



COLORADO

Department of Transportation

Division of Project Support

**Non-project Specific Scope of Work (SOW) for
Exploration, Evaluation, Oversight and Design Work as Applied to
Geological Hazards and Geotechnical Engineering
May 2018**

Introduction

The Colorado Department of Transportation (CDOT) recognizes the affect geologic hazards have on the transportation system. These hazards include rockfall, rockslides, debris flow, landslides, sinkholes, subsurface failures, embankment distress and other geologic hazard and geotechnical related highway structure failures. The task of reducing and managing these hazards is one of the goals of the Geohazards and Soils and Geotechnical Programs. These programs are responsible for:

- Responding to emergency incidents involving geological hazards and providing recommendations regarding highway safety and mitigation,
- Responding to inquiries regarding potential geologic hazards from CDOT Maintenance, CDOT Engineering, and the public,
- Managing Geohazards Program funding allocated through CDOT's Asset Management Program,
- Maintaining the Geohazards Management Plan and the Transportation Asset Management Geohazards Project List,
- Providing feasibility studies, mitigation plans and mitigation designs for Geohazard Corridors in accordance with the Geohazards Management Plan and for Region Engineering and Maintenance as required,
- Provide geotechnical investigation and designs for Region Engineering and Maintenance projects as requested,
- Updating the Geohazards Management Plan,
- Maintaining rockfall, rockslide, landslide, sink hole, debris flow, and embankment mitigation devices statewide including instrumentation,
- Reading, maintaining and managing data from instruments installed at geohazard sites, and
- Ensuring state of the art geohazard and geotechnical mitigation and evaluation practices are implemented.



As awareness of geologic hazards and the availability of data to assess them continues to increase, so has the need for managing them using data and incorporating practices that are consistent with CDOT's performance goals for the state transportation system. The work for this contract is to assist the CDOT Geohazard and Geotechnical Programs with their responsible tasks and help with developing methods to manage and respond to geologic hazards that improve the state of practice.

General Scope of Work

The consultant will provide as needed assistance to evaluate using GAM principles, investigate, and provide mitigation designs for geologic hazards, especially those associated with rock slopes, rockfall, debris flow, landslides, embankments, and sinkholes. This work includes services as needed per PE stamp requirement of CDOT designs. The consultant will also provide as needed assistance associated with data management of CDOT's Geohazard Management Plan (GMP) and the development of a data management and visualization system to complement remote sensing data collection and processing. The Geohazards Program will use the results of this effort in conjunction with or as part of the GMP decision process to allocate Program resources. Additional geohazard work includes mitigation inventory and inspection, assistance with statewide monitoring of rockfall and other geologic hazards, and oversight of rock scaling and geologic hazard mitigation.

The consultant will assist the CDOT Soils and Geotechnical Program as needed with geotechnical site investigation, geotechnical design and design review, drilling assistance, drilling oversight, and borehole logging. Preparation of geotechnical plan sheets will be required as needed and shall be prepared using software compatible with software used by CDOT. In addition, the consultant will provide as needed assistance associated with the Soils and Geotechnical Program's file management and data collection system.

During critical emergencies involving geological or geotechnical hazards and/or when qualified staff from CDOT is unavailable to respond, the consultant shall respond to the emergency. The response shall include an evaluation of the hazard that caused the emergency and provide mitigation options to CDOT. The consultant shall apply industry accepted safety practices when accessing slopes.

Qualifications and Availability

The consultant performing this work shall demonstrate satisfactory performance of the type of work described in this SOW during the past three years by employees of the company.

Rockfall and geologic hazard evaluations often require hands on exploration of steep rock slopes and specific geologic features that require the use of rope access techniques. The consultant shall have knowledge of rope access techniques or the ability to train employees qualified under this SOW in use of rope access techniques.

The work involves responding to emergencies caused by rockfall and other geologic hazards. To provide this service, the consultant shall have at least one employee, who meets the qualification of this SOW, available at all times throughout the duration of this contract to respond to the emergency. The response shall be considered satisfactory if the consultant's employee is on site within 6 hours of being notified of the emergency unless otherwise directed by CDOT or the incident commander.

Authorization to Proceed and Work Limits

Work for this contract shall be by Task Order for a specific task or combination of tasks. Unless authorized by emergency procedures, the work shall not commence until a written Notice-to-Proceed is received by the consultant and shall be completed in the time specified.

The work locations will be statewide.



Status of Contract

The Consultant shall monitor the fiscal status of the contract, and advise the CDOT Contract Manager of any potential for supplementing their contract or negotiating an additional task order. Failure to monitor contract status and provide timely notification may result in discontinuation of the Consultant's services until a supplemental agreement can be effected.

Full Scope of Services

A: Exploration and Design

Provide geological and geotechnical engineering exploration and designs that include plans and specifications using CDOT design standards for state of the art geologic hazard mitigation systems and geotechnical engineering applications. CADD work will be conducted using Microstation and Inroads Software, latest versions used by CDOT. The work includes:

- Conducting site visits and field reconnaissance of slopes and geotechnical structures along highways as directed by the CDOT;
- Providing recommendations for the most appropriate geologic hazard mitigation and geotechnical engineering measures based on safety, constructability, cost, performance and CDOT's asset management practices,
- Preparing draft and final design details and specifications for selected geologic hazard mitigation and geotechnical engineering solutions;
- Locating and staking locations for mitigation measures for design and construction;
- Providing and collecting survey and subsurface information, including data from laser scans and photogrammetry analysis and; seismic survey for the purpose of enhancing geologic hazard and geotechnical investigation, design and cross section of slopes, roadways and embankments,

B: Oversight

Provide oversight, as requested, during construction of mitigation projects. This task may involve use of rope access techniques to reach construction locations on a slope.

C: Emergency Response

Respond to emergency rockfall and geologic hazard incidents. This task requires the consultant to respond to emergency incidents with a qualified employee as described in the Qualifications and Availability section of this SOW. The work includes:

- Evaluating the hazard that caused the emergency by accessing the source area of the hazard where possible. This work may involve the use of rope access techniques to evaluate the stability of slopes or geologic features;
- Providing mitigation recommendations and designs;



- Providing recommendations regarding the urgency of the emergency and need for mitigation;
- Guiding mitigation construction activities; and
- Providing monitoring recommendations and installing monitoring systems such as instruments to measurement displacement, loads, strain, and other geotechnical measurements.

D: Monitoring and Rock Scaling

This task includes assistance with prioritizing locations for monitoring and instrumentation systems and locating areas for rock scaling. These efforts shall be conducted with a focus on the overall performance of the transportation corridor the work is located. Rope access techniques may be required to complete the work for this task. Equipment purchased through this contract for monitoring shall become the property of CDOT. The work includes:

- Providing monitoring recommendations and designing monitoring systems;
- Providing and installing monitoring systems;
- Providing rock scaling recommendations; and
- Directing rock-scaling activities.

E: Data Collection and Management

This task includes collecting, presenting and managing data used to evaluate geologic hazards and geotechnical assets statewide and assisting with the development of a data management and analysis system that incorporates data from the GMP, remote sensing, geodatabases, ratings/evaluations and weather stations. Knowledge of GIS and data management and visualization applications is required for this work. Rope access techniques and CDOT traffic control standards may be required as well. The work will involve:

- Collecting slope rating data;
- Maintaining in-place and remote monitoring equipment;
- Inventorying and inspecting rockfall and other geological hazard mitigation devices;
- Providing recommendations and assistance to maintain and improve the Geohazard Management System; and
- Collecting data to manage other geological hazards such as landslides, debris flows, sink holes, rockfall, rockslides, and embankment distress, and
- Assisting with the development of an information management system to combine data from the GMP, remote sensing, instruments, geodatabases, weather stations and empirical observations to enhance resource allocation and improve planning and design efficiency.



F: Other Services

As requested by CDOT and as specified in the Task Orders, other services such as providing equipment for borehole drilling, borehole logging, conducting geotechnical and geologic explorations otherwise not specified above, and providing traffic control for geotechnical and geologic explorations may be requested on an as needed basis. The Task Order scope of work for these services will include details of the need.

