

SCOPE OF WORK (SOW)  
Retaining Wall and Noise Wall Inspection and Asset Management Services  
Colorado Department of Transportation

**I. GENERAL**

The goal of this project is the continuance of the development of a risk based inspection program for retaining walls and noise walls, inventory and inspect the retaining walls and noise walls on Colorado's state highway system, report the conditions of the individual walls to the Colorado Department of Transportation (CDOT), Staff Bridge, utilize a web based data management to gain efficiency in collecting and distributing data that integrates with the CDOT AASHTOWare BrM version 5.x database, and meet compliance with any FHWA requirements and guidelines. Retaining walls and noise walls will be referred to as "structures" hereafter in this Scope of Work (Scope). The Colorado Department of Transportation will be referred to as the "Owner" hereinafter in this Scope.

The purpose of this scope is to update the inventory, conduct inspections and report the findings to the Owner on the state's structures in accordance with the most current version of the Recording and Coding Guide for the Inventory and Inspection of Colorado's Retaining Walls and Noise Walls.

It is anticipated that task orders will be written to this contract for a period of four years to perform the following work:

- A. Updating of the CDOT Recording and Coding Guide for the Inventory and Inspection of Colorado's Retaining Walls and Noise Walls as required.
- B. Continued development of the web based data management system, mobile application, and user guides. The web based data management system shall be compatible with the CDOT AASHTOWare BrM version 5.x. Integration with other databases may be required as identified in the individual task orders.
- C. Continued development of a risk based inspection program for retaining walls and noise walls.
- D. Continued development of a risk based asset management plan for retaining walls and noise walls.
- E. Inventory and inspection of the retaining walls and noise walls on Colorado's state highway system.

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**II. DEFINITIONS**

- A. **AASHTO** – American Association of State Highway and Transportation Officials.
- B. **BRIAR** – Bridge Ratings, Inspections and Records
- C. **ELECTRONIC DATA FILES** - Electronic files containing inventory and inspection data for each structure in the version of CDOT AASHTOWare BrM version 5.x, or other database formats as specified by the CDOT Project Manager. Electronic sketches of structures in a MicroStation compatible format as needed. PDF files of all inspection reports including any additional documents required for the reports, i.e. tally sheets, inspection sketches, JPG files of structure photographs, etc.
- D. **ENGINEER** – CDOT Bridge Inspection Engineer or his/her designee.
- E. **FHWA** – Federal Highway Administration.
- F. **FY** – Fiscal Year
- G. **MUTCD** – Manual on Uniform Traffic Control Devices
- H. **NEW STRUCTURES** – Structures not previously inspected such as newly constructed structures requiring initial inspection or structures found to be qualifying and without prior inspections.
- I. **NHS** – National Highway System.
- J. **EI** – Element Inspection form. A structure inspection form found within the inspection tab of AASHTOWARE BrM, on which the applicable structure element condition states and comments are reported for each structure inspected.
- K. **SI&A** – Structure Inspection and Appraisal form. An inventory and appraisal form found within the AASHTOWARE BrM program that contains information about a structure.
- L. **STRAHNET** – Strategic Highway Network

**III. INSPECTION STANDARDS**

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The work shall be carried out in accordance with the following documents and revisions thereto:

- A. Recording and Coding Guide for the Inventory and Inspection of Colorado's Retaining Walls and Noise Walls
- B. Bridge Asset Management and Inspection Manual (BRIAR Manual)
- C. CDOT Pontis Bridge Inspection Manual,
- D. AASHTO Manual for Bridge Evaluation
- E. Bridge Inspection Reference Manual
- F. Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (Report No. FHWA-PD-96-001)
- G. Other documents as defined by individual task orders.

**IV. CONSULTANT QUALIFICATIONS**

The consulting firm shall be pre-qualified to conduct bridge inspection work for the State of Colorado, Department of Transportation.

The project manager, the inspection team leader, and the bridge inspectors, shall meet the qualifications as stated in the Code of Federal Regulations, 23 CFR, 650.309.

**V. PROJECT MANAGEMENT AND COORDINATION**

The Contract Administrator for the work is:

Behrooz Far, P.E.  
State Bridge Engineer  
Colorado Department of Transportation  
4201 East Arkansas Ave.  
Room 107  
Denver, Colorado 80222  
(303) 757-9309

The Bridge Inspection Engineer for the work is:

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Lynn E. Crosswell, P.E.  
Bridge Inspection Engineer  
Colorado Department of Transportation  
4201 East Arkansas Ave.  
Room 107  
Denver, Colorado 80222  
(303) 757-9188

The Project Manager for “day-to-day activities for the “Work” is:

Mark Stadig  
Colorado Department of Transportation  
4201 East Arkansas Ave.  
Room 107  
Denver, Colorado 80222  
(303) 757-9417

## **VI. PROJECT LOCATION**

The project location will be state-wide. The structures to be inspected will be identified by a risk based selection and listed within the individual task orders.

## **VII. PROJECT DURATION**

- A. The project duration is four years.
- B. Individual task orders will be written for the work. The work shall commence on the date specified in the individual task order notice to proceed and shall be completed as specified in the individual task orders.
- C. Completion of the task order work is defined as (1) having submitted all structure inspection reports in the required format to the Project Manager for review, (2) the Project Manager having reviewed and approved the reports and (3) formal presentations of the final reports and findings provided to CDOT at the end of each task order.

## **VIII. CONSULTANT RESPONSIBILITY**

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- A. The Consultant shall be responsible for updating the Recording and Coding Guide for the Inventory and Inspection of Colorado's Retaining Walls and Noise Walls.
- B. The Consultant shall be responsible for the development of a web based data management system compatible the CDOT AASHTOWare BrM version 5.x database or other databases as identified in the individual task orders.
- C. The Consultant shall be responsible for the further development of the risk based inspection program for retaining walls and noise walls.
- D. The consultant will support CDOT Staff Bridge and Transportation Asset Management programs with implementation of risk-based asset management for walls. The work for this contract will update future inventory development, data management, risk analysis, and documentation for the wall asset management plan. The plan will recommend and document:
  - objectives and measures,
  - inventory and condition,
  - performance gap identification,
  - life cycle cost and risk management analysis,
  - financial planning, and
  - investment strategies.

This contract will further develop the existing wall asset management plan consistent with current MAP 21 regulations, CDOT asset management efforts, and with emerging national research in transportation asset management. Based on prior development work, the current asset management document will be revised or updated to present the final wall asset management process. The proposed work activities shall emphasize risk, as defined by the uncertainty measured by probability and consequence, in each outcome.

Consultant shall develop wall replacement and rehabilitation candidate lists based on the wall asset management plan.

- E. The Consultant shall be responsible for the complete, timely inspection and reporting of all structures identified in individual task orders.
- F. The Consultant shall furnish all electronic equipment such as computers, laptops, tablets or other as necessary to complete the work.
- G. The Consultant shall submit completed inspection reports to the Project Manager.
- H. The Consultant shall conduct the work in accordance with all governing safety rules and regulations applicable to the work.

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- I. The Consultant shall provide for their traffic control, working with the appropriate maintenance sections and Region Traffic Engineers to request close lanes when required. A list of contacts will be provided to the Consultant upon request.
- J. The Consultant will provide all necessary inspection and testing equipment, personal protective equipment (PPE), vehicles for transport and access to properly and adequately perform the work described herein.

**IX. INSPECTION REQUIREMENTS**

- A. Inspections and structure evaluations will be performed via normal and customary visual means as defined by the following references and will include evaluation of all accessible structure components within reason unless noted otherwise to identify changes from previously recorded conditions, and to determine their physical and functional condition. All inspectors shall utilize the mobile inspection tablet developed for these inspections. Inspectors shall be familiar with the mobile application and the desktop data management system. All structure coding items shall be completed per the requirements of the NBIS and CDOT in accordance with the most recent editions of the following:
  - 1. Bridge Asset Management and Inspection Manual (BRIAR Manual)
  - 2. The FHWA manual Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Structures, December 1995 (Federal Coding Guide), except that English Units shall be recorded.
  - 3. The CDOT Structure Inventory Coding Guide.
  - 4. The CDOT Pontis Bridge Inspection Coding Guide. The condition states and comments for the Pontis elements applicable to a structure shall be reported in the Pontis inspection module.
  - 5. AASHTO Manual for Bridge Evaluation
  - 6. Retaining and Noise Wall Inspection and Asset Management Manual
  - 7. Other documents as defined by individual task orders.
- B. Inventory digital color photographs are required for each structure as defined by individual task orders.

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- C. Supplemental digital color photographs and sketches shall be taken and/or developed as necessary to give a clear understanding and documentation of distressed conditions.
- D. Digital cameras shall be a minimum of 2 megapixel resolution capabilities and be Global Positioning System (GPS) enabled. Photos shall be submitted in the Joint Photographic Experts Group (jpg) format. The photos shall be submitted on a compact disk (CD), DVD, flash drive or other method as directed by the CDOT Project Manager.
- E. The PEI condition states and comments and the SI&A items shall be reported using the report format as directed by the CDOT Project Manager. The PEI and SI&A information shall be revised, if necessary, to reflect the actual elements, quantities, comments and items found in the structure.
- F. Completed inspection reports shall be submitted to the CDOT Project Manager within 90 days of the inspection date or at the end of the Task Order period whichever is earlier.

**X. UNDERWATER INSPECTIONS**

- A. Underwater inspections shall consist of any appropriate method, short of employing diving or remote submersibles, to evaluate the structure below the waterline. For water depths up to 3 feet, the consultant shall investigate the foundation conditions by probing and/or feeling for undercutting of the foundation or other problems such as deterioration of foundation elements.
- B. All structures with typical water depths in excess of 3' throughout the year shall be recorded in the inspection notes in the report and a list shall be provided to the CDOT Project Manager.

**XI. REPORTING**

- A. All inspection data shall be submitted electronically.
- B. Completed inspection reports containing PEI and SI&A information shall be submitted to the CDOT Project Manager.
- C. All forms shall include the inspector's original or electronic signature and the appropriate date.
- D. As necessary, supplemental sketches, photos, plans, etc. shall be prepared and included as part of the final report to document the structures condition.

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- E. Electronic report shall be submitted on a CD in the CDOT AASHTOWare BrM version 5.x database format as specified by the CDOT Project Manager and compatible with IBM PC microcomputer systems. Alternately, electronic files may be e-mailed. In lieu of submitting separate CDs, all information can be included on a single CD, DVD, flash drive or other method as directed by the CDOT Project Manager.

**XII. SERVICES AND MATERIALS AVAILABLE FROM CDOT**

The following services and materials will be available to the consultant from CDOT:

- A. CDOT Structure Inventory Coding Guide, CDOT Pontis Bridge Inspection Manual, Pontis User's Manual, and BRIAR Manual.
- B. CDOT Staff will be available for reference on coding, or other related concerns.
- C. Most current designated STRAHNET and NHS routes (identified in the database).

**XIII. FINAL REVIEW**

- A. Each electronic structure folder will be reviewed by the CDOT Project Manager for completeness and consistency. Each incomplete or inconsistent report will be returned to the consultant for review and for corrections
- B. The consultant shall hold a final report presentation meeting, at the end of each task order, with CDOT when all inspection work is completed and reports have been accepted by the CDOT Project Manager. This presentation shall occur no later than 60 days from the date that the final reports are accepted by the project manager.
- C. The CDOT Project Manager may accompany the consultant during field inspections or visit the office of the consultant to review procedures and inspection reports and to verify billings.

**XIV. METHOD OF PAYMENT**

These contracts will be paid for on a cost plus fixed fee basis. The consulting firms will bill for their actual costs, incurred while performing the work, using the negotiated rates. Consultants will bill monthly and include a project status update with each billing.



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**APPENDIX A**  
**IDENTIFICATION OF CRITICAL WALL CONDITIONS**

- A. **PURPOSE:** This appendix establishes the procedures of the Colorado Department of Transportation (CDOT), Staff Bridge Branch regarding the general subject of essential repair findings (ERF). The term “essential repair” as contained within these procedures is intended to mean a structural or safety related deficiency that requires immediate follow-up inspection or action.
- B. **TYPICAL CONDITIONS:** The following represents typical but not all inclusive inspection findings which are considered to be an ERF:
1. **Retaining and Noise Wall Structures**
    - a. A portion of the wall may fall and injure a person or damage property
    - b. Scour, drainage, damage, deterioration, or corrosion that threaten the structural integrity of the wall
    - c. Scour under a spread footing, which has caused a loss of 15% of the bearing area
- C. It shall be the responsibility of the bridge inspection team leader performing an inspection to be alert for conditions other than identified above which may also be considered an ERF. Such a finding shall be reported to CDOT upon return from the inspection or, if deemed necessary, immediately by telephone or in person.
- D. The criticality of the deficiency will result in one or more of the following actions with an importance described as follow:
1. Immediate closure.
  2. Restricted traffic usage.
  3. Urgent repairs.
- E. **SPECIAL ACTIONS REQUIRED OF THE INSPECTION TEAM LEADER:**
1. The team leader shall notify CDOT by phone, or in person, when the actions identified as 1 (Immediate closure) or 2 (Restricted traffic usage) above are appropriate. He or she should describe the unsafe condition and recommend immediate steps to be taken to insure safety to the traveling public. The consultant shall follow-up all verbal communication in writing within 3 business days.
  2. The consultant shall notify CDOT in writing, within one week, when the action identified as 3 (Urgent repairs) above is appropriate. This notice should include comments relative to an appropriate repair. This does not mean that the consultant must provide a design for the repair.
  3. The team leader shall provide written confirmation to CDOT for any action required above. E-mail confirmation with supporting documentation shall be sent to the CDOT Project Manager with “cc” to other as directed by the CDOT Project Manager on all essential inspection findings correspondence.