

## **SCOPE OF WORK**

### **Front Range Non-Project Specific Traffic Engineering Services**

#### **Section 1.0: Program Management, Policy & Training**

##### **Traffic and Safety related Procurement**

- Provide technical expertise and administrative support for the procurement of specialized data, hardware, software, and training programs.
- Provide oversight and assistance in procurement programs, such as sponsorship programs for the procurement of equipment and services, and assistance with procurement scopes of work and Request for Proposal (RFP) development.
- Provide support for public-private partnerships (P3) and innovative contracting.

##### **Traffic and Safety Training**

- Perform, review, train, and provide technical support on various traffic software, travel demand and traffic operation models, including but not limited to, VISSIM, CORSIM, SYNCHRO, TruTraffic (formerly TSPP-Draft), HCS/FreeVAL, RODEL, SIDRA, and TransModeler.
- Train CDOT personnel on use of specialized traffic, transportation engineering, and telecommunications/network-related software in addition to any training requested.
- Research innovative industry practices and demonstrate their potential application within CDOT.
- Provide support to the Traffic Modeling program and Region Traffic Staff to coordinate all training, including standardizing the training and development of traffic employees statewide.
- Provide training video and webinar support to include creation, filming, and editing (including any accessibility needs).

##### **Manuals, Procedures, and Guidance**

- Develop and update Traffic documents that may include: Traffic Incident Management Plans, Operations Plans, Lane Closure Strategies, and Managed Lane Strategies. Deliverables may include the development of formal plans or strategies, other manuals as needed, training, visual aids, and meeting documents.
- Provide Emergency Management operations and support by assisting in the development of CDOT's Incident Management Team and incident management strategies, expanding CDOT's All-Hazard and Wildfire response capability, and updating any CDOT Emergency Operations Plans.
- Assist in the development of policies, procedures, and guidelines for the administration of various CDOT engineering programs, this includes preparing executive summaries and presentations for use by CDOT staff.
- Required to work with a CDOT approved vendor to meet statewide accessibility requirements.

#### **Section 2.0: Engineering Analysis, Data & Asset Management**

##### **Studies / Analysis**

- Perform traffic operations, safety, and maintenance studies by analyzing various types of

transportation data to summarize and visualize findings in formats for easy public use and understanding in decision making. This includes Greenhouse Gas (GHG) studies and modeling.

- Conduct field studies, including speed, curve, signing, operations, Intelligent Transportation Systems (ITS) applications, etc.
- Perform Access Management/Control studies and analyses. This includes preparing traffic impact studies, creating public meeting presentations, coordinating with local agencies, reviewing traffic impact studies from developers and other consultants, and providing technical support.
- Develop individual signal timing plans, corridor signal timing progression plans, and optimization plans, including ramp metering studies.
- Assist in the evaluation and implementation of traffic signal/ramp metering related technologies and systems including adaptive/responsive systems, automated performance measures, and deployment of V2X infrastructure in support of the Signal Phasing and Timing (SPaT) data broadcast.
- Conduct analyses needed for consideration of safety measures in the designing, planning and construction of transportation projects, including optimizing traffic flow during construction.
- Assist in the full implementation of the operations evaluation process, including operational assessment creation, study, and review.
- Provide geotechnical recommendations and reports relating to test hole boring, classifications analyses, concrete and asphalt testing, pavement design, and foundation analysis and design.
- Conduct traffic engineering, safety, and operations support work for Region and Headquarters staff, including conducting inventories, polls, surveys, research, literature reviews, and program evaluations and audits; providing technical, policy, and procedural writing; providing SEA documentation support; Concept of operations; etc.
- Assist in the development of strategic, project, and programmatic plans for branch, region, and statewide goals.

### **Review and Technical Support**

- Conduct program and project management oversight, coordination, support, quality analysis, and facilitation activities, and assist region and headquarters staff to deliver safety, traffic engineering, ITS, and operations programs.
- Provide comprehensive event management support and coordination encompassing all activities from initial concept development to post-event evaluation including any project close out activities. This includes: pre-event, event, and post-event management activities.
- Assist staff with developing, integrating, and reporting safety, traffic engineering, and operations performance measures, metrics, and key performance indicators (KPIs).
- Assist staff with developing standard specifications and details related to traffic items.
- Conduct “before and after” studies for projects funded by safety programs, using crash data to assess the effectiveness of project selection and mitigation strategies.
- Perform Local Agency project plan reviews and structural reviews, and provide comments and recommendations as needed.
- Review, facilitate and attend meetings, and provide technical assistance on traffic impact studies, NEPA, 1601s, Interchange Access Requests (IAR), Minor Interchange Modification Requests, Environmental Assessments, Environmental Impact Studies, and maintenance studies as requested. This includes independent reviews of other’s designs.
- Provide technical assistance with traffic engineering, ITS, and maintenance-related issues as requested and create white paper write-ups.
- Provide technical assistance in researching and preparing federal grant applications for engineering projects, including writing, graphics, photographs, layout, traffic modeling, and benefit-cost analysis.
- Provide technical support for the planning, design, operations, maintenance, and integration of toll roads, managed lanes, Connected & Autonomous Vehicles (CAV), Innovative Mobility initiatives, and other technical areas as directed.

- Assist in the deployment, testing, and evaluation of ITS- and CAV-related technologies and software applications, including operationalizing cutting-edge mobile and roadside technologies that enable multiple V2V & V2I applications.
- Development of map-based software applications with capability to process and react to various datasets.
- Provide expert testimony regarding maintenance and traffic operations.
- Review and design structural shop drawings for traffic signals, ITS structures, overhead signs (cantilevers, butterfly, two posts), bridge attachments for conduit, light poles, etc. as requested.
- Provide miscellaneous services regarding traffic operations and ITS to help with the day-to-day operations of the Regions, the Colorado Traffic Management Center (CTMC), and regional traffic management centers.
- Provide assistance with statewide planning, agreements, and public or private coordination activities for current and future ITS, traffic, congestion management, and other CDOT activities.
- Conduct modeling, simulation, analysis, and alternatives analysis for various roadway segment and intersection configurations for traffic engineering, operations, and safety scenarios using current modeling software, including VISSIM, CORSIM, SYNCHRO, TruTraffic, Rodel, SIDRA, Dynus-T, Vision Zero Suite, and HCS.
- Provide web-based support including website design, development, implementation, edits, and coordination of new or existing web applications or pages.
- Assist in the implementation and management of the Corridor Operations and Bottleneck Reduction Assistance (COBRA) program including identification of locations, research of innovative solutions, and evaluation of measures (before and after studies).
- Provide hydraulics engineering services and support.
- Assist in support, explorations, and evaluations of emerging technologies, including aerial support for operations, connected vehicles, autonomous vehicles, big data tools, LiDAR, etc.
- Provide technical guidance and support for various maintenance programs, including Winter Operations Program, Tunnel Asset Management, Maintenance Project Program (M-Projects), Deicer Quality Assurance Program, Avalanche Control Program, Noxious Weed Program, and sign shop manufacturing facility.
- Coordinate, manage, and oversee programs such as the Bridge Parolee Program, Adopt-A-Highway Program, and Commercial Driver's License (CDL) Program.
- Augment CDOT staff related to traffic work

#### **Data Management and Asset Management**

- Assist in warehousing and managing data in SAP, ArcFM/Fiber Manager, ArcGIS, and other data warehousing applications.
- Assist in the development of a centralized data repository for sensor, field, and other large datasets and asset data.
- Provide database management, system architecture, integration, interfaces, general support, application development, reporting, and dashboard development.
- Collect, review, process, and perform Quality Assurance/ Quality Control (QA/QC) on traffic and safety data.
- Support and represent the asset manager by providing data analysis, quality assurance, report development, asset inventory data management, and budgeting support.
- Assist with budget setting workshops and analyze inventory data to support funding requests.
- Provide support with asset management functions for signals and other ITS devices, signs, markings, guardrails, and fiber optic communications.
- Assist in the development of technical plans for various asset categories.
- Develop functional requirements for operational performance measures for automated reporting using available CDOT systems and reporting tools.
- Develop functional requirements for software or algorithms to automate data extraction from field survey sources using available CDOT systems and reporting tools or developing new tools.

## Section 3.0: Engineering Design, Infrastructure & Specialized Modeling

### Design

- Design and prepare preliminary and final plans, specifications, quantities, and estimates (using CDOT required software) for all types of traffic, MLOS, and ITS projects to meet CDOT, City, County, Council of Governments (COG), or Metropolitan Planning Organizations (MPO), Federal Highway Administration (FHWA) requirements, including:
  - Roadway design (including construction phasing and traffic control plans)
  - Intersection design (including Alternative Intersection Design)
  - Roadway pavement markings (tape, thermoplastic, water-based, etc.)
  - Traffic signals (LED displays, mast arm designs, adaptive signals/controllers, etc.)
  - Vehicle detection systems (video, loop microwave, radar, ultrasonic, etc.)
  - Interconnect systems (hardware, phone, cellular phone, spread spectrum, radio, etc.)
  - Sign layouts, signing plans, and sign support systems, including sign structure design and analysis and sign sequences on the highway, which shall be consistent with the MUTCD and CDOT's practices and policies
  - ITS devices (variable message boards, closed-circuit television, fiber optic infrastructure or other devices, other communications media, etc.)
  - Fiber optic networking drawings and fiber optic splicing plans
  - ITS Fiber Network plans for interconnection to the CTMC, Nodes/Regions, tunnels, EJMT, HLT, and Traffic Management Centers, including network design, fiber assignments, and studies and reports
  - ITS Network Support Plans
  - Utility plans that comply with federal and state legislated SUE requirements
  - Construction (temporary) geometric design, capacity analysis, signing, pavement marking, and signal design plans and schedules
  - Lighting design (intersection, roadway, underdeck/tunnels, and electric/powersystem)
- Provide a Colorado Licensed Professional Engineer (PE) Stamp to certify designs, changes to designs, and Plans, Specifications, and Estimates (PS&E) packages.
- Provide railroad crossing design and coordination services, railroad flagging, railroad permitting for utilities, railroad signal design and consulting services, railroad crossing diagnostics, inspections, and construction oversight.

## 4.0 Construction Support, Field Services & Utilities

### Data Collection, Surveying, Inspection, and Locates

- Perform the collection of various traffic and maintenance related data and physical information, using field instrumentation, unmanned aerial systems (UAS), traffic counters, photogrammetry LiDAR, and other data collection methods.
- Develop data collection requirements, including identification of specific data fields, and perform field inventories of traffic control devices, traffic and ITS infrastructure assets, and maintenance infrastructure assets.
- Provide underground fiber optic, power cable, and other utility locating services for traffic and ITS communications backbone and devices. Perform potholing for locates and conduct Subsurface Utility Engineering (SUE) surveys.
- Provide structural inspections and reports of traffic signal poles and mast arms, ITS structures, and sign structures.
- Provide roadway surveying plans with a Professional Land Surveyor (PLS) Stamp as required. Traffic control and permits will be required.
- Perform pavement marking and signage retroreflectivity measurements.

### Construction

- Oversee construction management, inspection, and completion of appropriate CDOT paperwork as required, including ITS construction and field management, and materials (LIMS) data entry. Prepare monthly estimates for approval.
- Perform construction traffic control management and coordination activities.
- Perform material testing in accordance with CDOT Field Materials & Construction Manuals.

- Prepare sample test and material documentation to CDOT Central or Region laboratory.
- Provide design support during construction to address changes to design elements due to constructability issues or plan errors.
- Prepare and review change orders for CDOT and local agency construction projects to ensure they are in accordance with CDOT standards and requirements.
- Provide construction administration support.

#### **Utility Investigation Activities**

- **Investigation:** Conduct investigation of project areas to determine existing utility conditions.
- **FIR/FOR Design:** Complete all coordination and deliverables necessary for scoping, Field Inspection Review (FIR) and Final Office Review (FOR) design for utility plans; provide 3-D modeling in high conflict areas. This includes coordination and deliverable required by the CDOT Region Utility Engineer (RUE) and work on a plan of action.
- **Deliverables:** Final CADD files, utility contact lists, potholing maps/charts, and utility relocation notes/specifications.
- **Coordination:** Coordinate utility permits, scoping meetings, and FIR/FOR meetings with all utility providers. Complete investigation requirements according to ASCE / C1 3802 Standards Guidelines for the Collection and Depiction of Existing Subsurface Utility Data, commonly referred to as ASCE 38. This includes the following: Request and receipt of utility maps and easements from utility companies will be coordinated with the CDOT project manager and with the CDOT RUE. Conduct a review of utility information, obtain existing utility mapping from the utility providers. Request franchise agreements from the local agencies. Request identification for any secondary utility provider attachments to the main utility provider's facility. Work with surveyors to adjust datum to match CDOT projects. Shall employ Professional Engineers who are in responsible charge of the work to stamp plans, when applicable.