrastructure being implemented that could be successfully replicated by CAST communities. This document provides the study results, including profiles of 11 successful and/or innovative multi-modal solutions that resort communities have implemented. Two additional profiles are included to provide ideas and lessons learned, with one highlighting solutions with opportunities for improvement and one summarizing partnership and funding ideas.

SURVEY & RESEARCH SUMMARY

CAST SURVEY SUMMARY

A survey distributed to CAST members solicited multi-modal solutions for consideration in this report. The survey also asked general ranking questions about community priorities, challenges, and mobility needs to ensure profiled solutions align with the needs of CAST communities. Survey results are displayed on the charts to the right, with written summaries provided below.

Community Priorities, Challenges, and Mobility Needs

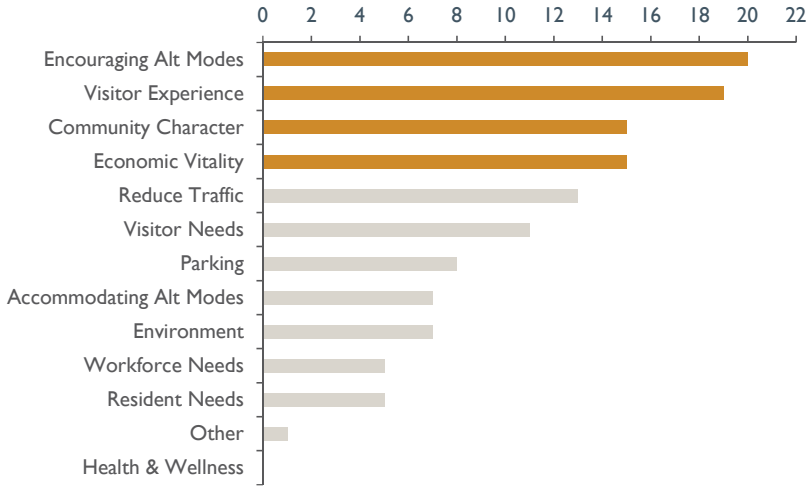
When asked to rank their community's priorities from a transportation perspective, respondents ranked encouraging the use of alternative modes (walking, biking, and transit) as the top priority, followed by visitor experience, community character, and economic vitality.

Respondents most frequently ranked the seasonality of demand as the top challenge. This was followed by the availability of parking, mobility challenges influenced by land use (e.g. employee housing availability and location), and balancing the different needs of residents, employees, and visitors.

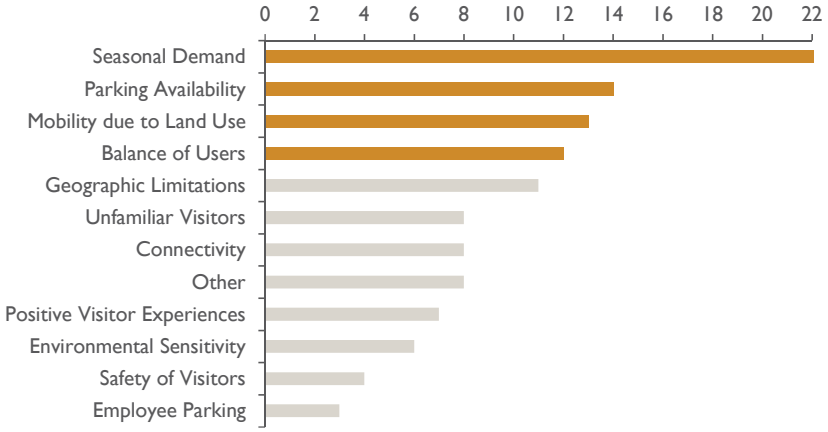
When presented with a list of top mobility solutions they might be interested in, respondents noted parking-related solutions were of the most interest, followed by funding and the collection/distribution of information. Summed together, solutions focused on alternative modes are also of great interest, but just in a more varied manner compared to the other categories.

A more detailed presentation of the survey and the summary data are available as part of the study process description in APPENDIX A. Solutions submitted are summarized as part of the IMPLEMENTED SOLUTIONS GUIDE matrix at the end of this section.

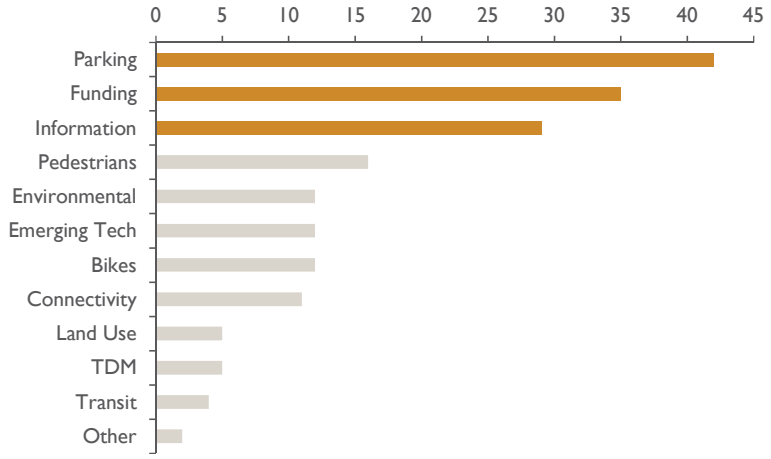
CAST Community Priorities - Rankings in the Top 3



CAST Community Challenges - Rankings in the Top 3



Top Mobility Solutions of Interest - Categorized



SURVEY & RESEARCH SUMMARY
(continued)


Credit: zermatt.ch

ZERMATT, SWITZERLAND

Zermatt, situated in the Swiss Alps, banned private and non-electric vehicles in the 1970s to prevent air pollution. To reach Zermatt, visitors must travel from nearby Täsch via train, taxi, or helicopter. Once in Zermatt, only small electric vehicles that operate like taxis or hotel shuttles are allowed with a permit, with personal use prohibited. Two traditional bus routes that use larger electric buses are provided, while bike rentals and horse-drawn carriages are also available.

NON-CAST RESEARCH SUMMARY

Other resort and tourism focused locations throughout North America and the rest of the world were investigated to uncover ideas for solutions to supplement those from CAST communities. A key difference for some of these locations is how the community is governed or located in respect to the resort. In some cases, the community is part of the resort and is not a traditional municipality. In other cases, the resort is not directly adjacent to supporting communities. Both of these situations exist in CAST areas but are more common outside CAST. These differences influence the types of solutions that are needed or can be implemented, as well as how they are implemented. In general, many North American locations are implementing solutions similar to those in CAST communities. Differences primarily result from how state laws differ or from population density.

Outside North America, information was difficult to obtain due to language barriers and a lack of materials online. In Europe – specifically the Alps – regional train service often links resort communities with major population areas from which visitors travel. In Asia – primarily Japan and South Korea – regional train service also often connects resort communities. Public and private bus options are popular as well, with ride/ski packages offering discounts to promote arrival without a personal vehicle. Technological innovations, such as visitor help robots and smart-screen windows on buses, were deployed as part of the Pyeongchang Winter Olympics but were more focused on demonstrating potential innovation. More information about the research of non-CAST communities can be found as part of the study process description in APPENDIX A.

OUTREACH SUMMARY

Phone interviews were conducted with CAST, non-CAST, and business representatives to learn more about the collected and prioritized solutions. The following provides a general overview of information learned from this outreach, organized by topical areas.

Parking

Parking cost, restrictions, enforcement, and communicating availability were all topics of the solutions discussed. Most communities contacted have parking restrictions and enforcement, with varying approaches and time limits. In communities where parking is free, problems with employees occupying prime spots were observed, even if time limits aimed to prevent this. Paid parking is being implemented in more places, but many communities have concerns over economic impacts and public reactions. Keys to successful implementation are how it is deployed and how the public is engaged. There is a desire to collect/distribute parking occupancy information to reduce traffic looking for spaces and to manage availability. Banff and Vail monitor occupancy in their lots, but no resort communities reviewed have implemented in-pavement sensors despite having interest.

Alternative Modes

Transit is the focus of most alternative mode solutions. Many CAST communities offer local transit service, often fare-free to promote its use and to improve the visitor experience. Several locations are interested in microtransit, but only Aspen has implemented a service. Bike facilities are primarily in the form of off-street paths/trails, with limited on-street facilities, and a few communities deploying temporary bike parking corrals in summer months. Bike shares exist in several communities but have yet to gain significant traction and are primarily available during summer months. The focus for pedestrians is safe crossings of roadways and making streets more active through sidewalk patios and other amenities.

Travel Demand Management / Employee Transportation

Most resort communities, especially those with transit, have some form of travel demand management (TDM) that is typically focused on resort employees. Solutions include free/discounted transit, free carpool parking and facilitation, land use policies and programs that promote denser employee housing near transit, commuter challenge programs, and the alternative mode solutions described above.

Information Collection / Distribution

Given geographical and financial constraints that limit large infrastructure projects, many communities are investing in better understanding how travelers access their transportation network to more effectively target their limited resources. Information such as travel patterns, mode use, parking behavior, system performance, and real-time bus locations is being tracked using technologies ranging from wireless monitors to in-bus GPS tracking. These collected data help communities plan more efficiently, target messages to the right areas and people, modify system operations in real time, and create robust performance measures that can be tracked and reported to the public.

TETON VILLAGE, WY

The Teton Village Association Improvement & Service District has been tasked with implementing and tracking TDM strategies for Teton Village, which was required by Teton County to implement TDM since its inception. With no on-street parking provided and limited off-street parking, a package of TDM strategies has been implemented to reduce traffic congestion and to allow efficient access to the resort for both visitors and employees who travel from outside of Teton Village. Strategies implemented include:

- Free and frequent in-town bus service
- Subsidized regional bus service, including passes for all Teton Village employees
- Paid parking to disincentivize private vehicle use
- Free carpool parking
- Commuter challenges promoting alternative modes
- Additional lodging and services to reduce the need to travel to/from Teton Village

The implementation of these strategies has resulted in traffic counts remaining at year 2000 levels despite an increase in resort visitors. And nearly 50% of surveyed employees arrived via transit in Winter 2016.

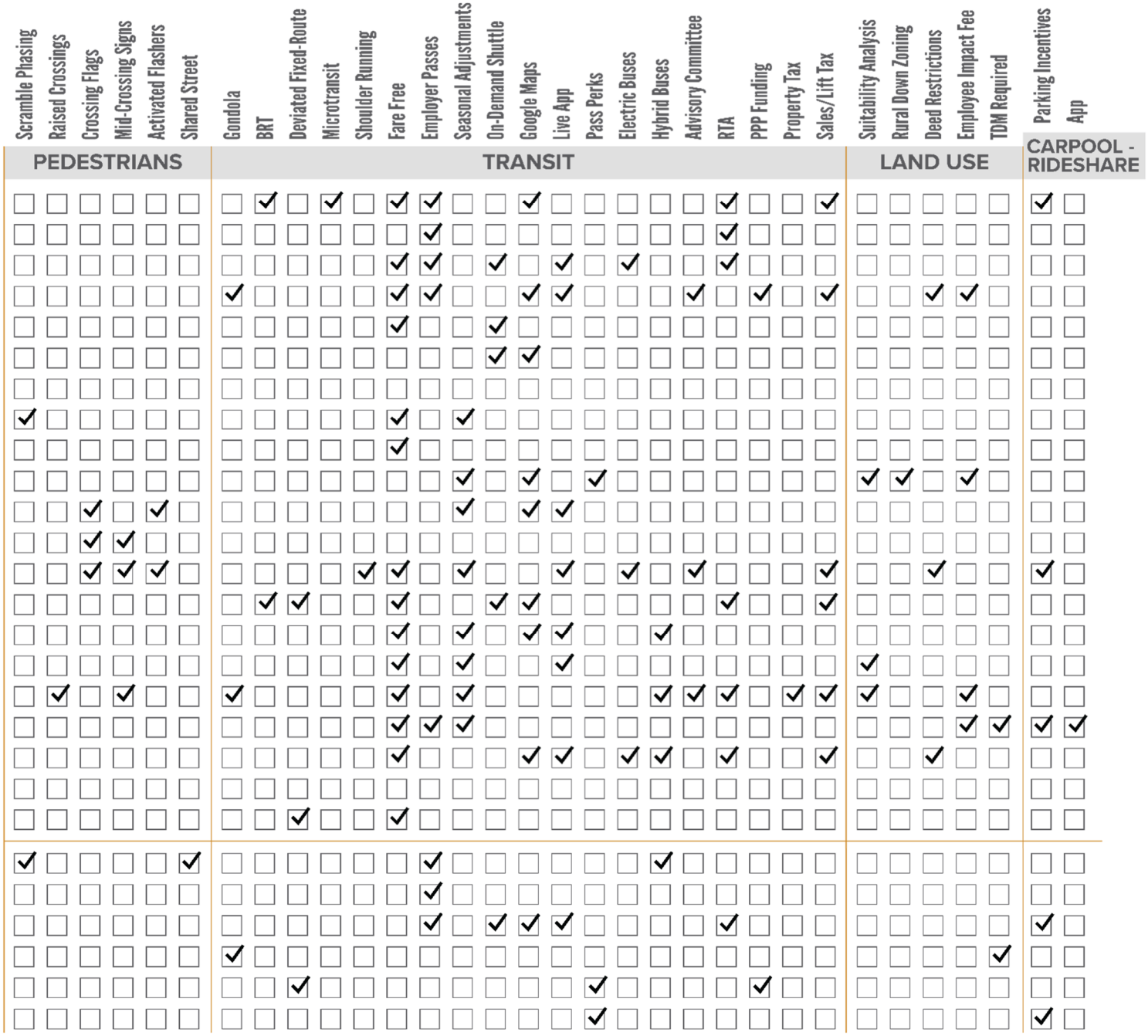
This information is also distributed back to the public so that they can make smarter travel decisions. Several communities provide their transit information through Google Maps and/or through other smartphone apps incorporating real-time bus tracking. Some communities provide interactive maps and/or real-time travel information on their website. Many noted coordination with local hotels and resorts to distribute information about alternative modes. What is lacking is a universal app that brings together all the information streams. Breckenridge noted their transit app can incorporate other streams, such as parking availability, but requires each service to have an open interface to share data. Apps like GoDenver integrate multiple modes but lack single payment processing across services and require custom development, which can be costly.

IMPLEMENTED SOLUTIONS GUIDE

This report highlights several of the most successful and innovative solutions found throughout the research process. body of information so that those interested in solutions not profiled in this report have a place from which to start.

	LOCATION \ SOLUTION	Enforcement	Fees Fund Transit	Advisory Committee	Paid	Peak Pricing	Monitoring	Live Availability	Text Alerts	New Structured	Dedicated Employee	Park 'n Ride	Reserved Parking	Roundabouts	Wireless Monitoring	Regional Coordination	Live Dashboard	TDM Challenge	Traffic Alerts	Bike Share	Wayfinding/Mapping	Bike Lanes	Valet	Seasonal Parking	Bus Bike Trailor
		PARKING												CONGESTION						BICYCLES					
CAST	Aspen (CO)	✓			✓	✓						✓								✓					
	Avon (CO)															✓									
	Beaver Creek (CO)				✓	✓					✓	✓				✓									
	Breckenridge (CO)	✓	✓		✓	✓					✓	✓				✓									
	Crested Butte (CO)																								
	Denver (CO)	✓			✓							✓		✓						✓					
	Dillon (CO)															✓									
	Estes Park (CO)									✓		✓													
	Gunnison (CO)	✓																							
	Jackson/Teton County (WY)	✓																✓		✓	✓	✓		✓	
	Ketchum (ID)	✓			✓	✓														✓		✓			
	Pagosa Springs (CO)											✓													
	Park City (UT)	✓	✓		✓	✓	✓	✓			✓	✓		✓	✓	✓	✓		✓	✓	✓	✓		✓	
	Snowmass Village (CO)											✓													
	Steamboat Springs (CO)	✓																				✓			
	Summit County (CO)													✓		✓			✓		✓				
	Telluride (CO)	✓			✓						✓	✓		✓					✓					✓	
	Teton Village (WY)		✓		✓	✓				✓		✓						✓							
	Vail (CO)			✓			✓	✓		✓		✓		✓		✓									
	Whistler (BC)																						✓		
	Winter Park (CO)		✓																						
NON-CAST	Banff (AB)	✓					✓	✓							✓		✓	✓							
	Bend (OR)																								
	Lake Tahoe area (CA/NV)												✓												
	Mammoth Lakes (CA)																								
	Mt Hood area (OR)												✓												✓
	Stevens Pass (WA)								✓																

However, there were many more solutions collected during this study. The matrix below retains and provides this
The matrix is not meant to be all encompassing; rather, it summarizes only solutions collected.




SHERIDAN
NEW
HOTEL
MUSIC
TELLURIDE

SOLUTION PROFILES

This section contains profiles developed to highlight the selected solutions identified at the culmination of the research and outreach process. These solutions were selected based on what communities were interested in as a result of the CAST survey and how innovative and/or impactful the solution is in the communities where it has been implemented.

The solution profiles are meant to be a starting point in identifying new or next-step solutions to address the unique challenges experienced by resort communities. They are organized to provide high-level summary information, along with detailed lessons learned and key elements to keep in mind when deploying. Additional information available in the appendices is listed at the bottom of each profile (when available), as well as contact information and reference materials. Each profile is designed to be printed back-to-back on one sheet of paper, making them easy to distribute to interested parties.

Each profile highlights the community topic areas it addresses. Topic areas include:

- Congestion
- Connectivity/Access
- Parking
- Safety
- Visitor/User Experience
- Environmental Footprint
- Economic Vitality

To more easily locate solution profiles that are of the most interest, the matrix to the right lists each profile in alphabetical order (as organized within this report) with the topic areas addressed by each. Two profiles – Partnerships & Funding and Opportunities for Improvement – do not address any specific topics, with the first summarizing some of the partnerships observed in resort areas, while the second provides lessons learned from solutions that did not successfully address the transportation issues they were intended to solve.

SOLUTION / ADDRESSES	Congestion	Connectivity/Access	Parking	Safety	Visitor/User Experience	Environmental Footprint	Economic Vitality
Automated/Autonomous Shuttles	☑	☑	☑	☑	☑	☑	☐
Electric Buses	☐	☐	☐	☐	☑	☑	☐
Microtransit	☑	☑	☑	☐	☑	☑	☐
Paid Parking	☑	☑	☑	☐	☑	☐	☐
Parking Monitoring	☑	☐	☑	☐	☑	☐	☐
Partnerships and Funding	■	■	■	■	■	■	■
Street Activation	☐	☑	☐	☑	☑	☐	☑
Sustainable Land Use	☑	☑	☐	☐	☑	☑	☐
Transit in Google Maps	☐	☑	☐	☐	☑	☐	☐
Transit Smartphone App	☐	☑	☐	☑	☑	☐	☑
VelociRFTA Bus Rapid Transit	☑	☑	☑	☐	☑	☑	☑
Wireless Traffic Monitoring	☑	☐	☐	☐	☑	☐	☐
Opportunities for Improvement	■	■	■	■	■	■	■

■ Multi-topic solution profile.

PROJECT: AUTOMATED/AUTONOMOUS SHUTTLES

ADDRESSES: Congestion ☑ Connectivity/Access ☑ Parking ☑ Safety ☑ Visitor/User Experience ☑ Environmental Footprint ☑ Economic Vitality ☐

PROBLEM STATEMENT

Many CAST communities have a robust transit system, yet first/last mile connections with transit stops/stations remain challenging. Labor and capital required to expand service can be expensive, especially when deploying eco-friendly buses. Low unemployment rates and industries offering better pay can make hiring drivers with the necessary qualifications difficult. Demand for some first/last mile connections may not meet the service standards required to deploy a standard bus. Investing in improving non-motorized modes can help fill this gap, but adverse weather conditions, distances, and steep grades can deter travelers from consistently using these modes. Additionally, mobility challenged populations such as the elderly and disabled often cannot use these modes.

SOLUTION

Widespread use of automated/autonomous vehicles may be years away, but automated/autonomous shuttles are already being deployed in both public and private settings around the world. Several manufacturers have automated/autonomous shuttles for sale or lease including EasyMile, Navya, May Mobility, and Local Motors to name a few. These shuttles have been designed to operate in existing traffic environments with little to no upgrades in transportation infrastructure required. They are tailored to provide first/last mile connections and circulator service. They are typically electric, which supports community environmental sustainability goals.

DESIRED OUTCOMES

- Increase access to transit, especially for mobility-challenged populations
- Improve the public transit experience
- Reduce staffing needs
- Reduce emissions and dependence on oil

IMPLEMENTATION STEPS

- Must have secure storage with Level 2 electric charging stations
- Traffic signals require DSRC for communicating with vehicle

LESSONS LEARNED

- Can operate without an operator on private roads, but federal rules require an operator when using public roads
- Can be implemented in 2-3 months
- Future improvements will allow deployment with mixed-traffic that travel faster than 20mph

COST

EasyMile vehicles cost $250,000-$300,000 each to purchase, with leasing options also available.

FUNDING

- The Advanced Transportation and Congestion Management Technologies Deployment Initiative (ATCMTD) under FHWA has annual funding of $60 million per year through 2020 to support deployments of new transportation technologies, with acceleration of connected and automated vehicle deployment being one of the primary program goals.
- EasyMile has been included in several federal grant applications, and was part of a successful state air quality grant in California.
- Ad revenue (in/on vehicles ads)

Winter weather test of EZ 10 vehicle for MnDOT

PROJECT: AUTOMATED/AUTONOMOUS SHUTTLES

(Cont.)

Did You Know: Automated vs Autonomous Today, most people accept the terms "autonomous", "automated", "self-driving", and "driverless" as interchangeable. However, FHWA provides definition for both automated and autonomous vehicles. Autonomous vehicles would operate without human intervention or assistance and without communication to other vehicles and/or roadside devices. Automated vehicles, on the other hand, would rely on a level of connectivity to complete automated driving functions. Current discussion regarding the distinction between the two indicates that the potential lack of connectivity associated with autonomous vehicles could mean that the traffic management, cooperative driving operations, and capacity improvements would be limited under this configuration. For example, automatic cruise control (currently available on multiple vehicles) is an example of a non-connected but semi-autonomous/automatic function on a car. Without the connected component, the vehicle is providing a programmed, automatic reactive response to the braking or acceleration of the vehicle ahead of it. Current automatic cruise control programming is such that it actually increases the spacing between vehicles, rather than decreasing it, effectively decreasing roadway capacity. Adding connectivity can allow vehicle platooning to occur, reducing headways and synchronizing acceleration and braking to increase roadway capacity. Connected automated vehicles (CAVs) make decisions based on data received from other connected vehicles and infrastructure, rather than as a singular entity. The connected component of an autonomous/automated future is therefore essential to bring about the capacity and transportation efficiency improvements.

OPERATION SPECIFICATIONS

- Average passenger capacity of 15
- 8-15 hours of operation on a single battery charge
- Handle grades of up to 15% at full passenger capacity
- Typical operating speeds of between 12-25mph
- Operate in all weather conditions
- Typical minimum operating temperature of -4°F for full battery efficiency
- Provide fixed-route or on-demand service
- Operate in mixed-traffic that travel up to 20mph
- Wheelchair accomodations

Winter weather test of EZ 10 vehicle for MnDOT

Considerations for Connected Automated Vehicles (CAVS)

How CAVs will impact the operations of our transportation systems is one of the most debated questions in the transportation industry. However, consensus is building around general assumptions regarding CAVs, and it is becoming more clear what considerations need to be made to plan for CAVs regardless of how they are deployed and when. The following are eight key considerations to keep in mind when planning for a future with CAVs:

- Prior to CAVs, communities need to prepare for an increased number of connected, electric vehicles (e.g. providing accessible and reliable charging infrastructure, and the supported connected vehicle infrastructure)
- CAVs will increase the vehicular carrying capacity of roads
- CAVs will impact parking demand, location and design - potentially decreasing space requirements, shifting parking supply to remote CAV parking locations (private ownership), or reducing demand (shared), etc.
- CAVs are expected to increase the number of vehicle trips being made and the vehicle miles of travel
- Connected, automated transit vehicles can allow for expanded service hours and service areas, increased frequency, reduced operational costs, and increased customer satisfaction and safety while moving more people.
- CAVs may change the narrative on private vehicle ownership as the auto manufacturers developing the technologies simultaneously invest in mobility-as-a-service platforms
- CAVs may increase the mobility of non-drivers (children, elderly, disabled)
- CAVs will increase the safety of all transportation system users

CONTACT INFORMATION

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EasyMile
415-815-8200
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Note: The majority of shuttle information was provided by Easy Mile and relates to their EZ10 vehicle.

FELSBURG HOLT & ULLEVIG

PROJECT: ELECTRIC BUSES | Park City (UT)

ADDRESSES: Congestion ☐ Connectivity/Access ☐ Parking ☐ Safety ☐
Visitor/User Experience ☑ Environmental Footprint ☑ Economic Vitality ☐

PROBLEM STATEMENT

Park City has one of the most ambitious climate action goals in North America; all City operations will utilize 100% renewable electricity to achieve a net zero carbon footprint by 2022. Park City's overall goal is to achieve net-zero community wide by 2032. Transportation and mobile sources are the largest share of Park City's municipal carbon footprint. As a City department, Park City Transit must support the achievement of this goal and the City Council's commitment to not purchase any additional diesel buses.

SOLUTION

Transition all Park City Transit vehicles to a zero emission, bus (ZEB) electric fleet. As of July 2018, Park City has transitioned six vehicles to ZEB and anticipates delivery of an additional seven ZEBs that will be operational for the 2018/2019 winter season. Park City has a total fleet of 43 vehicles and expects full transition to battery electric by 2032.

DESIRED OUTCOMES

- Support Park City's implementation of their Climate Action Plan
- Protect the environmental well-being of Park City
- Improve air quality by achieving a net zero carbon footprint
- Provide transit service to residents, employees, and visitors that is comfortable, clean, quiet, and efficient

IMPLEMENTATION STEPS

- Research and understand available ZEB options and supporting infrastructure requirements
- Identify potential funding sources and/or apply for grants to purchase vehicles and necessary charging stations (e.g., FTA 5339c)
- Conduct feasibility study and fleet transition strategy (needed vehicle range, charging requirements, and total cost of ownership)
- Work with energy providers to source electricity from renewable energy sources rather than fossil fuels
- Identify ZEB requirements and conduct technology assessment
- Develop technical specifications, draft and release RFP
- Select manufacturer and monitor all phases of production and ZEB/charging station acquisition (production oversight, Buy America Audits, Inspections, etc.)
- Conduct maintenance staff and operator training
- Conduct vehicle, charging, and data system testing
- Implement service
- Conduct ZEB benefits analysis and report on key performance indicators

INFRASTRUCTURE PLANNING CONSIDERATIONS

- Site selection
- Capacity planning and utility coordination
- Redundancy/contingency planning
- Scalability for fleet expansion
- Parking, staging, and yard operations
- Data networking and charge management requirements
- Planning, design, and permitting
- Construction, installation, and commissioning
- Coordination with vehicle delivery

COST

Vehicles: $600,00-$800,000 each (includes battery leasing, not purchase)

Charging Infrastructure: approximately $200,000 per station

FUNDING SOURCES

- US DOT Federal Transit Administration (FTA) Capital and Low-No Emissions Grant (5339c)
- Park City Transit Fund (generated from Utah Mass Transit Tax and a Resort Tax)

PROJECT: ELECTRIC BUSES | Park City (UT)

(Cont.)

LESSONS LEARNED

- Coordinate with local utility provider(s) early in the process to understand rate structure and opportunities for partnership.
- Identify champions - elected officials, staff, and community members - to support the transition to ZEBs.
- Engage the public, board, elected officials, etc. early and often throughout the process.
- Include maintenance staff in the entire process to garner buy-in of vehicle transition to ZEB.
- Use a comprehensive operator training program, as operator behavior can significantly affect vehicle efficiency and range and docking process at charging stations is complex at first.
- Consider leasing batteries to reduce vehicle acquisition costs and to maintain flexibility in making improvements to the vehicles as technology changes and improves.
- Implementation of ZEBs resulted in excitement from the community and has attracted more choice riders. Choice riders are attracted to the vehicle design and quality, the quietness of the vehicles, and the environmental benefits.

NEXT STEPS

- Continue to monitor emerging trends and technologies.
- Track development of battery electric cutaway buses as Park City will need to replace four cutaways with ZEBs, which are not currently available.
- Work with the Utah Transit Authority (UTA) to transition regional commuter buses to ZEBs.
- Monitor system performance including energy, capital, and operational cost savings.

Vail (CO) The Town of Vail has been in the process of testing different electric bus manufacturers (BYD, Gillig, New Flyer, and Proterra) and will conduct a competitive procurement process in late 2018. This process marks the beginning of transitioning Vail's fixed-route fleet of 10 buses to become fully electric to meet the Town's emission goals. The Town also chose to pursue electric buses over compressed natural gas (CNG) buses due to the cost of required infrastructure improvements to maintenance and storage facilities to safely accommodate CNG buses.

The Town has secured a $600,000 FTA Low-No grant towards the roughly $900,000 purchase of its first bus, which is anticipated to occur in 2019 with delivery in 2020. The remaining buses are estimated to be replaced by 2024. An additional $300,000-$400,000 will be necessary to purchase the appropriate charging stations (about $60,000/station), which will utilize solar power for a portion of the electricity needed.

Vail is also working with ECO Transit - the regional transit service provided by Eagle County - to facilitate charging for their future electric bus fleet. This is part of the CDOT Intermountain Transportation Planning Region's (TPR) greater vision of incorporating electric buses throughout the TPR. The Vail Transit Center has been identified as the likely location for ECO electric buses to recharge before returning west along I-70.

Electric bus demo in Vail (CO)

CONTACT INFORMATION

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REFERENCE MATERIALS

www.parkcitytransit.com
https://youtu.be/bYxFyHvvv5I

FELSBURG HOLT & ULLEVIG

PROJECT: MICROTRANSIT | Aspen (CO)

ADDRESSES: Congestion ☑ Connectivity/Access ☑ Parking ☑ Safety ☐
Visitor/User Experience ☑ Environmental Footprint ☑ Economic Vitality ☐

PROBLEM STATEMENT

Parking demand in Aspen's core exceeds parking supply with many visitors staying relatively close-in, opting to drive and park in downtown. This contributes to parking occupancy issues and congestion. The City was looking for first and last mile solutions to reduce the parking demand and congestion.

SOLUTION

Aspen Downtowner is an app-based, on-demand, door-to-door microtransit system that operates in Aspen's core and nearby neighborhoods. The vehicles are electric, heated golf carts that hold seven passengers plus the driver. The service is free of charge and operates from 11 AM to 11 PM in spring, summer, and fall. It operates from 8 AM to 11 PM in winter.

The fleet consists of five vehicles (increasing to seven vehicles in winter 2018) that can carry skis but are not equipped for bicycles. Dogs are allowed on the service. Children must be five years or older to ride on the service with adults due to legal restraints requiring car seats.

The program has been in place for approximately two years and started as a pilot project. The City recently signed a five year contract with the Downtowner vendor and anticipates the service is on its way to becoming a permanent service as a result of the positive feedback from users and 47,000 one-way person trips recorded annually. Downtowner (the vendor) owns and maintains the vehicles, and hires and trains the drivers as well.

LESSONS LEARNED

- The City feels it may have been beneficial to involve the cab companies more comprehensively prior to initiating the service, as cab companies have expressed opposition to competing with a free service operated by the City.
- Customers outside the service area have requested service but Aspen is trying not to compete with transit services.
- The original pilot program was tip-based, but it was determined that it seemed awkward to request a tip for a free service, thus the City eliminated this option.
- The original pilot program had iPads in each of the vehicles but they were often not working and were not being put to their intended use by passengers to find menus, bus schedules, etc.
- Local businesses support the service.
- The City may scale back winter hours because the 8 AM to 11 AM period was slow.
- The City has opted to take a more active role in the promotion of the service to ensure compatibility of messaging with other services.
- Other vendors considered include The Gotcha Group and The Free Ride.
- Typical wait time is 4 to 6 minutes; when they exceed 10 minutes, the City will check in with the vendor.
- The service appears to primarily be used by visitors and second home owners, but not as much by commuters.

PROMOTION

The service is promoted similar to other public transportation services. Concierges also promote it and people learn about it through word of mouth.

COST

The program cost $540,000 for 2018-2019, which includes vehicles, drivers, and insurance. Two new chargers for the two new vehicles have been funded separately.

FUNDING

The Downtowner is paid for through Aspen's Transportation Fund, which is made up of funds from a lodging tax and a portion of the sales tax. Parking revenues generated also contribute to the City's Transportation Fund.

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REFERENCE MATERIALS

www.cityofaspen.com/270/downtowner

PROJECT: PAID PARKING | Breckenridge (CO)

ADDRESSES: Congestion ☑ Connectivity/Access ☑ Parking ☑ Safety ☐
Visitor/User Experience ☑ Environmental Footprint ☐ Economic Vitality ☐

PROBLEM STATEMENT

During peak visitation periods, parking demand exceeds supply. As the parking supply approaches and exceeds capacity, people looking to park circulate and recirculate looking for an open spot increasing traffic and congestion, and causing visitor frustration. Employees and business owners often park for long periods of time in prime parking spaces. Other non-paid parking management strategies have not been effective enough in addressing this issue and improving parking availability.

SOLUTION

Implemented paid parking in 2016 after a long evaluation period. On-street parking and paid lots typically cost $0.50/hour but can vary by time of day, day of week, and season. During the summer, the south gondola lot costs $10 and the price is coordinated with Breckenridge Ski Area who owns a large surface parking area in town. Users can pay via a kiosk or Passport smartphone app, which also allows paying for the extensions.

DESIRED OUTCOME

- Reduce employee and business owner parking in town core
- Achieve parking occupancy in town core of approximately 85% of supply
- Reduce searching and recirculation
- Improve visitor experience

Passport smartphone app used by Breckenridge

OTHER LOCATIONS

Banff (AB) conducted a paid parking pilot project in 2014 where they charged for parking and collected data for four parking lots in the town core. Data from the trial showed the average parking duration increased by 25 minutes with paid parking implemented. Results from the trial will help inform Town Council decisions on future parking policy changes.

Teton Village (WY) charges for parking in surface lots and no on-street parking is allowed. They increased peak pricing for the busiest periods (Christmas to New Years, Presidents' Day) in the remote lot from $10 per day to $15 per day and the close-in lots from $20 per day to $30 per day. This resulted in 6% less parking occupancy, but a 6% increase in carpooling and an increase in revenue that was used towards funding their shuttle.

Jackson (WY) provides free on-street parking but restricts it to 3 hours from 9 AM to 6 PM. They have found that time limits alone are not effective. They are conducting a multi-phase parking study for downtown and are considering remote/intercept parking, paid parking, and shorter time limits to better manage parking.

COST

- Purchase and installation of 70 parking kiosks was approximately $500,000
- Approximately $700,000/year includes flat annual fee for management of parking program and actual expenses, which is similar to managing the program in-house.
- Transaction fees for the Passport smartphone app (enforcement is contracted with Interstate Parking)

FUNDING

- Program is self-funded, raising about $1.5 million annually in revenue
- Extra revenue goes into Breckenridge's transit and parking fund

PROJECT: PAID PARKING | Breckenridge (CO)

(Cont.)

IMPLEMENTATION STEPS

- Conduct parking study to identify causes of parking issues, such as employees in prime spots
- Conduct a thorough evaluation of parking options
- Develop a public information and engagement process
- Evaluate potential parking equipment vendors
- Conduct marketing campaign to inform residents and visitors of the change
- Purchase and install equipment/smartphone app
- Monitor availability by sub area and adjust rates to maintain 85% availability

NEXT STEPS

- Integrate with real-time transit info into traveler app to provide real-time parking information
- Real-time parking availability signs
- Regularly monitor parking demand versus supply and adjust parking fees annually to achieve demand of 85% of supply

LESSONS LEARNED

- Time limits alone were not effective because there was no restriction on “reparking” (moving a vehicle)
- Price of parking can be used in place of time limits to manage turnover rate
- Coordinate parking cost with adjacent parking owners, such as resorts
- People stay longer with paid parking than time-restricted parking
- Reverting back to free parking during non-peak seasons resulted in return of previous parking behaviors and associated issues
- Having tried many non-paid options previously helped community realize paid parking was the next logical step
- Worked with Interstate Parking to modify their cost-recovery process to be actual costs to avoid public perception that company tickets more to boost revenue
- Negotiated a lower transaction fee for Passport due to large volume of small transactions
- People without the Passport app usually use kiosks to pay, while residents and regulars normally use the app, so marketing is necessary to boost usage

PRICE MANAGEMENT

The price of parking can be changed at any time to meet occupancy and turnover goals. The Town of Breckenridge will be reviewing their rates after observing parking behaviors over the first 2 years of implementation.

Ketchum (ID) recently implemented paid parking in two City-owned lots within the city core with little public engagement or study. Although this has moved employees out of the lots, the lots are receiving little use by others, as the community has been slow to accept paid parking in this limited application. The City hopes to conduct a parking plan to more effectively implement paid parking.

Parking kiosk similar to those used in Breckenridge

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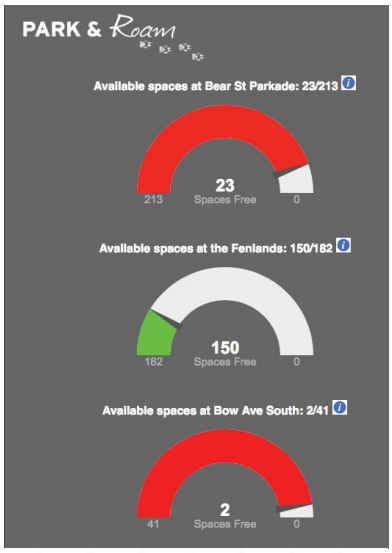
REFERENCE MATERIALS

www.townofbreckenridge.com/paid-parking

FELSBURG HOLT & ULLEVIG

PROGRAM: PARKING MONITORING | Banff (AB)

ADDRESSES: Congestion ☑ Connectivity/Access ☐ Parking ☑ Safety ☐
Visitor/User Experience ☑ Environmental Footprint ☐ Economic Vitality ☐



PROBLEM STATEMENT

Banff is a popular resort area with substantial seasonal visitation. Most visitors arrive by private auto and require parking. During peak summer periods, parking demand exceeds supply resulting in searching and recirculation and visitor frustration.

SOLUTION

Banff tracks parking availability at 10 parking lots throughout the town core. Information on availability is disseminated to travelers through a website https://banffparking.ca and a traffic dashboard website http://dashboard.banff.ca/. Parking availability is tracked using sensors at the entry and exit points. Wireless communication sends information to town hall for inclusion on the website. Availability is also sent to a real-time message board at the town entrance. The company currently used to deploy the infrastructure is TCS.

DESIRED OUTCOMES

- Provide users information on parking availability to reduce traffic by tempering the need to search and recirculate.
- Encourage people to park in the remote/intercept lot and use alternative modes to access town.
- Improve visitor experience.

COST

Installation cost was approximately $300,000 for all 10 lots. This includes the counter, power supply to the counter, delineation, and bollards so people do not exit out the back of the lot.

Annual operating cost is approximately $200 per year per lot. This includes the data plan, IT support, and daily calibration of each lot counter by staff.

In-house IT staff developed and maintains the live data websites as part of their normal operations.

FUNDING

General fund

IMPLEMENTATION STEPS

- Identify town core area for monitoring.
- Solicit and evaluate proposals for sensor equipment and installation.
- Develop visitor website and/or app to display information.
- Purchase and install sensors and real-time signing.
- Use social media, Town website, printed brochures, and newspaper ads to drive people to live parking websites.

Vail (CO) The Town of Vail monitors five of its Town-owned parking lots using entry/exit counters. Live availability is displayed on the Town's website, within the Town's smartphone app, and through Vail Resort's website.

Banff live parking website and available spaces sign

LESSONS LEARNED

- TCS uses separate vendors for the various aspects of the infrastructure supplied. It would be easier to coordinate with a single supplier for all aspects.
- Calibration is required daily; video sensors would be more accurate.
- About 15% fewer people entered monitored lots when real-time parking signs were on and displayed a lot was full, compared to when signs were off.
- The parking page is heavily used; second most visited page on town website.

NEXT STEPS

- Implement overhead video monitoring to increase accuracy.
- Evaluate paid parking to further incentivize a mode shift.
- Increase awareness through signage and online communication.
- Develop visitor app.

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REFERENCE MATERIALS

banffparking.ca
dashboard.banff.ca
Banff Transportation Master Plan
www.vailgov.com/parking-counts

FELSBURG HOLT & ULLEVIG

PROGRAMS: PARTNERSHIPS AND FUNDING

PROBLEM STATEMENT

Funding projects and programs to address mobility concerns is an issue for most communities. Usually the mobility concerns communities face are also a problem for other organizations and jurisdictions.

SOLUTION

This profile provides on overview of the partnerships and funding sources discussed with the communities interviewed.

DESIRED OUTCOMES

- Coordinated shared responsibilities, solutions, and costs
- Sustainable funding to support mobility solutions

PARTNERSHIPS

Public / Public

- Teton County, Teton Village, and Jackson (WY) work collaboratively on numerous mobility projects including:
  - Sharing funding of transit service and path construction connecting Jackson, Teton Village, and nearby areas
  - Complementary changes to land use and zoning (down-zoning in rural unincorporated areas and commensurate up-zoning in urbanized areas)
- Banff (AB) partners with Calgary (AB), Canmore (AB), and Parks Canada to provide weekend and holiday regional transit service from May to September
- Estes Park (CO) and Rocky Mountain National Park partner to provide transit service betwee the town and park
- The Colorado Department of Transportation (CDOT) convenes weekly traffic management meetings with jurisdictions along the I-70 mountain corridor during the winter months (and as needed during summer months) to coordinate needs for anticipated weather events, construction activity, and large events
- Summit County (CO) converted their work submitted for CDOT's statewide bike map – which involved working with municipalities within the County – into an interactive web map for the County and as a template for the rest of the Intermountain Transportation Planning Region members
- Vail (CO) is partnering with a local school and Vail Resorts to develop a new parking structure for school and visitor use
- Park City (UT) has a formal agreement with the Utah Department of Transportation (UDOT) to allow shoulder running transit year-round

Public / Non-Profit

- Teton County, Teton Village, and Jackson (WY) work with a non-profit called Friends of Pathways to run alt-mode commuter challenges and run Jackson's bikeshare program

Public / Private

- Jackson (WY) and Telluride (CO) partner with local business owners to identify where seasonal bike parking would be most beneficial to the community
- Banff (AB) worked closely with its local business community when testing and implementing their Woonerff (shared street)
- Ketchum (ID) partnered with a local hospital as a public health initiative to fund their new bikeshare program, while a healthcare provider and the Park City Chamber sponsor the Park City/Summit County (UT) e-bike share
- Hotels in Banff (AB) contribute financially to the area's transit system; in exchange, their guests can ride the service for free
- Clackamas County (OR) partners with Mt Hood area ski resorts and the Oregon Department of Transportation (ODOT) to offer regional bus service from the outer boundaries of Portland (OR)
- Breckenridge (CO) and the Breckenridge Ski Area (Vail Resorts) partner on many projects including:
  - Parking pricing policy
  - Coordinated transit services and bus tracking, connecting the town with the base of the mountain
- Vail (CO) includes business and resort representatives on its Parking and Transportation Task Force
- Park City and Summit County (UT) help fund the Salt Lake City/ Park City regional commuter bus service

FUNDING

- Transit-specific sales and use taxes (Summit County (UT) recently passed several sales and other taxes to fund transit)
- The San Miguel Authority for Regional Transportation (Telluride area) supplements their sales tax with a transit-specific property tax to evenly spread the funding burden
- Tourism-based taxes (pillow tax, lift ticket tax, etc.)
- Breckenridge (CO), Teton Village (WY), and Whistler (BC) use parking fee revenues to support transit and active mode transportation projects
- FTA grant funding including Small Starts, Low and No Emission Vehicles, Bus and Bus Facilities, etc.
- Mammoth Lakes (CA) has been considering a fee in-lieu of parking policy to allow developers to pay into a fund to support transit rather than add more parking (the policy has not been implemented)
- Federal Lands Access Program (FLAP) for access to, adjacent to, or in Federal lands
- Park City (UT) has a real estate transfer tax to fund transit


Lodging
SEE TO SKI
STEAMIES
BURGER
T.KARN
TELLURIDE

PROJECT: STREET ACTIVATION | Banff (AB)

ADDRESSES: Congestion ☐ Connectivity/Access ☑ Parking ☐ Safety ☑
Visitor/User Experience ☑ Environmental Footprint ☐ Economic Vitality ☑

PROBLEM STATEMENT

Banff Avenue – the main arterial through Banff – received a refreshed design in 2001 and attracts in excess of 20,000 pedestrians per day during the peak summer months. Meanwhile, Bear Street has been recognized as an important pedestrian link in the downtown core to relieve demand along Banff Avenue, but it is used by a fraction of the pedestrians that use Banff Avenue.

SOLUTION

Banff's Transportation Master Plan recommended a reconfiguration of the 200 block of Bear Street into a Woonerff – a shared/living street where pedestrians, cars and cyclists all share the road. Shared streets prioritize pedestrians by giving them the right-of-way for the entire street, while vehicles drive at very slow speeds and cyclists travel through the area at a leisurely pace.
Non-transportation activities, such as restaurant patios, are used to help foster the pedestrian-first nature of the street.

DESIRED OUTCOMES

- Foster more sustainable, active modes of transportation
- Enhance the vibrancy of downtown spaces
- Be a catalyst to encouraging commercial uses along streets adjacent to the main street

COST

- The project was initially implemented as a four-year pilot project for a capital cost of approximately $200,000.
- A permanent design is currently underway; the anticipated capital cost is $6 million for the one block stretch. The project scope will include a new roadway surface as well as full reconstruction of the deep services (water, sewer and storm). Construction is anticipated in 2019.
- Annual operating/maintenance cost, including amenities such as landscaping, is expected to be around $50,000.

FUNDING

General fund

IMPLEMENTATION STEPS

- Identification of need in local transportation plan
- Planning of shared street components and conceptual design for pilot project
- Stakeholder and public engagement process, including adjacent businesses
- Identification of funds for implementation of multi-year pilot project
- Assessment of value and success of project
- Issue request for proposals for preliminary and final design
- Identify funding and construct

COMPLEMENTARY IDEAS

Crosswalk Treatments Estes Park and Banff implemented scramble crosswalks providing an all pedestrian phase at signalized intersections. Other communities implemented raised crosswalks (Telluride), automated pedestrian-actuated lit crosswalks (Bernalillo, NM), and rectangular rapid flashing beacons (Keystone).

Seasonal On-Street Bike Parking
Jackson replaces one or two on-street parking spaces in six locations downtown with bike parking corrals from May through October. Each corral includes a four-space U rack and space delineators that cost about $1,000 each. Telluride has been implementing a similar system using larger bike racks in 10 parking spaces around town for a cost of $500/space. The Town reports that businesses appreciate the sidewalk space these systems clear, as the racks are heavily used during the summer. Implementation and disassembly require two days per year for both locations and are funded out of the agency's annual budget.

Seasonal Boardwalk Patios Similarly, some communities seasonally replace a few select parking spaces with a temporary boardwalk-style sidewalk to create space for restaurant patios and other amenities within the street to slow traffic and attract pedestrian activity.

PROJECT: STREET ACTIVATION | Banff (AB)

(Cont.)

LESSONS LEARNED

- Adjacent businesses have been a driving force in implementing the Woonerff on Bear Street, recognizing that activating the street is more beneficial than maintaining adjacent on-street parking.
- Project has been very successful in achieving the identified goals.
- Keep in mind ADA detectable surfaces.
- Consider drainage needs without curb and gutter.

Seasonal bike parking in Telluride

Woonerff patio in Banff

Raised crosswalk in Telluride

Seasonal bike parking in Jackson

Example lit crosswalk

Example seasonal boardwalk patio

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REFERENCE MATERIALS

www.banff.ca/index.aspx?NID=969
FHWA-HEP-17-096: Accessible Shared Streets

FELSBURG HOLT & ULLEVIG

POLICY: SUSTAINABLE LAND USE | Teton County/Jackson (WY) | Summit County (CO)

ADDRESSES: Congestion ☑ Connectivity/Access ☑ Parking ☐ Safety ☐
Visitor/User Experience ☑ Environmental Footprint ☑ Economic Vitality ☐

PROBLEM STATEMENT

Available land for development in resort communities is often scarce and expensive. Developers prefer to build on land already owned or where least expensive, which is usually outside of existing developed areas. This results in an increase in congestion from a lack of access to alternative modes such as transit or bicycle facilities. Resort communities are in need of workforce housing and often prefer that this type of development occur where transit and non-motorized modes can serve trips to/from the resorts.

SOLUTION

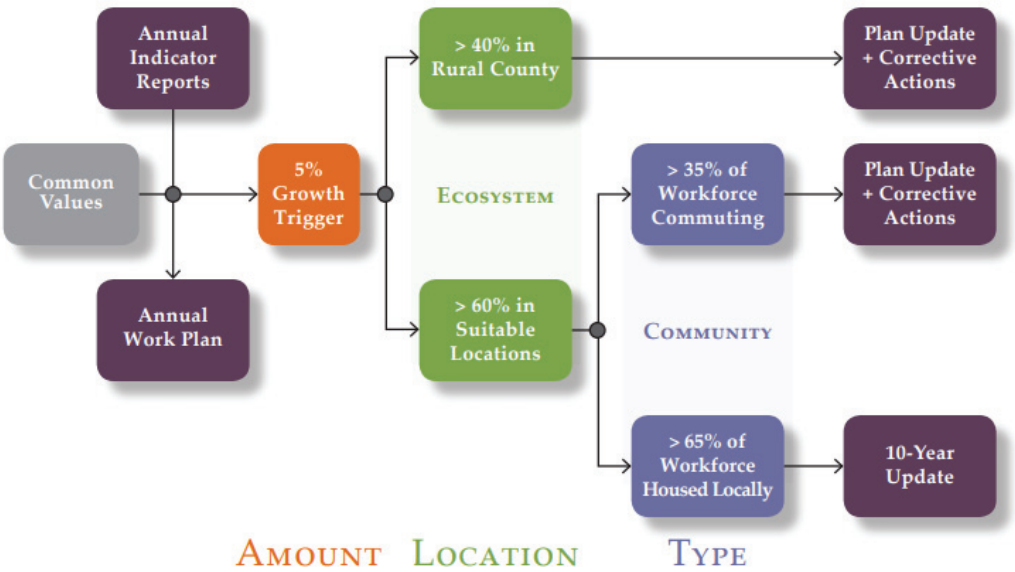
Teton County (WY) - in coordination with the Town of Jackson - and Summit County (CO) have both undertaken land use policy changes to move development from locations without services outside of developed areas to locations with transit and other services. They have combined these changes with incentives for new development to be workforce housing.

Teton County/Jackson (WY)
Teton County's comprehensive plan aims to increase the use of alternative modes, protect the environment, and house more of the area's workforce locally. The plan led to the down-zoning of rural lands to remove the ability to subdivide, resulting in a reduction of 2,300 potential housing units from these areas. The plan also defined transitional neighborhoods that are suitable for increased development due to proximity of existing services and attractions, including transit. The County is working with the Town of Jackson to implement this up-zoning, which will use incentives such as square-footage bonuses and residency requirements in an effort to promote the construction of affordable housing.

Summit County (CO)
Summit County's comprehensive plan included a GIS suitability analysis that reviewed potential greenfield and infill properties to identify which parcels are suitable for workforce housing based on the availability of existing services. One of the requirements was the availability of transit. Parcels identified as suitable are eligible for a transfer of development rights (TDR) program, which allows holders of rural parcels eligible for private development to swap development rights to suitable-identified parcels. In exchange, the TDR allows for density bonuses and the ability to develop workforce housing, even if the suitable parcel is not zoned for workforce housing – a variance supported by the comprehensive plan.

Telluride
The Telluride Affordable Housing Strategic Plan identifies potential sites where the Town could construct deed-restricted affordable housing. These sites are prioritized based on a weighting system that considers 10 criteria, one of which is proximity to transit.

Teton County Comprehensive Plan Land Use Correction Process



DESIRED OUTCOMES

- Reduce congestion associated with sprawl
- Preserve rural, environmentally sensitive surroundings and the visitor experiences that are associated with the natural beauty of these areas
- Maximize existing services, specifically transit availability
- Increase in affordable workforce housing that is not dependent on using passenger vehicles

LESSONS LEARNED

- Substantial public and stakeholder outreach going beyond the typical groups is required throughout the process, with tailored messaging depending on the group.
- One-on-one meetings with elected officials fosters understanding and avoids false assumptions.
- Communicate the bigger-picture issues being addressed beyond just the land use changes, including how moving workforce housing into town can minimize congestion.
- Down-zoning was not seen as a taking by Teton County because the land value remained unchanged whether subdividing was allowed or not.

IMPLEMENTATION STEPS (Cont.)

- Establish goals and criteria, including requirement that transit be accessible
- Conduct analyses to identify where up-zoning is suitable/desirable
- Engage the public and stakeholders, including elected officials
- Update comprehensive plan and zoning allowances

NEXT STEPS

Teton County and Jackson considered changing their parking requirements for new developments to reduce the presence and use of passenger vehicles and promote transit use. Although this was not implemented, parking maximums rather than minimums can be the next step in land use policy changes.

New development near the Frisco Transit Center in Frisco (CO)

Vail (CO) The Town of Vail's InDEED program provides funds to homeowners and developers to deed-restrict residential properties for occupation by only Eagle County employees working at least 30 hours/week. The program is a tool used to help achieve the Town's Housing Strategic Plan goal of adding employee housing. Applications and payment amounts are assessed on a case-by-case basis by the housing authority board and are funded by the Town's capital fund. No rent or resale maximums are applied; however, the employment hours requirement helps alter the market value to be more affordable. The program has been seen as successful; however, applicants experience difficulty obtaining financing from banks outside the Vail area who are not familiar with the program.

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REFERENCE MATERIALS

Teton County Comprehensive Plan Elements (Appendix B1)
Telluride Regional Housing Strategy Matrix Memo (Appendix B2)

FELSBURG HOLT & ULLEVIG

PROGRAM: TRANSIT IN GOOGLE MAPS | Breckenridge (CO) | Steamboat Springs (CO)

ADDRESSES: Congestion ☐ Connectivity/Access ☑ Parking ☐ Safety ☐
Visitor/User Experience ☑ Environmental Footprint ☐ Economic Vitality ☐

PROBLEM STATEMENT

Resort communities play host to visitors from around the world, all with varying levels of familiarity with navigating transit systems. Visitors might feel overwhelmed in interpreting a new transit system in an unfamiliar place, while language barriers can amplify this issue. Some communities may offer their transit information through a local smartphone app, but visitors may not know it exists or be unwilling to add yet another app that will be utilized only for the duration of their stay.

SOLUTION

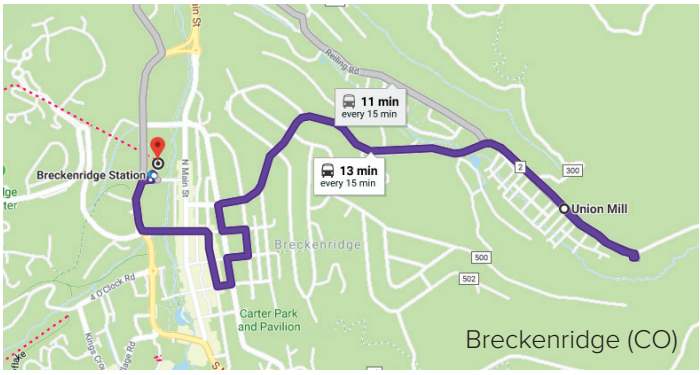
Google Maps is one of the most universal smartphone navigation apps that is used by millions of people across all smartphone platforms across the world. It provides navigation for all modes, including transit. Google has created the Google Transit API to enable local transit agencies to upload their transit routes and schedules for use in the travel planning function of Google Maps. Staff from Breckenridge and Steamboat Springs have recently uploaded their systems into Google Maps using Google's Transit API.

DESIRED OUTCOMES

- Make transit routes and schedules easier to access and interpret by users through a universal medium
- Incorporate local transit as a modal option for trip planning
- Increase transit visibility and use
- Enhance the visitor experience
- Integrate transit systems for seamless trip planning across service areas

IMPLEMENTATION STEPS

- Ensure transit maps and schedules on your transit website are current and accurate
- Sign-up for a National Rural Transit Assistance Program (RTAP) account to use their General Transit Feed Specification (GTFS) Builder and watch how-to videos
- Use RTAP spreadsheets to develop GTFS files
- Create a Google Partner Dash account, upload feed, use validation tool, and approve feed for Google review
- Make necessary changes as requested by Google and alert Google team lead via email with a list of changes made (may require several rounds of review)
- Once approved by Google, the feed will be live



Snowmass Village (CO) is working with Studio Six to update their transit maps and information distribution into a more user and mobile friendly format. In doing so, Snowmass Village also saw this update as an opportunity to import their transit information into Google Maps. Rather than conducting this process in-house, they hired Trillium Solutions as a subconsultant of the map update to produce and integrate their GTFS data into Google Maps for a cost of about $3,500 for their system of 6-7 routes during peak seasons. This integration will help users more easily trip plan transfers with the Roaring Fork Transportation Authority's regional transit system, which also used Trillium to import their system into Google Maps.

PROGRAM: TRANSIT IN GOOGLE MAPS | Breckenridge (CO) | Steamboat Springs (CO) (Cont.)

COST

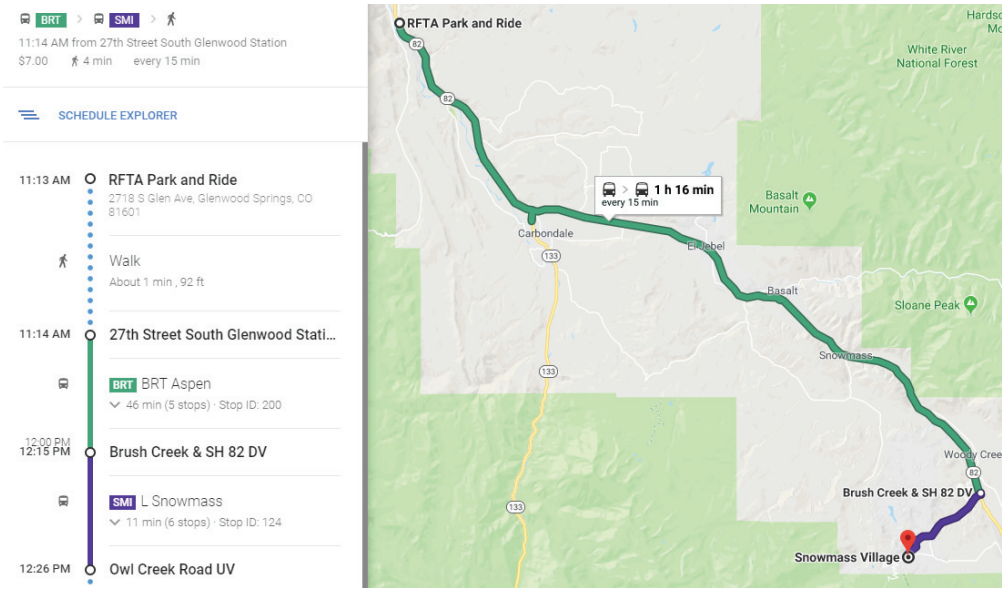
Breckenridge and Steamboat Springs both completed the process in-house, which took approximately four months and seven months to complete, respectively. However, actual employee resource allocation was approximately 40-80 hours. Using a third party, such as Trillium Solutions, was estimated to cost $500/route.

FUNDING

In-house implementation was absorbed by the local agency's budget.

LESSONS LEARNED

- Conducting process in-house is tedious, but serves as a good review and refinement of schedules and maps, and updates/changes can be implemented in a more timely manner. Once the system is in place, it is fairly easy to maintain.
- Familiarity with Excel and the daily operations and schedules is important for the process to be executed smoothly. It is also best if someone on staff is familiar with GTFS.
- GTFS is designed to handle fixed routes, and seasonal schedules are more challenging as they require updates to the feed throughout the year.
- Locate stops using Google Maps, as Google validates locations in Google Maps.
- Focus on programming data that is necessary for display in Google Maps when using guide spreadsheets, as extraneous data can extend the Google review process. Additional information can always be added later.
- Only build in the current schedule.
- Have patience and be prepared for several rounds of comments from Google. Google is most concerned with the consistency of what you upload compared to published materials. The review is very detailed, down to the consistency of route colors used.
- Stay up-to-date with the uploaded data, refresh as needed, and prepare upcoming feeds before service changes to allow for Google review time.



Example integration between RFTA and Snowmass Village transit systems when trip planning

NEXT STEPS

Transit agencies can integrate into Google Transit's GTFS Realtime, allowing for the sharing of real-time bus locations and arrival times in Google Maps. Steamboat Springs uses a seperate service (RouteMatch) to convey this information to users, while Breckenridge has its own personalized transit app (My Free Ride) that displays real-time information.

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REFERENCE MATERIALS

RTAP: www.nationalrtap.org/Web-Apps/GTFS-Builder
Google Transit API: https://developers.google.com/transit
Helpful tips from Kenneth Symank of Breckenridge (Appendix B3)

FELSBURG HOLT & ULLEVIG

PROJECT: TRANSIT SMARTPHONE APP | Breckenridge (CO) | Steamboat Springs (CO)

ADDRESSES: Congestion ☐ Connectivity/Access ☑ Parking ☐ Safety ☑
Visitor/User Experience ☑ Environmental Footprint ☐ Economic Vitality ☑

PROBLEM STATEMENT

One of the primary complaints from transit riders is they arrive at a stop on time only to find no bus as scheduled, at which point they are unsure when the bus will eventually arrive or if it arrived early and they missed it. Riders also may not have easy access to route and schedule information when not at a stop or at a computer, as this information can be difficult to review on a transit provider's website using a phone. These issues are magnified in inclement weather, as the willingness of riders to wait at a stop for the next bus diminishes and so does their visitor experience. Additionally, transit providers are interested in obtaining more data about how their system is operating and how riders are using their system.

SOLUTION

Breckenridge (CO) and Steamboat Springs (CO) have both outfitted their fleets with GPS technologies to provide real-time bus tracking to riders via smartphone app and mobile website. These technology packages also enable both operators to collect advanced and more reliable system and rider data.

DESIRED OUTCOMES

- Communicate location of buses in real-time
- Improve rider experience and confidence in the system
- Boost ridership and reduce use of private vehicles to minimize congestion
- Provide system information accessible by mobile devices
- Collect more accurate passenger data
- Track system performance more reliably (on-time performance, buses off route, etc.)
- Reduce customer complaint calls and calls to drivers for location identification, especially in adverse driving conditions to improve safety

IMPLEMENTATION STEPS

- Identify desired tracking data and features, and determine priorities (e.g. customization or ease of implementation)
- Review and select appropriate technology provider (Example: Syncromatics, RouteMatch, DoubleMap, NextBus, etc.)
- Purchase and install automatic vehicle location (AVL) tracking modules for fleet and data management server
- Develop app (if customizable)
- Test tracking, counting, and/or on-board automated announcement features
- Market release of app, including at bus stops and at resorts

TECHNOLOGY PACKAGES

Breckenridge (CO) The Town purchased a suite of products from Syncromatics to track system performance, more accurately count ridership, and automate stop announcements. The suite allowed Breckenridge to create a real-time bus smartphone app (My Free Ride) for their Free Ride transit system. The Town worked to implement the system on both their Free Ride buses and Breckenridge Resort shuttles. The app provides route information, scheduled and projected stop times, and real-time bus location.

Steamboat Springs (CO) The City purchased a program package from RouteMatch primarily for real-time bus location information for use by both riders and the agency. This information is provided through the smartphone app RouteMatch2, which is a universal transit tracking app from which the rider can select the transit system they want to use. Users can also visit the City's website for route, schedule, and real-time bus information or use text messaging to receive information on the next bus arrival.

COST

Breckenridge's system cost $500,000 to implement, which included digital message boards that display next bus arrival information at select bus stops. There is also an annual $10,000 service fee, which includes data plans for communications with buses. Approximately $5,000 was spent on marketing.

Steamboat Springs spent about $160,000 to implement their system, and pays about $20,000 annually for their service package, which includes their data plan for communications. They are currently testing their automated passenger counters (APC), which cost $100,000 to implement and $12,000 annually. Implementation of automatic stop announcements costs $6,000 per bus, with on-going support in-house.

FUNDING

Breckenridge funded their implementation and ongoing costs from the general fund. Steamboat Springs has implemented their system in phases by applying and receiving small 5311 grant funds. This was a factor in their product selection process, as most all-at-once systems cost over $300,000. They are continuing to use this approach to implement future improvements/additions.

PROJECT: TRANSIT SMARTPHONE APP | Breckenridge (CO) | Steamboat Springs (CO) (Cont.)

LESSONS LEARNED

Breckenridge (CO)

- Google Maps must be installed on a phone for the app to work
- Warranty on in-bus hardware is valuable due to expense
- Syncromatics specializes in bus prediction, contracts out for other services, so can be challenging to coordinate depending on issue
- The more features and data provided, the more complex the system is to manage and may require an IT staff person to maintain, especially the in-bus modules (more connections is more complex)
- Android platform is easier to work with, as Apple platform requires a secure connection
- APC helps drivers focus on driving and providing service, and is more accurate, especially for large group boardings

Steamboat Springs (CO)

- Found RouteShout less intensive to implement and maintain than other packages
- Preferred that RouteMatch is located in Denver and provides good customer service
- Real-time information and web apps reduce the number of bus location request calls received
- Real-time tracking provides a safety benefit by allowing drivers to focus on the road, especially during adverse weather conditions, rather than responding to radio requests for location
- APC is challenging when riders have sports equipment
- Automated stop announcement helps with consistency and is available in multiple languages, which enhances visitor experience

Both operators noted their automated stop announcement systems have been unreliable and are still actively working out the issues to fully implement.

PERFORMANCE MEASURES

- Number of downloads / website hits / text requests
- Complaint calls received regarding bus locations
- Track which routes are viewed
- Ridership when APC is implemented

NEXT STEPS

Breckenridge (CO)

- Integrate real-time parking availability into app
- Deploy real-time information displays in buses
- Increase marketing at lodging sites and resorts
- Implement more real-time digital message boards at bus stops
- Provide live tracking information on TVs in lodging lobbies

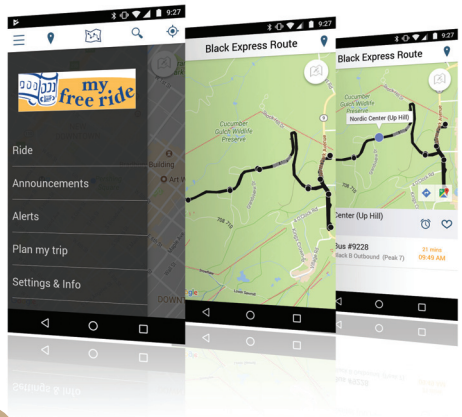
Steamboat Springs (CO)

- Fully implement APC system
- Collect and provide real-time bus occupancy information
- Implement automatic stop announcement system on all buses (currently only on one bus)

OTHER LOCATIONS

Vail (CO) The Town of Vail uses the NextBus app to provide real-time bus tracking. The service costs approximately $50,000/year, which is structured as a per-bus fee and includes real-time information for several digital display boards. NextBus also tracks and maintains historical real-time performance data, which will populate the newly acquired CSched software. CSched uses NextBus historical data to develop optimized transit schedules. Tracking data is also used to validate complaints received from riders. In addition to NextBus, the Town is working with ECO Transit - the regional transit provider for Eagle County - to create a more robust trip planning website that focuses on alternative modes, particularly transit service.

Summit County (CO) The Summit Stage, a regional transit service provided by Summit County, uses DoubleMap for data collection and distribution through a smartphone app and mobile website – a similar system to the one implemented in Breckenridge, but also available through a universal app like RouteShout2. The system cost $500,000 to implement and was funded by the County's transit tax. The County hopes to implement a notification feature in their app that allows users to ask for alerts when a bus is a certain time away.



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REFERENCE MATERIALS

Breckenridge RFP (Appendix B4)

PROGRAM: VelociRFTA BUS RAPID TRANSIT | Roaring Fork Valley

ADDRESSES: Congestion ☑ Connectivity/Access ☑ Parking ☑ Safety ☐
Visitor/User Experience ☑ Environmental Footprint ☑ Economic Vitality ☑

PROBLEM STATEMENT

A majority of Roaring Fork Valley local commuters and visitors use private autos for some portion of their trips. State Highway (SH) 82 - the roadway that links Valley communities between Glenwood Springs and Aspen - is at capacity during peak travel times, causing delays and creating environmental concerns.

SOLUTION

The Roaring Fork Transportation Authority (RFTA) has become the primary regional transportation alternative by offering safe, affordable, convenient, and sustainable transit and trail services year-round for the Roaring Fork Valley. To further address congestion and environmental issues associated with the capacity constraints of SH 82, RFTA deployed the VelociRFTA BRT – the first rural bus rapid transit system in the United States. The service runs along the 42-mile SH 82 corridor serving the City of Glenwood Springs, the Town of Carbondale, the Town of Basalt, the City of Aspen, and is connected to nearby communities and other areas by local transit services and other RFTA routes. VelociRFTA provides rail amenities on rubber tires, including reduced capital costs, on-street operations, and comfortable passenger stations. Intelligent transportation systems provide passenger counting, real-time bus tracking, onboard Wi-Fi, and speedy fare collection. VelociRFTA travel times are competitive with the private auto by using strategically placed queue bypasses and limiting the number of stops between the beginning and end points of the route. Buses for the service are fueled by compressed natural gas (CNG), providing operational efficiencies, decreased tailpipe emissions, and reduced noise.

COST

RFTA bonding authority: $21.23 million

Federal Transit Administration Very Small Starts grant: $24.97 million

IMPLEMENTATION STEPS

- Identify current and future needs in the corridor
- Design and evaluate alternatives to achieve goals
- Apply for Very Small Starts grant
- Begin project development
- Gain voter support
- Complete advanced project planning
- Receive planning and building approvals
- Finalize design
- Construct the system
- Test the new system and begin operation
- Update the system with necessary improvements

PERFORMANCE MEASURES

- RFTA ridership
- Public support
- Environmental impact
- Relationship with state/federal funding partners

DESIRED OUTCOMES

- Increase popularity of public transportation
- Improve the public transit experience through improved facilities and services, better reliability, and increased frequency
- Contribute to the reduction of regional greenhouse gas emissions
- Reduce dependence on oil

FUNDING

- Residents and visitors via a dedicated regional sales and use tax
- FTA Very Small Starts Grant
- CDOT grants for IT upgrades to the existing non-BRT fleet that support VelociRFTA
- CDOT right-of-way lease agreements along SH 82

LESSONS LEARNED

- Expect park and ride capacity strain during peak hours and in peak seasons
- Create long-term capital replacement plan
- Prepare for intensified competition for bus operators, skilled mechanics, and facilities workers
- Organize a Facilities Master Plan
- Need for additional coordination with local systems connecting to BRT

PROGRAM: VelociRFTA BUS RAPID TRANSIT | Roaring Fork Valley

(Cont.)

NEXT STEPS

- Continue community outreach, including increased public awareness of the Destination 2040 Plan
- Create a Bus Operator/Passenger Security Plan
- Negotiate agreements with Aspen Skiing Company
- Expand on Google Transit use, such as utilizing real-time bus location
- Conduct a fare study
- Update the RFTA 5-Year Strategic Plan
- Complete the Integrated Transportation System Plan
- Identify and secure grants to fund capital construction projects
- Finish construction of highway improvements and pedestrian crossings for better travel reliability and access
- Pursue a potential property tax ballot initiative in November 2018

Snowmass Village (CO) recently implemented a high-frequency regional service to better connect the Town and its local services to the VelociRFTA BRT service to leverage its frequency and reliability. The previous Snowmass Village service had a frequency of 30 minutes. This left riders connecting from VelociRFTA with long transfer wait times, diminishing the purpose of the BRT service. The new service has a frequency of 15 minutes, making the connection more convenient. The route saw a 6 percent increase in ridership in May 2018 compared to May 2017 when the less-frequent service was in place. The more frequent service will cost $300,000 to operate during the spring, summer, and fall of 2018.

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FELSBURG HOLT & ULLEVIG

PROGRAM: WIRELESS TRAFFIC MONITORING | Banff (AB)

ADDRESSES: Congestion ☑ Connectivity/Access ☐ Parking ☐ Safety ☐
Visitor/User Experience ☑ Environmental Footprint ☐ Economic Vitality ☐

PROBLEM STATEMENT

Banff plays host to a variety of visitors, with some staying for several days, while others make their visit a day trip. Different visitors have different needs, such as where to park and their willingness to use alternative modes based on how much time they have to spend in Banff. Congestion has been increasing, yet visitors may not realize how much time they are spending in traffic.

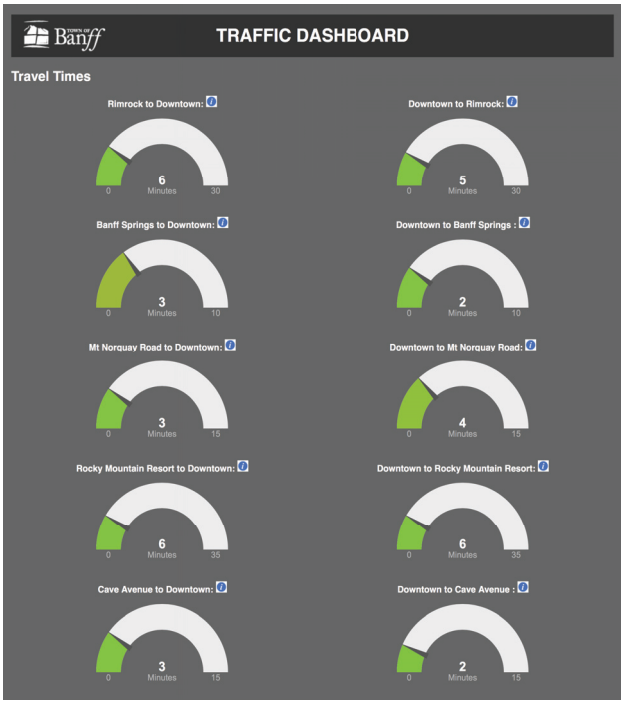
SOLUTION

Banff has deployed 12 BluFax devices along several major travel corridors to collect travel information. BluFax is a wireless monitoring technology that anonymously tracks wireless-enabled devices to measure origin/destination trends, travel time, length of stay, and repeat visit frequency. This information is used to better identify transportation needs and solutions to meet the unique needs of the different types of visitors, such as aiding in traffic forecasts and where/how to market alternative modes. It is also used to feed a live traffic website (dashboard.banff.ca) that provides travel times to visitors and is used by City staff to preemptively trigger green lights to clear severely congested roadways at specific locations.

DESIRED OUTCOMES

- Provide travel times to visitors
- Identify travel patterns of different visitor types
- Use to inform when to preempt green signals
- Focus marketing efforts
- Compare how travel patterns/behaviors change over time
- Monitor transportation goals and objectives, such as mode share targets

Ft Collins (CO) has been using BlueTOAD technology to collect travel time and speed information. This information is used by equipped traffic signals to select a predetermined signal timing plan to best accommodate live traffic conditions.



Banff live travel times http://dashboard.banff.ca/

IMPLEMENTATION STEPS

- Identify metrics to collect
- Select locations to monitor in order to make desired conclusions from data collected, such as mode share at entrance points or travel time from highway to downtown
- Review and select best product to meet needs (Blyncsy and TrafficCast - which makes BlueTOAD and acquired BluFax - are other makers of similar products)
- Acquire additional data analytics applications, if not done in-house
- Develop information distribution products (website, smartphone app, dynamic message boards, etc.), if desired
- Deploy wireless monitors

COST

About $3,200 per wireless monitor, which does not include installation or operational costs.

FUNDING

General fund

(Cont.)

LESSONS LEARNED

- Deployment and maintenance, including the website, are IT intensive.
- Congestion can reach a certain severity where green light preemption creates long waiting times for pedestrians to cross streets.
- Demonstrating the data collected and the direct benefits of having this information about visitors helped sell the project to residents.
- Important to have consistent deployment spacing for some comparing reporting metrics.
- Potential for latency issues on a combined fiber/cellular network.

PERFORMANCE MEASURES

- Reduced delays from implementing green light preemptions
- Mode share by location (93% arrive by personal vehicle; more people using private vehicles and transit compared to last year)
- Average travel times by origin/destination
- Traffic counts
- Length of stay and visit frequency (51% are day visitors, 62% are repeat visitors)

NEXT STEPS

The Town is actively pursuing the deployment of BluFax monitors outside the Town's boundaries to better understand where visitors are coming from and when they are traveling to improve regional transit connections. This type of technology could also be used to help implement congestion pricing.

Blyncsy wireless monitor deployed in Park City (UT)

Park City (UT) | Summit County (UT) | Utah Department of Transportation (UDOT)

Park City is in the middle of a 3-year pilot project implementing Blyncsy - a wireless traffic monitoring provider who offers the infrastructure as a service. Monitors are owned and deployed by Blyncsy in order to avoid privacy concerns of a government agency collecting travel pattern data of citizens. Like the system in Banff, Blyncsy anonymizes the data it collects. Unlike Banff who owns the infrastructure and processes the data for display, Blyncsy offers it through a portal that Park City accesses to obtain information such as travel times, travel trends including origin and destination information, heat maps, and more. Monitors cost about $2,500 per location per year, which can vary based on service agreement length and power supply type (hard-wired or solar). The service also allows for unlimited licenses for data access.

Blyncsy also shares data from customers within the same state with each other, allowing Park City to view Summit County and UDOT data, both of which are customers of Blyncsy as well. Specifically, Park City utilizes information collected at the Salt Lake City Airport and along I-80, as well as coordinating traffic signal cycle changes remotely with UDOT based on traffic conditions. Park City also uses the data it accesses to communicate travel times, send text alerts regarding traffic conditions, populate variable message signs, and deploy extra buses during peak use periods. Resorts are also customers, receiving a waiver of some impact fees for implementing Blyncsy.

Summit County offers a publicly-accessible visualization of its Blyncsy data that allows visitors to track travel trends and compare them against real-time current conditions and County performance measures - a feature that may be deployed in Park City in the future. Blyncsy is also being deployed to better track festival attendance, such as the Sundance Film Festival in Park City. And Blyncsy recently received a Utah Science Technology and Research (USTAR) grant to integrate connected vehicles technology into its system to deploy signal prioritization for snow plows.

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REFERENCE MATERIALS

Sample analyses using this data (Appendix B5)

KETCHUM (ID) - Bikeshare

ATTEMPTED SOLUTION

The City of Ketchum has had a form of bikeshare in place since 2013. The initial program used a grant to deploy 40 dock-based bikes throughout the city that used a credit card payment system and contained GPS tracking. The program cost approximately $8 a month per bike, which the City broke even on. With the bikes receiving less use than expected and some sustaining damage, the City cut back the program in 2017 to 14 bikes, removing the hardware on each bike and making them free to use without docking requirements.

Mountain Rides Bikeshare

LESSONS LEARNED

- Initial bikeshare was primarily used by visitors, as most Ketchum residents own bikes. However, there are six bike shops in town that offer rentals, so even visitors did not use the service frequently, as bikeshare bikes were heavy and more cumbersome to use.
- Once bikes were made free and dockless, qualitative observations suggested that use increased, but there was no way to collect data on how the bikes were being used and their positioning could not be controlled.

CORRECTIVE STEPS

Recognizing that making the bikes easier to use increased demand, the City has partnered with a local hospital to bring 28 formal hub-based dockless bikes into operation in 2018. The hospital is covering the $8/month/bike fee as part of its public health initiative. The bikes will be equipped with GPS tracking, allowing the City to focus the placement of the bikes to facilitate first/last mile connections with transit. The City plans to supplement these bikes with electric pedal assist bikes (e-bikes) to generate interest in bicycling and encourage longer-distance bike trips in place of using a passenger vehicle.

JACKSON (WY) - Parking Enforcement

ATTEMPTED SOLUTION

The Town of Jackson currently has a 3-hour parking limit in its downtown core and has been experiencing parking supply issues. However, license plate monitoring has shown that parking is frequently used by employees who have learned how enforcement is conducted. This was a common issue noted by many resort-based communities.

Jackson (WY) The Town of Jackson has also recently implemented a hub-based dockless bikeshare program. They conducted a feasibility study, implemented a pilot program to gather data, and worked with local bike shops to complement their services when rolling out the formal program by pricing the bikeshare to promote short trips (< 30 minutes). Jackson also reported an increase in e-bike use and is considering them for their bikeshare as well.

LESSONS LEARNED

- Drivers who park daily in the time-restricted area learn how to bypass enforcement through understanding the amount of time it takes to fully validate how long each car has been parked and reshuffling spaces to reset their time limit.
- Businesses still believe more parking is needed.

CORRECTIVE STEPS

The Town noted that they are looking into reducing time limits, creating a satellite parking lot with shuttle for employees, and paid parking – all solutions that can help alleviate this issue. Other ideas could include instituting a “no re-parking” policy to avoid reshuffling, mixing up enforcement schedules, and increasing enforcement.

TETON VILLAGE (WY) - Ridesharing Service

ATTEMPTED SOLUTION

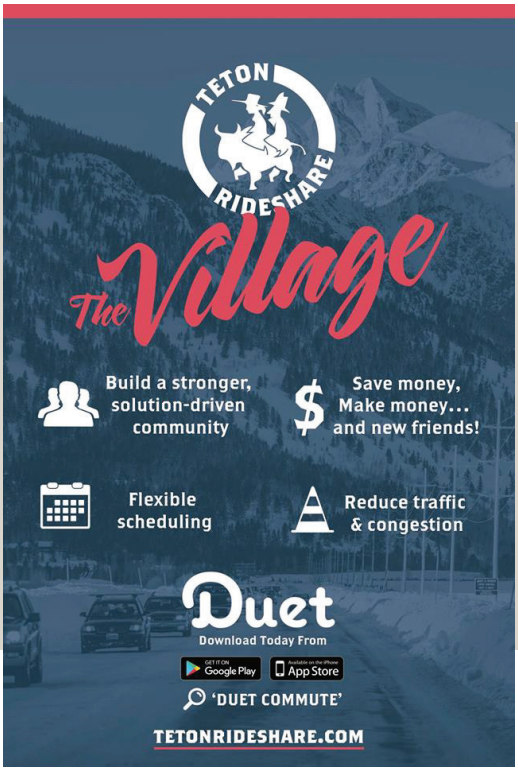
Teton Village has successfully implemented several transportation demand management strategies (TDM), having had a TDM program in place since its inception. In an effort to add to its TDM offerings, it partnered with Duet, which packages carpooling as a rideshare smartphone app that pairs drivers and riders. Despite having 200 registered users and committing $5,000 in incentives to entice commuters to use the service, few have participated regularly.

LESSONS LEARNED

- Duet is designed primarily for traditional work schedules that are consistent. However, most employees in Teton Village work varied schedules, making it difficult for the app to find commuting pairs.

CORRECTIVE STEPS

Carpooling can be a great TDM tool to combat congestion, especially when the workforce of an area is focused around specific industries and employment centers. Additionally, facilitating carpooling through a smartphone app makes it much easier for users. However, this technological advancement alone cannot make carpooling a more viable option for employees. Complementary steps from employers might be necessary, such as increased coordination of employee schedules, to make carpooling more impactful.



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