Bus Transit Signal Priority Project Overview

Hal Johnson, Utah Transit Authority

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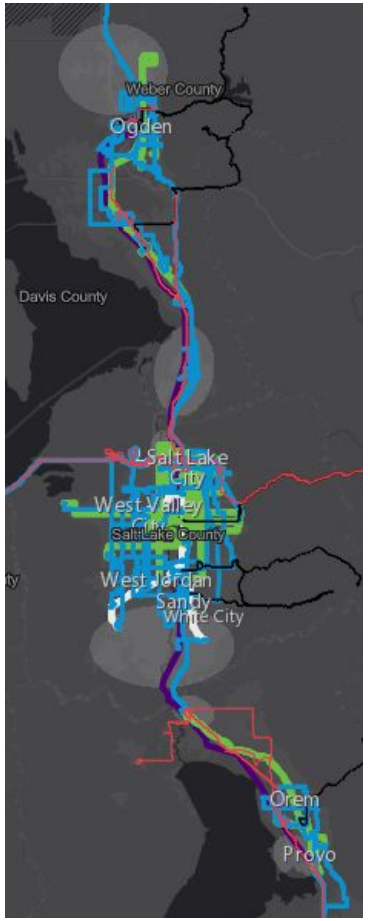
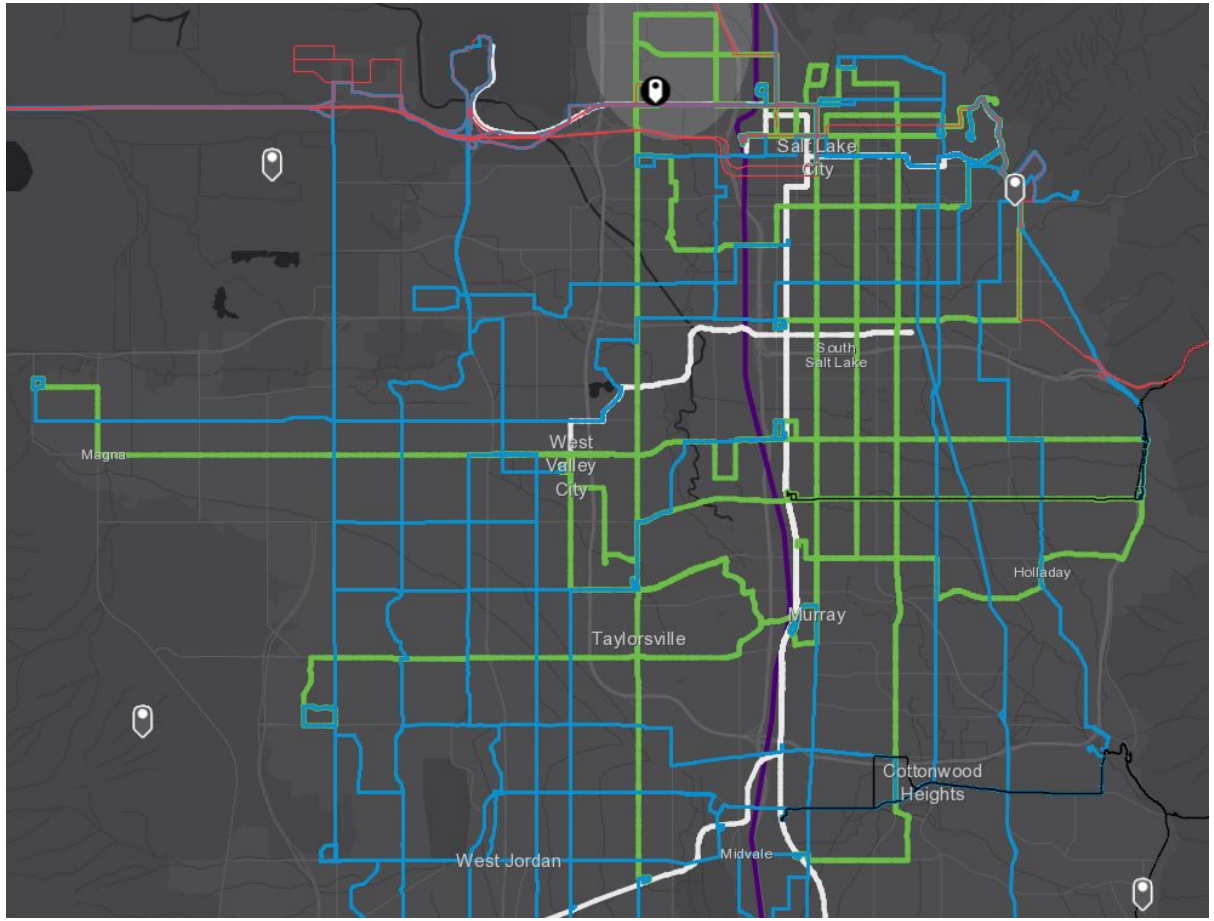
Implementation: Five Year Service Plan





Benefits

TSP can reduce transit travel time, increase reliability, and improve the overall customer experience

Specific examples of reduced bus travel times in other cities

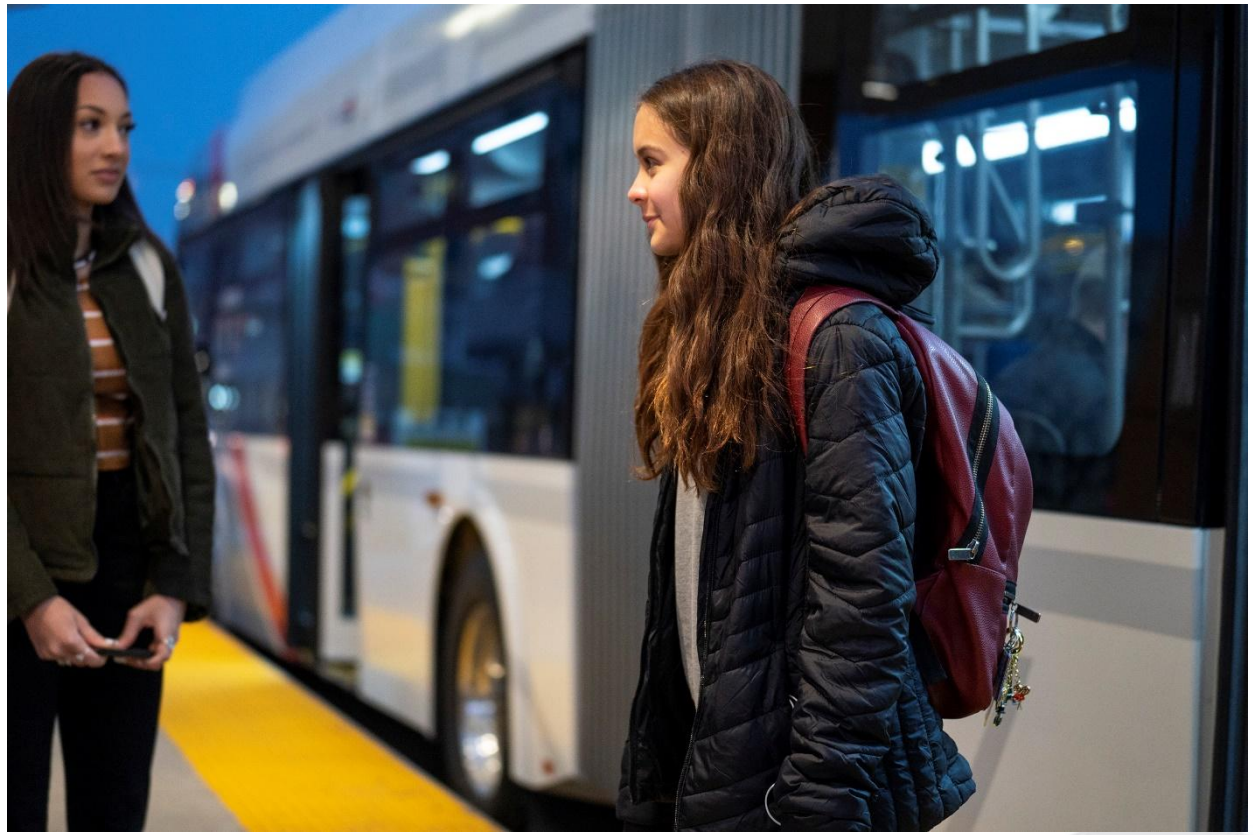
- 8-10% in Seattle, Los Angeles, and Portland
- 4-15% in Minneapolis
- 15% in Chicago

UTA has benefited from TSP increasing bus reliability

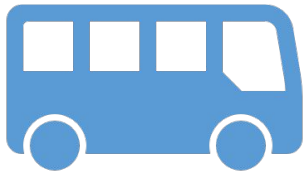
- Route 217: On-time reliability +5% with 19% less schedule variability
- UVX: Large improvements in reliability

New Benefits Anticipated

- Innovative, new connected corridor and connected vehicle applications
- Potential for:
  - Increased ridership as TSP makes bus travel more attractive to customers
  - New safety applications
  - Reduced emissions
  - Increase Route efficiency by redefining what 'late' means



Costs



Total cost of implementing TSP is $2.7 million over 5 years

Equipment: $6,200 per bus installed

Operations & Maintenance: $70,000 per year

Mobilization: Varies by installation plan

Recognize UDOT's significant partnership

Potential cost savings and return on investment hinges on reducing transit delays

Increases efficiency, if possible, to "cut a bus"

Uses less fuel

Cost savings from faster bus service may fully offset Operations & Maintenance (O&M) and fund additional service

Implementation

What are we trying to accomplish?

Better Customer Experience

What does good look like?

Cut travel times by 15%, keep 88% reliability

What does the data say?

Existing travel times TBD, reliability TBD%

What are we going to do?

Deploy C-V2X TSP on Core Routes & BRT

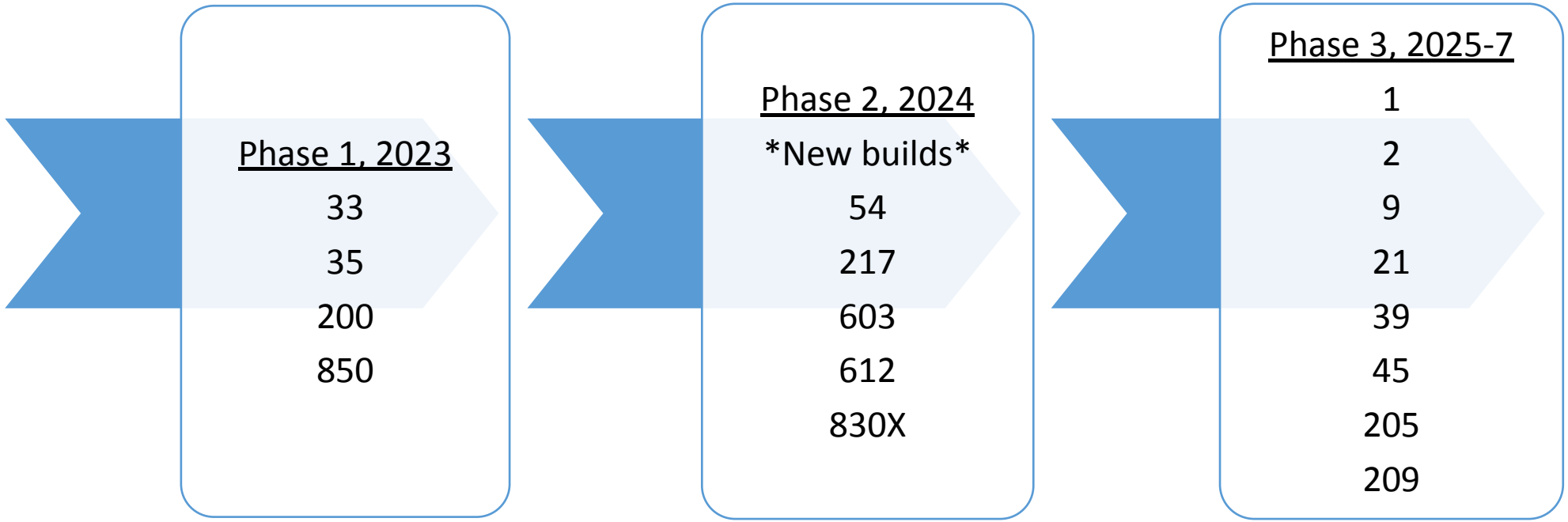
When?

Now through 2027

How well is it working?

- Measure Key Performance Indicators (KPIs)
- Milestones by garage

Implementation, cont.



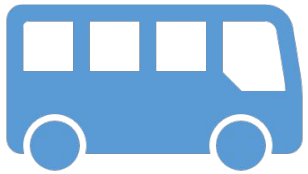
Impact

Expected overall impact of TSP on the transportation system

Minimal impact on cross-street traffic flow

Positive impact on safety

Positive impact on air quality, ridership, equity



Potential risks or unintended consequences

TSP can’t do it alone

Evolving system

UDOT + many other partners

Address through collaboration, agreements, regional planning, etc.

Questions & Discussion

Thank you

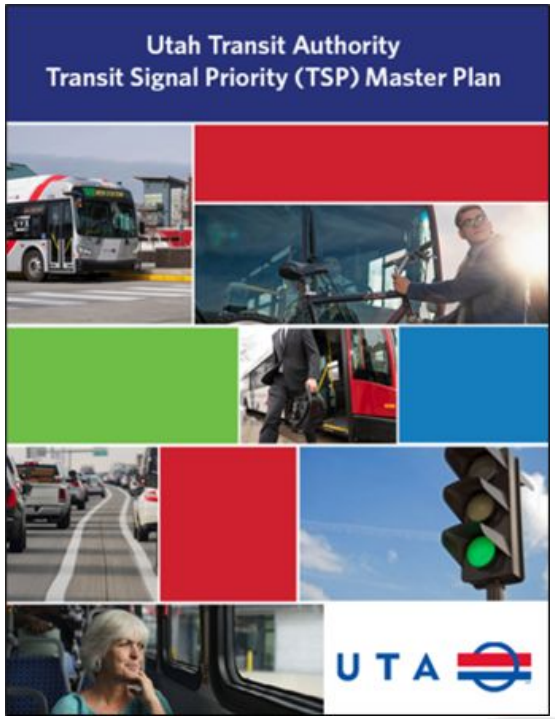
Back up slides

Related TSP Efforts

- SMART grant application (UDOT, UTA, Salt Lake City)
- ATTAIN grant application (UDOT)
- UTRAC project (UDOT, UTA, Wasatch Front Regional Council (WFRC))
- Regional TSP Coordination Study (UDOT, UTA, WFRC, Mountainland Association of Governments (MAG))
- Bus Speed & Reliability Program (UTA)
- Discussions with SLC regarding 200 South (UTA, SLC)

Implementation: Project Team & TSP Master Plan

Functional Team = **TSP Working Group**	Casey Brock Dave Beecher Scott Bingham
Core Team = Optional Attendees	Derick Lee, Kayla Kinkead, Matt Gray, Nathan Hess, Shawn Stephens
Subject Matter Experts = TSP Emeritus	Alex Beim, Dean Hansen, Dean Klebenow, Eric Callison, Greg Platt, Hal Johnson, Jaron Robertson, Jesse Rogers, Kyle Stockley, Landon Dixon, Kyle Brimley + Additional experts
Executive Sponsors	Nichol Bourdeaux, Alisha Garrett
UDOT Partners	Blaine Leonard, Peter Jager



Implementation: UTA Supporting Departments & Teams

- Innovative Mobility Solutions (IMS)
- Information Technology (IT)
- Operations Planning
- Bus Maintenance
- Bus Operations
- Fleet Management
- Service Planning
- Strategic Planning
- Capital Development
- Operations Analysis & Solutions (OAS)
- Accounting
- Grants
- Supply Chain

Intro: What is Transit Signal Priority (TSP)?

A technology that helps to reduce the waiting time for public transit vehicles at intersections

In partnership with UDOT, the UTA TSP project modifies traffic signal timing by allowing a longer green light for buses that are late

Technology

- Technology:
  - "Vehicle to Everything" (V2X) technology – a transportation-specific wireless technology licensed by the Federal Communications Commission in an allocated spectrum
  - Short-range, two-way, low-latency (very fast communication)
  - Communications are secured – prevents misuse, hacking, and interference
  - Standards-based technology – non-proprietary, available from multiple vendors
  - Customization built by UDOT – adapt to UTA on-board systems, determine bus lateness
- The technology has evolved
  - Earlier deployments (Redwood Road / Utah Valley Express or UVX) used "Dedicated Short-range Radio Communication" (DSRC) Technology
  - Current deployments use "C-V2X" technology
  - UDOT is replacing the DSRC technology to conform to the new standard

Technology, cont.

- There are other technologies that enable TSP
  - We chose V2X because it can do more than TSP – a versatile, multi-capable technology
  - Ultimate goal is safety – crash avoidance
  - UDOT uses this technology to:
    - Improve snowplow performance
    - Send a warning into a vehicle about an icy road or sharp curve
    - Working on applications to warn about pedestrian presence
- The on-board system connects to the vehicle CAN bus (J1939)
  - Reports information about vehicle movements – speed, braking, windshield wipers, etc.
  - This facilitates safety-based applications
  - Data can be mined to study operations and conditions

Compatibility

- Compatibility: Is TSP compatible with other transit technologies and systems already in use by UTA? Such as the Automatic Vehicle Location (AVL) system, and real-time passenger information displays.
- Information Technology (IT) support for TSP bus communications: installations / coordination with Operations / IT programming / Data monitoring / Mobile Data Device (MDD) transition / Sign out for TSP
- Future inclusion on new fleet orders / Diesel & electric buses
- Enabling Operations & Maintenance (O&M) / State of Good Repair (SGR)
- How do we know if the technology is working?