EXHIBIT "A" (Scope of Work)

Procurement
- Assist CDOT in procuring specialized related data, hardware, software and training
- Provide oversight and assistance in procurement programs, such as sponsorship programs for the procurement of equipment and services and assistance with RFP development
- Provide support for public private partnerships and innovative contracting

Data Collection
- Perform the collection of traffic data and physical information, using field instrumentation, photography, and/or other public or private sector methods
- Develop data collection requirements including identification of specific data fields, perform field inventories of traffic control devices and ITS infrastructure assets including fiber optic cable and features
- Assist in warehousing and managing data in SAP, ArcFM/Fiber Manager, ARCGIS and/or other warehousing applications

Training
- Perform, review, train, and provide technical support on various travel demand and traffic operations models including, but not limited to VISSIM, CORSIM, SYNCHRO, HCS/FreeVAL, and TransModeler
- Train CDOT personnel on use of specialized traffic, transportation engineering and telecommunications related software in addition to any training requested
- Provide multi-user multi scenario simulation training programs. This includes trainings, such as ICS and TIMS readiness, software, program, and process training
- Provide and conduct research and bring innovative ideas/implementations and demonstrate how they could be implemented at CDOT

Manuals, Procedures, and Guidance
- Support, prepare, update and assist Traffic Incident Management Plans as requested. This includes development of actual plans or strategies, manuals, training (quick clearance), and meeting documents. Tabletop exercises, functional exercises, and create other documents as required
- Prepare and update Lane Closure Strategies as requested (including the development of actual plans or strategies, manuals, training and meeting documents)
- Provide Emergency Management operations and support
- Assist in the development of policies, procedures, guidelines for administration of various engineering programs, which may include:
  - With input from CDOT and stakeholders, help develop and write procedures, processes, guideline documents that explain criteria, factors, scoring for selection, prioritization, weighting of safety and operations projects
  - Prepare executive summaries, presentations for use by CDOT staff for executive meetings, management briefings, Commission presentation, etc.
  - Write, edit, and revise technical specifications and standard plans

Studies / Analysis
- Perform traffic studies or analyses. Analyze various types of transportation data - crash, operations, roadway characteristics, summarize, and visualize in various formats for public use and understanding in decision-making
- Perform field studies, such as speed, curve, signing, operation, use of ITS applications, and safety

- Perform Access Management studies and analyses, including but not limited to preparing traffic impact studies as well as the review of major and minor traffic impact studies from developers and other consultants. Provide technical support
- Perform corridor before/after 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/or systems including adaptive/responsive systems, automated performance measures, and deployment of DSRC infrastructure to support the Signal Phasing and Timing (SPaT) broadcast
- Conduct analyses needed for consideration of safety measures in the designs and planning of transportation projects. Crash history will be provided by CDOT in most cases
- Assist in the full implementation of the operations clearance process including operational assessment creation, study and review. Assist with SEA and Safety processes in SharePoint
- Provide Geotechnical recommendations and reports with regard to test hole boring, classifications analyses, concrete and asphalt testing
- Conduct traffic engineering, TSM&O, safety, and operations support work for region and headquarters staff. Work may include conducting inventories, polls, survey, research, literature review, summaries, compilation, program evaluations and audits, technical, policy, procedural writing, TSM&O Project Evaluation support, SEA support, or other

Review and Technical Support
- Provide staff as needed to compliment the Region operations offices in all capacities
- Local Agency project plan review and structural review. Comments and recommendations as needed
- Review, attend meetings, and provide technical assistance on traffic impact studies, NEPA, 1601's, Interchange Access Request (IAR), Environmental Assessments and Environmental Impact Studies as requested (including Independent Review of other's designs)
- Attend, provide visual aids, take minutes, and prepare reports as needed for all meetings, as instructed (including letters of correspondence and meeting minutes)
- Provide technical assistance with traffic engineering, TSM&O, and ITS issues as requested and create white paper write-ups, including all SEA type of documents
- Provide technical assistance in preparing federal grant applications for TSM&O and Traffic Engineering projects including: writing, graphics, photographs, layout, traffic modeling, and benefit cost analysis
- Provide technical support in the area of planning, design, operations, maintenance and integration of toll roads, managed lanes, RoadX, Connected Vehicle, Managed Motorways initiatives, and other technical areas as directed
- Assist in the deployment, testing, evaluation of ITS, Connected Vehicles related technologies and applications including operationalizing cutting-edge mobile and roadside technologies that enable multiple V2V & V2I applications
- Provide expert testimony regarding traffic operations
- Review and/or design structural shop drawings for Traffic signals, ITS structures, or overhead sign (cantilevers, butterfly, two posts, bridge attachments for conduit, light poles and others as requested). All signs or drawings shall be reviewed and stamped by a Colorado Licensed Professional Engineer (PE) to certify designs and/or changes to designs
- Provide miscellaneous services regarding traffic operations and ITS to help with the Region's, the CTMC, and regional traffic management centers day to day operations
- 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 program or project management oversight, coordination and facilitation activities and assistance for region and headquarters staff to deliver safety, traffic engineering, ITS, and operations programs. Such work might include: assisting staff in organizing outreach meetings with local agencies, developing application submittal, review, development of

contract or procurement documents, and award process for local agencies to use CDOT or federal funding
● Collect, review, process, and perform Quality Control/Quality Assurance traffic or safety data
● Assist staff with developing, integrating, and reporting safety, TSMO, traffic engineering, and operations performance measures, metrics, and KPI's
● 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, but not limited to: VISSIM, CORSIM, SYNCHRO, Rodel, Dynus-T, Vision Zero Suite and HCS
● Provide web based support to develop new web applications, pages, or edit existing pages
● Assist staff with developing standard specifications and details related to TSMO/Traffic items
● Conduct before and after studies for projects funded by safety programs using crash data to assess effectiveness of project selection and mitigation strategies
● Assist in development of bottleneck mitigation program with identification of locations, implementation and evaluation of measures

Field Data, Surveying, Inspection and Locates
● Provide underground fiber optic, power cable, and all other utility locating services for Traffic and ITS communications backbone and devices:
  ○ Attend field locate meets at the appointed time
  ○ Mark underground utilities with appropriate markings and color
  ○ Respond to emergency locate requests within a 4 hour time period
  ○ Provide a sketch or as-built drawing to the contractor when requested
● Provide structural inspection and report of Traffic Signal poles and mast arms, ITS structures and sign structures
● Roadway surveying with a PLS Stamp as required, traffic control and permits will be required
● Performing potholing for locates, when necessary
● Perform pavement marking and signage retroreflectivity measurements

Design
● Design and prepare preliminary and final plans, specifications quantities, and estimates (using CDOT required software) for all types of Traffic, TSM&O, MLOS and ITS Projects to meet CDOT, City, County, COG, or FHWA requirements, including but not limited to:
  ○ 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 system (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 MUTCD and CDOT's practices and policies
  ○ Intelligent transportation systems devices (variable message boards, closed circuit television, fiber optic infrastructure or other devices, and other communications media, etc)
  ○ Fiber Optic Networking Drawings and Fiber Optic Splicing Plans
  ○ ITS Fiber Network plans for interconnection to the Colorado Traffic Management Center (CTMC), Nodes/Regions, tunnels, EJMT, HLT, and Traffic Management Centers (including network design, fiber assignments, and studies and reports)
  ○ ITS Network Support Plans
  ○ Develop construction (temporary): geometric design, capacity analysis, signing, pavement marking, and signal design plans and schedules
● Furnish detailing and drafting services

- Development of a centralized data repository for sensors, field, asset data (stakeholders)
- ITS system performance using sensor data
- Development of an ITS maintenance program and/or network maintenance system
- Lighting Design (intersection, roadway, underdeck/tunnels, electric/power system)

Construction
- Construction management, inspection and completion of appropriate CDOT paperwork as required, including ITS construction and field management, this will include materials (LIMS) data entry
- 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
- Prepare monthly estimates for approval
- Prepare and review change orders for CDOT and local agency construction projects to ensure they are in accordance with CDOT standards and requirements

TSM&O Support
- Provide on-site, full or part time, support services
- Development of a centralized data repository for sensors, field, and asset data
- Develop Region TSM&O Plans, corridor operations plan in accordance with the statewide TSM&O plan; update the existing statewide ITS architecture in turbo
- Establishment of a TSM&O consortium (working group for local agencies and CDOT)
- Develop functional requirements for operational performance measures for automated reporting using available CDOT systems and reporting tools
- Support CDOT with the AV pilot project proving ground and policies
- Provide support in SAP functions with regards to materials, warehouse, master data, fixed assets, etc.. This included functions for budget and Task Order management
- Provide support with asset management functions for signals and other ITS devices, signs, marking and fiber optic communications
- Provide fiber network communications support for CDOT's CISCO and CIENNA networks and assist in migration
- Assist in support, explorations, and evaluations of emerging technologies including aerial support for operations, connected vehicles, big data tools, LiDar, etc.
- Provide Database management, system architecture, integration, interfaces, general support, application development, reporting, and dashboard development
  - Develop data query tools, develop websites or other online tools to provide data queries, access to reports and analysis.
  - Develop applications or tools for data geocoding, data coding, and data modification.
- Conduct strategic planning for administering and delivering various engineering programs
- Assist in developing missions, vision, objectives, goals, measures, road-mapping, schedules, project development
- Provide the ability to utilize and access external CDOT subject matter experts in various current and emerging programs, projects, software and architectures. These include ITS, operations, planning, safety, managed lane pricing, and traffic operations strategies (such as variable speed limits and incident programs)
- Assist with Change Management
- Computer Science/Programming for various programs to support CTMC and CAV
- Assist with Budget Setting workshops and analyze inventory data to support funding requests for TSM&O and ITS related activities
- Provide Independent Review of other's design (Alternative Intersection Design or interchanges)