



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
July 2015**

Introduction

The Colorado Department of Transportation (CDOT) recognizes the affect geological hazards have on the transportation system. These hazards include rockfall, debris flow, landslides, sinkholes 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 geological hazards has increased, so has the need for managing them 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 Rockfall and Geotechnical Programs with their responsible tasks.

General Scope of Work

The consultant will provide as needed assistance to investigate, evaluate and provide mitigation designs for geological hazards, especially those associated with rock slopes, rockfall, debris flow, landslides, embankments, and sink holes. This work includes services as needed per PE stamp requirement of designs. The consultant will also provide as needed assistance associated with data management of CDOT's Geohazard Management Plan; mitigation inventory and inspection; and assist with statewide monitoring of rockfall and other geological hazards, rock scaling and geological hazard mitigation oversight.

During critical emergencies involving geological 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 and, where applicable, follow CDOT's Rockfall Emergency Response Procedures during these incidents.

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 geological 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 geological 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 may be performed at locations throughout the state. Exact work locations cannot be predetermined for tasks associated with emergency response; responding to geological hazard inquiries; monitoring; and data collection.

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 geological hazard mitigation systems and geotechnical engineering applications. CADD work will be conducted using Microstation and Inroads Software, latest versions used by CDOT. The work will include:

- Conducting site visits and field reconnaissance of slopes and geotechnical structures along highways as directed by the CDOT;
- Providing recommendations for the most appropriate geological 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 geological hazard mitigation and geotechnical engineering solutions;
- Locating and staking locations for mitigation measures for design and construction;
- Providing survey and subsurface information, including data from laser scans and photogrammetry analysis, and seismic survey for the purpose of enhancing geological 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 geological 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 situation. This includes accessing the source area of the hazard, which may involve the use of rope access techniques, to evaluate the stability of slopes or geological 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, as well as, 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 in. Rope access techniques may be required to complete the work for this task. Equipment purchased through this contract for the purpose of monitoring shall become the property of CDOT. The work will involve:

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

E: Data Management and Collection

This task includes collecting and presenting data used to manage geological hazards statewide. Knowledge of GIS 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.

F: Other Services

As requested by CDOT and as specified in the Task Orders, other services such as bore hole drilling and geotechnical explorations otherwise not specified above may be requested on an as needed basis. The scope of work for these services will include details of the need.

