

APPLICATION OVERVIEW

What: The Call for Projects for the FY 2024-2027 Regional Transportation Operations and Technology Set-Aside

Funding Available: at least \$16,000,000

Call Dates: June 1, 2023 until July 7, 2023, 5 pm

Application Submittals: submit the items below to Jerry Luor (jluor@drcog.org)

1. REQUIRED: a **single PDF document** containing 1) this application (**before saving to PDF, press Ctrl-A to select all, and F9 to update all formulas**), 2) one location map/graphic, 3) cost estimate (your own or the CDOT [cost estimate form](#)), 4) CDOT/RTD concurrence response (if applicable), 5) completed CDOT SEA-Local Agency Template, 6) project support form(s), and 7) any required documentation based on the application text (i.e., FHWA emissions calculators). Please DO NOT attach additional cover pages, embed graphics in the application, or otherwise change the format of the application form.
2. OPTIONAL: Submit **one additional** PDF document containing any supplemental materials, if applicable.
3. REQUIRED: Submit a single zipped GIS shapefile of your project. At a minimum, the shapefile should consist of project limits and planned equipment locations.

Other Notable items:

- **Eligibility:** Projects must align with the eligibility guidelines in the [Policies for FY2024-2027 TIP Set-Aside Programs](#). Proposed work on roadways must primarily be located on the [DRCOG Regional Roadway System](#) to be eligible for funding (the DRCOG RRS can also be viewed within the [DRCOG Data Tool](#)).
- **Call-for-Projects Pre-Application Webinar:** To be eligible to submit an application, at least one person from your agency must have attended the Regional Transportation Operations and Technology Set-Aside Pre-Application Webinar on April 26, 2023.
- **Application Data:** To assist sponsors in filling out the application, DRCOG has developed the [DRCOG Data Tool](#). A link to the instructions is also included. Additionally, sponsors may download datasets to run their own analyses from this same site.
- **Project Affirmation:** The application must be affirmed by either the applicant's City or County Manager, Chief Elected Official (Mayor or County Commission Chair) for local governments, or agency director or equivalent for other applicants.
- **Evaluation Process:** DRCOG staff will post all applications. DRCOG staff will assemble an evaluation panel to review and make recommendations for funding, including a ranked waiting list. The recommended list of projects will be presented to the Regional Transportation Operations Working Group and Advanced Mobility Partnership Working Group prior to action by the DRCOG committees and Board.
- If you have any questions or need assistance, contact gmackinnon@drcog.org or jluor@drcog.org.

APPLICATION FORMAT

The Regional Transportation Operations and Technology set-aside application contains two parts: *project information* and *evaluation questions*.

Project Information

Applicants enter **foundational** information for the *project/program/study* (hereafter referred to as *project*), including a problem statement, project description, and concurrence documentation from CDOT and/or RTD, if applicable. This section is not scored.

Evaluation Questions

This part includes four sections (A-E) for the **applicant to provide qualitative and quantitative responses** to use for scoring projects. The checkboxes and data entry fields should guide the applicant's responses. They are not directly scored but provide context as reviewers consider the full response to each question. Applicants may access the [DRCOG Data Tool](#) as well as other relevant data resources.

Scoring Methodology: Each section will be scored on a scale of 0 to 5, relative to other applications received. All questions will be factored into the final score, with any questions left blank receiving 0 points. The four sections are weighted and scored as follows:

Section A. Deployment of RTO&T Initiatives in RTO&T Strategic Plan 30%

Projects will be evaluated on the degree to which they address a significant subregional problem or benefit people throughout the subregion. Relevant quantitative data should be included within narrative responses.

5	The project implements or advances several Primary initiatives.
4	The project implements or advances one Primary initiative
3	The project implements or advances several Secondary initiatives.
2	The project implements or advances one Secondary initiative.
1	The project implements or advances one or more Tertiary initiatives.
0	The project implements no initiatives.

Section B. Regional Impact of Proposed Project 25%

Projects will be evaluated on the degree to which they address a significant subregional problem or benefit people throughout the subregion. Relevant quantitative data should be included within narrative responses.

5	The project benefits will substantially address a major subregional problem and benefit people and businesses in multiple communities.
4	The project benefits will significantly address a major subregional problem primarily benefiting people and businesses in one community.
3	The project benefits will either moderately address a major subregional problem or significantly address a moderate -level subregional problem.
2	The project benefits will moderately address a moderate -level subregional problem.
1	The project benefits will address a minor subregional problem.
0	The project does not address a subregional problem.

Section C. Metro Vision Regional Transportation Plan Priorities25%

The TIP set-aside's investments should implement the 2050 Metro Vision Regional Transportation Plan (2050 MVRTP) regional project and program investment priorities, which contribute to addressing the Board-adopted Metro Vision objectives and the federal performance-based planning framework required by the Federal Highway Administration and Federal Transit Administration as outlined in current federal transportation legislation and regulations. Therefore, projects will be evaluated on the degree to which they address the six priorities identified in the 2050 MVRTP: safety, active transportation, air quality, multimodal mobility, freight, and regional transit. It is anticipated that projects may not be able to address all six priorities, but it's in the

applicant’s interest to address as many priority areas as possible. Relevant quantitative data is required to be included within narrative responses. The table below demonstrates how each priority area will be scored.

5	The project provides demonstrable substantial benefits in the 2050 MVRTP priority area and is determined to be in the top fifth of applications based on the magnitude of benefits in that priority area.
4	The project provides demonstrable significant benefits in the 2050 MVRTP priority area.
3	The project provides demonstrable moderate benefits in the 2050 MVRTP priority area and is determined to be in the middle fifth of applications based on the magnitude of benefits in that priority area.
2	The project provides demonstrable modest benefits in the 2050 MVRTP priority area.
1	The project provides demonstrable slight benefits in the 2050 MVRTP priority area and is determined to be in the bottom fifth of applications based on the magnitude of benefits in that priority area.
0	The project does not provide demonstrable benefits in the 2050 MVRTP priority area.

Section D. Financial Leveraging 5%

Scores are assigned based on the percent of other non-federal funding sources.

Score	% non-Federal Funds
5	36% and above
4	31 - 35.9%
3	26 - 30.9%
2	21 - 25.9%
1	17.21 - 20.9%*
0	17.21%

*(includes 100% eligible projects with no match)

Section E. Project Readiness 15%

Be sure to answer ALL questions. While “Yes” answers will generally reflect greater readiness, opportunities are given to provide additional details to assist reviewers in fully evaluating the readiness of your project.

5	Substantial readiness is demonstrated and all known obstacles that are likely to result in project delays have been mitigated.
4	Significant readiness is demonstrated and several known obstacles that are likely to result in project delays have been mitigated.
3	Moderate readiness is demonstrated and some known obstacles that are likely to result in project delays have been mitigated.
2	Slight readiness is demonstrated and some known obstacles that are likely to result in project delays have been mitigated.
1	Few mitigation or readiness activities have been demonstrated.
0	No mitigation or readiness activities have been demonstrated.

Project Information

1. Project Title	Aurora Traffic Signal Equipment Upgrade	
2. Project Location <i>Provide a map, as appropriate (see Page 1)</i>	Start point: N/A End point: N/A OR Geographic Area: Various signalized intersections within City of Aurora. See location map.	
3. Project Sponsor (entity that will be financially responsible for the project)	City of Aurora	
4. Project Contact Person:		
Name: Jim Paral		Title: Senior Engineer, Public Works Engineering
Phone: 303-739-7328		Email: jmparal@auroragov.org
5. Required Concurrence and Project Support: Does this project touch CDOT Right-of-Way, involve a CDOT roadway, connect to a CDOT system, access RTD property, or request RTD involvement to operate service? Does this project directly involve other local agency partners.		<input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <i>If yes, provide a completed Peer Agency Support Form for each partner.</i>
6. What planning document(s) identifies this project? <i>Provide link to document(s) and referenced page number if possible, or provide documentation in the supplement</i>	If this project is listed in the DRCOG 2050 Metro Vision Regional Transportation Plan (2050 MVRTP) , provide the staging period: N/A	
	Local/Regional plan:	Planning Document Title: N/A Adopting agency (local agency Council, CDOT, RTD, etc.): N/A Provide date of adoption by council/board/commission, if applicable: N/A
	Please describe public review/engagement to date:	N/A
	Other pertinent details:	N/A
7. Identify the project's key phases and the anticipated schedule of phase milestones. (phases and dates should correspond with the "Phase to be Initiated" in the Funding Breakdown table below)		
Phases to be included:	Major phase milestones:	Anticipated completion date (based on October 2023 DRCOG approval date): (MM/YYYY)
<input type="checkbox"/> Preconstruction <input checked="" type="checkbox"/> Construction <input type="checkbox"/> Both		
<u>REQUIRED FOR ALL PHASES</u>	Intergovernmental Agreement (IGA) executed with CDOT/RTD (Assumed process is 4-9 months; any work performed before execution is NOT reimbursable)	06/2024
<input type="checkbox"/> Design	Design contract Notice to Proceed (NTP) issued (if using a consultant):	N/A
	Design scoping meeting held with CDOT (if no consultant):	N/A
	FIR (Field Inspection Review):	N/A
	FOR (Final Office Review):	N/A
<input type="checkbox"/> Environmental	Environmental contract Notice to Proceed (NTP) issued (if using a consultant):	N/A
	Environmental scoping meeting held with CDOT (if no consultant):	N/A

<input type="checkbox"/> Right-of-Way	Initial set of ROW plans submitted to CDOT:	N/A
	Estimated number of parcels to acquire: <input type="text" value="Enter Number"/>	
	ROW acquisition completed:	N/A
<input type="checkbox"/> Construction	Required clearances:	N/A
	Project publicly advertised:	N/A
<input type="checkbox"/> Study	Kick-off meeting held after consultant NTP (or internal if no consultant):	N/A
<input checked="" type="checkbox"/> Equipment Purchase (Procurement)	RFP/RFQ/RFB (bids) issued:	10/2024
<input type="checkbox"/> Other Phase not Listed Describe: Describe	First invoice submitted to CDOT/RTD:	N/A

8. Problem Statement: What specific subregional problem/issue will the transportation project address?

Currently, intersections without video detection are unable to provide multimodal detection, 24/7 traffic counts, and remote configuration of detection zones. The absence of these elements results in increased maintenance costs as well as an increased need for external count data services. Existing detection is sometimes unreliable and cannot always be monitored remotely. The installation of video detection will address these issues.

Currently, intersections without Uninterruptible Power Supplies (UPS) are at risk of becoming inoperable in the event of a power failure. The UPS also provides power conditioning to incoming utility power thereby providing clean and stable power that can extend the life of the traffic signal equipment within the cabinet. The installation of UPS will address these issues and allow the intersections to continue to operate.

9. Identify the project's **key elements.** A single project may have multiple project elements.

Roadway

- ☒ Operational Improvements
- ☐ General Purpose Capacity (2050 MVRTP)
- ☐ Managed Lanes (2050 MVRTP)
- ☐ Pavement Reconstruction/Rehab
- ☐ Bridge Replace/Reconstruct/Rehab

Grade Separation

- ☐ Roadway
- ☐ Railway
- ☐ Bicycle
- ☐ Pedestrian

Regional Transit¹

- ☐ Rapid Transit Capacity (2050 MVRTP)
- ☐ Mobility Hub(s)
- ☐ Transit Planning Corridors
- ☐ Transit Facilities (Expansion/New)

☒ **Safety Improvements**

Active Transportation Improvements

- ☒ Bicycle Facility
- ☒ Pedestrian Facility

☒ **Air Quality Improvements**

☐ **Improvements Impacting Freight**

Multimodal Mobility (i.e., accommodating a broad range of users)

- ☐ Complete Streets Improvements

☐ **Study**

☐ **Other**, briefly describe: [Click or tap here to enter text.](#)

¹For any project with transit elements, the sponsor must coordinate with RTD to ensure RTD agrees to the scope and cost. Be sure to include RTD's concurrence in your application submittal.

- 10.** Define the **scope** and **specific elements** of the project (including any elements checked in #9 above).
DO NOT include scope elements that will not be part of the DRCOG funded project or your IGA scope of work (i.e., adjacent locally funded improvements or the project merits and benefits). Please keep the response to this question tailored to details of the scope only and no more than five sentences.

The project will deploy new video detection systems and UPS at 42 intersections along the DRCOG roadway network within the City of Aurora. Selected intersections for video detection and selected intersections for UPS may overlap but will not be the same 42 intersections based on existing equipment. The project intersections are indicated on the attached location map. Project components will include all video detection systems, mounting hardware, cabling, power supplies, cabinet components, licensing, integration, and testing. The project will follow a system engineering analysis (SEA) process to confirm and document a synchronization-based justification for the selection of the video detection and UPS systems.

- 11.** What is the current status of the proposed scope as defined in Question 10 above? *Note that overall project readiness is addressed in more detail in Section E below.*

The project intersections have been selected for these upgrades. Upon approval of funding, the City is prepared to move forward with procurement of the equipment. The products must conform to City standards. The City plans to use an existing purchasing agreement from another agency with a 'FIPI' from CDOT. Upon approval from CDOT, the equipment will be purchased and installed at project intersections on a rolling basis.

- 12.** Would a smaller DRCOG-allocation than requested be acceptable, while maintaining the original intent of the project?

☒ Yes ☐ No

*If yes, smaller meaningful limits, size, service level, phases, or scopes, along with the cost, **MUST** be defined.*

Smaller DRCOG funding request: Based on the amount of funding provided, the project intersections would be reduced proportionally. For example, if \$500,000 of funding was provided, the project would implement new video detection and UPS at 21 intersections. The intersections no longer receiving upgrades would be selected at the City's discretion.

Outline the differences between the scope outlined above and the reduced scope: The scope of the project would remain the same, but the quantity would be scaled from 42 intersections to a reduced amount.

Project Financial Information and Funding Request (All funding amounts in \$1,000s)		
<i>To update the formulas below, enter your information, highlight the formulas, and press F9 or right-click and select Update Field.</i>		
Total amount of Federal Funding Request (in \$1,000's) (Not to exceed 82.79% of the total project cost)	\$1,021	100.00% of total project cost
Match Funds (in \$1,000's) List each funding source and contribution amount.	Contribution Amount	% Contribution to Overall Project Total
Click or tap here to enter text.	\$0	0.0%
Click or tap here to enter text.	\$Match Amount	0.0%
Click or tap here to enter text.	\$Match Amount	0.0%
Click or tap here to enter text.	\$Match Amount	0.0%
Click or tap here to enter text.	\$Match Amount	0.0%

Click or tap here to enter text.	\$Match Amount	0.0%
Total Match <i>(private, local, state, regional, or federal)</i>	\$ 0	0.0%
Project Total	\$1,021	

Funding Breakdown (in \$1,000s) (by program year)¹ (Total funding should match the Project Total from above)

To update the formulas below, enter your information, highlight the formulas (or Ctrl-A), and press F9. OR close and reopen the file.

	FY 2024	FY 2025	FY 2026	FY 2027	Total
DRCOG Requested Funds	\$0	\$1021	\$0	\$0	\$1,021
CDOT or RTD Supplied Funds ²	\$0	\$0	\$0	\$0	\$ 0
Local Funds (Funding from sources other than DRCOG, CDOT, or RTD)	\$0	\$0	\$0	\$0	\$ 0
Total Funding	\$ 0	\$1,021	\$ 0	\$ 0	\$1,021
Phase to be Initiated	Select Phase	Equipment Purchase (Procurement)	Select Phase	Select Phase	
Notes:	<ol style="list-style-type: none">1. Fiscal years are October 1 through September 30 (e.g., FY 2024 is October 1, 2023 through September 30, 2024). The proposed funding plan is not guaranteed if the project is selected for funding. While DRCOG attempts to accommodate applicants' requests, final funding will be assigned at DRCOG's discretion. Funding amounts must be provided in year of expenditure dollars using a recommended 3% inflation factor.2. Only enter funding in this line if CDOT and/or RTD specifically give permission via concurrence letters or other written source.				
Affirmation:	By checking this box, the applicant's Chief Elected Official (Mayor or County Commission Chair/City or County Manager/Agency Director) has certified it allows this application to be submitted for potential DRCOG-allocated funding and will follow all local, DRCOG, state, and federal policies and regulations if funding is awarded. <input checked="" type="checkbox"/>				

Evaluation Questions

A. Deployment of RTO&T Initiatives in RTO&T Strategic Plan

WEIGHT

30%

Select the initiatives to be deployed or advanced by this proposed project. It is possible to select more than one initiative.

Primary initiatives

- | | |
|--|-------------------------------------|
| Develop a Regional Situational Awareness platform. | <input checked="" type="checkbox"/> |
| Develop processes to share traffic camera view and control between jurisdictions and public safety. | <input checked="" type="checkbox"/> |
| Develop a Regional Performance Monitoring Data Archive platform. | <input checked="" type="checkbox"/> |
| Develop strategies and processes to coordinate performance-based management. | <input checked="" type="checkbox"/> |
| Deploy additional supporting transportation surveillance and control systems and infrastructure. | <input checked="" type="checkbox"/> |
| Develop Traffic Incident Management standard operating procedures. | <input type="checkbox"/> |
| Standardize and implement transit signal priority performance management and system optimization procedures. | <input type="checkbox"/> |

Secondary initiatives

- | | |
|---|-------------------------------------|
| Develop evacuation and recovery plans and exercises. | <input checked="" type="checkbox"/> |
| Develop processes to coordinate traveler information messaging across the region. | <input checked="" type="checkbox"/> |
| Develop active work zone monitoring and management in the field. | <input type="checkbox"/> |
| Deploy additional safety-focused technology applications | <input checked="" type="checkbox"/> |
| Expand the Regional Performance Monitoring Data Archive platform. | <input checked="" type="checkbox"/> |
| Expand the Regional Situational Awareness platform. | <input checked="" type="checkbox"/> |
| Expand transit signal priority deployment. | <input type="checkbox"/> |

Tertiary initiatives

- | | |
|---|-------------------------------------|
| Develop a Regional Multimodal Traveler Information platform. | <input checked="" type="checkbox"/> |
| Develop a process to monitor regional parking availability, capacity and pricing. | <input type="checkbox"/> |
| Develop a multimodal trip planner and reservation/ payment system. | <input type="checkbox"/> |
| Develop and deploy dynamic ride-sharing. | <input type="checkbox"/> |
| Develop and implement curbside management standards. | <input type="checkbox"/> |
| Develop continuity of operations plans. | <input type="checkbox"/> |

Describe how this project will deploy, advance or achieve the selected initiatives.

This project advances primary initiatives 1 through 5. To advance primary initiative 1, this project will provide high resolution ATSPM data at project intersections, both historically and in real time. In the future, this data could be shared with DRCOG to enhance the regional platform. Some of the project intersections are located on or near the jurisdictional boundaries of Aurora. Upon interagency agreements, the new video detection could provide video feed sharing between jurisdictions, in of support primary initiative 2. This project directly advances primary initiative 3 by providing real time ATSPM data which can be shared with the web-based platform. This project directly advances primary initiative 4 by providing ATSPM data to the Regional Performance Monitoring Data Archive platform. This project advances primary initiative 5 by deploying transportation detection infrastructure to monitor operations.

This project advances secondary initiatives 1, 2, 4, 5, and 6. To advanced secondary initiative 1, this project will provide backup battery power to intersections. Although the backup battery power is only available for a discrete amount of time, it still provides additional time for the signal to operate normally under the event of an evacuation. This project will provide backup battery to intersections that currently do not have a backup power source. Additionally, the battery backup will regulate power surges and subsequently extend the cabinet equipment lifespan. This project will also advance secondary initiative 2. The first step in providing traveler information systems is to observe the existing and ongoing roadway conditions. This project will provide the ability to obtain the necessary traveler information and will facilitate the ability to support future traveler information systems. Secondary initiative 4 is advanced by this project by directly addressing a safety issue. The installation of video detection systems allows for dilemma zone detection for vehicles, and thus provides a safety improvement to the project intersections. Similar to the primary initiatives, this project advances secondary

initiatives 5 and 6 by providing the ability to monitor and collect ATSPM data. In the future, this data could be shared with the Regional Performance Monitoring Data Archive platform.

Through the ability to detect bicycles and pedestrians, this project also advances tertiary initiative 1 by providing the ability to monitor and collect multimodal data that could be shared in the future.

The Regional Transportation Operations and Technology Strategic Plan emphasizes a data management concept that requires interagency information sharing. Describe in detail how this project will share data with other regional entities.

The scope of this project will provide the basis to obtain historical and real-time data at project intersections using the proposed video detection system. Upon the development of a regional platform and interagency agreements, this data could be shared. It should be noted that the City does currently have several multimodal devices deployed in the field. The data is brought back on a web-based platform where users from different agencies can be provided with read-only access. The City has already taken steps to share this data with CDOT and is willing to share data with other agencies as well.

The Regional Transportation Operations and Technology Strategic Plan emphasizes a data management concept that requires interagency information sharing. Describe in detail how this project will share data with other regional entities.

The scope of this project will provide the basis to obtain historical and real-time data at project intersections using the proposed video detection system. Upon the development of a regional platform and interagency agreements, this data could be shared. It should be noted that the City does currently have several multimodal devices deployed in the field. The data is brought back on a web-based platform where users from different agencies can be provided with read-only access. The City has already taken steps to share this data with CDOT and is willing to share data with other agencies as well.

B. Regional Impact of Proposed Project

WEIGHT

25%

Provide **qualitative and quantitative** responses to the following questions on the subregional impact of the proposed project. Be sure to provide all required information for each question. Quantitative data from is available from the [DRCOG Data Tool](#).

1. Why is this project regionally important? *Relevant quantitative data in your response is required.*

This project is regionally important due to the large area of impact. This project directly benefits City of Aurora residents and visitors that pass through the project intersections. All project intersections are along DRCOG roadways and additionally some border adjacent jurisdictions (such as Denver). Resultantly, travelers from adjacent jurisdictions working in or traveling through the City of Aurora will be positively impacted by this project and the benefits. As found in the DRCOG data, there are 156,505 households within 0.5 miles of the project intersections. This project also provides regional benefits by expanding the City's ability to provide ATSPM data to other jurisdictions. Many of the devices are proposed on state highways within the City, which see heavy volumes of regional commuter traffic.

2. How will the proposed project address the specific transportation problem described in the **Problem Statement** (as submitted in Project Information, #8)? Relevant quantitative data in your response is required.

This project would install 42 video detection systems across the City of Aurora and would provide real time visualization of the intersections, detection for non-vehicular traffic such as bike and pedestrians, provide count data, and reduce maintenance costs by improving the City's ability to remotely monitor intersections. The benefits of using video detection systems are:

- Improve traffic signal performance by providing multimodal detection at the intersection including bicyclists.
- Utilize hardware and algorithms designed for challenging environments with optimized accuracy and performance.
- Support future advance detection for approaching vehicles at signalized intersections, which can be used to safely terminate a phase in an effort to avoid driver dilemma zones.
- Designed for outdoor use and operational in all weather conditions as it meets NEMA TS 2 environmental requirements.
- Provide remote access to support detection zone reconfiguration from the TMC or from a technician's laptop to avoid unnecessary maintenance vehicle dispatches to the intersection.
- Remotely monitor and manage traffic studies.
- Ability to access 24/7 multimodal traffic counts including turning movement counts thereby minimizing the need for separate data count activities.
- Functional in urbanized areas where congestion is prevalent and multiple modes of travel are utilized.
- Non-invasive detection technology minimizes the cost of maintenance associated with inductive loop detector replacement.

Additionally, this project would install 42 battery backup systems across the City of Aurora thus allowing for these signals to remain in operation in the event of a power failure. The battery backup system will regulate the power surges and thus extend the life of the traffic signal equipment. The City utilized the 2020 Traffic Signal Manual from the Texas Department of Transportation (TXDOT) as a guide to determine the signalized intersections that would reap the most benefit from deployment of UPS. The recommendations in the manual included the following:

- Intersections with unique geometry such as wide medians, conflicting left turns that require lead-lag operation, protected-only left turn operation, or split phasing where right-of-way assignment is difficult for a four-way stop operation
- Intersections over capacity with heavy directional traffic flow
- Intersections with a history of signal malfunction due to power quality or reliability issues
- Intersections on high volume roads
- Intersections with rail preemption
- Intersections with emergency preemption or intersections near fire stations
- Intersections with signal repair response time in excess of 30 minutes
- Intersections within ¼ mile proximity to another intersection with UPS
- Intersections that are part of a coordinated system or are part of a corridor that functions as a major arterial in an urbanized area
- Intersections with high-speed approaches

All of the City's traffic signal locations in this application meet most of these conditions. Quantifiable benefits are difficult to obtain and research on other agency experience indicated that using accident statistics as a means for quantifying benefits of UPS implementation at traffic signals was unreliable because police reports were not consistent and accidents with property damage only sometimes are not reported. Additionally, reports for more severe accidents sometimes did not indicate if the traffic signal was dark or that the accident occurred in a vehicle queue caused by a dark signal.

The deployment of both video detection and UPS will lead to improved signal timing operations due to greater data collection accuracy and reduced workloads on staff. Past experience on projects that improve signal timing plans conservatively result in greater than 10% reductions in delay and travel times.

3. Does the proposed project benefit multiple municipalities and/or subregions? If yes, which ones and how? Also describe any funding partnerships (*other subregions, regional agencies, municipalities, private, etc.*) established in association with this project.

This project addresses City of Aurora signals on DRCOG corridors. While the project directly benefits the City of Aurora, the resultant data obtained from this project can be shared with DRCOG to advance the RTO&T primary, secondary, and tertiary initiatives. The data also will directly benefit CDOT since the City of Aurora currently operates and maintains 76 traffic signals along state highways. And the City participates in several multi-agency signal timing coordination on key regional corridors. More stable operations maintain greater coordination across boundaries with neighboring agencies. The City has also taken initial steps to share this data with CDOT and other regional partners.

4. Disproportionately Impacted and Environmental Justice Communities

This data is available in the DRCOG Data Tool. Completing the below table and referencing *relevant* quantitative data in your response is *required*.

To update the formulas below, enter your information, highlight the formulas (or Ctrl-A), and press F9. OR close and reopen the file.

	DI & EJ Population Groups	Number within ½ mile	% of Total	Regional %
Use 2015-2019 American Community Survey Data (Use a 0.5 mile buffer distance) [Equity data tab]	a. Total population	428,800	-	-
	b. Total households	156,505	-	-
	c. Individuals with low-income	116,500	27%	20%
	d. Individuals of color	243,380	57%	33%
	e. Adults age 60 and over	69,690	16%	13%
	f. Youth under 18	106,239	25%	16%
	g. Individuals with limited English proficiency	56,680	13%	3%
	h. Individuals with a disability	44,665	10%	9%
	i. Households that are housing cost-burdened	59,256	38%	32%
	j. Households without a motor vehicle	9,777	6%	5%

For Lines c. – i. use definitions in the [DRCOG Title VI Implementation Plan](#). For Line j., as defined in C.R.S. 24-38.5-302(3)(b)(I): “‘cost-burdened’ means a household that spends more than thirty percent of its income on housing.”

Describe how this project will improve access and mobility for each of the applicable disproportionately impacted and environmental justice population groups identified in the table above, *including the required quantitative analysis*:

This project will directly benefit each of the disproportionately impacted and environmental justice population groups listed above. The project intersections are within 0.5 mile of each group, as listed above. Each of these households and/or groups will be able to access and utilize the project intersections by using a vehicle, bicycle, or by walking. Group j will be able to utilize the project intersections by using a bicycle or by walking.

5. How will this project move the subregion toward achieving the shared [regional transportation outcomes](#) established in [Metro Vision](#) in terms of...
- Land Use, community, urban development, housing, employment? *(Improve the diversity and livability of communities. Contain urban development in locations designated for urban growth and services. Increase housing and employment in urban centers. Diversify the region's housing stock. Improve the region's competitive position.)*
 - As indicated by DI&EJ community percentages above, this project will improve transportation access to those communities.
 - Multimodal transportation, safety, reliability, air quality? *(Improve and expand the region's multimodal transportation system, services, and connections. Operate, manage, and maintain a safe and reliable transportation system. Improve air quality and reduce greenhouse gas emissions. Reduce the risk of hazards and their impact.)*
 - The proposed video detection system will increase the reliability of the transportation network within the City of Aurora by providing real time monitoring of conditions as well as providing and recording traffic counts. Additionally, the safety of the project intersections will improve due to the ability to use dilemma zone detection and the ability to extend green times when a bicyclist is detected. The proposed battery backup protection system will increase the reliability of the network by providing operable signal in the event of a power outage.
 - Connection/accessibility to particular locations supporting healthy and active choices? *(Connect people to natural resource and recreational areas. Increase access to amenities that support healthy, active choices. Improve transportation connections to health care facilities and service providers. Improve access to opportunity.)*
 - N/A

6. Items marked with an asterisk (*) below are available in the DRCOG Data Tool.

- Is there a DRCOG designated urban center within ½ mile of the project limits?*
- Does the project connect two or more urban centers?*
- Is there a transit stop or station within ½ mile of the project limits?*
- Is the project in a locally-defined priority growth and development area and/or an area with zoning that supports compact, mixed-use development patterns and a variety of housing options?

☒ Yes ☐ No If yes, please provide the name: [Aurora City Center, Florida, Iliff Avenue Center, I-225 /Parker Road, Smoky Hill, Colfax Avenue, Fitzsimons, 13th Avenue, Buckingham Center, 1st Avenue Center, Peoria-Smith, Iliff](#)

☐ Yes ☒ No If yes, please provide the names: [Click or tap here to enter text.](#)

Bus stop: ☒ Yes ☐ No If yes, how many: [703](#)

Rail station: ☒ Yes ☐ No If yes, how many: [10](#)

If yes, provide a link to the relevant planning document: "Aurora Places" Comprehensive Plan can found here:

<https://www.auroragov.org/cms/One.aspx?portalId=16242704&pageId=16535137>

If yes, provide how the area is defined in the relevant planning document: [As seen on Aurora Places page 25](#), several of our major arterials whose signals would be upgraded as part of this project, include Havana Street, Mississippi Avenue, Alameda Avenue, Colfax Avenue, Peoria Street, and Gun Club Road, directly serve either "City Corridor", or "Urban District" placetypes. These placetypes, as further described on the table on page 26 of "Aurora Places" are envisioned to have primary landuses of multifamily residential, single-family attached residential, restaurant, and commercial retail; and office and institution as either a primary or supporting landuse. Per document page 29 of "Aurora Places", the Urban District landuse would "prioritize mixed-used buildings with ground-floor commercial and multistory residential housing above to bolster commercial and social activity"; "provide easy-short pedestrian and bicycle connections to surrounding districts and neighborhoods"; "incorporate an accessible, well-connected transit hub to connect Urban Districts to the rest of the city and the region"; and "develop urban districts with a complete grid of streets creating relatively small urban blocks." The City Corridor placetype, as described on document page 45, lists defining features as "front commercial buildings along primary streets to ensure visibility and accessibility. Avoid street frontages dominated by parking lots or buildings set back large distances from the street"; "use single-family attached units where the City Corridor abuts a residential placetype to promote an appropriate transition"; and "design centers around a central organizing feature or gathering places <to> convey a sense of community."

Provide households and employment data* [Population and Employment tab]	2020	2050
Jobs within ½ mile	177,852	242,990
Households within ½ mile	152,696	191,779

Describe how this project will improve transportation options in and between key geographic areas including DRCOG-defined urban centers, multimodal corridors, mixed-use areas, Transit Oriented Development (transit near high-density development), or locally defined priority growth areas, *including the required quantitative analysis*:

[N/A](#)

7. Describe how this project will improve **access** and **connections** to key employment centers or subregional destinations. In your answer, define the key destination(s) and clearly explain how the project improves **access** and/or **connectivity**.

[N/A](#)

8. Congestion Mitigation Process Mobility Score

*Completing the below table and referencing relevant quantitative data in your response is required. In the **DRCOG Data Tool**, use a **0.02 mile buffer distance**.*

Provide congestion mobility parameters* [Congestion Mobility Score tab]	2021
Sum: length-weighted score	487.27
Sum: miles	97.65
Congestion Mobility Score	4.99

(The Congestion Mobility Score will automatically calculate based on values entered. If this has not updated, select the box and click F9)

C. Metro Vision Regional Transportation Plan Priorities

WEIGHT

25%

- ***Qualitative and quantitative*** responses are **REQUIRED** for the following items on how the proposed project contributes to the project and program investment priorities in the adopted 2050 Metro Vision Regional Transportation Plan. ***To be considered for full points, you must fully answer all parts of the question, including incorporating quantitative data into your answer.*** (see scoring section for details). Quantitative data from is available from the [DRCOG Data Tool](#).
- Checkboxes and data tables help to provide context and guide responses, but do not account for the full range of potential improvements and are not directly scored, but are required to be completed.
- Not all proposed projects will necessarily be able to answer all questions, however it is in the applicant's interest to address as many priority areas as possible.

Multimodal Mobility

Provide improved travel options for all modes.

(drawn from [2050 MVRTP priorities](#); [federal travel time reliability, infrastructure condition, & transit asset management performance measures](#); & [Metro Vision objective 4](#))

Examples of Project Elements: combinations of improvements that support options for a broad range of users, such as complete streets improvements, or an interchange project that incorporates transit and freight improvements, etc.

- What modes will project improvements directly address?
☒ Walking ☒ Bicycling ☒ Transit ☐ SOV ☐ Freight ☐ Other: Click or tap here to enter text.
- List the elements of this project which will address the above modes (i.e., sidewalk, shared use path, bus stop improvements, new general purpose or managed lanes, etc.): [Installation of video detection system will provide multimodal \(pedestrian and bicycle\) detection. This detection will enhance signal operations for these users. Additionally, the video detection will allow signals to operate more efficiently and improve transit times with corridors that utilize TSP. Installation of battery backup systems will keep signals in operation in the event of a power outage which will allow transit vehicles to maintain their planned schedules and eliminate potential delay due to the power outage.](#)
- Will the completed project be a complete street as described in the [Regional Complete Streets Toolkit](#)? [Complete Streets Typology](#) is available in the [DRCOG Data Tool](#).
☐ Yes ☒ No If yes, describe how it implements the Toolkit's strategies in your response. Click or tap here to enter text.
- Does this project improve travel time reliability and reduce delay?
☒ Yes ☐ No
- Does this project improve asset management of roadway infrastructure, active transportation facilities, and/or transit facilities or vehicle fleets?
☐ Yes ☒ No
- Does this project implement resilient infrastructure that helps the subregion mitigate natural and/or human-made hazards?
☒ Yes ☐ No

Question: Describe how this project will help increase mobility choices for people, goods, and/or services. Please include quantitative information, including any items referenced above, in your response. *Note that the proposed roadway operational improvements must be primarily on the DRCOG [Regional Roadway System](#) and/or [Regional Managed Lanes System](#).*

The installation of video detection will provide detection for multimodal users (pedestrians and bicyclists) at 42 intersections. At these intersections, multimodal user data does not exist right now. When deployed, multimodal user data can be used in the future to make data-driven decisions to meet DRCOG's goals to increase mobility choices. Since this detection will enable intersections to detect bicyclists and give them a green indication without a vehicle being present, it also serves to improve safety for bicyclists.

Question: Describe how this project will help improve asset reliability and availability. Please include quantitative information in your response (for example, reduce mean time to repair and increase mean time between failures).

The battery backup systems installed in this project will increase the signal reliability by allowing signals to continue operations even in the event of a power failure. Additionally, the batter backup system will regulate power surges

and subsequently extend the life of the signal equipment leading to additional reliability. Traffic operations staff have noted that a traffic signal or group of traffic signals at the City loses power every 2 weeks on average. From January 1, 2023 through June 30, 2023, Traffic Operations staff have spent 156 hours outside of normal business hours responding to traffic signal service requests. This project will help improve reliability and decrease the amount of time Traffic Operations spends responding to signal requests.

Question: Describe how this project will reduce delays and improve travel time reliability. Please include quantitative information in your response (for example, vehicle-hours traveled and travel time index).

The installation of video detection will allow for real time monitoring of the traffic signals and improve traffic signal performance by providing multimodal detection. Reliable video detection systems will be used to optimize the operations of the traffic signal, thus improving the delay and travel time reliability along DRCOG roadways.

The installation of UPS will lead to less disruptions to signal timing operations. The UPS will enhance the City's abilities to keep signalized intersections operational during loss of utility power with the goal of preventing or minimizing severe accidents. A signalized intersection that is dark or in flash contributes to traffic congestion and jeopardizes safety for vehicles, pedestrians, and bicyclists.

The deployment of both video detection and UPS will lead to improved signal timing operations due to greater data collection accuracy and reduced workloads on staff. Past experience on projects that improve signal timing plans conservatively result in greater than 10% reductions in delay and travel times.

Air Quality	Improve air quality and reduce greenhouse gas emissions. (drawn from 2050 MVRTP priorities ; state greenhouse gas rulemaking ; federal congestion & emissions reduction performance measures ; Metro Vision objectives 2, 3, & 6a) Examples of Project Elements: active transportation, transit, or TDM elements; vehicle operational improvements; electric vehicle supportive infrastructure; etc.					
	<ul style="list-style-type: none"> Does this project reduce congestion? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Does this project reduce vehicle miles traveled (VMT)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Does this project reduce single-occupant vehicle (SOV) travel? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 					
Emissions Reduced (kg/day)		CO 143.95	NOx 13.38	VOCs 6.51	PM 10 10.12	CO₂e 18,019
Use the FHWA CMAQ Calculators or a similar reasonable methodology to determine emissions reduced. Base your calculations on the year of opening. Please attach a screenshot of your work (such as the FHWA calculator showing the inputs and outputs) as part of your submittal packet. Note: if not using the FHWA Calculators, please describe your methodology and sources in your narrative below.						
<p>Question: Describe how this project helps reduce congestion and air pollutants, including but not limited to carbon monoxide, ground-level ozone precursors, particulate matter, and greenhouse gas emissions. Please include quantitative information, including any items referenced above, in your response.</p> <p>Through this project, video detection and UPS installation will enable optimized traffic signal progression through improved detection and real-time available data. This optimization can result in less vehicular congestion and decrease the number of stops vehicles make, thus reducing emissions. Past experience on projects that improve signal timing plans conservatively result in greater than 10% reductions in delay and travel times.</p> <p>This project is expected to reduce emissions by the amount detailed in the table above. The FHWA CMAQ Calculator was used, specifically the Traffic Signal Synchronization tab. This project will implement improvements at locations across Aurora and thus the calculator tool was applied to multiple corridors across the signal system. The calculator is applicable to this project because improved detection and ability of ATSPM data will allow regular monitoring and optimization of signal timing at these intersections and subsequently reduce delays and improve travel time along corridors. To make the assumptions more conservative, the table above equates to approximately 25% of the full output from the FHWA CMAQ Calculator.</p>						

Regional Transit	<p>Expand and improve the subregion's transit network. (drawn from 2050 MVRTP priorities, Coordinated Transit Plan, RTD's Regional Bus Rapid Transit Feasibility Study) Examples of Project Elements: transit lanes, station improvements, etc. <i>Note:</i> For any project with transit elements, the sponsor must coordinate with RTD to ensure RTD agrees to the scope and cost. Be sure to include RTD's concurrence in your application submittal.</p>
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Items marked with an asterisk (*) below are available in the [DRCOG Data Tool](#).

- Does this project implement a portion of the regional bus rapid transit (BRT) network (as defined in the [2050 MVRTP](#))?*
- ☐ Yes
 ☒ No
 If yes, which specific corridor will this project focus on: [Click or tap here to enter text.](#)
- Does this project involve a regional transit planning corridor (as defined in the [2050 MVRTP](#))?*
- ☐ Yes
 ☒ No
 If yes, which specific corridor will this project focus on: [Click or tap here to enter text.](#)
- Does this project implement a mobility hub (as defined in the [2050 MVRTP](#))?
- ☐ Yes
 ☒ No
- Does this project improve connections between transit and other modes?
- ☐ Yes
 ☒ No
 If yes, please describe in your response.
- Does this project improve transit travel time reliability?
- ☒ Yes
 ☐ No
 If yes, please describe in your response.
- Does this project add and/or improve transit access to or within a DRCOG-defined urban center?*
- ☐ Yes
 ☒ No

Question: Describe how this project improves connections to or expands the subregion's transit system, as outlined in the [2050 MVRTP](#). Also describe how this project improves transit travel time reliability. Please include quantitative information, including any items referenced above, in your response. *Note that rapid transit improvements must be on the [Regional Rapid Transit System](#).*

[UPS will improve transit travel time reliability when deployed at intersections that have existing or planned Transit Signal Priority deployments. Multimodal detection will also provide continuous traffic counts as well as other ATSPM metrics to more accurately measure bus travel times and improvements with TSP projects. The City currently has functional TSP on Havana St and TSP is planned on Colfax Avenue west of I-225.](#)

Safety	Increase the safety for all users of the transportation system. (drawn from 2050 MVRTP priorities , Taking Action on Regional Vision Zero , CDOT Strategic Transportation Safety Plan , & federal safety performance measures) Examples of Project Elements: bike/pedestrian crossing improvements, vehicle crash countermeasures, traffic calming, etc.	
Items marked with an asterisk (*) below are available in the DRCOG Data Tool .		
<ul style="list-style-type: none"> Does this project address a location on the DRCOG High-Injury Network or Critical Corridors or corridors defined in a local Vision Zero or equivalent safety plan?* <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Does this project implement a safety countermeasure listed in the countermeasure glossary? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Will this project result in a reduction of average roadway clearance time and incident clearance time and/or secondary incidents? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Will this project result in a reduction of first responder struck-bys? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No 		
Provide the current number of crashes involving motor vehicles, bicyclists, and pedestrians* (using the 2016-2020 period – <i>in the DRCOG Data Tool, use a 0.02 mile buffer distance</i>) [Crash Severity 2016-2020 tab] NOTE: if constructing a new facility, report crashes along closest existing alternative route		Sponsor must use industry accepted crash modification factors (CMF) or crash reduction factor (CRF) practices (e.g., CMF Clearinghouse , NCHRP Report 617 , or DiExSys methodology).
Fatal crashes	20	
Serious Injury crashes	193	
Other: Non-Serious Injury and Property Damage Only crashes	6,417	
Estimated reduction in crashes <u>applicable to the project scope</u> (per the five-year period used above)		Provide the methodology and sources below:
Fatal crashes reduced	0	CMF ID: 9870 (see details below)
Serious Injury crashes reduced	0	
Other: Non-Serious Injury and Property Damage Only crashes	67	

Question: Describe how this project will implement safety improvements (roadway, active transportation facility, etc.), particularly improvements in line with the recommendations in [Taking Action on Regional Vision Zero](#). Please include quantitative information, including any items referenced above, in your response. *Note that any improvements on roadways must be primarily on the DRCOG [Regional Roadway System](#).*

The installation of video detection systems will improve safety at project intersections by providing advanced dilemma-zone detection and traffic signal bicycle detection. These improvements will apply to 42 intersections. These improvements include Critical Corridors, as identified in the Taking Action on Regional Vision Zero Plan, including but not limited to: Colfax Ave, Havana St, Peoria St, Chambers Rd, 6th Ave, Mississippi, and Parker Road. Of the 42 intersections currently selected, 36 are on Critical Corridors. As identified in the Taking Action on Regional Vision Zero Plan, advanced dilemma-zone detection is a potential countermeasure to reduce crashes involving a red light or arterial streets. As identified in the Taking Action on Regional Vision Zero Plan, traffic signal bicycle detection is a potential countermeasure to reduce bicycle crashes. Traffic operations staff have noted that a traffic signal or group of traffic signals at the City loses power every 2 weeks on average. Additionally, installation of UPS would improve safety of signal operations by lessening signal disruption caused by flash operations or a dark signal.

Additionally, the Crash Modification Clearinghouse has CMF ID: 9870 “Coordinate Arterial Signals” that is applicable to this project. This CMF has a 21% reduction in property damage only crashes. This CMF also has a prior condition of no coordination. The proposed project will help maintain existing coordination, rather than establish coordination. Past experience on projects that improve signal timing plans conservatively result in greater than 10% reductions in delay and travel times, thus, it is assumed only 10% of the CMF will apply to this project ($21\% \times 10\% = 2.1\%$). Additionally, the CMF applies to property damage only (PDO) crashes. The DRCOG data tool combines non-serious and PDO crashes. It is assumed for the purpose of this analysis, 50% of those crashes are PDO crashes. Thus, the reduction was reduced additionally by 50% ($2.1\% \times 50\% = 1.05\%$). Based on these conditions, there is an expected reduction of 67 crashes ($1.05\% \times 6,417$ crashes).

Question: Describe how this project will reduce average incident duration, secondary incidents and first responder struck-bys. Please include quantitative information in your response. *A “responder struck-by” incident is a collision between a motor vehicle in transit and a responder working a roadway incident. The responder may be a nonmotorist, an occupant of a stopped response vehicle or an unoccupied response vehicle.*

Traffic operations staff have noted that a traffic signal or group of traffic signals at the City loses power every 2 weeks on average. The installation of UPS will result in less instances of a signal going into flash or going dark. If the signal can remain in operation, first responders can continue to utilize preemption while responding to incidents thereby eliminating unwanted delays.

Freight	<p>Maintain efficient movement of goods within and beyond the subregion.</p> <p>(drawn from 2050 MVRTP priorities; Regional Multimodal Freight Plan; Colorado Freight Plan, federal freight reliability performance measure; Metro Vision objective 14)</p> <p>Examples of Project Elements: bridge improvements, improved turning radii, increased roadway capacity, etc.</p>
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Items marked with an asterisk (*) below are available in the DRCOG Data Tool.

- Is this project located in or impact access to a [Freight Focus Area](#)?*
☒ Yes ☐ No If yes, please provide the name: [I-70 East Distribution Center](#)
- If this project is located in a [Freight Focus Area](#) does it address the relevant Needs and Issues identified in the Plan (see text located within each Focus Area)?
☐ Yes ☒ No If yes, please describe in your response below.
- Is the project located on the [Tier 1 or Tier 2 Regional Highway Freight Vision Network](#)?*
☒ Yes ☐ No
- Check any items from the [Inventory of Current Needs](#) which this project will address:
☐ Truck Crash Location ☐ Rail Crossing Safety ([eligible locations](#))
☐ Truck Delay ☐ Truck Reliability ☐ Highway Bottleneck
☐ Low-Clearance or Weight-Restricted Bridge
 Please provide the location(s) being addressed: [Click or tap here to enter text.](#)
- Does this project include any innovative or non-traditional freight supportive elements (i.e., curb management strategies, cargo bike supportive infrastructure, etc.)?
☐ Yes ☒ No If yes, please describe in your response below.

Question: Describe how this project will improve the efficient movement of goods. In your response, identify those improvements identified in the [Regional Multimodal Freight Plan](#), include quantitative information, and include any items referenced above. *Note that any improvements on roadways must be primarily on the DRCOG [Regional Roadway System](#).*

[Not applicable to this project](#)

Active Transportation	Expand and enhance active transportation travel options. (drawn from 2050 MVRTP priorities ; Denver Regional Active Transportation Plan ; & Metro Vision objectives 10 & 13) Examples of Project Elements: shared use paths, sidewalks, regional trails, grade separations, etc.	
Items marked with an asterisk (*) below are available in the DRCOG Data Tool.		
<ul style="list-style-type: none"> Does this project close a gap or extend a facility on a Regional Active Transportation Corridor or locally-defined priority corridor?* <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Does this project improve pedestrian accessibility and connectivity in a pedestrian focus area?* <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No Does this project improve active transportation choices in a short trip opportunity zone?* <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No Does this project include a high-comfort bikeway (like a sidepath, shared-use path, separated bike lane, bicycle boulevard)? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No If yes, please describe in your response. 		
Bicycle Use <i>NOTE: if constructing a new facility, report bike usage along closest existing alternative route</i> To update the formulas below, enter your information, highlight the formulas (or Ctrl-A), and press F9. OR close and reopen the file.		
1. Current Average Single Weekday Bicyclists:		Project is not anticipated to increase bike trips.
Bicycle Use Calculations	Year of Opening	2050 Weekday Estimate
2. Enter estimated additional average weekday one-way bicycle trips on the facility after project is completed.	N/A	N/A
3. Enter number of the bicycle trips (in #2 above) that will be diverting from a different bicycling route. (Example: {#2 X 50%} or other percent, if justified on line 10 below)	N/A	N/A
4. = Initial number of new bicycle trips from project (#2 – #3)	0	0
5. Enter number of the new trips produced (from #4 above) that are replacing a trip made by another non-SOV mode (bus, carpool, vanpool, walking, etc.). (Example: {#4 X 30%} or other percent, if justified on line 10 below)	N/A	N/A
6. = Number of SOV trips reduced per day (#4 - #5)	0.00	0.00
7. Enter the value of {#6 x 2 miles}. (= the VMT reduced per day) (Values other than 2 miles must be justified by sponsor on line 10 below)	N/A	N/A
8. = Number of pounds GHG emissions reduced (#7 x 0.95 lbs.)	0.00	0.00
9. If values would be distinctly greater for weekends, describe the magnitude of difference: N/A		
10. If different values other than the suggested are used, please explain here: N/A		
Pedestrian Use <i>NOTE: if constructing a new facility, report pedestrian usage along closest existing alternative route</i> To update the formulas below, enter your information, highlight the formulas (or Ctrl-A), and press F9. OR close and reopen the file.		
1. Current Average Single Weekday Pedestrians (including users of non-pedaled devices such as scooters and wheelchairs):		Project is not anticipated to increase ped trips.
Pedestrian Use Calculations	Year of Opening	2050 Weekday Estimate
2. Enter estimated additional average weekday pedestrian one-way trips on the facility after project is completed	N/A	N/A
3. Enter number of the new pedestrian trips (in #2 above) that will be diverting from a different walking route (Example: {#2 X 50%} or other percent, if justified on line 10 below)	N/A	N/A
4. = Number of new trips from project (#2 – #3)	0	0
5. Enter number of the new trips produced (from #4 above) that are replacing a trip made by another non-SOV mode (bus, carpool, vanpool, bike, etc.). (Example: {#4 X 30%} or other percent, if justified on line 10 below)	N/A	N/A
6. = Number of SOV trips reduced per day (#4 - #5)	0.00	0.00
7. Enter the value of {#6 x .4 miles}. (= the VMT reduced per day) (Values other than .4 miles must be justified by sponsor on line 10 below)	N/A	N/A

8.	= Number of pounds GHG emissions reduced (#7 x 0.95 lbs.)	0.00	0.00
9.	If values would be distinctly greater for weekends, describe the magnitude of difference: N/A		
10.	If different values other than the suggested are used, please explain here: N/A		

Question: Describe how this project helps expand the active transportation network, closes gaps, improves comfort, and/or improves connections to key destinations, particularly improvements in line with the recommendations in the [Denver Regional Active Transportation Plan](#). Please include quantitative information, including any items referenced above, in your response.

Not applicable to this project.

D. Financial Leveraging		WEIGHT	5%
What percent of outside funding sources (non-federal funds) does this project have? <i>(Match percentage will automatically calculate based on values entered in the Funding Request table. If this has not updated, select the box to the right and click F9.)</i> [*includes 100% eligible projects with no match]	Enter score:	36%+ outside funding sources 5	
		31 - 35.9%..... 4	
		26 - 30.9%..... 3	
		21 - 25.9%..... 2	
		17.21 - 20.9%* 1	
		17.21%..... 0	
E. Project Readiness		WEIGHT	15%
<i>Provide responses to the following items to demonstrate the readiness of the project. DRCOG is prioritizing those projects that have a higher likelihood to move forward in a timely manner and are less likely to experience a delay.</i>			
Subsection 1. Avoiding Pitfalls and Roadblocks			
a. Has a licensed engineer (CDOT, consultant, local agency, etc.) reviewed the impact the proposed project will have on utilities, railroads, ROW, historic and environmental resources, etc. and have those impacts and pitfalls been mitigated as much as possible to date before this submittal? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> N/A (for projects which do not require engineering services) If yes, please type in the engineer's name below which certifies their review and that impacts have been evaluated and mitigated as much as possible before your application is submitted: Carlie Campuzano, P.E. Please describe the status to date on each, including 1) anticipated/known pitfalls/roadblocks, and 2) mitigation activities taken to date: <ul style="list-style-type: none"> Utilities: No anticipated conflicts. Railroad: No anticipated conflicts. Right-of-Way: No anticipated conflicts. Work will be performed within public ROW at existing City of Aurora Signals. Environmental/Historic: No anticipated conflicts. Other: N/A 			
b. Have additional project risks been identified? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A If yes, please provide a brief description of the known risks and planned mitigation activities. A Local Agency SEA form is required and attached to this application. At this time, the robust SEA process will not be required for this application.			
c. Is this application for a single project phase only (i.e., design, environmental, ROW acquisition, construction only, study, equipment purchase, etc.)? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, are the other prerequisite phases complete? <input type="checkbox"/> Yes <input type="checkbox"/> No <input checked="" type="checkbox"/> N/A			
d. Will this project seek a Finding in the Public Interest as part of equipment procurement? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No If yes, please provide an explanation of the need for a Finding in the Public Interest. Do not reference specific products trade names.			

The SEA process will be used to validate whether a synchronization based FIPI is acceptable to choose both the video detection system and UPS brands that Aurora is currently using.

- e. Has all required ROW been identified? ☐ Yes ☐ No ☒ N/A

Has all required ROW already been acquired and cleared by CDOT? ☒ Yes ☐ No ☐ N/A

Is existing equipment within ROW? ☒ Yes ☐ No ☐ N/A

Will subsurface utility engineering be a factor in this project? ☐ Yes ☒ No

Has subsurface utility engineering been accounted for in the project scoping, phasing and estimate? ☐ Yes ☐ No ☒ N/A

- f. Based on the current status provided in Project Information, question 11, do you foresee being able to execute your IGA by October 1 of your first year of funding (or if requesting first year funding, beginning discussions on your IGA as soon as possible), so you can begin your project on time?

☒ Yes ☐ No

Does your agency have the appropriate staff available to work on this project? ☒ Yes ☐ No

If yes, are they knowledgeable with the federal-aid process? ☒ Yes ☐ No ☐ N/A

- g. Have other stakeholders in your project been identified and involved in project development?

☒ Yes ☐ No ☒ N/A

If yes, who are the stakeholders?

N/A

Please provide any additional details on any of the items in Subsection 1, if applicable.

City of Aurora owns and operates all signals included for this project. Although some signals are located on CDOT ROW, CDOT has previously indicated all signals operated by Aurora can be accessed. Aurora will purchase all equipment and city staff will install.

Subsection 2. Local Match Availability

- a. Is all the local match identified in your application currently available and not contingent on any additional decisions, and if a partnering agency is also committing match, do you have a commitment letter?

☐ Yes ☒ No

Please describe:

Not applicable, no local match on this project.

- b. Is all funding for this project currently identified in the sponsor agency's Capital Improvement Program (CIP)?

☐ Yes ☒ No

Please describe:

Not applicable, no local match on this project.

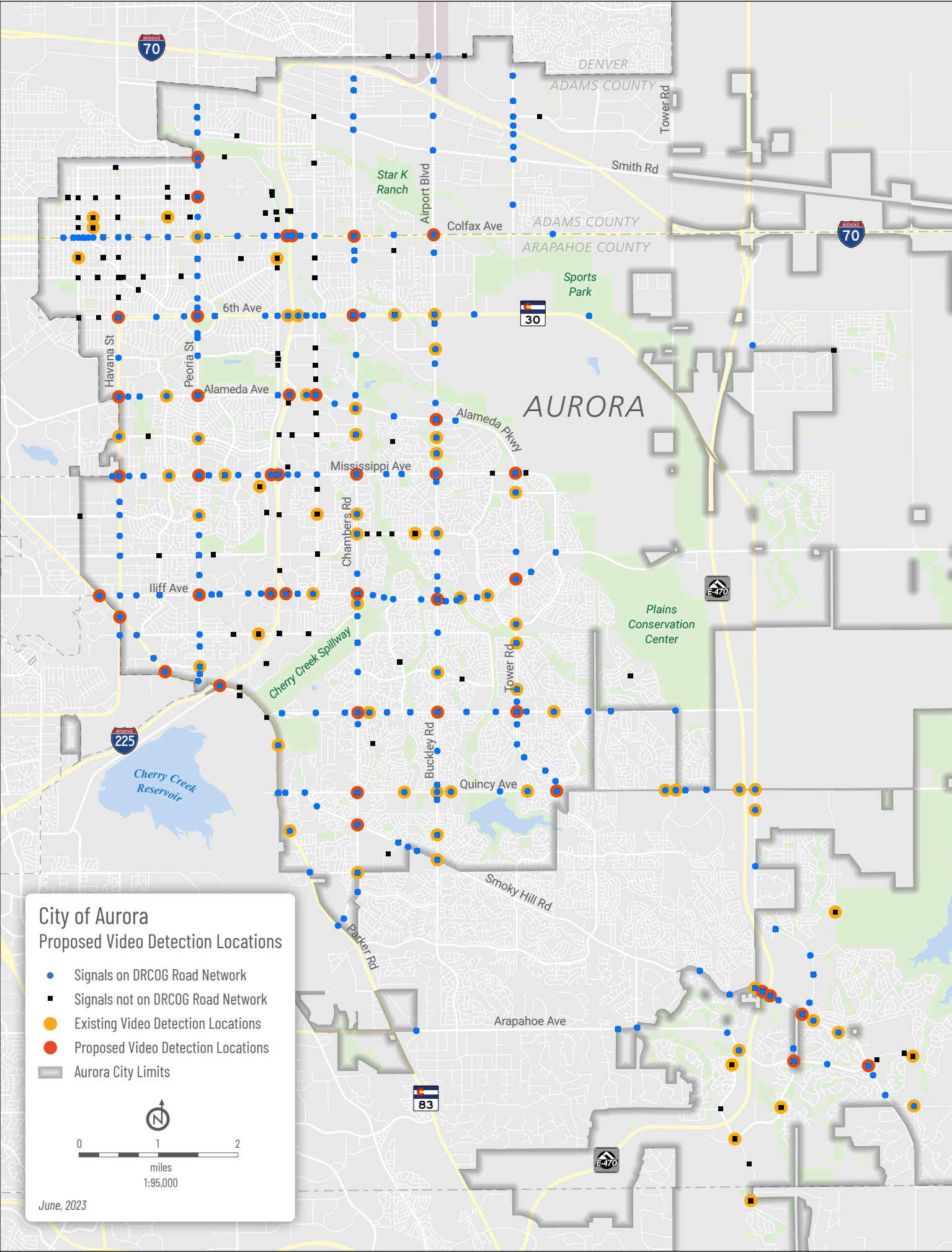
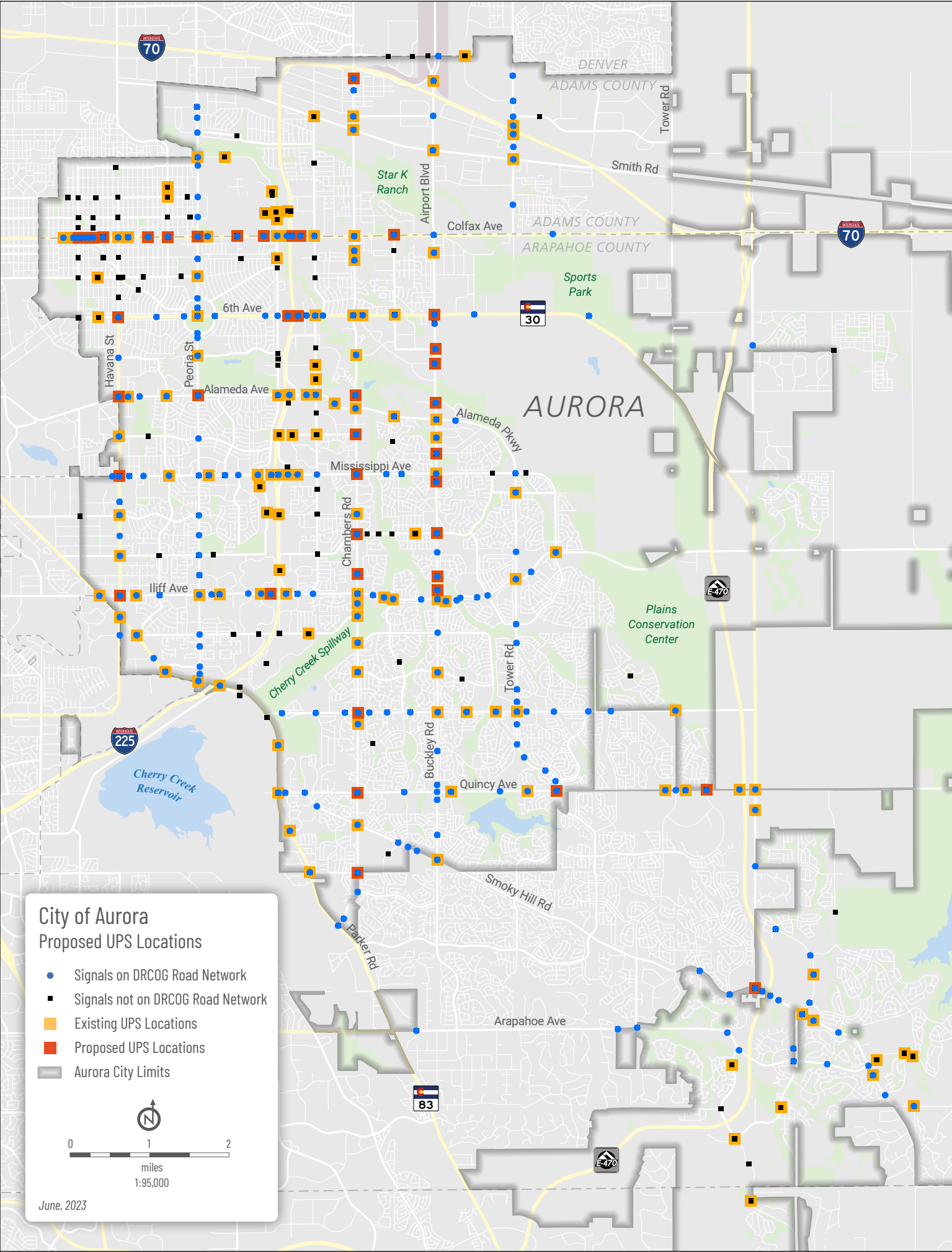
Subsection 3. Systems Engineering Analysis Documentation

Systems Engineering Analysis (SEA) is a federally required process for deployment of transportation technology projects using funds from the Highway Trust Fund. CDOT established and administers a formal [SEA process](#) for transportation technology projects in the state, including local agency projects.

Please complete at least the first seven sections of the required [SEA-Local Agency Template](#). Submit the completed form with this application.

Submit completed applications to jluor@drcog.org no later than 5pm on July 7, 2023.

Prior to submitting, press Ctrl+A to select all, then press F9 to update all formulas. You can then print to PDF.



Project Cost Estimate

Project Title: Aurora Traffic Signal Equipment Upgrade

Project Location: Various signalized intersection within City of Aurora

Project Sponsor: City of Aurora

Item	Quantity	Unit Cost	Total Cost
MIO Full System - Candy Cane Mount Assembly	42	\$12,700	\$533,400
MIO Detection License	42	\$2,700	\$113,400
MIO Managed LTE Connectivity (1 GB) (1 yr)	42	\$200	\$8,400
MIO TrafficLink Intersection Monitoring	42	\$240	\$10,080
MIO TrafficLink Continuous Counts	42	\$920	\$38,640
CAT5e Shielded Non-Plenum Cable (ft) + RJ-45 connectors	10500	\$1	\$6,300
APC Secure UPS 1300 VA/1300 W, 120 VAC In/Out	42	\$2,800	\$117,600
APC Secure UPS Service Bypass Unit 2000 W, 120 VAC	42	\$400	\$16,800
APC Secure UPS Battery Harness (8 ft)	42	\$400	\$16,800
APC Secure UPS Battery, 50 AH, 12 VDC, Extended Temp	168	\$400	\$67,200
Subtotal			\$928,620
Contingency			\$92,862
Project Total (Rounded)			\$1,021,000
Federal Runding Request		100%	\$1,021,000
Match Funds (City of Aurora)		0%	\$0

APPLICANT INFORMATION					
1. Who is requesting project support? City of Aurora					
2. Project Sponsor: City of Aurora		3. Other Project Partners:			
4. Contact Person: Carlie Campuzano Email: ccampuza@auroragov.org		Title: Traffic Manager Phone: 303-739-7309			
PROJECT DESCRIPTION					
5. Project Title: Aurora Traffic Signal Equipment Upgrades				Total Project Cost: \$1,021,000	
Project Location: CoCity Wide				Project Limits: (mileposts, intersecting roads, rivers, etc.) City Wide	
County: Adams		Municipality(ies): City of Aurora		Project Length: City Wide	
Brief Description of Project: The project will deploy new video detection systems and Uninterruptible Power Supplies (UPS) at 42 intersections within the City of Aurora. Project components will include all video detection systems, mounting hardware, cabling, power supplies, cabinet components, licensing, integration, and testing. The project will also include a systems engineering analysis (SEA) process to confirm and document a synchronization-based justification for the selection of the video detection system.					
SUPPORT REQUEST					
6. Based on who is requesting support (see #1), from whom are you are requesting support? If you are requesting support from multiple entities, please fill out and send a separate form to each. <input type="checkbox"/> Local Agency, Specify: <input checked="" type="checkbox"/> CDOT <input type="checkbox"/> RTD					
7. Type of Support Requested: <input checked="" type="checkbox"/> Material Participation (e.g. staff, resources, operations responsibilities, etc.) Specify: Staff participation in data sharing related to detection cameras <input type="checkbox"/> Financial Commitment: <input type="checkbox"/> Local (non-DRCOG) Funds: Amount: <input type="checkbox"/> State Funds: Amount: <input type="checkbox"/> RTD Funds: Amount:					
8. Please type your name and date below which certifies the above information is accurate and complete: Name: Carlie Campuzano Date: 6/28/23					
RESPONSE (to be completed by agency from whom support is requested)					
9. The agency in #1 above has requested your support for their project. Who are you? Colorado Department of Transportation					
10. Contact person at supporting agency: Alazar Tesfaye Title: Region 1 Traffic & Safety Program Engineer Email: alazar.tesfaye@state.co.us Phone: (303)564-6446					

11. Will your agency participate in this project? <input checked="" type="checkbox"/> Yes <input type="checkbox"/> No	
12. Does your agency commit financial support to this project, if requested? <input type="checkbox"/> Yes <input checked="" type="checkbox"/> No <input type="checkbox"/> N/A	
If yes, provide amount: \$ Fiscal year(s) funds are provided in:	
If yes, where are funds coming from:	
13. Please enter your name and date below which certifies the above information is accurate and complete, and your subregion/agency will honor any financial commitments made above:	
Name:	Alazar Tesfaye
Date:	Digitally signed by Alazar Tesfaye Date: 2023.06.30 12:50:30 -06'00'



Requirement: The [systems engineering analysis \(SEA\)](#) process is required per [23 CFR 940](#). The SEA is the project delivery process for the technology element of the project. If the project does not have technology, the project still needs documentation that the scope was evaluated and no additional SEA documentation is required beyond section two of this form. As a matter of policy, CDOT has committed to following the intent and requirements of the SEA process for all transportation projects, regardless whether the project is state or federally funded.

Purpose: The SEA is intended to help design a robust and sustainable technology system. The SEA prompts discussions during design with stakeholders and is intended to document those critical discussions. Since technology does require maintenance and has relatively short life cycles, the SEA also helps projects plan for how to keep the system maintained and operating after construction is completed.

Who is responsible: The local agency will be required to complete this form. This form shall be submitted to CDOT a minimum of two weeks prior to the FOR meeting. It must be reviewed and approved prior to receiving CDOT Concurrence to Advertise for construction. The ITS & Network Services Branch needs at least two weeks to review documents.

Section 1 - Project Overview
<p>1.1 Local Public Agency Project Manager and Contact Information</p> <p>Carlie Campuzano, PE, PTOE, Traffic Manager, City of Aurora, 303-739-7309, ccampuza@auroragov.org</p>
<p>1.2 Consultant Project Manager and Contact Information (X N/A)</p>
<p>1.3 CDOT Project Manager and Contact Information</p> <p>Ben Kiene, PE, Region 1 Traffic Operations Engineer, 303-512-4025, benjamin,kiene@state.co.us</p>
<p>1.4 Project Location, Route Beginning and Ending MM, or Nearest Intersection</p> <p>City of Aurora, Colorado, within the City's limits</p>
<p>1.5 Project Description, Title, and Type of Work – This should include identification of the problem and the purpose of the project</p> <p>City of Aurora Traffic Signal Equipment Upgrade – Many signalized intersections located along the DRCOG</p>



regional network in the City of Aurora do not have detection that provides data to support Automated Traffic Signal Performance Measures (ATSPM), future traffic responsive operations, bicycle detection and support a regional platform for performance monitoring purposes. Additionally, many signals on the network in the City do not have Uninterruptible Power Supply (UPS) technology to provide the ability for signals to continue operating during power failures. This project will deploy needed video-based detection and UPS equipment.

1.6 CDOT Project Number and Sub Account Code

TBD]

1.7 Federal-Aid ☒ Yes ☐ No

1.8 Is the project within CDOT's Right of Way (ROW)? ☐ Yes ☒ No

1.9 Funding and Source of Each (Including State and Federal)

100% Federal STBG funding through the Denver Regional Council of Government's (DRCOG) Regional Transportation Operations & Technology (RTO&T) Set-Aside program.

1.10 Fiscal Year of Funding: FY 2024-2027

Section 2 - SEA Required?

Federal Requirement: 23 CFR 940.11 Project Implementation

2.1 Are there any technology elements included in the scope of the project?

The [National Regulation \(23 CFR 940\)](#) defines ITS as “electronics, communications, or information processing used singly or in combination to improve the efficiency or safety of a surface transportation system.” An ITS project is “any project that in whole or in part funds the acquisition of technologies or systems of technologies that provide or significantly contribute to the provision of one or more ITS user services as defined in the National ITS Architecture.”

Technology includes any type of device or system that is used to improve the roadways. This could include, but is not limited to, intelligent transportation systems devices. Examples are CCTV, DMS, VTMS, VSL, wrong way detection, RWIS, connected vehicles, [non-traditional signals](#) (click on link to understand which signals projects require an SEA), on board equipment in vehicles, and anything that has to be communicated to ATMS or other traffic management systems. Additionally, creating or modifying systems



and software that impacts the roadway is included in the SEA classification. If there is still confusion on what is classified as technology, please reach out to the ITS & Network Services Branch.

☒ Yes ☐ No

If the answer to 2.1 is “**yes**” then a **SEA is required**.

If the answer to 2.1 is “**no**” then a **SEA is not required** and the rest of this form does not need to be completed, but Sections 1 and 2 will need to be submitted for documentation purposes.

2.2 Which SEA process should be followed?

☐ Yes ☒ No Will the system be owned, operated, or maintained by CDOT?

☐ Yes ☒ No Does the project involve CDOT technology assets?

☐ Yes ☒ No Will the project connect to the CDOT network?

☐ Yes ☒ No Will the project be on CDOT right of way?

☐ Yes ☒ No Does the project involve multiple municipalities?

If “**yes**” is selected for any of the above questions, then the [Robust SEA Process](#) needs to be followed and this form is no longer applicable.

If “**no**” is selected for all questions, then completing this entire form will fulfill the [23 CFR 940](#) requirements for local agency projects only.

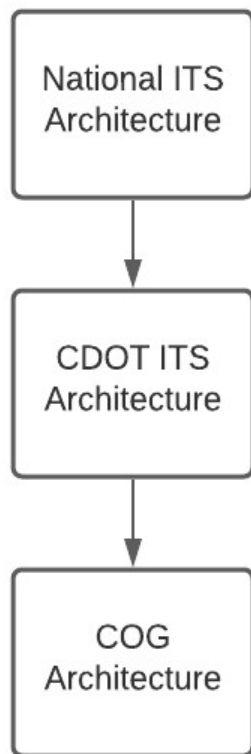
Section 3 - ITS Architecture Conformance

Federal Requirement: 23 CFR 940.11(c)(1) - “Identification of portions of the regional ITS architecture being implemented (or if a regional ITS architecture does not exist, the applicable portions of the National ITS Architecture)”

Per [23 CFR 940](#), every project has to comply with an ITS Architecture Plan. For background information, there is a [National ITS Architecture Plan](#) that is maintained by FHWA. The National Architecture Plan consists of Service Packages that identifies a problem that needs to be solved or a certain application of a technology. A service package states the basic requirements the project must achieve to create consistency. CDOT is then required to select the service packages from the National ITS Architecture Plan that will assist in fulfilling CDOT’s technology vision and make them CDOT specific. From there the local Council of Governments (COG’s) have to make their ITS Architectures as well. The local agencies should



use the COG's architecture plan if one exists. If one does not, the CDOT Architecture Plan should be followed.



Service packages are critical to identify as part of compiling required SEA documentation. Service packages focus on how the technology is being used rather than specific devices. For example, there is no Dynamic Message Sign (DMS) service package. It will be critical to understand the intent of use for the DMS in order to determine the applicable service package(s). A DMS could fall within the TM06 Traffic Information Dissemination if the intent is to provide drivers with information. If a DMS is being installed as part of a tunnel, then it could fall under TM24 Tunnel Management. The key is focusing on what application the DMS is being used in. It is possible for a project to fall within multiple service packages. Please reach out to the ITS & Network Services Branch with any questions.

3.1 Which architecture plan will be used?

- ☐ National ITS Architecture ☐ CDOT ITS Architecture
- ☒ COG

3.2 If using a COG/MPO/TPR Architecture Plan, what COG? N/A for using the National or CDOT Architecture Plan.

Denver Regional Council of Government (DRCOG)

3.3 List service packages that will be implemented on this project:

1. TM 01-02 Local Jurisdiction Infrastructure-Based Traffic Surveillance
2. TM 03-01 Local Jurisdiction Traffic Signal Control



3. VS 12-02 Local Jurisdiction Pedestrian and Cyclist Safety

To add additional service packages click in the line item 2 box and hit enter.

Section 4 - Procurement

Federal Requirement: 23 CFR 940.11(c)(5) Procurement options

4.1 State the procurement method for the project.

☒ Competitively Bid

☐ Sole Source

4.2 If 4.1 is competitively bid, then what kind is the project delivery method?

☐ Design, Bid, Build

☐ Design Build

☐ Construction Manager/General Contractor

☒ Other (Please specify)___Purchase Order_____

Section 5 - Alternative Analysis

Federal Requirement: 23 CFR 940.11(c)(4) - Analysis of alternative system configurations and technology options to meet requirements

Instructions: Document alternatives considered. When thinking of alternatives it is important to consider maintenance resources and costs into the selected alternative. An alternative can also include not implementing the project. More rows can be added as needed.

Alternative Title	Alternative Description	Selected (Yes/No)	Reason
Video-based detection	Video cameras detect traffic, and the images are digitized, processed and converted into traffic data. Can replace several loop detectors, and measure traffic over a limited area, rather than just a single point.	Yes	Compatibly with current City standards. Supports latest ITS standards, DRCOG regional architecture data requirements, multi-modal detection, supports future traffic responsive operations, and ability to transmit video to TMC.
inductive-loop detectors	Components of an inductive-loop detector system include:	No	Subject to failure upon pavement repair operations and pavement structure failures. Installation and repairs cause traffic obstructions.



	<ul style="list-style-type: none"> One or more turns of insulated loop wire wound in a shallow slot sawed in the pavement. Lead-in cable from the curbside pull box to the intersection controller cabinet. Electronics unit housed in a nearby controller cabinet. 		
microwave radar sensors	Transmits microwave energy toward the roadway. CW (Continuous Wave) Doppler radar can only detect flow and speed. FMCW (Frequency Modulated Continuous Wave) radar can also act as presence detector.	No	Past experience in City was not positive. Limitations with bicycle detection. Does not provide video outputs.
devices that utilize a combination of technologies	Newer type devices that combine technologies, mainly video and radar.	No	These products are fairly new, and untested in the City. Seem to be more expensive and potentially require more repair needs with multiple technologies.
UPS technology consistent with existing City UPS devices	back-up power supply for traffic signals	Yes	Familiarity and positive experience for City staff. Rugged for City environment.
UPS technology inconsistent with existing City UPS devices	back-up power supply for traffic signals	No	Would require gaining expertise with a second type of product and need for spares. Potential problems if not adequately rugged for City environment.

To add additional rows, right click on a row, select "insert", select "row below"

Section 6 - Roles & Responsibilities				
Federal Requirement: 23 CFR 940.11(c)(2) - Identification of participating agencies roles and responsibilities				
Instructions: Determine roles and responsibilities of the proposed technology system throughout the entire life cycle. More rows can be added as needed.				
Agency	Role/Position	Contact Info	Phase*	Responsibility
City of Aurora - Public Works	Traffic Manager	Carlie Campuzano ccampuza@auroragov.org	Design, Installation, Operations	Manager of entire traffic engineering and operations for traffic signal system
City of Aurora - Public Works	Traffic Operations Superintendent	Mike Jaques mjaques@auroragov.org	Design, Installation, Operations	Field operations of all city traffic signals and signal system.



*Phase: Design, Construction, Operations

To add additional rows, right click on a row, select "insert", select "row below"

Section 7 - Requirements & Corresponding Standards	
Federal Requirement: 23 CFR 940.11(c)(3) Requirements definitions and 23 CFR 940.11(c)(6) Identification of applicable ITS standards and testing procedures	
Instructions: Determine the functional requirements of the system and how these requirements will be implemented. Implementation could be specifications or included in the general design of the system. More rows can be added as needed.	
Functional Requirement	How is the requirement included in the project? Spec, plan set, etc
'Roadway Basic Surveillance' monitors traffic conditions using fixed equipment for vehicle/bicycle detection.	Specifications
'Roadway Data Collection' collects traffic data for use in transportation planning, research, and performance monitoring. It includes the sensors and supporting roadside infrastructure.	Specifications
'Roadway Field Device Support' monitors the operational status of field devices and detects and reports fault conditions.	Specifications
'Roadway Support Services' provides foundational functions that supports data collection, management, and distribution.	Specifications

To add additional rows, right click on a row, select "insert", select "row below"

Section 8 - Devices & System
Federal Requirement: 23 CFR 940.11(c)(6) Identification of applicable ITS standards and testing procedures and 23 CFR 940.11(c)(7) Procedures and resources necessary for operations and management of the system
8.1 Is a list or a map with all of the proposed devices attached? <input type="checkbox"/> Yes <input type="checkbox"/> No
8.2 Determine how each device type installed or modified on the project will be specified, tested, and operation of the devices documented. If the project is a whole system, then there may need to be a



system wide test as well to ensure all devices are working together properly. More rows can be added as needed.

Device and system type included in project	Is there a supporting specification(s)? If yes, give specification title.	Is there a supporting test document? If yes, give testing procedure title.	Is this device documented in a Standard Operating Procedure (SOP) Document? If yes, give SOP title.	Is this device documented in a Maintenance Plan document? If Yes, give maintenance plan title.

To add additional rows, right click on a row, select "insert", select "row below"

Section 9 - FHWA Involvement

9.1 Has FHWA classified this project as a Project of Division Involvement (PODI) and requires involvement in the review of SEA documents?

☐ Yes ☐ No

Section 10 - Schedule

10.1 Design Start Date:

10.2 AD date:

10.3 Construction Start:

10.4 Construction completion:

10.5 Relationship to other Federal, State, and local projects and phases. Tip: Does this project depend on another project to operate successfully? Is this project one of a series or projects for a phased approach?



COLORADO
Department of Transportation
Division of Maintenance & Operations

Local Agency SEA

Traffic Signal Synchronization

This calculator will estimate the emission reductions resulting from synchronizing the traffic signals along a previously unsynchronized corridor.

Navigator

[Intersection Improvements](#)

[Traffic Signal Synchronization](#)

[Roundabouts](#)

[Two Way Left Turn Lanes](#)

INPUT

Evaluation Year	2027	
Area Type	Urban	
Corridor Length	50	miles
Number of Signalized Intersections	150	
Number of Lanes (one direction)	2	
Posted Speed Limit	45	miles per hour (1 - 75 MPH)
Average Cycle Length	135	seconds
Truck Percentage	2%	
Annual Average Daily Traffic (AADT) (both directions)	40,000	veh/day
Peak-hour Volume (both directions)	4,000	veh/hr
Existing Corridor Travel Time	100	minutes
Total peak hours per day (AM+PM)	4	

OUTPUT

PERFORMANCE

	PEAK-HOUR	OFF-PEAK	
Volume (both directions)	4,000	1200	veh/hr
Existing Average Speed	30	25	mph
Travel Time Savings	1,580	982	min
Proposed Average Speed	41	30	mph

EMISSION REDUCTIONS

Pollutant	Peak-hour Kilograms/day	Off-Peak Kilograms/day	Total Kilograms/day
Carbon Monoxide (CO)	385.890	189.910	575.800
Particulate Matter <2.5 µm (PM _{2.5})	3.590	3.127	6.717
Particulate Matter <10 µm (PM ₁₀)	20.864	19.621	40.485
Nitrogen Oxide (NO _x)	24.315	29.226	53.541
Volatile Organic Compounds (VOC)	12.806	13.237	26.044
Atmospheric Carbon Dioxide (CO ₂)	24,678.343	46,970.216	71,648.559
Carbon Dioxide Equivalent (CO ₂ e)	24,884.647	47,191.758	72,076.405
Total Energy Consumption (MMBTU)	324.142	618.592	942.734