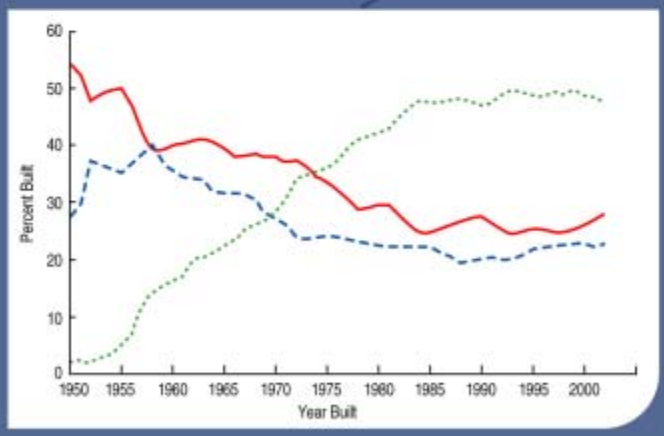
Material Usage and Condition of Existing Bridges in the U.S.

by Shri Bhide



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PCA Portland Cement Association

Material Usage and Condition of Existing Bridges in the U.S.

Based on NBI Data as of
December 2003

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MATERIAL USAGE AND CONDITION OF EXISTING BRIDGES IN THE U.S.

ABSTRACT

Data on the market share of the four major bridge construction materials used in the US (reinforced concrete, prestressed concrete, structural steel, and timber) are summarized in this report. All bridges carrying public roadways are considered. Data are extracted from the National Bridge Inventory (NBI) as of December 2003. The NBI is maintained by the Federal Highway Administration (FHWA). Tables and figures present information on both the number and deck area of existing bridges. To focus on current trends, data are also presented for bridges built during 1999-2003. The market share and performance (structural deficiency) of bridge materials are given by year of construction. This report updates data published in a similar document in September 2001[1].

The National Bridge Inventory

Following the tragic collapse of the Sliver Bridge in December 1967, Congress passed legislation that required each state to inspect and maintain an inventory of all bridges on the Federal-aid system. Inspection standards were issued in 1971 to satisfy this mandate of Congress. Most states completed their inventory of bridges on the Federal-aid system by the end of 1973. In 1978, Congress passed the Surface Transportation Assistance Act which expanded the law to require all highway bridges on public highways to be added to the inventory. Biennial inspections of all bridges were also required to ensure the safety of the traveling public.

The states are responsible for assuring that owners of all bridges on public roads perform the required inspections. Each state then collects the inspection reports for all bridges in the state and submits them annually to the FHWA, where they are entered into the National Bridge Inventory (NBI) database. The NBI must be updated annually as existing bridges are reinspected, new bridges are added, and old bridges are rehabilitated, replaced or abandoned.

The FHWA uses the NBI to identify bridges that are eligible for rehabilitation or replacement under federal programs. The NBI is also used as the basis for a biennial report on the condition of the nation's bridges. The Secretary of Transportation is required by law to submit this report to Congress[2].

The format for the NBI data is defined in the "Recording and Coding Guide" published by FHWA[3]. The current guide contains 116 data fields, some of which contain sub-fields. These fields contain a wide range of data about each bridge, including:

- Location and highway designation
- Year built and year reconstructed, if applicable
- Ownership and maintenance responsibility
- Structure geometry: structure length, main span length, number of main and approach spans, deck width, skew
- Material and structure type for main span and approach spans, if any
- Condition and appraisal ratings of structure
- Traffic data

The coding guide assists bridge inspectors in preparing data for identification items, such as bride location, and for rating items, such as substructure and superstructure condition. The guide is intended to provide greater uniformity in reporting data.

Data Used in this Report

The NBI is a dynamic database. It is regularly updated to reflect the current status of the bridge inventory. Therefore, any set of data taken from the NBI is a "snapshot" of existing bridges in the US at one point in time. This market share report is based on data extracted from the inventory as of December 2003. On that date, the NBI contained information for 699,898 structures. These structures included highway bridges (including culverts), railway bridges, tunnels, and other transportation structures carrying or passing over a public highway. The NBI includes data for structures located in all states plus Washington, DC, and Puerto Rico. The format of this report parallels that of Reference 1.

The main purpose for creating and maintaining the NBI is to monitor the condition of bridges carrying public highways. Therefore, for funding and reporting purposes, the FHWA considers only structures meeting the following criteria:

- The structure must support a roadway with vehicular traffic
- The total structure length must be equal to or greater than 20 ft.

Based on the above criteria, there are 594,888 structures in the inventory as of December 2003. Of the structures considered in this report, 474,515 are identified as bridges, and 120,373 as culverts. Culverts have been excluded from data considered for this report because they are typically buried structures. Therefore, the database of structures used for this report contains a total of 474,515 structures. This subset of the total NBI database, referred to as the report database in the following, is used to generate all tables and figures contained in this report.

For this report, data for all structures in the report database are retained, even when the structure has invalid or missing data in some data fields. The number of structures with invalid or missing data in any given field is very small. For ease of data extraction, invalid data fields were given null values. While importing data for the total of 699,898 structures, there were 1129 errors associated with input format for the data fields. Some structures had multiple invalid data fields, making the number of structures with invalid data fields smaller than 0.16%. The missing and/or invalid data fields may result in minor discrepancies between total numbers listed in different portions of the tables.

Data extracted from the NBI are often reported in terms of the number of bridges. Such an approach has limitations because it does not distinguish between different size bridges. A bridge may have a single or multiple spans. To address this limitation, data in this report are presented by the number of bridges and by the bridge deck area (i.e., product of structure length and width of bridge deck). Bridge deck area is more representative of the volume of construction, since large projects with greater deck area will receive more weight in the comparisons.

Bridge Condition

Data contained in the NBI can be used to determine whether a bridge is deficient in structural condition or function. The FHWA also requires that the time since construction (or reconstruction, if applicable) must be 10 years or more for a bridge to be classified as structurally or functionally deficient. This additional age requirement is ignored when assessing deficiency in this report.

The structural condition of bridges is evaluated based on five major items. Each item is rated on a scale of 0 to 9, from bridge closed to excellent condition, respectively. According to FHWA, a bridge is classified as structurally deficient if it meets any one of the following criteria:

- A condition rating of 4 or less for:
  - deck (Item 58)
  - superstructure (Item 59)
  - substructure (Item 60)
- An appraisal rating of 2 or less for:
  - structural evaluation (Item 67)
  - water-way adequacy (Item 71)

The FHWA coding guide[3] describes a condition rating of 4 as "POOR CONDITION – advanced section loss, deterioration, spalling or scour." An appraisal rating of 2 is noted as a "Basically intolerable requiring high priority of replacement." A structurally deficient bridge is restricted to light vehicular traffic, requires immediate rehabilitation to remain open, or is closed.

Of the 474,515 structures considered in this report, 79,519 or 16.8% are classified as structurally deficient.

A bridge may also be classified as functionally obsolete. This classification indicates that the deck geometry, clearances, load carrying capacity (comparison of the original design load to the current state legal load), or approach roadway alignment do not satisfy the current minimum criteria for the system of which it is a part. A bridge is excluded from the functionally obsolete category if it is classified as structurally deficient.

Of the 474,515 structures considered in this report, 81,953 or 17.3% are classified as functionally obsolete.

A total of 161,472 structures, or 34.0%, are classified as either structurally deficient or functionally obsolete. Note that culverts are excluded in this analysis.

The FHWA uses data in the NBI to compute a sufficiency rating for each bridge. This rating is based on structural adequacy and safety, serviceability and functional obsolescence, and essentiality for public use. A bridge may be eligible to receive federal funding for rehabilitation or replacement if it has a low sufficiency rating, is structurally deficient or functionally obsolete, and meets the minimum age requirement stated above.

Structural deficiency provides an indication of bridge condition. Therefore, it can be used to compare the relative durability and long-term performance of different US bridge materials. However, for the comparisons to be meaningful, bridges must be of the same age. In this report, data related to structural deficiency are based on the number of existing bridges. Deck area is not used when reporting structural deficiency. Structural deficiency does not necessarily reflect the overall condition of a bridge, but may only reflect the condition of a single element. It would be misleading to represent the entire bridge area as deficient if only a single element or span of the structure is the source of the deficiency.

The condition of bridges is not directly related to market share. It is included as a significant part of this bridge market share report for several reasons. The first reason is that bridge condition can be used as a general indication of the potential size of the bridge replacement market. The second reason is that the NBI data reveal that concrete bridges, both reinforced and prestressed, have demonstrated very good long-term performance. Further, this performance is significantly better than that of bridges built using other materials (see References 4 through 9).

Limitations of Data

It is important to note that the data presented in this report represent only bridges existing in the inventory as of December 2003. The NBI does not provide information on every bridge built in a given year, but only on those bridges that are still in service. If a bridge is demolished or totally replaced, it is deleted from the inventory.

All new bridges must be inspected and added to the NBI. Data on all bridges built in 2001 and 2002 may not have been entered into the 2003 NBI. The delay may be due to a lag between inspection and entry of data into the NBI. Therefore, data on bridges built during 2001 and 2002 may be incomplete. The incomplete sample is reported because it is assumed to be representative of the total population built during those years.

In this report, each bridge is categorized according to the FHWA definition, i.e. by the material of the main span superstructure. In structures incorporating approach spans, the main span superstructure material may differ from the approach span superstructure material. In this case, the contribution of the bridge to the market share is not accurate, since the material of the approach span is neglected. However, this situation occurs for less than 2.9% of all bridges. It is not possible to eliminate this minor source of error because the length of main and approach spans is not given in the NBI. Data reported on the basis of deck area are more strongly influenced by this situation than data reported on the basis of number of bridges built.

The NBI lists the "Year Built" for each structure. Where applicable, the "Year Reconstructed" is also given. If the superstructure of a bridge is replaced, but the substructure is reused, "Year Built" remains the year of original substructure construction. "Year Reconstructed" would then indicate the year the superstructure was replaced. Such a situation can lead to apparent inaccuracies in the analysis of NBI data. For example, prestressed concrete bridges were first built in the US in 1950. However, some bridges with prestressed concrete superstructures have a "Year Built" prior to 1950. These bridges have probably been "reconstructed" using prestressed concrete superstructures. In this report, all data are presented using "Year Built". "Year Reconstructed" is ignored. Data contained in the NBI do not identify if the superstructure has been replaced during reconstruction. It is expected that any error introduced by reconstructed superstructures is minor.

Prior to introduction of legislation requiring the inventory and inspection of all bridges on public highways, detailed records of construction were not always maintained. Therefore, the year of reconstruction is not known for many older bridges. When the inspection of all federal-aid bridges was first mandated in 1968, and the requirement was extended to all bridges in 1978, inspectors were required to estimate the year of construction for a bridge if the actual year was unknown. It appears that these estimates were rounded to five- or ten-year increments. This is particularly evident for the year 1900, for which the NBI records that 6,678 bridges were built. This number rivals the number of bridges built during the peak years of interstate construction. These estimated construction dates only affect bridges built prior to 1978 and have a minor impact on the data reported, since this report focuses on more recent trends.

Overview of Data Presented in Appendix A

Tables A.1 through A.8 present a broad overview of market share and bridge condition (structural deficiency) information for each state. Data for Washington DC and Puerto Rico are also reported. Data based on the number and deck area of bridges are presented for all existing bridges and for those built during the 1990-2003 period. Detailed data are given for the four most prevalent main span superstructure materials: reinforced concrete, prestressed concrete, steel, and timber. Data for reinforced and prestressed concrete bridges are also combined to reflect the total market share for

concrete. Data on structurally deficient bridges are provided as an indication of the overall condition of bridges in each state. This information can be used to assess the potential bridge replacement activity in a state. These numbers should not be used to compare performance of bridges constructed using different materials because bridges of different ages are included in the data.

Data presented in Tables A.9 through A.14 and Figures A.1 & A.2 could be used to compare performance of bridges of similar ages, built of different materials. The figures illustrate the changing market share of main span superstructure materials for existing bridges built in the indicated five- and ten-year periods since 1950. Data are presented in tables for the number, deck area and structural deficiency of existing bridges by main span superstructure material for the total inventory and for various highway systems: City Street, County Highway, Federal Lands Road, Interstate Highway, Other Road, State Highway, State Lands Road, and U.S. Numbered Highway. These data are further separated into ranges for year built and maximum span length. The data on structurally deficient bridges may be used to evaluate the relative performance of bridges constructed using different superstructure materials that were built during the same period of time.

Observations on Market Share and Bridge Condition

Many observations can be made from the information presented in this report. However, observations made here will be limited because the report is intended to present data rather than interpret the data. Trends also vary widely between states, making it difficult to make general observations. References 4 through 9 provide detailed evaluations of NBI data, including market share and performance comparisons. Although these references are based on data from previous versions of the NBI, the same trends hold true for data reported herein.

The most prominent observation is that reinforced and prestressed concrete make up an increasingly larger share of the bridge market. This is evident from the Figure A.1. The combined market share for reinforced and prestressed concrete bridges in the US is close to 70 % of bridges built in recent years for both number and deck area of bridges. This is a significant increase from the period 1950-1959 where the market share was approximately 43% based on number of bridges and 35% based on deck area of bridges.

The market share in each state may vary widely from the national trends. To illustrate the differences in current market conditions between states, the two states at the extremes of market share are discussed here based on data from Table A.7. In Maryland, only 22.5% of existing bridges built recently (1990-2003) were constructed using reinforced and/or prestressed concrete superstructures. In Hawaii, during the same period, the share is 100%. In Maryland, only 11.3% of the bridge deck area was supported on reinforced and/or prestressed concrete superstructures. In Hawaii, the corresponding percentage was 100%.

Condition and Material usage by various highway systems are shown in Tables A.9 through A.14. Interstate and State Highways have the largest share of the total deck area of bridges (28% and 26%, respectively). While County Highways have the largest number (45%) and the most structurally deficient bridges (22%), they account for only 17% of the total deck area. County and State Highways show high (75% and 70%, respectively) usage of concrete bridge deck area in recent years, up from about 36% and 39% respectively, in the 50s. Interstate Highways also demonstrate similar increase in the concrete bridge deck area; but the share of concrete bridge deck area is only 58%.

Data for all structurally deficient bridges in the US are listed in Tables A.13 and A.14. These data indicate that, for almost each road or highway system, reinforced and prestressed concrete bridges have a significantly lower rate of structural deficiency than steel or timber bridges within each range

of years shown. In most cases, timber bridges have the highest rate of structural deficiency by a wide margin.

Data for maximum span length for all bridges in the US (Table A.10) indicate that only 2.5% of all bridges have main spans of 150 ft. or longer. It can also be seen that steel is the more prevalent superstructure material for spans in excess of 150 feet, although the use of concrete for long span structures has been growing in recent years.

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APPENDIX A

Summary of Market Share and Bridge Condition Data

The following tables are included:

All Existing Bridges

Table A.1 2003 NBI Data for Selected Main Span Materials by State Based on Number of All Existing Bridges

Table A.2 2003 NBI Data for Selected Main Span Materials by State Based on Deck Area of All Existing Bridges

Table A.3 2003 NBI Data for All Concrete Bridges (RC+PS) by State Based on Number and Deck Area of All Existing Bridges

Table A.4 2003 NBI Data for Selected Main Span Materials by State Based on Number of All Existing Structurally Deficient Bridges

Table A.4a 2003 NBI Data for Selected Main Span Materials by State Based on Number of All Existing Structurally Deficient and Functionally Obsolete Bridges

Existing Bridges Built 1990 through 2003

Table A.5 2003 NBI Data for Selected Main Span Materials by State Based on Number of Existing Bridges Built 1990 through 2003

Table A.6 2003 NBI Data for Selected Main Span Materials by State Based on Deck Area of Existing Bridges Built 1990 through 2003

Table A.7 2003 NBI Data for All Concrete Bridges (RC+PS) by State Based on Number and Deck Area of Existing Bridges Built 1990 through 2003

Table A.8 2003 NBI Data for Selected Main Span Materials by State Based on Number of Existing Structurally Deficient Bridges Built 1990 through 2003

All Existing Bridges

Table A.9 2003 NBI Data for Year Built by Highway System and Material Based on Number of All Existing Bridges - All States + DC and PR

Table A.10 2003 NBI Data for Maximum Span Length by Highway System and Material Based on Number of All Existing Bridges - All States + DC and PR

Table A.11 2003 NBI Data for Year Built by Highway System and Material Based on Deck Area of All Existing Bridges - All States + DC and PR

Table A.12 2003 NBI Data for Maximum Span Length by Highway System and Material Based on Deck Area of All Existing Bridges - All States + DC and PR

Table A.13 2003 NBI Data for Year Built by Highway System and Material Based on Percentage of Structurally Deficient Bridges - All States + DC and PR

Table A.14 2003 NBI Data for Maximum Span Length by Highway System and Material Based on Percentage of Structurally Deficient Bridges - All States + DC and PR

Existing Bridges Built 1950 through 2003

Figure A.1 2003 NBI Share of Total Bridge Construction for Selected Main Span Materials Based on Number of Existing Bridges

Figure A.2 2003 NBI Percent Deficient Bridges for Selected Main Span Materials

Notes: Data are extracted from the NBI as of December 2003.

Bridges are classified as reinforced concrete, prestressed concrete, structural steel and timber based on the superstructure material for the main span. Values shown in the "Total" columns include bridges constructed using other materials such as masonry, aluminum, cast iron and wrought iron. Therefore, the sum of the values for the four materials listed will generally be slightly less than the total numbers in a state.

Data on structurally deficient bridges in Tables A.4 and A.8 should not be used to compare performance of bridges constructed using different materials because bridges of different ages are included in the data. Data presented in Tables A.13 and A.14 may be used to evaluate relative performance of bridges constructed using different materials that were built during the same period of time.

Table A.1 – Number and Percent of Bridges with Main Span Material of RC, PS, Steel and Timber for All Bridges

	Total	RC		PS		Steel		Timber	
State	**#**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Alabama	10,095	4,579	45.4%	1,227	12.2%	2,961	29.3%	1,300	12.9%
Alaska	1,125	22	2.0%	326	29.0%	533	47.4%	241	21.4%
Arizona	3,207	1,282	40.0%	1,333	41.6%	552	17.2%	36	1.1%
Arkansas	9,822	4,648	47.3%	132	1.3%	4,315	43.9%	696	7.1%
California	20,715	12,341	59.6%	4,942	23.9%	2,594	12.5%	788	3.8%
Colorado	6,568	1,283	19.5%	1,930	29.4%	2,822	43.0%	528	8.0%
Connecticut	3,578	515	14.4%	753	21.0%	2,211	61.8%	45	1.3%
Delaware	642	109	17.0%	152	23.7%	354	55.1%	22	3.4%
District Of Columbia	246	71	28.9%	17	6.9%	156	63.4%	0	0.0%
Florida	9,324	2,030	21.8%	5,652	60.6%	1,083	11.6%	556	6.0%
Georgia	9,102	3,344	36.7%	1,636	18.0%	3,818	41.9%	296	3.3%
Hawaii	960	579	60.3%	270	28.1%	62	6.5%	41	4.3%
Idaho	3,943	1,168	29.6%	1,582	40.1%	709	18.0%	483	12.2%
Illinois	21,604	5,185	24.0%	9,207	42.6%	7,050	32.6%	125	0.6%
Indiana	16,830	4,962	29.5%	6,271	37.3%	4,783	28.4%	716	4.3%
Iowa	21,678	5,204	24.0%	4,024	18.6%	9,273	42.8%	3,157	14.6%
Kansas	18,364	7,564	41.2%	1,091	5.9%	8,029	43.7%	1,488	8.1%
Kentucky	10,748	3,287	30.6%	4,774	44.4%	2,548	23.7%	122	1.1%
Louisiana	11,112	5,780	52.0%	1,323	11.9%	1,159	10.4%	2,734	24.6%
Maine	2,034	619	30.4%	40	2.0%	1,329	65.3%	32	1.6%
Maryland	3,905	701	18.0%	250	6.4%	2,711	69.4%	186	4.8%
Massachusetts	4,717	692	14.7%	761	16.1%	3,017	64.0%	76	1.6%
Michigan	9,380	1,124	12.0%	3,192	34.0%	4,551	48.5%	505	5.4%
Minnesota	8,483	1,051	12.4%	2,634	31.1%	3,042	35.9%	1,733	20.4%
Mississippi	13,814	6,036	43.7%	3,837	27.8%	2,165	15.7%	1,773	12.8%
Missouri	19,196	4,101	21.4%	2,722	14.2%	12,140	63.2%	229	1.2%
Montana	4,920	548	11.1%	1,723	35.0%	1,153	23.4%	1,495	30.4%
Nebraska	12,622	2,066	16.4%	1,242	9.8%	7,574	60.0%	1,737	13.8%
Nevada	952	419	44.0%	307	32.2%	193	20.3%	29	3.0%
New Hampshire	2,329	572	24.6%	126	5.4%	1,458	62.6%	137	5.9%
New Jersey	5,979	725	12.1%	1,267	21.2%	3,633	60.8%	258	4.3%
New Mexico	2,174	536	24.7%	913	42.0%	469	21.6%	234	10.8%
New York	15,640	2,082	13.3%	2,194	14.0%	10,720	68.5%	439	2.8%
North Carolina	12,996	1,119	8.6%	3,322	25.6%	7,470	57.5%	1,077	8.3%
North Dakota	3,711	585	15.8%	1,170	31.5%	1,377	37.1%	579	15.6%
Ohio	26,244	6,453	24.6%	6,124	23.3%	13,418	51.1%	128	0.5%
Oklahoma	16,702	3,377	20.2%	3,024	18.1%	8,686	52.0%	1,589	9.5%
Oregon	6,917	2,135	30.9%	3,001	43.4%	1,029	14.9%	751	10.9%
Pennsylvania	20,576	5,494	26.7%	6,889	33.5%	7,509	36.5%	238	1.2%
Puerto Rico	1,819	728	40.0%	754	41.5%	333	18.3%	0	0.0%
Rhode Island	721	164	22.7%	117	16.2%	405	56.2%	16	2.2%
South Carolina	8,073	4,799	59.4%	1,745	21.6%	1,401	17.4%	125	1.5%
South Dakota	4,905	1,693	34.5%	947	19.3%	1,869	38.1%	384	7.8%
Tennessee	11,565	4,017	34.7%	4,220	36.5%	2,871	24.8%	442	3.8%
Texas	31,072	11,200	36.0%	10,390	33.4%	7,545	24.3%	1,734	5.6%
Utah	2,302	519	22.5%	941	40.9%	729	31.7%	105	4.6%
Vermont	2,520	636	25.2%	95	3.8%	1,685	66.9%	93	3.7%
Virginia	10,169	2,618	25.7%	1,127	11.1%	6,328	62.2%	78	0.8%
Washington	7,609	3,128	41.1%	2,887	37.9%	855	11.2%	728	9.6%
West Virginia	6,370	1,200	18.8%	1,824	28.6%	3,242	50.9%	91	1.4%
Wisconsin	11,821	4,035	34.1%	3,232	27.3%	3,935	33.3%	593	5.0%
Wyoming	2,615	965	36.9%	219	8.4%	1,196	45.7%	234	8.9%
Total:	**474,515**	**140,090**	**29.5%**	**119,878**	**25.3%**	**181,050**	**38.2%**	**31,222**	**6.6%**

Note: Percentages are computed from 2003 NBI data using the ratio of number of bridges built from each material to total number of bridges in each state.

RC = Reinforced Concrete, PS = Prestressed Concrete

Table A.2 – Deck Area and Percent of Bridges with Main Span Material of RC, PS, Steel and Timber for All Bridges

State	Total SF (x 10^6)	Reinf. Concrete SF (x 10^6)	Reinf. Concrete %	P/S Concrete SF (x 10^6)	P/S Concrete %	Steel SF (x 10^6)	Steel %	Timber SF (x 10^6)	Timber %
Alabama	85.6	25.8	30.1%	18.3	21.4%	39.7	46.4%	1.7	2.0%
Alaska	6.6	0.2	3.6%	2.7	40.5%	3.2	48.7%	0.5	7.2%
Arizona	41.1	7.7	18.8%	26.6	64.6%	6.8	16.4%	0.1	0.1%
Arkansas	59.9	14.8	24.8%	1.9	3.2%	42.4	70.8%	0.8	1.3%
California	273.9	125.3	45.8%	104.9	38.3%	42.2	15.4%	1.1	0.4%
Colorado	41.0	7.4	18.0%	17.4	42.3%	15.5	37.7%	0.8	2.0%
Connecticut	33.8	1.3	3.9%	4.1	12.0%	28.1	83.1%	0.0	0.1%
Delaware	9.1	0.3	3.6%	1.5	16.6%	7.2	79.3%	0.0	0.4%
District Of Columbia	5.8	1.2	20.1%	0.2	3.3%	4.4	76.4%	0.0	0.0%
Florida	149.9	15.9	10.6%	95.5	63.7%	37.9	25.3%	0.6	0.4%
Georgia	92.1	21.2	23.0%	33.2	36.0%	37.2	40.4%	0.5	0.5%
Hawaii	11.6	4.1	35.1%	7.1	61.2%	0.4	3.3%	0.0	0.3%
Idaho	15.8	3.4	21.7%	7.7	48.8%	4.3	27.3%	0.3	2.2%
Illinois	127.4	13.3	10.4%	31.7	24.9%	82.0	64.3%	0.2	0.2%
Indiana	73.5	15.8	21.4%	21.4	29.1%	35.2	47.9%	1.0	1.4%
Iowa	78.8	15.3	19.4%	25.0	31.8%	35.4	45.0%	3.0	3.8%
Kansas	77.3	32.5	42.0%	8.4	10.9%	34.6	44.8%	1.5	1.9%
Kentucky	54.8	13.9	25.3%	19.6	35.7%	21.2	38.6%	0.1	0.3%
Louisiana	152.7	25.7	16.8%	55.2	36.1%	65.9	43.1%	4.0	2.6%
Maine	12.4	1.2	9.9%	0.6	4.7%	10.5	84.7%	0.1	0.4%
Maryland	48.2	3.0	6.2%	1.9	4.0%	42.6	88.4%	0.5	1.0%
Massachusetts	38.8	2.7	6.9%	2.9	7.4%	32.6	83.9%	0.2	0.6%
Michigan	62.3	4.4	7.0%	16.5	26.5%	40.6	65.3%	0.7	1.2%
Minnesota	60.8	5.8	9.6%	23.9	39.3%	27.9	45.8%	3.2	5.3%
Mississippi	81.2	17.9	22.0%	39.0	48.0%	22.4	27.6%	1.9	2.4%
Missouri	98.9	15.7	15.9%	19.7	19.9%	63.2	63.9%	0.3	0.3%
Montana	20.3	1.5	7.2%	9.4	46.5%	7.7	37.9%	1.7	8.4%
Nebraska	39.2	6.3	16.1%	8.8	22.4%	22.6	57.7%	1.5	3.8%
Nevada	11.9	4.1	34.8%	4.9	41.4%	2.8	23.2%	0.0	0.2%
New Hampshire	11.0	0.9	8.6%	0.2	2.0%	9.6	87.0%	0.2	1.7%
New Jersey	66.5	3.0	4.5%	8.2	12.3%	54.6	82.1%	0.4	0.6%
New Mexico	16.1	2.4	14.9%	9.6	59.2%	3.7	23.1%	0.4	2.5%
New York	136.3	10.6	7.8%	9.5	7.0%	114.0	83.6%	0.5	0.4%
North Carolina	77.5	5.2	6.7%	25.7	33.2%	45.3	58.4%	1.4	1.8%
North Dakota	12.2	1.1	9.0%	4.9	40.1%	5.6	46.0%	0.6	4.9%
Ohio	131.5	17.6	13.4%	16.0	12.2%	97.3	74.0%	0.2	0.2%
Oklahoma	72.4	8.7	12.1%	28.5	39.3%	34.1	47.1%	1.0	1.4%
Oregon	48.8	14.1	28.9%	19.0	38.9%	14.5	29.7%	1.2	2.4%
Pennsylvania	126.6	13.2	10.4%	41.6	32.9%	70.3	55.5%	0.3	0.2%
Puerto Rico	19.7	2.8	14.4%	15.1	76.5%	1.8	9.1%	0.0	0.0%
Rhode Island	7.9	0.8	9.6%	1.2	15.4%	5.8	73.9%	0.0	0.3%
South Carolina	59.2	21.0	35.5%	12.9	21.8%	25.2	42.5%	0.1	0.2%
South Dakota	18.0	5.9	32.8%	3.4	18.8%	8.3	46.1%	0.4	2.2%
Tennessee	85.2	19.1	22.4%	36.2	42.4%	29.6	34.7%	0.3	0.4%
Texas	350.9	67.6	19.3%	174.0	49.6%	96.4	27.5%	1.8	0.5%
Utah	17.3	1.7	10.1%	6.8	39.2%	8.7	50.3%	0.1	0.4%
Vermont	8.6	0.7	8.4%	0.1	1.5%	7.6	88.6%	0.1	1.4%
Virginia	87.7	9.6	11.0%	18.2	20.8%	59.7	68.1%	0.1	0.1%
Washington	68.8	24.7	35.8%	27.4	39.8%	15.4	22.4%	1.2	1.8%
West Virginia	33.6	1.8	5.4%	4.9	14.5%	26.8	79.7%	0.1	0.3%
Wisconsin	62.1	11.9	19.1%	20.7	33.3%	28.8	46.4%	0.7	1.1%
Wyoming	13.0	3.8	29.3%	0.6	4.6%	8.3	63.6%	0.3	2.5%
Total:	**3,395.9**	**656.0**	**19.3%**	**1,094.4**	**32.2%**	**1,588.0**	**46.8%**	**38.0**	**1.1%**

Note: Percentages are computed from 2003NBI data using the ratio of deck area of bridges built from each material to deck area of bridges in each state.

RC = Reinforced Concrete, PS = Presstressed Concrete, SF = Square Feet

Table A.3 – Number and Deck Area of Bridges with Main Span Material of Concrete (RC and PS) for All Bridges

Number of Existing Bridges				Deck Area of Existing Bridges			
Sorted by State		Sorted by Percentage		Sorted by State		Sorted by Percentage	
State	%	State	%	State	%	State	%
AL	57.5%	MD	24.4%	AL	51.5%	VT	9.8%
AK	30.9%	NE	26.2%	AK	44.1%	MD	10.2%
AZ	81.5%	NY	27.3%	AZ	83.4%	NH	10.6%
AR	48.7%	VT	29.0%	AR	27.9%	MA	14.3%
CA	83.4%	NH	30.0%	CA	84.1%	ME	14.5%
CO	48.9%	MA	30.8%	CO	60.2%	NY	14.7%
CT	35.4%	AK	30.9%	CT	15.9%	CT	15.9%
DE	40.7%	ME	32.4%	DE	20.2%	NJ	16.9%
DC	35.8%	NJ	33.3%	DC	23.4%	WV	20.0%
FL	82.4%	NC	34.2%	FL	74.3%	DE	20.2%
GA	54.7%	CT	35.4%	GA	59.0%	DC	23.4%
HI	88.4%	MO	35.5%	HI	96.3%	RI	25.0%
ID	69.7%	DC	35.8%	ID	70.5%	OH	25.6%
IL	66.6%	VA	36.8%	IL	35.4%	AR	27.9%
IN	66.7%	OK	38.3%	IN	50.5%	VA	31.7%
IA	42.6%	RI	39.0%	IA	51.2%	MI	33.5%
KS	47.1%	DE	40.7%	KS	52.9%	WY	33.9%
KY	75.0%	IA	42.6%	KY	61.0%	IL	35.4%
LA	63.9%	MN	43.4%	LA	52.9%	MO	35.8%
ME	32.4%	WY	45.3%	ME	14.5%	NE	38.5%
MD	24.4%	MI	46.0%	MD	10.2%	NC	39.8%
MA	30.8%	MT	46.2%	MA	14.3%	PA	43.3%
MI	46.0%	KS	47.1%	MI	33.5%	AK	44.1%
MN	43.4%	ND	47.3%	MN	48.8%	MN	48.8%
MS	71.5%	WV	47.5%	MS	70.0%	ND	49.1%
MO	35.5%	OH	47.9%	MO	35.8%	UT	49.3%
MT	46.2%	AR	48.7%	MT	53.7%	IN	50.5%
NE	26.2%	CO	48.9%	NE	38.5%	IA	51.2%
NV	76.3%	SD	53.8%	NV	76.2%	OK	51.3%
NH	30.0%	GA	54.7%	NH	10.6%	AL	51.5%
NJ	33.3%	AL	57.5%	NJ	16.9%	SD	51.7%
NM	66.7%	PA	60.2%	NM	74.1%	WI	52.5%
NY	27.3%	WI	61.5%	NY	14.7%	LA	52.9%
NC	34.2%	UT	63.4%	NC	39.8%	KS	52.9%
ND	47.3%	LA	63.9%	ND	49.1%	MT	53.7%
OH	47.9%	IL	66.6%	OH	25.6%	SC	57.2%
OK	38.3%	NM	66.7%	OK	51.3%	GA	59.0%
OR	74.3%	IN	66.7%	OR	67.9%	CO	60.2%
PA	60.2%	TX	69.5%	PA	43.3%	KY	61.0%
PR	81.5%	ID	69.7%	PR	90.9%	TN	64.9%
RI	39.0%	TN	71.2%	RI	25.0%	OR	67.9%
SC	81.1%	MS	71.5%	SC	57.2%	TX	68.8%
SD	53.8%	OR	74.3%	SD	51.7%	MS	70.0%
TN	71.2%	KY	75.0%	TN	64.9%	ID	70.5%
TX	69.5%	NV	76.3%	TX	68.8%	NM	74.1%
UT	63.4%	WA	79.1%	UT	49.3%	FL	74.3%
VT	29.0%	SC	81.1%	VT	9.8%	WA	75.7%
VA	36.8%	PR	81.5%	VA	31.7%	NV	76.2%
WA	79.1%	AZ	81.5%	WA	75.7%	AZ	83.4%
WV	47.5%	FL	82.4%	WV	20.0%	CA	84.1%
WI	61.5%	CA	83.4%	WI	52.5%	PR	90.9%
WY	45.3%	HI	88.4%	WY	33.9%	HI	96.3%

Note: Percentages are computed from 2003NBI data by adding percentages for reinforced (RC) and prestress (PS) concrete from Tables A.1 and A.2.

RC = Reinforced Concrete, PS = Prestressed Concrete.

Table A.4 – Structurally Deficient Bridges with Main Span Material of RC, PS, Steel and Timber for All Bridges

	Total		RC		PS		Steel		Timber	
State	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Alabama	2,324	23.0%	598	13.1%	44	3.6%	930	31.4%	748	57.5%
Alaska	145	12.9%	3	13.6%	16	4.9%	85	15.9%	41	17.0%
Arizona	159	5.0%	71	5.5%	14	1.1%	62	11.2%	12	33.3%
Arkansas	1,427	14.5%	257	5.5%	7	5.3%	691	16.0%	472	67.8%
California	2,991	14.4%	1,716	13.9%	391	7.9%	725	27.9%	159	20.2%
Colorado	401	6.1%	88	6.9%	29	1.5%	211	7.5%	73	13.8%
Connecticut	307	8.6%	63	12.2%	36	4.8%	202	9.1%	6	13.3%
Delaware	33	5.1%	4	3.7%	3	2.0%	25	7.1%	1	4.5%
District Of Columbia	18	7.3%	3	4.2%	2	11.8%	13	8.3%	0	0.0%
Florida	301	3.2%	95	4.7%	54	1.0%	60	5.5%	92	16.5%
Georgia	1,232	13.5%	360	10.8%	18	1.1%	683	17.9%	171	57.8%
Hawaii	155	16.1%	88	15.2%	14	5.2%	20	32.3%	33	80.5%
Idaho	317	8.0%	59	5.1%	53	3.4%	149	21.0%	56	11.6%
Illinois	2,353	10.9%	645	12.4%	257	2.8%	1,406	19.9%	45	36.0%
Indiana	2,083	12.4%	700	14.1%	302	4.8%	1,023	21.4%	58	8.1%
Iowa	5,281	24.4%	575	11.0%	208	5.2%	3,297	35.6%	1,201	38.0%
Kansas	3,190	17.4%	747	9.9%	31	2.8%	1,763	22.0%	640	43.0%
Kentucky	1,105	10.3%	276	8.4%	117	2.5%	669	26.3%	43	35.2%
Louisiana	2,200	19.8%	424	7.3%	87	6.6%	266	23.0%	1,423	52.0%
Maine	325	16.0%	66	10.7%	1	2.5%	246	18.5%	12	37.5%
Maryland	386	9.9%	90	12.8%	23	9.2%	230	8.5%	43	23.1%
Massachusetts	589	12.5%	125	18.1%	21	2.8%	422	14.0%	21	27.6%
Michigan	1,923	20.5%	250	22.2%	176	5.5%	1,442	31.7%	55	10.9%
Minnesota	1,146	13.5%	184	17.5%	64	2.4%	693	22.8%	205	11.8%
Mississippi	3,891	28.2%	1,131	18.7%	27	0.7%	1,023	47.3%	1,710	96.4%
Missouri	5,162	26.9%	916	22.3%	23	0.8%	4,078	33.6%	145	63.3%
Montana	604	12.3%	26	4.7%	30	1.7%	334	29.0%	214	14.3%
Nebraska	2,606	20.6%	123	6.0%	14	1.1%	1,813	23.9%	656	37.8%
Nevada	58	6.1%	16	3.8%	7	2.3%	31	16.1%	4	13.8%
New Hampshire	710	30.5%	42	7.3%	5	4.0%	279	19.1%	63	46.0%
New Jersey	824	13.8%	115	15.9%	41	3.2%	611	16.8%	57	22.1%
New Mexico	370	17.0%	64	11.9%	97	10.6%	138	29.4%	71	30.3%
New York	2,144	13.7%	289	13.9%	99	4.5%	1,718	16.0%	38	8.7%
North Carolina	2,313	17.8%	216	19.3%	285	8.6%	1,459	19.5%	353	32.8%
North Dakota	834	22.5%	45	7.7%	25	2.1%	546	39.7%	218	37.7%
Ohio	3,057	11.6%	757	11.7%	98	1.6%	2,147	16.0%	55	43.0%
Oklahoma	8,110	48.6%	1,157	34.3%	103	3.4%	5,517	63.5%	1,333	83.9%
Oregon	566	8.2%	251	11.8%	68	2.3%	121	11.8%	126	16.8%
Pennsylvania	5,356	26.0%	1,948	35.5%	634	9.2%	2,682	35.7%	92	38.7%
Puerto Rico	269	14.8%	115	15.8%	55	7.3%	99	29.7%	0	0.0%
Rhode Island	191	26.5%	46	28.0%	19	16.2%	122	30.1%	4	25.0%
South Carolina	1,283	15.9%	769	16.0%	99	5.7%	300	21.4%	115	92.0%
South Dakota	993	20.2%	188	11.1%	53	5.6%	624	33.4%	128	33.3%
Tennessee	1,608	13.9%	642	16.0%	98	2.3%	629	21.9%	239	54.1%
Texas	2,711	8.7%	487	4.3%	75	0.7%	1,537	20.4%	608	35.1%
Utah	260	11.3%	61	11.8%	55	5.8%	112	15.4%	32	30.5%
Vermont	498	19.8%	112	17.6%	3	3.2%	348	20.7%	35	37.6%
Virginia	1,075	10.6%	274	10.5%	27	2.4%	743	11.7%	31	39.7%
Washington	477	6.3%	151	4.8%	43	1.5%	122	14.3%	161	22.1%
West Virginia	1,065	16.7%	356	29.7%	45	2.5%	659	20.3%	5	5.5%
Wisconsin	1,663	14.1%	480	11.9%	126	3.9%	987	25.1%	70	11.8%
Wyoming	430	16.4%	107	11.1%	32	14.6%	239	20.0%	52	22.2%
Total:	**79,519**	**16.8%**	**18,371**	**13.1%**	**4,254**	**3.5%**	**44,331**	**24.5%**	**12,225**	**39.2%**

Note: Percentages are computed from 2003 NBI data using the ratio of number of structurally deficient and functionally obsolete bridges listed above to number of bridges built, listed in Table A.1.

RC = Reinforced Concrete, PS = Prestressed Concrete.

Table A.4a – Structurally Deficient and Functionally Obsolete Bridges with Main Span Material of RC, PS, Steel and Timber for All Bridges

	Total		RC		PS		Steel		Timber	
State	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Alabama	4,402	43.6%	1,707	37.3%	117	9.5%	1,527	51.6%	1,041	80.1%
Alaska	382	34.0%	5	22.7%	51	15.6%	220	41.3%	106	44.0%
Arizona	722	22.5%	302	23.6%	194	14.6%	208	37.7%	18	50.0%
Arkansas	3,586	36.5%	1,181	25.4%	26	19.7%	1,797	41.6%	569	81.8%
California	6,387	30.8%	3,719	30.1%	979	19.8%	1,349	52.0%	332	42.1%
Colorado	1,386	21.1%	357	27.8%	268	13.9%	587	20.8%	171	32.4%
Connecticut	1,355	37.9%	257	49.9%	206	27.4%	836	37.8%	21	46.7%
Delaware	132	20.6%	21	19.3%	10	6.6%	95	26.8%	4	18.2%
Florida	2,235	24.0%	547	26.9%	1,042	18.4%	377	34.8%	268	48.2%
Georgia	3,038	33.4%	947	28.3%	118	7.2%	1,776	46.5%	193	65.2%
Hawaii	499	52.0%	348	60.1%	66	24.4%	40	64.5%	39	95.1%
Idaho	723	18.3%	187	16.0%	192	12.1%	253	35.7%	90	18.6%
Illinois	4,405	20.4%	1,130	21.8%	566	6.1%	2,629	37.3%	71	56.8%
Indiana	4,304	25.6%	1,297	26.1%	776	12.4%	2,057	43.0%	116	16.2%
Iowa	7,130	32.9%	827	15.9%	431	10.7%	4,345	46.9%	1,510	47.8%
Kansas	5,756	31.3%	1,582	20.9%	89	8.2%	3,028	37.7%	994	66.8%
Kentucky	3,679	34.2%	1,378	41.9%	894	18.7%	1,340	52.6%	61	50.0%
Louisiana	4,182	37.6%	1,373	23.8%	296	22.4%	667	57.5%	1,845	67.5%
Maine	840	41.3%	218	35.2%	5	12.5%	593	44.6%	19	59.4%
Maryland	1,470	37.6%	329	46.9%	64	25.6%	979	36.1%	62	33.3%
Massachusetts	2,739	58.1%	379	54.8%	310	40.7%	1,879	62.3%	64	84.2%
Michigan	3,344	35.7%	499	44.4%	500	15.7%	2,258	49.6%	84	16.6%
Minnesota	1,663	19.6%	306	29.1%	155	5.9%	952	31.3%	237	13.7%
Mississippi	5,215	37.8%	1,721	28.5%	316	8.2%	1,442	66.6%	1,734	97.8%
Missouri	8,510	44.3%	1,908	46.5%	197	7.2%	6,222	51.3%	182	79.5%
Montana	1,121	22.8%	130	23.7%	169	9.8%	505	43.8%	317	21.2%
Nebraska	4,050	32.1%	210	10.2%	30	2.4%	2,827	37.3%	983	56.6%
Nevada	229	24.1%	111	26.5%	55	17.9%	54	28.0%	7	24.1%
New Hampshire	1,719	73.8%	187	32.7%	32	25.4%	601	41.2%	87	63.5%
New Jersey	2,440	40.8%	282	38.9%	303	23.9%	1,692	46.6%	103	39.9%
New Mexico	707	32.5%	137	25.6%	206	22.6%	226	48.2%	119	50.9%
New York	7,039	45.0%	1,099	52.8%	465	21.2%	5,238	48.9%	101	23.0%
North Carolina	5,433	41.8%	671	60.0%	562	16.9%	3,607	48.3%	593	55.1%
North Dakota	1,067	28.8%	59	10.1%	39	3.3%	669	48.6%	300	51.8%
Ohio	7,838	29.9%	1,640	25.4%	532	8.7%	5,493	40.9%	89	69.5%
Oklahoma	9,376	56.1%	1,477	43.7%	277	9.2%	6,189	71.3%	1,414	89.0%
Oregon	1,806	26.1%	779	36.5%	346	11.5%	416	40.4%	265	35.3%
Pennsylvania	9,919	48.2%	3,101	56.4%	1,756	25.5%	4,548	60.6%	156	65.5%
Rhode Island	443	61.4%	87	53.0%	65	55.6%	264	65.2%	13	81.2%
South Carolina	2,053	25.4%	1,184	24.7%	249	14.3%	503	35.9%	117	93.6%
South Dakota	1,463	29.8%	277	16.4%	78	8.2%	858	45.9%	244	63.5%
Tennessee	3,809	32.9%	1,683	41.9%	451	10.7%	1,380	48.1%	285	64.5%
Texas	9,945	32.0%	2,896	25.9%	2,205	21.2%	3,776	50.0%	1,006	58.0%
Utah	520	22.6%	130	25.0%	136	14.5%	211	28.9%	42	40.0%
Vermont	995	39.5%	229	36.0%	14	14.7%	672	39.9%	75	80.6%
Virginia	3,460	34.0%	951	36.3%	212	18.8%	2,236	35.3%	51	65.4%
Washington	2,023	26.6%	932	29.8%	412	14.3%	406	47.5%	267	36.7%
West Virginia	2,699	42.4%	772	64.3%	484	26.5%	1,391	42.9%	45	49.5%
Wisconsin	2,575	21.8%	749	18.6%	316	9.8%	1,412	35.9%	89	15.0%
Wyoming	659	25.2%	219	22.7%	62	28.3%	302	25.3%	76	32.5%
Total:	**161,472**	**34.0%**	**42,517**	**30.3%**	**17,324**	**14.5%**	**82,932**	**45.8%**	**16,675**	**53.4%**

Note: Table does not include District of Columbia and Puerto Rico. Also, the functionally obsolete bridges from these two states are not included in the total number of functionally obsolete bridges reported on Page 3. Table A.4 and Page 3 will be updated later.

Percentages are computed from 2003 NBI data using the ratio of number of structurally deficient bridge listed to number of bridges built, listed in Table A.1.

RC = Reinforced Concrete, PS = Prestressed Concrete.

Table A.5 – Number and Percent of Bridges with Main Span Material of RC, PS, Steel and Timber for Bridges – Built from 1990 through 2003

	Total	RC		PS		Steel		Timber	
State	**#**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Alabama	1,524	761	49.9%	498	32.7%	145	9.5%	117	7.7%
Alaska	256	0	0.0%	90	35.2%	91	35.5%	75	29.3%
Arizona	662	94	14.2%	548	82.8%	15	2.3%	2	0.3%
Arkansas	2,055	796	38.7%	57	2.8%	1,112	54.1%	90	4.4%
California	2,034	684	33.6%	1,282	63.0%	56	2.8%	10	0.5%
Colorado	1,564	140	9.0%	763	48.8%	625	40.0%	35	2.2%
Connecticut	323	19	5.9%	146	45.2%	146	45.2%	12	3.7%
Delaware	159	15	9.4%	76	47.8%	64	40.3%	4	2.5%
District Of Columbia	2	1	50.0%	0	0.0%	1	50.0%	0	0.0%
Florida	1,950	454	23.3%	1,042	53.4%	291	14.9%	163	8.4%
Georgia	1,366	363	26.6%	726	53.1%	179	13.1%	98	7.2%
Hawaii	29	6	20.7%	23	79.3%	0	0.0%	0	0.0%
Idaho	473	180	38.1%	202	42.7%	69	14.6%	22	4.7%
Illinois	3,927	507	12.9%	2,861	72.9%	522	13.3%	25	0.6%
Indiana	2,946	665	22.6%	1,505	51.1%	487	16.5%	278	9.4%
Iowa	2,580	784	30.4%	1,015	39.3%	550	21.3%	231	9.0%
Kansas	2,431	1,033	42.5%	313	12.9%	1,051	43.2%	28	1.2%
Kentucky	2,266	38	1.7%	1,956	86.3%	223	9.8%	43	1.9%
Louisiana	1,594	1,065	66.8%	221	13.9%	82	5.1%	142	8.9%
Maine	181	23	12.7%	24	13.3%	121	66.9%	10	5.5%
Maryland	613	46	7.5%	92	15.0%	408	66.6%	67	10.9%
Massachusetts	285	14	4.9%	165	57.9%	97	34.0%	9	3.2%
Michigan	1,112	47	4.2%	889	79.9%	85	7.6%	91	8.2%
Minnesota	1,272	310	24.4%	750	59.0%	123	9.7%	89	7.0%
Mississippi	3,538	1,530	43.2%	1,374	38.8%	331	9.4%	303	8.6%
Missouri	4,687	558	11.9%	1,576	33.6%	2,526	53.9%	27	0.6%
Montana	410	42	10.2%	264	64.4%	72	17.6%	32	7.8%
Nebraska	1,961	548	27.9%	509	26.0%	872	44.5%	29	1.5%
Nevada	257	41	16.0%	169	65.8%	44	17.1%	3	1.2%
New Hampshire	226	36	15.9%	42	18.6%	134	59.3%	14	6.2%
New Jersey	593	33	5.6%	297	50.1%	213	35.9%	48	8.1%
New Mexico	265	44	16.6%	180	67.9%	38	14.3%	3	1.1%
New York	2,409	246	10.2%	918	38.1%	1,109	46.0%	128	5.3%
North Carolina	1,936	29	1.5%	1,348	69.6%	551	28.5%	8	0.4%
North Dakota	318	9	2.8%	280	88.1%	23	7.2%	6	1.9%
Ohio	4,746	1,034	21.8%	2,297	48.4%	1,396	29.4%	17	0.4%
Oklahoma	3,062	240	7.8%	1,408	46.0%	1,374	44.9%	38	1.2%
Oregon	745	54	7.2%	613	82.3%	44	5.9%	34	4.6%
Pennsylvania	1,946	70	3.6%	1,404	72.1%	443	22.8%	26	1.3%
Puerto Rico	399	58	14.5%	316	79.2%	25	6.3%	0	0.0%
Rhode Island	52	17	32.7%	16	30.8%	17	32.7%	2	3.8%
South Carolina	1,411	594	42.1%	570	40.4%	213	15.1%	34	2.4%
South Dakota	459	131	28.5%	259	56.4%	61	13.3%	8	1.7%
Tennessee	1,837	172	9.4%	1,361	74.1%	262	14.3%	42	2.3%
Texas	5,795	715	12.3%	3,268	56.4%	1,416	24.4%	279	4.8%
Utah	433	73	16.9%	206	47.6%	150	34.6%	4	0.9%
Vermont	221	74	33.5%	27	12.2%	106	48.0%	14	6.3%
Virginia	1,412	293	20.8%	275	19.5%	821	58.1%	18	1.3%
Washington	940	176	18.7%	655	69.7%	94	10.0%	12	1.3%
West Virginia	1,562	33	2.1%	1,023	65.5%	436	27.9%	70	4.5%
Wisconsin	2,695	1,396	51.8%	1,060	39.3%	128	4.7%	101	3.7%
Wyoming	252	36	14.3%	31	12.3%	173	68.7%	11	4.4%
Total:	**76,171**	**16,327**	**21.4%**	**36,990**	**48.6%**	**19,615**	**25.8%**	**2,952**	**3.9%**

Note: Percentages are computed from 2003NBI data using the ratio of number of bridges built from each material to number of bridges in each state.

RC = Reinforced Concrete, PS = Prestressed Concrete.

Table A.6 – Deck Area and Percent of Bridges with Main Span Material of RC, PS, Steel and Timber for Bridges – Built from 1990 through 2003

State	Total SF (x 10^6)	Reinf. Concrete SF (x 10^6)	Reinf. Concrete %	P/S Concrete SF (x 10^6)	P/S Concrete %	Steel SF (x 10^6)	Steel %	Timber SF (x 10^6)	Timber %
Alabama	18.4	3.8	20.9%	10.7	58.3%	3.7	20.2%	0.1	0.6%
Alaska	1.3	0.0	0.0%	0.8	62.6%	0.4	31.0%	0.1	6.4%
Arizona	15.9	1.0	6.0%	14.5	91.3%	0.4	2.5%	0.0	0.0%
Arkansas	14.2	2.4	16.8%	1.1	8.0%	10.6	74.7%	0.1	0.5%
California	45.8	7.1	15.6%	37.9	82.8%	0.7	1.6%	0.0	0.0%
Colorado	13.1	0.8	5.9%	8.5	64.5%	3.8	29.1%	0.1	0.4%
Connecticut	3.5	0.1	1.9%	0.9	26.6%	2.5	71.1%	0.0	0.4%
Delaware	1.7	0.0	1.9%	1.0	60.3%	0.6	37.6%	0.0	0.3%
District Of Columbia	0.0	0.0	79.4%	0.0	0.0%	0.0	20.6%	0.0	0.0%
Florida	37.3	3.8	10.1%	26.0	69.8%	7.3	19.7%	0.2	0.4%
Georgia	22.0	3.5	15.9%	17.1	77.6%	1.2	5.6%	0.2	0.9%
Hawaii	0.4	0.2	55.9%	0.2	44.1%	0.0	0.0%	0.0	0.0%
Idaho	3.0	0.4	13.6%	2.0	66.8%	0.6	19.0%	0.0	0.6%
Illinois	16.6	1.6	9.6%	7.8	46.8%	7.1	42.7%	0.1	0.4%
Indiana	12.0	2.3	19.4%	6.1	51.1%	3.2	26.5%	0.4	2.9%
Iowa	13.3	2.7	20.5%	7.5	56.3%	2.8	21.1%	0.3	2.1%
Kansas	15.0	5.1	34.1%	4.1	27.0%	5.8	38.3%	0.0	0.3%
Kentucky	9.6	0.1	0.7%	8.3	85.7%	1.3	13.0%	0.0	0.4%
Louisiana	26.7	4.8	18.0%	14.5	54.2%	5.7	21.5%	0.2	0.6%
Maine	1.8	0.1	3.0%	0.4	21.9%	1.3	73.2%	0.0	0.8%
Maryland	7.0	0.3	4.8%	0.5	6.5%	6.1	86.8%	0.1	1.9%
Massachusetts	1.9	0.0	0.8%	0.7	38.4%	1.2	60.2%	0.0	0.6%
Michigan	7.2	0.4	5.8%	5.0	69.7%	1.7	22.9%	0.1	1.6%
Minnesota	11.7	1.5	12.8%	7.1	60.7%	2.9	24.6%	0.2	1.9%
Mississippi	21.5	4.1	18.9%	14.2	66.0%	2.9	13.6%	0.3	1.5%
Missouri	27.0	1.2	4.5%	11.6	42.8%	14.2	52.5%	0.1	0.2%
Montana	1.9	0.1	6.2%	1.2	64.7%	0.5	27.8%	0.0	1.3%
Nebraska	9.2	1.7	18.7%	3.7	39.9%	3.8	41.0%	0.0	0.4%
Nevada	4.1	0.2	4.3%	3.2	80.0%	0.6	15.7%	0.0	0.1%
New Hampshire	1.7	0.1	5.4%	0.1	6.6%	1.5	87.2%	0.0	0.8%
New Jersey	6.8	0.2	3.4%	2.8	40.7%	3.7	54.1%	0.1	1.1%
New Mexico	3.0	0.3	9.5%	2.3	78.8%	0.3	11.7%	0.0	0.1%
New York	13.8	0.8	5.8%	3.4	24.7%	9.4	68.4%	0.1	1.1%
North Carolina	21.0	0.2	0.8%	12.8	60.8%	8.1	38.4%	0.0	0.0%
North Dakota	1.8	0.0	1.2%	1.4	81.7%	0.3	16.7%	0.0	0.4%
Ohio	19.5	2.3	11.9%	7.1	36.2%	10.1	51.6%	0.0	0.1%
Oklahoma	15.5	1.1	7.4%	11.5	74.5%	2.7	17.6%	0.0	0.2%
Oregon	5.0	0.7	13.7%	4.1	81.0%	0.2	4.6%	0.0	0.7%
Pennsylvania	13.5	0.1	0.5%	7.7	57.2%	5.7	42.2%	0.0	0.2%
Puerto Rico	9.2	0.4	4.7%	8.6	93.4%	0.2	1.9%	0.0	0.0%
Rhode Island	1.0	0.1	7.2%	0.6	65.3%	0.3	27.2%	0.0	0.3%
South Carolina	16.1	4.5	28.0%	4.6	28.5%	7.0	43.3%	0.0	0.2%
South Dakota	2.5	0.7	26.4%	1.4	54.1%	0.5	19.2%	0.0	0.3%
Tennessee	18.9	0.5	2.5%	13.2	69.8%	5.2	27.5%	0.0	0.1%
Texas	90.6	4.4	4.8%	61.3	67.6%	17.3	19.1%	0.3	0.3%
Utah	5.7	0.2	3.0%	2.2	39.1%	3.3	57.9%	0.0	0.0%
Vermont	0.6	0.1	11.4%	0.0	6.8%	0.4	79.8%	0.0	2.1%
Virginia	21.5	1.6	7.6%	7.4	34.5%	12.4	57.7%	0.0	0.1%
Washington	8.6	0.9	10.1%	5.9	69.4%	1.7	19.7%	0.0	0.6%
West Virginia	7.3	0.1	1.6%	3.0	41.0%	4.1	56.4%	0.1	1.0%
Wisconsin	13.0	3.0	23.2%	7.7	59.1%	2.2	16.9%	0.1	0.7%
Wyoming	1.6	0.1	6.9%	0.1	6.6%	1.3	85.3%	0.0	0.7%
Total:	**661.3**	**71.7**	**10.8%**	**385.9**	**58.4%**	**190.8**	**28.8%**	**3.6**	**0.5%**

Note: Percentages are computed from 2003NBI data using the ratio of deck area of bridges built from each material to deck area of bridges in each state.

RC = Reinforced Concrete, PS = Prestressed Concrete, SF = Square Feet.

Table A.7 – Percent of Bridges with Main Span Material of Concrete (RC and PS) – Built from 1990 through 2003

Number of Existing Bridges				Deck Area of Existing Bridges			
Sorted by State		Sorted by Percentage		Sorted by State		Sorted by Percentage	
State	%	State	%	State	%	State	%
AL	82.6%	MD	22.5%	AL	79.1%	MD	11.3%
AK	35.2%	ME	26.0%	AK	62.6%	NH	12.0%
AZ	97.0%	WY	26.6%	AZ	97.3%	WY	13.4%
AR	41.5%	NH	34.5%	AR	24.8%	VT	18.1%
CA	96.7%	AK	35.2%	CA	98.4%	AR	24.8%
CO	57.7%	VA	40.2%	CO	70.5%	ME	24.9%
CT	51.1%	AR	41.5%	CT	28.5%	CT	28.5%
DE	57.2%	MO	45.5%	DE	62.1%	NY	30.5%
DC	50.0%	VT	45.7%	DC	79.4%	MA	39.2%
FL	76.7%	NY	48.3%	FL	79.9%	UT	42.1%
GA	79.7%	DC	50.0%	GA	93.5%	VA	42.1%
HI	100.0%	CT	51.1%	HI	100.0%	WV	42.6%
ID	80.8%	OK	53.8%	ID	80.4%	NJ	44.1%
IL	85.8%	NE	53.9%	IL	56.3%	MO	47.3%
IN	73.7%	KS	55.4%	IN	70.5%	OH	48.1%
IA	69.7%	NJ	55.6%	IA	76.8%	IL	56.3%
KS	55.4%	DE	57.2%	KS	61.1%	SC	56.5%
KY	88.0%	CO	57.7%	KY	86.4%	PA	57.6%
LA	80.7%	MA	62.8%	LA	72.2%	NE	58.6%
ME	26.0%	RI	63.5%	ME	24.9%	KS	61.1%
MD	22.5%	UT	64.4%	MD	11.3%	NC	61.6%
MA	62.8%	WV	67.6%	MA	39.2%	DE	62.1%
MI	84.2%	TX	68.7%	MI	75.5%	AK	62.6%
MN	83.3%	IA	69.7%	MN	73.5%	CO	70.5%
MS	82.1%	OH	70.2%	MS	84.9%	IN	70.5%
MO	45.5%	NC	71.1%	MO	47.3%	MT	70.9%
MT	74.6%	IN	73.7%	MT	70.9%	LA	72.2%
NE	53.9%	MT	74.6%	NE	58.6%	TN	72.3%
NV	81.7%	PA	75.7%	NV	84.3%	TX	72.4%
NH	34.5%	FL	76.7%	NH	12.0%	RI	72.6%
NJ	55.6%	GA	79.7%	NJ	44.1%	MN	73.5%
NM	84.5%	LA	80.7%	NM	88.3%	MI	75.5%
NY	48.3%	ID	80.8%	NY	30.5%	IA	76.8%
NC	71.1%	NV	81.7%	NC	61.6%	AL	79.1%
ND	90.9%	MS	82.1%	ND	82.9%	DC	79.4%
OH	70.2%	SC	82.5%	OH	48.1%	WA	79.5%
OK	53.8%	AL	82.6%	OK	81.8%	FL	79.9%
OR	89.5%	MN	83.3%	OR	94.7%	ID	80.4%
PA	75.7%	TN	83.5%	PA	57.6%	SD	80.5%
PR	93.7%	MI	84.2%	PR	98.1%	OK	81.8%
RI	63.5%	NM	84.5%	RI	72.6%	WI	82.3%
SC	82.5%	SD	85.0%	SC	56.5%	ND	82.9%
SD	85.0%	IL	85.8%	SD	80.5%	NV	84.3%
TN	83.5%	KY	88.0%	TN	72.3%	MS	84.9%
TX	68.7%	WA	88.4%	TX	72.4%	KY	86.4%
UT	64.4%	OR	89.5%	UT	42.1%	NM	88.3%
VT	45.7%	ND	90.9%	VT	18.1%	GA	93.5%
VA	40.2%	WI	91.1%	VA	42.1%	OR	94.7%
WA	88.4%	PR	93.7%	WA	79.5%	AZ	97.3%
WV	67.6%	CA	96.7%	WV	42.6%	PR	98.1%
WI	91.1%	AZ	97.0%	WI	82.3%	CA	98.4%
WY	26.6%	HI	100.0%	WY	13.4%	HI	100.0%

Note: Percentages are computed from 2003NBI data by adding percentages for reinforced (RC) and prestressed (PS) concrete from Tables A.6 and A.6

RC = Reinforced Concrete, PS = Prestressed Concrete.

Table A.8 – Structurally Deficient Bridges with Main Span Material of RC, PS, Steel and Timber for Bridges – Built from 1990 through 2003

	Total		RC		PS		Steel		Timber	
State	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**	**#**	**%**
Alabama	75	4.9%	33	4.3%	8	1.6%	19	13.1%	14	12.0%
Alaska	3	1.2%	0	0.0%	0	0.0%	2	2.2%	1	1.3%
Arizona	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Arkansas	94	4.6%	7	0.9%	0	0.0%	63	5.7%	24	26.7%
California	68	3.3%	29	4.2%	31	2.4%	8	14.3%	0	0.0%
Colorado	5	0.3%	0	0.0%	2	0.3%	2	0.3%	1	2.9%
Connecticut	5	1.5%	1	5.3%	4	2.7%	0	0.0%	0	0.0%
Delaware	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
District Of Columbia	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Florida	13	0.7%	0	0.0%	0	0.0%	6	2.1%	7	4.3%
Georgia	20	1.5%	1	0.3%	1	0.1%	4	2.2%	14	14.3%
Hawaii	1	3.4%	1	16.7%	0	0.0%	0	0.0%	0	0.0%
Idaho	3	0.6%	0	0.0%	2	1.0%	1	1.4%	0	0.0%
Illinois	6	0.2%	1	0.2%	2	0.1%	3	0.6%	0	0.0%
Indiana	40	1.4%	6	0.9%	10	0.7%	22	4.5%	2	0.7%
Iowa	31	1.2%	6	0.8%	2	0.2%	17	3.1%	6	2.6%
Kansas	13	0.5%	4	0.4%	0	0.0%	8	0.8%	0	0.0%
Kentucky	21	0.9%	0	0.0%	2	0.1%	19	8.5%	0	0.0%
Louisiana	43	2.7%	9	0.8%	2	0.9%	1	1.2%	31	21.8%
Maine	9	5.0%	0	0.0%	0	0.0%	9	7.4%	0	0.0%
Maryland	5	0.8%	1	2.2%	1	1.1%	3	0.7%	0	0.0%
Massachusetts	2	0.7%	0	0.0%	2	1.2%	0	0.0%	0	0.0%
Michigan	46	4.1%	1	2.1%	31	3.5%	13	15.3%	1	1.1%
Minnesota	3	0.2%	2	0.6%	0	0.0%	1	0.8%	0	0.0%
Mississippi	434	12.3%	20	1.3%	1	0.1%	144	43.5%	269	88.8%
Missouri	33	0.7%	7	1.3%	2	0.1%	24	1.0%	0	0.0%
Montana	13	3.2%	0	0.0%	1	0.4%	10	13.9%	2	6.2%
Nebraska	2	0.1%	0	0.0%	0	0.0%	1	0.1%	1	3.4%
Nevada	4	1.6%	0	0.0%	1	0.6%	3	6.8%	0	0.0%
New Hampshire	3	1.3%	1	2.8%	0	0.0%	0	0.0%	1	7.1%
New Jersey	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
New Mexico	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
New York	15	0.6%	1	0.4%	4	0.4%	8	0.7%	2	1.6%
North Carolina	6	0.3%	0	0.0%	0	0.0%	5	0.9%	1	12.5%
North Dakota	4	1.3%	0	0.0%	2	0.7%	1	4.3%	1	16.7%
Ohio	12	0.3%	3	0.3%	2	0.1%	7	0.5%	0	0.0%
Oklahoma	879	28.7%	40	16.7%	3	0.2%	815	59.3%	21	55.3%
Oregon	0	0.0%	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Pennsylvania	8	0.4%	0	0.0%	0	0.0%	6	1.4%	2	7.7%
Puerto Rico	14	3.5%	3	5.2%	10	3.2%	1	4.0%	0	0.0%
Rhode Island	1	1.9%	0	0.0%	1	6.2%	0	0.0%	0	0.0%
South Carolina	45	3.2%	4	0.7%	1	0.2%	9	4.2%	31	91.2%
South Dakota	10	2.2%	2	1.5%	4	1.5%	4	6.6%	0	0.0%
Tennessee	38	2.1%	11	6.4%	3	0.2%	15	5.7%	9	21.4%
Texas	116	2.0%	3	0.4%	5	0.2%	70	4.9%	37	13.3%
Utah	4	0.9%	0	0.0%	0	0.0%	3	2.0%	1	25.0%
Vermont	4	1.8%	0	0.0%	0	0.0%	3	2.8%	1	7.1%
Virginia	9	0.6%	1	0.3%	0	0.0%	7	0.9%	1	5.6%
Washington	2	0.2%	0	0.0%	0	0.0%	1	1.1%	1	8.3%
West Virginia	10	0.6%	0	0.0%	1	0.1%	8	1.8%	1	1.4%
Wisconsin	6	0.2%	3	0.2%	0	0.0%	2	1.6%	1	1.0%
Wyoming	11	4.4%	1	2.8%	2	6.5%	8	4.6%	0	0.0%
Total:	**2,189**	**2.9%**	**202**	**1.2%**	**143**	**0.4%**	**1,356**	**6.9%**	**484**	**16.4%**

Note: Percentages are computed from 2003NBI data using the ratio of number of structurally deficient bridges listed to number of bridges built, listed in Table A.5.

RC = Reinforced Concrete, PS = Prestressed Concrete.

Table A.9 – Number and Percent of Bridges with Main Span Material of RC, PS, Steel and Timber by System and Year Built – All States + DC and PR

		Year Built								
		<1940	1940–1949	1950–1959	1960–1969	1970–1979	1980–1989	1990–1999	2000–2003	Grand Total
Total for All Highway Systems										
Total	#	84,926	26,274	61,272	92,389	71,348	61,067	62,328	13,851	473,455
Reinf. Concrete	%	38.0	34.0	35.8	32.3	24.4	21.4	21.3	22.1	29.5
PS Concrete	%	4.6	2.0	7.5	21.8	35.4	46.5	48.6	48.5	25.3
Steel	%	49.4	50.3	46.5	39.8	34.0	26.9	25.5	26.9	38.2
Timber	%	6.2	13.4	10.1	6.1	6.1	5.1	4.3	2.0	6.6
City Street										
Total	#	11,003	2,325	5,511	8,142	7,037	6,759	6,199	1,222	48,198
Reinf. Concrete	%	42.1	41.2	34.8	32.9	25.9	26.1	30.1	27.7	33.1
PS Concrete	%	5.9	3.1	15.0	28.8	44.2	52.6	50.1	50.8	29.6
Steel	%	43.7	49.4	46.7	35.9	26.9	17.8	15.4	19.1	32.7
Timber	%	3.2	5.9	3.1	2.4	2.9	3.4	4.1	2.0	3.3
County Highway										
Total	#	44,830	13,528	23,088	32,095	31,151	31,335	32,187	6,917	215,131
Reinf. Concrete	%	29.0	23.7	27.6	29.0	26.3	22.8	23.0	26.5	26.2
PS Concrete	%	3.9	1.7	6.6	20.1	31.5	41.2	41.3	39.9	22.6
Steel	%	57.5	53.8	47.8	37.7	31.0	28.0	29.1	30.6	40.0
Timber	%	8.6	20.5	17.9	13.2	11.1	7.9	6.3	2.6	10.7
Federal Lands Road										
Total	#	621	379	1,405	1,628	1,229	986	642	82	6,972
Reinf. Concrete	%	49.1	45.1	36.5	35.1	21.8	20.5	12.8	20.7	30.6
PS Concrete	%	2.9	3.4	3.3	15.8	33.1	41.2	45.8	32.9	21.1
Steel	%	35.3	28.2	22.3	18.5	17.5	20.0	18.1	30.5	21.4
Timber	%	10.3	22.4	36.7	29.9	27.3	18.0	23.2	15.9	26.2
Interstate Highway										
Total	#	357	346	6,870	20,597	10,618	4,732	3,081	817	47,418
Reinf. Concrete	%	44.0	41.0	30.6	32.9	18.5	9.7	9.8	11.3	25.3
PS Concrete	%	8.4	2.9	10.6	22.5	36.7	50.2	51.3	51.8	28.8
Steel	%	47.1	55.8	58.7	44.6	44.7	39.8	37.7	36.7	45.7
Timber	%	0.0	0.3	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Road										
Total	#	3,099	675	1,594	1,659	1,419	1,317	1,654	453	11,870
Reinf. Concrete	%	20.7	19.6	16.0	13.9	11.8	11.0	12.9	11.9	15.5
PS Concrete	%	5.6	4.9	10.0	19.8	21.8	29.2	40.9	52.3	19.4
Steel	%	61.6	66.2	69.1	61.2	58.4	48.7	34.5	24.5	55.8
Timber	%	7.9	8.7	4.5	5.1	8.0	10.7	11.5	10.6	8.0
State Highway										
Total	#	17,411	6,672	17,670	21,383	14,232	11,518	12,870	2,920	104,676
Reinf. Concrete	%	52.4	46.1	45.9	36.8	27.2	23.4	19.7	17.5	36.1
Total	%	5.1	1.7	5.8	21.5	38.6	54.4	60.5	61.4	26.7
Steel	%	37.6	47.0	41.4	38.7	32.7	21.8	19.5	20.2	34.0
Timber	%	2.9	5.1	6.8	3.0	1.3	0.4	0.2	0.2	2.8
State Lands Road										
Total	#	244	82	85	99	76	82	144	56	868
Reinf. Concrete	%	17.6	23.2	14.1	19.2	21.1	12.2	13.2	5.4	16.2
PS Concrete	%	16.4	0.0	12.9	15.2	19.7	17.1	30.6	23.2	17.5
Steel	%	54.9	54.9	49.4	39.4	35.5	24.4	38.2	64.3	45.9
Timber	%	8.2	22.0	23.5	26.3	23.7	46.3	18.1	7.1	19.6
U.S. Numbered Highway										
Total	#	7,361	2,267	5,049	6,786	5,586	4,338	5,551	1,384	38,322
Reinf. Concrete	%	59.1	54.7	52.1	34.6	20.4	15.1	15.2	15.5	35.0
PS Concrete	%	4.7	2.4	5.4	22.0	39.3	57.0	62.9	61.4	29.2
Steel	%	32.4	37.6	41.3	43.3	40.2	27.8	20.7	22.5	34.4
Timber	%	3.2	5.1	1.1	0.1	0.1	0.0	0.0	0.0	1.1

Note: Reference: 2003 NBI data.
RC = Reinforced Concrete, PS = Prestressed Concrete, DC = District of Columbia, PR = Puerto Rico.

Table A.10 – Number and Percent of Bridges with Main Span Material of RC, PS, Steel and Timber by System and Span Length – All States + DC and PR

		Maximum Span Length						
		<50	50–99	100–149	150–199	200–249	>=250	Grand Total
Total for All Highway Systems								
Total	#	275,076	148,023	39,732	7,217	2,422	2,064	474,534
Reinf. Concrete	%	41.6	14.6	8.5	5.1	4.6	5.5	29.5
PS Concrete	%	16.5	39.6	34.4	22.3	16.4	7.8	25.3
Steel	%	30.2	45.1	56.2	71.7	78.0	86.0	38.2
Timber	%	11.0	0.5	0.3	0.5	0.1	0.1	6.6
City Street								
Total	#	26,297	16,328	4,673	727	218	144	48,387
Reinf. Concrete	%	46.4	19.3	12.6	8.7	9.6	13.2	33.2
PS Concrete	%	21.8	40.0	38.0	30.9	20.6	7.6	29.6
Steel	%	24.3	39.6	48.3	58.9	67.9	77.1	32.6
Timber	%	5.6	0.6	0.5	0.7	0.0	0.0	3.3
County Highway								
Total	#	155,057	50,545	8,385	1,118	297	155	215,557
Reinf. Concrete	%	32.0	11.9	9.2	7.2	8.1	15.5	26.3
PS Concrete	%	16.2	41.1	30.2	17.0	10.8	6.5	22.6
Steel	%	36.6	46.1	59.4	72.8	80.5	75.5	40.0
Timber	%	14.7	0.7	0.7	2.3	0.3	1.3	10.8
Federal Lands Road								
Total	#	4,358	2,242	371	51	22	17	7,061
Reinf. Concrete	%	31.2	31.2	20.2	15.7	13.6	23.5	30.4
PS Concrete	%	14.2	31.4	36.4	19.6	22.7	11.8	20.9
Steel	%	15.6	28.4	38.5	64.7	59.1	64.7	21.5
Timber	%	38.2	8.2	3.8	0.0	0.0	0.0	26.4
Interstate Highway								
Total	#	10,923	24,727	8,726	1,938	666	542	47,522
Reinf. Concrete	%	66.3	15.8	9.0	3.6	2.4	4.1	25.3
PS Concrete	%	17.4	34.5	29.8	25.3	21.5	8.3	28.8
Steel	%	16.2	49.6	60.7	70.9	76.0	87.6	45.7
Timber	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Road								
Total	#	6,043	4,251	1,253	218	81	58	11,904
Reinf. Concrete	%	22.6	10.1	2.7	5.0	2.5	6.9	15.5
PS Concrete	%	13.9	24.2	32.8	10.6	2.5	10.3	19.4
Steel	%	48.3	62.3	61.4	80.7	93.8	81.0	55.7
Timber	%	13.8	2.1	2.1	1.4	0.0	0.0	8.0
State Highway								
Total	#	56,153	34,137	10,777	2,255	809	698	104,829
Reinf. Concrete	%	56.9	14.7	6.9	4.2	3.3	4.0	36.1
Total	%	15.7	42.2	37.3	23.8	17.6	8.9	26.7
Steel	%	21.6	42.9	55.4	71.8	78.5	86.2	34.0
Timber	%	5.2	0.1	0.1	0.1	0.1	0.1	2.8
State Lands Road								
Total	#	669	179	28	3	2	0	881
Reinf. Concrete	%	16.6	15.1	10.7	33.3	0.0	0.0	16.1
PS Concrete	%	14.8	27.4	14.3	33.3	50.0	0.0	17.5
Steel	%	42.5	53.6	67.9	33.3	50.0	0.0	45.5
Timber	%	25.7	2.8	0.0	0.0	0.0	0.0	20.1
U.S. Numbered Highway								
Total	#	15,576	15,614	5,519	907	327	450	38,393
Reinf. Concrete	%	68.3	15.0	6.8	4.6	5.8	2.9	35.0
PS Concrete	%	14.5	42.1	39.6	14.6	8.6	5.3	29.2
Steel	%	14.2	42.8	52.4	80.4	83.2	91.6	34.4
Timber	%	2.7	0.0	0.0	0.1	0.0	0.0	1.1

Note: Reference: 2003 NBI data.
RC = Reinforced Concrete, PS = Prestressed Concrete, DC = District of Columbia, PR = Puerto Rico.

Table A.11 – Deck Area and Percent of Bridges with Main Span Material of RC, PS, Steel and Timber by System and Year Built – All States + DC and PR

		Year Built								
		<1940	1940–1949	1950–1959	1960–1969	1970–1979	1980–1989	1990–1999	2000–2003	Grand Total
Total for All Highway Systems										
Total (x 10^6)	SF	285	105	408	768	662	502	536	126	3,391
Reinf. Concrete	%	33.8	33.0	26.8	24.3	14.1	12.5	10.6	12.0	19.3
PS Concrete	%	4.6	2.1	7.7	21.2	36.7	50.7	58.6	57.1	32.2
Steel	%	57.4	61.0	63.5	53.5	48.3	35.5	28.6	30.1	46.8
Timber	%	2.4	3.8	1.9	0.9	0.8	0.7	0.6	0.3	1.1
City Street										
Total (x 10^6)	SF	55	11	38	66	57	59	52	11	349
Reinf. Concrete	%	37.8	40.0	28.6	28.4	19.9	16.1	15.6	14.9	24.5
PS Concrete	%	4.0	1.9	11.5	24.8	41.7	56.4	62.0	59.3	34.1
Steel	%	52.3	55.5	59.0	46.2	37.8	26.4	21.2	25.0	39.8
Timber	%	1.2	2.3	0.7	0.5	0.5	0.6	0.6	0.3	0.7
County Highway										
Total (x 10^6)	SF	62	20	65	107	100	97	97	22	570
Reinf. Concrete	%	28.9	26.8	28.9	28.7	23.4	22.7	20.8	23.2	25.2
PS Concrete	%	5.0	2.1	6.9	23.7	34.9	47.3	54.1	52.2	31.3
Steel	%	58.4	57.1	57.2	43.0	37.4	26.7	22.4	23.3	38.8
Timber	%	6.6	13.8	6.8	4.5	4.3	3.1	2.5	1.0	4.6
Federal Lands Road										
Total (x 10^6)	SF	2	1	4	4	3	3	2	0	18
Reinf. Concrete	%	47.7	52.2	46.6	37.9	27.1	23.7	23.2	25.4	35.6
PS Concrete	%	1.8	1.5	11.1	24.6	41.7	51.6	56.8	50.4	29.4
Steel	%	38.7	37.3	26.2	28.2	21.9	18.6	8.9	18.4	24.5
Timber	%	4.7	7.8	15.4	9.0	9.1	5.9	11.0	5.8	9.5
Interstate Highway										
Total (x 10^6)	SF	14	10	122	318	241	120	97	19	940
Reinf. Concrete	%	10.6	21.4	19.2	22.0	9.5	8.5	5.1	7.9	14.5
PS Concrete	%	2.5	3.4	9.2	18.9	34.3	46.9	54.8	42.6	29.0
Steel	%	86.0	75.1	71.5	59.0	56.2	43.3	37.7	49.2	56.1
Timber	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Road										
Total (x 10^6)	SF	11	2	11	12	10	12	16	4	78
Reinf. Concrete	%	22.6	16.6	8.3	10.3	7.5	8.8	6.2	4.1	10.1
PS Concrete	%	5.3	3.5	10.8	18.9	27.8	47.5	59.4	70.7	31.8
Steel	%	66.7	76.6	79.6	70.0	63.6	37.0	33.2	23.8	55.4
Timber	%	2.8	2.7	0.7	0.8	1.1	1.2	1.2	1.1	1.3
State Highway										
Total (x 10^6)	SF	82	38	108	173	161	130	167	36	896
Reinf. Concrete	%	36.6	33.4	32.6	26.4	14.1	11.1	8.7	11.2	20.0
Total	%	5.3	1.9	6.3	21.5	40.7	54.1	62.0	56.7	34.5
Steel	%	55.4	62.8	59.1	51.5	44.8	34.7	28.7	31.2	44.5
Timber	%	1.4	1.8	2.0	0.6	0.2	0.1	0.0	0.0	0.6
State Lands Road										
Total (x 10^6)	SF	0	0	0	0	0	0	0	0	2
Reinf. Concrete	%	37.2	41.4	19.9	21.3	47.7	12.9	28.4	62.8	34.4
PS Concrete	%	9.5	0.0	20.8	34.3	22.9	17.5	34.2	23.2	21.7
Steel	%	43.5	44.9	49.0	35.3	20.5	54.9	30.1	13.1	34.9
Timber	%	7.6	13.7	10.3	9.1	9.0	14.8	7.3	0.9	8.6
U.S. Numbered Highway										
Total (x 10^6)	SF	59	23	59	89	90	83	103	32	539
Reinf. Concrete	%	38.1	39.6	31.0	21.5	12.7	6.3	6.9	7.2	17.7
PS Concrete	%	4.2	1.8	4.6	23.1	36.0	51.0	59.4	67.1	34.1
Steel	%	56.3	57.4	64.1	54.6	51.3	42.4	29.0	25.0	46.8
Timber	%	0.8	1.0	0.2	0.0	0.0	0.0	0.0	0.0	0.2

Note: Reference: 2003 NBI data.
RC = Reinforced Concrete, PS = Prestressed Concrete, SF = Square Feet, DC = District of Columbia, PR = Puerto Rico.

Table A.12 – Deck Area and Percent of Bridges with Main Span Material of RC, PS, Steel and Timber by System and Span Length – All States + DC and PR

		Maximum Span Length						
		<50	50–99	100–149	150–199	200–249	>=250	Grand Total
Total for All Highway Systems								
Total (x 10^6)	SF	671	1,269	804	254	127	272	3,397
Reinf. Concrete	%	54.9	14.3	9.3	6.2	3.8	4.2	19.3
PS Concrete	%	19.5	42.9	37.9	21.2	20.1	12.8	32.2
Steel	%	19.7	42.5	51.5	72.4	75.1	82.3	46.8
Timber	%	5.4	0.1	0.0	0.1	0.0	0.0	1.1
City Street								
Totall (x 10^6)	SF	68	149	94	21	8	10	350
Reinf. Concrete	%	53.1	21.6	14.9	8.4	7.7	12.0	24.5
PS Concrete	%	21.5	38.2	40.7	32.0	26.9	7.0	34.1
Steel	%	19.0	39.8	44.1	59.2	63.8	78.2	39.7
Timber	%	3.3	0.1	0.1	0.1	0.0	0.0	0.7
County Highway								
Totall (x 10^6)	SF	233	216	87	23	6	6	571
Reinf. Concrete	%	44.0	14.6	9.1	3.6	6.0	10.7	25.2
PS Concrete	%	20.7	42.5	37.0	15.9	22.3	24.3	31.2
Steel	%	24.2	42.5	53.4	80.0	71.4	64.0	38.8
Timber	%	10.8	0.3	0.3	0.4	0.1	0.2	4.6
Federal Lands Road								
Totall (x 10^6)	SF	6	7	3	1	1	1	18
Reinf. Concrete	%	44.3	32.9	25.7	17.1	34.1	40.8	35.6
PS Concrete	%	16.1	39.4	38.7	32.0	27.8	9.1	29.4
Steel	%	14.3	22.9	33.9	50.9	37.5	50.1	24.5
Timber	%	24.7	3.1	1.1	0.0	0.0	0.0	9.6
Interstate Highway								
Totall (x 10^6)	SF	75	351	250	99	52	115	942
Reinf. Concrete	%	62.3	13.8	11.1	7.5	2.2	4.4	14.5
PS Concrete	%	20.9	40.1	27.9	23.0	17.9	12.5	28.9
Steel	%	16.7	46.1	59.4	69.3	79.8	83.1	56.1
Timber	%	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Other Road								
Totall (x 10^6)	SF	11	32	23	6	2	5	79
Reinf. Concrete	%	33.7	9.2	4.6	3.9	1.0	7.5	10.5
PS Concrete	%	18.0	32.6	51.6	8.9	3.5	5.8	31.7
Steel	%	39.5	57.3	42.9	86.4	95.4	73.4	55.1
Timber	%	7.5	0.5	0.3	0.1	0.0	0.0	1.3
State Highway								
Totall (x 10^6)	SF	188	322	211	66	37	72	896
Reinf. Concrete	%	61.2	12.9	7.3	5.3	4.2	3.6	20.0
Total	%	18.6	46.5	44.2	23.7	23.0	10.5	34.5
Steel	%	17.1	40.5	48.2	70.9	72.2	84.8	44.5
Timber	%	2.8	0.0	0.0	0.0	0.0	0.0	0.6
State Lands Road								
Totall (x 10^6)	SF	1	1	0	0	0	0	2
Reinf. Concrete	%	49.0	23.2	6.0	31.5	0.0	0	34.3
PS Concrete	%	11.8	34.8	24.8	11.1	66.2	0	21.7
Steel	%	23.0	40.0	68.4	57.4	33.8	0	34.8
Timber	%	15.9	1.6	0.0	0.0	0.0	0	8.8
U.S. Numbered Highway								
Totall (x 10^6)	SF	89	191	137	38	21	63	540
Reinf. Concrete	%	68.3	11.8	5.8	4.9	4.5	1.7	17.7
PS Concrete	%	16.4	48.1	42.7	11.3	18.7	16.6	34.1
Steel	%	14.1	40.0	47.8	83.5	73.1	81.5	46.9
Timber	%	0.9	0.0	0.0	0.0	0.0	0.0	0.2

Note: Reference: 2003 NBI data.
RC = Reinforced Concrete, PS = Prestressed Concrete, SF = Square Feet, DC = District of Columbia, PR = Puerto Rico.

Table A.13 – Percent of Structurally Deficient Bridges with Main Span Material of RC, PS, Steel and Timber by System and Year Built – All States + DC and PR

		Year Built							
		<1940	1940–1949	1950–1959	1960–1969	1970–1979	1980–1989	1990–1999	2000–2003
Total for All Highway Systems									
Total SD	%	38.2	32.2	22.3	13.9	9.8	4.9	3.0	2.3
Reinf. Concrete	%	26.9	17.8	13.3	10.5	8.2	2.8	1.2	1.4
PS Concrete	%	7.8	5.1	13.1	8.5	4.4	1.2	0.4	0.5
Steel	%	48.7	37.9	25.8	15.8	11.5	9.3	7.2	5.7
Timber	%	46.6	52.1	45.2	39.6	37.7	23.8	17.3	8.2
City Street									
Total SD	%	37.9	32.1	21.8	13.1	8.4	2.9	1.5	1.3
Reinf. Concrete	%	32.2	22.7	15.4	11.6	8.2	2.6	1.2	0.0
PS Concrete	%	7.1	9.9	12.4	9.9	5.1	1.5	0.6	0.8
Steel	%	46.9	39.1	27.8	15.4	12.2	4.7	3.7	3.9
Timber	%	52.2	53.3	50.6	36.2	24.2	15.7	7.4	8.0
County Highway									
Total SD	%	44.1	40.7	30.5	20.4	14.6	7.6	5.1	4.0
Reinf. Concrete	%	29.6	20.9	17.5	15.0	10.7	3.5	1.5	2.1
PS Concrete	%	7.3	6.4	14.0	7.5	4.2	1.1	0.3	0.7
Steel	%	53.2	44.5	32.6	22.7	18.4	15.2	11.4	9.2
Timber	%	49.9	56.8	51.3	45.1	42.3	26.6	21.1	10.9
Federal Lands Road									
Total SD	%	17.7	12.1	10.9	8.8	10.0	5.2	2.0	0.0
Reinf. Concrete	%	11.5	6.4	4.9	5.6	4.9	3.0	0.0	0.0
PS Concrete	%	5.6	0.0	8.5	10.5	5.9	2.5	0.3	0.0
Steel	%	24.2	15.0	15.7	11.0	17.2	7.1	6.0	0.0
Timber	%	29.7	22.4	14.4	10.3	14.0	11.3	3.4	0.0
Interstate Highway									
Total SD	%	17.4	9.8	10.2	7.5	4.5	1.5	0.6	0.9
Reinf. Concrete	%	10.2	10.6	8.4	7.0	6.0	2.0	0.0	1.1
PS Concrete	%	3.3	0.0	6.9	4.7	3.1	2.0	0.8	0.7
Steel	%	26.8	9.8	11.8	9.3	5.0	0.7	0.4	1.0
Timber	%	0.0	0.0	0.0	0.0	0.0	100.0	0.0	0.0
Other Road									
Total SD	%	37.9	25.9	16.1	16.4	9.7	5.1	1.3	0.4
Reinf. Concrete	%	28.6	14.4	9.8	17.0	6.6	3.4	0.9	1.9
PS Concrete	%	7.6	3.0	14.4	12.8	4.2	1.6	0.9	0.0
Steel	%	42.7	28.6	16.1	16.2	12.0	6.9	1.4	0.9
Timber	%	41.8	44.1	41.7	31.8	13.3	8.5	2.6	0.0
State Highway									
Total SD	%	31.1	23.7	20.4	12.6	6.1	1.4	0.5	0.4
Reinf. Concrete	%	25.5	15.7	12.8	9.3	5.8	1.8	0.8	0.4
Total	%	8.4	2.6	18.0	12.9	5.6	1.1	0.3	0.4
Steel	%	41.3	30.7	26.3	14.4	6.2	1.8	0.4	0.2
Timber	%	37.5	38.2	38.1	28.0	25.8	12.5	19.2	16.7
State Lands Road									
Total SD	%	28.3	30.5	25.9	22.2	19.7	15.9	3.5	3.6
Reinf. Concrete	%	14.0	36.8	0.0	5.3	0.0	0.0	0.0	0.0
PS Concrete	%	17.5	0.0	9.1	33.3	6.7	0.0	0.0	0.0
Steel	%	35.8	22.2	33.3	23.1	37.0	40.0	9.1	5.6
Timber	%	20.0	44.4	35.0	26.9	22.2	13.2	0.0	0.0
U.S. Numbered Highway									
Total SD	%	22.5	15.8	13.2	8.9	4.1	0.9	0.1	0.2
Reinf. Concrete	%	17.7	13.4	8.9	6.6	3.2	0.3	0.1	0.9
PS Concrete	%	10.1	1.8	8.5	6.9	3.4	0.8	0.1	0.1
Steel	%	33.5	21.5	19.0	11.6	5.2	1.3	0.3	0.0
Timber	%	15.7	7.0	22.2	0.0	60.0	100.0	0.0	0.0

Note: Reference: 2003 NBI data.
RC = Reinforced Concrete, PS = Prestressed Concrete, DC = District of Columbia, PR = Puerto Rico.

Table A.14 – Percent of Structurally Deficient Bridges with Main Span Material of RC, PS, Steel and Timber by System and Span Length – All States + DC and PR

		Maximum Span Length				
		<50	50–99	100–149	150–199	200–249
Total for All Highway Systems						
Total SD	%	20.7	11.8	9.8	11.8	16.9
Reinf. Concrete	%	13.1	12.7	13.9	18.7	19.6
PS Concrete	%	4.7	3.0	2.0	3.7	4.8
Steel	%	32.9	18.8	13.7	13.4	19.0
Timber	%	39.5	25.1	34.1	42.1	50.0
City Street						
Total SD	%	19.7	13.8	11.0	12.8	17.0
Reinf. Concrete	%	15.7	15.9	18.4	15.9	14.3
PS Concrete	%	5.0	4.5	2.2	3.6	2.2
Steel	%	37.0	21.5	15.0	16.1	20.3
Timber	%	32.9	35.8	43.5	60.0	0.0
County Highway						
Total SD	%	24.7	15.2	16.4	24.2	32.0
Reinf. Concrete	%	14.9	13.1	12.8	22.5	8.3
PS Concrete	%	3.9	2.1	1.6	1.6	0.0
Steel	%	34.9	27.1	24.1	28.7	38.9
Timber	%	43.7	30.3	31.7	50.0	0.0
Federal Lands Road						
Total SD		11.7	5.4	5.7	5.9	9.1
Reinf. Concrete	%	7.3	3.0	4.0	0.0	0.0
PS Concrete	%	8.6	2.3	1.5	0.0	0.0
Steel	%	19.0	9.9	9.8	9.1	7.7
Timber	%	13.7	9.8	0.0	0.0	0.0
Interstate Highway						
Total SD	%	4.7	6.6	6.4	6.4	10.1
Reinf. Concrete	%	4.2	10.4	11.4	22.9	18.8
PS Concrete	%	3.1	3.4	2.9	4.1	7.0
Steel	%	8.5	7.6	7.4	6.4	10.7
Timber	%	33.3	0.0	0.0	0.0	0.0
Other Road						
Total SD	%	21.6	14.3	10.7	12.8	22.2
Reinf. Concrete	%	15.5	15.2	23.5	9.1	50.0
PS Concrete	%	6.1	4.7	1.0	4.3	0.0
Steel	%	28.9	16.5	13.8	12.5	21.1
Timber	%	21.8	28.9	34.6	0.0	0.0
State Highway						
Total SD	%	16.4	11.1	8.6	10.5	18.2
Reinf. Concrete	%	12.7	13.8	16.4	17.0	37.0
Total	%	6.9	3.7	2.1	4.1	5.6
Steel	%	28.6	17.3	11.8	12.2	19.7
Timber	%	34.5	19.4	77.8	0.0	100.0
State Lands Road						
Total SD	%	20.2	20.1	17.9	0.0	0.0
Reinf. Concrete	%	8.1	18.5	0.0	0.0	0.0
PS Concrete	%	11.1	6.1	0.0	0.0	0.0
Steel	%	26.8	29.2	15.8	0.0	0.0
Timber	%	21.5	0.0	0.0	0.0	0.0
U.S. Numbered Highway						
Total SD	%	10.8	8.3	6.7	10.4	13.5
Reinf. Concrete	%	9.9	11.4	10.6	19.0	15.8
PS Concrete	%	3.0	2.5	1.3	4.5	0.0
Steel	%	22.3	13.0	10.5	11.0	15.1
Timber	%	14.5	50.0	0.0	0.0	0.0

Note: Reference: 2003 NBI data.
RC = Reinforced Concrete, PS = Prestressed Concrete, DC = District of Columbia, PR = Puerto Rico.

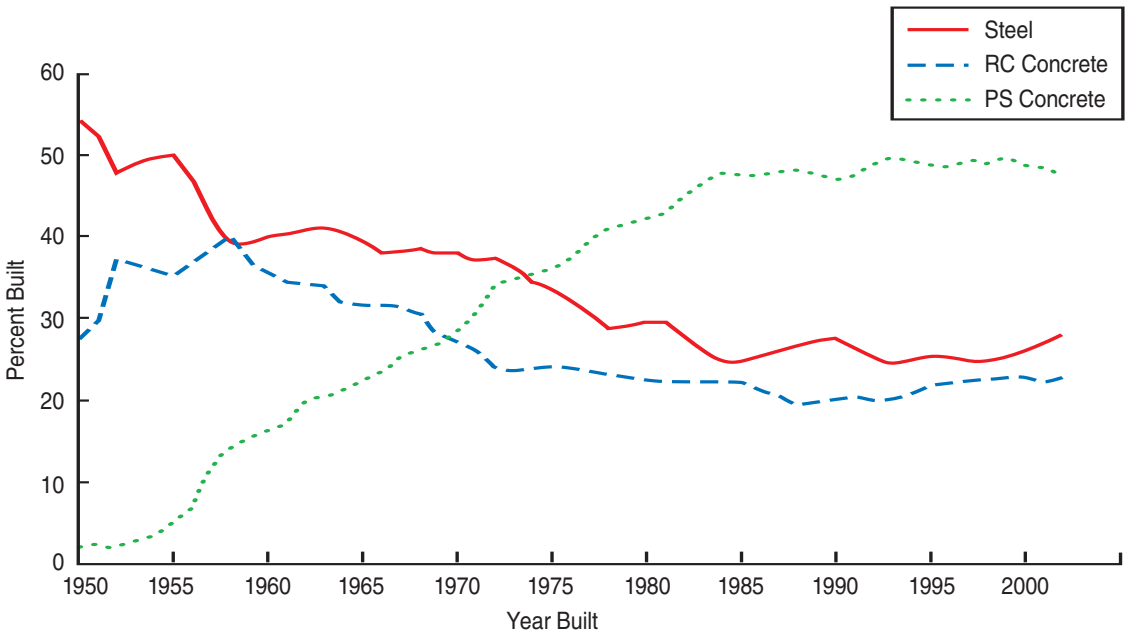

Figure A.1 Bridges Built
Reference: 2003 NBI Data

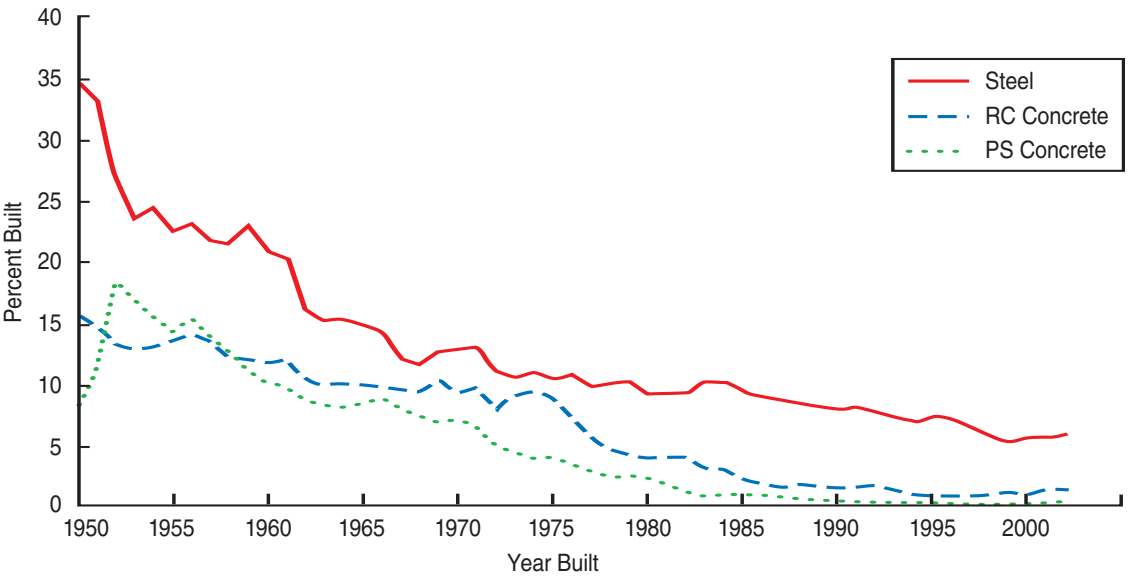

Figure A.2 Structurally Deficient Bridges
Reference: 2003 NBI Data

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