WASATCH CHOICE VISION

2023-2050 RTP Update

RGC Technical Advisory Committee // December 16, 2020

2023-2050 Regional Transportation Plan Process

2020	2021	2022-2023
Explore the uncertainty of the future	Test planning ideas and identify projects	Phase and implement projects

WASATCH CHOICE VISION

Process Goals for Wasatch Choice and 2023-2050 RTP

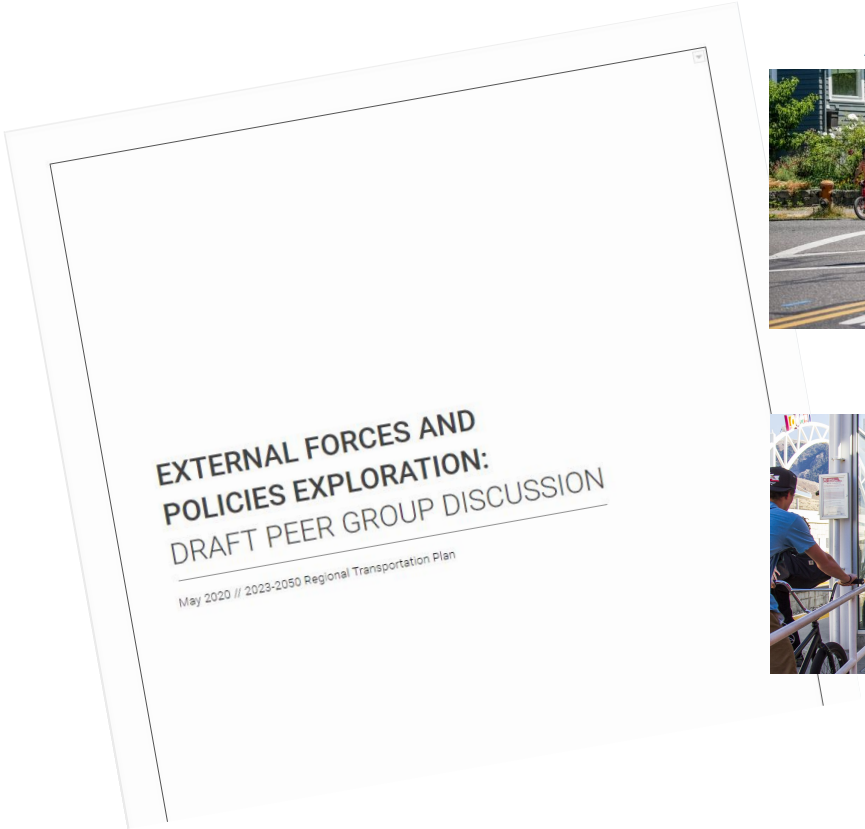
1. Engage communities, partner agencies, stakeholders, and the public in the planning process.
2. Provide resources to help local communities to implement the Regional Vision.
3. Address external forces and uncertainties, including COVID-19.
4. Explore policies, including changes in investment frameworks.
5. Coordinate regional transportation with local land use considerations and plans.
6. Utilize a performance-based approach to planning, including using performance measures to inform interim decisions.

WASATCH CHOICE VISION

External Forces and Policies

WHAT IS LIFE LIKE IN 2050?

Where We've Been



Peer Groups

ACTIVE TRANSPORTATION

ROADWAYS

TRANSIT & ON-DEMAND

LOCAL COMMUNITY

WASATCH CHOICE VISION

Where We've Been - Peer Groups

1. Active Transportation
2. Local Communities
3. Roadways
4. Transit & On-Demand

External Forces
Discuss forces and provide feedback

Potential Policies
Discuss policies and provide feedback

- Establish future scenarios
- Test policies and investments under scenarios
- Invite policy makers to consider action

WASATCH CHOICE VISION

Where We've Been - Streamlining Forces and Policies

FORCES

1. Connected and autonomous vehicles
2. High-tech transit systems
3. ~~Inter-regional high-speed transit~~
4. Micro-mobility adoption
5. E-Bike adoption
6. ~~Electric vehicle adoption~~
7. On-demand travel and sharing services
8. Freight disruptions
9. Internet shopping
10. Drones
11. Telecommuting

POLICIES

1. ~~App development~~
2. Congestion pricing
3. Curbside management
4. Fare-free transit
5. Local street design
6. Managed lanes
7. ~~Micro-transit~~
8. Modernization of parking regulations
9. Road usage charge
10. Street connectivity
11. ~~Subsidized e-bike purchases~~

WASATCH CHOICE VISION

External Forces and Policies

EXTERNAL **FORCES**

COVID-19

CONNECTED & AUTONOMOUS VEHICLES

HIGH-TECH TRANSIT SYSTEMS

MICRO-MOBILITY & E-BIKES

ON-DEMAND TRAVEL & SHARING SERVICES

E-COMMERCE & DELIVERY

TELECOMMUTING

EXTERNAL **POLICIES**

CONGESTION PRICING

CURBSIDE MANAGEMENT

FARE-FREE TRANSIT

LOCAL STREET DESIGN MODIFICATIONS

MANAGED LANES

PARKING MODERNIZATION

ROAD USAGE CHARGE

STREET CONNECTIVITY

WASATCH CHOICE VISION

Where We're Going

1. Research external forces and their impact to transportation, land use, and economic development
2. Develop ranges of implementation to test in scenarios
3. Develop performance measures and targets
4. Run and test scenarios
5. Combine test scenarios into draft preferred forces scenario
6. Test policies against draft preferred forces scenario
7. Finalize forces and policies into a preferred scenario

WASATCH CHOICE VISION

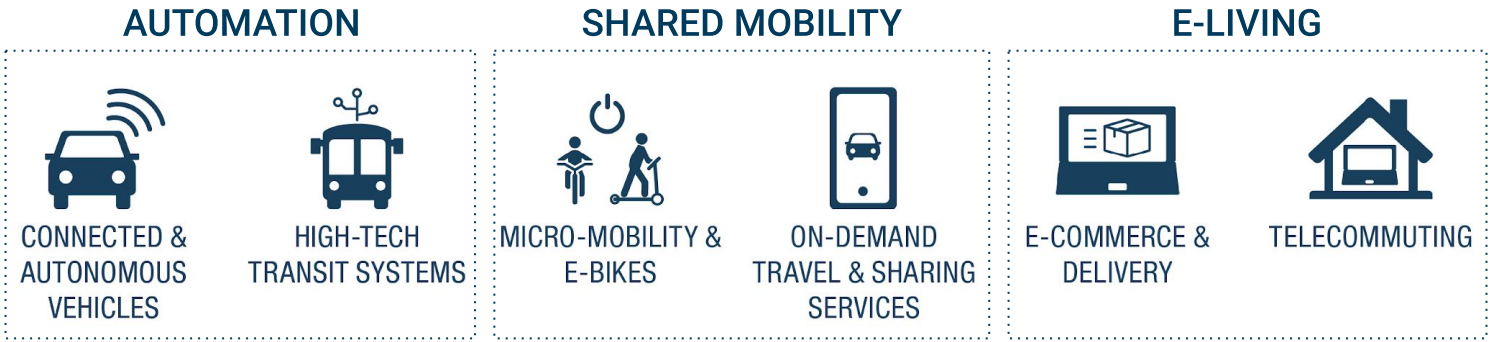
Where We're Going

1. Research external forces and their impacts
2. Develop implementation ranges and performance measures and targets
3. Run and test scenarios to develop draft preferred forces scenario
4. Test policies against draft preferred forces scenario
5. **Finalize forces and policies into an ULTIMATE preferred scenario**

WASATCH CHOICE VISION

Scenario Development

Three Scenarios with Emphasis on:



\+ Base 2019 RTP Scenario

WASATCH CHOICE VISION

Scenario Development

	AUTOMATION			SHARED MOBILITY		E-LIVING		
	CONNECTED VEHICLES	AUTONOMOUS VEHICLES	HIGH-TECH TRANSIT SYSTEMS	MICRO-MOBILITY AND E-BIKES	ON-DEMAND TRAVEL AND SHARING SERVICES	E-COMMERCE (DELIVERY)	E-COMMERCE (SHOPPING)	TELECOMMUTING
Base scenario	No Implementation			Minimal Implementation		Minimal Implementation		
Scenario 1: High Automation	High			Medium		Low		
Scenario 2: High Shared Mobility	Medium			High		Medium		
Scenario 3: High E-Living	Low			Low		High		
Preferred Forces Scenario	TBD			TBD		TBD		

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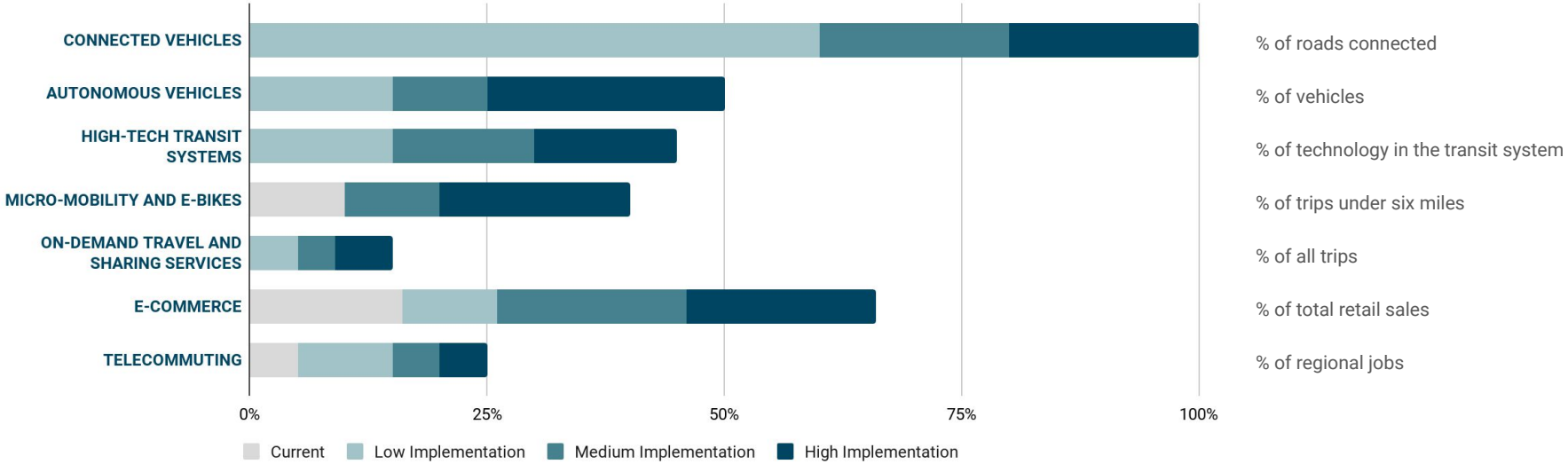
Ranges of Implementation in 2050



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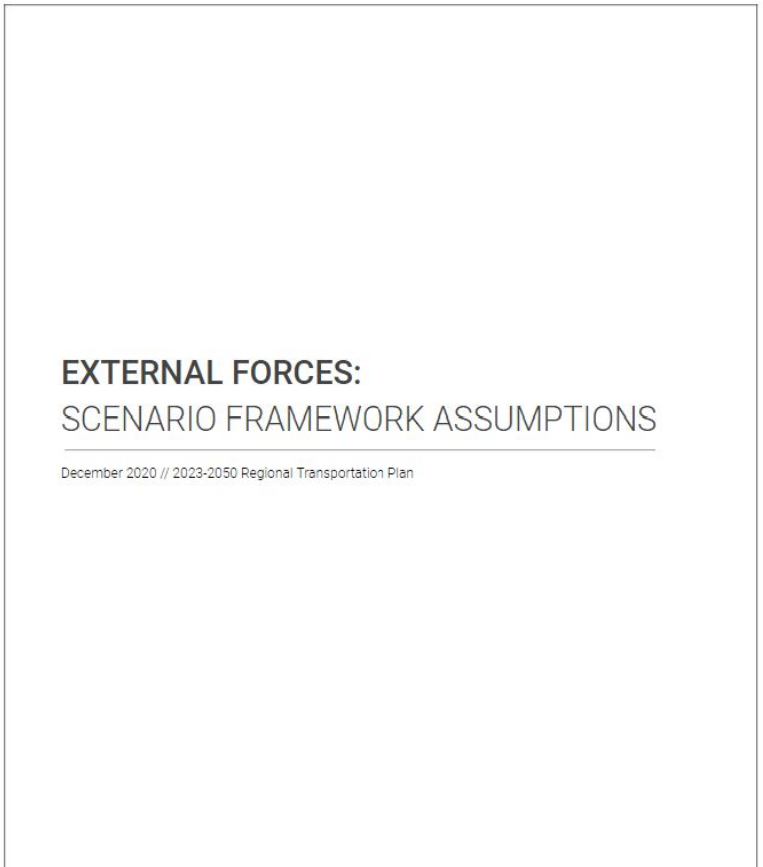
Technical Documentation



- General trends
- Implementation ranges and rationale
- Sources
- Model integration

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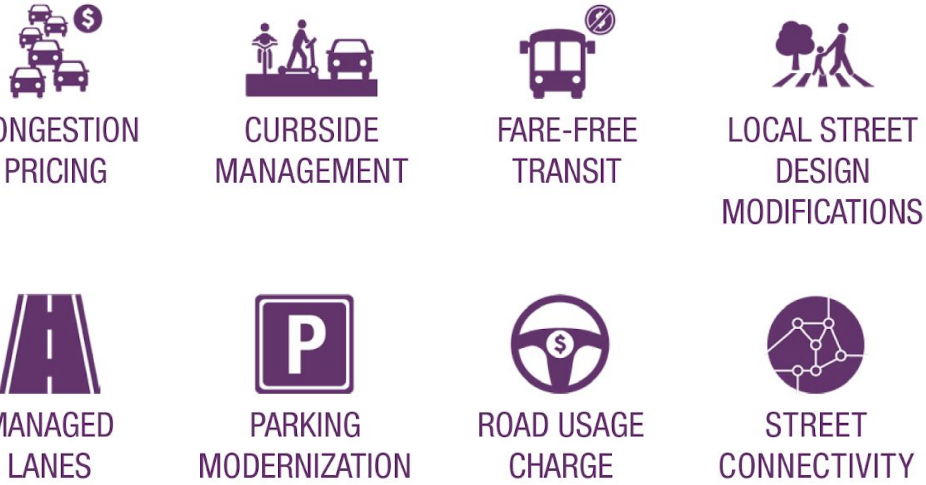
Exploring Policies



\+ App development

\+ Subsidized e-bike purchases

WASATCH CHOICE VISION

Exploring Policies

EXPLORE WITH TECHNICAL SUPPORT

CONGESTION PRICING

FARE-FREE TRANSIT

MANAGED LANES

ROAD USAGE CHARGE

EXPLORE THROUGH ADDITIONAL STUDY

STREET CONNECTIVITY

EXPLORE THROUGH CONVERSATIONS

CURBSIDE MANAGEMENT

PARKING MODERNIZATION

LOCAL STREET DESIGN MODIFICATIONS

ONLY INCLUDE IN DOCUMENT

App development

Subsidized e-bike purchases

WASATCH CHOICE VISION

Recently Completed and Ongoing Projects Previously Mentioned:

UDOT STUDIES	UTA STUDIES
Southwest Salt Lake County Transportation Study	FrontRunner Next Steps
I-15 Statewide Study	Southwest Salt Lake County Transportation Study
Northeast Tooele Study	Point of the Mountain Transit Study
11400 South	South Davis - Salt Lake Connector EIS
SR-126	Tooele Transit Study
7300 West / SR-111	Local Link
Statewide Managed Lanes Study	Mobility Hubs
Connected Vehicle Study	Future of LRT
9000 South / SR-111	Micro Transit
US-89 / SR-13	

What additional projects should be included to explore?

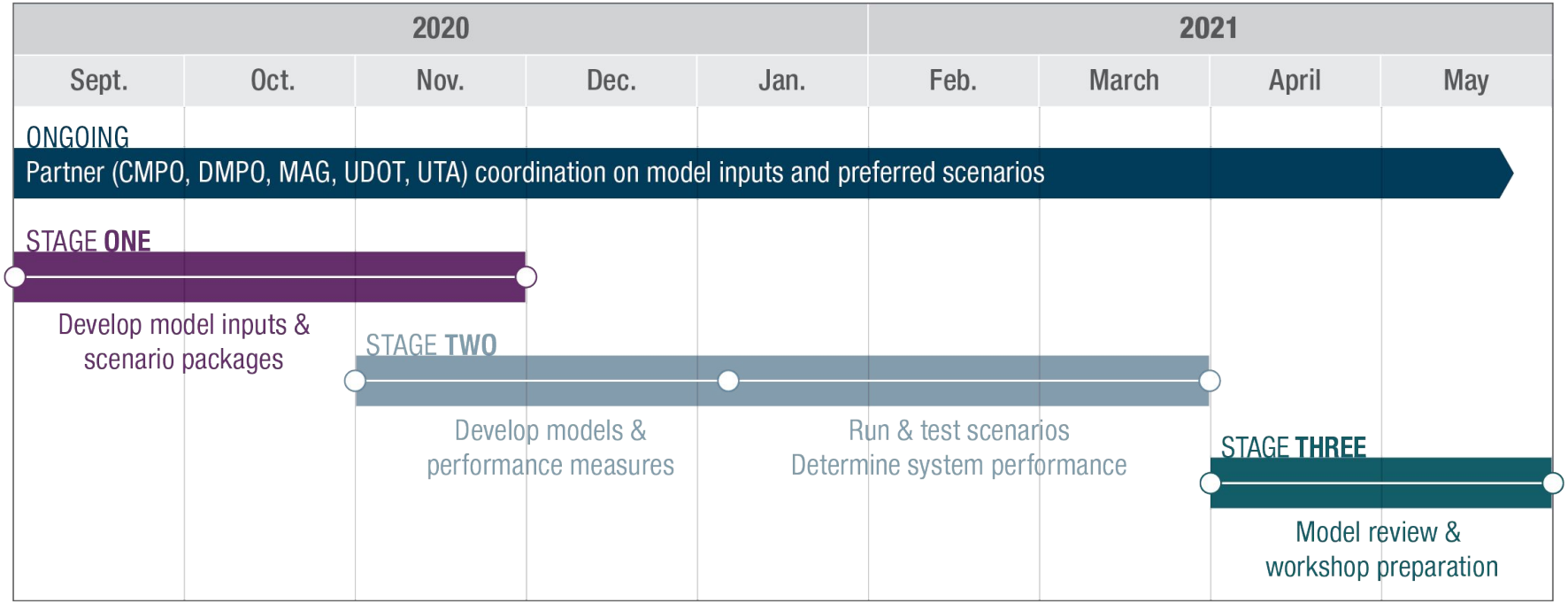
Measuring Outcomes

- Comparing scenarios, not projects
- Mix of qualitative and quantitative measures
- Potential carry-overs from the last plan:
  - Access to opportunities
  - Truck speeds on freight corridors
  - Auto travel time
  - Transit use
- Other things to consider:
  - Walk and bike use
  - VMT
  - Equity
  - Safety

What are you interested in exploring at the system-level?

WASATCH CHOICE VISION

Schedule



WASATCH CHOICE VISION

Freight Stakeholder Meeting

Freight Stakeholder Group

- Get better understanding of transportation challenges industries face in the region
- Share External Forces + Policies RTP Initiative
- Build partnerships with local delivery, warehousing, and freight groups

MEETING PARTICIPANTS

- Regional Retail/Wholesale Suppliers with distribution centers in the Wasatch Front
  - Freeport Center
  - Boyer Company
  - Associated Foods
  - Admiral Beverage Corporation
  - Lifetime Products
- Aviation and Rail Representatives
  - BNSF, Union Pacific
  - Deseret UAS
  - City Airports
- UDOT
- Utah Inland Port Authority
- Point of the Mountain
- West Valley City

WASATCH CHOICE VISION

Comments from Group Discussions

REFLECTION ON TODAY

- Shortage of trucks and truck drivers
- More truck volume on roadways, but less change in total amount of goods
- Packaging volume is not a concern
- Increases in delivery stops
- Congestion in and around freight centers and roadways servicing these areas
- Opportunity to increase development of industrial uses around airports

EXPLORING THE FUTURE

- Distribution centers will “hold” larger quantities of goods
- Buildings will continue to rise (in height) to accomodate more goods
- Continued automation at warehouses
- GPS tracking of truck deliveries
- Repurposed retail spaces
- Autonomous and electric trucking in the future

WASATCH CHOICE VISION

Freight Stakeholder Group

- Reconvene Spring 2021
- What might be of interest for communities regarding freight that you would like brought up in this group?
- Additional stakeholder members
  - Do you know of businesses that we should reach out to participate in this group?
  - Are you a community with freight oriented uses interested in participating?

WASATCH CHOICE VISION

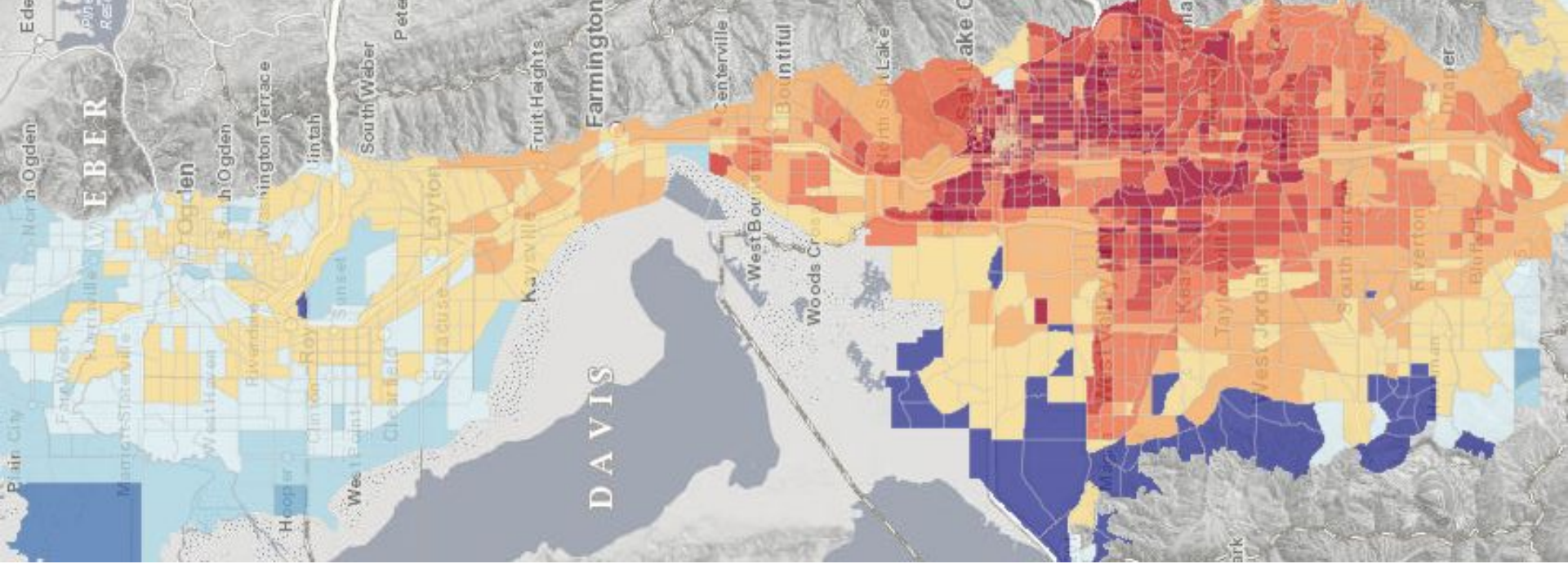
Preview of 2021

We need your help

What aspects might you be interested in getting involved/providing review?

- Local Transportation Revenue + Expenditures
  - Local maintenance and operation expenditures
  - General Fund local transportation spending
  - Cost per mile of infrastructure (for city roads) and right-of-way costs
- Street Connectivity Ordinances
- Socioeconomic data
- Centers refinement

WASATCH CHOICE VISION



WASATCH CHOICE VISION

Access to Opportunity

RGC Technical Advisory Committee // December 16, 2020

Access to Opportunities (a.k.a ATO, Accessibility, Access to Destinations)

A framework for considering how efficiently **connections** are made to:

- Employment,
- Basic needs, &
- Community amenities.

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Access to Opportunities (ATO)

Mobility: speed of travel

WASATCH CHOICE VISION

Access to Opportunities (ATO)

Mobility: speed of travel

Proximity: distance apart

WASATCH CHOICE VISION

Access to Opportunities (ATO)

Mobility: speed of travel

+

Proximity: distance apart

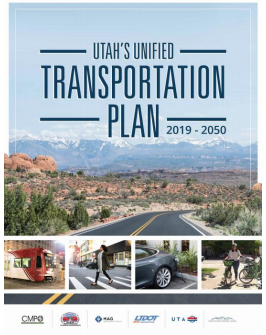
=

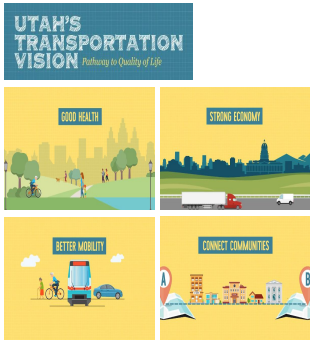
Accessibility: ease of reaching key destinations

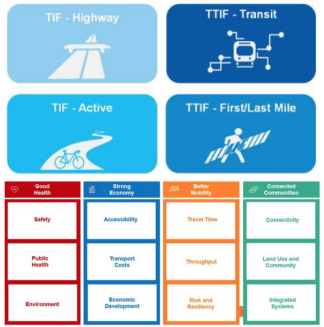
WASATCH CHOICE VISION

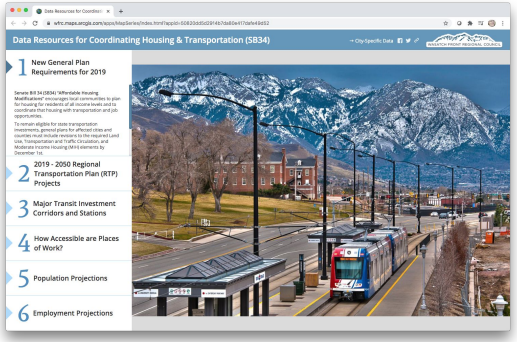
ATO in Regional Planning

- State and regional visioning
- Transportation planning processes
- Project prioritization
- Local land use planning
- Performance measures









WASATCH CHOICE VISION

Why ATO?

Strong alignment with Utah and Regional goals

- **Quality of Life:** UVision/Unified Plan framework
- **Economic development:** positioning Utah for success
- **Efficiency:** maximize return on investment
- **Equity:** supporting underserved or historically disadvantaged areas

WASATCH CHOICE VISION

How ATO Changes

ATO **Increases:**

- Increase speed of travel
- Provide mode choices
- Cluster housing near transportation infrastructure
- Cluster jobs and amenities near housing

Transportation and development projects like these...

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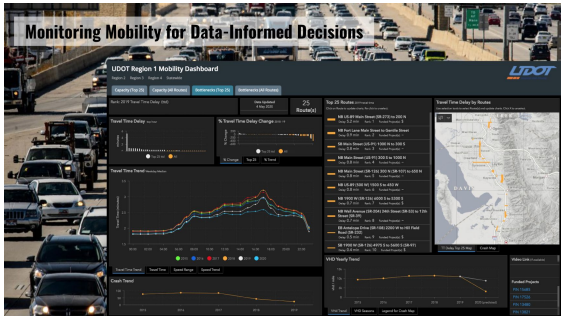
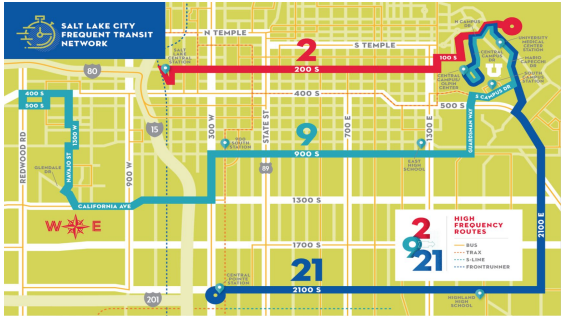

Monitoring Mobility for Data-Informed Decisions
UDOT Region 1 Mobility Dashboard


UDOT
Click to add text
I-15 NB Collector / Distributor System
PROJECT MAP


SALT LAKE CITY FREQUENT TRANSIT NETWORK
2
9
21
HIGH FREQUENCY ROUTES
BUS
TRAX
S-LINE
FRONTRUNNER


Ogden WSU Bus Rapid Transit (BRT)


Parley's Trail - Sugarhouse


Utah State University - Tooele Campus
Orchard Springs Elemetary - Pleasant View


Transit-Oriented Development


Flex Lanes - Taylorsville


Daybreak Parkway
LIVE HERE
or
WORK HERE
or
BOTH!

How can you use ATO?

How to Use ATO

Many ways to increase ATO. **What matters most?**

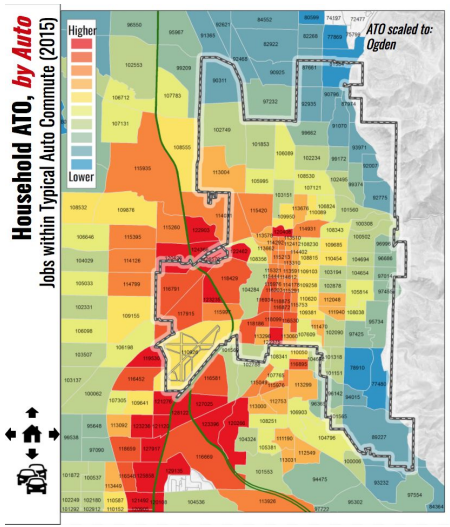
- **ROI:** what changes provide most gain for $$$ spent?
  - Ongoing contribution toward a thriving economy
  - What are capital + ongoing costs to the public?
  - What are ongoing costs to users?
- **Lasting:** what gains will endure for years, decades, generations?

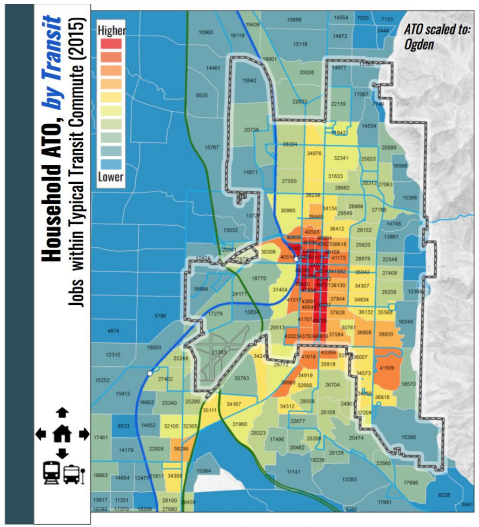
WASATCH CHOICE VISION

How WFRC Measures + Applies ATO

01 Workplace accessibility (TAZ-based)

- From the Travel Demand Model
  - Can forecast future ATO and gains (RTP scenarios, projects)
- For auto or transit modes
- From perspective of:
  - Households
  - Employers/businesses



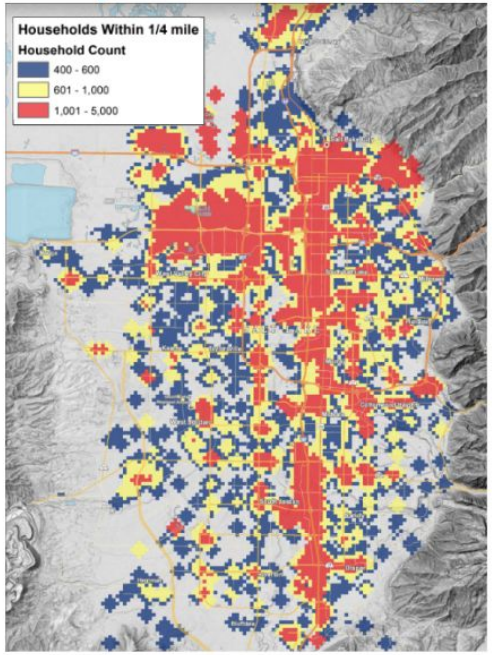


How WFRC Measures + Applies ATO

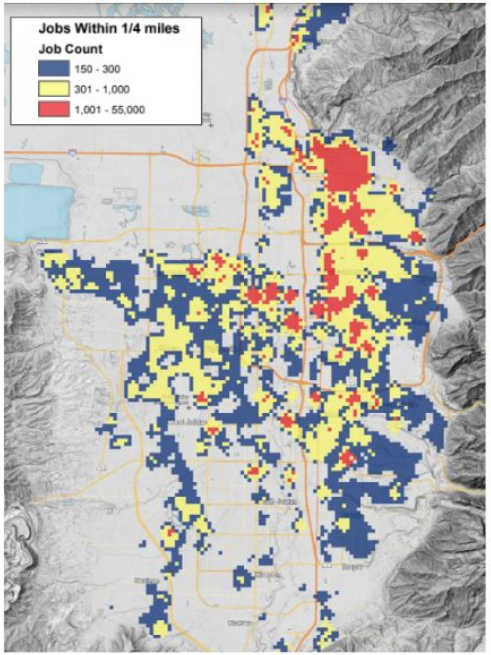
02 Nearby housing and job intensity (grid-based)

- Households with ¼ mile
- Jobs within ¼ mile

Nearby Household Intensity



Nearby Employment Intensity



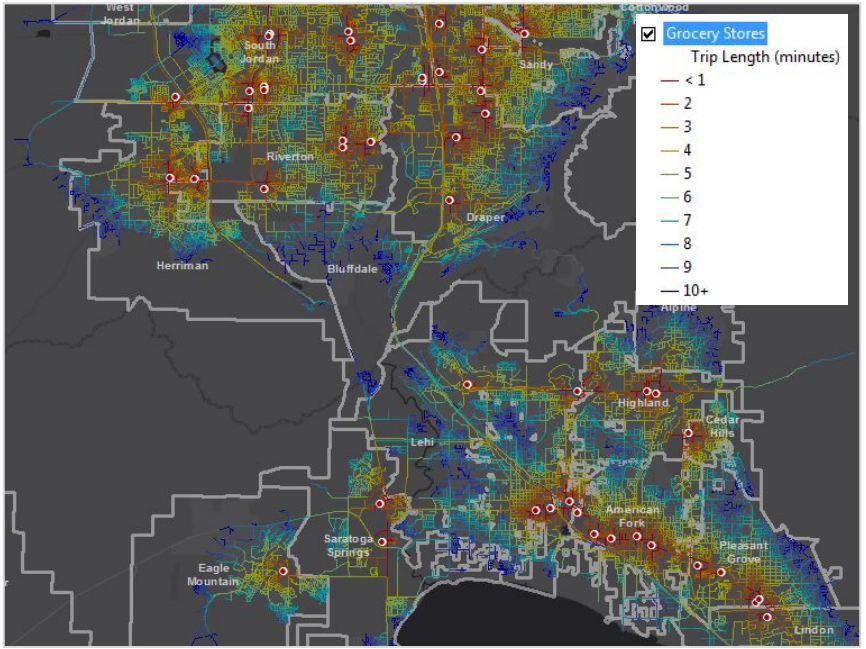
STP Project Prioritization

How WFRC Measures + Applies ATO

03 Access to key destinations

- Community centers + services
- Grocery Stores
- Hospitals & Clinics
- Parks & Recreation
- Retail Centers
- Schools
- Transit Stations

Grocery Access Drive Times



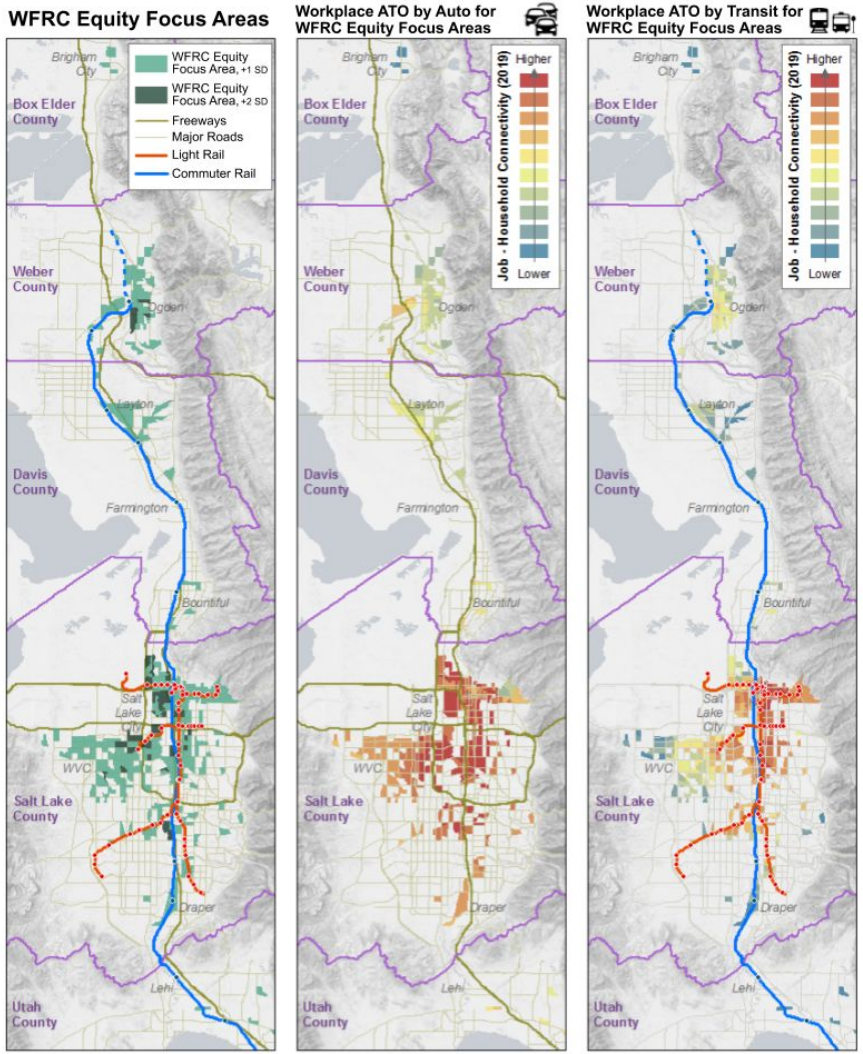
STP Project Prioritization

ATO + Equity Lenses

Areas for additional consideration in WFRC's planning process:

Census block groups

- **Low income** (>25%)
- **Racial/ethnic minority** (>40%)
- **Zero-car households** (>10%)



Increasing ATO, a quick sketch:

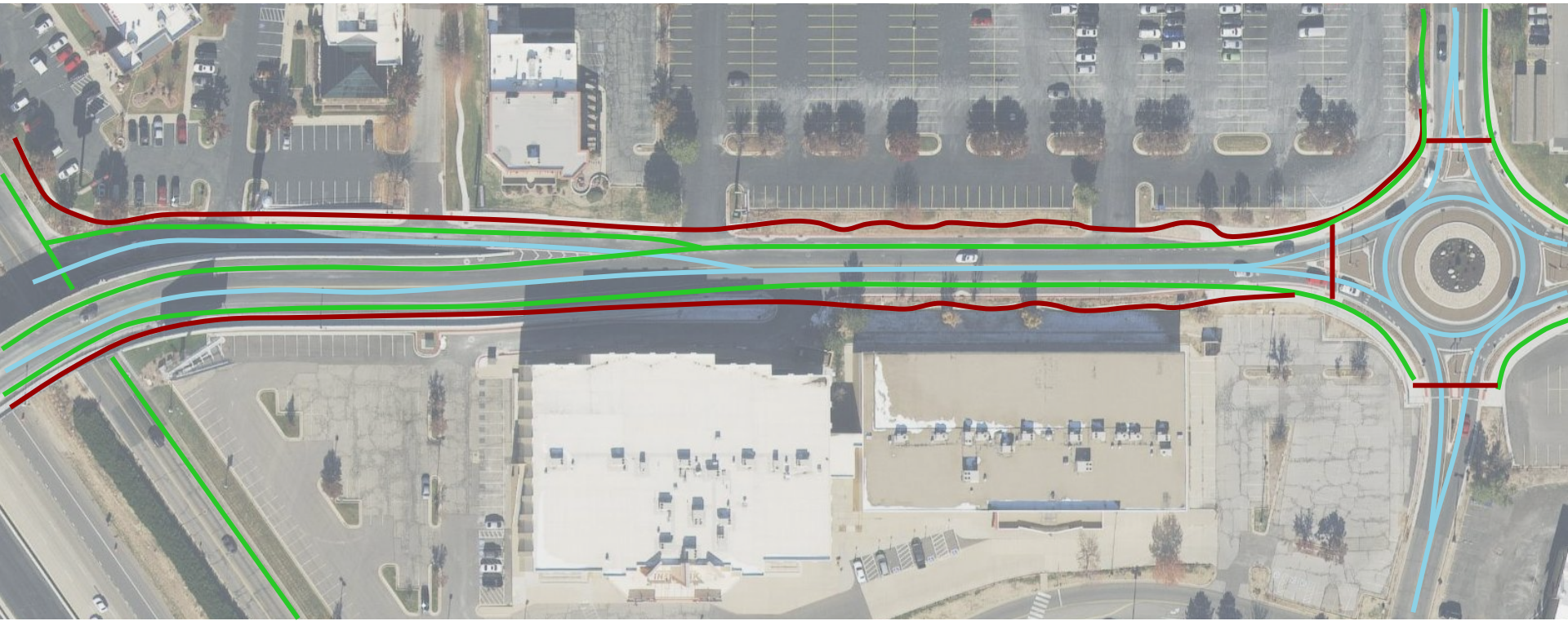
Layton Midtown Crossing Project

2017
before project

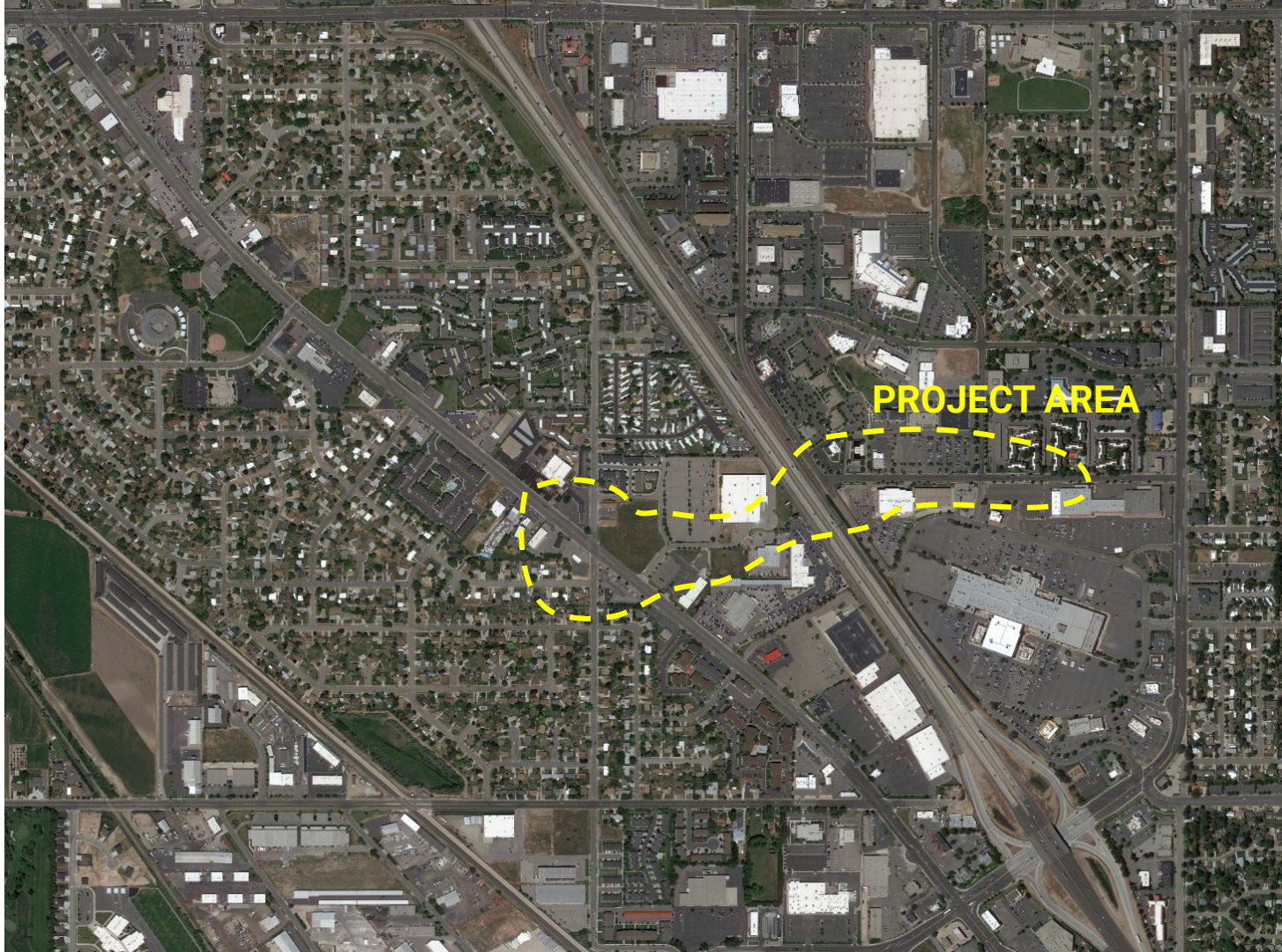
2018

Midtown Crossing & Realignment Project Completed

New auto, bike, and pedestrian connections across I-15



2017
before project

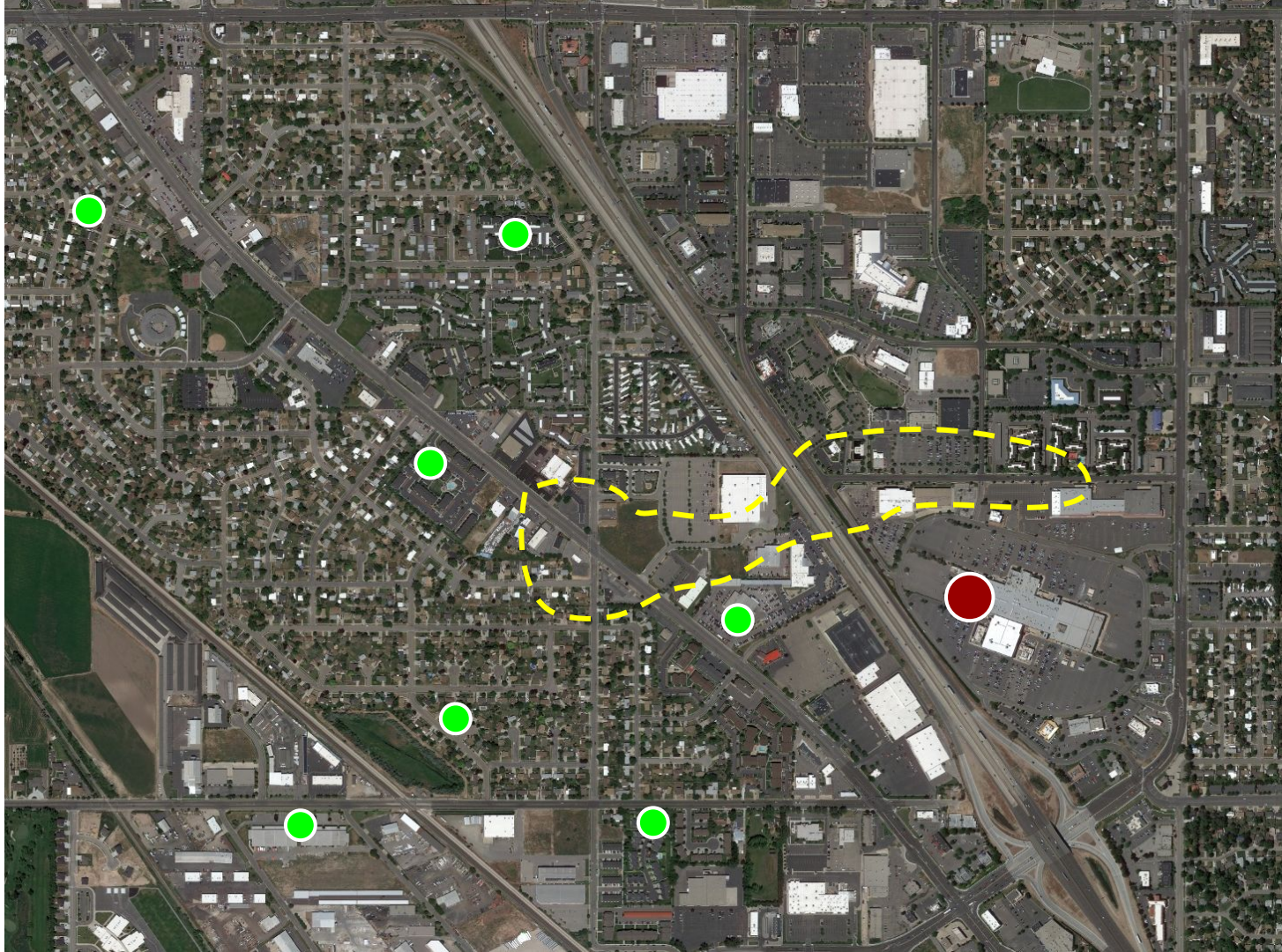


2017

before project

= Sample Residences

= Key Destination



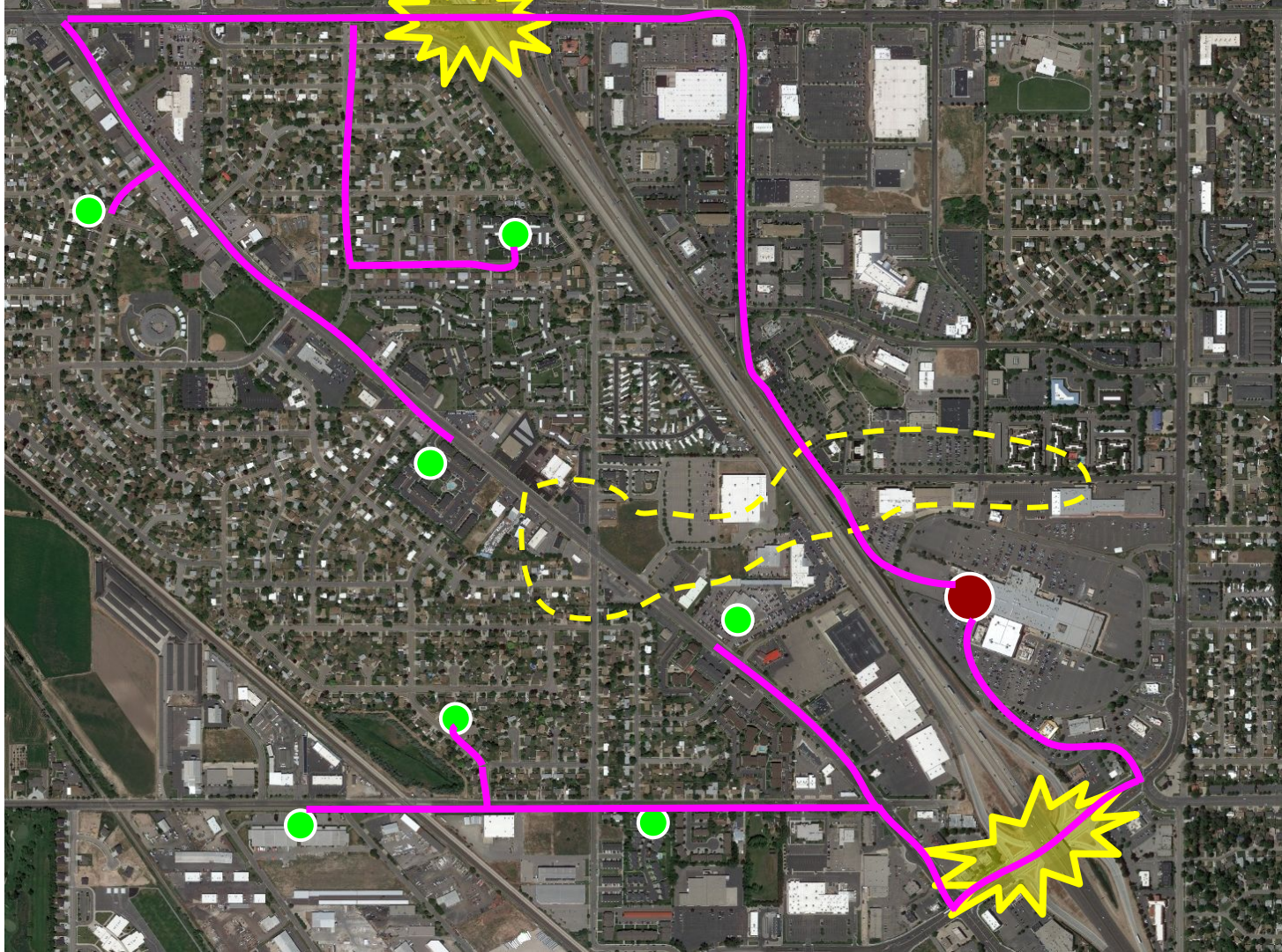
2017

before project

= Sample Residences

= Key Destination

= Shortest Path Connectors



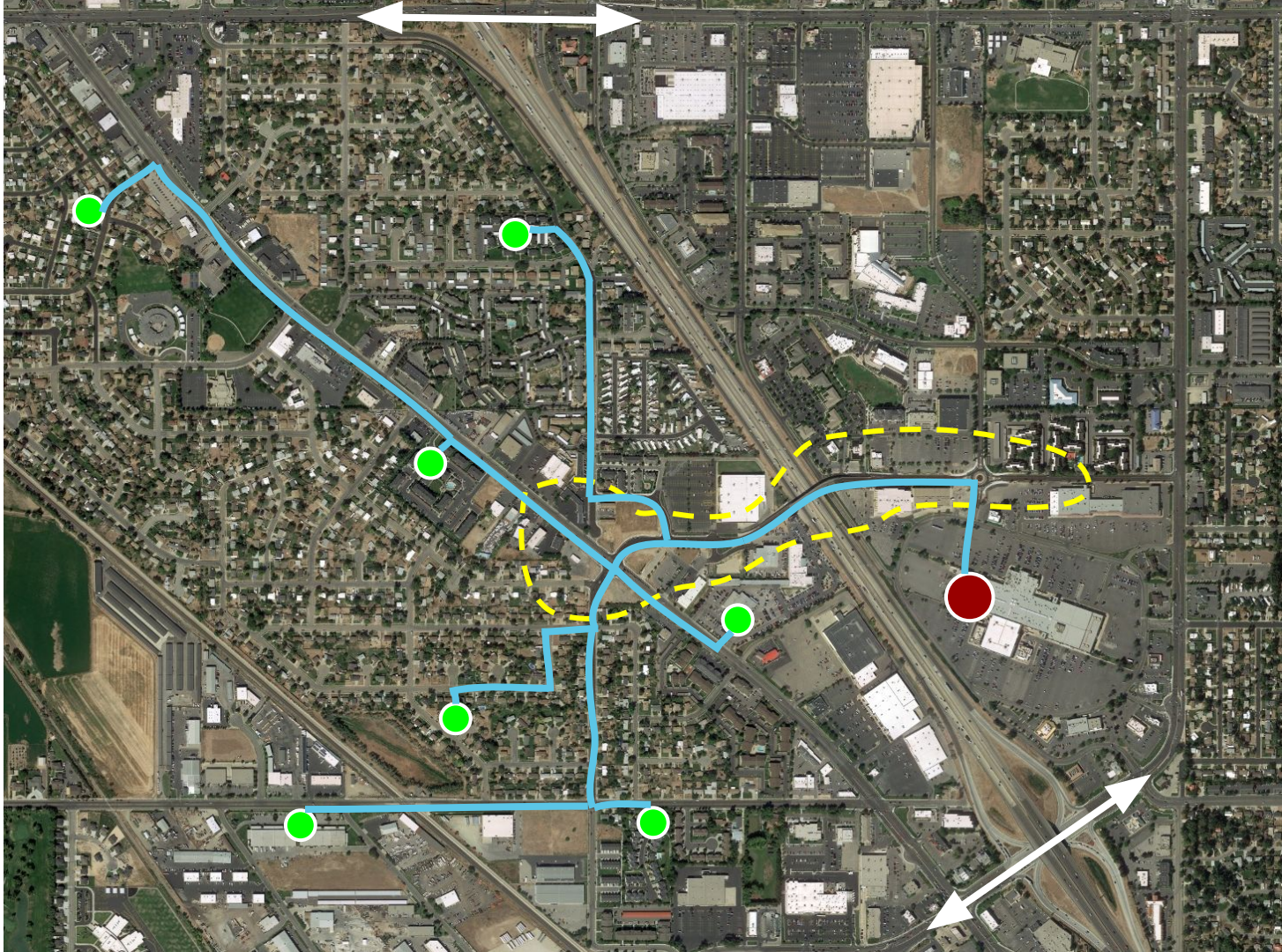
2018
after project

= Sample Residences

= Key Destination

= Shortest Path Connectors

- → 32% reduction in VMT for the 7 residential trips in this example
- → Attractiveness of biking/walking to center
- → Reduced pressure at nearby interchanges



Increasing ATO, a quick sketch:

West Valley Central Station

2009
before TRAX

2018
After TRAX

8.5 acres mixed-use with:

- Residential
- Hotel
- Office
- Commercial
- Conference center
- Public safety building
- Library
- City Hall

Conclusion

- ATO or Accessibility = Mobility + Proximity
- ATO concepts & measures are informing Utah plans & projects
- We have a good start on ATO measures and tools (+ more to come)
    - Residents
    - Employers & Businesses
    - Multimodal Access to Amenities
    - Additional Emphasis in Equity Focus Areas

WASATCH CHOICE VISION

More Information + Resources

wfrc.org/ato

wfrc ato

julieb@wfrc.org

WASATCH CHOICE VISION

EXTERNAL FORCES:
A GUIDE

September 2020 // 2023-2050 Regional Transportation Plan

WASATCH FRONT REGIONAL COUNCIL

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

CAV	Connected and Autonomous Vehicles
DSCR	Dedicated Short-Range Communications
ITS	Intelligent Transportation System
MAG	Mountainland Association of Governments
MPO	Metropolitan Planning Organization
NHTSA	National Highway Traffic Safety Administration
PTC	Positive Train Control
RTP	Regional Transportation Plan
TAS	Travel Advisory Systems
TNC	Transportation Network Companies
TSP	Transit Signal Priority
UDOT	Utah Department of Transportation
USDOT	United States Department of Transportation
UTA	Utah Transit Authority
V2V	Vehicle-to-Vehicle
V2I	Vehicle-to-Infrastructure
V2X	Vehicle-to-Technology
VMT	Vehicle Miles Traveled
WFRC	Wasatch Front Regional Council

INTRODUCTION

WFRC is beginning the 2023-2050 Regional Transportation Plan (RTP) process with a focus on exploring and understanding external forces - transportation technologies and shifts in market and consumer demand that may impact transportation, land use, and economic development decisions. The intent of this approach is to elevate the discussion of these planning uncertainties and understand these changes statewide, regionally, and locally.

Initial research and literature reviews focused on 11 external forces: connected and autonomous vehicles, e-bike adoption, electric vehicle adoption, freight disruptions, high-tech transit systems, internet shopping, inter-regional high-speed transit, new micro-mobility adoption, on-demand travel and sharing services, passenger drone and drone taxis, and telecommuting. A guidebook was created for four peer groups to review and discuss in separate meetings. The peer groups consisted of staff from local governments, agencies, and businesses whose work is directly tied to, or may be heavily influenced by, the identified forces. Each meeting included a discussion of each force as well as a poll asking each peer group attendee how impactful they believed a force would be in the future. A scale of one to five was used, with a rating of one being of the least significance and impact and a rating of five being of the most significance and impact for potential to shape transportation in the future. WFRC staff took these polling results and compiled comments made during the peer group discussion to refine the initial guidebook and aid WFRC staff in identifying the most significant forces that should receive additional attention in the 2023-2050 RTP planning process.This guidebook is the refined version of the initial guidebook based on feedback from the four peer groups. Overall, this is a starting point for communities, transportation agencies, and other stakeholders to come together to discuss how the Region should move forward, address future uncertainty, and become more resilient in the face of change.

As the designated Metropolitan Planning Organization (MPO) for Davis, Salt Lake, Weber, and southern Box Elder Counties, WFRC is responsible for coordinating the Wasatch Choice Regional Vision and the RTP planning process that is updated and adopted every four years. The planning process looks out several decades into the future to anticipate needed transportation investments. The current four-year planning cycle began in 2019 and will be completed in 2023, leading to the adoption of the 2023-2050 RTP.

Recent four-year planning cycles have increasingly recognized the relationship between transportation, land use, and economic development. Holistic planning of these three elements in concert has led to the adoption of the Wasatch Choice Regional Vision, our communities' shared vision for transportation investments, development patterns, and economic opportunities that will enhance the Region's quality of life. The RTP informs, and is the transportation element of, the Wasatch Choice Regional Vision. Several partners are involved in the development of the RTP and the Regional Vision, including the Mountainland Association of Governments (MAG), the Utah Department of Transportation (UDOT), the Utah Transit Authority (UTA), and county and city governments, along with other agencies, stakeholders, and the public.

WFRC also works with the Cache MPO, Dixie MPO, MAG, UDOT, and UTA on Utah's Unified Transportation Plan. The exploration of external forces will inform the 2023 Unified Transportation Plan in addition to being addressed in the WFRC RTP planning process.

TABLE 1. TOPIC AREAS

Automation (Next-Generation Systems) *Each topic area is linked to its section in the document*	Connected and Autonomous Vehicles (CAV)	Autonomous vehicles (AVs) are vehicles that are capable of driving without human intervention (also called self-driving or driverless vehicles). A connected vehicle (CV) is one that communicates with other vehicles (V2V), infrastructure (V2I), and other road users (V2X) via wireless technology.
	High-Tech Transit Systems	High-tech transit systems utilize technology within their fleet. Often utilizing Intelligent Transportation System (ITS) to become more efficient through Transit Signal Priority (TSP), Traffic Signal Coordination (TSC), and other technologies.
Shared Mobility (New Mobility Options) *Each topic area is linked to its section in the document*	Micro-Mobility and E-Bikes	Micro-mobility refers to the use of lightweight devices that are typically used for shorter-distance transport. These can include electric assisted bicycles (e-bikes), electric scooters (e-scooters), and other mobility devices that have improved electric motor technology. Micro-mobility devices can be both personally owned or shared among users, such as GREENBike in Salt Lake City.
	On-Demand Travel and Sharing Services (TNC)	The use of technology in the form of a mobile application that enables users to call/secure individual and shared transportation services.
E-Living (Lifestyle) *Each topic area is linked to its section in the document*	E-Commerce and Delivery	E-commerce and delivery refer to a series of changes that are occurring in the way people purchase goods and how those goods are delivered. These include, but are not limited to, internet shopping, food delivery, truck automation and platooning, and last-mile delivery logistics, including the use of drones.
	Telecommuting	A work arrangement in which an employee works outside the office, often working from home or a remote location.

AUTOMATION (NEXT-GENERATION SYSTEMS)

CONNECTED AND AUTONOMOUS VEHICLES (CAV)

Description	**Connected and autonomous vehicles (CAV)** can be passenger vehicles, public transport, and freight vehicles, and can operate as a fleet or private vehicle. CAV requires the use of sensors, cameras, light detection and ranging (LIDAR), GPS, and other on-board technology to operate with reduced, limited, and/or no human interaction. **Autonomous vehicles (AVs)** are capable of driving without human intervention (also called self-driving or driverless vehicles). **A connected vehicle** is one that communicates with other vehicles (V2V), infrastructure (V2I), and other road users (V2X) via wireless technology. This includes a range in the levels of automation ability depending on the technology. The "connected" aspect of CAV also operates via dedicated short-range communications (DSRC) that are omnidirectional or potentially through cellular, wireless, or satellite connections.
Key Considerations for Decision Makers	In general, most research indicates improved safety benefits of CAV by reducing driver error and connecting vehicles to other vehicles, infrastructure, and road users. CAV at full automation would have long-term benefits for pedestrians and cyclists as it would reduce potential for distracted drivers. However, one of the most commonly predicted negative effects of CAV is on cyclist and pedestrian safety especially during the transitional period where technology may not be able to accurately detect pedestrian and cyclist movements. This could create further transportation mode separation and put additional constraints on active transportation travel. Because CAVs promise to make transportation more convenient, it will eliminate one of the biggest transportation costs - the value of time - by giving people the opportunity to engage in other activities while traveling. People will have fewer incentives to minimize or optimize travel, thus potentially increasing vehicle travel and shifting land use with more people willing to accept longer commutes.  UDOT also has prioritized connected vehicle technology research and implementation for state vehicles. UDOT and Panasonic launched a partnership in 2019 to further expand V2X technology in the state and connected vehicle (CV) technology is currently being used on roadways today. Although connected vehicle technology is readily implemented on roadways today, a larger range of uncertainties exist with regards to when full automation of connected vehicles

	will be adopted in the United States. Many industry experts have different timelines for AV market penetration and full adoption that vary between the upcoming decades (primarily years 2030 to 2050). However, the majority predict NHTSA Level 4 automation of vehicles to be around by 2030.
Key Findings	CAV has wide implications to safety, roadway design, freight, parking, land use, transit options, and traffic markings and signaling. While connected vehicle technology is being incorporated in newer vehicle models and slowly adopted by state transportation departments across the United States, less certainty exists for how autonomous vehicles will penetrate the market. As of June 2019 and according to USDOT, more than 1,400 connected and autonomous vehicles are being tested in 36 states by more than 80 companies including Tesla, Alphabet, Nuro, Audi, BMW, and Bosch. With more fully-autonomous vehicles, the cost of driving and travel time delays would be reduced if individuals are able to do other in-vehicle activities. CAV also has the potential to increase the miles vehicles travel with no occupants sitting in the car. People may be more willing to accept a longer commute with adoption of automated vehicles. This may lead to individuals less willing to chain their trips at full automation. There are many touted benefits of CAV technology, including its potential for reducing crashes, congestion, and headways on narrower lane widths. CAV could expand mobility for those currently unable to drive and may improve first-/last-mile connections with transit. However, CAVs may also shift mode choice and affect transit-dependent populations by offering opportunities for mobility for certain populations (young and older populations, persons with disabilities, and/or underserved populations). CAVs may also impact demand and location of parking facilities.
What We Know with Higher Certainty	By reducing the cost of driving time, AVs will encourage greater travel and increased VMT, which could lead to more congestion.
What We Know with Lower Certainty	We know with lower certainty how the introduction of CAV will take place in the shared economy (to operate as a TNC) and how likely it is for private vehicle ownership to be reduced due to CAV. The benefits to accessibility and mobility for persons with limited access to vehicular travel are also known with lower certainty. However, most studies indicate this will likely occur when CAV is fully commercially adopted.
COVID-19 Resiliency	During the pandemic, social distancing measures have increased. To support these social distancing measures, AVs are being used to ferry COVID-19 tests from drive-thru clinics to a processing lab within the Mayo Clinic Florida Campus in Jacksonville, Florida. This study is being supported by Jacksonville Transportation Authority. However, similar trends can be seen in other countries fighting COVID-19. In China, CAVs have been used to transport necessary medical supplies and food to healthcare professionals and the public in high-infection areas to reduce the spread of coronavirus.

HIGH-TECH TRANSIT SYSTEMS

Description	High-tech transit systems utilize technology to improve operations within the transit systems. Often utilizing Intelligent Transportation System (ITS) to become more efficient through Transit Signal Priority (TSP), Travel Advisory Systems (TAC), and other technologies mentioned below.
Key Considerations for Decision Makers	The utilization of ITS technologies has the ability to create faster and more reliable transit through optimization of TSP, TAS, and PCT. Software system security, especially for self-driving systems, should be considered when implementing autonomous shuttles/buses to ensure hacking issues are mitigated to keep passengers safe. It will be important to consider barriers for the visually impaired and those who need assistance boarding and exiting an autonomous transit vehicle. It is also important to consider how high-tech transit is influenced by ever-evolving transportation apps. Having real time information available to users through mobile applications can increase the reliability of transit, and has the potential to increase ridership numbers.
Key Findings	TSP is a technology that reduces wait times at traffic signals. There are a few ways that TSP is utilized - detection systems on transit vehicles, priority request generators, and an overall TSP management system set in place. Research has shown that this strategy optimizes schedule adherence, and therefore, waiting time. Evaluating TSP implementation for bus along major arterials found that travel time was reduced more than 40 percent in some cases - which can be translated into faster arrival time, lower transit delay, and more reliable transit service. Studies have found that TSP has minimal effect on the general traffic. TAS is used to inform transportation updates to the traveling user. The system has the capabilities to deliver real-time information like travel time, travel speed, delay, accidents on roads, change in route, diversions, and workzone conditions. This provides safety and comfort to citizens and easy maintenance and surveillance for city administration. PTC improves safety by preventing any train-to-train collisions, speeding derailments, and trains routed the wrong way on tracks due to switches being left in the wrong position. This technology offers back office systems and communication alongside onboard hardware equipment that is associated with the PTC system in place. Autonomous shuttles/busses are beneficial in providing more frequent and regular services, providing first-/last-mile solutions, optimizing paratransit services, reducing in operating costs and human error, and could help aid driver shortages to increase reliability. Passenger counters are another piece of technology being implemented. They allow for real-time crowdedness on transit. This is helpful to riders for trip planning and creating positive user experience.
What We Know with Higher Certainty	ITS are developing and becoming more commonplace. Autonomous shuttle/bus technology is emerging rapidly and it is something to anticipate integrating

	within our transportation systems. These systems are already being implemented in projects throughout the Wasatch Front Region. The Utah Transit Authority and the Utah Department of Transportation have partnered on a pilot autonomous shuttle that is being showcased throughout the region. Intelligent transportation systems have yet to make serious headway in Utah, but they are in the beginnings of conversations.
What We Know with Lower Certainty	User trust of autonomous shuttles/busses for future use. The general trend to date shows that people are willing to use autonomous buses, but the majority of that population has been younger.
COVID-19 Resiliency	Transit ridership has sharply decreased due to COVID-19. Because of the shared nature of transit, passenger counters providing real-time crowdedness on transit vehicles has the potential to ease riders anxieties when transitioning back to riding public transit. Ridership is anticipated to go back up over time, but the timeline for getting back to the baseline is uncertain.

SHARED MOBILITY (NEW MOBILITY OPTIONS)

MICRO-MOBILITY AND E-BIKES

Description	Micro-mobility refers to the use of lightweight devices that are typically used for shorter-distance transport. These can include traditional bicycles, electric assisted bicycles (e-bikes), electric scooters (e-scooters), and other mobility devices that have improved electric motor technology. Micro-mobility devices can be both personally owned or shared among users, such as GREENBike in Salt Lake City.
Key Considerations for Decision Makers	The safety of e-bike and e-scooter use is a concern to many. Just like with pedestrian infrastructure, maintenance of micro-mobility infrastructure, such as snow removal and gravel sweeping, needs to be invested in. Cities need improved regulatory framework and improved infrastructure to encourage micro-mobility use. Curb management is a crucial component to the success of micro-mobility. Some type of public subsidy to make private company services a permanent part of a city's mobility landscape may also be needed in certain communities. Also, regulation on the operation of electric mobility devices are necessary to ensure user and pedestrian safety.
Key Findings	 There is great potential to replace car trips under five miles with micro-mobility. Reports show 23 to 40 percent of micro-mobility trips are replacing vehicle trips. E-bikes make cycling longer distances and utilitarian trips more attainable for those who regularly ride a bicycle and for those who do not. In shared bike systems, e-bikes are used three times more than traditional pedal bikes. E-bikes can offer a cheaper transportation alternative to the car, increase physical fitness levels, improve air quality, and decrease noise in cities. Some e-bike trips will replace transit and other active transportation trips, but up to nearly 68 percent of utilitarian e-bike trips replace a car trip. In 2018, the U.S. saw a 73 percent increase in e-bike sales compared to the previous year. Unlike electric cars, e-bikes do not require a special power network to recharge the battery. In addition, energy use for charging 5 million e-scooters is 80 to 90 percent less than used by equivalent cars.
What We Know with Higher Certainty	Dense urban cores are best served by micro-mobility and can lead to reduced parking demand. Existing micro-mobility trips are replacing some vehicle trips,

	but not all. Bikeshare trips tend to be during commute peak hours while e-scooter trips peak on weekends. Increase in micro-mobility use lessens the need for private vehicle parking. The market is still growing for e-bikes. Utilitarian bike models such as cargo and commuter bikes, are more realistically able to replace the function of a car with the assistance of an electric motor. Connected infrastructure for scooter and bike use is critical and necessary for micro-mobility use to be successful. A recent study in Salt Lake City, Utah indicates that sidewalk ridership increases by 310% when no bike lane is available. When a bike lane is available for use, 82.2% of Lime Scooter users ride on the bike lane and most users prefer not to ride the sidewalk.
What We Know with Lower Certainty	What is known with less certainty is whether construction of safe bicycle infrastructure will accelerate the adoption of e-bikes, or will the adoption of e-bikes accelerate the construction of safe infrastructure. Will e-bike adoption reach the potential of shifting trips from cars? How quickly the price of e-bikes, and their associated motors and batteries, will decrease as technology and manufacturing processes improve? Will the e-bikes and micro-mobility market serve vulnerable populations? Which companies will be around in the next five years and what cities will they be operating in? Will access to these devices reduce car ownership? Short time frame of these devices being in the market with huge influxes of private investment doesn't tell us if the scooter industry will ever be profitable. How will municipal regulation impact use of micro-mobility? Will cities invest in more protected infrastructure?
COVID-19 Resiliency	During pandemic social distancing measures, bicycle riding has increased as people have looked for recreational pursuits as well as transit trip replacements. Many micro-mobility companies have shut down during the pandemic with bikeshare as an exception in larger cities like Chicago and New York. These systems have offered free one-month memberships to health care workers as an option to avoid social distancing struggles on transit. Renewed emphasis on deep cleaning of devices will probably be a focus for months after the pandemic has slowed. Biking trips are up during the pandemic. Micro-mobility can plan a role in filling transit gaps due to decreased service and capped ridership. 

ON-DEMAND TRAVEL AND SHARING SERVICES (TRANSPORTATION NETWORK COMPANIES (TNC))

Description	The use of technology in the form of a mobile application that enables users to call/secure individual and carpool rides.
Key Considerations for Decision Makers	Integrating carsharing, micromobility, and ridesourcing with transit will provide the most mobility options to users. Furthermore, having all of these options aggregated in one app eases user experience frustrations. While on-demand and TNCs, such as Uber and Lyft, have been found to decrease public transit ridership, other cases have been found to complement it. These outcomes seem dependent on existing transportation systems and accessibility. It will be important to consider how on-demand travel will affect automobile ownership. Automobile ownership may determine the extent to which carsharing, bikesharing, and transit complement TNCs (lack of auto ownership is anticipated to increase the use of a variety of on-demand modes/resources). Curbside management is a key consideration for decision makers. For instance, Uber and Lyft now command 70 percent of SLC Airport commercial rides. Uber and Lyft will have 510 feet of curb space at the new airport, compared to just 90 feet for taxi stands,and 360 feet for resort shuttles and limo companies for pick and drop offs.
Key Findings	Currently there are about 600 cities with TNCs. TNCs utilize mobility-as-a-service, which integrates all available options for transportation into a single mobility service that allows users to order, track, travel, and pay for transportation. Highly dependent on population size, transportation network in place, geography, and other variables, TNCs' impact on transit systems can vary greatly. In some instances, cities found Uber/Lyft as a complement to their transit agencies by seeing an increase in ridership. Other studies found the implementation of sharing services increased rail ridership, but decreased bus ridership. Overall findings show that the implementation of TNCs and sharing services increase VMT and generally lower ridership on transit systems.
What We Know with Higher Certainty	These technologies are here and they are impacting transportation and transportation mode choices.
What We Know with Lower Certainty	TNC current usage in Utah and how these companies are impacting other mode choices. Long-term feasibility and the longevity of these services due to heavy venture capital subsidies.
COVID-19 Resiliency	Ridership in TNC's has fallen since COVID-19, with some cities seeing a decrease of up to 70 percent in rides requested. This initial ridership loss is expected to recover, but how well it recovers remains unknown. Because of uncertainties surrounding COVID19, many people have chosen forms of active transportation to get around, which could impact future TNC ridership numbers.

E-LIVING (LIFESTYLE)

E-COMMERCE AND DELIVERY

Description	E-commerce and delivery refer to a series of changes that are occurring in the way people purchase goods and how those goods are delivered. These include, but are not limited to, internet shopping, food delivery, truck automation and platooning, and last-mile delivery logistics including drones.
Key Considerations for Decision Makers	Online shopping is already a large and growing portion of all U.S. retail sales, which is forcing conventional retail to rethink the use of existing square footage and how to improve customer experience and convenience. Half of mall-based department stores are projected to close in the next five years. Square footage for retail brick and mortar stores has been steadily declining for years. However, while news stories often tout the "death of retail," the difference between the number of store closings and openings often favors the openings side of the equation. Companies preparing to thrive are repositioning their logistics operations to sell to consumers both online and in-store. Online shopping has also increased demand for warehousing and distribution footprint in cities. Distribution centers tend to favor suburban and exurban locations. These distribution/fulfillment centers require larger workforces than traditional warehouses, creating more trips by employees coming from areas with limited transit service options and working multiple shifts.There is also a trend in seeing stores shift to operate more like showrooms, small warehouses, and pickup locations (also known as omni-stores). Regarding innovative trucking technology, according to the American Transportation Research, one of the largest barriers is the patchwork of truck self-driving laws among states. The Federal Autonomous Vehicle Policy USDOT has developed includes no rules or regulations - only guidance for states. What is clear is that trucking innovation is tied to the overall development of connected and autonomous vehicles. Communities and the State should assess implications for local revenue and taxation, infrastructure funding, warehouse demand (zoning), transportation to jobs, and increased deliveries in neighborhoods via drones or otherwise, as they relate to e-commerce.
Key Findings	E-commerce represents a growing share of the retail market and is most commonly associated with online shopping of retail products - including clothing, consumer electronics/technology, furniture, computer equipment and beauty products. According to the US Census Bureau, total e-commerce sales for 2019 were estimated at $601.7 billion, an increase of approximately 14.9 percent from 2018. In addition, delivery of groceries and other food items via e-commerce are growing. According to a Gallup study, 11.0 percent of consumers said they buy groceries online—for pickup or home delivery—at least once per month, up from

	9.0 percent in 2017. In 2019, 4.0 percent of consumers say they buy groceries online at least once per week, unchanged from 2017. This number is most likely rising during the COVID-19 pandemic. Freight delivered via truck moves much of the nation's goods and the industry is moving toward truck automation and platooning using connected technology and automated driving support systems (V2V). These vehicles automatically maintain a set, close distance between each other when they are connected for certain parts of a journey, for instance on motorways. Studies indicate truck platooning has the potential to reduce fuel consumption by 10 percent, while improving safety on the roadway. Cost saving potential exists in requiring fewer drivers and the ability for trucks to operate 24 hours per day. The first fully autonomous truck was able to complete a cross-country delivery from Pennsylvania to California with no disengagements in December 2019. Warehousing demand is soaring with the growth of e-commerce and faster delivery in urbanized areas. Rents for warehouses in between 70,000 and 120,000 square feet rose more than 33.7 percent in five years across the United States. Businesses have been adding smaller fulfillment and distribution center locations that put inventory closer to customers to have items delivered in two days or less. Companies also are adapting existing buildings such as empty malls to warehousing, while more retailers are using their stores as fulfillment centers for online customers. Last-mile delivery is the movement of goods from a distribution hub to the final delivery destination. With the advent of e-commerce, last-mile delivery and logistics has become a popular area of interest for retailers due to the growing demand for fully integrated omnichannel retailing. A variety of solutions have been brought up to address last-mile delivery abilities in urban areas including e-cargo bikes, drones, and third-party delivery services that operate like TNCs, but for goods instead of passengers. In Utah, amendments to HB 277 on personal delivery devices were made in 2020 to allow autonomous personal delivery devices (not motor vehicles) to use pedestrian areas to deliver cargo and goods at a maximum speed of 10 mph. Microhubs are consolidation centers for last-mile deliveries in dense urban districts, which include small neighborhood lockers that can reduce the time a delivery person spends in a building, and consequently reduces the time that curb space is utilized for active deliveries.
What We Know with Higher Certainty	E-commerce - Delivery trips will continue to increase as a proportion of overall transportation trips. Truck Automation and Platooning - Level 1 Commercial truck platooning, where a driver is still engaged but the truck is communicating with another to coordinate braking and acceleration, is approved in 27 states, including Utah. Land Use - Square footage for retail brick and mortar stores has been steadily

	declining for years. However, while news stories often tout the "death of retail," the difference between the number of store closings and openings often favors the openings side of the equation. Companies preparing to thrive are repositioning their logistics operations to sell to consumers both online and in-store, requiring distribution hubs closer to customers, including new warehousing space. Last-Mile/Delivery - Bikes/Drones/Third Party/Micro-Hubs - Smaller last-mile delivery vehicles are already in use, including e-bikes, as well as third party contractors. Drone deliveries are still in development. Micro-hubs are occurring in many places: 1. The City of Chicago converted a floor of a downtown municipal parking garage into a fulfillment center allowing for deliveries to be accomplished by bicycle and foot. 2. Singapore and several European cities have established Delivery Micro-Hubs which are consolidation centers with a smaller footprint where goods are delivered from warehouses and distribution centers via truck and picked up by the customer or delivered by cargo bike or bicycle to their destination. 3. The cities of New York, Seattle, and Boston have pilot programs using e-trikes for mail delivery; several other pilots have been undertaken in other cities around the world. 4. City Council of Paris, France invited developers to create central city logistics centers (five of which are operational) and mandated that 50 percent of final-kilometer deliveries be carried out by non-diesel vehicles by 2017, followed by the total phase-out of diesel-fueled deliveries by 2020.
What We Know with Lower Certainty	E-commerce - While online sales continue to grow, it is unclear how much it will displace the need for physical store locations or how quickly that displacement may occur. Truck Automation and Platooning - Most truck operators and fleet managers feel that platooning technology is highly developed, but it will still take time to implement into real-world operation. Technological improvements needed include on-board technologies such as LIDAR and on-board human machine systems. Large fleet managers do not predict widespread adoption before 2030. Ongoing studies surrounding how other road users would respond to a "wall of trucks" on freeways, spacing of trucks, and regular vehicles merging in between, ahead of, or behind platoon trucks. Last-Mile/Delivery - Bikes/Drones/Third Party/Micro-Hub There is less certainty on how much of a role transportation network companies (TNCs) and contractors play in last-mile distribution and freight delivery. Hired contractors are not required to be registered as motor carriers (transporting cargo for hire) and, consequently, avoid a number of safety and operational requirements. This is difficult to account for in travel models. Package delivery by drone is being coordinated by the Federal Aviation Administration. Several pilot programs are underway, but widespread adoption requires clearing regulatory and logistics hurdles. At this point, the cost effectiveness is still unknown.

COVID-19 Resiliency	The Cybersecurity and Infrastructure Security Agency identified transportation and logistics workers as essential during the coronavirus crisis. Demand for freight has increased during the pandemic, even spotlighted the importance of trucking and freight movement during this time frame. Internet shopping activity has increased with people placed under stay-at-home directives. According to the Utah Sales Tax Commission report for March 2020, non-store retail (internet) are up 76 percent in the state. Online shopping and telemedicine are helping people avoid in-person contact. Additionally, many brick and mortar shops, if they haven't already done so, are rapidly moving their business online to continue serving clients. However, this increase in internet sales does not make up for much of the losses in industries in the State. More people are also ordering from grocery stores online as a result of the pandemic. Downloads of Instacart, Walmart's grocery app, and Shipt increased 218 percent, 160 percent, and 124 percent respectively on March 15, 2020, compared to the year prior. Drones and robots are being used for deliveries to reduce cross-infection by implementing home delivery of drugs and meals.

TELECOMMUTING

Description	Telecommuting is the act of partially or entirely replacing out-of-home work activities by working at home or at locations close to home. This reduces the potential for network congestion and vehicular emissions, specifically during rush hours.
Key Considerations for Decision Makers	There are adoption differences in the types of telecommuting (full-term vs. non-daily) and differences depending on socioeconomic status and job sector. Telecommuting may affect land use patterns and housing affordability as more employees would be willing to live further away. Telecommuting may eliminate congestion at peak periods and has lower costs and a shorter implementation timeline than many other travel-demand management techniques.
Key Findings	There is a significant opportunity during the COVID-19 pandemic to accelerate long-term adoption of telecommuting. For telecommuting to be a realistic option for employees, high-speed telecom infrastructure systems may need to be more available and affordable. Although telecommuting is heralded for its ability to reduce VMT and congestion, the literature shows modest benefits to VMT of essentially no change to a two percent reduction in VMT. This modest benefit could be due to employees moving farther away from their workplaces because they have the ability to part-time telecommuting, resulting in an increase in weekly commute VMT and/or it could be attributed to teleworkers making more off-peak trips. Employment areas with higher concentrations of employees tend to have higher rates of telecommuting than employment areas with fewer employees.

What We Know with Higher Certainty	Before COVID-19, telecommuting was slowly increasing throughout the nation. However, the U.S. is undergoing an unparalleled experiment in telecommuting in the midst of COVID-19, the long-term effects of which are unknown.
What We Know with Lower Certainty	There is less certainty to which extent telecommuting can improve congestion and emissions. Many researchers have shown a rebound effect of telecommuters - they make more trips than they would if they commuted to the workplace. In addition, there is evidence that shows teleworking may increase the willingness to accept a longer commute and may induce urban sprawl. Telecommuting adoption rates differ by job sectors and it is unclear how this might evolve over the long-term. Added to these uncertainties is how recent events will influence long-term telecommuting adoption. The impacts of telecommuting on both travel demand and network operation are still inconclusive and there is substantial need for more empirical evidence on this issue. It can be difficult to quantify how many employees are actually working from home as Census data related to work-from-home includes both telecommuters and home-based businesses and the Census generally asks about typical work commutes, missing those who telecommute only one or two days a week.
COVID-19 Resiliency	Global Workplace Analytics forecasts that 25 to 30 percent of the workforce may work at home on a multiple-days-a-week basis within the next two years, accelerated by the coronavirus pandemic. Companies and individuals have been forced to overcome telework challenges and may be more comfortable with it and employees may demand more opportunities to work remotely.

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WASATCH CHOICE VISION

Vision Implementation Workshops

Salt Lake County // November 2020

COVID-19 and Salt Lake County Communities

WASATCH CHOICE VISION

COVID-19 and Salt Lake County

Retail trips	-19%
Workplace trips	-34%
Open space, trips to (statewide)	+54%
Transit use (systemwide)	-59%
Bicycle use*	+55%
Freeway use (2020 vs 2019)	-12%

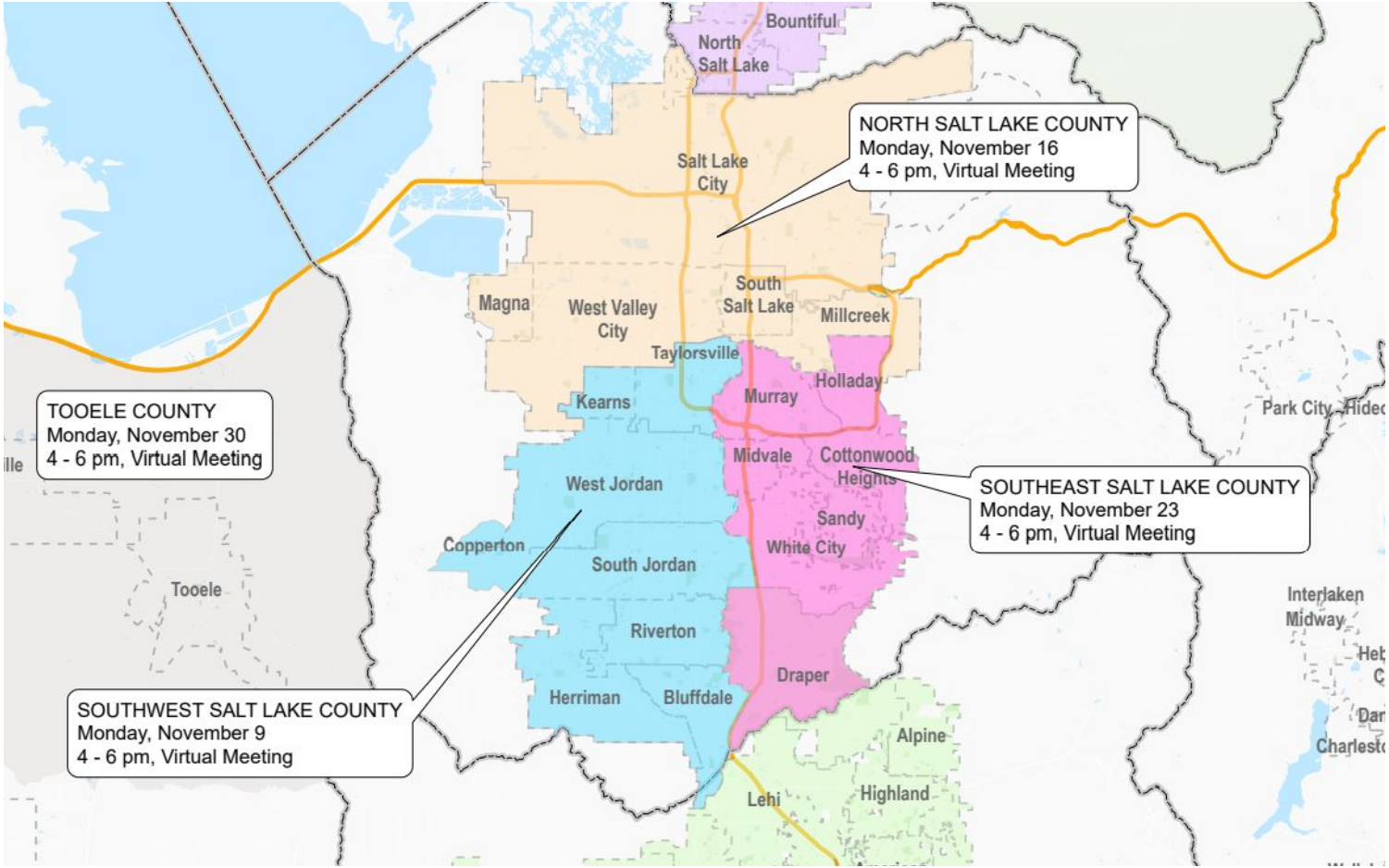
September data versus “Pre-COVID-19”

Sources: Google COVID-19 Community Mobility Report, Strava Metro Dashboard, UDOT, UTA, WFRC

*UDOT Region 2

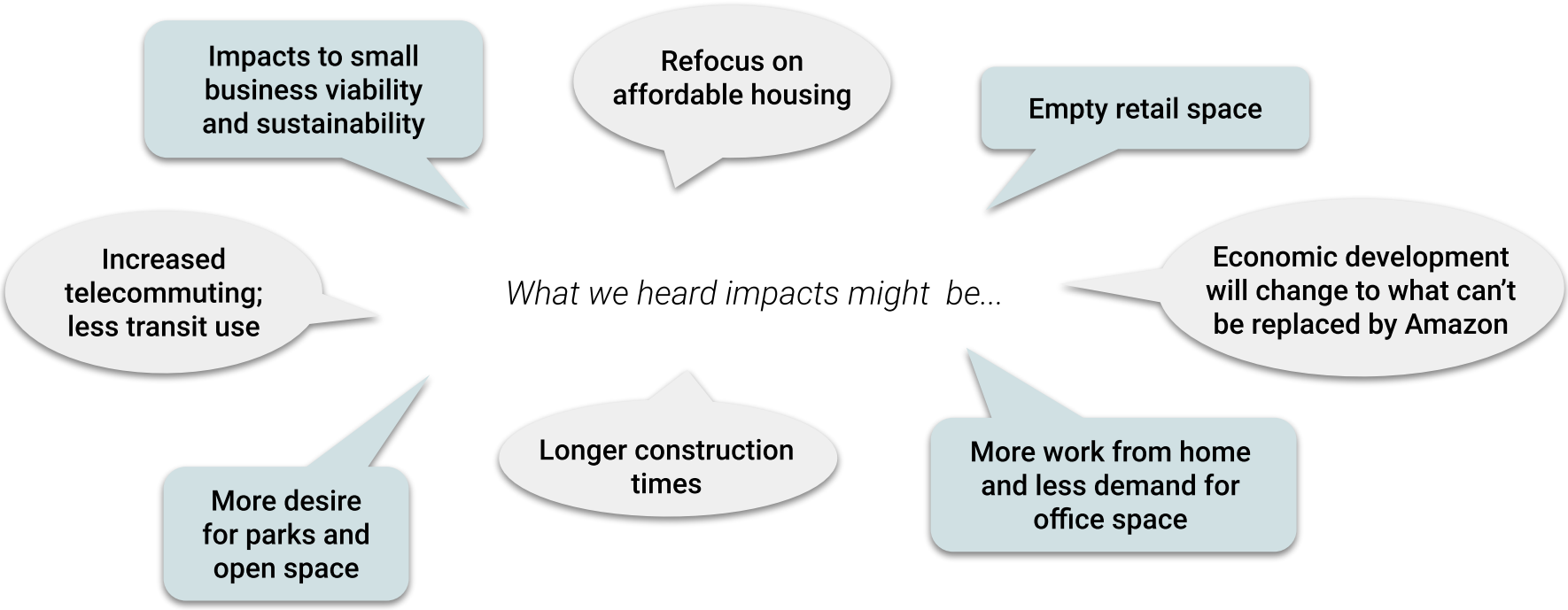
WASATCH CHOICE VISION

COVID-19: What are potential long-term impacts to transportation, land development, and economic development?


NORTH SALT LAKE COUNTY
Monday, November 16
4 - 6 pm, Virtual Meeting
TOOELE COUNTY
Monday, November 30
4 - 6 pm, Virtual Meeting
SOUTHEAST SALT LAKE COUNTY
Monday, November 23
4 - 6 pm, Virtual Meeting
SOUTHWEST SALT LAKE COUNTY
Monday, November 9
4 - 6 pm, Virtual Meeting
Bountiful
North Salt Lake
Salt Lake City
Magna
West Valley City
South Salt Lake
Millcreek
Taylorsville
Holladay
Murray
Kearns
Midvale
Cottonwood Heights
West Jordan
Sandy
White City
Copperton
South Jordan
Tooele
Riverton
Draper
Herriman
Bluffdale
Alpine
Highland
Lehi
Park City
Interlaken
Midway

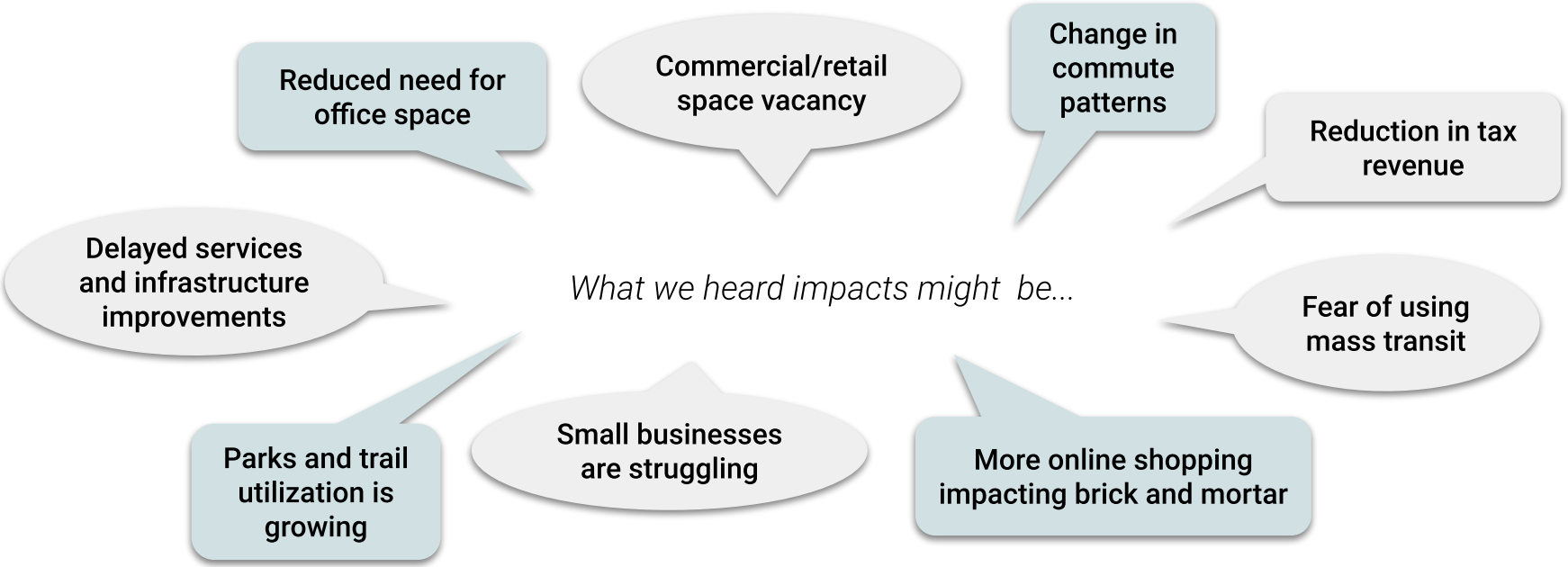
NORTH

What are potential long-term impacts of COVID-19 on transportation, land development, or economic development?



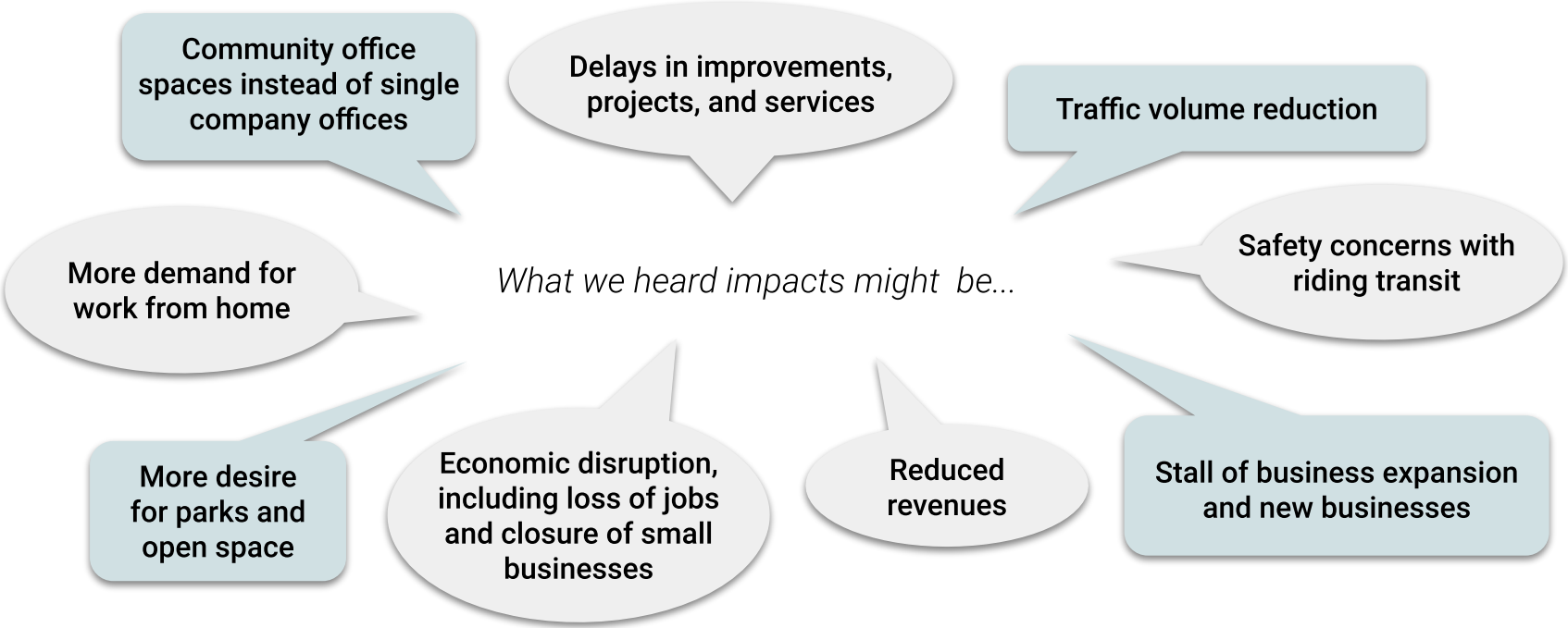
SOUTH-EAST

What are potential long-term impacts of COVID-19 on transportation, land development, or economic development?



SOUTH-WEST

What are potential long-term impacts of COVID-19 on transportation, land development, or economic development?



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