

**Report No. CDOT-2010-  
Final Report**

---



# **COLORADO STATEWIDE HISTORIC BRIDGE INVENTORY STUDY NO: 34.11**

**Lisa Schoch  
CDOT Environmental Programs Branch**

**and**

**Clayton Fraser  
FraserDesign**

**May 2011**

**COLORADO DEPARTMENT OF TRANSPORTATION  
APPLIED RESEARCH AND INNOVATION BRANCH**

The contents of this report reflect the views of the author(s), who is(are) responsible for the facts and accuracy of the data presented herein. The contents do not necessarily reflect the official views of the Colorado Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification, or regulation.

## Technical Report Documentation Page

1. Report No. CDOT-2010-	2. Government Accession No.	3. Recipient's Catalog No.	
4. Title and Subtitle Colorado Statewide Historic Bridge Inventory		5. Report Date May 2011	
		6. Performing Organization Code	
7. Author(s) Lisa Schoch and Clayton Fraser		8. Performing Organization Report No.	
9. Performing Organization Name and Address Lisa Schoch (CDOT) 4201 E. Arkansas Avenue Denver, CO 80222  Clayton Fraser (Fraser Design) 5700 Jackdaw Drive Loveland, CO 80537		10. Work Unit No. (TRAVIS)	
		11. Contract or Grant No.	
12. Sponsoring Agency Name and Address Colorado Department of Transportation - Research 4201 E. Arkansas Ave. Denver, CO 80222		13. Type of Report and Period Covered  Final, research and report-writing spanned from 4/5/09 – 6/30/10	
		14. Sponsoring Agency Code	
15. Supplementary Notes Prepared in cooperation with the US Department of Transportation, Federal Highway Administration			
16. Abstract: The purpose of the Colorado statewide historic bridge inventory was to document and evaluate the the National Register of Historic Places eligibility all on-system highway bridges and grade separation structures built in Colorado between 1959 and 1968. The results of this study were to be documented in a searchable database, in individual historic bridge site forms, and in Multiple Property Documentation Form (MPDF), a report that includes a historic context and provides guidance for evaluating historic properties. The project scope also included an update to information about the listed, eligible or possibly eligible bridges identified in CDOT's previous bridge inventories from 1983, 1987, and 2000. The project was not completed during the contract period, so all of the data is in draft form and there are no results to report.  Implementation: The results of the inventory will be used by the history staff at CDOT Headquarters and Regions 4 and 6 in coordinating compliance with Section 106 of the National Historic Preservation Act for projects involving bridge replacement and repair. It will be distributed to each of the CDOT transportation regions for use in project planning. The survey will also be used by the Colorado Office of Archaeology and Historic Preservation (OAHP) and local historical societies, preservation groups, certified local governments, and other organizations interested in historic bridges. The results of the study will be distributed to agencies and groups and once the study has been completed, a copy of the inventory will be housed at the Colorado OAHP for use by historians, consultants, preservation groups, and members of the public.			
17. Keywords: Bridge inventory, 1959-1968, National Register, documentation, photography, demolition, listed, eligibility, non-eligibility		18. Distribution Statement No restrictions. This document is available to the public through the National Technical Information Service 5825 Port Royal Road Springfield, VA 22161	
19. Security Classif. (of this report) None	20. Security Classif. (of this page) None	21. No. of Pages 14	22. Price

**Form DOT F 1700.7 (8-72)** Reproduction of completed page authorized

# **COLORADO STATEWIDE HISTORIC BRIDGE INVENTORY**

Report No. CDOT-2010-

**Prepared by:**

Lisa Schoch  
CDOT Environmental Programs Branch

and

Clayton Fraser  
FraserDesign

**Sponsored by:**

Colorado Department of Transportation  
In Cooperation with the  
U.S. Department of Transportation  
Federal Highway Administration

Colorado Department of Transportation  
Research Branch  
4201 E. Arkansas Avenue  
Denver, CO 80222  
(303) 757-9506

May 2011

## **ACKNOWLEDGEMENTS**

The Study Manager for this project was: Lisa Schoch (CDOT Environmental Programs Branch (EPB)—Headquarters). The study panel was comprised of: Dianna Litvak (CDOT Region 6), Robert Autobee (CDOT Region 4), Jennifer Wahlers (CDOT EPB HQ), Amy Pallante, and Joseph Saldibar (Office of Archaeology & Historic Preservation/State Historic Preservation Office), Robert DeDios (CDOT DTD Research), and Astrid Liverman (Colorado Historical Society/National and State Register Coordinator).

The authors of this report also wish to acknowledge the capable assistance of Steve White, Bridge Management EP Tech III with the Colorado Department of Transportation Staff Bridge Branch.

## **EXECUTIVE SUMMARY**

The purpose of the study was to evaluate for National Register of Historic Places (NRHP) eligibility the on-system highway bridges in Colorado built during the 1959 - 1968 period. The scope of work also involved an update to CDOT's three previous bridge inventories (completed in 1983, 1987, and 2000) to evaluate the condition of NRHP-listed, eligible, and possibly eligible bridges from those studies and re-evaluate their NRHP eligibility status.

The study is needed to assist CDOT in its compliance with Section 106 of the National Historic Preservation Act, which requires federal agencies to assess the effect of their undertakings on historic properties. CDOT historians will be able to use the results of the inventory to streamline the Section 106 review of projects involving bridges determined not eligible in the survey, and will know when to budget more time for the clearance process for replacement projects involving bridges determined eligible.

Because this study was not completed in the contract period, and all materials submitted were in draft form, there are no research results. CDOT's Environmental Programs Branch plans to complete the study in the next year and will provide the final report on the Division of Transportation Development's Research Branch web site.

## **IMPLEMENTATION STATEMENT**

The results of the inventory will be used by the history staff at CDOT in coordinating compliance with Section 106 of the National Historic Preservation Act for projects involving bridge replacement and repair. It will be distributed to each of the CDOT transportation regions for use in project planning. The survey will also be used by the Colorado Office of Archaeology and Historic Preservation (OAHP) and local historical societies, preservation groups, certified local governments, and other organizations interested in historic bridges. The results of the study will be distributed to agencies and groups, and a copy of the inventory will be housed at the Colorado OAHP for use by historians, consultants, preservation groups, and members of the public.

**TABLE OF CONTENTS**

**INTRODUCTION .....1**  
**BACKGROUND .....1**  
**STUDY OBJECTIVES AND SCOPE OF STUDY .....2**  
**CONCLUSIONS AND RECOMMENDATIONS .....4**  
**REFERENCES .....5**

## INTRODUCTION

### Background

For all of its construction projects, CDOT is responsible for ensuring compliance with Section 106 of the National Historic Preservation Act of 1966 (Section 106) and Section 4(f) of the Department of Transportation Act of 1966. Section 106 requires that federal agencies evaluate the effect of their undertakings on historic properties. CDOT carries out the Section 106 compliance process on behalf of the Federal Highway Administration (FHWA). The Section 106 process involves identifying historic properties, evaluating effects to properties, and mitigating adverse effects to historic properties. In order to determine if a property is significant, historians evaluate it against the National Register of Historic Places (NRHP) criteria. To qualify for eligibility to the NRHP, properties must be significant for association with events, significant people, or must be an example of architecture or engineering. Typically, properties that are 50 years or older are evaluated for eligibility. Once CDOT historians have identified properties and assessed effects, they are required by Section 106 to consult with the State Historic Preservation Officer (SHPO) and other interested or consulting parties, about those findings. Concurrence on eligibility and effects is sought from SHPO and consulting parties in order to move forward with the Section 106 process and ultimately, to clear the project for construction. CDOT is also responsible for compliance with Section 4(f), a substantive law that applies to properties listed in or eligible to the NRHP. Because the process of going through Section 4(f) is lengthy, it is important for CDOT to know which properties are eligible and will be impacted by projects.

Among the many resources that CDOT historians evaluate in the field are vehicular bridges. Highway projects can involve a variety of effects to bridges, including everything from minor maintenance and rehabilitation, to replacement. Like other resources along project corridors, bridges that are 50 years or older must be evaluated to determine if they are eligible to the NRHP. Since 1983, CDOT has conducted three statewide bridge surveys to aid in streamlining the Section 106 process. Each survey resulted in the evaluation of hundreds of on and off-system bridges statewide. The most recent survey—completed in 2000—documented bridges constructed up to 1958. In the next few years, bridges that were not covered in the 2000 survey will reach the 50-year age requirement and will need to be evaluated as part of the Section 106



review process. An inventory of bridges constructed between 1959 and 1968 is necessary to save time and streamline Section 106 review. The bridge inventory will also save time with regard to field work. When a project involves impacts to a bridge, the CDOT historians can check the bridge inventory and if the bridge has already been evaluated, a field survey of the structure is not necessary.

The bridge inventory will be an invaluable tool for CDOT historians and will save countless hours of field survey and Section 106 consultation time, which expedites project delivery for transportation projects involving bridges. The inventory will also provide a wealth of historical background information about the state's historic bridges and bridge development in Colorado.

### **Study Objectives and Scope of Study**

The objective of the study was to evaluate for NRHP eligibility the vehicular bridges and grade separations currently maintained in CDOT's Structure Inventory and Appraisal (SI&A) listing as having been built between 1959 and 1968, and to document this effort through a Multiple Property Documentation Form (MPDF), a searchable database, and bridge inventory forms for each structure. The scope also included an update of CDOT's three previous historic bridge inventories to ascertain and document any changes in condition of all bridges identified as listed, eligible, or possibly eligible for the NRHP, and to determine if the eligibility status for those bridges had changed based on changes to the structure.

The following tasks were undertaken to meet these objectives. None of these tasks were finalized and remain incomplete.

\*A customized computer database was developed based on CDOT Staff Bridge's SI&A general database. The database included locational, structural and historical information for all of the structures.

\*A draft MPDF was prepared. This document was formatted according to National Park Service requirements and included a historic context, associated property types, geographical data, evaluation methods, a bibliography, and tables and figures. Several drafts of this document were

reviewed by CDOT staff and staff from the Colorado Historical Society and the Office of Archaeology and Historic Preservation (OAHP). The document is still in draft form and needs to be revised.

\*CDOT inspection photographs of every bridge built between 1959 and 1968 were reviewed to eliminate bridges with obvious integrity problems. For every bridge in the inventory, a six-page Bridge Inventory Form was prepared, presenting locational, structural and historical information, as well as a location map and photographs. NRHP eligibility for each bridge was evaluated according to the registration requirements developed as part of the draft MPDF. Using these criteria, 20 structures were preliminarily identified as eligible for the NRHP. These forms are still in draft form and will need to be revised.

\*The three previous statewide historic bridge inventories from 1983, 1987, and 2000 were evaluated to identify which bridges would require additional evaluation. Combining the structures from these previous inventories and updates, 712 bridges and grade separations were identified for further evaluation. A Microsoft Access database was produced that includes data about all of these structures. The consultant reviewed photographs and data from the previous inventories and compared them with photographs and data provided by the Staff Bridge Branch of CDOT, to ascertain which of the structures have been altered or demolished. Of the structures evaluated in that effort, it was determined 151 have been demolished and 152 had alterations of note. Most of these alterations involve changes to or replacement of guardrails. Draft forms were produced for all of the 712 bridges in the database, regardless of change of status. The forms are in draft form and will need to be revised.

## **CONCLUSIONS AND RECOMMENDATIONS**

The tasks associated with the historic bridge inventory project were not finalized during the contract period and all of the associated deliverables for this project are incomplete. CDOT's Environmental Programs Branch is in the process of re-evaluating the project scope and planning the completion of the study.

### **ADDENDUM**

After the 2011 publication of this incomplete report, CDOT Environmental Programs Branch coordinated another study, which evaluated over 700 on-system bridges built between 1959-1968 for NRHP eligibility. For information on that study please contact the CDOT Senior Staff Historian or the Colorado Office of Archaeology and Historic Preservation.

## REFERENCES

- Abbott, Carl, Stephen J. Leonard and Thomas J. Noel, *Colorado: A History of the Centennial State*. 4<sup>th</sup> Edition. Boulder: University Press of Colorado, 2005.
- American Association of State Highway Officials. *A Policy on Geometric Design of Rural Highways*. Washington, D.C.: AASHO, 1955.
- American Association of State Highway Officials. *Public Roads of the Past: Historic American Highways*. Washington, D.C.: AASHO, 1953.
- American Association of State Highway Officials. *Standard Specifications for Highway Bridges*. Washington, D.C.: AASHO, 1957, 1961, 1965, 1969.
- American Association of State Highway and Transportation Officials. *Bridge Design Specifications*. Washington, D.C.: AASHTO, 2004.
- American Association of State Highway and Transportation Officials. *AASHTO 1914-1989: Moving America into the Future*. Washington, D.C.: AASHTO, 1990.
- American Association of State Highway and Transportation Officials. *Standard Specifications for Highway Bridges*. Washington, D.C.: AASHTO, 2002.
- American Association of State Highway and Transportation Officials. *The States and Interstates: Research on the Planning, Design and Construction of the Interstate and Defense Highway System*. Washington, D.C.: AASHTO, 1991.
- Analysis of Rigid Frame Concrete Bridges*. Chicago: Portland Cement Association, 1935.
- Colorado Department of Transportation. Bridge Kardex File. CDOT Bridge Division, Denver, Colorado.
- Colorado Department of Highways. "Colorado Historic Bridge Survey Phase II." January 1988.
- Colorado Department of Highways. *Commemorating the Opening of the Pueblo Freeway, July 1, 1959*. Denver: Colorado Department of Highways, 1958.
- Colorado Department of Highways. *Commemorating the Opening of the Monument Valley Freeway, Colorado Springs, July 1, 1960*. Denver: Colorado Department of Highways, 1960.
- Colorado Department of Highways. *Commemorating the Opening of the Denver Valley Highway, November 23, 1958*. Denver: Colorado Department of Highways, 1958.
- Condit, Carl W. *American Building*. Chicago: University of Chicago, 1982.
- Crocker and Ryan, Consulting Engineers, *The Valley Highway: A North-South Limited-Access*

- Highway through Denver*. Denver: Crocker and Ryan, 1944.
- Franklin, F.H. "Trend in Modern Steel Bridge Design." *The Canadian Engineer*, 1 October 1929.
- Guedes, Pedro. *Encyclopedia of Architectural Technology*. New York: McGraw-Hill Book Company, 1976.
- Historic Bridges—Criteria for Decision Making*. Washington, D.C.: Transportation Research Board, 1982.
- "The History of I-25 in Colorado, The History of I-70 in Colorado, etc." [www.dot.state.co.us/50anniversary/I25.cfm](http://www.dot.state.co.us/50anniversary/I25.cfm) (8 June 2009).
- Hornbostel, Caleb. *Construction Materials: Types, Uses and Applications*. New York: John Wiley and Sons, 1990.
- Jacobs, David, and Neville, Anthony. *Bridges, Canals and Tunnels*. New York: American Heritage Publishing Company, 1968.
- Kaszynski, William. *The American Highway: The History and Culture of Roads in the United States*. Jefferson, North Carolina: McFarland & Company, 2000.
- Kutz, Myer, ed. *Handbook of Transportation Engineering*. New York: McGraw Hill, 2004.
- Lewis, Tom. *Divided Highways: Building the Interstate Highways, Transforming American Life*. New York: Penguin Books, 1997.
- Louis Berger Group. "The Interstate Highway System in the United States: Draft Final Historic Context Report." December 2004.
- McNichol, Dan. *The Roads That Built America: The Incredible Story of the U.S. Interstate System*. New York: Sterling Publishing Company, 2006.
- Mesalek, Mark. "Colorado Highways: Interstate 25, Colorado Highways: Interstate 70, etc." [www.mesalek.com](http://www.mesalek.com) (8 June 2009).
- Parsons Brinckerhoff. "A Context for Common Historic Bridge Types." October 2005.
- "Plans for Postwar Superhighways Are Outlined by Denver," *Denver Post*, 12 July 1945.
- Ridgway, A.O. "A Program of Grade Separation Structures for Colorado." *University of Colorado Highway Conference*. March 1936.

Rose, Mark H. *Interstate: Express Highway Politics, 1939-1989*. Knoxville: University of Tennessee Press, 1979.

Salmon, Charles G. *Steel Structures: Design and Behavior*. New York: Harper & Row, 1980.

Tonias, Demetrios E., and Jim J. Zhao. *Bridge Engineering*. New York: McGraw Hill, 2007.

U.S. Department of Transportation, Federal Highways Administration, *2008 Bridge Inspector's Reference Manual plus Bridge Inspection Standards, Fracture Critical Bridge Inspection, Timber Bridge Manual, Covered Bridge Manual*. Washington, D.C.: Department of Transportation, 2008.

“U.S. Highway 6, U.S. Highway 24, etc.” <http://www.rockymountainroads.com> (8 June 2009).