

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

**I. GENERAL**

The goal of this project is to update the National Bridge Inventory (NBI) through inspection of bridges owned by local governments (cities and/or counties) and to inform the bridge owners and the Colorado Department of Transportation (CDOT) of the conditions of the bridges. These bridges will be referred to as “Off-system” bridges hereafter in this Scope of Work (Scope). The local agencies and will be referred to as the “owner” hereinafter in this Scope.

The National Bridge Inventory Standards (NBIS) requires all public bridges to be inspected at least every two years (with the approval of the Federal Highway Administration (FHWA) and the agreement of the owner, some of the bridges that meet specific Federal criteria may be inspected every four years).

The purpose of this agreement is to conduct bridge inspections on Off-system bridges in accordance with the requirements of the National Bridge Inspection Standards (NBIS) and to report the findings to the State and to the owner. The bridge inspections shall be referred to as “the work” henceforth in this Scope. The structures to be inspected must meet the NBIS definition of a bridge as follows:

“A structure, including supports, erected over a depression or an obstruction such as water, a highway, or a railway and having a track or passageway for carrying traffic or other moving loads, and having an opening measured along the center of the roadway of more than 20 feet between under copings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.”,

Colorado has approximately 4,850 Off-system bridges. The list of bridges to be inspected during each of the agreement periods will be identified prior to the renewal of the agreement for each of the periods. The bridge inspection engineer may also direct the consultant to inspect other bridges as necessary.

The maximum term for this agreement shall be for four years. The term shall be divided into periods as follows:

- |                                  |              |         |               |
|----------------------------------|--------------|---------|---------------|
| 1. Initial period (one year):    | July 1, 2009 | through | June 30, 2010 |
| 2. First Supplement (one year):  | July 1, 2010 | through | June 30, 2011 |
| 3. Second Supplement (one year): | July 1, 2011 | through | June 30, 2012 |
| 4. Third Supplement (one year):  | July 1, 2012 | through | June 30, 2013 |

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

## II. DEFINITIONS

- A. **AASHTO** – American Association of State Highway and Transportation Officials.
- B. **ELECTRONIC DATA FILES** - Electronic files containing inventory and inspection data for structures in the bridge inspection engineer specified version of Pontis AASHTOWARE, or other database format, specified by the bridge inspection engineer. Electronic sketches of all the bridges identified in Exhibit E in a Microstation or Microsoft Paint compatible format. PDF files of all inspection reports. Electronic files of bridge photographs as described in section IX, paragraph E of this scope. Electronic rating input files. PDF files of entity bridge maps.
- C. **ENGINEER** – CDOT bridge inspection engineer or designee.
- D. **ENTITY BRIDGE MAPS** – County or other entity maps that are used to graphically record bridge locations.
- E. **FHWA** – Federal Highway Administration.
- F. **FY** – Fiscal Year
- G. **NEW STRUCTURES** – Structures not previously inspected such as newly constructed structures requiring initial inspection or structures found to be qualifying and without prior inspections.
- H. **NHS** – National Highway System.
- I. **OFF-SYSTEM** – Those public bridges which are owned and maintained by local governments and not by the Colorado Department of Transportation
- J. **PEI** – Pontis Element Inspection form. A structure inspection form found within the inspection module of Pontis AASHTOWARE, on which the applicable structure element condition states and comments are reported for each structure inspected.
- K. **SI&A** – Structure Inspection and Appraisal form, (formerly CDOT Form #422). An inventory and appraisal form found within the Pontis AASHTOWARE inspection module that contains information about a structure.
- L. **STRAHNET** – Strategic Highway Network
- M. **TEMPORARY BRIDGE** – A structure with temporary shoring or temporary repairs or a structure erected to maintain traffic, for the short term, pending permanent repair or replacement.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

**III. INSPECTION STANDARDS**

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

- A. CDOT Pontis Bridge Inspection Manual,
- B. AASHTO Manual for Condition Evaluation of Bridges
- C. Bridge Inspection Reference Manual
- D. Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges (Report No. FHWA-PD-96-0010)
- E. Underwater Inspection of Bridges (Report No. FHWA-DP-80-1)
- F. Inspection of Fracture Critical Bridge Members (Report No. FHWA-IP-86-26)
- G. Hydraulic Engineering Circular No. 18 (HEC-18, Publication No. FHWA-IP-90-017),
- H. Hydraulic Engineering Circular No. 20 (HEC-20, Publication No. FHWA-IP-90-014)

**IV. CONSULTANT QUALIFICATIONS**

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

The individual in charge of the organizational unit, in charge of the inspection team, and the bridge inspectors, shall meet the qualifications as stated in the Code of Federal Regulations, 23 CFR, 650.307.

**V. PROJECT MANAGEMENT AND COORDINATION**

The Contract Administrator for the work is:

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

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

The bridge inspection engineer for the work is:

Jeff Anderson, P.E.  
bridge inspection engineer  
Colorado Department of Transportation  
4201 East Arkansas Ave.  
Room 107  
Denver, Colorado 80222  
(303) 757-9188

Project management activities will be coordinated by:

Karen Mondragon, CEPM I  
Colorado Department of Transportation  
4201 East Arkansas Ave.  
Room 107  
Denver, Colorado 80222  
(303) 757-9470

## **VI. PROJECT LOCATION**

The State is divided into three horizontal bands with one consultant contracted to do each band. It is anticipated that the consultants inspecting these areas will be rotated after the first two years of this contract, and every two years thereafter. The Department reserves the right to combine or otherwise modify any, or all, of the bands and to select the consultant(s) to perform the work in accordance with these modifications at the conclusion of the consultant selection process. The bridge inspection engineer may revise these alignments of counties in the odd and even years.

The counties, which include the cities within these counties, currently in each of the three bands are as follows:

### **A. NORTH AREA:**

**Odd numbered fiscal years:** see Exhibit E

**Even numbered fiscal years:** see Exhibit E

### **B. CENTRAL AREA:**

**C. Odd numbered fiscal years:** see Exhibit E

**Even numbered fiscal years:** see Exhibit E

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

**D. SOUTH AREA:**

**Odd numbered fiscal years:** see Exhibit E

**Even numbered fiscal years:** see Exhibit E

**E. UNSCHEDULED INSPECTIONS**

- A. Unscheduled inspection of bridges will be required from time to time. These inspections are typically for newly constructed bridges that require a post-construction inspection. At times, a local entity will request an inspection for bridges that the local entity has discovered to have an apparently critical problem.
- B. Newly constructed bridges must be inspected and rated within thirty days of notification from the bridge inspection engineer.
- C. Special inspections shall be conducted at the request of the bridge inspection engineer for non-NBI qualifying and CDOT-owned structures. The inspection requirements and standards outlined within this scope of work shall apply to these structures.

**VII. PROJECT DURATION**

- A. The work shall commence on the date specified in the Notice to Proceed and shall be completed on, or before, June 30 of the following year.
- B. Completion is defined as (1) having submitted all bridge reports in the required format to the bridge inspection engineer for review, (2) the bridge inspection engineer having reviewed and approved the reports for distribution to the owners, and (3) the presentation of the final reports to the owners in a meeting held at a location specified by the owner.

**VIII. CONSULTANT RESPONSIBILITY**

- A. The consultant shall be responsible for the complete inspection, rating, and reporting of qualifying off-system bridges in their areas. NBI bridge inspections shall be conducted within the same quarter that the structures were last inspected in. When this timing requirement cannot be met, written notification shall be given to the bridge inspection engineer.
- B. The consultant shall stay informed of changes in the bridge inventory in their areas due to annexations, replacements, or newly constructed bridges. The consultant shall inform the bridge inspection engineer of these changes.
- C. The consultant shall follow the procedures specified in Appendix A of the Scope when a critical bridge condition is encountered.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

- D. The consultant shall insure that bridges are properly posted and signed. Photo documentation of the posting sign shall be included with each inspection report.
- E. The consultant shall submit completed inspection reports to the bridge inspection engineer for review prior to submitting the reports to the owner.
- F. The consultant shall conduct the work in accordance with all governing safety rules and regulations applicable to the work.
- G. The consultant shall be responsible for providing updated ADT's for the counties and cities inspected under supplements 3 and 4.
- H. The consultant shall be responsible for providing pin inspections under supplement 4.

**IX. INSPECTION REQUIREMENTS**

- A. All bridge coding items shall be completed per the requirements of the NBIS and CDOT in accordance with the following:
  - 1. The FHWA manual Recording and Coding Guide for the Structure Inventory and Appraisal of the Nation's Bridges, December 1995 (Federal Coding Guide), except that English Units shall be recorded,
  - 2. The CDOT Structure Inventory Coding Guide, and
  - 3. The CDOT Pontis Bridge Inspection Coding Guide (only numeric values are necessary on the PEI form for Items 58, 59, 60, 61, 62, 71, and 72. Comments for those items are not necessary. The condition states and comments for the Pontis elements applicable to a structure shall be reported on the PEI forms according to the CDOT Pontis Bridge Inspection Coding Guide).
- B. The consultant shall meet with the bridge inspection engineer at the beginning of each quarter to present a progress report for the previous quarter and a project schedule for the next quarter. The progress report shall list the entities inspected and the number of bridges and types inspected in each entity. The schedule for the next quarter shall include the entities to be inspected, the number of bridges and types in each of the entities, the personnel assigned to do the work, and the approximate dates that the inspections will commence in each entity.
- C. The consultant shall contact each bridge owner prior to beginning work in the owner's area. The consultant shall meet with the bridge owner at the owner's request. The purpose of this contact or meeting is to identify themselves to the

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

owner, to learn of changes in the inventory, to present their plan of action to the owner, and to obtain information pertinent to the inspection such as plans, maps, etc.

- E. A minimum of three 3 ½” by 5” mounted color photographs, or color reproductions on paper from digital cameras are required for each bridge. One photograph shall show the complete bridge in an elevation view and the other photograph shall show the entire roadway surface of the bridge looking in the direction of inventory. The roadway photo may be taken looking in the opposite direction the next inspection cycle and alternate between the two, thereafter. The elevation view, if at all possible, shall be taken from the upstream side where roadways cross waterways. The elevation view may be taken from the downstream side if that view of the bridge is less obstructed by vegetation. One photograph shall be taken at the bottom of the superstructure or culvert, showing the girders if applicable and oriented to look down the center of the roadway from beneath the structure. In all cases the description of the photo shall identify the direction in which the photo is taken. digital cameras shall be a minimum of 2 megapixel resolution capabilities. Individual photo sizes shall be limited to less than 500 kilobytes where possible. In addition to providing the paper photographs, the pictures shall be stored and submitted on a compact disk.
- F. Supplemental photographs and sketches shall be completed to give a clear understanding and documentation of distressed bridge conditions.
- G. A separate set of photographs, taken in a panoramic view, is required for those bridges that are over waterways. These photos shall be taken every six years unless changes merit a more frequent interval. The procedures for taking the scour photographs are defined further in this scope of work.
- H. The PEI condition states and comments and the SI&A items shall be reported with the “Inspection Report\_English (with Notes), “insp007b\_inspection\_sia\_english” or other report approved by the bridge inspection engineer. The PEI and SI&A information shall be revised, if necessary, to reflect the actual elements, quantities, comments and items found in the structure. For re-inspections, many of the items listed on the form will remain the same as in previous reports and need not be changed unless found to be in error or changed since the last inspection report.
- I. A cross-section shall be provided with each inspection for structures that span across waterways, dry streambeds, gullies, or other potential waterways. The cross-section shall be plotted on the structure sketches and made a part of the report. The cross-section shall be measured to the underside of the girders or other structural members and taken at each pier, abutment midpoint of each span, and intermediate locations as appropriate. The new cross-sections shall be plotted over previous cross-sections to determine if scour or degradation is

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

occurring. The consultant shall inform the entity in writing, with a copy to the bridge inspection engineer, whenever the following conditions are found:

1. A general channel degradation, as determined by the cross-sections, of 1' or more, and/or
2. Local pier and/or abutment scour of 2 ft., and/or
3. Footings or pilings have become exposed.

The letter shall specifically identify the problem being reported, the location of the problem, and recommended action for the entity to take. The recommended action may include, but is not limited to monitoring, load restrictions, closure, a brief description of a repair, or a recommendation for a hydraulic evaluation and structural analysis of the bridge that is beyond the services to be provided under this agreement.

- K. Completed inspection reports shall be submitted to the bridge inspection engineer within 30 days after completing a county or at the end of the contract period whichever is earlier.
- L. Railroad bridges, pedestrian bridges and tunnels are special structures that require inspection. The inspection requirements are the same as highway structures. Railroad bridges and tunnels need not be load rated. Pedestrian bridges may be load rated, if directed by the bridge inspection engineer.
- M. If cracks or other flaws are suspected in steel members, non-destructive testing (NDT) (dye-penetrant, magnetic particle, or ultrasonic) shall be performed on the suspected portion to accurately determine if cracks or other flaws are present. Consultants shall have the appropriate NDT equipment present at each steel structure inspection site.
- N. Each inspected bridge shall be located using GPS equipment to obtain longitudes and latitudes. GPS equipment shall be accurate to within ten feet. The GPS reading shall be taken at the left edge of roadway at abutment one.

**X. STRUCTURAL ANALYSIS REQUIREMENTS**

- A. Each new structure, and any previously inspected and rated structure for which the rating may have changed because of structural reasons (subject to paragraph E in this section) since the last inspection, shall be rated in accordance with the current AASHTO Manual for Condition Evaluation of Bridges, AASHTO Standard Specifications for Highway Bridges, and CDOT Staff Bridge Load Factor Rating Manual. The load rating capacity shall be reported on the Load Rating Summary Sheet.
- B. The consultant shall employ the computer programs currently used by CDOT bridge rating unit unless otherwise approved to evaluate the load carrying

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

capacity. Any re-rates or new ratings shall be performed using Virtis, as applicable. Ratings shall be complete and independent of any previous analysis. The costs of the computer runs shall be included in the cost of the work.

- C. If the current physical condition of the structure and present loadings (subject to paragraph E in this section) accurately reflect those assumed in an existing load rating, the structure need not be re-rated. However, the Load Rating Summary Sheet shall clearly state that, in the judgment of the consultant, the bridge did not require re-rating and the statement shall be signed by the consultant. The work involved with this shall be included in the regular inspection of the structure and not be paid for separately.
- D. Special Rating Conditions:
1. Normally, substructures are not analyzed in establishing the load ratings. However, if the consultant finds deteriorated conditions in the substructure that affect the load carrying capacity of the bridge, the consultant shall conduct a substructure analysis and load-rate the bridge based on the controlling rating. The ratings of the superstructure and substructure shall both be noted on the Load Rating Summary Sheet when the substructure is the controlling unit.
  2. Concrete structures for which details of reinforcement are not known, and for which a reasonable search cannot locate plans, must be rated visually using sound engineering judgment. As a general rule, load restrictions will not be required if distress is not visible and the Load Rating Summary Sheet shall indicate a 36 Ton inventory rating and a 40 Ton operating rating and clearly state that the rating was a visual rating based on field observations.
  3. Bridges shall be re-rated when:
    - a. The change in asphalt or gravel thickness from the previous rating amounts to 3" or more.
    - b. Structural conditions change. For example when one or more timber stringers have deteriorated, broken, split, or otherwise lost section capacity since the previous rating.
    - c. The structure was widened or rehabilitated and not re-rated at that time.
    - d. Other conditions exist that suggest re-rating is needed. The condition must be documented with the new rating.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

**XI. FRACTURE CRITICAL STEEL BRIDGES**

Fracture critical members are those defined by the FHWA in their manual titled *Inspection of Fracture Critical Bridge Members* and shall be identified and inspected in accordance with that document.

- A. Fracture Critical Members (FCM), or member components, are non-redundant tension members or tension components of members whose failure would be expected to result in collapse of the bridge.
- B. Some examples of fracture critical bridges are two-girder systems, two-girder steel box sections, two-truss systems, tied arches, suspension spans, simply supported cross girders and pier caps, and two-girder systems using pin and hanger supports.
- C. The consultant shall identify steel structures with members classified as “Fracture Critical” and shall identify the members on copies of the plans or on sketches and made a part of the structure folder. The consultant shall provide a list of the fracture critical bridges to the bridge inspection engineer with each submittal of the inspection reports. The words “FRACTURE CRITICAL” shall be clearly stamped on the outside of each appropriate structure folder.
- D. Ultrasonic testing shall be conducted on the pins of pin-connected trusses and the pins and hanger straps of the connected girders in FY 2013. A list of the bridges tested in 2009 will be provided by CDOT. Pins and hanger straps that the consultant has special concern about may be inspected on a more frequent interval as agreed to, or directed, by the bridge inspection engineer.
- E. Ultrasonic testing shall be done in accordance with the requirements specified in Appendix C, “Ultrasonic Inspection Procedure for Bridge Pins and Hanger Straps”. Use of dye penetrant and/or magnetic particle NDT methods is considered part of the regular inspection work and not paid for separately.

**XII. 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’, 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 bridges with piers and/or abutments with typical water depths in excess of 3’ throughout the year shall be recorded in the reports and a list of the submerged substructure units provided to the bridge inspection engineer. The substructure units below the waterline will be inspected under a separate contract in fiscal year 2010 and at 4-year intervals thereafter.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

**XIII. SITE REVIEW**

- A. A site review will be required for all bridges recommended for closure to verify that they are closed. Photographs shall be taken to record the visit and, if appropriate, notes shall be made and included in the structure folder.
- B. Bridges that have been removed and replaced with non-qualifying structures shall be photographed and a short narrative shall be provided describing the replacement structure. These bridges shall be removed from the bridge inventory.

**SCOUR ANALYSIS/REPORT**

- A. The scour analysis report shall be sealed by the professional engineer performing the analysis.
- B. Scour depth shall be determined per the guidelines documented in the HEC-18 manual. The scour analysis
- C. If a local scour analysis has not previously been conducted for structures over a watercourse, a depth of scour prediction shall be made in accordance with HEC-18. A reasonable effort shall be made to determine the foundation type, e.g. spread footing, piling, caisson, etc, so that a risk factor may be determined. Canal crossings and shale stream bottoms are examples of conditions where scour analysis may not be necessary. The bridge inspection engineer shall approve the scour analysis prior to it being performed for structures with a low scour potential (i.e., structures over lined channels, canals, or other controlled waterways).
- D. For each bridge analyzed for scour, the consultant shall submit the following information as part of the final report. This information shall be entered into the Pontis table, "Userbrdg":
  - 1. Item113C Area of opening
  - 2. Item113D Channel slope through the bridge opening
  - 3. Item113E Maximum estimated depth of flow
  - 4. Item113F Pier width
  - 5. Item113G Angle of attack to the pier
  - 6. Item113H Wetted perimeter
  - 7. Item113I Local scour depth predicted by HEC-18 methods
  - 8. Item113J Manning's *n*

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

9. Item 113K Flow rate (Q) through bridge
  10. Item 113L Length of pier
  11. Item 113M Scour Watch (Y/N)
- E. For each bridge analyzed for scour, the consultant shall submit a table showing structure number; feature crossed; calculated scour depth for a 500-year flood; distance to bottom of bridge footing, piles or other foundation type referenced to the bottom of the upstream girder (bridge foundation type may be unknown); type of streambed foundation material; velocity of stream; pier dimensions; pier type, slope of the streambed, depth of flow. The procedure for conducting this work is as follows:
1. Make visual observation of bridge site relative to the drainage basin.
  2. Probe at abutments and piers to identify and record scour and undercutting.
  3. Measure and record pier width, length, and pier nosing. Determine angle of flood flow to pier centerline.
  4. Determine streambed cross-sections 500' upstream and 500' downstream, as site features will allow, measured from the upstream edge of the bridge and tied to streambed cross-sections taken during the regular bridge inspection.
  5. Identify streambed material types e.g. boulders, cobbles, gravel, sand, silt, etc.
  6. Take a minimum of two photographs looking upstream and two photographs looking downstream in a panoramic manor to get as much of a view of the contributing area as possible.
  7. When practical, discuss stream flow history with local people.
  8. Estimate the depth of maximum flow considering one of the following:
    - a. Depth of flow equal to the vertical distance from flow line to bottom of girder.
    - b. Depth of flow equal to the vertical distance from flow line to top of channel banks where visual inspection indicates water will flow away from the bridge.
    - c. Depth of flow equal to the vertical distance from flow line to 3ft. above the channel banks when visual inspection does not indicate where water will flow away from the bridge.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

9. Where bridges are determined to be scour critical or have unknown foundations, determine and report the water surface level at which the bridge should be closed.
10. If the depth of scour is below the foundation, then the bridge is considered to be scour-critical. If there is calculable scour, but not below the bottom of the foundation, perform a structural analysis to determine whether or not the bridge is unstable. The scour analysis shall be included in the report and shall be used for coding Item 113.

**XV. REPORTING**

- A. The consultant shall use a CDOT-provided computer program for reporting Pontis inspection and NBIS inventory information. The consultant shall provide final reports, with original signatures, to the entity and to the bridge inspection engineer. The electronic data files, as described in Section II, paragraph B, shall be provided only to the bridge inspection engineer. The bridge inspection engineer will provide the electronic data file to the entity at their request
- B. Each inspected structure shall be located on the entity maps. If a structure has been permanently removed, the entity map shall be modified accordingly. Maps that have become illegible shall be redone.
- C. With the approval of the bridge inspection engineer, the consultant may generate his own SI&A forms that conform to the requirements of CDOT and the NBIS.
- D. The structure folder shall be an 8 ½” X 14 ½” manila file folder that contains the various forms and reports. Labels that are loose shall be reattached or replaced and folders that are deteriorated shall be replaced.
- E. Completed inspection reports containing PEI and SI&A information currently “Inspection Report\_English (with Notes), “insp007b\_inspection\_sia\_english” as found in the inspection module of Pontis AASHTOWARE, ratings, sketches, and other pertinent documentation shall be included in a structure folder and one shall be submitted to the bridge inspection engineer and one copy to the entity.
- F. All forms shall include the inspector’s and/or rater’s original signature and the appropriate date.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

- G. Overwriting of previous reports is not acceptable.
- H. As necessary, supplemental sketches, photos, plans, etc. shall be prepared and included as part of the final report to document bridge condition.
- I. If a bridge is rated or re-rated, all rating calculations and a new Load Rating Summary Sheet shall be submitted as part of the final report. An electronic copy of the input file shall be submitted to the bridge inspection engineer on 1.44 MB floppy disk or CD.
- J. In addition to the printed reports, an electronic report that duplicates the printed report shall be submitted on a CD in the Pontis AASHTOWARE version specified by the bridge inspection engineer and compatible with IBM PC microcomputer systems. Alternately, electronic files may be e-mailed.

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

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

- A. All forms required to be completed for each inspection.
- B. Load Rating Summary Sheets
- C. CDOT Structure Inventory Coding Guide, CDOT Pontis Bridge Inspection Manual, Pontis User's Manual, CDOT Staff Bridge Load Factor Rating Manual, and the most current user manuals for the bridge rating programs.
- D. CDOT Staff will be available for reference on coding, rating, computer use, or other related concerns. CDOT Staff will provide the current version of Pontis for use on the consultant computers. Licensing for this software is covered under the CDOT annual licensing agreement with AASHTO. The consultant will be responsible for obtaining their own version of Virtis for rating bridges.
- E. Most current designated STRAHNET and NHS routes (identified in the database).
- F. ADT adjustment tables.
- G. Electronic files on computer disks in the version of Pontis AASHTOWARE specified by the bridge inspection engineer, compatible with IBM PC microcomputers. These will be provided on an entity basis and will reflect the current inventory. Edit features within Pontis AASHTOWARE will be used

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

for adding structures to the database, editing data on existing structures, and printing the appropriate forms.

- H. Pontis installation compact disk.

**XVII. FINAL REVIEW**

- A. Each structure folder will be reviewed by the bridge inspection engineer 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 with each entity when all inspection work is completed and reports have been accepted by the bridge inspection engineer. This presentation shall occur no later than 60 days from the date that the final reports are accepted by the bridge inspection engineer. This will be a joint review with the proper city/county officials and the consultant to discuss the inspection reports. This review will be held at a mutually agreed upon location. A letter documenting this meeting shall be submitted to the bridge inspection engineer. If the city/county officials choose not to have the presentation, the letter will state that the officials declined the presentation. The consultant shall notify the project manager of the meeting by e-mail and extend an invitation for the project manager to attend.
- C. The bridge inspection engineer or his designee may accompany the consultant during field inspections or visit the office of the consultant to review procedures and inspection reports and to verify billings.

**XVIII. METHOD OF PAYMENT**

These contracts will be paid for on a specific rate of pay basis. The consulting firms will bill for their actual costs, using the negotiated rates, incurred while performing the work. The consulting firms will be paid after turning in the billings and support documents for each entire county. Structures in the larger counties may be broken up as agreed upon between the consulting firms and the Engineer.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

**APPENDIX A**  
**IDENTIFICATION OF CRITICAL BRIDGE CONDITIONS**

- A. **PURPOSE:** This appendix establishes the procedures of the Colorado Department of Transportation, Bridge Design and Management Branch regarding the general subject of critical bridge inspection findings. The term “critical” as contained within these procedures is intended to mean a structural or safety related deficiency that requires immediate follow-up inspection or action.

Bridge postings and/or closings result in many short term adverse effects on the delivery of public and private service locally but in themselves do not necessarily constitute a critical condition. Rather, deficiencies that are such as to compromise the ability of the structure to safely convey traffic are deemed to be critical inspection findings (CIF) requiring immediate identification, notification, correction, and follow-up.

- B. **TYPICAL CONDITIONS:** The following represents typical but not all inclusive inspection findings which are considered to be a CIF:

1. **Tension Members**

Tension members identified as fracture critical members within the Structure File Data and which are damaged by natural or impact forces.

2. **Load Capacity**

A condition which results in a restriction of the maximum acceptable load carrying capacity of a structure to some value less than 27 Tons on the Type III, 3-axle truck at the Operating Rating level.

3. **Timber Structures**

- a. Three adjacent crushed stringers
- b. Three broken stringers in one span, two of which are adjacent to one another.
- c. Stringers with rot at the ends, which may cause the stringer to fall off the timber cap.
- d. “Mushrooming” for a depth of 2” on three adjacent stringers.
- e. Rot in the top of 80% of all stringers in one span, which reduces the effective depth by 25%.

4. **Concrete Structures**

- a. Concrete girders with over 30% of the primary moment steel severed.
- b. Loss of section in beam ends and/or spalls in concrete girder supports where girders have less than 80% bearing area remaining.
- c. Girders sheared at the ends to the extent that displacement has occurred.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

5. Steel Structures
  - a. Trusses with misalignment of a top chord member in an amount that exceeds half the width of the member.
  - b. One element of a two element bottom chord truss member being severed.
  - c. The bottom flange of a steel girder being severed.
  - d. Bottom chord truss members with over 30% section loss.
  - e. Steel culverts including Super Spans with unusual displacement of the section and/or gaps at the point of overlap and cracks in bolt lines.
  
6. General – All Structures
  - a. Scour which has caused vertical or horizontal displacement.
  - b. Scour under a spread footing, which has caused a loss of 15% of the bearing area.
  - c. Substructure problems that threaten the structural integrity of the bridge.
  
- 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 a CIF. Such a finding shall be reported to the owner 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. Posting load limits.
  3. Restricted traffic usage.
  4. Urgent repairs.
  
- E. SPECIAL ACTIONS REQUIRED OF THE INSPECTION TEAM LEADER:
  1. The team leader shall notify the owner by phone, or in person, when the actions identified as 1 through 3 above are appropriate. He should describe the unsafe condition and recommend immediate steps to be taken to insure safety to the traveling public.
  2. The team leader shall provide written confirmation to the owner for any action required by 1 above. Copies of the confirmation with supporting documentation shall be sent to the bridge inspection engineer.
  3. Within ten working days after an owner has been informed of a type 1, 2, or 3 deficiency, the consultant shall contact the owner by phone to determine what action was taken. The consultant shall send a follow-up letter to the bridge inspection engineer describing what action was taken by the owner.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

4. The consultant shall notify the owner in writing of Type 4 deficiencies within one week. This notice should include comments relative to an appropriate repair. This does not mean that the consultant must provide a design for the repair. A copy of the notification shall be sent to the bridge inspection engineer. The bridge inspection engineer will notify the FHWA division administrator when a critical deficiency, 1 through 4 is reported. The bridge inspection engineer will forward documentation, as describe in paragraph E.2 above, to the FHWA division administrator.
- F. The bridge inspection engineer will follow-up with the owner as to any items brought to his attention per paragraph E.4 above and which are indicated to be unresolved.

Colorado Department of Transportation  
Scope of Work for Off-System Bridge Inspection

APPENDIX B  
BRIDGE CLOSURE REQUIREMENTS

- A. A bridge MUST BE CLOSED if it is not capable of carrying 3 Tons at the operating level.
- B. Bridges with an Inventory Rating of 3 Tons must be posted with a gross load of # Tons and must be closed to trucks.
- C. Bridges that require closure must be closed per the MUTCD signing and barricading specifications. The “ROAD CLOSED” sign shall be placed at the point of physical closure. If the jurisdiction desires, the message may be changed to “BRIDGE CLOSED”. This sign is to be accompanied by a permanent Type III barricade installation that completely closes the roadway to the passage of vehicles.
- D. Due to the tendency for the public to move and/or drive around barricades, particular effort should be made to insure that a substantial installation is used.