



# Colorado Off-System Bridge Program Description and Guidelines for Selecting Bridges for Rehabilitation or Replacement Funding

These guidelines are intended to provide assistance in selecting OFF-SYSTEM bridge projects and estimating funding eligibility and participation in accordance with the requirements of the Federal Highway Bridge Program and CDOT established criteria.

For more information, contact:

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September 9, 2011

## Program Description

What is a bridge? The Federal definition of a bridge as defined in the National Bridge Inspection Standards (NBIS) published in the Code of Federal Regulations (23 CFR 650.3) is as follows:

“A structure including supports erected over a depression or an obstruction, such as water, highway, or 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 (6.1 meters) between undercopings of abutments or spring lines of arches, or extreme ends of openings for multiple boxes; it may also include multiple pipes, where the clear distance between openings is less than half of the smaller contiguous opening.”

Public bridges meeting this definition fall under the provisions of the National Bridge Inventory Standards (NBIS) and must be inspected on a regular basis. The results of the inspections become a part of the National Bridge Inventory (NBI).

The federal government, through the federal bridge program, provides funding to the Colorado Department of Transportation (CDOT), as well as the other states, for financing a portion of the replacement or rehabilitation costs of bridges which are on the Select List. These funds are also used for bridge inspection, inventory, and asset management purposes.

CDOT's bridge program consists of the federal bridge program funds allocated to the state plus state funds. In recent years state funds have made up 40% to 50% of the total program. Per Federal requirements at least 15% of the federal bridge program funds must be used for off-system bridges. In recent years CDOT has allocated 30% to 35% of the total CDOT bridge program funds to off-system bridges.

The terms on-system and off-system refer to the Federal Functional Classification description of the route carried by the bridge. Generally CDOT owned bridges are on-system and city and county owned bridges are off-system. More specifically,

- On-System bridges are those where Item 26 of the NBI = one of the following:
  - 01 (Rural, Principal Arterial - Interstate),
  - 02 (Rural, Principal Arterial - Other),
  - 06 (Rural, Minor Arterial),
  - 07 (Rural, Major Collector),
  - 11 (Urban, Principal Arterial - Interstate),
  - 12 (Urban, Principal Arterial - Other Freeways or Expressways) ,
  - 14 (Urban, Other Principal Arterial), or
  - 16 (Urban, Minor Arterial).
- Off-System bridges are those where Item 26 of the NBI = one of the following:
  - 08 (Rural, Minor Collector),
  - 09 (Rural, Local),
  - 17 (Urban Collector), or
  - 19 (Urban, Local).

## Definition of Terms

### National Bridge Inventory (NBI)

The aggregation of structure inventory and appraisal data collected to fulfill the requirement of the National Bridge Inspection Standards that each State shall prepare and maintain an inventory of all bridges subject to the NBIS.

### National Bridge Inspection Standards (NBIS)

Federal regulations establishing requirements for inspection procedures, frequency of inspections, qualifications of personnel, inspection reports, and preparation and maintenance of a State bridge inventory. The NBIS apply to all structures defined as bridges on all public roads.

### Public Road

Any road under the jurisdiction of and maintained by a public authority and open to public travel.

### Sufficiency Rating

The sufficiency rating formula is a method of evaluating data by calculating four separate factors to obtain a numeric value which is indicative of a bridge's sufficiency to remain in service. The result of this method is a percentage in which 100 percent would represent an entirely sufficient bridge and zero would represent an entirely insufficient or deficient bridge. The sufficiency rating shall not be less than 0% nor greater than 100%.

The factors considered in determining a sufficiency rating are: S1 - Structural Adequacy and Safety (55% maximum), S2 - Serviceability and Functional Obsolescence (30% maximum), S3 - Essentiality for Public Use (15% maximum), and S4 - Special Reductions (detour length, traffic safety features, and structure type - 13% maximum).

$$\text{Sufficiency Rating} = S1 + S2 + S3 - S4.$$

Bridges which have a sufficiency rating less than 80.0 qualify for the Federal Select List.

### Federal Select List of Bridges

The Federal Select List of Bridges, commonly known as "the Select List", is a subset of the National Bridge Inventory (NBI). The bridges on the Select List have a Sufficiency Rating less than, or equal to, 80.0 AND are either Structurally Deficient or Functionally Obsolete. Bridge program funds can be expended only on bridges which meet these Select List criteria.

To further refine the use of bridge program funds, those bridges on the Select List that have a sufficiency rating from 50.0 through 80.0 qualify only for rehabilitation unless it can be shown that replacement is more economical or feasible. Bridges on the Select List which have a sufficiency rating less than 50.0 qualify for replacement.

## Selecting Bridges for Rehabilitation or Replacement Funding

The following procedures and requirements are used for bridge replacement and rehabilitation projects utilizing bridge program funds.

1. Projects are selected for funding by the Special Highway Committee (SHC). The SHC is administered through the Colorado Municipal League and Colorado Counties Incorporated and is composed of four representatives each from counties and municipalities.

On years where bridge program funding is available for authorizing additional projects, the SHC will solicit the counties and municipalities for bridge applications. Projects are then selected based on priority, typically determined by sufficiency rating and available funds.

Off-System bridge program projects are administered by the CDOT regional offices through the Region Local Agency Project Coordinator. When a county or municipality is notified by the SHC that their bridge application has been successful, the county or municipality then works with the CDOT Region Local Agency Project Coordinator to deliver the project.

The SHC will typically maintain a four year plan of projects. Funding is typically not made available until July and is only made available for budgeting projects scheduled in that fiscal year. The state fiscal year starts on July 1<sup>st</sup>.

2. Before submitting an application for bridge program funding to the SHC, verify that the structure is on, or currently qualifies for, the Federal Select List of Bridges. A copy of the select list can be obtained from the CDOT Staff Bridge Branch, Structure Asset Management Unit. In order to qualify for the Select List, two conditions must be satisfied:
  - a) The structure must have a Sufficiency Rating of 80.0 or less and
  - b) The structure must be either Structurally Deficient (SD) or Functionally Obsolete (FO). Whether a structure is SD or FO is determined by applying specific Federal criteria. If a structure is both SD and FO, then the SD designation controls.

Changes of bridge inspection coding may cause the bridge to fall off the current Select List. Bridges are generally considered eligible if the bridge has appeared on the Select List sometime in the last ten years. Any request to use bridge program funds for a bridge not on the Select List should be fully documented and justified to indicate that additional deficiencies have developed through some natural or unforeseen phenomenon or that the bridge was dropped from the Select List because of changes in the Federal Coding Guide. Contact the Bridge Management Unit for clarification in these cases.

2. Determine if the structure qualifies for replacement or rehabilitation funding:
  - a) Replacement: Structures on the Select List with a Sufficiency Rating LESS THAN 50 qualify for replacement. However, rehabilitation of a structure should always be considered.

Project eligibility includes total replacement of a structurally deficient or functionally obsolete bridge with a new facility constructed in the same general traffic corridor.

- b) Rehabilitation: Structures on the select list with a Sufficiency Rating less than or equal to 80.0 qualify for rehabilitation.

Project eligibility includes the work required to restore the structural integrity of a bridge, as well as work necessary to correct major safety defects, except as noted under ineligible work.

3. Bridge program requirements which must be addressed:

- a) Design Requirements: The project design for replacement or rehabilitation must follow the criteria set by the following design documents: CDOT Project Development Manual, CDOT Bridge Design Manual, CDOT Bridge Detailing Manual, CDOT Bridge Rating Manual, CDOT Drainage Manual, the AASHTO LRFD Bridge Design Specifications, the AASHTO Policy on Geometric Design of Highways and Streets, and other requirements as identified by the CDOT Region Local Agency Project Coordinator.

A structural selection report shall address alternative and economic solutions for the replacement or rehabilitation of the existing bridge.

On a case-by-case basis, under certain conditions a structure apparently only eligible for rehabilitation may still be replaced if:

1. the existing structure type makes rehabilitation impossible, or
2. the existing conditions would be sacrificed by rehabilitation, or
3. the cost of rehabilitation would exceed the cost of replacement.

Applicable hydraulic and environmental issues shall also be included in the report. This report should be submitted in the early stages of the design process to CDOT Staff Bridge Design and Management through the Special Highway Committee. CDOT Staff Bridge Design and Management will forward the report to the appropriate Region Local Agency Program Manager for review and concurrence.

b) Ineligible work:

- 1) Roadwork: The costs of long approach fills, causeways, connecting roadways, interchanges, ramps, and other extensive earth structures, when constructed beyond the attainable touchdown point, are not eligible under the bridge program.

A nominal amount of approach work, sufficient to connect the new facility to the existing roadway or to return the gradeline to an attainable touchdown point in accordance with good design practice is eligible. This roadway work should generally be no more than 15% of the cost for replacing the bridge and shall not be more than the minimum necessary to meet current geometric design requirements.

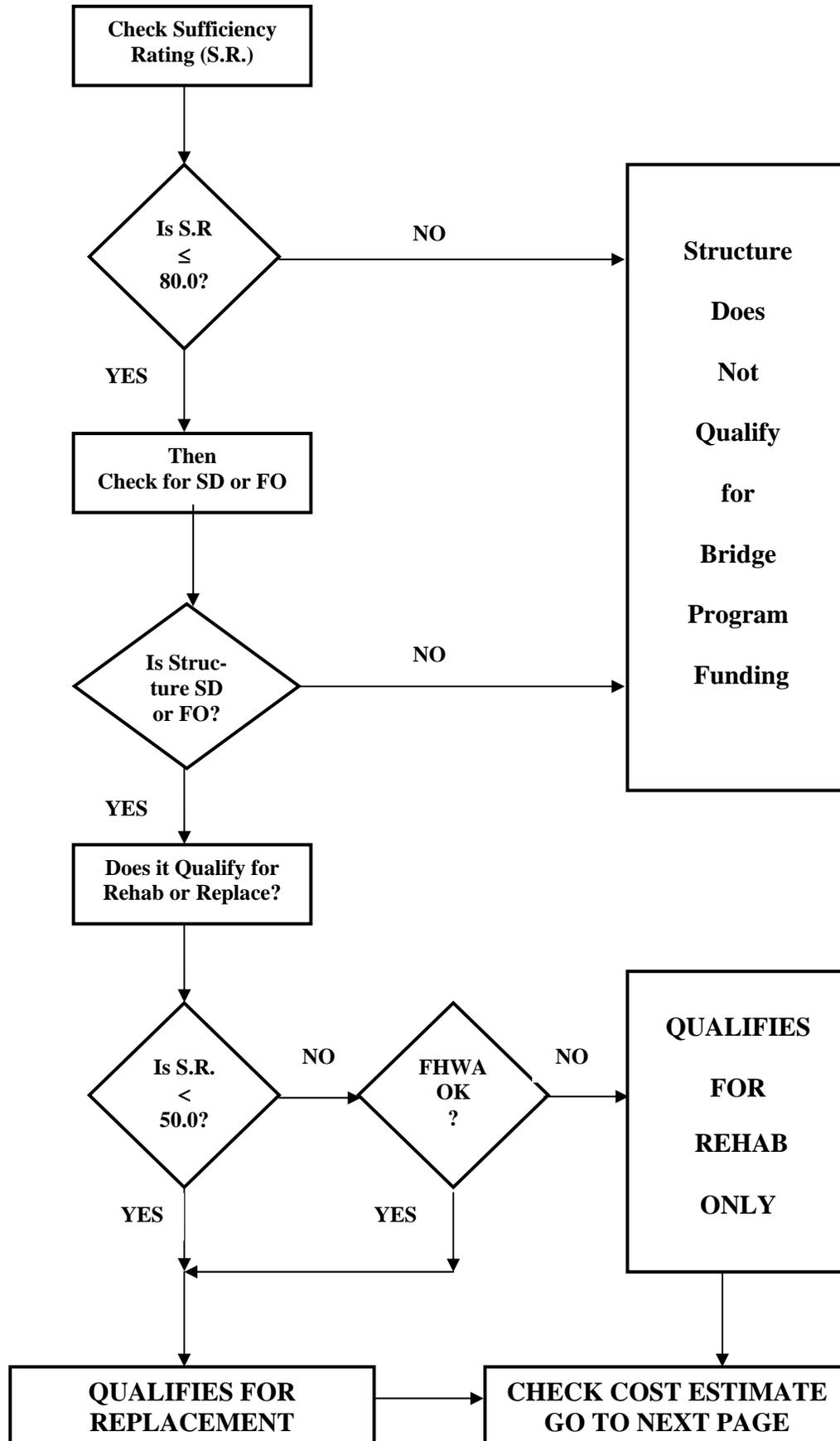
Roadwork costs exceeding 15% of the bridge replacement or rehabilitation costs, or the minimum necessary to meet current geometric design requirements, shall utilize other funding sources.

- 2) Aesthetic features: Special architectural features on bridges required by the environmental document may be eligible for bridge program funds. Otherwise, other funding sources shall be utilized.
- 3) Ten-Year Rule: A bridge will not appear on the Select List nor qualify for bridge program funding within 10 years of the date of its construction, reconstruction or major rehabilitation. This policy applies no matter what funds were used for the construction, reconstruction or rehabilitation: Federal, State, local, private, or any combination thereof.

Bridges removed from the Select List because of the 10-year rule criteria but with Federal-aid funds obligated for construction work prior to their removal will continue to be eligible for bridge program funds.

- 4) Examples of work which are not considered reconstruction or major rehabilitation and are not eligible for bridge program funding:
  - A. Safety feature replacement or upgrading (for example, bridge rail, approach guardrail or impact attenuators).
  - B. Overlay of bridge deck as part of a larger highway surfacing project (for example, overlay carried across bridge deck for surface uniformity without additional bridge work).
  - C. Utility work.
  - D. Emergency repair to restore structural integrity to the previous status following an accident. Federal ER program funding may be available for a declared disaster exceeding \$700,000 roadway/bridge damage.
  - E. Retrofitting to correct a deficiency which does not substantially alter the physical geometry or increase the load-carrying capacity.
  - F. Work performed to keep a bridge operational while plans for complete rehabilitation or replacement are under preparation (for example, adding a substructure element or extra girder).

# Eligibility Flow Chart



## Estimating Reasonable Costs for Bridge Replacement

The following method is provided to estimate bridge replacement cost prior to any engineering and is for planning purposes and to establish an initial reasonable project cost. A detailed engineering cost estimates will be needed before starting either the design or construction phases of projects using bridge program funds. Actual costs will be significantly different than this estimate.

The SHC or CDOT may require a detailed engineering estimate before approving an application for funding or a request to supplement previously approved funds. If the funding requested exceeds the amount obtained by using this method, a detailed engineering cost estimate should be performed to help justify the request.

This method only applies to bridge replacements. Bridge rehabilitation projects vary widely in scope and therefore require a bridge engineer's estimate.

The "total project cost factor" accounts for the roadway work, traffic control, utilities, environmental work, ROW, and other non-bridge items that relate to the bridge replacement project.

The larger "engineering cost factor" includes both design and construction engineering. If the application is for construction funds only, use the smaller factor.

If the "new bridge deck area" is not known, a method for estimating the new area based on the area of the old bridge is given below.

### Estimating Total Project Cost

New bridge deck area	_____	Sq. Ft.
Times the bridge only unit cost,	_____	x \$134/Sq. Ft.
Times the total project cost factor,	_____	x 2.73
Times engineering cost factor,	_____	x 1.31 or 1.15
Estimated reasonable total project cost =	\$ _____	

### Estimating New Bridge Deck Area

Calculate the deck area of the existing bridge to the nearest Square Foot:

Structure Length (NBI Item49):	_____	Ft.
Times the width out-to-out (NBI Item52):	_____	Ft.
Existing Deck Area =	_____	Sq. Ft.

Estimate the area of the new bridge deck:

Existing Deck Area from above	_____	Sq. Ft.
Multiply by size factor	_____	x 2.11
Estimated new deck area =	_____	Sq. Ft.