UDOT STRUCTURES
2015 Annual Bridge Report

The Bridge Management Divison inspects and manages

2,971 BRIDGES

including **state** and **locally** owned public bridges

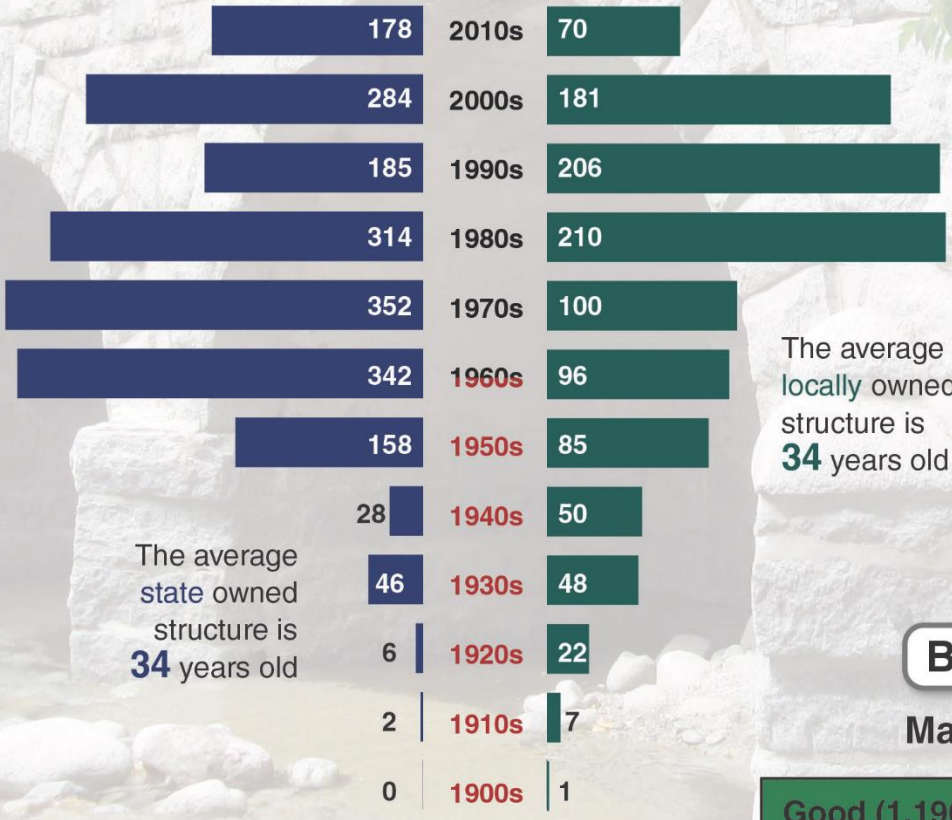
The **State** owns **1,895** bridges

The other **1,076** bridges are divided among 140 Agencies

Region 1	589
Region 2	831
Region 3	491
Region 4	1,060

The 2015 Annual Bridge Report provides an overview of the Bridge Inventory, Bridge Condition, and ongoing Bridge Programs within the Structures Division

Bridge Inventory

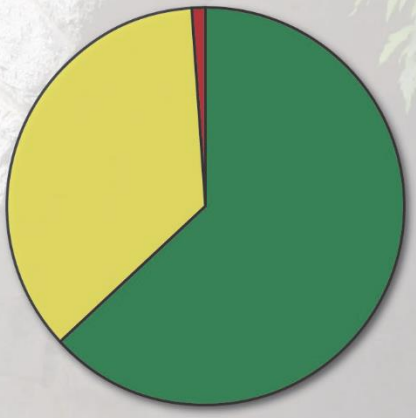


The average locally owned structure is **34** years old

The average state owned structure is **34** years old

20% of the **state** owned inventory is more than 50 years old

Bridge Condition



Bridge Programs

Management Strategy

Good (1,196)	Service life extended through **preservation** treatments
Fair (681)	Condition improved by **rehabilitation** treatments
Poor (18)	**Replacement** required - currently, all poor bridges are programmed for replacement

UDOT *Keeping Utah Moving*

TABLE OF CONTENTS

SECTION 1 EXECUTIVE SUMMARY 1-1
1.1 INTRODUCTION 1-1
1.1.1 Structure Inventory 1-1
1.1.2 Structure Condition 1-2
1.1.3 Structure Programs 1-2

SECTION 2 STRUCTURE INVENTORY 2-1
2.1 INVENTORY BY CATEGORIES 2-1
2.1.1 Ownership 2-1
2.1.2 Distribution by Region 2-2
2.1.3 Vehicular Route Types 2-3
2.1.4 Bridge Types 2-4
2.1.5 Bridge Deck Overlay Types 2-6
2.2 AGE OF IN-SERVICE STRUCTURES 2-7
2.3 FRACTURE CRITICAL BRIDGES 2-8
2.4 SCOUR CRITICAL STRUCTURES 2-9
2.5 COMPLEX AND HIGH COST BRIDGES 2-10
2.5.1 Complex Bridges 2-10
2.5.2 High Cost Bridges 2-10
2.6 ANCILLARY STRUCTURES 2-11

SECTION 3 STRUCTURE CONDITION 3-1
3.1 CONDITION OF STRUCTURES 3-1
3.1.1 Overall State Owned Bridge Condition 3-1
3.1.2 Bridge Health Index 3-4
3.2 MAP-21 FUNDING AND PERFORMANCE MEASURES 3-5
3.2.1 Structural Deficiency 3-6

SECTION 4 STRUCTURE PROGRAMS 4-1
4.1 STRUCTURE INSPECTION PROGRAM 4-1
4.1.1 NBIS 23 Metrics 4-1
4.2 BRIDGE REPLACEMENT/REHABILITATION PROGRAM 4-2
4.3 BRIDGE PRESERVATION PROGRAM 4-4
4.3.1 Painted Steel Protection Systems 4-8
4.3.2 Concrete Deck Protection 4-9
4.4 OFF-SYSTEM BRIDGE PROGRAM 4-10
4.5 MAINTENANCE PROGRAM 4-11
4.6 LOAD RATING PROGRAM 4-11
4.7 SCOUR PROGRAM 4-12
4.7.1 Unknown Foundation Program 4-12

LIST OF FIGURES

Figure 2-1 Structure Inventory by Owner 2-1
Figure 2-2 Structures by Route Type 2-3
Figure 2-3 State Owned Structures by Structure Type 2-4
Figure 2-4 Locally Owned Structures by Structure Type 2-5
Figure 2-5 State Owned Vehicular Deck Overlay Type over Time 2-6
Figure 2-6 Structures by Year Built 2-7
Figure 2-7 Cumulative Age Distribution of State Owned Structures by Year Built 2-8
Figure 2-8 SC Bridges by Year 2-9
Figure 3-1 Overall Structure Conditions by NBIS Components 3-2
Figure 3-2 NBIS Transitions in the State Inventory from 2013 to 2014 3-3
Figure 3-3 State Owned Bridge Health Indexes by Decade 3-4
Figure 3-4 Locally Owned Bridge Health Indexes by Decade 3-5
Figure 3-5 Diagram of Structures by Ownership and Funding 3-6
Figure 3-6 Percentage of Structurally Deficient Bridges – Utah vs Nation 3-7
Figure 4-1 Painted Steel Superstructure by Year and Condition State 4-9
Figure 4-2 Bare Concrete Decks by Year and Condition State 4-10
Figure 4-3 Load Rating Program Progress 4-12

LIST OF TABLES

Table 2-1 Utah Structure Inventory by Structure Type 2-2
Table 2-2 Utah Structure Inventory by Facility Carried 2-2
Table 2-3 Utah Structures by Region 2-2
Table 2-4 Structures by Route Type Carried 2-3
Table 2-5 Utah Structures by Superstructure Type 2-4
Table 2-6 Bridges by Number of Spans 2-5
Table 2-7 State Owned Vehicular Bridge Deck Overlay Data 2-6
Table 2-8 Fracture Critical Bridges 2-8
Table 2-9 Bridge Scour Status 2-9
Table 2-10 Complex Vehicular Bridges 2-10
Table 2-11 High Cost Bridges 2-11
Table 2-12 Utah Ancillary Structure Inventory by Type 2-11
Table 3-1 Number of Structures in each NBIS Category 3-2
Table 3-2 Structurally Deficient, State Owned Bridges in Utah 3-7
Table 3-3 Structurally Deficient, Locally Owned Bridges in Utah 3-7
Table 3-4 State Owned SD Bridges and Year Programmed 3-8
Table 4-1 FY 2014-2018 Bridge Replacement/Rehabilitation Projects 4-2
Table 4-2 FY 2014-2017 Bridge Preservation Projects 4-5
Table 4-3 Painted Steel Superstructure Condition Summary 4-8
Table 4-4 Bare Concrete Deck Condition Summary 4-9
Table 4-5 Off-System Bridge Program 4-10
Table 4-6 Load Posted, State Owned Structures 4-11

LIST OF ACRONYMS

AASHTO	American Association of State Highway and Transportation Officials
ABR	Annual Bridge Report
AC	Asphaltic Concrete
ADT	Average Daily Traffic
BHI	Bridge Health Index
CFR	Code of Federal Regulations
CoRe	Commonly Recognized (elements)
FC	Fracture Critical
FO	Functional Obsolescence
JHC	Joint Highway Committee
MAP-21	Moving Ahead for Progress in the 21st Century Act
NBI	National Bridge Inventory
NBIS	National Bridge Inspection Standards
NHPP	National Highway Performance Program
NHS	National Highway System
SC	Scour Critical
SD	Structurally Deficient
SF	Square Feet
STP	Surface Transportation Program
STRAHNET	Strategic Highway Network

BRIDGE MANAGEMENT ENGINEER LETTER

I am pleased to provide the second Annual Bridge Report (ABR) on behalf of the Bridge Management Division. The purpose of this report is to provide a quick reference to those interested in key facts about the overall bridge inventory in Utah, the condition of the inventory, and ongoing bridge programs that address important objectives of the Structures Division.

Bridge condition and inventory data are constantly changing, but this annual report is intended to be the definitive source for bridge information in Utah. This report provides the most up-to-date information and is presented in straight forward, easy to understand tables, figures, and graphics. All information has been updated to the current year, with additional data provided in a few areas and many improved graphics. Key changes in the 2015 ABR include:

- The report cover now functions as an elegant quick reference sheet
- Average Daily Traffic (ADT) data has been added to Table 2-4
- Ancillary structure data is included in Section 2.6
- Specific region information is provided in Table 3-1
- The off-system bridge program is included in Section 4.4
- The maintenance program is included in Section 4.5

Last year, 2014, was a full and successful year; accomplishments include:

- Published the first edition of the Bridge Management Manual
- Overhauled the bridge management system to improve data collection, utilization, and reporting
- Completed the unknown foundation program, including meeting with all local bridge owners
- Completed the underwater bridge inspections
- Completed the local bridge inspection cycle
- Transitioned the bridge inspection program to collect and utilize the American Association of State Highway and Transportation Officials (AASHTO) Elements
- Positioned the load rating program for completion in 2015
- Inventoried ancillary structures, including overhead signs, retaining walls, and minor structures

This year, 2015, promises to be equally eventful; key initiatives include:

- Develop a stronger responsive bridge maintenance program
- Advance a barrier program to replace or retrofit vulnerable bridge railings
- Finish the five-year program to load rate every bridge
- Complete the first two-year cycle of bridge inspections utilizing AASHTO Elements
- Refine asset management strategies and reporting through Decision Lens
- Build on 3D technology to maximize asset management objectives

The challenges that lie ahead appear formidable, but the Bridge Management Division is eager, focused, and steadfast on the vision to Keep Utah Moving through unrivaled bridge management practices.

Sincerely,

Joshua J. Sletten, Bridge Management Engineer

Section 1
EXECUTIVE SUMMARY

1.1 INTRODUCTION

The 2015 Annual Bridge Report provides an overview of the bridge inventory, bridge condition, and ongoing bridge programs within the Structures Division. The inventory includes all structures meeting the definition of a bridge. A bridge is defined as a structure that has a track or passageway for carrying traffic or other moving loads and having a length of more than 20 feet. Box culverts, three sided culverts and other drainage structures that meet this definition are included in the bridge inventory. The Structures Division does not systematically inspect structures with a length less than 20 feet, overhead sign structures, or retaining walls. Data in this report does include 34 state owned pedestrian structures as these structures are inspected and managed by the Bridge Management Division.

1.1.1 Structure Inventory

The Bridge Management Division inspects and manages the data of 2,971 structures, including state and locally owned public structures as of April 1, 2015. This report will always be based on the April 1st date, as the data is dynamic throughout the year. There are 140 different agencies that own these structures; the state owns 1,895 structures while all local agencies combined own 1,076 structures. State structures are divided geographically by region. The number of state owned structures within each region is 375, 554, 291, and 675 for Regions 1, 2, 3, and 4, respectively.

The average age of structures in the inventory is 34 years for both state and locally owned structures. There is an ever decreasing number of structures built prior to 1950 that are still in service – 82 state and 128 local. These structures have significantly exceeded the design service life and will be considered for replacement or rehabilitation in the near future.

The Bridge Management Division closely monitors two types of structures that have inherently more risk associated with them – Fracture Critical (FC) and Scour Critical (SC) structures. FC bridges lack load path redundancy and may fail entirely if one element fails. SC bridges are vulnerable to failure due to scour in the event of extreme flows. The state owns 53 FC bridges and 10 SC structures.

Complex and high cost bridges represent a significant investment and require special bridge management consideration. These structures make up a relatively small amount of the overall inventory; however, the asset value is very high. Complex structures are characterized by non-typical construction such as large arches or post-tensioned segmental concrete box bridges. High cost bridges are large or complex structures that have significantly higher replacement costs. The state owns 13 complex and 69 high cost bridges.

The Bridge Management Division has begun to inventory ancillary structures, such as walls and overhead signs. Although not required by the NBIS, these are inspected on an as needed basis when deterioration is of concern or for project planning. Currently, 2,089 ancillary structures have been inventoried.

1.1.2 Structure Condition

The overall (state and local) structure inventory is generally in good condition primarily due to funding policies aimed at rehabilitating and replacing deficient bridges. Utah continues to rank third best in the nation for least amount of Structurally Deficient (SD) bridges on the National Highway System (NHS) with just 0.9 percent of the inventory. The Bridge Management Division is focused on improving the overall bridge condition by addressing deficiencies and applying preventive treatments in a timely manner.

1.1.3 Structure Programs

The Structures Division has implemented several programs to identify and fund projects to maintain the structure inventory in a state of good repair. The following programs and corresponding purposes are:

- Bridge Inspection Program – The Bridge Management Division conducts biennial safety inspections according to the National Bridge Inspection Standards (NBIS). Results are reported to the Federal Highway Administration (FHWA) annually in April. These inspections have been performed since the national standards program was adopted in 1971. In 2014, the Utah Department of Transportation (UDOT) began the transition to the recently updated American Association of State Highway and Transportation Officials (AASHTO) Elements, which are described in the *AASHTO Manual for Bridge Element Inspection, 1st Edition, 2015 Interim Revisions*. This transition is a two-year process that is expected to be completed in June 2016. Additionally, underwater inspections were performed on 60 state and local structures in 2014. These inspections are performed on a five-year cycle.

- The Bridge Replacement/Rehabilitation Program – This reactive program funds structures requiring major structural work, major safety upgrades, or complete replacement. The program prioritizes these types of structures based on vulnerability (i.e., risk), criticality (i.e., importance), condition, and load rating. This program addresses the structures with the poorest condition in the inventory. All structurally deficient bridges owned by the state are currently funded for rehabilitation or replacement.

- The Bridge Preservation Program – This is a proactive program aimed at preserving structures by preventing, delaying, or reducing deterioration of bridges and bridge elements. The primary benefit of this program is that it extends bridge service life and reduces the amount of future costly replacement or rehabilitation.

- The Off-System Bridge Program – All local public agency bridges not included in the Federal Aid Highway System are eligible for federal funding through the Joint Highway Committee (JHC). The state administers this funding to assist local agencies with removing deficient bridges from the National Bridge Inventory (NBI).

- The Bridge Maintenance Program – This program was initiated to quickly fix observed bridge deficiencies. The program is intended to address common deficiencies through a bridge procurement contract with dedicated bridge funding. This program allows for work to be done much sooner than other programs.

- Load Rating Program – This program load rates all state and locally owned structures. This program promotes safety of the traveling public, provides accurate data to support and allocate funding, assists in the development of a programmatic permit truck routing system, and more effectively evaluates higher truck load permits.

- Scour Program – This program allocates funding for projects to address structures that are scour critical. These funds are used to identify and remedy scour hazards and minimize the risk associated with bridge failures due to scour. In 2014, the Bridge Management Division finished a project that developed a formal plan of action for all 455 bridges with unknown foundations. Additionally, this program generated detailed hydraulic studies for 36 bridges that were determined to have a higher risk of failure due to scour.

Section 2
STRUCTURE INVENTORY

2.1 INVENTORY BY CATEGORIES

The Bridge Management Division inspects and manages the data of 2,971 structures, including state and locally owned structures, as of April 1, 2015. The Bridge Management Division performs biennial NBIS safety inspections on these structures and provides recommendations to local municipalities for bridge maintenance, repair, or replacement.

2.1.1 Ownership

There are 140 different agencies that own structures in the structure inventory; the state owns 1,895 structures, which comprise 64 percent of the total structure inventory. All local agencies combined own 1,076 structures, which comprise 36 percent of the total structure inventory. The categories of structure ownership are shown in Figure 2-1. The Other Agencies category in this figure includes (7) Salt Lake International Airport bridges, (3) Bureau of Reclamation bridges, (29) private railroad bridges (that are over a public road), and (2) private vehicular bridges. The types of state and locally owned structures are shown in Table 2-1. The types of state and locally owned structures by facility carried are shown in Table 2-2.

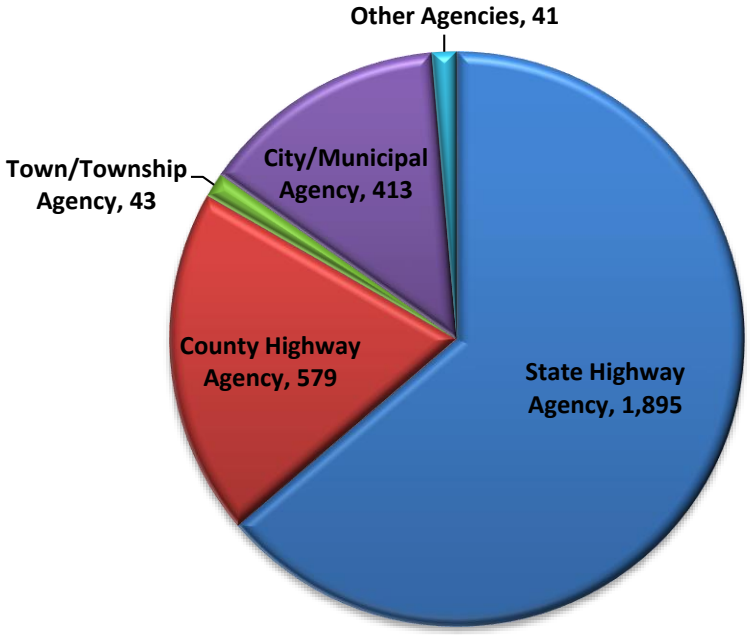


Figure 2-1
Structure Inventory by Owner

Structure Type	State	Local
Bridges	1,511	830
Culverts	379	246
Tunnels	4	0
Other[a]	1	0
Total	1,895	1,076

[a]0R-119 is a pipe crossing supported by columns

Table 2-1
Utah Structure Inventory by Structure Type

Facility Carried	State	Local
Highway	1,814	1,045
Railroad	24	29
Pedestrian	35	2
Other[a]	22	0
Total	1,895	1,076

[a]Other structures include canal crossings, pipe crossings, tunnels, and other miscellaneous crossings

Table 2-2
Utah Structure Inventory by Facility Carried

2.1.2 Distribution by Region

UDOT is divided into four Regions organized from north to south (with Region 1 in the north and Region 4 in the south). Table 2-3 shows the division of structures by Region.

Owner	Region 1		Region 2		Region 3		Region 4	
	Bridges	Culverts	Bridges	Culverts	Bridges	Culverts	Bridges	Culverts
State	325	50	495	59	238	53[a]	454	221[b]
Local	173	41	213	64	170	30	274	111
Total	498	91	708	123	408	83	728	332

[a] Includes two concrete-lined tunnels (US-189 – Provo Canyon)
[b] Includes two rock tunnels (Bryce Canyon National Park)

Table 2-3
Utah Structures by Region

2.1.3 Vehicular Route Types

UDOT identifies public roadways by using federal classifications. The National Highway System (NHS) is the principal network of roadways important to the nation's economy, defense, and mobility. The NHS includes interstates (the Eisenhower Interstate System), other principal arterials, the Strategic Highway Network (STRAHNET), major STRAHNET connectors, and intermodal connectors. The U.S. Department of Transportation developed the NHS in cooperation with the states, local officials, and metropolitan planning organizations.

Table 2-4 categorizes the state's structure inventory by vehicular route type. Figure 2-2 categorizes the structures on each transportation system. See Figure 3-5 for additional information on route types and ownership.

Route Description	State		Local	
	Count	ADT	Count	ADT
NHS	1,311	28,815,769	8	240,455
Non-NHS	584	1,497,184	1,068	2,806,031
Federal-Aid Highways	1,717	30,029,826	284	2,146,842
Non-Federal-Aid Highways	178	3,806,625	792	899,644
Interstate Carried	799	22,132,240	0	0
Interstate Crossed	261	4,716,431	5[a]	N/A

[a] UPRR over Interstate

Table 2-4
Structures by Route Type Carried

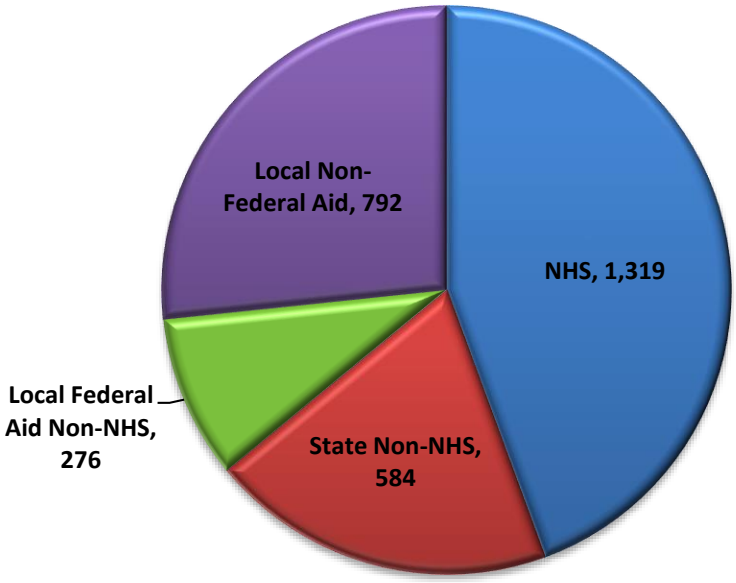


Figure 2-2
Structures by Route Type

2.1.4 Bridge Types

A typical way of categorizing structures is by the primary load carrying components in the superstructure, including the girders (or beams) that make up the span of the bridge. The superstructure types are outlined in Table 2-5.

	Superstructure Type	State	Local
Concrete	Reinforced (Culvert)	309	180
	Reinforced (Single Span)	123	226
	Reinforced (Multi-Span)	101	22
	Pre-stressed/Post-Tensioned (Single Span)	588	278
	Pre-stressed/Post-Tensioned (Multi-Span)	172	16
Steel	Steel (Culvert)	69	62
	Steel (Single Span)	224	219
	Steel (Multi-Span)	297	38
Other	Wood or Timber	5	31
	Masonry	1	0
	Aluminum or Iron	2	4
	Tunnels	4	0
	Total	1,895	1,076

Table 2-5
Utah Structures by Superstructure Type

Figure 2-3 and Figure 2-4 illustrate state and locally owned structures, respectively, by structure type.

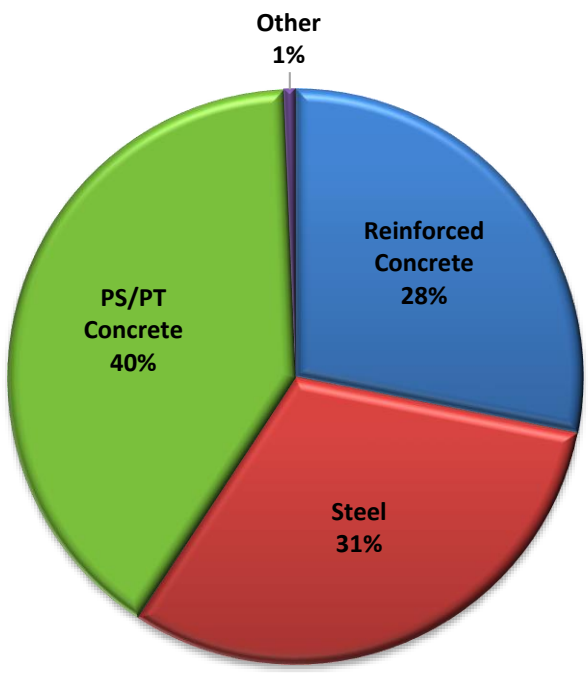


Figure 2-3
State Owned Structures by Structure Type

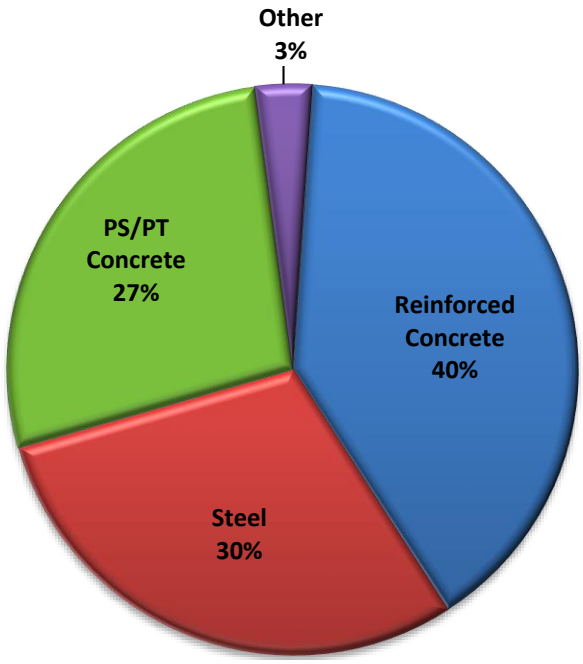


Figure 2-4
Locally Owned Structures by Structure Type

The majority of bridges in the state are short to medium span deck and girder bridges. The count of bridges by number of spans is shown in Table 2-6. The count does not contain culverts. Single span bridges are typically preferred because of the lower initial cost, lower maintenance cost, and higher seismic performance. Multi-span bridges have more foundations, which tend be significantly more expensive due to Utah's geologic conditions.

Number of Spans	State		Local	
	Count	Percentage	Count	Percentage
1	686	45.4%	687	82.8%
2	258	17.1%	51	6.1%
3	396	26.2%	65	7.8%
4	100	6.6%	14	1.7%
5	34	2.3%	7	0.8%
6	13	0.9%	2	0.2%
7	3	0.2%	3	0.4%
8	7	0.5%	1	0.1%
9	3	0.2%	0	0%
10+	11	0.7%	0	0%

Table 2-6
Bridges by Number of Spans

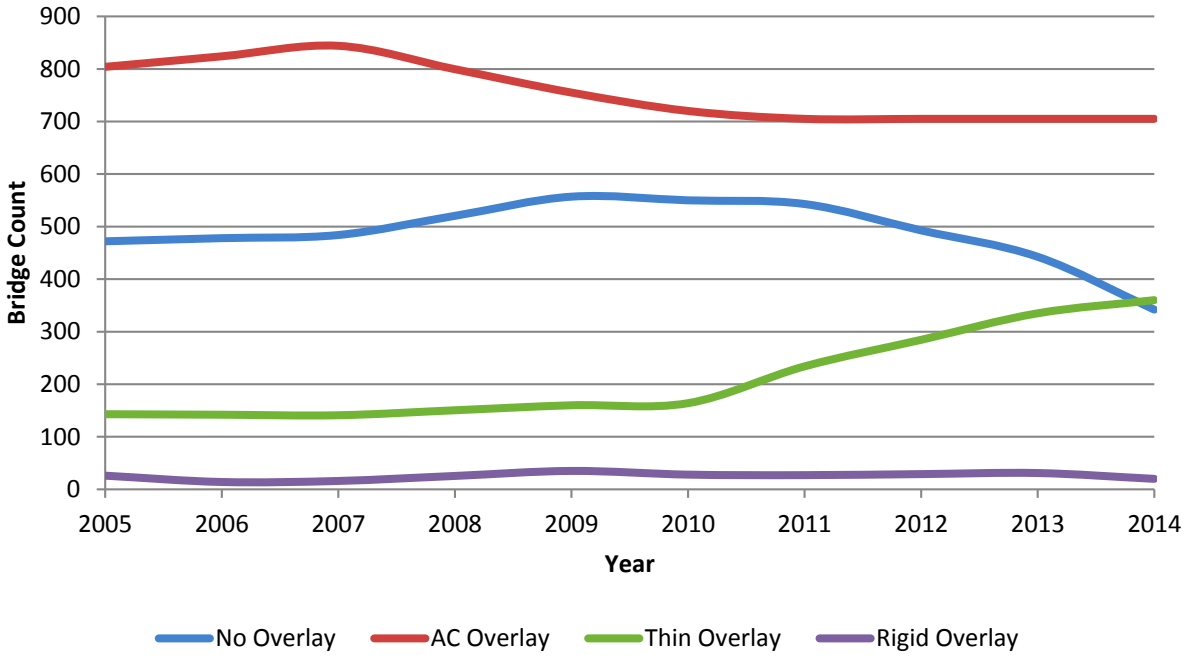
2.1.5 Bridge Deck Overlay Types

The deck is the driving surface of a bridge that spans between the main flexural members (i.e., beams, girders) and is the most important component regarding bridge durability and long term protection. Table 2-7 presents state owned deck overlay types on vehicular bridges. Figure 2-5 shows historical data for state owned deck overlay type counts and area, respectively, on vehicular bridges. The deck overlay types are identified using bridge inspection elements data.

Type	Count	Deck Area (SF)
No Overlay	350	4,762,311
Asphaltic Concrete (AC) Overlay	705	5,711,339
Thin Overlay (Polymer)	360	6,620,798
Rigid Overlay	20	416,040
Total	1,435	17,510,488

Note: This table does not include pedestrian bridges, culverts, canal crossings, or utility crossings.

Table 2-7
State Owned Vehicular Bridge Deck Overlay Data



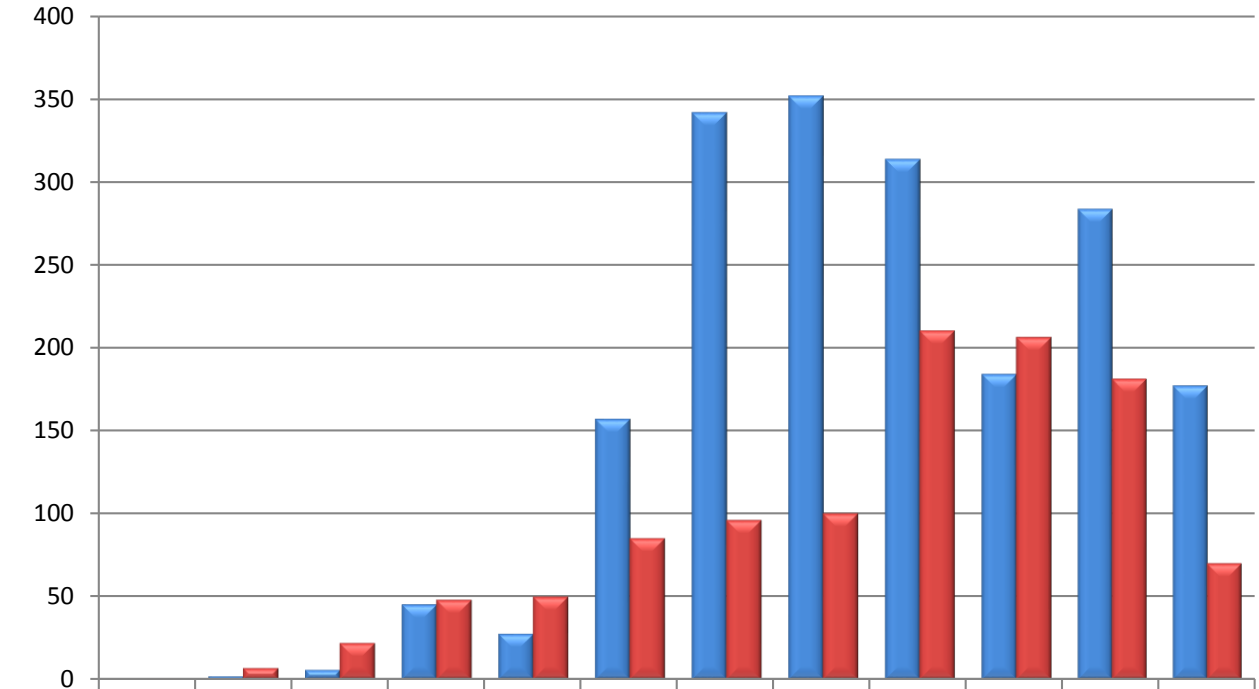
Note: This figure does not include pedestrian bridges, canal crossings, or utility crossings.

Figure 2-5
State Owned Vehicular Deck Overlay Type over Time

2.2 AGE OF IN-SERVICE STRUCTURES

In the past, the Structures Division has prioritized the repair or replacement of a bridge with a worst-first approach where the worst condition structures had the highest funding priority. Typically, older structures have experienced the most wear and have required replacement. As such, Utah has a decreasing number of structures built prior to 1950 still in service. This approach has served the Structures Division well in maintaining a system in a state of good repair. However, with fewer poor condition structures and the new availability of federal funding for preservation, the Bridge Management Division is transitioning into a more balanced planning approach that prioritizes funding based on needs and performance. The Bridge Management Division optimizes funding by employing techniques to preserve structures and extend service life.

Figure 2-6 shows the decade in which each structure in the state was built. Figure 2-7 shows the cumulative age distribution by decade. Structures built prior to the year 2000 were typically designed for a 50-year service life. The number of bridges that has exceeded this service life, i.e., structures built in 1965 or earlier, comprises 20 percent of the state owned inventory. The average year built of the inventory is 1981 for both state and locally owned structures. Refer to Section 3 for condition evaluation of the bridges within each decade.



	1900s	1910s	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s
State	0	2	6	46	28	158	342	352	314	185	284	178
Local	1	7	22	48	50	85	96	100	210	206	181	70

Figure 2-6
Structures by Year Built

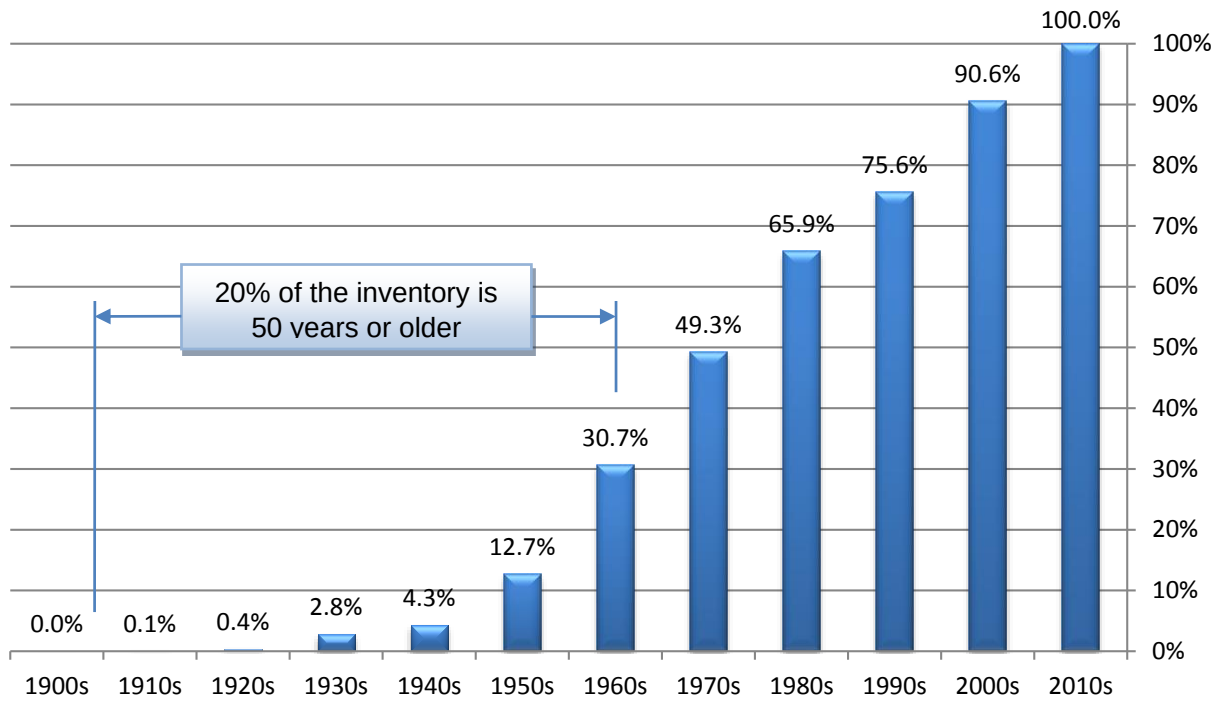


Figure 2-7
Cumulative Age Distribution of State Owned Structures by Year Built

2.3 FRACTURE CRITICAL BRIDGES

Fracture Critical (FC) bridges contain steel members in tension, or with a tension element, whose failure may cause a portion of or the entire bridge to collapse. The categories of FC bridges in Utah are shown in Table 2-8. The counts do not include railroad overpass bridges.

Route Description	State	Local
1 or 2 Steel Girder Systems	2	7
Pin and Hanger Details	35	3
Steel Bent Caps	1	0
Steel Trusses	2	14
Suspension or Cable Structures	1	0
Super/Sub Integral Framing Details	5	0
Multiple FC Details	7	1
Total FC Bridges	53	25

Table 2-8
Fracture Critical Bridges

FC bridges require in-depth inspections in which all FC members are inspected within an arm's reach.

2.4 SCOUR CRITICAL STRUCTURES

Scour Critical (SC) structures have potentially unstable foundations due to scour (removal of material due to channel flows) and are vulnerable to failure during extreme flows. Table 2-9 shows the number of SC structures as well as the scour status of the entire bridge inventory. Figure 2-8 shows the historical trend of SC structures.

Route Description	NBIS Field 113	State Owned	Locally Owned
SC – Bridge Failed	0	0	0
SC – Failure Imminent	1	0	0
SC – Extensive Scour	2	0	5
SC – Unstable	3	10	97
Stable, Needs Action	4	31	86
Stable Within Footing	5	117	312
Calculations Not Performed	6	0	0
Countermeasures	7	70	83
Stable Above Footing	8	592	412
On Dry Land	9	10	5
Not Over Waterway	N	1,065	76
Tidal, Low Risk	T	0	0
Unknown Foundation Risk	U	0	0
Total SC Bridges		10	102

Table 2-9
Bridge Scour Status

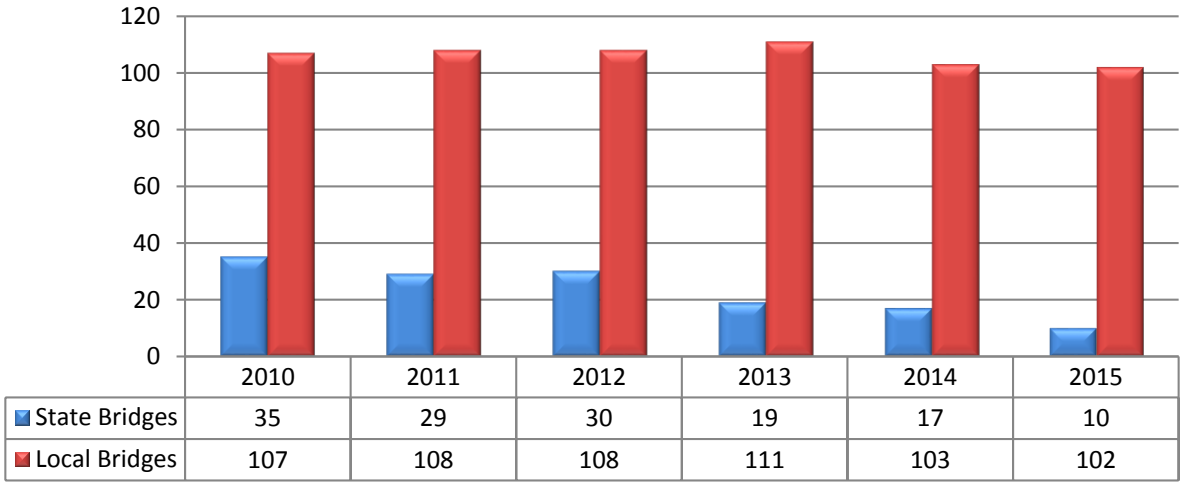


Figure 2-8
SC Bridges by Year

SC structures require specific attention during routine inspections. The footings are probed to determine if any progressive scour is occurring. Changes to the scour status are evaluated by bridge and hydraulic engineers based on inspection results.

2.5 COMPLEX AND HIGH COST BRIDGES

Complex and high cost bridges represent a significant investment and require special bridge management consideration. These structures make up a relatively small amount of the overall inventory; however, the asset value is very high. It is imperative that these structures maintain a state of good repair and the service lives are maximized.

2.5.1 Complex Bridges

Complex structures are characterized by unique or non-standard construction elements, such as truss, large arch, suspension, cable-stayed, movable, or segmental concrete box bridges that carry vehicular traffic. The number of bridges in each category is shown in Table 2-10.

Route Description	State Owned	Locally Owned
Deck Truss	0	2
Through Truss	2	12
Deck Arch	6	1
Through Arch	3	0
Suspension	0	0
Cable-Stayed	0	0
Movable	0	0
Segmental Box Girder	2	0

Table 2-10
Complex Vehicular Bridges

2.5.2 High Cost Bridges

The Bridge Management Division defines high cost bridges as meeting one or more of the following:

- Deck area greater than or equal to 40,000 square feet
- Max span length greater than or equal to 300 feet
- Total bridge length greater than or equal to 1,000 feet
- Complex bridges that carry vehicular or railroad traffic (not pedestrian traffic)

High cost bridges account for 3.7 percent of the state owned inventory and 2.0 percent of the locally owned inventory. Table 2-11 shows the characteristics of high cost bridges. Some bridges meet multiple criteria. Generally, a high cost bridge will cost a minimum of $7 million to replace. Large or complex structures will cost significantly more.

Route Description	State Owned	Locally Owned
Deck Area ≥ 40,000 SF	56	5
Max Span ≥ 300 FT	14	0
Total Bridge Length ≥ 1,000 FT	27	5
Complex Bridges (Vehicular/Railroad)	13	15
Total High Cost Bridges	69	22

Note: Some bridges meet multiple criteria.

Table 2-11
High Cost Bridges

2.6 ANCILLARY STRUCTURES

The Bridge Management Division currently inspects ancillary structures, such as walls and sign structures, on an as needed basis when deterioration is of concern or for project planning. Although not required by the NBIS, routine inspections may be appropriate. The Division is beginning to inventory these structures and will continue to do so. Table 2-12 provides details of the ancillary structures that have been inventoried.

Structure Type	Count
Minor Structures	468
Walls	649
Signs	972
Total	2,089

Table 2-12
Utah Ancillary Structure Inventory by Type

Section 3
STRUCTURE CONDITION

3.1 CONDITION OF STRUCTURES

In July 2014, the Division began using National Bridge Elements and Bridge Management Elements during NBIS inspections to provide more detailed inspection data and to conform to federal requirements. Previously, AASHTO CoRe Elements were used dating back to 2002. Element level inspections provide more detailed bridge data and condition assessment. This information is a major contribution to the development of more effective bridge management tools. Significant advantages of the new elements are:

- Nationally uniform bridge assessment
- Improved assessment of bridge decks
- Identification and assessment of wearing surfaces and protective systems

3.1.1 Overall State Owned Bridge Condition

In general, the overall structure inventory is in good condition, particularly when compared to its national counterparts. Utah ranks third best in the nation for least amount of Structurally Deficient (SD) bridges on the NHS with only 0.9 percent as structurally deficient.

SD bridges are not inherently unsafe. An SD bridge, when left open to traffic, typically requires significant maintenance and repair to remain in service and eventual rehabilitation or replacement to address deficiencies. The Structures Division identifies SD bridges for consideration in the Replacement and Rehabilitation Program. Functional Obsolescence (FO) is a function of the geometrics of the bridge in relation to the geometrics required by current design standards. FO is not a key identifier for the Structures Division to determine funding. These structures are usually identified by the Regions as part of roadway projects due to substandard geometric standards.

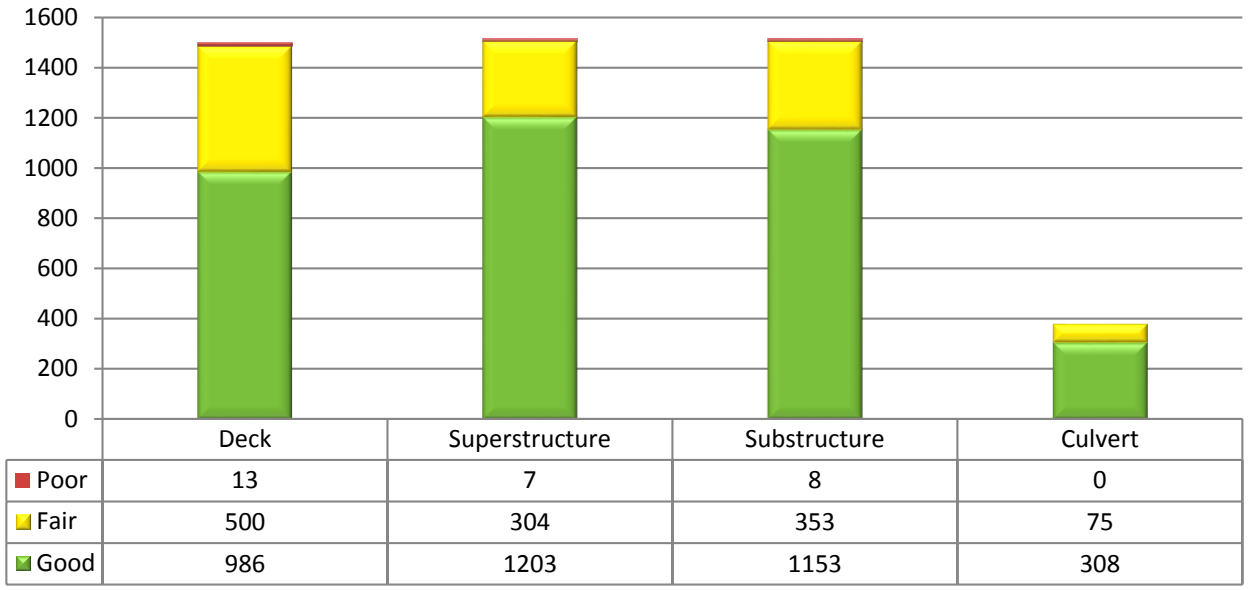
The following quantifies structure deficiency items of the state owned inventory:

- SD Structures – 18 (168,667 square feet of deck area)
- FO Structures – 179 (1,389,024 square feet of deck area)
- Load Posted Structures – 3

An overall representation of the general structural condition of state owned structures is shown in Figure 3-1. NBIS values for categories are:

- Good – 9-7
- Fair – 6-5
- Poor – 4-1

The number of state owned structures in each NBIS category is shown in Table 3-1.



Note: 0R-61 and 0R-288 have a Superstructure, Substructure, and Culvert NBIS Component (carry water over I-215). Tunnels are included under Culvert.

Figure 3-1
Overall Structure Conditions by NBIS Components

NBIS Component		9	8	7	6	5	4	3	Average
Deck	Statewide	5	157	824	411	89	13	0	6.69
	Region 1	2	21	194	71	33	4	0	6.62
	Region 2	1	55	235	157	31	5	0	6.63
	Region 3	1	58	98	64	13	4	0	6.82
	Region 4	1	23	297	119	12	0	0	6.74
Superstructure	Statewide	9	475	719	236	68	7	0	7.07
	Region 1	2	101	149	53	17	4	0	7.02
	Region 2	2	163	244	62	24	1	0	7.11
	Region 3	3	105	73	39	17	1	0	7.15
	Region 4	2	106	253	82	10	1	0	7.01
Substructure	Statewide	8	324	821	290	63	8	0	6.93
	Region 1	2	78	159	76	9	2	0	6.94
	Region 2	2	117	270	79	25	3	0	6.97
	Region 3	2	77	106	34	16	3	0	7.03
	Region 4	2	52	286	101	13	0	0	6.84

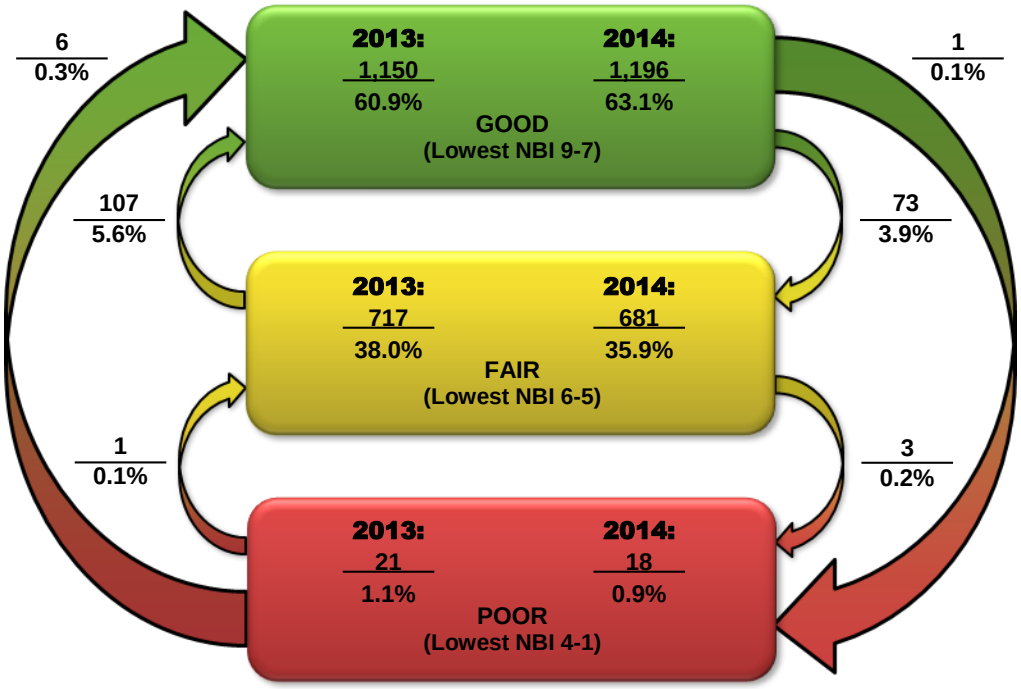
Table 3-1
Number of Structures in each NBIS Category

NBIS Component		9	8	7	6	5	4	3	Average
Culvert[a]	Statewide	0	81	227	59	16	0	0	6.97
	Region 1	0	19	22	7	1	0	0	7.20
	Region 2	0	9	33	14	4	0	0	6.78
	Region 3	0	10	33	9	1	0	0	6.98
	Region 4	0	43	138	29	10	0	0	6.97

[a]Tunnels are included under Culvert.

Table 3-1 (Continued)
Number of Structures in each NBIS Category

One way that the Bridge Management Division defines the overall condition of a structure is by taking the lowest of its NBIS component ratings. An overall representation of the changes that occurred from 2013 to 2014 on state owned structures is shown in Figure 3-2. There were 25 new bridges added and 18 bridges removed from the inventory in 2014.



Note: A net sum of 7 bridges was added to the state inventory in 2014.

Figure 3-2
NBIS Transitions in the State Inventory from 2013 to 2014

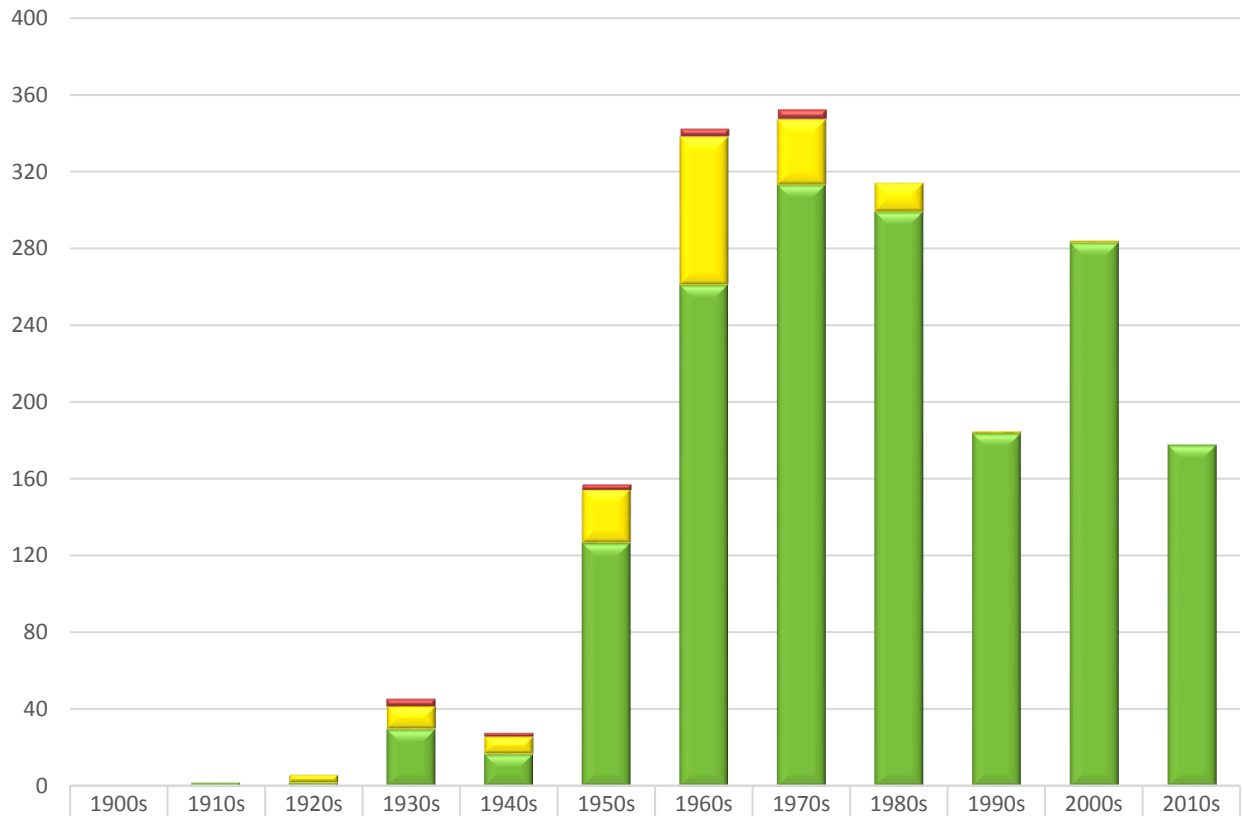
3.1.2 Bridge Health Index

The Bridge Management Division has developed its own method for assessing overall structure condition called the Bridge Health Index (BHI). This method rates the structure as a whole based on the deterioration of each element using its replacement cost as a means to weigh importance. This method is a useful tool in evaluating structure needs and prioritizing funding.

An older method that accomplished similar goals was called the Sufficiency Rating. It was provided by FHWA and was used to qualify for federal funding. The transition to funding under the MAP-21 legislation allows a state to develop a customized method of condition evaluation that is meaningful to the overall Bridge Management Program.

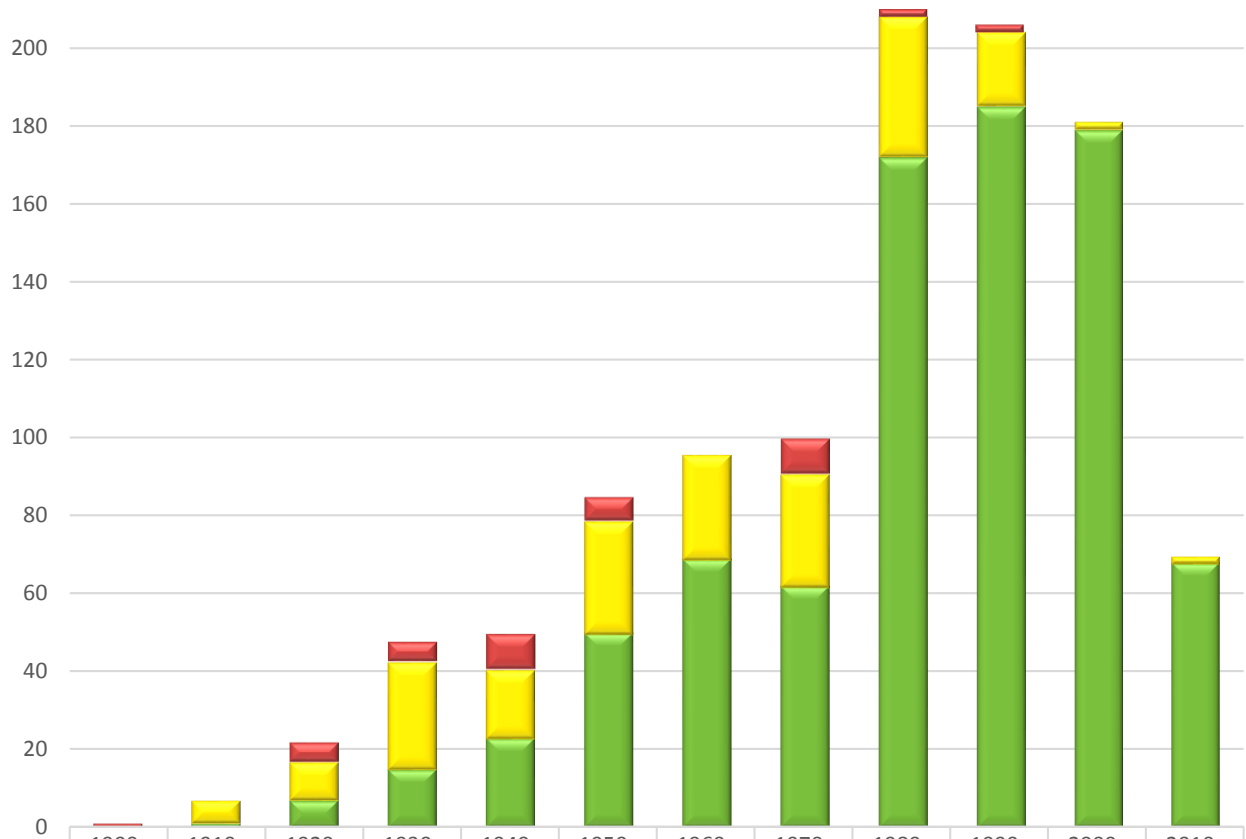
State owned and locally owned bridges are shown graphically in Figure 3-3 and Figure 3-4. The BHI categories have been roughly calibrated to the National Bridge Inventory (NBI) data. The categories are:

- Good – 100-80
- Fair – 80-60
- Poor – 60-0



	1900s	1910s	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Poor	0	0	0	4	2	3	4	5	0	0	0	0
Fair	0	0	4	12	9	28	77	34	15	1	1	0
Good	0	2	2	30	17	127	261	313	299	184	283	178

Figure 3-3
State Owned Bridge Health Indexes by Decade



	1900s	1910s	1920s	1930s	1940s	1950s	1960s	1970s	1980s	1990s	2000s	2010s
Poor	1	0	5	5	9	6	0	9	2	2	0	0
Fair	0	6	10	28	18	29	27	29	36	19	2	2
Good	0	1	7	15	23	50	69	62	172	185	179	68

Figure 3-4
Locally Owned Bridge Health Indexes by Decade

3.2 MAP-21 FUNDING AND PERFORMANCE MEASURES

MAP-21 is the current federal transportation bill that was signed into law in 2012. It consolidated several FHWA funding programs (including the Highway Bridge Program) into the National Highway Performance Program (NHPP) and the Surface Transportation Program (STP). States are required to develop a risk and performance based asset management plan for the NHS to improve or preserve asset condition and system performance. Figure 3-5 displays how state and locally owned bridges are distributed among federal on-system and the NHS. Funding definitions are as follows:

- NHPP – National Highway Performance Program
- ST_Bridge – State Bridge Program
- UDOT STP – UDOT Surface Transportation Program
- JHC STP – Joint Highway Committee Surface Transportation Program

While some structures may be eligible for multiple funding sources, funding is prioritized based on restrictions. Structures on NHS routes will be assigned NHPP funding whenever possible. If NHPP funding is not available for a top priority NHS structure, the structure will be ranked against the remaining state owned, non-NHS structures. If the NHS structure is a top priority over the other state owned structures, it will be assigned ST_Bridge funding. The same evaluation will be done for state owned structures when NHPP and ST_Bridge funds are not available to determine if they will be assigned STP funds, ranking them against all state owned structures and all locally owned federal aid structures.

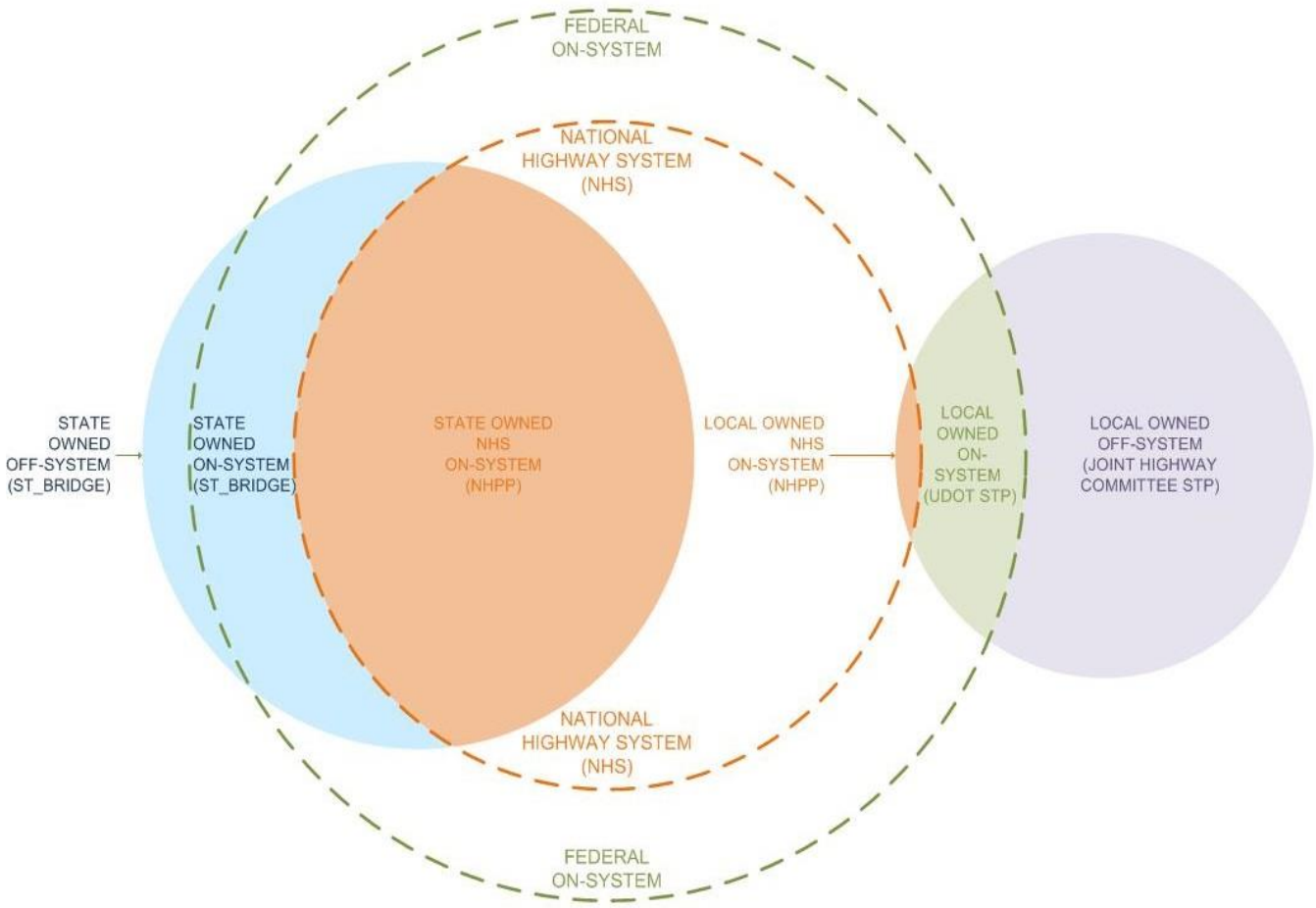


Figure 3-5
Diagram of Structures by Ownership and Funding

3.2.1 Structural Deficiency

MAP-21 requires a state to devote resources to improve the condition of the NHS until the established minimum is exceeded. The minimum standard for NHS bridges is that no more than 10 percent of the total deck area can be structurally deficient for the three years preceding. The bridge inventory in Utah is well below this threshold. The values of SD bridges for 2015 are shown in Table 3-2 and Table 3-3.

Type	Count	SD Count	Count Percentage	Deck Area (SF)	SD Deck Area (SF)	Deck Area Percentage
NHS	1,311	12	0.9%	14,135,373	124,206	0.9%
Non-NHS	584	6	1.0%	3,375,115	44,461	1.3%
Total	1,895	18	0.9%	17,510,488	168,667	1.0%

Note: Culverts are included in this table, which affect structure count but not deck area.

Table 3-2
Structurally Deficient, State Owned Bridges in Utah

Type	Count	SD Count	Count Percentage	Deck Area (SF)	SD Deck Area (SF)	Deck Area Percentage
NHS	8	0	0.0%	9,652	0	0.0%
Non-NHS	1,068	59	5.5%	2,603,410	63,464	2.6%
Total	1,076	59	5.5%	2,613,062	63,464	2.6%

Note: Culverts are included in this table, which affect structure count but not deck area.

Table 3-3
Structurally Deficient, Locally Owned Bridges in Utah

The historical trend of SD bridges in Utah is shown in Figure 3-6.

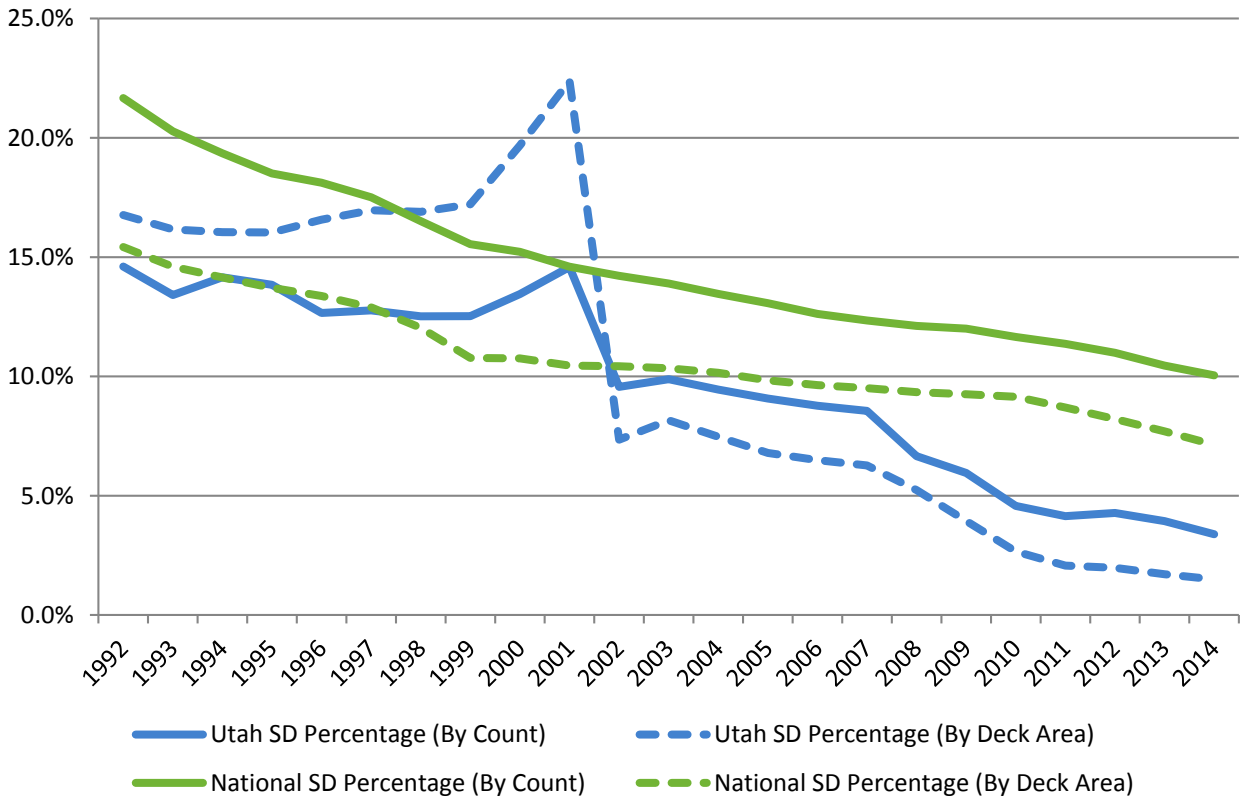


Figure 3-6
Percentage of Structurally Deficient Bridges – Utah vs Nation

All state owned SD bridges are projected to be replaced within the next three years. Table 3-4 provides details of each bridge and the timing of replacement.

Structure Number(s)	Region	Location	Deck Area (SF)	Concept	Year Programmed
1D-615/ 3D-615	1	I-15 over SR-68 (500 South in Bountiful)	25,344	Bridge Replacement	Under Construction
1D-611	1	I-15 over SR-93 (2600 South in Bountiful)	12,998	Bridge Replacement	Under Construction
0C-433	2	County Road over I-80, Northeast of Wanship	10,736	Deck Replacement	Under Construction
0C-434	2	County Road over I-80, Northeast of Wanship	8,938	Deck Replacement	Under Construction
2C-402	2	I-15 Ramp to SR-270 (West Temple) at 200 South	17,717	Substructure Repairs	In Design
2F-261/ 4F-261	3	SR-265 over Provo River, West of University Avenue Interchange	11,493	Bridge Rehabilitation	In Design
0F-49	2	1700 East over I-80	11,828	Deck Replacement	2016
0F-52	2	SR-186 (Foothill Drive) over I-80 Off Ramp (Parley's Way)	12,839	Deck Replacement	2016
3C-423	2	SR-186 (Foothill Drive) Ramp to I-215 (Parley's Interchange)	12,889	Deck Replacement	2016
4C-424	2	I-80 WB to I-215 SB Ramp (Parley's Interchange)	5,750	Substructure Repairs	2016
0C-293	4	SR-18 over Santa Clara River	10,079	Superstructure Repair	2016
0F-24	1	SR-240 over I-15, Honeyville Interchange	9,578	Bridge Replacement	2017
1D-672	2	US-89 to I-15 Ramp, Beck Street Interchange	8,910	Substructure Repair	2017
0C-454	3	SR-75 over UPRR, North of Springville	6,187	Deck Replacement	2017
0C-72	3	SR-311 over Strawberry River, North of Duchesne	1,493	Bridge Replacement	2018
0D-820	1	SR-102 over West Canal, South of Thatcher	1,888	Bridge Replacement	2018

Table 3-4
State Owned SD Bridges and Year Programmed

Section 4
STRUCTURE PROGRAMS

4.1 STRUCTURE INSPECTION PROGRAM

NBIS inspections are performed on each bridge on a two-year (maximum) cycle. The number of inspections performed in 2014 was 1,614. These inspections include routine and special inspections. Special inspections are performed when a structure's condition warrants more frequent inspections according to Bridge Management Division inspection procedures.

At the beginning of the 2014 state bridge inspection cycle, the Bridge Management Division began using the recently updated AASHTO Elements that are described in the *AASHTO Manual for Bridge Element Inspection, 1st Edition, 2015 Interim Revisions*. These elements include National Bridge Elements, which improve the standardized data reported to FHWA and Bridge Management Elements, which assist agencies with more specific bridge inspection data. The transition to these new elements is a two-year process that is expected to be completed in June 2016. As part of this transition process, the Bridge Management System has been completely overhauled, modernizing a system that has been relatively untouched since 2005.

Underwater (UW) inspections are performed on a five-year cycle. UW inspections are required on bridges that are continuously under four feet of water or more. Last year, the inspection program performed 60 UW inspections on bridges that met these conditions. The next cycle of UW inspections will occur in 2019.

4.1.1 NBIS 23 Metrics

The Bridge Management Division ensures compliance with FHWA requirements related to managing the existing inventory of bridges. NBIS and 23 Code of Federal Regulations (CFR) §650 discuss several of the requirements. The Bridge Management Manual documents the UDOT policy and procedures (including submission requirements) to comply with the following FHWA requirements:

- Bridge inspection program (e.g., qualifications, inspection frequencies)
- Plan of action for scour critical bridges
- Critical findings
- Quality control/quality assurance
- Bridge inventory (e.g., maintenance of and annual submission to FHWA)
- Load rating

The Bridge Management Division and FHWA hold quarterly meetings to discuss the status on each of the FHWA requirements. The meetings address subjects such as scheduled bridge inspections for the next three months. The Bridge Management Division is currently compliant on all 23 metrics.

In 2010, Congress directed FHWA to make more significant progress in improving its oversight of bridge conditions and safety. In response, FHWA overhauled the Metrics for the Oversight of

the National Bridge Inspection Program. The publication presents 23 metrics, which address the following topics:

- State DOT organization and record keeping
- Qualifications of NBI personnel
- Bridge inspection frequency and procedures
- Load rating and bridge posting

One fundamental goal of the FHWA metrics is to set minimum requirements for FHWA reviews to promote a data driven, risk based approach to oversight during annual NBIS compliance reviews. The metrics are intended to present:

- Clear and uniform expectations for all states
- Consistent criteria for judging each metric
- Compliance determination based upon the criteria for each metric

4.2 BRIDGE REPLACEMENT/REHABILITATION PROGRAM

The Bridge Replacement/Rehabilitation Program funds structures that require major structural work, major safety defects, or complete replacement. The Rehabilitation and Replacement List prioritizes these types of structures based on vulnerability (i.e., risk), criticality (i.e., importance), condition, and load rating. This program addresses structures with the poorest condition in the inventory.

Structures built prior to 2000 were typically designed to meet a service life of 50 years. Structures built prior to 1966 are expected to be nearing the end of the service life. There are at least 240 state owned structures that will require consideration for replacement or rehabilitation in the near future. Each decade approximately 300 to 400 bridges will be nearing the end of the service life. These structures will also need to be considered for replacement or rehabilitation. In 2014, UDOT replaced three bridges, constructed three new bridges, and rehabilitated/widened seven bridges, for a total value of $23,720,000. Table 4-1 shows the projects in the 2015-2019 Bridge Replacement/Rehabilitation Program.

Yr	Reg	County	Structure Number	Project Location	Concept
2015	1	Davis	1D-611	I-15 over 2600 South Interchange in North Salt Lake	Deck Replacement
			3D-611		Deck Replacement
			1D-615	I-15 over 500 South Interchange in Bountiful	Deck Replacement
			3D-615		Deck Replacement
			1D-620	I-15 over 1500 South in Woods Cross	Deck Replacement
			3D-620		Deck Replacement
	4	Sanpete	039004F	Clarion Road over Sevier River, West of Centerfield	Bridge Replacement

Table 4-1
FY 2015-2019 Bridge Replacement/Rehabilitation Projects

Yr	Reg	County	Structure Number	Project Location	Concept
2016	2	Salt Lake	0F-52	I-80; 1700 East to East Canyon	Substructure Repairs, Deck Replacement
			3C-423		Repaint Girders, Deck Replacement
			3F-53		Substructure Repairs
			2C-421		Repaint Girders, Substructure Repairs
			0C-422		Repaint Girders, Substructure Repairs
			4C-424		Substructure Repairs
			0F-49		Membrane and Overlay, Substructure Repairs
			0C-562		Repaint Girders
			0C-574		Repaint Girders
			0C-575		Repaint Girders, Substructure Repairs
	4	Garfield	0C-489	Dirty Devil bridge on SR-95	Minor rehabilitation
		Washington	0C-293	Veyo Arch Bridge on SR-18	Rehabilitation and Paint
2017	1	Box Elder	0F-24	SR-240 over I-15, Honeyville Interchange	Bridge Replacement
	2	Salt Lake	1D-672	US-89 (Beck Street); Northbound Ramp to I-15	Major Rehabilitation
			1C-617	I-215 over SR-201	Bridge Replacement
			3C-617		Bridge Replacement
	3	Utah	0C-454	SR-75 over UPRR, Springville	Deck Replacement and Major Rehabilitation
			0C-468	SR-75 Bridge over County Road and UPRR	Rehabilitation
	4	Garfield	0C-322	Dry Wash Bridge at Henrieville	Rehabilitation
2018	1	Box Elder	003025D	6800 West Street in Box Elder County over Corinne Canal	Bridge Replacement
			0D-820	SR-102 over West Canal, South of Thatcher	Bridge Replacement
		Weber	0D-634	SR-39, Ogden Canyon between Ogden and Pineview Reservoir	Bridge Replacement
			0F-381		Rehabilitation
			0F-598		Rehabilitation
	2	Summit	0C-338	Toll Gate Canyon Interchange Bridge	Rehabilitation
			2C-475	I-84 EB to I-80 EB, Echo Interchange	Deck Replacement and Major Rehabilitation

Table 4-1 (Continued)
FY 2015-2019 Bridge Replacement/Rehabilitation Projects

Yr	Reg	County	Structure Number	Project Location	Concept
2018 (Continued)	2	Tooele	0C-583	Tooele Interchange Bridge in Lakepoint	Bridge Replacement
	3	Duchesne	0C-72	SR-311 over Strawberry River, North of Duchesne	Bridge Replacement
		Wasatch	0D-470	SR-113 over Provo River, near Midway	Substructure Rehabilitation
	4	Carbon	0C-682	West Price Connection Bridge over UPRR	Deck Replacement
		Garfield	017045V	R4; County Roads over Alvey and Twenty Mile Washes	Culvert Replacement
			017054V		
2019	1	Morgan	029014D	5800 East over Weber River at Devil's Slide	Bridge Replacement
	2	Salt Lake	0F-115	Jordan River Bridge on 4500 South Street	Rehabilitation and Parapet Replacement
			2C-438	I-80 EB Bridge over the UPRR at Blackrock	Bridge Replacement
			4C-438	I-80 WB Bridge over the UPRR at Blackrock	Bridge Replacement
		Summit	0C-566	East Henefer Interchange	Bridge Rehabilitation
			0D-772	Weber River Bridge at Henefer	Pending S&E

Table 4-1 (Continued)
FY 2015-2019 Bridge Replacement/Rehabilitation Projects

4.3 BRIDGE PRESERVATION PROGRAM

The Bridge Preservation Program is a proactive program aimed at preserving structures in a state of good repair. Bridge preservation is defined as actions or strategies that prevent, delay, or reduce deterioration of bridges or bridge elements, restore the function of existing bridge elements, keep bridges in good condition, and extend service life. Preservation actions may be preventive or condition driven. The Bridge Preservation Program implements activities that aid in extending the life of a bridge for relatively limited cost. Funding can be used for stand-alone projects or bridge work combined with established Region projects. In 2014, UDOT applied preservation treatments to 28 bridges, for a total value of $2,300,000. Table 4-2 shows the projects in the 2015 and 2016 Bridge Preservation Program.

Yr	Reg	County	Route	Structure Number	Project Location	Concept
2015	1	Davis	SR-67	1F-703	SR-67; Legacy Parkway	Polymer Overlay & Pothole Patching, Parapet Surface Repair
				3F-703		Polymer Overlay & Pothole Patching, Parapet Surface Repair
				1F-644		Polymer Overlay & Pothole Patching, Parapet Surface Repair
				3F-644		Polymer Overlay & Pothole Patching, Parapet Surface Repair
				1F-667		Polymer Overlay, Parapet Surface Repair, Concrete Coating
				3F-667		Polymer Overlay, Parapet Surface Repair, Concrete Coating
			I-215	3F-701		Polymer Overlay & Pothole Patching, Parapet Surface Repair
			Local	0F-718		Polymer Overlay, Parapet Surface & Sidewalk Repair
				0F-717		Polymer Overlay, Parapet Surface & Sidewalk Repair
	2	Salt Lake	I-215	3C-857		Polymer Overlay & Pothole Patching, Parapet Surface Repair
				1F-747		Polymer Overlay & Pothole Patching, Parapet Surface Repair
		Summit	US-40	2C-754	US-40 Near Jordanelle Reservoir	Deck Hydrodemolition and Overlay
				4C-754		Deck Hydrodemolition and Overlay
				2F-463		Deck Hydrodemolition and Overlay
				4F-463		Deck Hydrodemolition and Overlay
	3	Wasatch	SR-319	0C-729		Deck Hydrodemolition and Overlay
	4	Grand	I-70	2D-549	I-70; Cisco to Westwater	Remove & replace Asphalt Overlay/Membrane
				4F-286		Remove & replace Asphalt Overlay/Membrane
				2F-186		Remove & replace Asphalt Overlay/Membrane
				4F-186		Remove & replace Asphalt Overlay/Membrane
			SR-279	0V-2059	SR-279; Potash Plant Road, MP 0 - 4.1	Scour Repair - Cutoff wall replacement
				0V-2058		Scour Repair - Cutoff wall repair
				0V-1720		Scour Repair - Riprap placement

Table 4-2
FY 2015-2016 Bridge Preservation Projects

Yr	Reg	County	Route	Structure Number	Project Location	Concept
2016	2	Salt Lake	I-15	1C-833	Ramp I-15 NB to I-215 WB	Thin bonded polymer overlay patching
				1F-664	Ramp I-15 NB to I-215 EB	Thin bonded polymer overlay patching
				2C-838	SR-201 EB Bridge over 900 West On-Ramp	Thin bonded polymer overlay patching
				2C-844	Ramp Bridge from SR-201 EB to I-15 NB	Thin bonded polymer overlay patching
				3C-842	Ramp Bridge, I-15 SB CD to SR-201 WB	Thin bonded polymer overlay patching
				4C-841	SR-201 WB, Ramp transition bridge from I-80 & I-15	Thin bonded polymer overlay patching
				4C-846	Ramp Bridge, I-80 WB, CD to SR-201 WB	Thin bonded polymer overlay patching
				4C-847	Ramp Bridge from I-80 WB to I-15 SB @ 2400 South	Thin bonded polymer overlay patching
				4C-851	Ramp Bridge, I-80 WB to I-15 NB CD	Thin bonded polymer overlay patching
				4C-848	Ramp Bridge, I-80 WB to I-15 SB & SR-201 WB	Thin bonded polymer overlay patching
				4C-852	Ramp Bridge from I-80 WB, CD to I-15 NB, CD	Thin bonded polymer overlay patching
				1C-870	I-15 NB Off-Ramp bridge to SR-269 EB	Thin bonded polymer overlay patching
				4C-874	North Leg of the 500 South Viaduct	Thin bonded polymer overlay patching
				4C-873	500 South Viaduct to I-15	Thin bonded polymer overlay patching
				3C-886	I-15 SB Ramp Bridge to I-80 WB	Thin bonded polymer overlay patching
			I-80	2C-871	6th South Off-Ramp Viaduct	Thin bonded polymer overlay patching
				4F-642	I-80 WB Bridge over 400 South	Thin bonded polymer overlay patching
				4C-883	I-80 WB Bridge over 1000 West Street	Thin bonded polymer overlay patching
				2C-884	Ramp Bridge, I-80 EB to I-15 NB	Thin bonded polymer overlay patching
				2C-887	I-80 EB Bridge over 900 West	Thin bonded polymer overlay patching

Table 4-2 (Continued)
FY 2015-2016 Bridge Preservation Projects

Yr	Reg	County	Route	Structure Number	Project Location	Concept
2016 (Continued)	2	Salt Lake	I-215	4C-727	Citation Bridge over I-215 at 10th East	Thin bonded polymer overlay patching
				4C-736	20th East NB Ramp Bridge to I-215 WB	Thin bonded polymer overlay patching
				0F-458	Knudsen Corner	Remove HMA/Place Poly Concrete
				0C-757		Remove Poly/Place Poly Concrete
				0C-759		Remove Poly/Place Poly Concrete
				4C-760		Bare Deck/Place Poly Concrete
				2C-761		Bare Deck/Place Poly Concrete
			SR-190	0F-562		Bare Deck/Place Poly Concrete
			SR-71	0F-693	SR-71; 12300 South over Jordan River	Polymer Overlay & Pothole Patching
			SR-201	2C-919	SR-201 over KCC Haul Road in Magna	Polymer Overlay, Abutment Backwall Repair
				4C-919		Polymer Overlay
				2C-839	SR-201 EB Ramp Bridge over the Roper Yards	Thin bonded polymer overlay patching
				4C-837	SR-201 WB On-Ramp Bridge from 700 West	Thin bonded polymer overlay patching
			Local	0C-814	Vine Street over I-15	Polymer Overlay & Pothole Patching, Clean & Overcoat Structural Steel
				0C-621	Winchester Street Bridge over I-215	Pothole patching, membrane, and overlay
		Summit	SR-32	0C-288	SR-32 over Weber River upper end of Rockport Res.	Scour Repair, paint structural steel
			SR-150	0D-269	SR-150; Mirror Lake Highway Bear River Crossing	Scour Repair
	3	Duchesne	SR-35	0F-650	SR-35 over north fork of Duchesne River	Thin bonded polymer overlay
			US-40	0F-690	US-40 over Antelope Creek, E of Duchesne	Thin bonded polymer overlay, Parapet Surface Repair
		Utah	US-6	0C-679	US-6 Bridge over UPRR at mouth of Spanish Fork Canyon	Thin bonded polymer overlay
				0C-1017	Skyview Bridge, US-6 Skyview to Tucker	Thin bonded polymer overlay
		Wasatch	US-40	0F-602	US-40 over Currant Creek	Thin bonded polymer overlay

Table 4-2 (Continued)
FY 2015-2016 Bridge Preservation Projects

Yr	Reg	County	Route	Structure Number	Project Location	Concept
2016 (Continued)	4	Carbon	US-6	0D-808	US-6 Slide area at the top of Price Canyon	Parapet sealing and surface repair
		Grand	US-191	1F-763	US-191 over Colorado River	Thin bonded polymer overlay and concrete repair
				3F-763		Thin bonded polymer overlay
				0C-928	Seven Mile Wash Bridge on US-191	Thin bonded polymer overlay
		San Juan	US-191	0F-594	US-191; Kane Springs Wash	Polyester concrete overlay & Pothole Patching, Parapet Surface Repair

Table 4-2 (Continued)
FY 2015-2016 Bridge Preservation Projects

4.3.1 Painted Steel Protection Systems

The Bridge Management Division is in the process of developing a program to address the protective paint system on steel superstructures. Table 4-3 shows the current quantities of painted steel elements in each condition state.

Description	Quantity (FT)	Percent	Repair Action
Condition State 1	959,932	85.0%	None
Condition State 2	127,664	11.3%	Spot paint trouble areas such as beam ends
Condition State 3	19,640	1.7%	Repaint
Condition State 4	22,194	2.0%	Repaint
Total	1,129,430	100%	

Table 4-3
Painted Steel Superstructure Condition Summary

The historical trend of painted steel superstructure elements in Utah is shown in Figure 4-1.

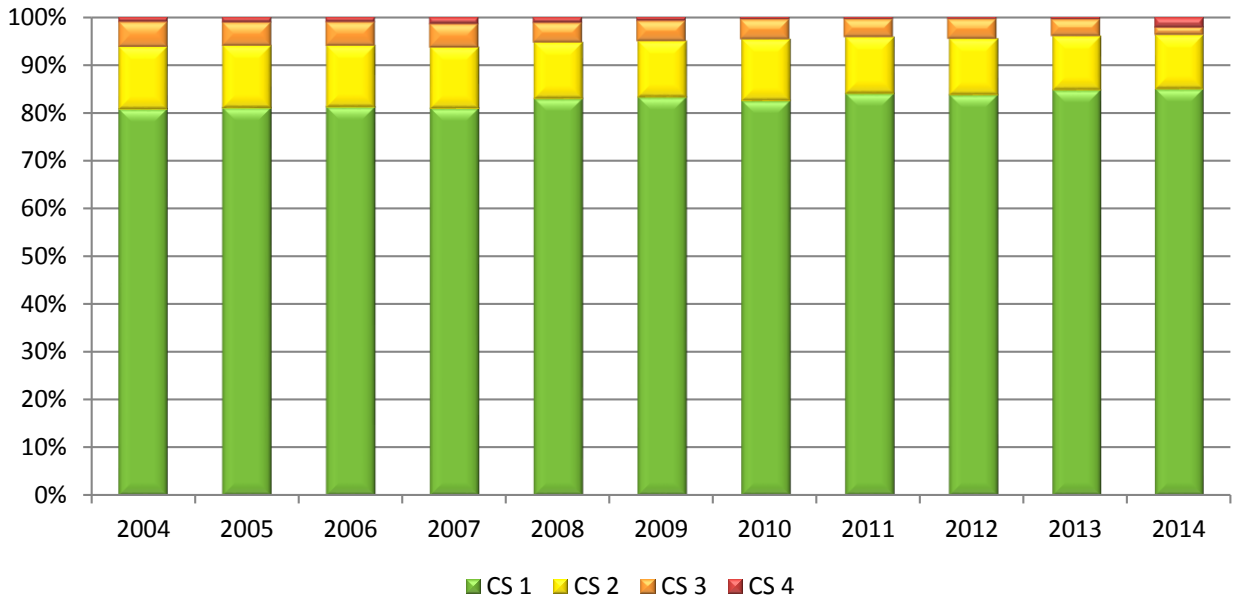


Figure 4-1
Painted Steel Superstructure by Year and Condition State

4.3.2 Concrete Deck Protection

The Structures Division has been applying protective overlays to bridge decks for many years. Initially, asphalt overlays were applied mostly due to asphalt pavement adjacent to the bridge and to address rideablility issues, as opposed to addressing bridge protection.

Recent developments in asset management strategies have led to improved performance and extended service life in bridge decks. One such strategy is to apply thin-bonded polymer overlays to existing bare concrete bridge decks. Another strategy is to apply a thin, low-permeability rigid overlay such as polyester concrete. Table 4-4 provides the current information on bridges without any overlay protection.

Description	Quantity (SF)	Percent	Repair Action
Condition State 1	3,333,104	87.8%	Apply a protective overlay
Condition State 2	408,504	10.8%	Structural pothole patch & apply a protective overlay
Condition State 3	55,413	1.5%	Structural pothole patch & apply a protective overlay
Condition State 4	0	0.0%	Replace upper portion of deck & apply a protective overlay
Total	3,797,021	100%	

Table 4-4
Bare Concrete Deck Condition Summary

The historical trend of bare concrete deck elements in Utah is shown in Figure 4-2.

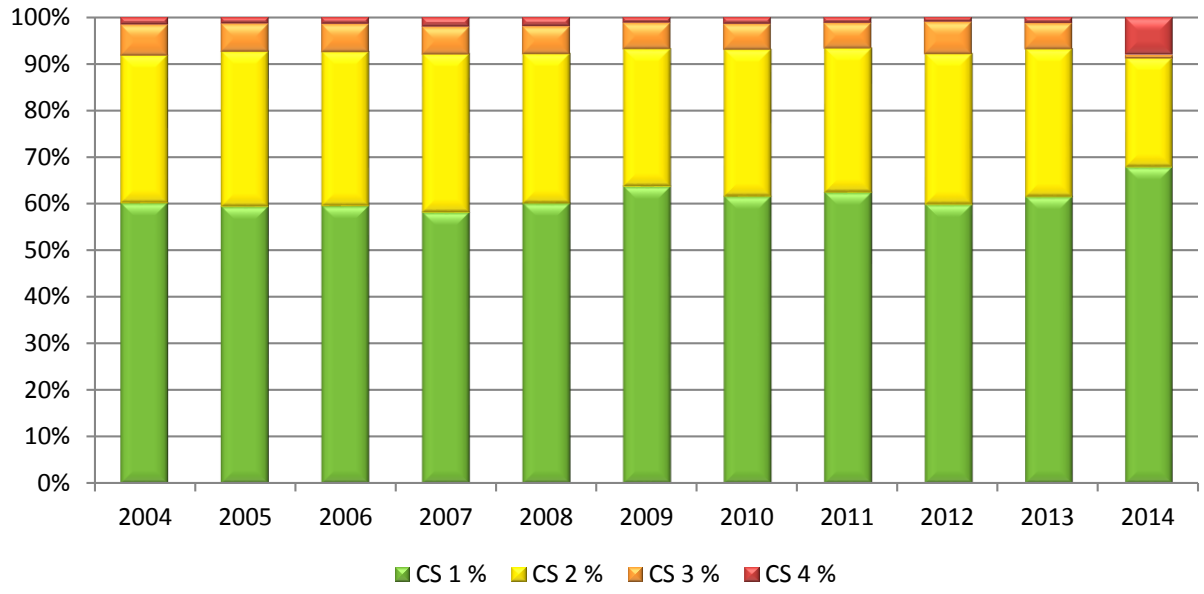


Figure 4-2
Bare Concrete Decks by Year and Condition State

4.4 OFF-SYSTEM BRIDGE PROGRAM

All local public agency bridges not included in the Federal Aid Highway System are eligible for federal funding through the Joint Highway Committee (JHC). The JHC is composed of representatives from Utah counties and cities and is responsible for the local public agency projects within the Off-System Bridge Program. A bridge will be considered for replacement or preservation in accordance with the Bridge Management Manual. Table 4-5 shows the current projects in the program.

Structure Number(s)	Region	Location	Year Programmed
003023C	1	Malad River Bridge, Southwest of Plymouth	Under Construction
043039F	2	Icy Springs Bridge over the Weber River, Coalville	Under Construction
013005C, 013005C, 013064C	3	Bridges near Tabiona	2014
029003C	1	Stoddard Lane over Weber River, Morgan County	2015
005012C, 005033C, 005037D	1	Bridges in Cache County	2015
035014F	2	600 East Larchwood Drive, Midvale	2015
043046C	2	Hoytsville Bridge, Summit County	2016
053019C	4	Rockville Bridge over the Virgin River, Rockville	2016

Table 4-5
Off-System Bridge Program

4.5 MAINTENANCE PROGRAM

The Bridge Maintenance Program was initiated to quickly fix observed bridge deficiencies. The program is intended to address common deficiencies through a bridge procurement contract with dedicated bridge funding. This process allows the work to be performed much sooner than waiting to add the work to the next unfunded year on the Bridge Replacement/Rehabilitation Program or the Bridge Preservation Program. Bridge contractors submit unit prices for several simple work items before the specific bridge or the extent of the work is known. Since many of the recurring bridge deficiencies are consistent with these simple work items, engineers can now quickly identify a number of bridges to address and direct the contractor to do the work at the pre-determined price.

The focus of this program is on patching potholes in concrete bridge decks, patching delaminated areas of thin bonded polymer overlays, cleaning bridge drainage systems and washing structural elements. These four deficiencies are carefully tracked through the Bridge Inspection Program and with the assistance of region personnel. Work on any one bridge may be minor, but when possible, several bridges with similar deficiencies and in close proximity are bundled into one project. The procurement contract can also be used to provide waterproofing membrane with asphalt overlays, deck seals, and bridge parapet repair.

This work is done in close coordination with each Region to provide the necessary administration, construction oversight, and material testing. When necessary, the construction oversight and material testing are completed with a Consultant engineer. Either the Structures Division or the Region performs the administration.

4.6 LOAD RATING PROGRAM

The Bridge Management Division is currently in its fourth year of a five-year program to load rate all state and locally owned structures. A bridge load rating is defined as the safe live load carrying capacity of a bridge. This program promotes safety of the traveling public, provides accurate data to support and allocate funding, assists in the development of a programmatic permit truck routing system, and more effectively evaluates higher truck load permits. Table 4-6 shows all of the state owned structures that are load posted. Figure 4-3 shows the current progress. The total structure count is based on public (non-private) structures.

Bridge ID	Location	Facility Carried	Feature Intersected	Posting
0A-385	1 mile east of Ivie Creek Interchange	SR-76	Unnamed Wash	Tandem Group 34,000 lb
0A-387	1.5 miles west of Fremont Junction Interchange	SR-72	Post Hollow Wash	Tandem Group 34,000 lb
0A-446	North of Mayfield	SR-137	Twelve Mile Wash	Tandem Group 34,000 lb

Table 4-6
Load Posted, State Owned Structures

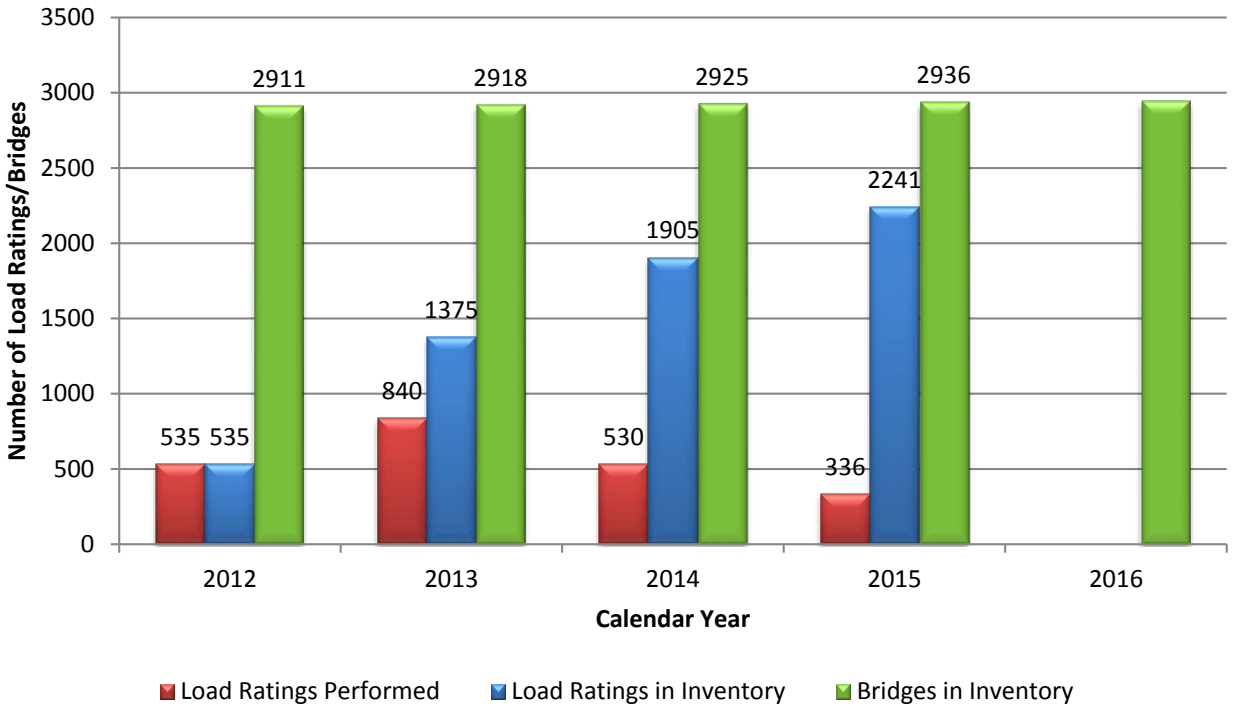


Figure 4-3
Load Rating Program Progress

4.7 SCOUR PROGRAM

The goal of the scour program is to allocate funding for projects to address structures that are scour critical. These funds are spent to identify and mitigate scour hazards to minimize the risk associated with bridge failures due to scour. This work will reduce future maintenance costs associated with scour. The established program has been incorporated into the Bridge Preservation Program.

4.7.1 Unknown Foundation Program

In 2014, the Bridge Management Division finished a program to develop a formal plan of action for all bridges with unknown foundations. This program was in response to the FHWA Memorandum for Technical Guidance for Bridges over Waterways with Unknown Foundations dated January 9, 2008, which set November 2010 as the target date for eliminating the number of bridges with unknown foundations from the inventory in each state. Additionally, this program generated detailed hydraulic studies for 36 bridges that were determined to have a higher risk of failure due to scour. The Division discussed the unknown foundation program and scour plans of action with all local bridge owners across the state.