

Phase 1 Comprehensive Installation Plan (CIP)

Vehicle-to-Everything (V2X) Accelerator: Connecting the West – Utah Department of Transportation

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List of Acronyms and Abbreviations

ANSI	American National Standards Institute
AT	Alternating Current
AVL	Automatic Vehicle Location
AWG	American Wire Gauge
BIU	Bus Interface Unit
BSM	Basic Safety Message
C-V2X	Cellular Vehicle-to-Everything
CAP	Comprehensive Acquisition Plan
CAN	Controller Area Network
CCB	Configuration Control Board
CCTV	Closed-Circuit Television
CDOT	Colorado Department of Transportation
CI	Connected Intersection
CIP	Comprehensive Installation Plan
ConOps	Concept of Operations
CSW	Curve Speed Warning
CTW	Connecting the West
CV	Connected Vehicle
DC/DC	Direct Current to Direct Current
DDI	Diverging Diamond Interchange
DIN	German Institute for Standardization
DIP	Dual In-line Package
DOT	Department of Transportation
DSRC	Dedicated Short Range Communications
EB	Eastbound
FCC	Federal Communications Commission
FHWA	Federal Highway Administration
GHz	Gigahertz
GNSS	Global Navigation Satellite System
GPIO	General Purpose Input/Output
GTFS	General Transit Feed Specification
ID	Identification
I/O	Input/Output
IP	Internet Protocol
IR	Installation Report
IT	Information Technology
ITS	Intelligent Transportation Systems
LAN	Local Area Network
LC	Lucent Connector

LED	Light Emitting Diode
LiDAR	Light Detection and Ranging
LTE	Long-term Evolution
MAP	Map Data Message
mm	Millimeter
MP	Milepost
NB	Northbound
NOFO	Notice of Funding Opportunity
NPT	National Pipe Thread
OBE	On-Board Equipment
OBP	On-Board Processor
OBU	On-Board Unit
OEM	Original Equipment Manufacturer
PoE	Power over Ethernet
QA	Quality Assurance
QC	Quality Control
RMA	Return Merchandise Authorization
RSE	Roadside Equipment
RSU	Roadside Unit
RWIS	Road Weather Information System
SB	Southbound
SCM	Signal Command Module
SCMS	Security Credential Management System
SDSM	Sensor Data Sharing Message
SDX	Situation Data Exchange
SFP	Small Form-factor Pluggable
SI	Signalized Intersection
SIM	Subscriber Identity Module
SLA	Sealed Lead-Acid
SOI	System of Interest
SPUI	Single-Point Urban Interchange
SR	State Route
SRM	Signal Request Message
SSH	Secure Shell
ST	Straight Tip
STP	System Test Plan
STRS	System Test Results Summary
SWIW	Spot Weather Impact Warning
TIA	Telecommunications Industry Association

TIM	Traveler Information Message
TMS	Traffic Monitoring Station
TSP	Transit Signal Priority
UDOT	Utah Department of Transportation
USB	Universal Serial Bus
USDOT	United States Department of Transportation
UTA	Utah Transit Authority
V	Volt
V2X	Vehicle-to-Everything
VDC	Volts Direct Current
VMS	Variable Message Sign
VPN	Virtual Private Network
VRU	Vulnerable Road User
WB	Westbound
WYDOT	Wyoming Department of Transportation

1 Introduction

This document is the Comprehensive Installation Plan (CIP) for the Connecting the West (CTW) Program, part of the United States Department of Transportation's (USDOT) Saving Lives with Connectivity: Accelerating Vehicle-to-Everything (V2X) Deployment grant program (often referred to as the V2X Accelerator program). This document provides details of the proposed installation approach and further identifies the types and number of equipment required to be configured and installed.

1.1 Purpose of Plan

The purpose of this CIP is to document the CTW Program's installation approach and to provide details about the installation, equipment, components, and configuration required for the system. This will be useful to demonstrate compliance with both the policies for the State of Utah and the Notice of Funding Opportunity (NOFO). This plan provides installation details for Utah and Colorado as these CTW partners will deploy physical systems for the CTW deployments. Wyoming is not included in this installation plan as Wyoming's participation in the CTW Program does not include any new installations. Deployment is one of the significant elements of the Phase 1 V2X Accelerator projects. As such, details provided in this plan aim to model a viable approach to V2X deployment to other state and local agencies.

Note: This plan represents the initial deployment strategy and technical baseline established prior to field execution. Throughout the project implementation, adaptive adjustments were made to account for field constraints, including shifts in roadside locations, intersection locations and hardware updates. The tables within this plan are preserved, while final "as-built" locations and information are documented in the Phase 1 Installation Report (IR).

1.2 Organization of the Plan

This CIP contains the following sections:

- Section 2 – Acquisition Overview: Provides an overview of the acquisition approach, schedule, and vendor selection.
- Section 3 – Installation Overview: Provides an overview of various aspects of the installation considered in the CTW deployments.
- Section 4 – Infrastructure/Roadside Equipment: Provides detailed information regarding installation of the roadside units (RSUs), on-board units (OBUs), fiber switches, light detection and ranging (LiDAR) systems, signal command modules (SCMs), and blank-out signs.
- Section 5 – In-vehicle Equipment: Provides detailed information regarding installation of OBUs on transit buses and snowplows.
- Section 6 – Data/Management Center Equipment/Services: Provides information about existing Central Systems used in the CTW Program.

- Section 7 – Planned Deployment Information: – Summarizes information and locations of the CTW deployments.

1.3 CTW System Overview

The proposed CTW system is a system of systems, with a system of interest (SOI) that includes Central Systems, Field Equipment, and Vehicle Systems. Utah Department of Transportation (UDOT), Wyoming Department of Transportation (WYDOT), and Colorado Department of Transportation (CDOT) will continue to operate their individual Central Systems and Field Equipment while also continuing to operate fleet vehicles equipped with Cellular V2X (C-V2X) technologies. WYDOT will also continue to operate fleet vehicles equipped with satellite-enabled V2X communications. In addition to the SOI, external systems will support the CTW SOI.

As introduced originally in the CTW Concept of Operations (ConOps) document, the following summary of capability changes describes the expansions and changes planned through the CTW Program.

The description of desired changes includes the following categories of changes:

1. Expansion of existing capabilities (e.g., existing capabilities that will be expanded with no change to the functionality).
2. Capability changes (e.g., changes to existing conditions in terms of enhanced system capabilities and expanded deployments).
3. Personnel changes (e.g., changes to roles and responsibilities of CTW agency staff).

The following describes the anticipated changes within each category introduced above:

1. **Expansions of existing capabilities** – The following expansions of existing functions will be performed by the CTW Program:
 - a. *Expanded preferential treatment at connected intersections (CIs).* Expand signalized intersection (SI) preferential treatment for transit and emergency vehicles and snowplows to additional intersections and vehicles in Utah.
 - b. *Expanded CIs.* Expand the number of SIs in Utah that operate as CIs and meet the accuracy, reliability, and timeliness parameters needed to support in-vehicle safety applications to address the user needs to the extent possible.
 - c. *Expand the number of RSUs broadcasting and receiving messages.* Expand the deployments of RSUs to broadcast traveler information messages (TIMs) and receive basic safety messages (BSMs) in Utah and Colorado.
 - d. *Expand vulnerable road user (VRU) detection and alerts at intersections.* Deploy systems at a limited number of intersections in Utah to further test and demonstrate capabilities to detect VRUs that cross intersections and provide alerts to drivers about possible conflicts with their vehicles.
 - e. *Expand system monitoring and reporting.* Expand and enhance the collection, storage, and management of data describing the health of systems and messages exchanged with equipped vehicles.

- f. *Expand security credentialing.* Expand the processes of attaching security credentials to messages exchanged by additional field equipment and vehicle systems.
 - g. *Demonstrate original equipment manufacturer (OEM) vehicle interoperability.* Involve a C-V2X-enabled OEM vehicle with safety applications as a public agency-operated test vehicle with available safety applications and drive a predetermined, instrumented “loop” corridor within the three CTW states.
 - h. *Expand integration of connected vehicle (CV) data.* Expand the ingest, quality check, and processing of data from CVs in Colorado and Utah as the number of RSU data collection sites expand.
 - i. *Expand data storage.* Expand data storage processes to support additional RSU data collection sites.
2. **Capability changes** – The proposed system will accomplish the following capability changes:
- a. *Improve TIM consistency.* Modify the approaches used in CTW states for generating and managing TIMs to achieve consistency in message structure and content.
 - b. *Increase and improve TIM creation.* Expand the capability to create TIM messages (using the agreed-upon consistency approach) that describe spot weather impact warning (SWIW), curve speed warning (CSW), alerts, and advisories by increasing the geographic coverage and expanding message content creation in Utah, Wyoming, and Colorado.
 - c. *Improve consistency of Interstate exchange of event reports.* Modify event report creation in each state to a consistent approach and exchange event reports describing traveler information alerts among the CTW states using the Situation Data Exchange (SDX).
 - d. *Create new TIM exchanges.* Utilize the SDX such that each CTW state sends TIMs and receives TIMs from neighboring states.
 - e. *Demonstrate Security Credential Management System (SCMS) interoperability.* Conduct demonstrations to understand the extent to which SCMS certificates are interoperable between the CTW states and take steps to achieve interoperability as needed.
 - f. *Refine SCMS certificates without cellular service.* Refine and expand an approach to topping off SCMS certificates in Utah fleet vehicles that do not require cellular service.
3. **Personnel changes** – No new personnel are expected to be added as a result of the proposed system, but roles and responsibilities of staff may change:
- a. *Manage additional Map Data Messages (MAP).* In Utah, staff and/or contractors will be responsible for creating and managing additional MAP messages.
 - b. *Maintain additional Field Equipment.* In Colorado and Utah, staff will be responsible for maintaining new Field Equipment added as part of this effort.
 - c. *Maintain additional Vehicle Systems.* In Utah, staff will be responsible for maintaining equipment on fleet vehicles that support C-V2X connectivity.

- d. *Manage additional TIMs and TIM interoperability.* In all CTW states, staff will need to manage the creation, update, and removal of TIMs to ensure they convey the maximum information possible to travelers and adhere to interoperability standards and best practices.
- e. *Manage expanded data.* In each CTW state, staff will be responsible for managing data retention and access.

2 Acquisition Overview

The acquisition approach includes Utah and Colorado, as these CTW partners will make purchases for the CTW deployments. Wyoming is not included in the acquisition approach as Wyoming's participation in the CTW program does not include any new purchases.

The CTW acquisition approach follows the NOFO, the State of Utah's acquisition policies (for Utah's acquisitions), and the State of Colorado's acquisition policies (for Colorado's acquisitions). To ensure full compliance with policies and laws of the State of Utah and State of Colorado, all purchasing is being done directly through each state's respective purchasing system. UDOT and CDOT have procurement processes that allow the acquisition and tracking of equipment and software for client contracts. The procurement and accounting processes include the following staffing resources: legal/contracts, accounts receivable, and accounts payable.

More information can be found in the CTW Comprehensive Acquisition Plan (CAP) document for these topics:

- Acquisition Approach
- Acquisition Schedule
- Vendor Outreach Plan

3 Installation Overview

This section provides an overview of the installation for the CTW Program deployments. The installation approach includes Utah and Colorado, as these CTW partners will be the ones installing CTW deployments. Wyoming is not included as a participant with any required installations as part of the CTW Program.

The CTW installations follow the NOFO, the State of Utah's and Colorado's standards, specifications, and policies. The following sections within this overview explain the supplier base, procurement method (which references the CAP), installation schedule, and installation plan.

Note: Table 1 and Table 2 represent planned quantities and completion dates that were original baseline projections. Actualized installation dates and final deployed totals are formally captured in the Phase 1 IR.

3.1 Supplier Base

Through previous CV deployments (which are currently in-place and being expanded to additional sites through this CTW Program), UDOT and CDOT have established contractual relationships with vendors that met the original requirements for software, hardware, and services. For some equipment and services, these previously identified vendors will be utilized for CTW installations in order to expand the existing functionality of and interoperability with in-place deployments.

For this CTW Program effort, UDOT and CDOT are utilizing existing mechanisms such as pre-approved product lists, master agreements, and other procurement processes to initiate equipment and software purchases for expanding the existing systems to additional sites through this CTW Program.

3.2 Procurement Method

Procurement methods for all equipment required for the CTW installations are found in the CTW CAP.

3.3 Inventory Management

In Utah and Colorado, equipment is either delivered to the state warehouse or directly to the consultant installer's warehouse. As devices are ready to be installed, they are provisioned and tested. Spare units are kept on hand so they can be swapped out if units fail. If roadside equipment (RSE) is not working, they are typically swapped with a new one, sending the faulty device back to the manufacturer.

Utah and Colorado each track inventory by means of spreadsheets and keeping records of purchase orders and invoices. Utah also maintains communication and updates to lists with their consultants. Some

purchases of equipment are obtained through different grants and are tagged with proper project designations.

3.4 Configuration Management

Neither Utah nor Colorado has a Configuration Control Board (CCB). Decisions regarding configuration are made by the V2X Project Manager and relayed to the installers and technicians that implement configurations.

Configuration details about elements of the CTW system are described below. UDOT, in conjunction with their V2X contractor, Narwhal, maintains an online accessible spreadsheet that tracks pre-installation configurations, installation progress, and post-installation configurations of roadside equipment (i.e., RSUs and supporting equipment) and on-board equipment (OBUs and supporting vehicle equipment). The configurations described below will be recorded in this online resource. This online resource is available through Google Docs to CTW team members as well as additional UDOT staff and contractors responsible for operating and/or maintaining the overall Utah V2X system.

3.5 High-Level Equipment Inventory

Table 1 shows a high-level summary of devices procured as well as the number of devices that will be configured and installed by equipment type.

Table 1. Equipment Inventory

Source: UDOT, 2026

Equipment Type (Includes Ancillary Equipment)	Total Number Procured	Total Number Planned to be Configured and Installed	Spare Parts and Reserve Equipment
RSUs for Utah SIs	509	483	26
Utah RSUs on Interstates	240	231	9
Colorado RSUs on Interstates	50	42	8
OBUs for Utah vehicles	230	220	10
LiDAR detection systems at Utah SIs	8	8	0

All equipment quantities and configurations are based on the CAP and Hardware Early Purchases Addendum. Minor discrepancies (e.g., spares) reflect Phase 1 scope limits and life cycle reserve estimates. Each installation item maps directly to a CAP acquisition item.

3.6 Installation Schedule

The installation schedule is presented in Table 2.

Table 2. Installation Schedule

Source: UDOT, 2026

Item	Acquisition Date	Planned Installation Completion Date	Quantity	Description
Utah RSUs at SIs	June 2025	May 2026	483 signals	Includes all other ancillary equipment (e.g., fiber switches, mounting hardware, cabling, etc.)
Utah RSUs on Interstates	June 2025	May 2026	231 locations	Includes all other ancillary equipment (e.g., fiber switches, mounting hardware, cabling, etc.)
Colorado RSUs on Interstates	October 2025	January 2026	42 locations	Includes all other ancillary equipment (e.g., fiber switches, mounting hardware, cabling, etc.)
Utah OBUs	October 2025	May 2026	220 OBUs	97 snowplows, 123 Utah Transit Authority (UTA) transit buses. Includes all other ancillary equipment (e.g., on-board processors [OBPs], harnesses, hardware, etc.)
VRU safety systems	October 2025	April 2026	8 intersections	LiDAR detection system with blank-out signs configured with existing RSUs at the intersections

Some RSUs and OBUs were purchased in advance to take advantage of cost reductions and reduce risks in the installation schedule. These details are shown in the CTW CAP.

3.7 Installation Plan

The following is a high-level installation plan that describes a summary for each of the deployment items listed in this document:

- RSUs
 - o UDOT and CDOT will utilize existing infrastructure for all RSU installations. Along the Interstate, RSUs will be deployed on highway luminaire poles, dynamic message signs, road weather information systems (RWIS), and camera poles. Existing power and fiber connections were evaluated and found for each of the locations. RSUs will be provisioned with security certificates, enrolled in each state's respective V2X Central System, and configured before being installed in the field. RSUs will be mounted in a manner that allows an optimum line of sight to the device. Power over ethernet (PoE) switches are installed and configured at the site, providing power to the RSU. CAT 6 cabling is utilized to make these connections between the various components of RSE.
 - o Utah will install RSUs at traffic signals. The devices are typically hung on the vertical luminaire extension above the signal pole upright or mounted on the mast arm using a vertical stand-off pipe. Existing power and communications at the SIs will be utilized for these RSUs. RSUs will be provisioned with security certificates, enrolled in UDOT's V2X Central System, and configured before being installed in the field. PoE switches are installed and configured at the site with CAT 6 cabling used to power the RSE. SCMs are configured and installed in existing signal cabinets. Technicians and/or signal engineers program the signal controller for applications like transit signal priority (TSP) or signal preemption.
 - o Several RSUs in remote Utah regions utilize solar power. If site evaluations indicate a need for greater energy reserves, supercapacitors will be deployed to provide the necessary storage boost.
- OBUs
 - o UDOT will provision and configure OBUs before deploying on various transit buses and snowplows. All these installations in the CTW Program include the OBU interfacing with an OBP. Wire harnesses and mounting hardware are utilized for the installations. On-board equipment (OBE) will be installed in such a way to be out of sight of the vehicle user. Transit buses have existing cabinets and compartments to stow the OBE and cabling. Snowplows have space behind the driver seat for the OBE installation. On a transit bus, the OBP will be configured to interface with the on-board bus communication system. OBPs on snowplows will interface with the salt spreader.
- VRU Safety System
 - o UDOT already has dozens of SIs (outside of the CTW Program) where LiDAR and RSUs are present. The CTW Program will leverage 12 existing intersections that have existing LiDAR and RSUs to run the V2X VRU safety application. These existing LiDAR locations are currently used for vehicle detection and signal actuation. The CTW Program will add the minor configurations needed on the existing Commsignia RSU to interface with the Ouster LiDAR system to make this application work. UDOT will deploy LiDAR at eight more sites where an existing Commsignia RSU is present. Blank-out signs will also be included as an additional safety feature to go along with the LiDAR detection system. UDOT in-house signal technicians will perform the LiDAR and blank-out sign installations (mounting the hardware, running the appropriate cables, etc.). A UDOT consultant will configure and integrate the system to operate properly.

For more deployment information, see Section 7.

3.8 Quality Assurance and Quality Control Processes

Installations for both Utah and Colorado will follow a flow of quality assurance (QA) and quality control (QC) processes to ensure that all project deployment deliverables are met. Since both UDOT and CDOT plan to use existing contracting mechanisms for consultants to perform these installations, the traditional processes are followed.

Agencies will provide a detailed scope of work and schedule to consultants with experience in V2X deployment and request a cost proposal. UDOT and CDOT will conduct internal reviews before issuing the Notice to Proceed to do the work. As installations are performed, tracking spreadsheets and lists are kept to record ongoing project progress and status. Each installer will conduct roadside equipment standalone tests, configurations, and checks, which are documented and recorded throughout the project. When work is complete, UDOT and CDOT are notified and can then conduct final reviews. If anomalies such as faulty devices, failure to connect to various devices, or V2X applications not working properly are discovered, those items are recorded and reported to the installer to resolve.

QA/QC processes will also align with the System Test Plan (STP) and System Test Results Summary (STRS) documentation.

For intersection installations, additional checks can be made throughout the process by UDOT signal engineers, ensuring that not only does the CTW V2X application work, but also all other existing signal systems are operating and functioning properly. This is another way that the Department of Transportation (DOT) can evaluate and ensure the quality of these installations.

4 Infrastructure/Roadside Equipment

4.1 Roadside Unit

4.1.1 Installation Information

4.1.1.1 Suppliers

Commsignia will be the supplier for UDOT and CDOT RSUs in the CTW Program.

4.1.1.2 Inventory Control Method

Utah and Colorado have allocated additional RSUs to allow technicians to swap out devices that are not functioning without causing outage of the RSU operations.

4.1.1.3 Configuration

Installers contact information technology (IT) support in their respective state to set up Internet Protocol (IP) addresses for RSE devices. Other configurations for RSUs include the following:

- All RSUs. Configurations applying to all RSUs include:
 - o RSUs must be configured in how they handle messages received from the Central System or from the roadside SCM to define if the messages are “immediate forward” or “store and repeat.”
 - o RSUs must be configured to interface with the Central System.
 - o RSUs must be provisioned with initial certificates.
 - o RSUs must be configured to download security certificate updates.
- RSUs at SIs. At CIs:
 - o Signal controllers are configured and programmed to respond to preemption and priority requests sent by the SCM.
 - o The RSUs must be configured to interface with the SCM.
- RSUs at VRU system locations. The RSUs are configured with logic that receives the object list from the LiDAR system and generates the sensor data sharing message (SDSM).

4.1.1.4 Installation Procedures

Required tools and equipment:

- Bucket truck
- Battery powered drill and impact driver
- 3/4" hole saw
- 1/2" National Pipe Thread (NPT) tap
- Tap handle
- 5/16" drill bit
- 7/32" drill bit
- 3/8-16 tap
- 1/4-20 tap
- 3/8" ratchet
- 9/16" socket
- 13 millimeter (mm) socket
- Cable tags/labels
- #3 Phillips screwdriver
- Adjustable open-end wrench
- Adjustable tongue and groove pliers
- Fish tape or rodder
- Electrical tape
- RJ45 crimpers
- Wire strippers
- Insulated terminal crimpers
- Torque screwdriver
- Torque wrench
- Ethernet cable tester
- Laptop
- Universal Serial Bus (USB) memory stick

Required materials:

- ½" CGB cable gland
- Anti-seize compound
- 3/8-16 x 1-1/2" hex bolts, 3/8" flat washers, 3/8" lock washers
- 1/4-20 x 1" machine screws, 1/4" flat washers, 1/4" lock washers
- 10 American Wire Gauge (AWG) copper wire (green insulated)
- Insulated ring terminals for 10 AWG conductor, 1/4" and 3/8" stud
- Commsignia RSU
- PoE network switch
- Surge suppressor
- German Institute for Standardization (DIN) rail
- Helix SCM
- CAT 6 shielded cable, outdoor rated
- CAT 6 patch cable, 6'
- CAT 6 patch cable, 1'
- Shielded RJ45 connector
- Unshielded RJ45 connector
- Zip ties
- For standoff pipe mount locations:
 - o Hub plate for 2" pipe
 - o 2" x 30" aluminum standoff pipe (color matched by location)
- For Astro-Brac mount locations:
 - o Pelco Astro-Brac with accessories

RSU antenna connections:

- Antennas are attached to the RSU (see Figure 1). There are four different revisions of Commsignia enclosures. Antenna sockets differ between each revision, so it is important to identify which RSU is desired to be selected. The antenna connections include dedicated short-range communications (DSRC), light emitting diode (LED)/subscriber identity module (SIM), Wi-Fi, Ethernet, C-V2X, Bluetooth, C-V2X, and long-term evolution (LTE). The variants of revisions can be identified by checking the identification (ID) number in the bottom right corner of the address field of the product label.



Figure 1. Commsignia RSU with Attached Antennas

Source: UDOT, 2025

Assemble the RSU mounting bracket:

- Attach the RSU mounting bracket to the back of the RSU enclosure. Use the provided lock washers, flat washers, and screws.
- Attach the pipe clamp bracket to the RSU mounting bracket. Use the provided hex bolt, lock washer, flat washer, and nut.
- Orient the clamp to accept a horizontal pipe for a standoff (most common), or, for an Astro-Brac installation, orient the pipe clamp to accept a vertical pipe.

Determine mounting type:

- The mount style is dependent on the orientation of the structure on which the RSU will be mounted. For vertical structure (such as a camera pole or luminaire extension above a signal arm), a standoff pipe is used. For a horizontal structure (such as a signal crossarm), a Pelco Astro-Brac is used. Mounting to a vertical structure (pole) is the most common mounting style (see Figure 2).



Figure 2. RSU at an SI

Source: UDOT, 2025

Standoff pipe installation:

Where an RSU is to be mounted to a vertical pole, a standoff pipe is used to minimize interference of the structure with the 5.9 GHz radio signals transmitted from the RSU (see Figure 3 and Figure 4). Install the hub plate, standoff pipe, CAT 6 cable, and RSU:

1. Determine the mounting height of the RSU. The maximum mounting height for the RSU as allowed by the Federal Communications Commission (FCC) is 26 ft 3 in (8 meters) above grade directly below the RSU. There is no minimum mounting height; however, for best performance, the RSU should be mounted as high as possible (within FCC limitations) and should always be mounted higher than the cross arm at intersections. Exact mounting height and orientation should be field-determined to avoid any line-of-sight obstructions between the RSU and the roadway.
2. Mark the hub plate mounting and cable access holes on the pole at the intended mounting location.
3. Drill holes in the pole: (1) 3/4" hole for the cable access and (2) 5/16" holes for 3/8-16 bolts.
4. Thread the 3/4" hole with the 1/2" NPT tap and thread the 5/16" holes with the 3/8-16 tap.
5. Drop a twine down the 3/4" hole in the pole and pull a CAT 6 shielded outdoor-rated Ethernet cable up and out of the hole. The CAT 6 cable originates in the signal or intelligent transportation system (ITS) cabinet and routes through existing conduits to the base of the pole. Pull enough cable out of the pole to reach through the standoff pipe to the RSU, including additional length to form a drip loop below the RSU (approximately 5 ft. of cable).

6. Slide a CGB over the CAT 6 cable and thread it into the 1/2" NPT threaded hole in the pole. Tighten the CGB onto the CAT 6 cable to form a waterproof seal.
7. Prepare a length of 10 AWG green insulated copper wire (approximately 4 ft. long) with an insulated ring terminal for a 3/8" stud on one end. This wire is used to provide an electrical bond (equipotential bond) between the RSU and the pole that the RSU assembly is mounted to.
8. Attach the hub plate to the pole using (2) 3/8-16 bolts, flat washers, and lock washers. Route the 10 AWG bonding wire through the 2" pipe hub such that the 3/8" ring terminal can be attached to one of the 3/8-16 bolts as shown. Securely tighten the bolts; recommended tightening torque is 15 foot-pounds.
9. Feed the CAT 6 cable and 10 AWG bonding wire through the standoff pipe and thread the pipe into the hub plate. Tighten the set screw in the hub plate to secure the standoff pipe.
10. Mount the RSU on the standoff pipe. Slide the RSU pipe clamp over the end of the standoff pipe, orient the RSU vertically, and tighten the (2) M8 x 80 mm bolts to the recommended torque of 60 inch-pounds (5 foot-pounds).
11. Cut the 10 AWG bonding wire to length and crimp on an insulated ring terminal for a 1/4" stud. Remove one of the Phillips head M6 mounting screws from the back of the RSU and attach the bonding wire to the RSU. Re-tighten the mount screw to the recommended torque.
12. Cut the CAT 6 cable to length, allowing sufficient length for a drip loop, and install a shielded RJ45 connector. Follow the American National Standards Institute (ANSI)/Telecommunications Industry Association (TIA)-568B standard for pinout on the RJ45 connector.
13. Install an RJ45 unshielded connector at the end of the CAT 6 cable that is in the signal or ITS cabinet following the ANSI/TIA-568B standard. Test the CAT 6 cable using a cable tester designed to test Ethernet cables. If the cable does not pass, cut off and reinstall new RJ45 connectors and retest.
14. Slide the Commsignia-provided weather seal and locknut over the CAT 6 Ethernet cable and RJ45 connector (the provided seal fits over a terminated cable). Plug the RJ45 connector into the Ethernet port on the RSU and tighten the locknut on the weather seal.
15. Document the installation on the pole by taking photographs of the RSU, standoff pipe, and hub plate. Record the RSU serial number and the number on the UDOT asset tag that is attached to the RSU.



Figure 3. Mounted Standoff Pipe with Cables
Source: UDOT, 2025



Figure 4. RSU Mounted to the Standoff Pipe
Source: UDOT, 2025

Astro-Brac installation:

Where an RSU is to be mounted to a horizontal structure such as a signal arm, a Pelco Astro-Brac is used to provide vertical clearance above the horizontal member and to minimize interference of the structure with the 5.9 GHz radio signals transmitted from the RSU. Install Astro-Brac, CAT 6 cable, and RSU:

1. Determine the Astro-Brac mounting location. Typically, the Astro-Brac is located so that it can be accessed without having to close a lane or work over traffic.
2. Drill holes in the cross arm: (1) 3/4" hole for the cable access and (1) 7/32" hole for a 1/4-20 screw.
3. Thread the 3/4" hole with the 1/2" NPT tap and thread the 7/32" hole with the 1/4-20 tap.
4. Fish the CAT 6 cable up the pole, through the cross arm, and out of the 1/2" NPT threaded hole. The CAT 6 cable originates in the signal or ITS cabinet and routes through existing conduits to the base of the pole.
5. Attach the Astro-Brac to the cross arm according to the manufacturer's instructions included with the bracket. Carefully align the bracket so it is straight and level.
6. Clamp the Astro-Brac tube into the bracket. Ensure that the tube length is long enough for the RSU's antennas to have at least 3X clearance between the bottom of the lower antennas and the top of the signal cross arm. Double-check to make sure the tube is plumb.
7. Prepare a length of 10 AWG green insulated copper wire (approximately 4 ft. long) with an insulated ring terminal for a 1/4" stud on one end. This wire is used to provide an electrical bond (equipotential bond) between the RSU and the cross arm that the RSU assembly is mounted to.
8. Attach the 10 AWG bonding wire to the cross arm using a 1/4-20 machine screw, 1/4" flat washer, and 1/4" lock washer.
9. Slide a CGB over the CAT 6 cable and thread it into the 1/2" NPT threaded hole in the pole. Tighten the CGB onto the CAT 6 cable to form a waterproof seal.
10. Feed the CAT 6 cable and 10 AWG bonding wire up the Astro-Brac vertical tube until it comes out the top of the tube. Pull enough length on both to form a drip loop below the RSU.
11. Mount the RSU to the top of the Astro Brac tube. Slide the RSU pipe clamp over the top of the tube pipe, orient the RSU vertically, and tighten the (2) M8 x 80 mm bolts to the recommended torque of 60 inch-pounds (5 foot-pounds).
12. Cut the 10 AWG bonding wire to length and crimp on an insulated ring terminal for 1/4" stud. Remove one of the Phillips head M6 mounting screws from the back of the RSU and attach the bonding wire to the RSU. Re-tighten the mount screw to the recommended torque.
13. Cut the CAT 6 cable to length, allowing sufficient length for a drip loop, and install a shielded RJ45 connector. Follow the ANSI/TIA-568B standard for pinout on the RJ45 connector.
14. Install an RJ45 shielded connector at the end of the CAT 6 cable that is in the signal or ITS cabinet, following the ANSI/TIA-568B standard. Test the CAT 6 cable using a cable tester designed to test Ethernet cables. If the cable does not pass, cut off and reinstall new RJ45 connectors and retest.

15. Slide the Commsignia-provided weather seal and locknut over the CAT 6 Ethernet cable and RJ45 connector (the provided seal fits over a terminated cable). Plug the RJ45 connector into the Ethernet port on the RSU and tighten the locknut on the weather seal.
16. Document the installation on the pole by taking photographs of the RSU, standoff pipe, and hub plate. Record the RSU serial number and the number on the asset tag that is attached to the RSU.

4.1.1.5 Quality Assurance and Quality Control Processes

All RSU installations are verified to ensure QA and QC is being conducted appropriately for these CTW deployments. A series of checklists are utilized to allow thorough verification of the installations. Baseline verification and testing is done for RSU functionality and mounting inspection.

4.1.1.6 High-level Installation Schedule

UDOT will install all the RSUs (for both signals and interstates) by May 2026. CDOT will install their RSUs by the end of February 2026.

4.1.1.7 Hardware and Software Configuration Control Processes

UDOT and CDOT have existing configuration control processes that enable them to successfully operate RSUs. These processes will continue in the CTW Program and are summarized as follows:

- Installer will prepare equipment for installation that includes latest software versions and tests for functionality.
- A process is in place that as software updates are known to affect Field Equipment, there is a process to install these to all field devices and document when completed.

4.1.1.8 Spare Parts/Warranty Contingency Plan

If devices fail during their warranty period, they will be replaced. Experience has shown that they do not typically fail during the warranty period.

4.2 Fiber Switch

4.2.1 Installation Information

4.2.1.1 Suppliers

UDOT will use Fortinet switches for their deployments in Utah. CDOT will use Omnitron switches.

4.2.1.2 Inventory Control Method

Fiber switches are items that are under state contracts and regularly stocked. If devices are needed to swap out a broken or faulty piece of equipment, there is availability in stock to do that.

4.2.1.3 Configuration

There are configurations and some coordination is required to install a new fiber switch such as assigning IP addresses, tracking components (for replacements), and coordinating with the departments' IT teams to set up and utilize virtual private network (VPN) accesses.

Additional configuration is explained below throughout the installation procedures.

4.2.1.4 Installation Procedures

The following describes and summarizes some of the steps taken to install the fiber switch:

- Locate a suitable location to mount the switch and power supplies inside the cabinet (see Figure 5). Ensure other devices and/or future work and adjustments will not be blocked or impeded. Most switches are DIN-rail, which is typically mounted to the cabinet using track nuts. Securely mount the switch, power supplies, and PoE surge protector.
- Wire the power supplies to the new switch. If the power supply has an Alternating Current (AC) cord, wire it and plug it in.
- When removing an existing switch to be replaced, take note of the current ports being occupied via ethernet. Make sure the devices are plugged back into their correct port according to as-builts. Disconnect each ethernet cable from the existing switch and neatly route it over to the new switch.
- Most switches connect to the network via fiber optic cable using a small form-factor pluggable (SFP) module. Identify which SFP type is being used and carefully remove the fiber optic cable from the SFP. Carefully slide the SFP module into the new ports on the switch.
- Most cabinets have ST fiber gators installed. New Straight Tip (ST) to Lucent Connector (LC) fiber jumpers may be required to connect the fiber to the switch. Some cabinets have fiber coming in on a fan-out kit. These connectors can be LC or ST connectors. ST connectors will require the use of barrels and ST to LC jumpers. When the correct connectors have been determined, connect the fiber to the SFP's corresponding port on the new switch.
- Unplug and remove the existing switch along with its mounting hardware and/or any other corresponding devices.
- Connect a laptop to the fiber switch. Open a PuTTY or another secure shell (SSH) program to configure the switch to the proper network IP.
- Ping the switch and gateway from the laptop to ensure that the IP is configured correctly and is connected to the network. Reboot the switch and re-ping the IP and gateway to ensure that the switch's configuration was saved properly.



Figure 5. Typical Fiber Switch Inside a Signal Cabinet

Source: UDOT, 2025

4.2.1.5 Quality Assurance and Quality Control Processes

As described in Section 3.8, testing is done throughout the installation process.

4.2.1.6 High-level Installation Schedule

Fiber switches will be installed for both UDOT and CDOT by May 2026 as RSUs are installed.

4.2.1.7 Hardware and Software Configuration Control Processes

UDOT and CDOT manage ongoing software and firmware updates according to their contracts.

4.2.1.8 Spare Parts/Warranty Contingency Plan

If devices fail during their warranty period, they will be replaced. Experience has shown that they do not typically fail during the warranty period.

4.3 LiDAR Detection

4.3.1 Installation Information

4.3.1.1 Suppliers

UDOT plans to use the Ouster BlueCity LiDAR detection system for the CTW Program.

4.3.1.2 Inventory Control Method

The LiDAR detection systems are regularly stocked items at the UDOT state warehouse. Of the 20 planned intersections in the CTW Program, UDOT will install new LiDAR detection systems at 8 of the 20 intersections. The other 12 intersections already have existing Ouster BlueCity LiDAR detection systems functioning. If devices are needed to swap out a broken or faulty piece of equipment, there is availability in-stock to do that.

4.3.1.3 Configuration

A host system is used to connect to the edge box using the local area network (LAN) A (Debug) port and change the system settings. IP addresses are set, usernames and passwords are entered to log in, and edits can be made.

Detections zones are set up at the intersection for lane designations and crosswalk areas. The Commsignia RSU (also present at the intersection) is configured with logic to process object lists from the LiDAR detection system. The RSU creates and forwards SDSM messages to the OBU.

4.3.1.4 Installation Procedures

A user manual is provided by Ouster when purchasing a LiDAR detection system. The manual gives a thorough overview of required equipment, system capabilities, equipment component specifications, pre-installation guidance, and installations instructions. UDOT plans to have in-house signal technicians install these LiDAR systems. They have experience deploying dozens of these already throughout the state of Utah and are very familiar with best practices and installation methods to ensure the components function properly.

4.3.1.4.1 Site-Specific Considerations

UDOT will deploy two LiDAR sensors at each of the 20 planned intersections for the VRU safety applications. Utilizing two sensors on opposite corners of an intersection provides a better object detection range, especially if certain views of the sensor are occluded by trees or poles. LiDAR sensors are mounted 4 to 5 meters above the road. Tilt the sensor down 15 to 20 degrees, facing the center of the intersection. A sensor installed at 4 meters in height and tilted 10 degrees down will have around 4 meters of blind spot for pedestrians. Make sure there is enough space (offset) between the LiDAR pole and the edge of the intersection (desired detection area) to detect all the objects on the road.

Determine the wiring and communication architecture required. UDOT will use CAT 6 cable to connect the LiDAR sensor to the edge computer, which also connects and interfaces with the traffic signal controller.

4.3.1.4.2 Site Installation

Required tools:

- Bucket truck
- Stainless steel banding and banding tool
- RJ45 crimping tool
- Outdoor-Rated CAT 6 Cable for PoE+
- Quality ethernet cable tester capable of checking for continuity (no open circuits/broken wires), shorts (wires incorrectly making contact), crossed pairs, reversed pairs, split pairs, correct pairing, shield continuity, and signal quality.
- PoE tester to test the PoE ports voltage and connection

Below is a summary of installation steps to follow:

- Install the network cable. Use high-grade CAT 6 cable and ensure that the total length of each run is less than 90 meters (sensor to edge computer). Avoid sharp bends that are tighter than the recommended minimum bend radius. Keep data cables away from power cables as much as possible to reduce the chance of surges or electromagnetic interferences.
- Terminate CAT 6 cables with high-quality RJ45 connectors compatible with shielded CAT 6 cabling. Ground the CAT 6 only at one end to prevent ground loop currents.
- Test the cable. Before connecting any active equipment (edge computer, network switch, PoE splitter, LiDAR sensor) every CAT 6 cable must be tested to verify its integrity and performance.
- Install the PoE splitter. Identify a suitable location on the pole for mounting the PoE splitter. Use the provided screws and bracket to securely fasten the splitter to the pole.
- Ground the PoE splitter.
- Install the edge computer and test. Connect the CAT 6 cables to the ethernet ports.
 - o LAN 1: Connect to the network switch.
 - o LAN 2: Connect to other devices such as a traffic controller.
 - o LAN 3: Connect to LiDAR sensor.
 - o LAN 4: Connect to LiDAR sensor.
- Ground the edge box.
- Connect to the edge box and test the software.
- Check the LiDAR connection and point cloud. Ensure sensors are listed on that they are producing a live stream visually. Log the serial numbers of the lidars and their location at the intersection.
- Install the LiDAR sensors at the intersection (see Figure 6).
 - o LiDAR height: 4 meters.
 - o Direction: facing the intersection.

- o Tilt angle: 15-20 degrees downward.
- o Roll angle: zero degrees for flat roads.
- o Offset: approximately 3 meters.
- o Ensure a clear line of sight for LiDARs to achieve the best coverage area. Avoid installing the LiDAR close to traffic signs, signal heads, and other objects that might block the LiDAR's field of view.
- o Review the LiDAR point cloud.



Figure 6. Ouster LiDAR Sensor Installed on Signal Pole Upright

Source: UDOT, 2025

4.3.1.5 Quality Assurance and Quality Control Processes

As described above in Section 3.8, testing is done throughout the installation process. The work will be done by experienced UDOT signal technicians who run through a series of their own checklists to ensure new and existing systems at the signalized intersection are functioning correctly.

4.3.1.6 High-level Installation Schedule

It is anticipated to have all LiDAR detection system deployments completed and installed during Q1 of 2026

4.3.1.7 Hardware and Software Configuration Control Processes

Ouster notifies UDOT of on-going software updates and regularly conducts those as outlined in their contract with the department.

4.3.1.8 Spare Parts/Warranty Contingency Plan

The equipment for the LiDAR system is under warranty for 1 year. If they fail during that time (which in Utah's experience is rare), devices can be replaced and covered under warranty.

4.4 Signal Command Module

4.4.1 Installation Information

4.4.1.1 Suppliers

UDOT plans to use Helix Innovations SCMs for the CTW Program.

4.4.1.2 Inventory Control Method

Utah has allocated additional SCMs to allow technicians to swap out devices that are not functioning without causing outage of the SCM operations.

4.4.1.3 Configuration

Configuration for the SCMs is described below in the Installation Procedures in Section 4.4.1.4.

4.4.1.4 Installation Procedures

There are a couple options of methods to install the SCMs in the signal cabinet:

- SCM installation in the detector rack (see Figure 7):
 - o This option can be utilized if certain criteria are met:
 - The cabinet currently has a bus interface unit (BIU) installed and functional in the cabinet.
 - There are slots available in the detector rack. (Slots 13-16 are commonly used.) The SCM requires a 4-channel slot.
 - The detector rack is actively assigned in the signal controller.
 - If the cabinet is equipped with a Click-650 or Click-656, verify that BIU 9 is unassigned.
 - o Firmly slide the SCM into the detector rack. Neatly route an ethernet cable from the SCM to the switch. The SCM will receive power via a PoE switch.
- SCM enclosure installation:
 - o If installation in the detector rack is not feasible, the SCM with a suitable enclosure can be placed in the cabinet and wired to the BIU terminal block.
 - o Install insulated forks at the ends of the wires on the SCM enclosure wire harness.
 - o Connect the wires to the BIU inputs on the terminal block.
 - o Tighten connections securely, and route and tie wires and cables neatly. Run the cable to the desired location for the enclosure. Plug the cable into the enclosure.
 - o Neatly route an Ethernet cable from the SCM to the fiber switch. The SCM will receive power via PoE.



Figure 7. SCM Installation in a Detector Rack

Source: UDOT, 2025

The signal controller input needs to be remapped. The procedure is summarized as follows:

- Download the controller database to a memory stick.
- Edit the existing database using ASC3 Virtual Controller software.
- Upload the updated database from the memory stick to the controller.

To complete the installation and configuration/setup of the SCM, the IP address needs to be set for the SCM:

- The IP address of the SCM must be set while physically present at the cabinet. Once the IP address is set, all other configurations can be done remotely.
- Plug an Ethernet patch cable into the SCM's port and plug the other end into the laptop computer.
- Open a web browser to go to the SCM's IP address. A login screen appears, which requires credentials with administrator privileges.
- If the SCM's clock differs from the clock on the computer by more than one minute, a warning will appear. The user can synchronize the SCM's clock with the computer.

- Verify the SCM's IP address has been changed by pinging the SCM from a remote host on the network the SCM is connected to (e.g., from a laptop connected to the network via VPN).

4.4.1.5 Quality Assurance and Quality Control Processes

All SCM installations are verified to ensure QA and QC is being conducted appropriately for these CTW deployments. A series of checklists are utilized to allow thorough verification of the installations. Baseline verification and testing is done for SCM functionality.

4.4.1.6 High-level Installation Schedule

SCMs will be installed as part of the RSU installations at SIs in Utah. These are planned to be installed by May 2026.

4.4.1.7 Hardware and Software Configuration Control Processes

SCMs in operation are listed in UDOT V2X records. UDOT's consultant installer/integrator periodically handles hardware and software configuration needs as they arise (software updates, bug fixes, component maintenance, etc.).

4.4.1.8 Spare Parts/Warranty Contingency Plan

Warranty, as outlined in the vendor's contract for SCMs, applies in covering equipment replacements.

4.5 Blank-Out Sign

4.5.1 Installation Information

4.5.1.1 Suppliers

UDOT plans to use the Orange Traffic blank-out signs mounted with Pelco Astro-Brac assemblies.

4.5.1.2 Inventory Control Method

Blank-out signs will be ordered in two batches of 16. The first 16 signs will be enough to deploy at four intersections (four at each site). As those installations finish, another batch of 16 blank-out signs will be ordered. This will allow UDOT to cycle through equipment with a limited-size space in the UDOT ITS warehouse/bay.

4.5.1.3 Configuration

Before the sign is installed in the field, the installer/technician configures the LED driver module for the appropriate message color and brightness to optimize visibility of the sign.

Once installed, the sign is also configured to interface with the RSU. Logic programmed on the RSU and integration with a programmable Input/Output (I/O) controller allow the blank-out sign to be triggered

on/off when the LiDAR detection system detects the presence of VRUs in the crosswalk and oncoming vehicles.

4.5.1.4 Installation Procedures

The blank-out sign is composed of three basic assemblies: message display assembly, power supply assembly, and aluminum enclosure. The installer provides and installs appropriately sized power cable considering the length of the cable runs and potential voltage drops from the cabinet to the sign. The blank-out sign is mounted to the existing traffic signal mast arm near the signal pole upright using a Pelco Astro-Brac assembly. The installer applies silicon sealant between the serrated hub and upper arm of the Astro-Brac assembly. Sealant is also applied to all mount connection and entry points to prevent water infiltration.

4.5.1.5 Quality Assurance and Quality Control Processes

Blank-out signs will be verified to ensure appropriate functionality and operation with the VRU safety system. See also Section 3.8.

4.5.1.6 High-level Installation Schedule

It is anticipated to have all blank-out signs installed with LiDAR detection system deployments completed and installed during Q1 of 2026.

4.5.1.7 Hardware and Software Configuration Control Processes

N/A

4.5.1.8 Spare Parts/Warranty Contingency Plan

Blank-out signs are covered under a two-year warranty against defects in materials and workmanship. Signs may be replaced if any issues are discovered.

4.6 Supercapacitor

4.6.1 Installation Information

4.6.1.1 Suppliers

UDOT will leverage existing Econolite contracts to procure six 48 Volts Direct Current (VDC) capacitor modules and associated hardware. This equipment ensures standardization with UDOT's current infrastructure.

4.6.1.2 Inventory Control Method

UDOT personnel maintain an active inventory of supercapacitors. The project team will collaborate with them to evaluate power storage requirements at each solar-powered site. Following this assessment, the

necessary units will be issued to field installation teams, and the project will fund the replenishment of the ITS inventory.

4.6.1.3 Configuration

4.6.1.3.1 Solar Charger Hardware Configuration

- Remove the front cover of the solar charger to access the internal wiring and Dual In-line Package (DIP) switches.
- Adjust the DIP switches to the manufacturer-recommended settings for a 48 VDC system, as detailed in the installation manual.

4.6.1.3.2 Supercapacitor Commissioning

- Verify that both the cabinet battery circuit breaker and the solar array circuit breaker are in the OFF position.
- Activate the primary supercapacitor by toggling its power switch to the ON position.
- Engage the 50A circuit breaker on the primary supercapacitor.
- Measure the voltage and verify the polarity at the primary supercapacitor output (alternatively, this can be checked at the input of the cabinet battery circuit breaker).
- Repeat the power-on and verification sequence for the secondary supercapacitor.
- Once both units are powered and polarities are confirmed as correct, turn ON the cabinet battery circuit breaker.
- Turn ON the solar array circuit breaker.

4.6.1.3.3 Software and Firmware Updates

- Launch the MSView software application.
- Update solar charge controller and relay driver configuration files and voltage cut-off setpoints for a 48 VDC nominal system.
- Apply the new configuration files to both the solar charger and the relay driver.

4.6.1.4 Installation Procedures

4.6.1.4.1 Required Tools and Equipment

- Hand Tools
 - o Digital multimeter
 - o Wire cutters and strippers
 - o Insulated screwdriver set
- Computing
 - o Field laptop

- o Device-specific programming cables
 - o MSView software
- Documentation and Data
 - o Solar Charge Controller Manufacturer's Installation Manual (PDF)
 - o Updated 48 VDC configuration files for the solar charge controller and relay driver

4.6.1.4.2 Required Materials

- (2) Econolite ZX2000-48 48VDC supercapacitors (including all mounting accessories)
- Battery cabling (appropriately gauged for 48 VDC)
- RJ-45 communication cables
- (2) 48 VDC relays
- 48 VDC to 24 VDC power converter (required as determined by specific cabinet equipment)
- Heavy-duty zip ties

4.6.1.4.3 Typical Solar ITS Equipment

Figure 8 and Figure 9 show examples of typical solar ITS equipment, with the items shown numbered and listed below the figures.

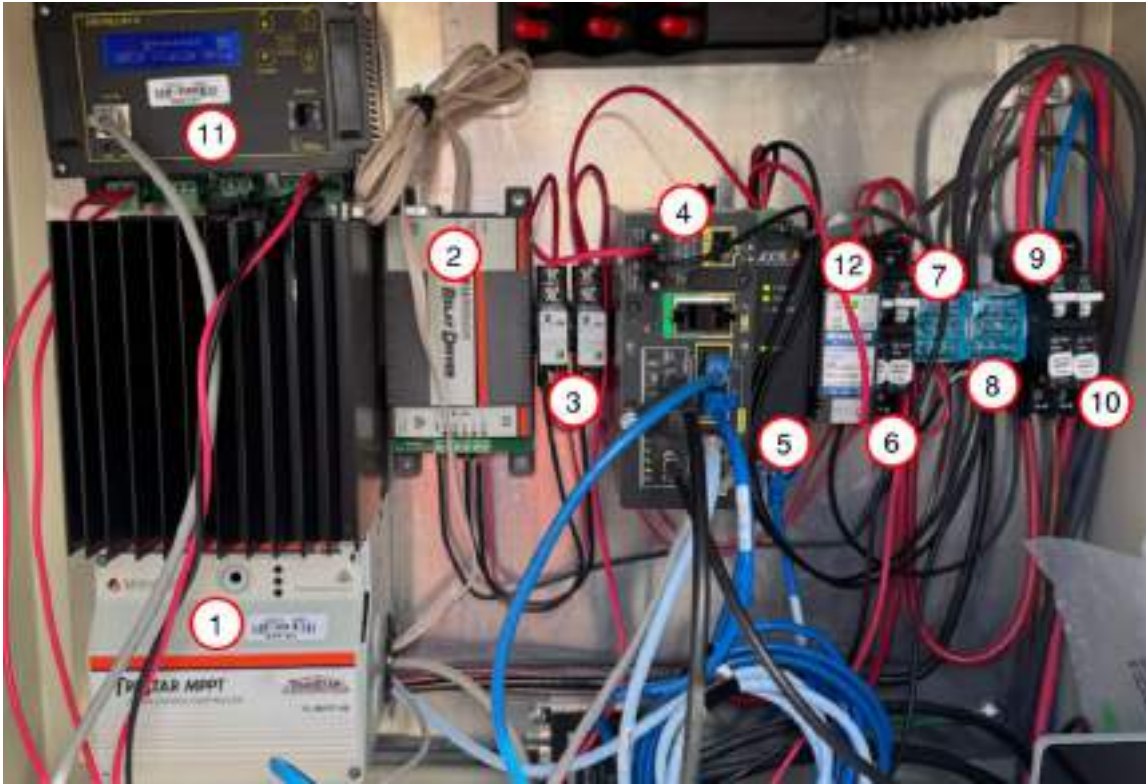


Figure 8. Typical Solar ITS Equipment Example 1

Source: UDOT, 2025

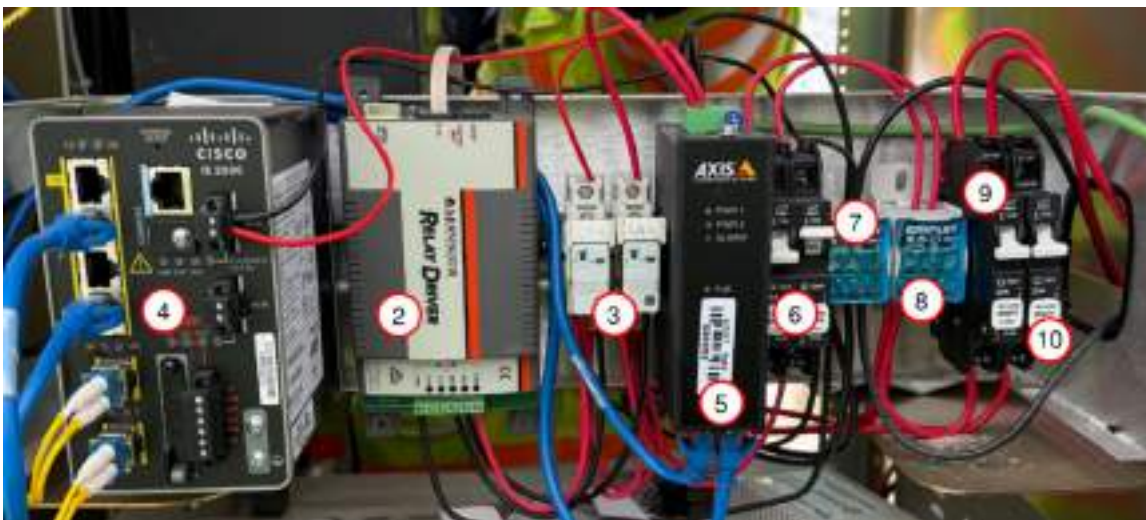


Figure 9. Typical Solar ITS Equipment Example 2

Source: UDOT, 2025

1. Solar charge controller
2. Relay driver
3. Relays
4. Switch or cell-modem
5. Camera PoE injector
6. Load circuit breakers
7. Negative distribution block
8. Positive distribution block
9. Battery circuit breaker
10. Solar array circuit breaker
11. DIN Relay 4 module
12. Direct Current to Direct Current (DC/DC) voltage converter (12 Volt [V])

4.6.1.4.3.1 Removal of SLA Batteries

The initial phase involves decommissioning the existing energy storage system and ensuring the cabinet is safe for reconfiguration.

- System De-energization:
 - o Disconnect the solar array and batteries from the cabinet equipment.
 - o Turn OFF the solar array circuit breaker.
 - o Turn OFF the battery circuit breaker.
- Battery Disconnection and Safety:
 - o Disconnect the cables from the existing Sealed Lead-Acid (SLA) batteries.
 - o Caution: SLA batteries remain "live" even when disconnected. They are 12V DC units capable of supplying high-amperage current; avoid shorting the terminals.
 - o Immediately replace terminal covers after cables are removed to prevent accidental contact.
- Cable Removal:
 - o Remove the red (+) battery cable from the input side of the battery circuit breaker.
 - o Remove the black (-) battery cable from the negative distribution block.
- Physical Removal:
 - o Extract the batteries from the cabinet.
 - o Safety Warning: Each battery weighs approximately 152 lbs; a two-person lift is required for safe removal.

4.6.1.4.3.2 Supercapacitor Installation and Wiring

- Mounting:
 - o Install two supercapacitors per cabinet.
- Cable Preparation:
 - o The supplied cables feature Anderson-style connectors. Cut off the 30A-rated connector on the load end of the cable (see Figure 10).



Figure 10. 30A-Rated Connector to Remove

Source: UDOT, 2025

- o Terminate the red (+) wire to the battery circuit breaker.
- o Terminate the black (-) wire to the negative distribution block.
- Power Connectivity:
 - o Connect the 50A Anderson-style connector to the Primary supercapacitor. These connectors are polarized to prevent incorrect connections.
 - o Either unit can serve as the primary; however, the unit physically wired to the cabinet's battery circuit breaker is designated as the Primary (Unit 1).
 - o Install the supplied interconnection cable (50A Anderson-style connectors on both ends) between the two units to connect them in parallel (see Figure 11).
- Communication:
 - o Connect the communication cable from the RS485-1 port on the Primary unit to the RS485-2 port on the Secondary unit (see Figure 12).
 - o Primary Addressing: Set DIP switch 1 to ON; all others to OFF.
 - o Secondary Addressing: Set DIP switch 2 to ON; all others to OFF (see Figure 13).



Figure 11. Connected Supercapacitors

Source: UDOT, 2026

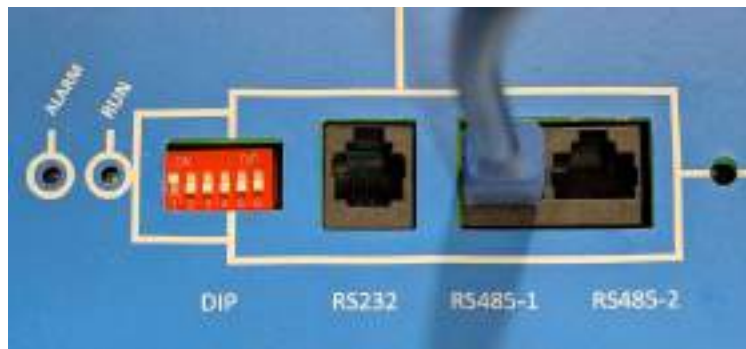


Figure 12. Primary Supercapacitor Address and Communication Cable

Source: UDOT, 2026

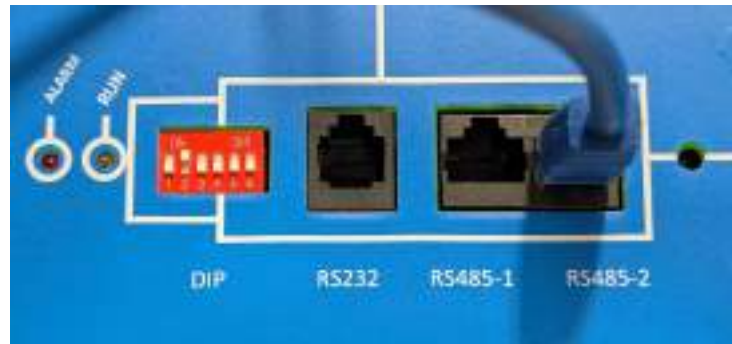


Figure 13. Secondary Supercapacitor Address and Communication Cable

Source: UDOT, 2026

4.6.1.4.3.3 Voltage Conversion and Component Replacement

Standard solar ITS cabinets typically operate at 24VDC. Because the new system operates at 48VDC nominal (55VDC maximum), components must be upgraded or regulated.

- Relay Upgrades:
 - o Replace the two existing 24V relays with 48V relays.
- TMS Integration:
 - o Install a 48V to 24V converter specifically for TMS equipment.
 - o Wire the TMS power directly to the output of this converter.
- Voltage Compatibility Check:
 - o Inspect any existing 12V voltage converters. Verify they support a maximum input voltage of at least 56VDC.
 - o If the rated input voltage is lower than 56VDC, replace the unit with a converter compatible with the new 48VDC nominal input.

4.6.1.5 Quality Assurance and Quality Control

Conduct a comprehensive functional check to ensure all peripheral equipment—including closed-circuit television (CCTV) cameras, Traffic Monitoring Stations (TMS), V2X units, and RWIS—is fully operational and communicating correctly over the network.

4.6.1.6 High-level Installation Schedule

It is anticipated to have all Solar RSU sites completed and installed during Q1 and Q2 of 2026.

4.6.1.7 Hardware and Software Configuration

No additional configuration is required.

4.6.1.8 Spare Parts/Warranty Contingency

Any faulty capacitors identified during installation will be replaced using existing inventory. Defective units will then be processed through the applicable Return Merchandise Authorization (RMA) procedure.

5 In-vehicle Equipment

5.1 On-board Equipment

OBE will include OBUs and OBPs for installations on snowplows and transit buses. Careful planning and coordination with vehicle owners/operators is needed to arrange equipment installation during times when the vehicles are not in use. Transit vehicles are typically equipped through the nighttime hours since they operate on daytime routes. Snowplows operate on an as-needed basis, so installations may happen at various times of day or, ideally, outside of the snow/winter season. The following sections outline information including equipment configuration and installation procedures for the OBE.

5.1.1 Installation Information

5.1.1.1 Suppliers

Commsignia will be the supplier for UDOT OBU deployments in the CTW Program. Helix OBPs will be attached to each OBU. Neither Colorado nor Wyoming plan to deploy OBUs in the CTW program.

5.1.1.2 Inventory Control Method

A limited number of OBUs and OBPs will either be on hand with UDOT's consultant installer or stocked at the state warehouse to minimize acquisition time in response to OBU equipment failures.

5.1.1.3 Configuration

Consultant installer configures the OBE during the installation process for the following:

- All OBUs. Configurations applying to all OBUs include:
 - o OBUs must be provisioned with initial certificates.
 - o OBUs must be configured to download security certificate updates.
 - o OBUs must be configured to interface with the OBP.
 - o OBUs are connected to the vehicle Controller Area Network (CAN) Bus.
- OBUs on transit vehicles:
 - o OBPs are configured to interface with the transit bus on-board system that manages schedule/lateness, General Transit Feed Specification (GTFS), and Automatic Vehicle Location (AVL) data.
- OBUs on snowplows:

- o OBPs are configured to interface with the on-board snowplow salt spreading system. (Preemption is requested as long as the snowplow is actively spreading salt and its position is within the geofenced area of the intersection.)

5.1.1.4 Installation Procedures

5.1.1.4.1 Transit Vehicle Installations

Required materials:

- Commsignia OBU
- Helix Innovations OBP
- V2X/Global Navigation Satellite System (GNSS) antenna
- Cabling and harnesses
 - o Main harness
 - o OBU-facing cable
 - o Diagnostic port splitter
 - o Extension harness (between the diagnostic port splitter and main harness)

Figure 14 represents the logic to determine when the OBP sends a TSP message to the OBU. Installation must support the inputs that include occupancy value, schedule reliability index, gear status (park or neutral), and if the vehicle is turned on. When these conditions are met, a 5V signal can be sent through the General Purpose Input/Output (GPIO) to generate a Signal Request Message (SRM).

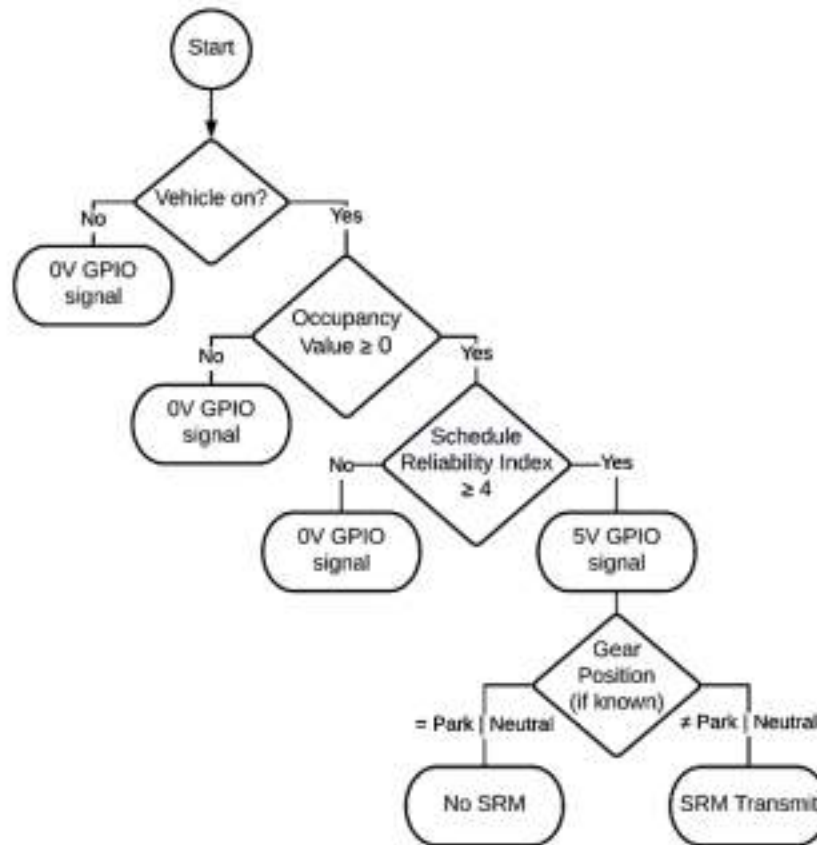


Figure 14. SRM Logic Tree for Transit Vehicles

Source: UDOT, 2025

In order to accomplish this logic tree, the following installation steps are performed:

- Ethernet connection from transit vehicle on-board schedule system to OBP to acquire vehicle route status and occupancy.
- OBE harness connection from the vehicle power management system to the OBU to acquire vehicle ignition status.
- OBE harness connection from the J1939 port to the OBU to acquire gear status.
- OBE harness connection from OBU to V2X/GNSS antenna.
- The installation team will consider available space, the location of the on-board transit vehicle system, OBE cable lengths, and concerns about physical space when choosing the best mounting and routing locations for the OBE. The OBE cable harnesses are designed to accommodate various physical configurations. When possible, the OBE will be mounted inside the equipment rack alongside existing systems.
- The V2X/GNSS antenna will be mounted on the roof of the vehicle. The antennas will be mounted in areas where the ceiling is accessible but behind panels to ensure an unchanged

visual appearance. The cables from the antenna will be routed alongside the existing harnesses, using the similar flex tubing (if required).

- o Use the stud-mount antenna installation method: use the stud-mounted shark fin housing. For this method, a 3/4-inch hole is drilled into the roof of the vehicle which is used to mount the antenna unit and to run the antenna cables directly into the vehicle. A threaded stud on the lower side of the antenna housing is placed into the drilled hole and secured with a nut. Adhesive sealant is applied between the exterior antenna/roof mating surface to create a waterproof seal. This method allows for the cables to be hidden from view inside the vehicle and behind the interior panels.

5.1.1.4.2 Snowplow Installations

Required materials:

- Commsignia OBU
- Helix Innovations OBP
- V2X/GNSS antenna
- Cabling and harnesses:
 - o Main harness
 - o Extension harness (between the diagnostics port and main harness)
 - o OBU-facing cable
 - o Diagnostic port splitter

Figure 15 represents the logic to determine when the OBP sends a preemption message to the OBU. Installation must support the inputs that include on/off status of the vehicle, on/off status of the salt spreader, and if the vehicle is in a gear that is not park or neutral. When these conditions are met, a 5V signal is sent through the GPIO to generate an SRM.

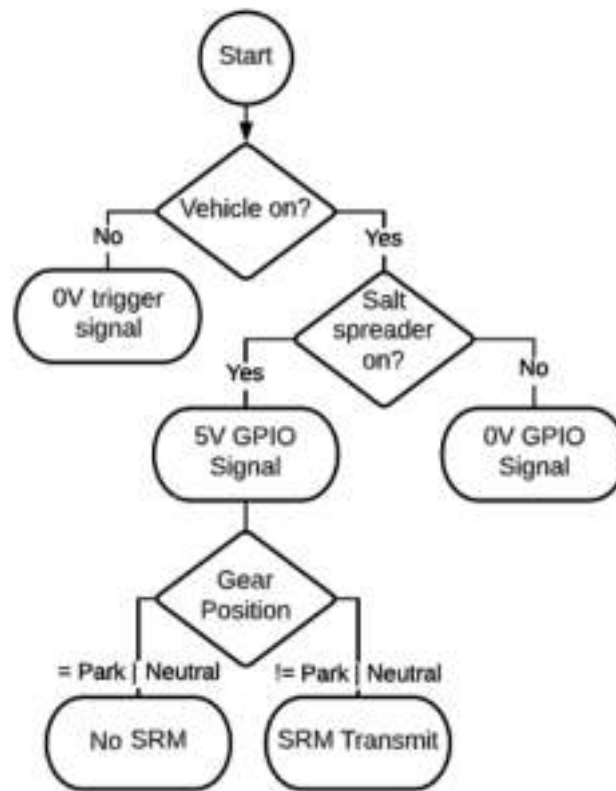


Figure 15. SRM Logic Tree for Snowplows

Source: UDOT, 2025

In order to accomplish this logic tree, the following installation steps are performed:

- Copper wire connection from salt spreader system to OBP.
- OBE harness connection from the vehicle ignition to the OBU.
- OBE harness connection to the J1939 port to acquire gear status.
- OBE harness connection from OBU to V2X/GNSS antenna.
- OBE integration with snowplow salt spreader. Snowplow can send signal request messages if salt spreader is active and the vehicle is within the MAP geofenced area of the intersection.
- The V2X/GNSS antenna will be mounted on the roof (or lightbar) above the cab of the vehicle. The antennas will be mounted along the vehicle's centerline unless obstructed by existing equipment. If obstructed, the antenna will be mounted as close to the centerline as possible with at least 5 inches of separation from any other antenna. The cables from the antenna should be routed alongside the existing lightbar harness, utilizing the same (or similar) penetration that exists for the lightbar harness. Each vehicle may have varying systems or designs which could prevent the installation team from installing according to the default approach described above. The installation team, process, and equipment are flexible so that installation configurations can

be adjusted in the field to fit a particular vehicle situation. The V2X/GNSS antenna can be mounted using two different methods described below:

- o Stud-mount antenna installation:
 - The recommended method for most light duty vehicles and many heavy-duty vehicles is to use the stud-mounted shark fin housing. For this method, a 3/4-inch hole is drilled into the roof of the vehicle which is used to mount the antenna unit and to run the antenna cables directly into the vehicle. A threaded stud on the lower side of the antenna housing is placed into the drilled hole and secured with a nut. Adhesive sealant is applied to create a waterproof seal. This method allows for the cables to be hidden from view inside the vehicle and behind the interior panels.
- o Adhesive-mount antenna installation:
 - As an alternate mounting method, the V2X/GNSS antenna may be mounted using a tape-adhesive only. Since there is no stud on the model of shark fin used in this method, no hole is drilled. Instead, this model has a magnetic base and is adhered directly onto the roof using double sided tape. The cables exit the housing to the side of the shark fin and are run on the outside of the vehicle and into the cab through an existing entry point such as the light bar cable entry point. The adhesive-mount method may also be used when mounting the V2X/GNSS antenna on a lightbar if equipped on the vehicle. This mounting location is advantageous because it typically optimizes line of sight and radio range of the antenna. When mounted on the light bar, the cables can be run from the shark fin unit and along the underside of the lightbar. The cable can be inserted into an existing entry point where cables for the light bar are already pulled into the vehicle cab.

5.1.1.5 Quality Assurance and Quality Control Processes

All OBE installations are reviewed to ensure appropriate QA and QC is being achieved. A series of checklists are utilized to allow thorough verification of the installations. Baseline verification and testing is done for OBE functionality, inspection of the vehicle, and OBE mounting inspection. The SRM broadcast is also tested for full functionality.

5.1.1.6 High-level Installation Schedule

OBUs will be installed on UTA buses and snowplows by March 2026.

5.1.1.7 Hardware and Software Configuration Control Processes

UDOT has existing configuration control processes that enable them to successfully operate OBUs. These processes will continue in the CTW Program and are summarized as follows:

- Installer will prepare equipment for installation that includes latest software versions and tests for functionality.
- As software updates become available that would affect field equipment, a process is followed to install the updates to all devices. This is all documented when completed.

5.1.1.8 Spare Parts/Warranty Contingency Plan

OBUs carry a 2-year warranty. If devices fail during their warranty period, they will be replaced. Experience has shown that they do not typically fail during the warranty period.

6 Data/Management Center Equipment/Services

The central management systems used by CDOT and WYDOT are currently operational. These systems provide the foundational back-office support for the SDX and the broader V2X ecosystem. UDOT is currently transitioning its legacy V2X maintenance and management system to the Parsons iNet platform. Although this migration is occurring in tandem with the CTW Program and will eventually support CTW operations, the procurement and implementation of the iNet system are outside the scope of the CTW Program.

For a comprehensive technical architecture and functional breakdown of these systems, please refer to the CTW ConOps.

7 Planned Deployment Information

UDOT is responsible for the deployments in Utah, and CDOT is responsible for the deployments in Colorado. These installations are summarized and described earlier in Section 3.

7.1 RSU Locations

UDOT's and CDOT's planned RSU deployments are summarized in the tables below. (For UDOT, see Table 3, Table 4, Table 5, and Table 6. For CDOT, see Table 7 and Table 8). The deployment planning considered locations with existing infrastructure where RSUs could be mounted and installed. The infrastructure includes availability for power and fiber communications. RSUs will be mounted at existing traffic signals, highway luminaire poles, dynamic message signs, RWIS, and camera poles.

To find additional information, including a map of CTW RSU deployment locations, visit the [CTW Program webpage](#) within UDOT's Transportation Technology website. To see a map of UDOT's complete V2X network RSUs (planned and existing), visit the [UDOT V2X Network website](#). This map also includes layers showing WYDOT and CDOT RSU locations.

7.1.1 UDOT RSUs at Signalized Intersections

Table 3. UDOT Phase 1a RSUs at SIs
Source: UDOT, 2026

East/West Street Name	North/South Street Name	City	Latitude	Longitude
200 South	900 West	Salt Lake City	40.76506217	-111.916849
100 South	400 West	Salt Lake City	40.7671455	-111.9025732
100 South	700 East	Salt Lake City	40.76724423	-111.8710837
100 South	900 East	Salt Lake City	40.76720326	-111.8653089
100 South	1100 East	Salt Lake City	40.76716118	-111.8596451
100 South	1300 East	Salt Lake City	40.76711882	-111.8539812
100 South	University Street	Salt Lake City	40.76713114	-111.8523157
100 South	Wolcott Street	Salt Lake City	40.76698686	-111.8489826

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East/West Street Name	North/South Street Name	City	Latitude	Longitude
100 South	800 East	Salt Lake City	40.7672166	-111.8682302
200 South	500 West	Salt Lake City	40.76498131	-111.905298
100 South	600 East	Salt Lake City	40.76717374	-111.8739222
200 South	600 West	Salt Lake City	40.764995	-111.908224
Riverdale Road (State Route [SR]-26)	Interstate (I)-84) Single-Point Urban Interchange (SPUI)	Riverdale	41.174852	-112.009933
Chimes View Drive	Riverdale Road (SR-26)	South Ogden	41.194048	-111.977669
Riverdale Road (SR-26)	Wall Ave (SR-204) / 40th Street	South Ogden	41.192491	-111.979301
Riverdale Road (SR-26)	Interstate 15 (I-15)	Riverdale/Roy	41.1709	-112.019734
21st Street (SR-104)	1100 West	West Haven	41.22937273	-112.006334
1300 North	Main Street (SR-126)	Sunset	41.132581	-112.026043
25th Street	Wall Avenue (SR-204)	Ogden	41.22076222	-111.9789105
40th Street	Washington (U.S. Highway [US]-89)	South Ogden	41.19053226	-111.9711867
South Weber Drive (SR-60)	2700 East	South Weber	41.127744	-111.910808
4300 South	Washington (US-89)	South Ogden/ Washington Terrace	41.184673	-111.97139
4700 South	Washington (US-89)	South Ogden/ Washington Terrace	41.17739321	-111.9713988

East/West Street Name	North/South Street Name	City	Latitude	Longitude
5000 South	Washington (US-89)	South Ogden/ Washington Terrace	41.17297854	-111.9707649
Washington (US-89)	Adams Ave Parkway	South Ogden/ Washington Terrace	41.17051072	-111.9685755
Washington (US-89)	Sunset Drive	South Ogden	41.16867029	-111.9647707
Washington (US-89)	850 East (Glasmann)	South Ogden	41.16562985	-111.9576179
Washington (US-89)	1050 East	South Ogden	41.16328109	-111.9521411
5600 South (SR-97)	I-15 Southbound (SB) Ramps	Roy	41.16165356	-112.0237638
5600 South (SR-97)	I-15 Northbound (NB) / Freeway Park Drive	Roy	41.1616409	-112.0217328
2300 North	Main Street (SR-126)	Sunset	41.14717562	-112.0260967
1800 North (SR-37)	Main Street (SR-126)	Sunset	41.13990127	-112.0260646
650 North (SR-103)	I-15 Southbound Ramps	Clearfield	41.12324199	-112.0243335
650 North (SR-103)	I-15 Northbound Ramps	Clearfield	41.12392192	-112.0229092
1200 South (SR-39)	1900 West (SR-126)	Marriott- Slaterville	41.24493183	-112.0252717
Wilson Lane (21st St / SR-104)	1900 West (SR-126)	West Haven	41.22869178	-112.0256128
SR-193 (Bernard Fisher Highway)	I-15 NB Off-ramp / Frontage Road	Clearfield	41.10357886	-112.0015284
SR-193 (Bernard Fisher Highway)	I-15 SB Ramps	Clearfield	41.10350424	-112.0050961

East/West Street Name	North/South Street Name	City	Latitude	Longitude
Harrisville Road (US-89)	Wall Avenue (SR-204) / Larsen Lane	Harrisville	41.27129541	-111.9776716
21st Street (SR-104)	I-15 NB Ramps	West Haven	41.22898837	-112.0107538
4000 South (SR-37)	Midland Drive (SR-108)	Roy	41.19057533	-112.0482922
2100 South (21st Street / SR-104)	I-15 SB Ramps	West Haven	41.228495	-112.014271
4800 South	3500 West (SR-108)	Roy	41.17614008	-112.0645304
6000 South	3500 West (SR-108)	Roy	41.15436619	-112.0644067
Hinckley Drive (SR-79)	Midland Drive (SR-108)	West Haven	41.197652	-112.040052
12th St (1200 South / SR-39)	I-15 NB Ramps	Marriott-Slaterville	41.24468	-112.015133
300 North (SR-107)	2000 West (SR-108)	West Point	41.11808126	-112.0644901
5600 South (Combe)	Harrison Boulevard (SR-203)	South Ogden	41.16154791	-111.940062
200 North (SR-273)	I-15 NB Ramps	Kaysville	41.03820515	-111.9473468
200 North (SR-273)	I-15 SB Ramps	Kaysville	41.03813954	-111.9497614
12th Street (1200 S / SR-39)	I-15 SB Ramps	Marriott-Slaterville	41.244699	-112.016803
4400 South	Washington (US-89)	South Ogden/ Washington Terrace	41.18142285	-111.9713044
Washington (US-89)	Harrison Boulevard (SR-203)	South Ogden	41.15494626	-111.9396463
31st Street (SR-79)	I-15 SB Ramps	Ogden	41.20521136	-111.9969126
31st Street (SR-79)	I-15 NB Ramps	Ogden	41.20563436	-111.9918923

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East/West Street Name	North/South Street Name	City	Latitude	Longitude
12th Street (1200 S / SR-39)	1200 West	Marriott-Slaterville	41.24461003	-112.0095444
800 North	2000 West (SR-108)	Clinton/West Point	41.12534255	-112.0645142
1300 North	2000 West (SR-108)	Clinton	41.132637	-112.064494
1800 North (SR-37)	1000 West	Clinton	41.1398861	-112.0453139
1800 North (SR-37)	2000 West (SR-108)	Clinton	41.13986806	-112.0644155
2300 North	2000 West (SR-108)	Clinton	41.147159	-112.06446
700 South	2000 West (SR-108)	Syracuse	41.103649	-112.06458
300 North (SR-107)	3000 West	West Point	41.118084	-112.083778
Layton Parkway (SR-126)	I-15 SPUI	Layton	41.056052	-111.960803
1800 North (SR-37)	250 West	Sunset	41.139874	-112.030846
1800 North (SR-37)	1500 West	Clinton	41.13987	-112.054827
Park Lane (SR-225)	Lagoon Drive	Farmington	40.991401	-111.896712
Park Lane (SR-225)	US-89 SB Ramps	Farmington	40.991044	-111.903441
Park Lane (SR-225)	US-89 NB Ramps	Farmington	40.99140047	-111.9020074
Park Lane (SR-225)	I-15 SB Off-ramp / Legacy (SR-67) SB On-ramp	Farmington	40.9890685	-111.9061898
Shepard Lane (SR-106)	US-89 SB Ramps	Farmington	41.00077723	-111.9083397
Shepard Lane (SR-106)	US-89 NB Ramps	Farmington	41.000784	-111.90731
Main Street (SR-273) (Cherry Hill)	US-89 SB Ramps	Farmington/ Fruit Heights	41.01180281	-111.9128754

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East/West Street Name	North/South Street Name	City	Latitude	Longitude
Main Street (SR-273) (Cherry Hill)	US-89 NB Ramps	Farmington	41.011061	-111.911357
Shepard Lane (SR-106)	Main Street (SR-106)	Farmington	41.00077302	-111.9003718
State Street (SR-227/SR-106)	Main Street (SR-106)	Farmington	40.980479	-111.887552
State Street (SR-227)	200 West (SR-227)	Farmington	40.980512	-111.891898
Park Lane (SR-225)	I-15 NB On-ramp / Legacy (SR-67) NB Off-ramp	Farmington	40.990085	-111.904966
Park Lane (SR-225)	Main Street (SR-106)	Farmington	40.991337	-111.893528
4000 South (SR-37)	4700 West (SR-134)	West Haven	41.190766	-112.093147
4000 South (SR-37)	3500 West	West Haven	41.190691	-112.064308
205 South (SR-193)	1550 West	Syracuse	41.110564	-112.055972
205 South (SR-193)	2000 West (SR-108)	Syracuse	41.110684	-112.064503
Pioneer Road	I-15 NB Ramps	Marriott-Slaterville	41.268412	-112.025586
205 South (SR-193)	3000 West	Syracuse	41.110644	-112.083754
1800 North (SR-37)	3000 West	Clinton	41.139875	-112.083797
500 South (SR-68)	200 West (SR-68)	Bountiful	40.884217	-111.885604
1000 North	500 West (US-89)	Bountiful/West Bountiful	40.898687	-111.892157
750 North (SR-315)	Main Street (US-89)	Willard	41.422314	-112.035775
600 North / Foxboro Drive	Redwood Road (SR-68)	North Salt Lake	40.852909	-111.929747

East/West Street Name	North/South Street Name	City	Latitude	Longitude
1100 North	Redwood Road (SR-68)	Woods Cross/North Salt Lake	40.861635	-111.92989
Center Street	Redwood Road (SR-68)	North Salt Lake	40.8418497	-111.9319183
2600 South (SR-93)	I-15 SB Ramps	Woods Cross/North Salt Lake	40.861962	-111.902666
2600 South (SR-93)	I-15 NB Ramps	Woods Cross/North Salt Lake	40.861321	-111.901384
2600 South (SR-93)	Wildcat Way/500 East	Woods Cross/North Salt Lake	40.861354	-111.899342
2600 South (SR-93)	US-89	Woods Cross/North Salt Lake/Bountiful	40.86165069	-111.896337
500 South (SR-68)	I-15 DDI	Bountiful/West Bountiful	40.884235	-111.896633
Parrish Lane (SR-105)	I-15 SB Ramps	Centerville	40.92152334	-111.8917028
Parrish Lane (SR-105)	I-15 NB Ramps	Centerville	40.92153472	-111.8902302
Parrish Lane (SR-105)	Market Place Drive	Centerville	40.92155299	-111.8878613
Parrish Lane (SR-105)	400 West	Centerville	40.92147359	-111.8855551
Parrish Lane (SR-105)	Main Street (SR-106)	Centerville	40.92153101	-111.8788398
Chase Lane (1000 N)	Main Street (SR-106)	Centerville	40.9291175	-111.8789062

East/West Street Name	North/South Street Name	City	Latitude	Longitude
Eagle Ridge Drive	US-89	North Salt Lake	40.83725693	-111.912622
Center Street	US-89	North Salt Lake	40.84181442	-111.9102117
3800 South/350 North	US-89	North Salt Lake/Davis County	40.84841476	-111.9067297
1500 South	500 West (US-89)	Bountiful	40.87472	-111.8922
500 South (SR-68)	500 West (US-89)	Bountiful	40.88426194	-111.892166
400 North (SR-106)	500 West (US-89)	Bountiful/West Bountiful	40.89406859	-111.892229
400 North (SR-106)	200 West	Bountiful	40.89396351	-111.8855594
400 North (SR-106)	Main Street (SR-106)	Bountiful	40.893671	-111.880007
Viewmont Drive (1000 N)	Main Street (SR-106)	Bountiful	40.899569	-111.878978
Pages Lane	Main Street (SR-106)	Centerville/Bountiful	40.90658621	-111.8789208
100 North	500 West (US-89)	Bountiful/West Bountiful	40.89045086	-111.8921853
1800 North	2000 West (SR-126)	Farr West	41.28958722	-112.0278242
2700 North (SR-134)	2000 West (SR-126)	Farr West	41.30670598	-112.0276255
2700 North (SR-134)	US-89	Pleasant View	41.30680087	-112.0055375
450 North (Pioneer Road)	2000 West (SR-126)	Marriott-Slaterville	41.26870905	-112.0279507
West Harrisville Road	US-89	Harrisville	41.2815114	-111.9856761
500 South (SR-68)	Redwood Road (SR-68)	Woods Cross	40.884015	-111.929995

East/West Street Name	North/South Street Name	City	Latitude	Longitude
6600 South	US-89	Uintah	41.140044	-111.915776
1500 South	Redwood Road (SR-68)	Woods Cross	40.874686	-111.930017
1100 South (US-91)	I-15 Diverging Diamond Interchange (DDI)	Brigham City/Perry	41.485668	-112.05288
Washington (US-89)	Crestwood/1475 East	South Ogden	41.1585882	-111.9442753
1500 South	SR-68 (300 West)	Bountiful	40.8746931	-111.8883264
1875 South	SR-68 (400 West)	Bountiful	40.87127891	-111.8906351
500 South (SR-68)	1100 West	West Bountiful	40.884244	-111.911763
500 S	Legacy Parkway (SR-67) SB Ramps	Davis County	40.883922	-111.938189
Parrish Lane (SR-105)	1250 West	Centerville	40.921524	-111.896894
5700 South	Harrison Boulevard (SR-203)	South Ogden	41.15919346	-111.9396618
Logan Road (US-89)	Bear Lake Boulevard (US-89)	Garden City	41.946651	-111.393401
Washington (US-89)	Skyline Drive	South Ogden	41.15202622	-111.9359373
2700 North (SR-134)	1500 West	Pleasant View/Weber County	41.30688375	-112.0157756
2700 North (SR-134)	I-15 SB Ramps	Farr West	41.306696	-112.02665
US-89	750 West	Harrisville/Pleasant View	41.29662832	-111.9962153
2700 North (SR-134)	I-15 NB Ramps	Farr West	41.30663644	-112.0252016

East/West Street Name	North/South Street Name	City	Latitude	Longitude
2700 North (SR-134)	600 West	Pleasant View	41.306245	-111.992082
2700 North (SR-134)	1740 West	Pleasant View/Farr West	41.306769	-112.020161
Main Street (SR-102)	300 East (SR-82)	Tremonton	41.71187121	-112.1616529
Main Street (SR-102)	Tremont Street	Tremonton	41.71172015	-112.166104
Main Street (SR-102)	1000 West	Tremonton	41.71131	-112.180991
1400 South	Main Street (SR-82)	Garland	41.726371	-112.162206
300 S (SR-198)	Main Street (SR-156)	Spanish Fork	40.10589647	-111.6547811
Center Street	Main Street (SR-156)	Spanish Fork	40.10985408	-111.654772
200 North	Main Street (SR-156)	Spanish Fork	40.112462	-111.654727
400 North (SR-147)	Main Street (SR-156)	Spanish Fork	40.114985	-111.6546907
800 North	Main Street (SR-156)	Spanish Fork	40.1201876	-111.6547406
1000 North	Main Street (SR-156)	Spanish Fork	40.12293056	-111.6546564
Main Street (SR-73)	I-15 SPUI	Lehi	40.388264	-111.833635
10400 North	5300 West (Alpine Highway/SR-74)	Highland	40.42091531	-111.7867467
400 South (SR-77)	1750 West	Springville	40.161355	-111.642413
Canyon Road (SR-198)	820 E / Tornado Lane	Spanish Fork	40.104314	-111.640665
400 South (SR-77)	950 West	Springville	40.16117	-111.627909
Canyon Road (SR-198)	2600 East / Spanish Fork Parkway	Spanish Fork	40.094769	-111.611411

East/West Street Name	North/South Street Name	City	Latitude	Longitude
400 South (SR-77)	I-15 SPUI	Springville	40.161385	-111.646651
400 South (SR-77)	2200 West	Springville	40.161319	-111.651064
Arrowhead Trail Road (SR-164)	Del Monte Road	Spanish Fork	40.090295	-111.661976
US-6	I-15 SB Ramp	Spanish Fork	40.128858	-111.649095
Canyon Road (SR-198)	1400 East	Spanish Fork	40.100142	-111.630822
SR-198	Woodland Hills Boulevard	Salem	40.079418	-111.659222
400 North	SR-198	Salem	40.060634	-111.668646
SR-198	Main Street	Salem	40.05701	-111.67332
2500 South	US-40	Naples	40.419408	-109.499262
500 South (East Side)	US-40	Vernal	40.448691	-109.502061
US-40 (Main Street)	SR-45	Naples	40.414614	-109.498458
100 North	Vernal Avenue (US-191)	Vernal	40.45720874	-109.5285639
100 North	500 West (SR-121)	Vernal	40.45703203	-109.5380879
100 South/1000 West	US-40	Vernal	40.45406987	-109.545415
Main Street (US-40)	500 West (SR-121)	Vernal	40.45562763	-109.538007
Main Street (US-40)	100 West	Vernal	40.4557009	-109.5303783
Main Street (US-40)	Vernal Avenue (US-191)	Vernal	40.45572002	-109.5285407
Main Street (US-40)	500 East	Vernal	40.45585343	-109.5190179

East/West Street Name	North/South Street Name	City	Latitude	Longitude
500 South (West Side)	US-40	Vernal	40.448143	-109.553301
1000 South	US-40	Vernal	40.44048	-109.56341
Main Street (US-40)	Center Street (SR-87)	Duchesne	40.163398	-110.40138
US-40/US-191 (Main Street)	Mall and Church Access (2100 West)	Vernal/Uintah County	40.436323	-109.568905
500 North (SR-121)	1500 West	Maeser	40.46281266	-109.5573753
500 North (SR-121)	2500 West	Maeser	40.4625233	-109.5765952
500 North (SR-121)	2000 West	Maeser	40.462628	-109.566797
1500 South	US-40	Uintah County	40.433458	-109.572654
400 South (SR-77)	1200 West	Springville	40.161274	-111.632488
1600 S	State Street (SR-51)	Springville	40.144767	-111.611484
800 South (SR-178)	930 West	Payson	40.031331	-111.748378
800 South (SR-178)	1270 West (Turf Farm Road)	Payson	40.03139064	-111.7540325
800 South (SR-178)	300 West (SR-198)	Payson	40.03125038	-111.7359771
100 North (SR-198)	Main Street (SR-115)	Payson	40.04452597	-111.7322432
800 South (SR-178)	I-15 SB Ramps	Payson	40.031467	-111.758743
Utah Avenue	100 West (SR-198)	Payson	40.043611	-111.73384
100 North (SR-198)	600 East	Payson	40.044504	-111.723587
100 North (SR-198)	1000 East	Payson	40.044586	-111.716113
1400 South	SR-198	Payson	40.022688	-111.742281

East/West Street Name	North/South Street Name	City	Latitude	Longitude
8000 South (SR-164)	I-15 SB Ramps	Utah County	40.085335	-111.703111
Main Street (SR-198)	Highland Drive (SR-198)	Santaquin	39.975583	-111.770356
Main Street (US-6)	I-15 SB Ramp	Santaquin	39.975601	-111.77336
Main Street (US-6)	400 East	Santaquin	39.975609	-111.776788
Main Street (US-6)	200 West	Santaquin	39.975606	-111.789511
Cedar Hills Drive	4800 West (North County Boulevard / SR-129)	Cedar Hills/Highland	40.415486	-111.773419
Harvest Parkway / 800 South	US-89	Mapleton	40.122889	-111.597789
600 North	Main Street (SR-115)	Payson	40.052394	-111.732242
750 North	SR-198	Salem	40.066101	-111.66587
SR-198	Loafer Mountain Parkway	Salem	40.048597	-111.691739
Expressway Lane	SR-51	Spanish Fork	40.122413	-111.629678
400 North (SR-147)	Spanish Fork Parkway	Spanish Fork	40.115489	-111.612026
300 South / Canyon Road (SR-198)	600 East	Spanish Fork	40.105803	-111.644219
Spanish Fork Parkway	State Street (SR-51)	Spanish Fork	40.127559	-111.625088
US-40	Ioka Lane (SR-87)	Duchesne County	40.257902	-110.061219
1000 South	US-40	Naples	40.441334	-109.499705
200 North (SR-121)	300 West	Roosevelt	40.302083	-109.997058

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East/West Street Name	North/South Street Name	City	Latitude	Longitude
200 North (SR-121/US-40)	200 East (US-40)	Roosevelt	40.30214066	-109.9888148
Lagoon Street	200 East (US-40)	Roosevelt	40.29944347	-109.9888218
200 North (US-40)	600 East	Roosevelt	40.30216014	-109.9823337
US-40	State Street	Roosevelt	40.29270072	-109.9917801
US-40	7500 East	Uintah County	40.30184	-109.859196
200 North (SR-121)	State Street	Roosevelt	40.302124	-109.991852
US-40	2000 West	Roosevelt	40.274046	-110.028959
200 North (US-40)	1500 East	Ballard/Uintah County	40.302216	-109.972913
US-40	5750 East	Uintah County	40.301873	-109.892464
100 North (SR-132)	Main Street (SR-28)	Nephi	39.71000752	-111.8361458
Center Street (SR-114)	I-15 NB Ramps	Provo	40.234488	-111.684484
9000 South (SR-209)	150 E (UTA TRAX)	Sandy	40.588051	-111.886133
9000 South (SR-209)	300 East	Sandy	40.588135	-111.881732
6200 South (SR-190)	3000 East	Holladay	40.63591528	-111.8054592
Wasatch Boulevard / Millrock Drive	SR-190 (6200 South / Wasatch Boulevard)	Holladay/ Cottonwood Heights	40.63078167	-111.8001883
Winchester (6400 South)	Fashion Boulevard (280 East) / I-215 South Westbound (WB) Ramps	Murray	40.63283345	-111.8833235

East/West Street Name	North/South Street Name	City	Latitude	Longitude
9000 South (SR-209)	450 West (Sandy Parkway)	Sandy	40.58799617	-111.9042254
9000 South (SR-209)	700 West	Sandy	40.58776724	-111.9101923
9000 South (SR-209)	1300 West	West Jordan	40.58779788	-111.9292012
10400 South (SR-151)	1300 West	South Jordan	40.56212942	-111.9290849
10400 South (SR-151)	1600 West (Beckstead)	South Jordan	40.562329	-111.93603
California Avenue (1340 S)	I-215 West SPUI	Salt Lake City	40.74044737	-111.9492253
700 North	I-215 West NB Ramps	Salt Lake City	40.78476412	-111.948419
6200 South (SR-190)	I-215 East SPUI	Holladay/ Cottonwood Heights	40.63749481	-111.8086805
700 North	I-215 West SB Ramps	Salt Lake City	40.7847519	-111.9499038
South Campus Drive (SR-282)	1500 East	Salt Lake City	40.7607919	-111.8474266
South Campus Drive (SR-282)	Pedestrian Crossing (1550 East)	Salt Lake City	40.760047	-111.84623
South Campus Drive (SR-282)	1725 East	Salt Lake City	40.75941273	-111.8418547
South Campus Drive (SR-282)	1800 East	Salt Lake City	40.76071876	-111.8388322
South Campus Drive (SR-282)	Mario Capecchi Drive (SR-282)	Salt Lake City	40.762298	-111.8356181

East/West Street Name	North/South Street Name	City	Latitude	Longitude
Wasatch Drive	Mario Capecchi Drive (SR-282)	Salt Lake City	40.765829	-111.836825
Hospital Entrance	Mario Capecchi Drive (SR-282)	Salt Lake City	40.769952	-111.838975
North Campus Drive (SR-282)	Central Campus Drive	Salt Lake City	40.77104816	-111.8448381
North Campus Drive (SR-282)/Medical Drive	Mario Capecchi Drive (SR-282)	Salt Lake City	40.77297488	-111.8406147
California Avenue (1300 South)	Bangerter Highway (SR-154)	Salt Lake City	40.74331277	-111.9895256
1820 South	Bangerter Highway (SR-154)	Salt Lake City	40.73088119	-111.9871398
SR-201 DDI	Bangerter Highway (SR-154)	Salt Lake City/West Valley City	40.725835	-111.986371
SR-201 South Frontage Road	Bangerter Highway (SR-154)	West Valley City	40.72291385	-111.9863999
2400 South	Bangerter Highway (SR-154)	West Valley City	40.71829574	-111.9857096
Parkway Boulevard (2700 South)	Bangerter Highway (SR-154)	West Valley City	40.7115595	-111.9814953
3100 South	Bangerter Highway (SR-154)	West Valley City	40.70388942	-111.9800431
4100 South	Bangerter Highway (SR-154)	West Valley City	40.6821037	-111.9815414
6200 South	Bangerter Hwy (SR-154) SPUI	Taylorsville/West Jordan	40.63859938	-111.9766022
7000 South	Bangerter Highway (SR-154) SPUI	West Jordan	40.62400115	-111.9763417

East/West Street Name	North/South Street Name	City	Latitude	Longitude
1300 South	I-15 Ramps and 500 West	Salt Lake City	40.741611	-111.905223
4500 South (SR-266)	I-15 SPUI	Murray	40.67445623	-111.9013755
Central Pointe Place / Sugar House Streetcar (2250 South)	State Street (US-89)	South Salt Lake	40.722292	-111.888235
9000 South (SR-209)	I-15 SPUI	Sandy	40.58799074	-111.9002612
14600 South (SR-140)	Pony Express Road	Draper/Bluffdale	40.485406	-111.900566
10600 South (SR-151)	I-15 SPUI	Sandy/South Jordan	40.558972	-111.898252
Research Way (2770 South)	Redwood Road (SR-68)	West Valley City	40.711119	-111.938872
12300 South (SR-71)	I-15 SPUI	Draper	40.52678311	-111.8910435
1000 North	Redwood Road (SR-68)	Salt Lake City	40.79106578	-111.9391672
700 North	Redwood Road (SR-68)	Salt Lake City	40.78476577	-111.9393179
500 North	Redwood Road (SR-68)	Salt Lake City	40.78017796	-111.9393491
North Temple	Redwood Road (SR-68)	Salt Lake City	40.77158637	-111.939228
South Temple	Redwood Road (SR-68)	Salt Lake City	40.769441	-111.939161

East/West Street Name	North/South Street Name	City	Latitude	Longitude
SR-201 SPUI	Redwood Road (SR-68)	Salt Lake City/West Valley City	40.72407338	-111.9389134
6200 South	Redwood Road (SR-68)	Taylorsville	40.63854935	-111.9387469
Victory Road (SR-186)	Beck Street (US-89)	Salt Lake City	40.794037	-111.903434
400 West	Beck Street (US-89)	Salt Lake City	40.79013178	-111.9010697
400 South (US-89)	West Temple (SR-270)	Salt Lake City	40.76065947	-111.89392
500 South (SR-269)	West Temple (SR-270)	Salt Lake City	40.7584755	-111.8938428
600 South (SR-269)	West Temple (SR-270)	Salt Lake City	40.75633872	-111.8939856
700 South	West Temple (SR-270)	Salt Lake City	40.75413409	-111.893907
800 South	West Temple (SR-270)	Salt Lake City	40.75200344	-111.8939276
900 South	West Temple (SR-270)/I-15 SB On-ramp/I-15 NB Off-ramp	Salt Lake City	40.74979843	-111.893898
400 South (SR-186 / US-89)	State Street (SR-186 / US-89)	Salt Lake City	40.76068104	-111.8882926
10400 South	State Street (US-89)	Sandy	40.56229897	-111.8908107
10600 South	State Street (US-89)	Sandy	40.55886052	-111.8907651
11000 South	State Street (US-89)	Sandy	40.55153438	-111.890766
400 Street (SR-186)	700 East (SR-71)	Salt Lake City	40.7606631	-111.8710385

East/West Street Name	North/South Street Name	City	Latitude	Longitude
9400 South	700 East (SR-71)	Sandy	40.58056996	-111.8721298
9800 South (Sego Lily)	700 East (SR-71)	Sandy	40.57320645	-111.8721322
10600 South	700 East (SR-71)	Sandy	40.5587784	-111.8721409
11000 South	700 East (SR-71)	Sandy	40.55148925	-111.8721934
Van Winkle (SR-152)	1300 East	Salt Lake County/Holladay /Millcreek	40.65909424	-111.8543692
5600 South	Van Winkle (SR-152)	Murray/Holladay	40.64931607	-111.8484816
6100 South (Highland / Vine)	Van Winkle (SR-152)	Murray/Holladay	40.64071302	-111.836335
6200 South	Van Winkle (SR-152)	Murray/Holladay	40.63851004	-111.8344819
10400 South (SR-151)	2200 West	South Jordan	40.5623925	-111.948233
10400 South (SR-151)	2700 West	South Jordan	40.56213187	-111.9577782
10400 South (SR-151)	3200 West	South Jordan	40.562181	-111.967288
10400 South (SR-151)	3400 West (River Heights Dr)	South Jordan	40.562036	-111.972063
6400 South	Highland Drive (SR-152)	Murray/Holladay	40.634663	-111.834226
1900 East	Mario Capecchi Drive (SR-282)	Salt Lake City	40.767759	-111.836268
400 South (US-89)	200 West	Salt Lake City	40.76069145	-111.8967671
400 South (US-89)	Main Street	Salt Lake City	40.76061487	-111.8910396
400 South (SR-186)	200 East	Salt Lake City	40.76069927	-111.8853143

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East/West Street Name	North/South Street Name	City	Latitude	Longitude
400 South (SR-186)	400 East	Salt Lake City	40.76070235	-111.8796409
400 South (SR-186)	500 East	Salt Lake City	40.76072415	-111.8767779
400 South (SR-186)	600 East	Salt Lake City	40.76074547	-111.873968
400 South (SR-186)	800 East	Salt Lake City	40.76066816	-111.8681875
400 South (SR-186)	900 East	Salt Lake City	40.76068927	-111.8653776
500 South (SR-269)	200 West	Salt Lake City	40.75839321	-111.8967892
500 South (SR-269)	Main Street	Salt Lake City	40.7584783	-111.8910111
500 South (SR-186)	1100 East	Salt Lake City	40.75847455	-111.8596226
600 South (SR-269)	200 West	Salt Lake City	40.75629736	-111.896708
600 South (SR-269)	Main Street	Salt Lake City	40.75630059	-111.891088
4465 South (Salt Lake Community College, SR-292)	2200 West	Taylorsville	40.67334596	-111.9483648
SR-201 SPUI	3200 West	Salt Lake City/West Valley City	40.72665389	-111.9678539
SR-201 South Frontage Road	3200 West	West Valley City	40.72572715	-111.9677875
2100 South (SR-201)	I-15 NB Ramps / 400 West	Salt Lake City/South Salt Lake	40.725434	-111.902034
2100 South (SR-201)	West Temple	Salt Lake City/South Salt Lake	40.72543621	-111.8939089
2100 South (SR-201)	Main Street	Salt Lake City/South Salt Lake	40.72549865	-111.891048

East/West Street Name	North/South Street Name	City	Latitude	Longitude
SR-201 SPUI	900 West	South Salt Lake	40.72417436	-111.9172224
Mortimer Way	Redwood Road (SR-68)	Bluffdale/Herriman	40.457533	-111.940495
Bangerter Highway (SR-154)	600 West SPUI	Draper	40.500596	-111.907671
10200 South	State Street (US-89)	Sandy	40.56597251	-111.8907642
11235 South (Auto Mall Drive) / 11275 South (Scheels)	State Street (US-89)	Sandy	40.547307	-111.890917
13800 South	Bangerter Highway (SR-154)	Draper	40.500685	-111.884915
Bangerter Highway (SR-154)	150 East	Draper	40.503514	-111.886212
Bangerter Highway (SR-154)	I-15 SPUI	Draper	40.50435536	-111.8910808
Bangerter Highway (SR-154)	Redwood Road (SR-68) SPUI	Riverton/Bluffdale	40.50062899	-111.9387247
Bangerter Highway (SR-154)	2700 West	Riverton/Bluffdale	40.50018567	-111.9576353
13400 South	Bangerter Highway (SR-154)	Riverton	40.50782594	-111.9826546
10400 South (SR-151)	Bangerter Highway (SR-154) SPUI	South Jordan	40.5618895	-111.9770705
9800 South	Bangerter Highway (SR-154)	South Jordan	40.57326825	-111.9771416
400 South	400 West	Salt Lake City	40.76069622	-111.9024988
500 South (SR-269)	400 West	Salt Lake City	40.7584995	-111.9025164
600 South (SR-269)	400 West	Salt Lake City	40.75626677	-111.9025336

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East/West Street Name	North/South Street Name	City	Latitude	Longitude
400 South	500 West	Salt Lake City	40.76056519	-111.9054332
500 South (SR-269)	500 West	Salt Lake City	40.75840485	-111.9054038
600 North (SR-268)	400 West	Salt Lake City	40.78240985	-111.9025084
3900 South	I-215 East SB Ramps	Salt Lake County	40.68703989	-111.7980719
14600 South (SR-140)	I-15 SPUI	Draper	40.484052	-111.89886
11800 South	State Street (US-89)	Draper	40.537064	-111.891311
14400 South (SR-140)	Redwood Road (SR-68)	Bluffdale	40.489634	-111.939979
Porter Rockwell Boulevard (SR-85/SR-131)	Redwood Road (SR-68)	Bluffdale/Herriman	40.462582	-111.942784
5400 South (SR-173)	6055 West	West Valley City	40.653087	-112.035513
Monroe Street	I-15 NB Off-ramp	Sandy	40.561611	-111.897882
9000 South (SR-209)	1510 West	West Jordan	40.58776308	-111.9340569
North Star Drive / 300 North	Redwood Road (SR-68)	Salt Lake City	40.776108	-111.939319
12800 South	Redwood Road (SR-68)	Riverton	40.51862755	-111.9386637
13400 South	Redwood Road (SR-68)	Riverton	40.50776933	-111.9387623
14000 South	Redwood Road (SR-68)	Bluffdale	40.497355	-111.938636
13200 South	Redwood Road (SR-68)	Riverton	40.511342	-111.938721

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East/West Street Name	North/South Street Name	City	Latitude	Longitude
13630 South (Christan Way)	Redwood Road (SR-68)	Riverton	40.50228	-111.938726
9000 South (SR-209)	4800 West	West Jordan	40.58793872	-112.0051295
9000 South (SR-209)	Grizzly Way (5200 West / Wild Acres Drive)	West Jordan	40.587961	-112.014756
14600 South	Redwood Road (SR-68)	Bluffdale	40.486033	-111.941638
1810 North (Chicago Street / 940 West)	Beck Street (US-89)	Salt Lake City	40.80629241	-111.9178804
5400 South (SR-173)	SR-85 SB (Mountain View)	West Valley City	40.653231	-112.045019
Parkway Boulevard (2700 South)	SR-85 (Mountain View) Ramps	West Valley City	40.710977	-112.030821
SR-201 EB Ramps	SR-85 (Mountain View)	West Valley City	40.72431	-112.029138
SR-201 WB Ramps	SR-85 (Mountain View)	Salt Lake City	40.726446	-112.029179
California Avenue (1400 South)	SR-85 (Mountain View)	Salt Lake City	40.740298	-112.029188
3300 South (SR-171)	TRAX Queue Cutter (200 West)	South Salt Lake	40.69984	-111.896942
TRAX Queue Cutter (8100 South)	Redwood Road (SR-68)	West Jordan	40.60424	-111.938755
SR-201	SR-202	Salt Lake County	40.727997	-112.170878
SR-201	7200 West	Salt Lake County/West Valley City	40.71860541	-112.0631338

East/West Street Name	North/South Street Name	City	Latitude	Longitude
14600 South (SR-140)	Porter Rockwell Boulevard (SR-131)	Bluffdale	40.486149	-111.90584
10600 South (South Jordan Parkway / SR-151)	Baxter Drive (900 West)	South Jordan	40.559802	-111.917133
10600 South (South Jordan Parkway / SR-151)	400 West (Jordan Gateway)	South Jordan	40.55886253	-111.90273
10600 South (South Jordan Parkway / SR-151)	Riverfront Parkway (700 West)	South Jordan	40.55890529	-111.9102332
10600 South (South Jordan Parkway / SR-151)	1055 West	South Jordan	40.56055726	-111.920511
11880 South (Kimballs Lane)	700 East (SR-71)	Draper	40.534952	-111.871148
2100 South (SR-201)	I-15 SB Ramps / 600 West	Salt Lake City/South Salt Lake	40.72557091	-111.9072134
400 South	I-15 SPUI	Salt Lake City	40.76067884	-111.9143976
9000 South (SR-209)	Monroe Street	Sandy	40.58805837	-111.895923
SR-201	8000 West	Salt Lake County	40.718163	-112.082226
11400 South (SR-175)	I-15 SPUI	South Jordan/Sandy/ Draper	40.544389	-111.894362
SR-201 (Eastbound [EB] Only)	8400 West (SR-111)	Salt Lake County	40.717204	-112.0917651
300 North (SR-186)	Main Street / Columbus Street (SR-186)	Salt Lake City	40.77591832	-111.8910307

East/West Street Name	North/South Street Name	City	Latitude	Longitude
2100 South (SR-201)	700 West / SR-201 WB On-ramp	Salt Lake City/South Salt Lake	40.72553972	-111.9111712
500 North	Columbus Street (SR-186)	Salt Lake City	40.779937	-111.889953
400 North / West Capitol Street / State Capitol	Columbus Street (SR-186)	Salt Lake City	40.778404	-111.890361
Carnation Drive (10100 S)	700 East (SR-71)	Sandy	40.567952	-111.872173
1300 South	I-15 NB Ramps	Salt Lake City	40.74162	-111.903602
Ute Boulevard	SR-224	Summit County	40.72450036	-111.544639
Olympic Parkway / Newpark Boulevard	SR-224	Summit County	40.7217802	-111.5446807
SR-248	US-40 SB Ramps	Summit County	40.68288135	-111.4632617
SR-248	US-40 NB Ramps	Summit County	40.683596	-111.461239
Brown's Canyon Road/Jordanelle Parkway	SR-248	Wasatch County	40.677493	-111.431774
Saddleback Boulevard/I-80 EB Off-ramp	SR-36	Tooele County	40.6857164	-112.2683356
Village Boulevard	SR-36	Tooele County	40.63031439	-112.2910833
Bates Canyon Road	SR-36	Tooele County	40.62376165	-112.2927659
Erda Way	SR-36	Tooele County	40.60179477	-112.2942847
SR-138	SR-112	Grantsville	40.59956929	-112.4259842
1000 North (SR-112)	200 West	Tooele	40.551016	-112.302853

East/West Street Name	North/South Street Name	City	Latitude	Longitude
Wasatch Boulevard (~8900 South)	Wasatch Boulevard / SR-210	Salt Lake County	40.589258	-111.793568
3500 East (8165 South)	Wasatch Boulevard (SR-210)	Cottonwood Heights	40.60293246	-111.7954897
7800 South (Bengal Boulevard)	Wasatch Boulevard (SR-210)	Cottonwood Heights	40.60942879	-111.7920027
Big Cottonwood (SR-190) / Fort Union Boulevard	Wasatch Boulevard (SR-190/SR-210)	Cottonwood Heights	40.61935693	-111.7894903
200 South (SR-248)	Main Street (SR-32)	Kamas	40.63988229	-111.280751
Center Street (SR-150)	Main Street (SR-32)	Kamas	40.64312527	-111.2807864
Southern Parkway (SR-7)	I-15 SPUI	St. George	37.027734	-113.605186
Center Street	State Street (SR-17)	La Verkin	37.20130807	-113.2724394
500 North (SR-9)	State Street (SR-9/SR-17)	La Verkin	37.21086251	-113.2721697
Dixie Drive	I-15 SPUI	St. George	37.075274	-113.584774
SR-130	I-15 NB Ramps (Exit 62)	Cedar City	37.72726723	-113.0512335
SR-130	I-15 SB Ramps (Exit 62)	Cedar City	37.72913582	-113.0540832
200 North (SR-56)	I-15 NB Ramps/1225 West	Cedar City	37.68083914	-113.078898
200 North (SR-56)	I-15 SB Ramps/1400 West	Cedar City	37.68083488	-113.0812887
Center Street	SR-63	Bryce Canyon	37.673966	-112.156405

East/West Street Name	North/South Street Name	City	Latitude	Longitude
Center Street (SR-21)	Main Street (SR-160)	Beaver	38.274185	-112.64122
300 South (US-89)	100 East (US-89 / US-89A)	Kanab	37.04296463	-112.5264123
Center Street (US-89)	Main Street	Kanab	37.04809	-112.528512
100 North	Main Street (US-191)	Moab	38.574836	-109.550795
Center Street	Main Street (US-191)	Moab	38.57326191	-109.5507993
100 South	Main Street (US-191)	Moab	38.571772	-109.550764
300 South	Main Street (US-191)	Moab	38.568666	-109.550753
Kane Creek	Main Street (US-191)	Moab	38.56383778	-109.5495862
Main Street (US-191)	400 East/Jackson Street	Moab	38.55760934	-109.5428775
US-191	500 West	Moab	38.588732	-109.560846
SR-128 (Colorado River)	US-191	Moab	38.601541	-109.57573
200 South	Main Street (US-191)	Moab	38.570216	-109.550791
Arches Entrance Road	US-191	Grand County	38.610983	-109.60819
Spanish Trail Road	US-191	Grand County	38.528329	-109.503432
200 North	Main Street (US-191)	Moab	38.576308	-109.550741
400 North	Main Street (US-191)	Moab	38.579302	-109.550907
Main Street (US-191)	Center Street (US-491)	Monticello	37.87262907	-109.3428417
100 North (SR-290)	Main Street (US-89)	Ephraim	39.36161853	-111.5871094

East/West Street Name	North/South Street Name	City	Latitude	Longitude
Main Street (SR-116)	State Street (US-89)	Mt. Pleasant	39.546759	-111.455329
Main Street (US-50)	State Street (US-89)	Salina	38.957517	-111.860146
Main Street (US-6 / US-50)	200 West	Delta	39.35241801	-112.5791885
100 North (SR-55)	US-6 EB Ramps	Price	39.60085	-110.82842
US-6 WB Ramps	Carbon Avenue (SR-10)	Price	39.588373	-110.811817
Main Street	Carbon Avenue (SR-10)	Price	39.59950612	-110.8112667
Main Street (SR-55)	Airport Road	Price	39.59762302	-110.7922234
Main Street (SR-55)	700 East	Price	39.59958642	-110.7978879
Main Street (SR-55)	300 East (SR-55)	Price	39.59956501	-110.8054189
300 South	Main Street (SR-55)	Price	39.59485523	-110.790694
100 North (SR-55)	Carbon Avenue (SR-10)	Price	39.60097974	-110.8112627
100 North (SR-55)	Price River Drive	Price	39.60089533	-110.8229583
100 North (SR-55)	300 East (SR-55)	Price	39.60100444	-110.8054592
US-6	100 East	Wellington	39.542415	-110.734068
100 North	Main Street (SR-10)	Huntington	39.328224	-110.964609
900 South	300 West	Salt Lake City	40.749802	-111.899609
1120 South	300 West	Salt Lake City	40.744545	-111.89967
1300 South	700 West	Salt Lake City	40.741531	-111.911152
1300 South	800 West	Salt Lake City	40.741596	-111.913951
California Avenue	900 West	Salt Lake City	40.740538	-111.9168

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East/West Street Name	North/South Street Name	City	Latitude	Longitude
California Avenue	Emery Street (1170 West)	Salt Lake City	40.740516	-111.924735
California Avenue	1200 West	Salt Lake City	40.740454	-111.92813
400 South	1500 West	Salt Lake City	40.760587	-111.934286
700 South	Geneva Road	Pleasant Grove	40.355187	-111.740744
700 North	Geneva Road	Pleasant Grove	40.350751	-111.740721
200 South	Geneva Road	Pleasant Grove	40.333582	-111.738793
2000 North	Geneva Road	Pleasant Grove	40.26072	-111.716313
11400 South	Bangerter Highway	South Jordan	40.544345	-111.983958
12600 South	Bangerter Highway	Riverton	40.522259	-111.984182

Table 4. UDOT Phase 1b RSUs at Signalized Intersections*Source: UDOT, 2026*

East/West Street Name	North/South Street Name	City	Latitude	Longitude
SR-18	Bluff Street	St. George	37.124094	-113.600528
SR-8	Valley View Drive	St. George	37.124094	-113.602531
SR-8	Westridge Drive	St. George	37.122733	-113.616298
SR-8	Dixie Drive	St. George	37.122822	-113.623757
100 North	100 East (SR-74)	American Fork	40.37908544	-111.7958574
300 North	100 East (SR-74)	American Fork	40.38309267	-111.7958582
620 South	500 East (SR-180)	American Fork	40.36428963	-111.7855132
1120 North	100 East (SR-74)	American Fork	40.3991276	-111.7949802

East/West Street Name	North/South Street Name	City	Latitude	Longitude
50 South (American Fork) / 1100 North (Pleasant Grove)	1100 East (American Fork) / 2000 West (Pleasant Grove) (North County Boulevard / SR-129)	American Fork/Pleasant Grove	40.375674	-111.769159
Canal Boulevard/Harvey Boulevard	North County Boulevard (SR-129)	American Fork/Highland	40.410037	-111.773441
State Street (US-89)	860 East	American Fork	40.371356	-111.774454
Canal Boulevard (9680 North)	SR-74 (5300 West)	American Fork/Highland	40.40855	-111.789322
State Street (US-89)	1650 West	Pleasant Grove	40.368996	-111.76409
Harvest Moon Drive	SR-85 (Mountain View)	Saratoga Springs	40.404558	-111.938349
Center Street (SR-114)	500 West (US-89)	Provo	40.23375558	-111.667445
Center Street (SR-114)	2050 West / Geneva Road (SR-114)	Provo	40.23387257	-111.6947354
Center Street (SR-114)	Independence Avenue	Provo	40.233568	-111.677869
Center Street (SR-114)	1600 West	Provo	40.23382331	-111.68749
Center Street (SR-114)	900 West	Provo	40.23378739	-111.674413
1000 North	Utah Avenue	Tooele	40.548267	-112.341999
1000 North	600 West	Tooele	40.550864	-112.317195

7.1.2 UDOT RSUs on Interstates

Table 5. UDOT Phase 1a RSUs on Interstates

Source: UDOT, 2026

Identifier	Milepost (MP)	Latitude	Longitude
I-15 SB @ I-70 Interchange / MP 132.18	132.18	38.57709885	-112.6037979
I-15 NB @ MP 133.8	133.8	38.60030365	-112.6083527
I-15 RWIS SB @ MP 169	169	39.02019882	-112.3047028
I-15 RWIS @ Sevier River / MP 200.11	200.11	39.4095993	-112.0516968
I-15 NB @ MP 204.4	204.4	39.4596405	-112.0052338
I-15 @ Mills Road / SR-78 / MP 206.55	206.55	39.48324966	-111.9789124
I-15 RWIS NB @ Lampson Canyon / MP 215.06	215.06	39.59439087	-111.9161224
I-15 SB @ MP 217.7	217.7	39.62688065	-111.9050369
I-15 SB @ 2400 South / MP 222.03	222.03	39.67399979	-111.8511963
I-15 @ 100 North / SR-132 / MP 225.26	225.26	39.71043015	-111.816803
I-15 SB @ Mona / SR-54 / MP 233.17	233.17	39.82116318	-111.8338776
I-15 RWIS NB @ Rocky Ridge / MP 241.4	241.4	39.93695068	-111.8114014
I-15 @ MP 246.42	246.42	39.99718857	-111.7633209
I-15 NB @ 400 North / MP 250.33	250.33	40.04840088	-111.7397003
I-15 SB @ Main Street / SR-115 / MP 251	251	40.05619812	-111.7320023
I-15 MP 252.8 @ Beer Creek	252.8	40.07300186	-111.7151031
I-15 NB @ 600 South / MP 255	255	40.10290146	-111.6839981

Identifier	Milepost (MP)	Latitude	Longitude
I-15 NB @ 300 North / MP 256.15	256.15	40.11410141	-111.6697006
I-15 NB @ 1600 South / MP 258.86	258.86	40.14514923	-111.646492
I-15 SB @ 300 North / MP 260.66	260.66	40.17116547	-111.6470337
I-15 SB @ 800 North / MP 261.1	261.1	40.17741776	-111.6469803
I-15 NB @ East Bay / MP 262.4	262.4	40.19589996	-111.6486969
I-15 @ 500 S Provo	265.4	40.227359	-111.677895
I-15 NB On-ramp @ University Avenue / US-189 / 1860 South / MP 263.65	263.65	40.21300125	-111.663002
I-15 SB @ Provo River / 550 North / MP 266.28	266.28	40.24119949	-111.6925964
I-15 NB @ 1460 North / MP 267.19	267.19	40.25355148	-111.6971512
I-15 NB @ 2000 South / MP 267.86	267.86	40.26087952	-111.7053452
I-15 NB @ 1650 South / MP 268.37	268.37	40.26665497	-111.7112579
I-15 SB @ University Parkway / SR-265 / MP 269.12	269.12	40.27560043	-111.7202988
I-15 SB @ 650 South / MP 269.87	269.87	40.28542328	-111.7259521
I-15 SB @ 100 South / MP 270.56	270.56	40.29534722	-111.7262
I-15 @ 100 South / MP 271.82	271.82	40.31919861	-111.7265015
I-15 NB @ 1600 North / MP 273.21	273.21	40.3288002	-111.7350998
I-15 NB @ 200 South / MP 273.67	273.67	40.33429718	-111.7439575
I-15 NB @ 100 North / MP 274.15	274.15	40.33876038	-111.7509384
I-15 NB @ Pleasant Grove Boulevard / MP 275.35	275.35	40.35031509	-111.7685928
I-15 NB @ 500 East / SR-180 / MP 276.5	276.5	40.36187744	-111.7856216

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Identifier	Milepost (MP)	Latitude	Longitude
I-15 NB @ 200 West / MP 277.71	277.71	40.37189484	-111.8030853
I-15 SB @ 400 South / MP 279.32	279.32	40.3830986	-111.8299026
I-15 NB @ 600 East / MP 280.3	280.3	40.39561081	-111.8396759
I-15 NB @ 900 North / MP 280.73	280.73	40.39880753	-111.8453903
I-15 NB @ 1200 North / MP 281.15	281.15	40.40244675	-111.8510666
I-15 NB @ 2200 North / MP 282.46	282.46	40.415001	-111.8707
I-15 NB @ 2800 North / MP 283.26	283.26	40.42328644	-111.8809891
I-15 NB @ 3200 North / MP 283.62	283.62	40.42734909	-111.8851776
I-15 SB @ Timpanogos Highway / SR-92 / MP 283.93	283.9	40.42979813	-111.8900223
I-15 NB @ 3800 North / Adobe Way / MP 284.3	284.3	40.43470001	-111.8935013
I-15 NB @ 4200 North / MP 284.65	284.65	40.43889999	-111.8979034
I-15 SB @ 4600 North / MP 285.12	285.12	40.44340134	-111.9049988
I-15 SB @ 4800 North / MP 285.37	285.37	40.44580078	-111.9085007
I-15 SB @ Point of the Mountain / MP 285.78	285.78	40.45059967	-111.9135971
I-15 SB @ 16200 South / MP 286.3	286.3	40.457901	-111.9148026
I-15 SB @ 15800 South / MP 286.64	286.64	40.46310043	-111.9141998
I-15 NB @ 15400 South / MP 287.23	287.23	40.47060013	-111.9085999
I-15 NB @ 15200 South / MP 287.63	287.63	40.47570038	-111.9051971
I-15 SB @ 15000 South / MP 287.91	287.91	40.479599	-111.9035034
I-15 SB @ 14300 South / MP 288.84	288.84	40.49039841	-111.8930969
I-15 SB @ 14200 South / MP 289.09	289.09	40.49349976	-111.8916016

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Identifier	Milepost (MP)	Latitude	Longitude
I-15 NB @ 14000 South / MP 289.34	289.34	40.49729919	-111.8908005
I-15 SB @ 13400 South / MP 290.08	290.08	40.50799179	-111.891571
I-15 SB @ 13000 South / MP 290.6	290.6	40.51506805	-111.8917847
I-15 SB @ 12600 South / MP 291.1	291.1	40.52220154	-111.8915024
I-15 NB @ 11900 South / MP 291.98	291.99	40.53543091	-111.8922272
I-15 SB @ 11000 South / MP 293	293	40.55006027	-111.8965759
I-15 NB @ 10800 South / MP 293.4	293.4	40.55583954	-111.897049
I-15 NB @ 10200 South / MP 294.2	294.2	40.56700134	-111.8992996
I-15 NB @ 9800 South / MP 294.6	294.76	40.57294083	-111.8997803
I-15 NB @ 9400 South / MP 295.18	295.18	40.58126831	-111.8996277
I-15 NB @ 8600 South / MP 296.16	296.16	40.59513855	-111.9023514
I-15 SB @ 8400 South / MP 296.4	296.4	40.59814835	-111.9039154
I-15 SB @ 8200 South / MP 296.64	296.64	40.60200119	-111.9046021
I-15 SB @ 7400 South / MP 297.6	297.6	40.6167984	-111.9060059
I-15 NB @ 6600 South / MP 298.5	298.5	40.62844849	-111.9028473
I-15 SB @ I-215 South Interchange / MP 299	299	40.63710022	-111.9050369
I-15 @ 6200 South	299.4	40.63710022	-111.9049988
I-15 SB @ 5800 South / MP 299.7	299.7	40.64547348	-111.9030304
I-15 NB @ 5550 South / MP 300	300.05	40.65050125	-111.9016037
I-15 NB @ 5000 South / MP 301	301.01	40.66459656	-111.9010086
I-15 NB @ 4100 South / MP 302.25	302.25	40.68282318	-111.9020462
I-15 NB @ 3750 South / MP 302.75	302.75	40.68983078	-111.9028625

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Identifier	Milepost (MP)	Latitude	Longitude
I-15 SB @ 3300 South / SR-171 / MP 303.45	303.45	40.69961548	-111.9030609
I-15 SB @ 2900 South / MP 304	304	40.70783997	-111.9041519
I-15 SB @ 2550 South / MP 304.53	304.53	40.71529007	-111.9048004
I-15 SB @ 2300 South / MP 304.9	304.9	40.72078323	-111.9048615
I-70 RWIS @ I-15 / MP 0.12	0.12	38.5771	-112.6038
I-70 EB @ I-15 / Cove Fort / MP 0.7	0.7	38.58079	-112.595631
I-70 RWIS WB @ Clear Creek Summit / MP 7.46	7.46	38.59124	-112.49404
I-70 RWIS @ Fish Creek / MP 11.31	11.31	38.56391	-112.43374
I-70 WB @ MP 12.8	12.8	38.5542	-112.4128
I-70 EB @ MP 15.84	15.84	38.55556	-112.36279
I-70 EB @ MP 24.4	24.4	38.606	-112.2341
I-70 WB @ MP 25.15	25.15	38.616181	-112.231836
I-70 RWIS EB @ 300 North / MP 38.77	38.77	38.7725	-112.0986
I-70 WB @ MP 44.9	44.9	38.83995	-112.02694
I-70 RWIS @ SR-24 / MP 49.33	49.33	38.87622	-111.95875
I-70 EB @ Sage Flat Road / MP 54.4	54.4	38.91192	-111.88812
I-70 EB @ State Street / US-89 / MP 56.73	56.73	38.93284	-111.85445
I-70 WB @ Salina Variable Message Sign (VMS) / MP 58.66	58.66	38.93159	-111.81922
I-70 EB @ Gooseberry Road / MP 63.57	63.57	38.9154	-111.73329

Identifier	Milepost (MP)	Latitude	Longitude
I-70 WB @ Convulsion Road / MP 73.52	73.52	38.88169	-111.57172
I-70 WB @ MP 82.87	82.87	38.78045	-111.48504
I-70 RWIS WB @ Fremont Junction / MP 93	93	38.7787	-111.31663
I-70 Liveview @ Devils Canyon / MP 115.68	115.68	38.85142	-110.92669
I-70 RWIS EB @ Ghost Rocks / MP 123.11	123.11	38.86581	-110.80612
I-70 RWIS WB @ Rattlesnake Bench / MP 137.07	137.07	38.90374	-110.562
I-70 Liveview WB @ Milepost 141.35	141.35	38.92556	-110.49734
I-70 WB @ US-6 / MP 157.25	157.25	38.977703	-110.24472
I-70 WB @ Crescent Junction / MP 180.85	180.85	38.93739	-109.83775
I-70 Liveview @ US-191 / Crescent Junction / MP 182.2	182.2	38.94249	-109.81626
I-70 WB @ MP 185.59	185.59	38.95549	-109.75546
I-70 Liveview @ MP 206.1	206.1	38.95256	-109.38945
I-70 Liveview WB @ MP 226.4	226.4	39.16653	-109.13629
I-80 EB @ 300 West / MP 122.57	122.57	40.71757507	-111.9009476
I-80 WB @ State Street / US-89 / MP 123.28	123.28	40.71849823	-111.8886032
I-80 WB @ 700 East / SR-71 / MP 124.1	124.1	40.71902847	-111.8716736
I-80 WB @ 900 East / MP 124.47	124.47	40.71969986	-111.8652191

Identifier	Milepost (MP)	Latitude	Longitude
I-80 WB @ 1200 East / Highland Drive / MP 124.9	124.9	40.72000122	-111.8572998
I-80 WB @ 1300 East / MP 125.1	125.1	40.72001266	-111.854187
I-80 WB @ 1500 East / MP 125.65	125.65	40.71995163	-111.8477402
I-80 WB @ 1700 East / MP 125.74	125.74	40.71873856	-111.8410339
I-80 EB @ 2000 East / MP 126.17	126.17	40.7161293	-111.8335495
I-80 EB @ 2200 East / MP 126.52	126.52	40.71408081	-111.8275299
I-80 EB @ 2400 East / MP 126.82	126.82	40.71279907	-111.822403
I-80 EB @ 2800 East / MP 127.39	127.39	40.71441269	-111.811882
I-80 EB @ I-215 East / MP 127.66	127.66	40.71310043	-111.8074036
I-80 WB @ Silvercreek Junction / US-40 / MP 147.5	147.5	40.73688889	-111.4866638
I-80 EB @ MP 149.62	149.62	40.76018524	-111.4710083
I-80 @ Wanship / SR-32 / MP 155.46	155.46	40.81299973	-111.4013977
I-80 @ 150 North / MP 163.05	163.05	40.9178009	-111.4072037
I-80 EB @ MP 176.4	176.4	41.04729843	-111.3026962
I-80 EB @ Echo Point of Entry / MP 180.7	180.7	41.08467102	-111.237999
I-80 EB @ MP 186.78	186.78	41.14009857	-111.1519012
I-80 Exit 191 Wahsatch	191.2	41.20094	-111.108076
US-6 @ MP 182.4	182.4	40.038329	-111.534744
US-89 @ MP 315.5	315.5	39.994871	-111.469002
US-6 @ MP 195.08	195.08	39.97247	-111.335648
US-6 @ MP 202.05	202.05	39.949927	-111.218158

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Identifier	Milepost (MP)	Latitude	Longitude
US-6 @ MP 206.46	206.46	39.93321	-111.153375
US-6 @ MP 210.46	210.46	39.928929	-111.083994
US-6 @ MP 217.3	217.3	39.8515	-111.013075
US-6 @ MP 222.4	222.4	39.810972	-110.941495
US-6 @ MP 229.82	229.82	39.725272	-110.867592
I-15 SB @ MP 169	169	38.9956548	-112.3211822

Table 6. UDOT Phase 1b RSUs on Interstates*Source: UDOT, 2026*

Identifier	Milepost	Latitude	Longitude
SR-20 @ MP 0.15	0.15	38.07138	-112.687769
US-89 @ MP 125.54	125.54	37.74967	-112.377036
US-191 @ MP 103.6	103.6	38.309943	-109.404765
SR-95 @ MP 121.1	121.1	37.573712	-109.491446
US-40 @ MP 59	59	40.198491	-110.890795
US-40 @ MP 49.14	49.14	40.184022	-111.059788
US-40 @ MP 42.08	42.08	40.241227	-111.151672
US-40 @ MP 34.21	34.21	40.303235	-111.257345
US-6 @ MP 141.08	141.08	39.9598	-112.102185
US-6 @ MP 149.45	149.45	39.951862	-111.956021
US-89 @ MP 103.7	103.7	37.488749	-112.512401
SR-14 @ MP 31.46	31.46	37.517153	-112.645574
SR-14 @ MP 8.2	8.2	37.631208	-112.939849

Identifier	Milepost	Latitude	Longitude
SR-14 @ MP 1	1	37.673952	-113.04868
SR-143 @ MP 3.94	3.94	37.829748	-112.814964
I-80 @ MP 54.89	54.89	40.761543	-113.01034
I-80 @ MP 40.8	40.8	40.726867	-113.282862
US-6 @ MP 182.4	182.4	40.038329	-111.534744
I-84 @ MP 106.44	106.44	41.050908	-111.619772
I-84 @ MP 96.63	96.63	41.114062	-111.762928
I-84 @ MP 98.85	98.85	41.092525	-111.737768
I-84 @ MP 92.42	92.42	41.138605	-111.827438
I-84 @ MP 88.3	88.3	41.136105	-111.91614
I-15 @ MP 121	121	38.425178	-112.646291
I-15 @ MP 113.3	113.3	38.314928	-112.654556
I-15 @ MP 70.76	70.76	37.805575	-112.94213
I-15 @ MP 61.27	61.27	37.713985	-113.066532
I-15 @ MP 54.1	54.1	37.62842	-113.120693
I-15 @ MP 44.12	44.12	37.508664	-113.213192
I-15 @ MP 39.1	39.1	37.438455	-113.232904
I-15 @ MP 29.45	29.45	37.311202	-113.295841
I-15 @ MP 23.6	23.6	37.243074	-113.354549
I-15 @ MP 15.91	15.91	37.166835	-113.450293
I-15 @ MP 10.43	10.43	37.124424	-113.532378
I-15 @ MP 4.65	4.65	37.059499	-113.584142
I-15 @ MP 0.14	0.14	37.001766	-113.621423

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Identifier	Milepost	Latitude	Longitude
I-15 @ MP 8	8	37.100424	-113.561649
I-15 @ MP 12.53	12.53	37.142849	-113.501424
US-89 @ MP 244	244	39.159125	-111.782429
US-89 @ MP 496.5	496.5	41.941878	-111.409731
US-89 @ MP 489.68	489.68	41.951878	-111.491711
US-89 @ MP 460.47	460.47	41.743924	-111.796545
SR-91 @ MP 5.61	5.61	41.496996	-111.956203
I-80 @ MP 119.6	119.6	40.970258	-111.439336
US-40 @ MP 8.25	8.25	40.625666	-111.440148
US-40 @ MP 13.7	13.7	40.557691	-111.425757
SR-95 @ MP 0.35	0.35	38.369512	-110.702806
SR-12 @ MP 2.56	2.56	37.691822	-112.15259
US-89 @ MP 183.8	183.8	38.502938	-112.258322
I-15 @ MP 392.7	392.7	41.886143	-112.169814
I-15 @ MP 385.3	385.3	41.784823	-112.172288
I-15 @ MP 379.9	379.9	41.705058	-112.192747
I-15 @ MP 373	373	41.635304	-112.099168
I-15 @ MP 365	365	41.536263	-112.066041
I-15 @ MP 356.35	356.35	41.404867	-112.048164
I-15 @ MP 360.62	360.62	41.465312	-112.05514
I-15 @ MP 352.2	352.2	41.342403	-112.036533
I-15 @ MP 341.2	341.2	41.196112	-112.000236
I-15 @ MP 332.87	332.87	41.089393	-111.99012

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Identifier	Milepost	Latitude	Longitude
I-15 @ MP 327.34	327.34	41.019696	-111.942066
I-15 @ MP 322.85	322.85	40.965323	-111.891675
I-15 @ MP 321.98	321.98	40.95709	-111.891757
I-15 @ MP 317.55	317.55	40.894212	-111.896201
I-15 @ MP 313.73	313.73	40.842216	-111.915712
I-15 @ MP 311.7	311.7	40.809436	-111.924414
I-15 @ MP 308.91	308.91	40.771986	-111.910143
I-15 @ MP 306	306	40.730856	-111.903859
I-215 @ MP 28.1	28.1	40.834357	-111.923
I-215 @ MP 26.8	26.8	40.829687	-111.946645
I-215 @ MP 24.9	24.9	40.802799	-111.949552
I-215 @ MP 22.3	22.3	40.764959	-111.951023
I-215 @ MP 18.3	18.3	40.706849	-111.952847
I-215 @ MP 16.4	16.4	40.680219	-111.951378
I-215 @ MP 14.1	14.1	40.647035	-111.949404
I-215 @ MP 12.4	12.4	40.637827	-111.920957
I-215 @ MP 9.75	9.75	40.630401	-111.869633
I-215 @ MP 7.7	7.7	40.634035	-111.83438
I-215 @ MP 5.5	5.5	40.648104	-111.807959
I-215 @ MP 3.75	3.75	40.675059	-111.803153
I-215 @ MP 1.3	1.3	40.707512	-111.796712
I-80 @ MP 116.7	116.7	40.764139	-111.966128
I-80 @ MP 115.1	115.1	40.766069	-111.99627

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Identifier	Milepost	Latitude	Longitude
I-80 @ MP 111.53	111.53	40.770616	-112.062929
I-80 @ MP 105.5	105.5	40.758435	-112.167587
I-80 @ MP 98.6	98.6	40.692585	-112.263759
I-80 @ MP 95.23	95.23	40.663873	-112.319327
I-80 @ MP 17.64	17.64	41.897098	-112.54023
I-80 @ MP 20.36	20.36	41.88454	-112.489649
I-80 @ MP 26.57	26.57	41.817171	-112.412673
I-80 @ MP 34	34	41.788009	-112.278878
US-191 @ MP 62	62	37.755863	-109.398023
US-191 @ MP 51.3	51.3	37.62526	-109.477894

7.1.3 CDOT RSUs on Interstates

Table 7. CDOT RSUs on Interstates

Source: UDOT, 2026

Identifier	Milepost	Latitude	Longitude
1.1 miles east of Horizon Drive in Grand Junction	32.361	39.10548793	-108.525877
1.1 miles east of I-70BL in Clifton	37.534	39.10741581	-108.4319195
US-6 in Palisade	43.744	39.12519333	-108.322554
0.7 miles west of Beavertail Tunnel	49.707	39.19242471	-108.2816133
West Beavertail Tunnel	50.328	39.19536394	-108.271514
0.5 miles east of Beavertail Tunnel	50.982	39.20219367	-108.2667209
1.5 miles east of Roan Creek Road in De Beque	62.789	39.337447	-108.193874
CO 215 in Parachute	74.664	39.4555436	-108.0472714

Identifier	Milepost	Latitude	Longitude
0.8 miles west of Rifle	86.122	39.5164414	-107.8577147
2.2 miles west of Mamm Creek Road / County Road (CR) 315	92.321	39.5282608	-107.7448376
1.2 miles west of 9th Street in Silt	96.409	39.54334224	-107.6718142
2.5 miles west of Castle Valley Boulevard in New Castle	103.124	39.56318592	-107.5522371
0.4 miles east of Castle Valley Boulevard in New Castle	105.654	39.5659535	-107.5093868
Canyon Creek Road in Glenwood Springs	108.959	39.5738964	-107.4529489
0.7 miles east of Canyon Creek Road	109.521	39.57524206	-107.4419162
0.8 miles west of CO 82 in Glenwood Springs	115.945	39.5539246	-107.3341286
0.4 miles west of CO 82 in Glenwood Springs	116.219	39.550968	-107.330636
West No Name Tunnel	117.64	39.560981	-107.310501
0.3 miles east of No Name Tunnel	118.231	39.5621245	-107.3010475
0.2 miles west of Grizzly Creek Rest Area	120.868	39.56221	-107.257003
1.5 miles east of Grizzly Creek Rest Area	122.498	39.56726	-107.231498
2.2 miles east of Grizzly Creek Rest Area	123.139	39.57357	-107.223701
0.4 miles east of Hanging Lake Tunnel	126.58	39.594224	-107.177311
1.3 miles west of Bair Ranch Rest Area VSL	127.487	39.6059039	-107.1559327
0.2 miles east of Bair Ranch Rest Area	128.786	39.615451	-107.135902
1.4 miles east of Bair Ranch Rest Area	129.706	39.623813	-107.1230896
3.0 miles west of Colorado River Road in Dotsero	130.945	39.6293107	-107.1036137
1.3 miles west of Colorado River Rd in Dotsero	132.318	39.64163893	-107.0833401
Colorado River Road	133.357	39.647786	-107.065941

Identifier	Milepost	Latitude	Longitude
3.0 miles west of Trail Gulch Road in Gypsum	137.027	39.648447	-106.998967
0.8 miles east of Trail Gulch Road in Gypsum	140.199	39.65377772	-106.9432714
1.0 mile west of Eby Creek Road	145.819	39.6539817	-106.8406004
2.8 miles west of CO 131	154.181	39.710929	-106.707252
0.9 miles west of CO 131	155.819	39.700906	-106.684299
CO 131	156.586	39.697029	-106.670794
0.5 miles east of CO 131	157.082	39.692283	-106.664246
1.8 miles east of CO 131	158.101	39.682626	-106.652755
Wilmore Lake	160.156	39.658437	-106.634297
0.6 miles west of Beard Creek Road in Edwards	162.327	39.651853	-106.595542
Beard Creek Road in Edwards	162.827	39.649372	-106.586639
0.9 miles west of Avon Road	165.951	39.640717	-106.533339
Avon Road	166.652	39.6373504	-106.5207988
1.1 miles east of Horizon Drive in Grand Junction	32.361	39.10548793	-108.525877

7.2 VRU Safety System Locations

For Utah's 20 intersections identified in the CTW Program, 12 of the 20 intersections will already have VRU detection systems purchased outside of the CTW Program. The CTW Program will acquire and install systems for eight more intersections, bringing the total number of VRU intersections to 20. Table 8 includes what locations have existing systems and which ones will have the planned installations. Four of the planned locations will include the deployments of four blank-out signs per site.

Table 8. UDOT VRU Safety System Locations*Source: UDOT, 2026*

Signal ID	Location	City	Existing/Planned
7335	5300 South & 700 West	West Valley City	Existing – Planned Blank-out Sign
7304	3300 South (SR-171) & 2300 East	Salt Lake City	Existing
7155	3300 South (SR-171) & State Street (US-89)	South Salt Lake	Existing – Planned Blank-out Sign
7814	1000 North & SR-36	Tooele	Existing
7813	1280 North & SR-36	Tooele	Existing – Planned Blank-out Sign
8117	Main Street & St. George Boulevard	St. George	Existing
5362	500 West & 500 South	Bountiful	Existing
5023	Washington Boulevard (US-89) & 23rd Street	Ogden	Existing
5024	Washington Boulevard (US-89) & 24th Street	Ogden	Existing
5019	Washington Boulevard (US-89) & 28th Street	Ogden	Existing
5017	Washington Boulevard (US-89) & 26th Street	Ogden	Existing
5018	Washington Boulevard (US-89) & 27th Street	Ogden	Existing
7502	1200 West & 3300 South (SR-171)	West Valley City	Planned
7602	Redwood Road (SR-68) & 4610 South	Taylorsville	Planned
7713	Bonanza & Kearns Boulevard (SR-248)	Park City	Planned

Signal ID	Location	City	Existing/Planned
7269	8400 West (SR-111) & 3500 South (SR-171)	Magna	Planned
7631	8400 West (SR-111) & 2700 South	Magna	Planned
7151	2100 South (SR-201) & State Street (US-89)	Salt Lake City	Planned – Planned Blank-out Sign
8220	300 West & 200 North (SR-56)	Cedar City	Planned
6456	900 West & Center Street (SR-114)	Provo	Planned

7.3 On-board Unit (OBU) Vehicle Deployments

Utah will deploy a total of 215 OBUs on vehicles as part of the CTW project. Table 9 summarizes the breakdown of planned OBU vehicle deployments.

Table 9. UDOT OBU Deployments

Source: UDOT, 2026

Vehicle Type	Quantity
UTA Buses	123
UDOT Snowplows	97

8 References

Panasonic. (n.d.) Phase 2B Snowplow OBE Installation Plan. Prepared for Utah Department of Transportation.

Panasonic. (n.d.) Phase 2B Transit OBE Installation Plan. Prepared for Utah Department of Transportation.

Ouster. (n.d.) Ouster BlueCity User Manual, Version 2.5.

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