Bridge Standard Systems

Final Report
WA-RD 123.1

July 1987

Washington State Department of Transportation
Planning. Research and Public Transportation Division

in cooperation with the
United States Department of Transportation
Federal Highway Administration

TECHNICAL REPORT STANDARD TITLE PAGE

1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
WA-RD-123.1		

4. Title and Subtitle	5. Report Date
Bridge - Standard Systems	6. Performing Organization Code July, 1987
7. Author(s) Harold C. Sorensen and Craig D. Olson	8. Performing Organization Report No. Y-3400, T12
9. Performing Organization Name and Address Structural Engineering Section Dept. of Civil & Environmental Engineering Washington State University Pullman, WA 99164-2914	10. Work Unit No. 11. Contract or Grant No. 13. Type of Report and Period Covered Final Report 3/86-7/87
12. Sponsoring Agency Name and Address Washington State Department of Transportation Transportation Building, KF-01 Olympia, WA 98504-5201	14. Sponsoring Agency Code

15. Supplementary Notes

Conducted in cooperation with the U.S. Department of Transportation, Federal Highway Administration.

16. Abstract

A survey of standards for bridges which exist in the U.S. and Canada was conducted. Pertinent information concerning these standards was placed into a matrix in a spread sheet format using Lotus 1-2-3 and an IBM/PC microcomputer. This information was reviewed for possible use in developing plans for standard bridge systems which could be used by county engineers in Washington.

Information on types of standard bridge systems to be developed was also obtained from Washington county engineers via a questionnaire.

It is recommended that designs for at least one standard bridge system be developed for each of the primary materials readily available in Washington, namely: steel, concrete and wood. Other details which should be included in the standards are given.

17. Key Words	18. Distribution Statement
Survey; bridge standards; Lotus 1-2-3; microcomputer; spread sheet; Washington County Engineers	

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price
Unclassified	Unclassified	53	

Form DOT F 1700.7 (8-69)
DOT Form 341-004
6/72

BRIDGE - STANDARD SYSTEMS

by

Harold C. Sorensen, Associate Professor
Craig D. Olson, Graduate Student

WASHINGTON STATE TRANSPORTATION CENTER

Department of Civil and Environmental Engineering
Washington State University
Pullman, WA 99164-2910

WSDOT Technical Monitor

R. H. Krier
Bridge Operations Engineer
Bridges and Structures

FINAL REPORT

Research Project Y-3400
Task 12

Prepared for

Washington State Department of Transportation
and in cooperation with
U.S. Department of Transportation
Federal Highway Administration

July 1987

ACKNOWLEDGMENTS

The authors express their sincere appreciation to the Washington State Department of Transportation in cooperation with the U.S. Department of Transportation, Federal Highway Administration for providing financial support for this project.

Appreciation is also expressed to the Association of Washington County Engineers for desiring that this project be performed. Special thanks go to members of the Bridge Committee of the County Engineers Association who gave of their valuable time to attend several meetings at the request of the authors, namely: Gene Unger (Clallam County), Marvin Carroll (Whitman County and Roger Diesen (Asotin County). Special thanks are also extended to Jerry Nicholls (Spokane County Bridge Engineer) and to Charles Ruth (WSDOT Bridge Engineer Supervisor), each of whom also gave valuable time to the authors concerning this project.

Special thanks are extended to each county engineer who returned the questionnaire which provided valuable information to the authors.

Thanks also go to G. Scott Rutherford (TRAC), William P. Carr (WSDOT) and George T. Markich (WSDOT) for their counsel and encouragement during the conduct of this project.

DISCLAIMER

The contents of this report reflect the views of the authors who are responsible for the facts and the accuracy of the data presented herein. The contents do not necessarily reflect the official views or policies of the Washington State Department of Transportation or the Federal Highway Administration. This report does not constitute a standard, specification or regulation.

TABLE OF CONTENTS

PROJECT OVERVIEW

Purpose

Many counties in Washington do not have employees with the expertise and/or time to design bridges, and employees that do have bridge design expertise seldom have the time to develop alternate designs to ensure the lowest possible cost for the structure.

The purpose of this research project was to identify two or more alternatives for bridges for which standard designs could be developed and used by the county engineers in the state of Washington.

Objective

The objective of this project was to conduct a survey to identify the standard designs and/or details which exist in the United States for various types of bridges and to evaluate the feasibility of the use of these standards in Washington. After evaluating and prioritizing each of the standard designs (including input from the county engineers of Washington), two or more alternate designs were to be selected for development and implementation.

The development and implementation of the standards for the alternates which were selected were not parts of the scope of this project. (It is anticipated that the specific details pertinent to the alternate designs which are chosen will be developed in a subsequent project.)

Major Findings

Information concerning standards for bridges or standards used for bridge design was solicited from 224 government agencies and private design offices in the U.S. and Canada. One hundred twenty-eight (128) responses were received.

The responses included information on various road widths, number of spans, variations in span lengths, span continuity, primary material and design load. Other information which was received related to the elements of the superstructure and the substructure.

This information was entered into the memory of a microcomputer in a spread sheet format and reviewed and, subsequently, stored on a diskette. A list of possible bridge alternatives was prepared. Then a questionnaire concerning these alternatives was developed and mailed to all Washington county engineers. The results associated with the analysis of the responses to the questions on the questionnaire and with the analyses of the data collected during the performance of this project provide the basis for the following recommendations.

Recommendations

It is recommended that standards for bridge systems with various superstructures be developed in accordance with the following priorities.

Priority 1: Prestressed Concrete Deck Girders

Priority 2: Prestressed Concrete Girders with C.I.P. Deck

Priority 3: C.I.P. Slab Bridges

Priority 4: Steel Girders with Precast Deck

Priority 5: Timber Glulam Girders with Timber Deck

Priority 6: Steel Girders with C.I.P. Deck

Each set of these standards should include appropriate details for:

1. Abutment wall type piers.
2. a. Spread footings and
   b. Steel and concrete piles with 55 ton bearing capacity.
3. Lengths in increments from 20 ft. to 110 ft.

4. a. Single span from 20 ft. to 110 ft. and

   b. Multiple spans from 60 ft. to 110 ft.

5. Roadway widths of 28 ft. and 32 ft.

6. HS20 loading and a new heavier (HS25) loading.

DISCUSSION

Introduction

The use of road design standards dates back to the Romans. In the U.S., until the 19th century, standards were established primarily by consensus. In the 19th century, with writings and practices of eminent road builders and manuals of eminent college engineering professors and the U.S. Corps of Engineers available as references, standards were based on recommendations from these references rather than by consensus. States set up independent highway departments starting about the turn of the century. The federal government became involved with the passage of the Federal Aid Road Act in 1916, but even though this law called for the secretary of agriculture's approval of "substantial" highway projects, no federal standards were established, and the secretary's recommendations were based on accepted state practices. In 1914 the American Association of State Highway Officials (AASHO) was formed to provide a clearinghouse for standards, becoming the necessary link between the highway technician and the road builder. AASHO (now referred to as AASHTO) created the Committee on Roads and Bridges, which has published "Standard Specifications for Highway Bridges." These specifications form the basis for all bridge design performed in the United States and most of the rest of the world.

Bridges of a wide variety have been designed and built throughout history. When the U.S. Congress passed the Federal-Aid Highway Act of 1956 authorizing the National System of Interstate and Defense Highways, it became apparent relatively soon thereafter that many structures on this national system would be similar. Hence, a need for various bridge standards was identified. At first these standards consisted for individual parts or portions of the bridge, e.g., rockers and rollers. Then standards were

developed for entire bridges. Standard bridges are still being developed for use on the nation's primary and secondary road systems. Many of the standard bridges are presently being used by government agencies to replace old substandard bridges which exist in our highway system.

In 1932 highway engineers for the 87 counties in Minnesota organized the Minnesota County Highway Engineers Association. One of the accomplishments achieved by this organization has been the development of standardized bridge designs for various types of superstructures and substructures for use by the county officials for roads in their jurisdictions.

Many other states have associations of county highway engineers, including Washington. Many state highway departments and many other agencies have developed standard bridge designs. It was concluded that a survey of these existing standard bridge designs would be of value to the Association of Washington County Engineers in order to develop a series of alternate designs for use by the county engineers. The standard designs would be selected on the basis of ease of construction, fabrication and erection, maintenance and life cycle, economy and proven performance.

Procedure for Obtaining the Data

In order to conduct the survey, a mailing list was compiled which included various developers and users of standard bridge designs. The list contained names of various city, county, state and federal agencies as well as private engineering consulting firms. (See attachment 1.)

A letter was written and copies of the letter were mailed to the agencies and firms on the aforementioned list. (See attachment 2.) This letter requested that information associated with any standard design of an entire

bridge or a bridge component be forwarded to the principal investigator for inclusion into a data base for evaluation by the authors.

The responses to this letter which were received ranged from a simple statement indicating that information on standard plans was not available from the agency to the receipt of four eight-inch diameter sets of full size plans containing standard bridge details. The most frequent response was in the form of an 11 x 17 booklet of standard bridge details from which a complete set of bid documents could be derived for various types of bridges.

Analysis of the Data

In order to review the information on standard bridges (or details) which was received, a spread sheet layout was created. Lotus 1-2-3 was chosen as the computer software carrier system, and the data were entered into the spread sheet matrix using IBM/PC hardware. (See attachment 3.) The spread sheet contains columns for general information (roadway width, number of spans, span lengths, span continuity, primary material, design load, ease of construction, availability of materials and cost), superstructure details and substructure details as well as the source of the information and pertinent references to design codes. The majority of the desired information for the matrix was relatively easy to obtain from the bridge plans which were received. However, conclusions regarding the ease of construction and the cost are based in part on the judgment of the P.I. and are subject to change as more input is received from other sources.

Much information concerning standards for bridges was received and entered into the data base. It became apparent very quickly that, in order to make conclusions concerning alternative bridges to be developed for county engineers in Washington, input on bridge needs should be solicited from the

county engineers. Hence, a questionnaire was developed and mailed to each of the 39 county engineers in Washington. Thirty-three (33) questionnaires were returned. A summary of the responses to the questionnaire was produced. (See attachment 4.)

A meeting was organized by the authors which involved representatives from the WSDOT and the members of the Bridge Committee of the Washington Association of County Engineers. At this meeting, the purpose of this project was explained, and the spread sheet matrix of standard bridge data and the summary of the questionnaire were reviewed. As a result of the discussions at this meeting, a condensed spread sheet matrix was developed. (See attachment 5.)

Another meeting was organized (with the same people in attendance) at which discussions concerning the condensed spread sheet data were held. These discussions were valuable to the authors to help them arrive at the recommendations stated later in this report.

A report on this project was presented by the P.I. to the members of the County Engineers Association at their annual convention in November, 1986. Additional input on standard bridges was solicited and received from the county engineers at this meeting. In addition, copies of several of the complete sets of standard plans which were received in the survey process were displayed at this meeting with a sign-up sheet attached. The WSDOT then copied the appropriate sets of plans and mailed the copies to the signees for use as references in developing future bridge plans.

CONCLUSIONS

It is concluded from the performance of this project that there is a need to develop some standard bridge systems which can be used by Washington county engineers (29 of 39 county engineers indicated this need via the questionnaire).

The benefits which can be realized from the use of these standard bridge systems will be a savings of time and money on both the county and state levels in developing the bid documents and in the actual cost of the structures through competitive bidding and standardized construction practices.

RECOMMENDATIONS

It is recommended that standard bridge systems be developed for use by Washington county engineers. These systems can be designed independently from any systems which already exist or can include details of the systems which already exist as identified during the performance of this project. The standard bridge systems which are eventually designed should make use of present contractor construction capabilities as much as possible. At least one standard bridge system should be developed for each of the common building materials available in Washington; namely, concrete, steel and wood. Standard systems utilizing these three materials should guarantee that county engineers in all parts of the state can obtain acceptable structures at competitive prices.

The standard systems that should be developed are as follows:

Superstructures

Priority 1: Prestressed Concrete Deck Girders

Priority 2: Prestressed Concrete Girders with C.I.P. Deck

Priority 3: C.I.P. Slab Bridges

Priority 4: Steel Girders with Precast Concrete Deck

Priority 5: Timber Glulam Girders with Timber Deck

Priority 6: Steel Girders with C.I.P. Concrete Deck

Other Details to be Included in Standards

1. Abutment wall type piers.
2. a. Spread footings and
   b. Steel and concrete piles with 55 ton bearing capacity.
3. Lengths from 20 ft. to 110 ft. (in usable increments).
4. a. Single span from 20 ft. to 110 ft. and
   b. Multiple spans from 60 ft. to 110 ft.

5. Roadway widths of 28 ft. and 32 ft.

6. HS20 loading and possibly a new HS25 loading.

APPLICATIONS AND IMPLEMENTATION PLAN

Standard plans for bridge systems could be used by county engineers in Washington immediately upon the availability of such standards.

The entity responsible for the development of these standard plans and the cost of the development have not been determined and were not within the scope of this project.

REFERENCES

1. "Standard Specifications for Highway Bridges," Thirteenth Edition, 1983, adopted by the American Association of State Highway and Transportation Officials, and published by the Association, General Offices, 444 North Capitol Street, NW, Suite 225, Washington, D.C. 20001.

2. Membership List, Washington State Association of County Engineers.

ATTACHMENTS

1 List of Agencies

2 Solicitation Letter

3 Large Spread Sheet Matrix

4 Questionnaire

5 Condensed Spread Sheet

ATTACHMENT 1

STANDARD BRIDGE DESIGN DISK #1

AGENCY SOLICITATION RESPONSE RECORD

#	AGENCY	RESP	USES	SENT	REQ	AG.TYPE
1	DOT CALIFORNIA	Y	Y	Y	Y	STATE
2	OH.,SUMMIT COUNTY	Y	N	N	N	COUNTY
3	TN.,KNOX COUNTY	Y	N	N	N	COUNTY
4	PA.,ALLEGHENY COUNTY	Y	N	N	N	COUNTY
5	MN.,RAMSEY COUNTY	Y	N	N	N	COUNTY
6	DOT RHODE ISLAND	Y	N	N	N	STATE
7	MO.,ST. LOUIS COUNTY	Y	N	N	N	COUNTY
8	DOT NEW YORK	Y	N	N	N	STATE
9	OR.,LANE COUNTY	Y	N	N	N	COUNTY
10	CA.,SAN FRANCISCO CO.	Y				COUNTY
11	DOT MISSOURI	Y	N	N	N	STATE
12	VA.,CITY OF NORFOLK DPW	Y	N	N	N	CITY
13	DOT MAINE	Y	N	N	N	STATE
14	DOT NORTH DAKOTA	Y	N	N	N	STATE
15	CA.,CITY OF LONG BEACH	Y	N	N	N	CITY
16	GA.,CITY OF ATLANTA	Y	N	N	N	CITY
17	NJ.,CITY OF NEWARK	Y	N	N	N	CITY
18	DOT NEW HAMPSHIRE	Y	N	N	N	STATE
19	DOT ARIZONA	Y	Y	N	N	STATE
20	VA.,FAIRFAX COUNTY	Y				COUNTY
21	AL.,CITY OF BIRMINGHAM	Y	N	N	N	CITY
22	DOT INDIANA	Y	N	N	Y	STATE
23	HI.,CITY OF HONOLULU	Y	N	N	N	CITY/CO.
24	PA.,LANCASTER CO.	Y	N	N	N	COUNTY
25	DOT U.S. REGION 5	Y	Y	N	N	FED
26	DOT HAWAII	Y	N	N	N	STATE
27	BUREAU OF RECLAMATION NW.	Y	N	N	Y	FED
28	OH.,CITY OF TOLEDO	Y	N	N	N	CITY
29	DEPT.OF AG.,NRTH CNTRL DI	Y				FED
30	MI.,CITY OF DETROIT	Y	N	Y	N	CITY
31	TX.,CITY OF DALLAS	Y				CITY
32	CA.,CITY OF SAN DIEGO	Y	N	Y	N	CITY
33	SC.,RICHLAND COUNTY	Y	Y	Y	Y	COUNTY
34	ALBERTA TRANSPORTATION	Y	Y	Y	N	PROVINCE
35	MD.,BALTIMORE COUNTY	Y	N	N	N	COUNTY
36	NJ.,ESSEX COUNTY	Y	N	N	Y	COUNTY
37	DEPT.OF AG.,REGION 3	Y	N	N	N	FED
38	NC.,MECKLENBURG COUNTY	Y	N	N	N	COUNTY
39	OH.,CUYAHOGA COUNTY	Y	N	N	N	COUNTY
40	DOT SOUTH DAKOTA	Y	N	N	N	STATE
41	DOT NEW JERSEY	Y	N	N	N	STATE
42	DOT U.S. REGION 6	Y	N	N	N	FED
43	MO.,JACKSON COUNTY	Y	N	Y	Y	COUNTY
44	DOT MICHIGAN	Y	N	N	N	STATE
45	ONTARIO TRANSPORTATION	Y	N	N	N	PROVINCE
46	BUREAU OF RECLAMATION SW.	Y	N	N	N	FED
47	IL.,COOK COUNTY	Y	N	N	N	COUNTY
48	DOT U.S. REGION 1	Y	N	Y	N	FED
49	DOT MASSACHUSETTES	Y	N	N	N	STATE
50	LA.,JEFFERSON PARISH	Y	N	Y	N	COUNTY

STANDARD BRIDGE DESIGN DISK #1

AGENCY SOLICITATION RESPONSE RECORD

#	AGENCY	RESP	USES	SENT	REQ	AG.TYPE
51	TX.,DALLAS COUNTY	Y	N	N	Y	COUNTY
52	LA.,CITY OF NEW ORLEANS	Y	N	N	N	CITY
53	DOT IDAHO	Y	N	Y	N	STATE
54	DOT WASHINGTON STATE	Y	Y	Y	N	STATE
55	CA.,CITY OF LOS ANGELES	Y	N	Y	N	CITY
56	NOVA SCOTIA,DOT	Y	Y	Y	N	PROVINCE
57	DOT WYOMING	Y	Y	Y	N	STATE
58	MI.,OAKLAND COUNTY	Y	N	Y	N	COUNTY
59	AG.DEPT.,FOREST PR.LAB	Y	N	Y	N	FED
60	MORSE BROS.	Y	N	Y	Y	PRIVATE
61	SASKATCHEWAN,HGWY.& TRANS	Y	Y	Y	N	PROVINCE
62	DOT OREGON	Y	N	Y	N	STATE
63	DOT ARKANSAS	Y	Y	Y	Y	STATE
64	WPCI,OLYMPIAN STONE CO.	Y	N	Y	N	PRIVATE
65	DOT OHIO	Y	N	Y	N	STATE
66	YAKIMA PRECAST	Y	Y	Y	N	PRIVATE
67	VA.,CITY OF VIRGINIA BCH	Y	N	N	N	CITY
68	MD.,CITY OF BALTIMORE	Y	Y	N	N	CITY
69	DOT CONNECTICUT	Y	N	N	N	STATE
70	BUREAU OF RECLAMATION MP	Y	N	N	N	FED
71	WA.,CITY OF SEATTLE	Y	N	N	N	CITY
72	DOT U.S. REGION 9	Y	Y	Y	N	FED
73	AG.DEPT.,FOREST SERV.R10	Y	Y	Y	N	FED
74	DOT FLORIDA	Y	N	N	N	STATE
75	DOT ALASKA	Y	N	Y	N	STATE
76	AZ.,MARICOPA COUNTY	Y	Y	Y	N	COUNTY
77	AG.DEPT.,FOREST SERV. R5	Y	Y	Y	N	FED
78	TX.,TRAVIS COUNTY	Y	N	Y	N	COUNTY
79	UNITED STATES STEEL	Y	N	Y	N	PRIVATE
80	DOT MARYLAND	Y	N	Y	N	STATE
81	NY.,SUFFOLK COUNTY	Y	N	Y	N	COUNTY
82	AG.DEPT.,FOREST SERV. R6	Y	Y	Y	Y	FED
83	DOT VERMONT	Y	Y	Y	N	STATE
84	NY.,MONROE COUNTY	Y	N	Y	N	COUNTY
85	AG.DEPT.,FOREST SERV. R1	Y	Y	Y	Y	FED
86	DOT COLORADO	Y	Y	Y	N	STATE
87	DOT ILLINOIS	Y	Y	Y	N	STATE
88	DOT TEXAS	Y	Y	Y	Y	STATE
89	DOT OKLAHOMA	Y	Y	Y	N	STATE
90	OK.,OKLAHOMA COUNTY	Y	Y	N	N	COUNTY
91	DOT FEDERAL D.C.	Y	Y	Y	N	FED
92	DOT WEST VIRGINIA	Y	Y	Y		STATE
93	AG.DEPT.,FOREST SERV. R8	Y	Y	Y	Y	FED
94	DOT WISCONSIN	Y	Y	Y	N	STATE
95	DOT PENNSYLVANIA	Y	Y	Y	N	STATE
96	DOT KENTUCKY	Y	N	Y	N	STATE
97	DOT MONTANA	Y	N	Y	N	STATE
99	DOT IOWA	Y	Y	Y	N	STATE
100	DOT U.S. REGION 10	Y	Y	Y	N	FED
101	DOT U.S. REGION 8	Y	Y	Y	N	FED

STANDARD BRIDGE DESIGN DISK #1

AGENCY SOLICITATION RESPONSE RECORD

#	AGENCY	RESP	USES	SENT	REQ	AG.TYPE
102	NJ.,TURNPIKE AUTHORITY	Y	Y	Y	N	STATE
103	CENTRAL PREMIX CO.	Y	Y	Y	N	PRIVATE
105	WA.,SPOKANE COUNTY	Y	N	Y	N	COUNTY
106	WA.,KING COUNTY	Y	N	Y	N	COUNTY
107	CONCRETE TECHNOLOGY CORP.	Y	Y	Y	N	PRIVATE
108	DOT NORTH CAROLINA	Y	Y	Y	Y	STATE
109	DOT GEORGIA	Y	Y	Y	N	STATE
110	NJ.,BERGEN COUNTY	Y	Y	Y	N	COUNTY
111	AG.DEPT.,FOREST SERV. R4	Y	Y	Y	N	FED
112	PA.,CITY OF PHILADELPHIA	Y	N	N	N	CITY
113	MO.,CITY OF KANSAS CITY	Y	N	N	Y	CITY
114	OH.,CITY OF CINCINNATI	Y	N	Y	Y	CITY
115	CA.,LOS ANGELES COUNTY	Y	N	N	N	COUNTY
116	AG.DEPT.,FOREST SERV. R9	Y	Y	Y	Y	FED
117	AG.DEPT.,F.S. EXP.STN.	Y	N	N	N	FED
118	AG.DEPT.,FOREST SERV. R3	Y	N	N	N	FED
119	BUREAU OF RECLAMATION LC	Y	N	N	N	FED
120	WI.,CITY OF MILWAUKEE	Y	N	Y	Y	CITY
121	L. DOLIN	N				PRIVATE
122	ASSOCIATED SAND & GRAVEL	N				PRIVATE
123	HIGHWAY AUTH. PUERTO RICO	Y	N	N	N	TERR.
124	AZ.,CITY OF PHOENIX	N				CITY
125	OH.,CITY OF CLEVELAND	N				CITY
126	DOT MINNESOTA	N				STATE
127	KY.,CITY OF LOUISVILLE	N				CITY
128	WA.,CITY OF SPOKANE	N				CITY
129	OR.,CITY OF PORTLAND	Y	N	N	N	CITY
130	FL.,CITY OF JACKSONVILLE	N				CITY
131	TN.,SHELBY COUNTY	N				COUNTY
132	TX.,CITY OF AUSTIN	N				CITY
133	DOT D.C.	Y	N	N	N	FED
134	DOT FEDERAL REGION ?	N				FED
135	FL.,CITY OF MIAMI	N				CITY
136	DOT UTAH	N				STATE
137	OH.,FRANKLIN COUNTY	N				COUNTY
138	DOT SOUTH CAROLINA	N				STATE
139	DOT ALABAMA	N				STATE
140	FL.,BROWARD COUNTY	N				COUNTY
141	MO.,CITY OF ST. LOUIS	N				CITY
142	MA.,CITY OF BOSTON	N				CITY
143	MANITOBA HGWY. & TRANS.	Y		Y		PROVINCE
144	CA.,CITY OF SAN JOSE	N				CITY
145	DOT NEVADA	N				STATE
146	TX.,CITY OF EL PASO	N				CITY
147	KY.,JEFFERSON COUNTY	N				COUNTY
148	OH.,CITY OF COLUMBUS	N				CITY
149	LA.,ORLEANS COUNTY	N				COUNTY
150	CA.,CITY OF SACRAMENTO	N				CITY
151	CA.,ORANGE COUNTY	N				COUNTY
152	FL.,DADE COUNTY	N				COUNTY

STANDARD BRIDGE DESIGN DISK #1

AGENCY SOLICITATION RESPONSE RECORD

#	AGENCY	RESP	USES	SENT	REQ	AG.TYPE
153	CA.,ALMEDA COUNTY	N				COUNTY
154	GA.,FULTON COUNTY	N				COUNTY
155	NEW BRUNSWICK DOT	N				PROVINCE
156	OH.,MONTGOMERY COUNTY	N				COUNTY
157	PA.,CITY OF PITTSBURGH	N				CITY
158	T.FAIRBANK HWY.RES.CTR.	N				
159	DOT LOUISIANA	Y	Y	Y	N	STATE
160	DOT NEW MEXICO	N				STATE
161	TN.,CITY OF NASHVILLE	N				CITY
162	TN.,DAVIDSON COUNTY	N				COUNTY
163	DOT NEBRASKA	N				STATE
164	DOT DELEWARE	N				STATE
165	DOT KANSAS	N				STATE
166	MA.,SUFFOLK COUNTY	N				COUNTY
167	DC.,CITY OF	N				CITY
168	IL.,CITY OF CHICAGO	N				CITY
169	NY. NJ.,PORT AUTHORITY	N				
170	LA.,JEFFERSON COUNTY	N				COUNTY
171	CA.,SAN DIEGO COUNTY	N				COUNTY
172	CO.,CITY OF DENVER	N				CITY
173	DOT NEW YORK	N				STATE
174	DOT FEDERAL REGION ?	N				FED
175	AG.DEPT.,FS.EXP.STN	N				FED
176	AL.,MOBILE	N				
177	NY.,NASSAU COUNTY	N				COUNTY
178	NY.,CITY OF BUFFALO	N				CITY
179	DOT TENNESSEE	N				STATE
180	SC.,GREENVILLE COUNTY	N				COUNTY
181	BUREAU OF RECLAMATION MT.	N				FED
182	BUREAU OF RECLAMATION CO.	N				FED
183	OK.,CITY OF OKLAHOMA CITY	N				CITY
184	OK.,CITY OF TULSA	N				CITY
185	OR.,MULTNOMAH COUNTY	N				COUNTY
186	NY.,SYOSSET	N				
187	BUREAU OF RECLAMATION UT.	N				FED
188	GUAM,PUBLIC WORKS	N				TERR.
189	NC.,CITY OF CHARLOTTE	Y	Y	N	N	CITY
190	AG.DEPT.,FS.EXP.STN.NC.	N				FED
191	AG.DEPT.,FOREST SERV. R2	N				FED
192	NY.,ERIE COUNTY	N				COUNTY
193	CM DOT,SAIPAN	N				TERR.
194	OH.,HAMILTON COUNTY	N				COUNTY
195	PA.,MONTGOMERY COUNTY	N				COUNTY
196	MN.,CITY OF ST.PAUL	N				CITY
197	CA.,CITY OF OAKLAND	N				CITY
198	CA.,SANTA CLARA COUNTY	N				COUNTY
199	MS RIVER BRIDGE AUTHORITY	N				FED
200	TX.,HARRIS COUNTY	N				COUNTY
201	MN.,CITY OF MINNEAPOLIS	N				CITY
202	NY.,COUNTY OF NEW YORK	N				COUNTY

STANDARD BRIDGE DESIGN DISK #1

AGENCY SOLICITATION RESPONSE RECORD

#	AGENCY	RESP	USES	SENT	REQ	AG.TYPE
203	IN.,CITY OF INDIANAPOLIS	N				CITY
204	DOT VIRGINIA	N				STATE
205	NE.,CITY OF OMAHA	N				CITY
206	AG.DEPT.,FS.EXP.STN. PA.	N				FED
207	AL.,MONTGOMERY COUNTY	N				COUNTY
208	CA.,CITY OF SAN FRANCISCO	N				CITY
209	DOT FEDERAL REGION ?	N				FED
210	TX.,CITY OF HOUSTON	N				CITY
211	TX.,CITY OF SAN ANTONIO	N				CITY
212	DOT MISSISSIPPI	N				STATE
213	MI.,GENESSE COUNTY	N				COUNTY
214	LA.,E.BATON ROUGE COUNTY	N				COUNTY
215	PA.,CHESTER COUNTY	Y	N	N	N	COUNTY
216	TX.,CITY OF FORT WORTH	N				CITY
217	AZ.,CITY OF TUCSON	N				CITY
218	NY. NJ. PORT AUTHORITY	N				
219	AG.DEPT.,FS.PROD.LAB. UT.					FED
220	AG.DEPT.,FS.PROD.LAB. CA.					FED
221	AG.DEPT.,FS.PROD.LAB. CO.					FED
222	AG.DEPT.,FS.PROD.LAB. OR.					FED
223	AG.DEPT.,FS.PROD.LAB. WI.					FED
224	BOYD BROWN & ASSOC. ENG.	Y				PRIVATE

ATTACHMENT 2

Washington
State University

Department of Civil and Environmental Engineering, Pullman, Washington 99164-2910 / 509-335-2576

April 8, 1986

Dear :

In March, 1986 the Washington State Department of Transportation awarded to me a contract regarding Standard Bridge Systems.

Most counties in the state of Washington do not have employees with the expertise and/or the time to design bridges, and those that do very seldom have the time to develop alternate designs to ensure the lowest cost. By specifying one type of material over other types, competition is reduced and costs are increased.

The objective of this project is to survey the various types of standard bridge designs which exist in the United States and Canada and to evaluate the feasibility of the use of these standard bridges in the various counties in Washington. Each of the standard bridge designs received as a result of this survey request will be assessed. The product of the data assessment will be a spread sheet matrix displaying the data. These data will be made available to the Washington Association of County Engineers for help in prioritizing the standard bridge designs so that two or more alternate designs can be selected for implementation. These complete data will also be available upon request to any agency providing information as a result of this solicitation.

I am hereby requesting that you send to me information pertinent to all standard bridge designs (i.e., plans, specifications, etc.) that are used by your agency. Your timely attention to this request will be greatly appreciated because a graduate student supported by the project funds will be available on May 16, 1986 to begin computer analysis of the information. Your cooperation is essential to the success of this project. Thank you in advance for your participation.

Respectfully yours,

Harold C. Sorensen, Ph.D., S.E.
Associate Professor - Structures
Principal Investigator
(509) 335-5183

HCS/cb

ATTACHMENT 3

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET ABBREVIATION KEY

#	SOURCE	*******GENERAL******* ROAD WIDTH	NO. SPANS	SPAN LENGTH	BRIDGE TYPE	PRIMARY MATERIAL	DESIGN LOAD	EASE OF AVAIL.OF CONSTR. MATERIAL	COST

IN FEET

>1 ONE OR MORE SPANS

W/O PARENTHESIS-BRIDGE LENGTH
W/PARENTHESIS-SPAN LENGTH

CO CONTINUOUS
COH CONTINUOUS WITH HINGE
SI SIMPLE

C CONCRETE
S STEEL
W WOOD

AASHTO RATING IF AVAILABLE

E EASY
ME MODERATLY EASY
MD MODERATLY DIFFICULT
D DIFFICULT

ALL MATERIALS APPEAR
TO HAVE SIMILAR AVAILABILITY

L LOW
M MEDIUM
H HIGH

(Match Page 2)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET ABBREVIATION KEY

*******SUBSTRUCTURE*******													
ABUTMENT				WING WALL				INTERMEDIATE SUPPORTS					
ABT. MAT'L	ABT. TYPE	FTG. TYPE	FTG. MAT'L	EXIST	MAT'L	FTG. TYPE	FTG. MAT'L	TYPE	SHAFT MAT'L	FTG. TYPE	FTG. MAT'L	CAP MAT'L	

C CONCRETE
S STEEL
W WOOD

Y YES
N NO
O OPTIONAL

PB PILE BENT
PR PIER
PRFR STEEL FRAME PIER
CR CRIB

CC CONCRETE CRIB
CP CAPPED PILE
CPS CAPPED PILE STUB TYPE
CPSW CAPPED PILE STRAIGHT WING TYPE
RW RETAINING WALL
S STUB
SW STRAIGHT WING
SW/FX STRAIGHT WING/FLEXIBLE

DS DRILLED SHAFT
MS MUDSILL
P PILE
R ROCK,SF
SF SPREAD FOOTING
WS WOODSILL

C CONCRETE
S STEEL
W WOOD

(Match Page 1)

(Match Page 3)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET ABBREVIATION KEY

*******SUPERSTRUCTURE*******															
DECK -------	DECK SUPPORT STRUCTURE ----------						MISC ----------								
		CONC ----------			STEEL OR WOOD -------										
PRIMARY MAT'L	PRIMARY MAT'L	TYPE	PROCESS	CROSS SECTION	TYPE	COMPOSITE ACTION	EXP.JTS. EXIST	LOCATION	CURB & HANDRAIL EXIST	MAT'L	SPEC,CODE REFERENCED	SOURCE MATERIAL
C CONCRETE					GLB GLUE LAM.BEAM							
S STEEL					GLD GLUE LAM.DECK							
W WOOD					GLP GLUE LAM. PANEL							
CFSG CONCRETE FILLED STEEL GRATE					GLS&D GLUE LAM. STRINGERS AND DECK							
SG STEEL GRATE					LS LOG STRINGERS							
					PG PLATE GIRDERS							
	C CONCRETE				PGF PLATE GIRDER FRAME							
	S STEEL				PLD GLUE LAM.COMPOSITE WOOD AND CONCRETE DECK							
	W WOOD				RB ROLLED BEAM							
					TS TIMBER STRINGER							
		PC PRECAST										
		PP POURED IN PLACE				Y YES						
						N NO						
			PS PRESTRESSED									
			PT POST TENSIONED				Y YES					
							N NO					
							O OPTIONAL					
				AG AASHTO OR SIMILAR SHAPED GIRDERS								
				BB BOX BEAM				A ABUTMENTS				
				BG BOX GIRDER				P PIERS				
				BI BULB I								
				BT BULB T					Y YES			
				CB CHANNEL BEAM					N NO			
				DBT DECKED BULB T					O OPTIONAL			
				DT DOUBLE T								
				HS HOLLOW SLAB						C CONCRETE		
				PB PLANK BEAM,(SOLID SLAB UNITS)						S STEEL		
				PG PAN GIRDER						W WOOD		
				RD RIBBED DECK								
				SL SLAB								
				SG SLAB AND GIRDER,(SIMILAR TO PG)								
				TB T BEAM								

(Match Page 2)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET PLM9 PRINT DATE:8/14/86 ,10/7/86

#	SOURCE	*******GENERAL******* ROAD WIDTH	NO. SPANS	SPAN LENGTH	BRIDGE TYPE	PRIMARY MATERIAL	DESIGN LOAD	EASE OF AVAIL.OF CONSTR. MATERIAL	COST
1	DOT R1			S		S			
2	DOT R1			S		C			
3	DOT R1			M		S			
4	DOT R1			L		S			
5	DOT OK.	26,32	>1	(20-60)	SI	S	HS20	E	L
6	DOT OK.	26,32	>1	(30-80)	SI	S	HS20		
7	DOT OK.	26,32,33	>1	(20-55)	SI	C	HS20+		
8	DOT OK.	26,32	>1	(35-100)	SI	C	HS20		
9	DOT OK.	26,32	>1	(30,40)	SI	C	HS20	D	H
10	DOT CA.				CO,SI	C			
11	DOT CA.				CO,SI	C			
12	DOT CA.				CO,SI	S			
13	DOT HI.				CO,SI	C			
14	DOT AZ.			60-	CO	C	HS20+		
15	DOT AZ.			60-	COH	C	HS20/INT		
16	DOT WV.		1	(20-70)	SI	C	HS20+	E	
17	DOT WV.		1	(20-70)	SI	C	HS20+		
18	DOT WV.		1	(8-26)	SI	C	HS20+		
19	DOT WV.		1		SI	W,S	HS20+		
20	DOT WV.		>1		SI	W			
21	DOT OH.					C/S			
22	DOT OH.	28-44	3	45-150	CO	C/S	HS20/INT.		
23	DOT OH.	28-44	>3	35-150	CO	C	HS20/INT		
24	DOT OH.		1	10-36	SI	C	HS20/INT.		
25	DOT OH.		>1	<300	CO	C/S			
26	DOT OH.		>1	<150	CO	C/S			
27	DOT OH.	24	>1	(20-75)	SI	S/W			
28	DOT LA.	20-40	>1	(19')	SI	C	HS20		
29	US STEEL	28	>1	(25-80)	SI	S,C	H15		
30	US STEEL	28	2,3,4	(25-100)	CO	S,C	H15		
31	US STEEL	34,44	>1	(25-80)	SI	S,C	HS20		
32	US STEEL	34,44	2,3,4	(25-100)	CO	S,C	HS20		
33	DOT GA.	31	>1	(15,20)	SI	C	HS15	E	
34	DOT GA.	32-9	>1	(30,40)	SI	C	HS15	E	
35	DOT GA.	30	>1	(30,40)	SI,CO	C,S	HS15		
36	DOT TX.	26-48	>1	(40-80)	SI	C	HS20	E	L
37	DOT TX.	26-48	>1	(30,40)	SI	C	HS20		
38	DOT TX.	26-44	>1	(30-120)	SI	C	HS20	E	
39	DOT TX.	28-44	>1	(30-55)	SI(CO)	C	HS20		
40	DOT TX.	26-44	3	160-260	CO	S,C	HS20		
41	NY.,MONROE CO.		1	20-50	SI	C	HS20	E	
42	NY.,MONROE CO.			50-80	SI	C,S	HS20		
43	DOT NC.	24-42		(25-50)	SI	C	HS20	E	
44	DOT NC.	24,28,34,40		(20-55)		S	HS20/INT		
45	DOT VT.	14,15-5		(20-80)		S&W	HS20		
46	DOT VT.		1	(10-29)	SI	C	HS15,HS20		
47	DOT IL.	24	>1	(25-60)	SI	C	HS20	E	
48	DOT IL.	32	>1	(30-80)	SI	S	HS20		
49	DOT CO.	28-36	1	36-68	SI	S	HS20		
50	DOT CO.	30-38	1	36-66	SI	C	HS20	E	
51	DOT IA.	24,30	1	30-80	SI	C	H20*	E	
52	DOT IA.	24,30		75-125	CO	C	H20*		
53	DOT IA.	24,30	3	126-243	CO	C	H20*	E	
54	DOT MT.		>1	(30-135)	SI	C		E	
55	DOT MT.	37,41	3	78	CO	C	HS20/INT.		
56	DOT WI.	24,26,28,30	1	20-40	SI	C	H20*		
57	DOT WI.	24,26,28,30	2	20-36	CO	C	H20*		
58	DOT WI.	24,26,28,30	>1	(18-32)		W	H20*		
59	DOT WI.	24,26,28,30	1	50-66	SI	C	H20*	E	
60	DOT WI.	24,26,28,30		32-52	SI	C	H20*	E	

(Match Page 2)

(Match Page 5)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET

(Match Page 1)

#	SOURCE	*******SUBSTRUCTURE*******												
		ABUTMENT				WING WAL.				INTERMEDIATE SUPPORTS				
		ABT. MAT'L	ABT. TYPE	FTG. TYPE	FTG. MAT'L	EXIST	MAT'L	FTG. TYPE	FTG. MAT'L	TYPE	SHAFT MAT'L	FTG. TYPE	FTG. MAT'L	CAP MAT'L
1	DOT R1													
2	DOT R1													
3	DOT R1													
4	DOT R1													
5	DOT OK.	S(C)	CP(CPSW)	P(P,R)	S(S,C)	O(Y)	S(C)	P(P,R)	S(S,C)	PB	S	P	C,S	C,S
6	DOT OK.	C	CPSW(SW)	P(R)	C,S(C)	Y	C	P(R)	C,S(C)	PR(PB)	C(S)	DS,SF,P(P)	C(S)	C
7	DOT OK.	C	CPSW	P(R)	S(C)	Y	C	P(R)	S(C)	PR(PB)	C(S)	DS,SF,P(P)	C(S)	C
8	DOT OK.	C	CPS	P	C,S	Y	C	P	C,S	PR(PB)	C(C,S)	DS,SF,P(P)	C(C,S)	C
9	DOT OK.	C	CPSW	P(R)	C,S(C)	Y	C	P(R)	C,S(C)	PR(PB)	C(C,S)	DS,SF,P(P)	C(C,S)	C
10	DOT CA.	C	S	DS,P	C	O	C	DS,P	C	O		DS,P	C	
11	DOT CA.	C		DS,P	C	O	C	DS,P	C	O		DS,P	C	
12	DOT CA.	C		DS,P	C	O	C	DS,P	C	O		DS,P	C	
13	DOT HI.			P	C			P	C			P	C	
14	DOT AZ.													
15	DOT AZ.													
16	DOT WV.	C	RW	SF,P	C,S	Y	C	SF,P	C,S					
17	DOT WV.	C	CC	P,R	S,C	Y	C	P,R	S,C					
18	DOT WV.	C	CP	P	S									
19	DOT WV.													
20	DOT WV.									PR				C,S,W
21	DOT OH.	C	S,SW	P,R	S,C	Y	C	P,R	S,C					
22	DOT OH.	C	CP	P	C,S					PB	C,S	P	C,S	C
23	DOT OH.	C	CP	P	S,C	N				PB	C,S	P	C,S	C
24	DOT OH.	C	SW	P,R,SF	S,C	Y	C	P,R,SF	S,C					
25	DOT OH.	C	SW/FX	P	C,S	Y	C	P	C,S	O				C
26	DOT OH.	C	SW/FX	P	C,S	Y	C	P	C,S	O				C
27	DOT OH.	C,S	CP	P	C,S					PB	S	P	S	C,S
28	DOT LA.	C	CP	P	C,S	O	C						C,S,W	C
29	US STEEL	C,S	CP	P	S					PB	S	P	S	C,S
30	US STEEL	C,S	CP	P	S					PB	S	P	S	C,S
31	US STEEL	C,S	CP	P	S					PB	S	P	S	C,S
32	US STEEL	C,S	CP	P	S					PB	S	P	S	C,S
33	DOT GA.	C	CP	P	C,S	N				PB	C,S	P	C,S	C
34	DOT GA.	C	CP	P	C,S	N				PB	C,S	P(SF)	C,S(C)	C
35	DOT GA.	C	CP	P	C,S	N				PB	C,S	P(SF)	C,S(C)	C
36	DOT TX.	C	S	P(DS)	C,S(C)	Y	C	P	C,S	PR	C	P	C,S	C
37	DOT TX.	C	S	P(DS)	C,S(C)	Y	C	P	C,S	PR(PB)	C(C,S)	DS(P)	C(C,S)	C
38	DOT TX.	C	S	P(DS)	C(C)	Y	C	P	C,S	PR(PB)	C(C,S)	DS(P)	C(C,S)	C
39	DOT TX.	C	S	P(DS)	C(C)	Y	C	P	C,S	PR(PB)	C(C,S)	DS(P)	C(C,S)	C
40	DOT TX.	C	S	P(DS)	C,S(C)	Y	C	P	C,S	PR	C	DS(P)	C(C,S)	C
41	NY.,MONROE CO.	C	S	P	C,S,W	Y	C	P	C,S,W					
42	NY.,MONROE CO.	C	S	P	C,S,W	Y	C	P	C,S,W					
43	DOT NC.	C	S	P	C,S	Y	C	P	C,S	PB(PR)	C,S(C)	P(SF)	C,S(C,S)	C
44	DOT NC.	C	CP	P	S					PB	S	P	S	S
45	DOT VT.	C												
46	DOT VT.	C												
47	DOT IL.	C	CP	P	C,C&S					PB	C,C&S	P	C,C&S	C
48	DOT IL.	C	CP	P	C,C&S					PR	C	P	C,C&S	C
49	DOT CO.	S	S	P	S	Y	S	P	S					
50	DOT CO.	C	S	P	S	Y	C	P	S					
51	DOT IA.	W	S	P	W	Y	W	P	W					
52	DOT IA.	C	CP	P	S,W	Y	C			PB	S,W	P	S,W	C
53	DOT IA.	C	CP	P	S,W	Y	C			PB	S,W	P	S,W	C
54	DOT MT.	C												C
55	DOT MT.													C
56	DOT WI.	C	RW	P	C,S					N				
57	DOT WI.	C	RW	P	C,S	N				PR(PB)	C	P	C,S	C
58	DOT WI.	W	RW	P	W					PB	W	P	W	W
59	DOT WI.	C	RW	P	C,S	N								
60	DOT WI.	C	RW	P	C,S	N								

(Match Page 3)

(Match Page 6)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET

(Match Page 2)

#	SOURCE	*******SUPERSTRUCTURE******* DECK	DECK SUPPORT STRUCTURE						MISC			
			CONC				STEEL OR WOOD					
		PRIMARY MAT'L	PRIMARY MAT'L	TYPE	PROCESS	CROSS SECTION	TYPE	COMPOSITE ACTION	EXP.JTS. EXIST	EXP.JTS. LOCATION	CURB & HANDRAIL EXIST	CURB & HANDRAIL MAT'L
1	DOT R1		S				RB					
2	DOT R1		C	PC	PS	AG						
3	DOT R1		S				PG					
4	DOT R1		S				PG					
5	DOT OK.	C	S				RB				Y	S
6	DOT OK.	C	S				RB,PG	Y	O	A,P	Y	C,S
7	DOT OK.	C	C	PC	PS	DT			O	A	Y	C,S
8	DOT OK.	C	C	PC	PS	AG			O	A,P	Y	C,S
9	DOT OK.	C	C	PP		PG			O	A	Y	C,S
10	DOT CA.	C	C	PP		BG,TB			Y		Y	C,S
11	DOT CA.	C	C	PC,PP	PS	AG			Y		Y	C,S
12	DOT CA.	C	S				PG		Y		Y	C,S
13	DOT HI.	C	C	PP		BG			Y			
14	DOT AZ.	C	C	PP		SL					Y	
15	DOT AZ.	C	C	PP		SL					Y	
16	DOT WV.	C	C	PC	PS	HS,BB					Y	S
17	DOT WV.	C	C	PC	PS	CB					Y	S
18	DOT WV.		C	PC	PS	PB						
19	DOT WV.	W,SG,CFSG	S				RB		Y	A	Y	S
20	DOT WV.	W	W				GLB				Y	W,S
21	DOT OH.	C	S				RB,PG		Y	A	Y	C,S
22	DOT OH.	C	C	PP		SL			O		Y	C,S
23	DOT OH.	C	C	PP		SL			N		H	
24	DOT OH.	C	C	PP		SL					Y	S
25	DOT OH.	C	S				RB		Y	P	Y	C,S
26	DOT OH.	C	S				RB		N		Y	C,S
27	DOT OH.	W	S				RB				Y	S
28	DOT LA.	C	C	PP,PC		SL			Y	A,P	Y	C,S
29	US STEEL	C	S				RB	O	Y	A,P	Y	S
30	US STEEL	C	S				RB	O	Y	A,P	Y	S
31	US STEEL	C	S				RB	O	Y	A,P	Y	S
32	US STEEL	C	S				RB	O	Y	A,P	Y	S
33	DOT GA.	C	C	PC	(PS)	CB(S_)			Y	A,P	Y	C
34	DOT GA.	C	C	PC(PP)	PS	BB(T3)			Y	A,P	Y	C
35	DOT GA.	C	S				RB	N	O	A,P	Y	C
36	DOT TX.	C	C	PC	PS	AG			O	A,P	Y	C,S
37	DOT TX.	C	C	PP		SG			O	A,P	Y	C,S
38	DOT TX.	C	C	PC	PS	BB			O	A,P	Y	C,S
39	DOT TX.	C	C	PC	PS	TB			O	A,P	Y	C,S
40	DOT TX.	C	S				RB	Y	Y		Y	C,S
41	NY.,MONROE CO.	C	C	PC	PS	HS			Y	A	Y	C,S
42	NY.,MONROE CO.	C	S				RB	Y	Y	A	Y	C,S
43	DOT NC.	C	C	PC	PS	HS			Y	P	Y	C,S
44	DOT NC.	S	S				RB	N	N		Y	S
45	DOT VT.	W	S				RB	N			Y	S
46	DOT VT.	C	C	PP		SL			Y	A	Y	S
47	DOT IL.	C	C	PC	PS	HS					Y	S
48	DOT IL.	C	S				RB	Y	Y	A,P	Y	S
49	DOT CO.	S	S&C				RB	N	Y	A	Y	S,W
50	DOT CO.	C	C	PC	PS	DT			N		Y	S
51	DOT IA.	C	C	PC	PS	AG			N		Y	C
52	DOT IA.	C	C	PP		SL			N		Y	C
53	DOT IA.	C	C	PC	PS	AG			N		Y	C
54	DOT MT.	C	C	PC	PS	AG			O	P	Y	C
55	DOT MT.	C	C	PP		SL					Y	C
56	DOT WI.	C	C	PP		SL			N		Y	S
57	DOT WI.	C	C	PP		SL			N		Y	S
58	DOT WI.	W	W				GLP		N		Y	W
59	DOT WI.	C	C	PC	PS	AG			N		Y	S
60	DOT WI.	C	C	PC	PS	HS			N		Y	S

(Match Page 4)

(Match Page 7)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET

#	SOURCE	SPEC,CODE REFERENCED	SOURCE MATERIAL
1	DOT R1	AISC,PCI,FHWA	LETTER
2	DOT R1	" " "	LETTER
3	DOT R1	" " "	LETTER
4	DOT R1	" " "	LETTER
5	DOT OK.		PLAN,COMPLETE
6	DOT OK.	AASHTO	PLAN,COMPLETE
7	DOT OK.		PLAN,COMPLETE
8	DOT OK.		PLAN,COMPLETE
9	DOT OK.		PLAN,COMPLETE
10	DOT CA.		PLAN,MISC.
11	DOT CA.		PLAN,MISC.
12	DOT CA.		PLAN,MISC.
13	DOT HI.		PLAN,MISC.
14	DOT AZ.	AASHTO	PLAN,MISC.
15	DOT AZ.	AASHTO	PLAN,MISC.
16	DOT WV.	WVDOT	PLAN,MISC.
17	DOT WV.	WVDOT	PLAN,MISC.
18	DOT WV.	WVDOT	PLAN,MISC.
19	DOT WV.	WVDOT	PLAN,MISC.
20	DOT WV.	WVDOT,AASHTO	PLAN,MISC.
21	DOT OH.	AASHTO	PLAN,MISC.
22	DOT OH.	AASHTO	PLAN,MISC.
23	DOT OH.	AASHTO	PLAN,MISC.
24	DOT OH.	AASHTO	PLAN,MISC.
25	DOT OH.	AASHTO	PLAN,MISC.
26	DOT OH.	AASHTO	PLAN,MISC.
27	DOT OH.	AASHTO	PLAN,MISC.
28	DOT LA.	AASHTO	PLAN,MISC.
29	US STEEL	AASHTO	LFD HANDBOOK
30	US STEEL	AASHTO	LFD HANDBOOK
31	US STEEL	AASHTO	LFD HANDBOOK
32	US STEEL	AASHTO	LFD HANDBOOK
33	DOT GA.		PLAN,COMPLETE
34	DOT GA.		PLAN,COMPLETE
35	DOT GA.		PLAN,COMPLETE
36	DOT TX.		PLAN,MISC.
37	DOT TX.		PLAN,MISC.
38	DOT TX.		PLAN,MISC.
39	DOT TX.		PLAN,MISC.
40	DOT TX.		PLAN,MISC.
41	NY.,MONROE CO.	AASHTO,NYDOT	LETTER,TYP.PLAN
42	NY.,MONROE CO.	AASHTO,NYDOT	LETTER,TYP.PLAN
43	DOT NC.		PLAN,COMPLETE
44	DOT NC.		PLAN,MISC.
45	DOT VT.		PLAN,MISC.
46	DOT VT.		PLAN,MISC.
47	DOT IL.	AASHTO	PLAN,COMPLETE
48	DOT IL.	AASHTO	PLAN,COMPLETE
49	DOT CO.	AASHTO	PLAN
50	DOT CO.	AASHTO	PLAN
51	DOT IA.	AASHTO	PLAN,COMPLETE
52	DOT IA.	AASHTO	PLAN,COMPLETE
53	DOT IA.	AASHTO	PLAN,COMPLETE
54	DOT MT.	AASHTO,MDOT	PLAN,BEAM
55	DOT MT.	AASHTO	PLAN,BEAM
56	DOT WI.	AASHTO	PLAN,COMPLETE
57	DOT WI.	AASHTO	PLAN,COMPLETE
58	DOT WI.	AASHTO	PLAN,COMPLETE
59	DOT WI.	AASHTO	PLAN,COMPLETE
60	DOT WI.	AASHTO	PLAN,COMPLETE

(Match Page 3)

(Match Page 8)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET PLM9 PRINT DATE:8/14/86 ,10/7/86

#	SOURCE	*******GENERAL******* ROAD WIDTH	NO. SPANS	SPAN LENGTH	BRIDGE TYPE	PRIMARY MATERIAL	DESIGN LOAD	EASE OF CONSTR.	AVAIL.OF MATERIAL	COST
61	DOT PA.	24-48				W				
62	DOT PA.	24-48	1	18-35	SI	S				
63	DOT PA.	24-48	1	18-35	SI	C		E		
64	DOT PA.	24-48	1	18-35	SI	C		E		
65	DOT PA.	24-48	1	30-90	SI	S				
66	DOT PA.	24-48	1	30-90	SI	C				
67	DOT PA.	24-48	1	30-90	SI	C		E		
68	DOT PA.	24-48	1	90-130	SI	S	HS25/MIL.			
69	DOT PA.	24-48	1	90-130	SI	C	HS25/MIL.			
70	DOT PA.	24-48	1	90-130	SI	C	HS25/MIL.	E		
71	DOT KY.		>1		SI	C	HS20	E		
72	FS. R1	15	1	13-37	SI	W				
73	FS. R1	16-24		(13-35)		C	HS20	E		
74	FS. R1		1	13-39	SI	W				
75	FS. R8	13-25	>1	(19-31)	SI	C	HS20	E		
76	FS. R8	13-25	>1	(24,34)	SI	C	HS20	E		
77	FS. R8	16,26	>1	(30,40)	SI	C	HS20			
78	FS. R8	12	1	10-40	SI	W	HS20	E		
79	FS. R8	15,32	>1	(19,31)	SI	C&W	HS20			
80	FS. R8	14		19,31,45,60	SI	W	HS20			
81	DOT FED	28(44)	>1	40,50,60	SI	C	HS15(HS20)	E		
82	DOT FED	28(44)	>1	80,100,120	SI	C	HS15(HS20)	E		
83	DOT FED	28(44)	>1	20,25,30	SI	C	HS15(HS20)	E		
84	DOT FED	44	>1	(25)30-50	SI	C	HS20	E		
85	DOT FED	44	>1	50-80	SI	C	HS20	ME		
86	DOT FED	28(44)	>1	35-130	SI	C	HS15(HS20)	ME		
87	DOT FED	28-44	>1	20-70	SI	S	HS20			
88	DOT FED	28-44	>1	50-90	SI	S	HS20			
89	DOT FED	28-44	>1	20-70	SI	S	INT.			
90	DOT FED	28-44	>1	45-85	SI	S	INT.			
91	DOT FED	28-44	3	130-260	CO	S	HS20			
92	DOT FED	28-44	>1	90-180	SI	S	HS20			
93	DOT FED	40	3	312-624	CO	S	HS20			
94	DOT FED	24	>1	(11-21)	SI	W	HS15,HS20			
95	DOT FED	24	>1	(11-21)	SI	W	HS15			
96	DOT FED	24	>1	(16,20,24)	CO	W	HS15,HS20			
97	DOT FED	24	>1	(20,24,28)	CO	W	HS15			
98	DOT FED	24	>1	(25-65)	SI	W	HS15,HS20			
99	DOT FED	44	4	210	CO	C	HS20			
100	DOT FED	44	4	240	CO	C	HS20			
101	DOT FED	44	4	320	CO	C	HS20			
102	DOT FED	44	4	480	CO	S&C	HS20			
103	DOT FED	44	2	200,240	CO	S&C	HS20			
104	DOT FED	40	3	190	CO	S&C	HS20			
105	DOT FED	44	5	251	CO	S&C	HS20			
106	DOT FED	40	3	104	CO	C	HS20			
107	DOT FED	40	4	258	CO	C	HS20			
108	DOT FED	40	4	296	CO	C&S	HS20			
109	NJ.,BERGEN CO.	30	1	<25*	SI	C	HS20			
110	NJ.,BERGEN CO.	36	1	>25	SI	C&S	HS20			
111	NJ.,BERGEN CO.					C				
112	NY.,SUFFOLK CO.				SI	C&S				
113	MORSE BROS.			(20-70)						
114	MORSE BROS.			(60-90)						
115	MORSE BROS.			(60-105)						
116	MORSE BROS.			(70-135)						
117	MORSE BROS.			(40-200)						
118	YAKIMA PRECAST		1,2	15-120	SI	C	U-80 TRUCK	E		
119	CONC.TECH.CORP.		>1	(40-170)	SI	C	HS20			
120	CONC.TECH.CORP.		>1	(30-190)	SI	C	HS20			
121	CONC.TECH.CORP.	18	>1	(30-115)	SI	C	148,75 TON			
122	CONC.TECH.CORP.		>1	(40-180)	SI	C	HS20			
123	CONC.TECH.CORP.		>1	(25-65)	SI	C	HS20	E		

(Match Page 6)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET

(Match Page 5)

(Match Page 7)

#	SOURCE	*******SUBSTRUCTURE*******												
		ABUTMENT				WING WALL				INTERMEDIATE SUPPORTS				
		ABT. MAT'L	ABT. TYPE	FTG. TYPE	FTG. MAT'L	EXIST	MAT'L	FTG. TYPE	FTG. MAT'L	TYPE	SHAFT MAT'L	FTG. TYPE	FTG. MAT'L	CAP MAT'L
61	DOT PA.	C		SF	C									
62	DOT PA.	C	BW(S)CP											
63	DOT PA.	C	BW(S)CP											
64	DOT PA.	C	BW(S)CP	P										
65	DOT PA.	C	RW(CP)	SF(P)	C(S)									
66	DOT PA.	C	RW(CP)	SF(P)	C(S)									
67	DOT PA.	C	RW(CP)	SF(P)	C(S)									
68	DOT PA.	C	S	P(SF)	S(C)									
69	DOT PA.	C	S	P(SF)	S(C)									
70	DOT PA.	C	S	P(SF)	S(C)									
71	DOT KY.	C												C
72	FS. R1	W	CR			Y	W							
73	FS. R1													
74	FS. R1	W	RW	P,MS	W	Y	W	P,MS	W					
75	FS. R8	C	CP	P	C,S	Y	C*(W)	P	C,S(W)	PB	C,S	P	C,S	C
76	FS. R8	C	CP	P	S	Y	C*	P	S	PB	S	P	S	C
77	FS. R8	C	S	P	C,S	Y	C	P	C,S	PB	C,S	P	C,S	C
78	FS. R8	W	CR	MS		Y	W	MS						
79	FS. R8	W	CP	P	W	Y	W	P	W	PB	W	P	W	C,W
80	FS. R8													
81	DOT FED													
82	DOT FED													
83	DOT FED													
84	DOT FED													
85	DOT FED													
86	DOT FED													
87	DOT FED													
88	DOT FED													
89	DOT FED													
90	DOT FED													
91	DOT FED													
92	DOT FED													
93	DOT FED													
94	DOT FED	W	CP&RW	P	W	Y	W	P	W	PB	W	P	W	W
95	DOT FED	W	CP&RW	P	W	Y	W	P	W	PB	W	P	W	W
96	DOT FED	W	CP&RW	P	W	Y	W	P	W	PB	W	P	W	W
97	DOT FED	W	CP&RW	P	W	Y	W	P	W	PB	W	P	W	W
98	DOT FED	C								PB				C
99	DOT FED	C	S	R	C	Y	C	R	C	PR	C	DS	C	
100	DOT FED	C	S	P	C,S,W	Y	C	P	C,S,W	PR	C	P	C,S,W	C
101	DOT FED	C	S	P	S	Y	C	P	S	PR	C	P	S	
102	DOT FED	C	S	P	C,S,W	Y	C	P	C,S,W	PR	C	P(SF)	C,S,W(C)	C
103	DOT FED	C	S	P	C,S,W	Y	C	P	C,S,W	PR	C	P	C,S,W	C
104	DOT FED	C	S	P	C,S,W	Y	C	P	C,S,W	PRFR	S	P	C,S,W	
105	DOT FED	C	S	P	S	Y	C	P	S	PRFR	S	P	S	
106	DOT FED	C	S	P	S	Y	C	P	S	PR	C	DS(P)	C(S)	
107	DOT FED	C	S	P		Y	C	P		PB	C	P	C	C
108	DOT FED	C	S	P		Y	C	P		PR	C	P(SF)	S(C)	C
109	NJ.,BERGEN CO.	C	RW	P	W	Y	C	P	W					
110	NJ.,BERGEN CO.	C	S	SF	C	Y	C	SF	C					
111	NJ.,BERGEN CO.													
112	NY.,SUFFOLK CO.	C	S	SF	C	O	C	SF	C	PR	C	SF	C	C
113	MORSE BROS.													
114	MORSE BROS.													
115	MORSE BROS.													
116	MORSE BROS.													
117	MORSE BROS.													
118	YAKIMA PRECAST	C	CR	SF	C	Y	C	SF	C	PR	C	SF	C	C
119	CONC.TECH.CORP.													
120	CONC.TECH.CORP.													
121	CONC.TECH.CORP.													
122	CONC.TECH.CORP.													
123	CONC.TECH.CORP.													

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET

(Match Page 6)

#	SOURCE	*******SUPERSTRUCTURE******* DECK PRIMARY MAT'L	DECK SUPPORT STRUCTURE PRIMARY MAT'L	CONC TYPE	CONC PROCESS	CONC CROSS SECTION	STEEL OR WOOD TYPE	MISC COMPOSITE ACTION	MISC EXP.JTS. EXIST	MISC EXP.JTS. LOCATION	MISC CURB & HANDRAIL EXIST	MISC CURB & HANDRAIL MAT'L
61	DOT PA.	W	S				RB	N			Y	W
62	DOT PA.	C	S				RB	N				
63	DOT PA.	C	C	PC	PS	BB						
64	DOT PA.	C	C	PC		CB						
65	DOT PA.	C	S				RB	N				
66	DOT PA.	C	C	PC	PS	BB						
67	DOT PA.	C	C	PC	PS	SPREAD BB						
68	DOT PA.	C	S				PG	Y	Y	A	Y	C
69	DOT PA.	C	C	PC	PS	AG			Y	A	Y	C
70	DOT PA.	C	C	PC	PS	BB			Y	A	Y	C
71	DOT KY.	C	C	PC	PS	BB			Y	P	Y	C,S
72	FS. R1	W	W				LS	N	N		Y	W
73	FS. R1	C	C	PC	PS	RD					O	
74	FS. R1	W	W				GLB	N	N		O	S
75	FS. R8	C	C	PC	PS	CB					Y	C,S,W
76	FS. R8	C	C	PC		CB					Y	C,S,W
77	FS. R8	C	C	PP		SG						
78	FS. R8	W	W				LS				Y	W
79	FS. R8	C	C	PC	PS	CB						
80	FS. R8	W	W				GLB				Y	W
81	DOT FED	C	C	PP		TB			O		Y	C
82	DOT FED	C	C	PP		BG			O		Y	C
83	DOT FED	C	C	PC		CB					Y	C
84	DOT FED	C	C	PC	PS	(SL)HS					Y	C
85	DOT FED	C	C	PC	PS	BG					Y	C
86	DOT FED	C	C	PC	PS,PT	AG			O		Y	C
87	DOT FED	C	S				RB	N	Y		Y	C
88	DOT FED	C	S				RB	Y	Y		Y	C
89	DOT FED	C	S				RB	N	Y		Y	C
90	DOT FED	C	S				RB	Y	Y		Y	C
91	DOT FED	C	S				RB	Y	Y	A,P	Y	C
92	DOT FED	C	S				PG	Y	Y	A,P	Y	C
93	DOT FED	C	S				PG	Y	Y	A	Y	C
94	DOT FED	W	W				TS	N			Y	W
95	DOT FED	C	W				TS	N			Y	C
96	DOT FED	W	W				GLD	N			Y	W
97	DOT FED	C	C&W	PP		SL	PLD	Y			Y	C
98	DOT FED	W	W				GLS&D	N			Y	W
99	DOT FED	C	C	PP		HS			Y	A	Y	C
100	DOT FED	C	C	PP		TB			Y	A	Y	C
101	DOT FED	C	C	PP		BG			Y	A	Y	C
102	DOT FED	C	S				PG	Y	Y		Y	C
103	DOT FED	C	S				BG	Y	Y		Y	C
104	DOT FED	C	S				PGF	Y	Y	A	Y	C
105	DOT FED	C	S				PGF	Y			Y	C
106	DOT FED	C	C	PP		SL					Y	C
107	DOT FED	C	C	PC	PS	AG					Y	C
108	DOT FED	C	S				RB	Y	Y	A,P	Y	C
109	NJ.,BERGEN CO.	C	C	PC	PS	HS			Y	A	Y	C&S
110	NJ.,BERGEN CO.	C	S				RB	Y	Y	A	Y	S
111	NJ.,BERGEN CO.	C	C		PS	BB						
112	NY.,SUFFOLK CO.	C	S				RB	Y	Y		Y	S
113	MORSE BROS.	C	C	PC	PS	HS					T	S
114	MORSE BROS.	C	C	PC	PS	CB					T	S
115	MORSE BROS.	C	C	PC	PS	BB					T	S
116	MORSE BROS.	C	C	PC	PS	BT&CBT					T	S
117	MORSE BROS.	C	C	PC	PS	AG					T	S
118	YAKIMA PRECAST	C	C	PC	PS	RC						
119	CONC.TECH.CORP.	C	C	PC	PS(PT)	BT						
120	CONC.TECH.CORP.	C	C	PC	PS(PT)	DBT						
121	CONC.TECH.CORP.	C	C	PC	PS(PT)	DBT						
122	CONC.TECH.CORP.	C	C	PC	PS(PT)	AG						
123	CONC.TECH.CORP.	C	C	PC	PS	CB						

(Match Page 8)

(Match Page 11)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET

#	SOURCE	SPEC,CODE REFERENCED	SOURCE MATERIAL
61	DOT PA.	AASHTO	LETTER
62	DOT PA.	AASHTO	LETTER
63	DOT PA.	AASHTO	LETTER
64	DOT PA.	AASHTO	LETTER
65	DOT PA.	AASHTO	LETTER
66	DOT PA.	AASHTO	LETTER
67	DOT PA.	AASHTO	LETTER
68	DOT PA.	AASHTO	PLAN,COMPLETE
69	DOT PA.	AASHTO	PLAN,COMPLETE
70	DOT PA.	AASHTO	PLAN,COMPLETE
71	DOT KY.	AASHTO	PLAN,BEAM
72	FS. R1		PLAN,PARTIAL
73	FS. R1		PLAN,PARTIAL
74	FS. R1		PLAN,PARTIAL
75	FS. R8	AASHTO	PLAN,TYPICAL
76	FS. R8	AASHTO	PLAN,TYPICAL
77	FS. R8	AASHTO	PLAN,TYPICAL
78	FS. R8		PLAN,COMPLETE
79	FS. R8	AASHTO	PLAN,PARTIAL
80	FS. R8	AASHTO	PLAN,PARTIAL
81	DOT FED	AASHTO,ASTM,AWS	VOL. 1
82	DOT FED	AASHTO,ASTM,AWS	VOL. 1
83	DOT FED	AASHTO,ASTM,AWS	VOL. 1
84	DOT FED	AASHTO,ASTM,AWS	VOL. 1
85	DOT FED	AASHTO,ASTM,AWS	VOL. 1
86	DOT FED	AASHTO,ASTM,AWS	VOL. 1
87	DOT FED	AASHTO,ASTM,AWS	VOL. 2
88	DOT FED	AASHTO,ASTM,AWS	VOL. 2
89	DOT FED	AASHTO,ASTM,AWS	VOL. 2
90	DOT FED	AASHTO,ASTM,AWS	VOL. 2
91	DOT FED	AASHTO,ASTM,AWS	VOL. 2
92	DOT FED	AASHTO,ASTM,AWS	VOL. 2
93	DOT FED	AASHTO,ASTM,AWS	VOL. 2
94	DOT FED	AASHTO,ASTM,AITC	VOL. 3
95	DOT FED	AASHTO,ASTM,AITC	VOL. 3
96	DOT FED	AASHTO,ASTM,AITC	VOL. 3
97	DOT FED	AASHTO,ASTM,AITC	VOL. 3
98	DOT FED	AASHTO,ASTM,AITC	VOL. 3
99	DOT FED	AASHTO,ASTM,AWS	VOL. 4
100	DOT FED	AASHTO,ASTM,AWS	VOL. 4
101	DOT FED	AASHTO,ASTM,AWS	VOL. 4
102	DOT FED	AASHTO,ASTM,AWS	VOL. 4
103	DOT FED	AASHTO,ASTM,AWS	VOL. 4
104	DOT FED	AASHTO,ASTM,AWS	VOL. 4
105	DOT FED	AASHTO,ASTM,AWS	VOL. 4
106	DOT FED	AASHTO,ASTM,AWS	VOL. 4A
107	DOT FED	AASHTO,ASTM,AWS	VOL. 4A
108	DOT FED	AASHTO,ASTM,AWS	VOL. 4A
109	NJ.,BERGEN CO.	AASHTO,NJDOT	LETTER,TYP.PLAN
110	NJ.,BERGEN CO.	AASHTO,NJDOT	LETTER,TYP.PLAN
111	NJ.,BERGEN CO.		LETTER
112	NY.,SUFFOLK CO.		PLAN,MISC.
113	MORSE BROS.	DOT OR.,WA.,CA.	PLAN,MISC.
114	MORSE BROS.	DOT OR.,WA.,CA.	PLAN,MISC.
115	MORSE BROS.	DOT OR.,WA.,CA.	PLAN,MISC.
116	MORSE BROS.	DOT OR.,WA.,CA.	PLAN,MISC.
117	MORSE BROS.	DOT OR.,WA.,CA.	PLAN,MISC.
118	YAKIMA PRECAST	AASHTO,USFS	PLAN,TYPICAL
119	CONC.TECH.CORP.		DESIGN CHART
120	CONC.TECH.CORP.		DESIGN CHART
121	CONC.TECH.CORP.		DESIGN CHART
122	CONC.TECH.CORP.		DESIGN CHART
123	CONC.TECH.CORP.		DESIGN CHART

(Match Page 7)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET PLM9 PRINT DATE:8/14/86 ,10/7/86

#	SOURCE	*******GENERAL******* ROAD WIDTH	NO. SPANS	SPAN LENGTH	BRIDGE TYPE	PRIMARY MATERIAL	DESIGN LOAD	EASE OF CONSTR.	AVAIL.OF MATERIAL	COST
124	CNTRL PRE-MIX	24-36	1	(<20)	SI	C		E		
125	CNTRL PRE-MIX	24-36	1	(16-60)	SI	C		E		
126	CNTRL PRE-MIX	24-36	1	(50-150)	SI	C				
127	CNTRL PRE-MIX	1L-2L	1	(<150)	SI	C				
128	WPCI	28	1	(20-40)	SI	C	HS20	E		
129	DOT WA.		>1	(12.5-69)	SI	C	HS20	E		
130	DOT WA.		>1	(28-55.5)	SI	C	HS20			
131	DOT WA.		>1	(40-115)	SI	C	HS20/MIL.			
132	DOT WY.	26-36	3	103-166	CO	S	HS20			
133	DOT WY.	26-36	3,4,5	103-166	SI	C	HS20			
134	DOT OR.			(14-70)		C	HS20/MIL.	E		
135	DOT OR.					C	HS20			
136	DOT OR.			(54-118)		C				
137	DOT AR.	24.5,28	>1	(19,25,31)	SI	C	H20	E		
138	DOT AR.	28	>1	(25,(30))	SI	C	H15(HS20)			
139	DOT AR.	28		(35-90)		C&S	HS20			
140	DOT CA.		>1	(16-44)	CO,COH	C	HS20/ALT.			
141	DOT CA.			(116-138)		C	HS20/ALT.			
142	DOT CA.		>1	(20-48)	SI	C	HS20/ALT.	E		
143	DOT CA.					C	HS20/ALT.			
144	DOT AK.	36	1	(80)	SI	C	HS20			
145	DOT ID.	28	1	(30-80)	SI	C				
146	DOT SAS.	24-44	>1	(20-50)		C	MS200	E		VL
147	DOT NSA.	24	>1	(20-40)	SI	W	H15			
148	DOT ALB.	16-26	>1	(20-28)	SI	W	MS23			
149	DOT ALB.	21-45	>1	(20-36)	SI	C	MS23	E		
150	DOT ALB.	21-45	>1	(20-36)	SI	C	MS23	E		
151	DOT ALB.	28	1	(26-140)	SI	C	MS300	ME		
152	FS.R4	26*	1	(24)	SI	W	HS20			
153	FS. R5	14	1	(9-59)	SI	W	HS20	E		
154	FS. R6					C	HS20,MS.			
155	FS. R9	14	1	(9-31)	SI	W	HS20	E		
156	FS. R10	16	>1	(20-80)	SI	S	U-80	E		
157	MO.,JACKSON CO.		1	(30)	SI	C				
158	MO.,JACKSON CO.		>1	(35-60)	CO	C				
159	MO.,JACKSON CO.		>1	(60-100)	CO	C				
160	LA.,JFSN PRSH			(20-25)		C				
161	LA.,JFSN PRSH			(19)		C				
162	OH.,CINCINNATI		1	(250)	SI	C				
163	OH.,CINCINNATI			(250)		C&S				
164	OH.,CINCINNATI			(1925)		C				
165	OH.,CINCINNATI			(1925)		C&S				
166	WA.,KING CO.					C				
167	WA.,KING CO.					C				
168	WA.,KING CO.					C,W				
169	WA.,KING CO.					W				
170	MI.,DETROIT					C&S				
171	OR.,LANE CO.			(20-70)		C				30-60
172	OR.,LANE CO.			(20-110)		C				30-60
173	OR.,LANE CO.			(>100)		C				30-60
174	AZ.,MARICOPA CO	48	1		SI	C(C&S)	HS20			40
175	TX.,TRAVIS CO.		>1	(20-30)	SI	C				
176	TX.,TRAVIS CO.		>1	(20-30)	SI	C				
177	TX.,TRAVIS CO.		>1	(20-30)	SI	C&S				
178	TX.,TRAVIS CO.		>1	(80-100)		C				
179	SC.,RICHLAND CO	26	>1	(15)	SI	C	H15	E		
180	WA.,SPOKANE CO.									
181	WA.,SPOKANE CO.		>1	(20-100)	SI	C&S	HS20			
182	MI.,OAKLAND CO.	20	1	38	SI	C				
183	MI.,OAKLAND CO.	40	1	69	SI	C				
184	WI.,MILWAUKEE	48	1	130	BA	C&S	HS27	D		
185	WI.,MILWAUKEE	50	3	(70-68-48)	VL	C&S	HS27	D		
186	WI.,MILWAUKEE	36	1	(96)	SI	C	HS20			
187	DOT MANITOBA	28	>1	(40)	SI	C	HS25			
188	DOT MARYLAND	VAR	>1	VAR						
189	AISC	***AUTO STRESS DESIGN PROCEDURE FOR CONTINUOUS STEEL BRIDGES W/O COVER PLATES ,SEE REPORT								

(Match Page 10)

STANDARD BRIDGE DESIGN

BRIDG E SPREADSHEET

(Match Page 9)

#	SOURCE	*******SUBSTRUCTURE*******												
		ABUTMENT				WING WALL				INTERMEDIATE SUPPORTS				
		ABT. MAT'L	ABT. TYPE	FTG. TYPE	FTG. MAT'L	EXIST	MAT'L	FTG. TYPE	FTG. MAT'L	TYPE	SHAFT MAT'L	FTG. TYPE	FTG. MAT'L	CAP MAT'L
124	CNTRL PRE-MIX	C	RW(CP)	SF(P)	C(S)	Y	C	SF(P)	C(S)					
125	CNTRL PRE-MIX	C	RW(CP)	SF(P)	C(S)	Y	C	SF(P)	C(S)					
126	CNTRL PRE-MIX	C	RW(CP)	SF(P)	C(S)	Y	C	SF(P)	C(S)					
127	CNTRL PRE-MIX	C	RW(CP)	SF(P)	C(S)	Y	C	SF(P)	C(S)					
128	WPCI	C	SW	P,SF		Y	C	P,SF						
129	DOT WA.	C	CP	P	C,S,W					PB	C,S	P	C,S	C
130	DOT WA.	C	CP	P										C
131	DOT WA.													
132	DOT WY.	C	CP	P	S	Y	C	P	S	PB	S	P	S	S
133	DOT WY.	C	CP	P	S	Y	C	P	S	PB	S	P	S	C
134	DOT OR.													
135	DOT OR.													
136	DOT OR.													
137	DOT AR.	C	CP	P	C,S,W	Y	C	P	C,S,W	PB	C,S,W	P	C,S,W	C
138	DOT AR.	C	CP	P	C	Y	C	P	C	PB	C	P	C	C
139	DOT AR.	C	CP	P	S	Y	C	P	S	PB	S	P	S	C
140	DOT CA.	C	CP	P		Y	C	P		Y				
141	DOT CA.													
142	DOT CA.	C								Y				
143	DOT CA.													
144	DOT AK.	C	CP	P	S									
145	DOT ID.													
146	DOT SAS.	W	CP&RW	P	W,S	Y	W	P	W,S	PB	W,S	P	W,S	W
147	DOT NSA.	W	CR(CP)	(P)	(W)	Y	W			CR(CP)	W	(P)	W	W
148	DOT ALB.	W	CP&RW(CP)	P	W	Y	W	P	W	PB	W	P	W	W
149	DOT ALB.	W,S	CP&RW(CP)	P	W	Y	W	P	W	PB	W	P	W	W,S
150	DOT ALB.	C	SW	P	S,C	Y	C	P	S,C	PB	C,S	P	C,S	C
151	DOT ALB.	C	CP	P	S	Y	W	P	S					
152	FS.R4	W	RW	WS	W	Y	W	WS	W					
153	FS. R5	W	CR			Y	W							
154	FS. R6													
155	FS. R9	W	RW	MS		Y	W	MS						
156	FS. R10	S,W	SW(CP)	MS(P)	(S)	Y	W	MS(P)	W(S)	PB	S	P	S	S,W
157	MO.,JACKSON CO.													
158	MO.,JACKSON CO.									PR(PB)	C(S)	SF,DS(P)	C(S)	C(C)
159	MO.,JACKSON CO.									PR(PB)	C(S)	SF,DS(P)	C(S)	C(C)
160	LA.,JFSN PRSH													
161	LA.,JFSN PRSH													
162	OH.,CINCINNATI													
163	OH.,CINCINNATI													
164	OH.,CINCINNATI													
165	OH.,CINCINNATI													
166	WA.,KING CO.	C		P	C,S,W					PR	C	P	C,S,W	C
167	WA.,KING CO.	W	CR							CR	W			
168	WA.,KING CO.													
169	WA.,KING CO.													
170	MI.,DETROIT													
171	OR.,LANE CO.	C,S												
172	OR.,LANE CO.	C,S												
173	OR.,LANE CO.	C,S												
174	AZ.,MARICOPA CO.	C	CP	P	C									
175	TX.,TRAVIS CO.													
176	TX.,TRAVIS CO.													
177	TX.,TRAVIS CO.													
178	TX.,TRAVIS CO.													
179	SC.,RICHLAND CO.	C	RW	SF	C	Y	C	SF	C	PB	W	P	W	C
180	WA.,SPOKANE CO.													
181	WA.,SPOKANE CO.	C	CPSW	P	S	Y	C	P	S	O				C
182	MI.,OAKLAND CO.	C	CP	P	W									
183	MI.,OAKLAND CO.	C	CPSW	P	C	Y	C	P	C					
184	WI.,MILWAUKEE	C&S	S	P	C	Y	C&S	P	C					
185	WI.,MILWAUKEE	C&S	CP	P	C	Y	C&S	P	C	P	C&S	P	C	
186	WI.,MILWAUKEE	C	S	P	C	Y	C	P	C					
187	DOT MANITOBA	W	CP	P	W	Y	W	P	W	O	W	P	W	W
188	DOT MARYLAND	C	CP,S	P	C,S	O	C	P,(SF)	C,S(C)	O				
189	AISC	T***												

(Match Page 11)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET

(Match Page 10)

#	SOURCE	******SUPERSTRUCTURE****** DECK PRIMARY MAT'L	DECK PRIMARY MAT'L	DECK SUPPORT STRUCTURE CONC TYPE	CONC PROCESS	CONC CROSS SECTION	STEEL OR WOOD TYPE	COMPOSITE ACTION	MISC EXP.JTS. EXIST	EXP.JTS. LOCATION	CURB & HANDRAIL EXIST	CURB & HANDRAIL MAT'L
124	CNTRL PRE-MIX	C	C	PC	PS	HS			N		Y	S
125	CNTRL PRE-MIX	C	C	PC	PS	RD			N		Y	S
126	CNTRL PRE-MIX	C	C	PC	PS	BT,TB			N		Y	S
127	CNTRL PRE-MIX	C	C	PC	PS	AG			N			
128	WPCI	C	C	PC	PS	DT			N		Y	C
129	DOT WA.	C	C	PC	PS	SL,HS					Y	C
130	DOT WA.	C	C	PC	PS	RD						
131	DOT WA.	C	C	PC	PS	DBT					Y	C
132	DOT WY.	C	S				RB	N	N		Y	S
133	DOT WY.	C	C	PC	PS	DT			Y	A,P	Y	S
134	DOT OR.	C	C	PC	PS	SL,HS						
135	DOT OR.	C	C	PC	PS	AG,BI,BT						
136	DOT OR.	C	C	PC	PS	BB						
137	DOT AR.	C	C	PC		CB			Y	A,P	Y	C
138	DOT AR.	C	C	PP		SL			Y	A,P	Y	C
139	DOT AR.	C	S				RB	Y			Y	C
140	DOT CA.	C	C	PP		SL						
141	DOT CA.	C	C	PC	PS	BG						
142	DOT CA.	C	C	PC	PS	HS						
143	DOT CA.	C	C	PC	PS	DT,AG						
144	DOT AK.	C	C	PC	PS	DBT			Y	A	Y	S
145	DOT ID.	C	C	PC	PS							
146	DOT SAS.	C	C	PC	PS	BG			N		Y	C
147	DOT NSA.	W	W				TS					
148	DOT ALB.	W	W				TS				Y	S
149	DOT ALB.	C	C	PC	PS	HS			Y	P	Y	S
150	DOT ALB.	C	C	PC	PS	HS			Y	P	Y	S
151	DOT ALB.	C	C	PC	PS	DBT					Y	S
152	FS.R4	W	W				GLS				O	W
153	FS. R5	W	W				LS				O	W
154	FS. R6	C	C	PC	PS	SL,HS					Y	C
155	FS. R9	W	W				TS				O	W
156	FS. R10	W	S				RB				C	W
157	MO.,JACKSON CO.		C			BB						
158	MO.,JACKSON CO.		C	PC	PS	DT						
159	MO.,JACKSON CO.		C	PC	PS	AG*						
160	LA.,JFSN PRSH	C	C	PP		SL						
161	LA.,JFSN PRSH	C	C	PC								
162	OH.,CINCINNATI	C	C		PS	BB						
163	OH.,CINCINNATI	C	S				RB					
164	OH.,CINCINNATI	C	C		PS	AG*						
165	OH.,CINCINNATI	C	S				RB					
166	WA.,KING CO.		C	PC	PS	AG,T,DT						
167	WA.,KING CO.		C	PC		HS,SL						
168	WA.,KING CO.	C	W				TS					
169	WA.,KING CO.	W	W				LS					
170	MI.,DETROIT	C	S(C)	(PC,PP)	(PS)	(AG,BB)	RB,PG	Y				
171	OR.,LANE CO.	C	C	PC	PS	SL						
172	OR.,LANE CO.	C	C	PC	PS	BB						
173	OR.,LANE CO.	C	C	PC	PS	AG,BT						
174	AZ.,MARICOPA CO.	C	C(S)	PC	PS	HS	(RB)				Y	C
175	TX.,TRAVIS CO.	C	C	PP		SL						
176	TX.,TRAVIS CO.	C	C	PC	PS	AG,BB						
177	TX.,TRAVIS CO.	C	S				RB					
178	TX.,TRAVIS CO.	C	C	PC	PS	AG						
179	SC.,RICHLAND CO.	C	C	PC		SL					Y	C
180	WA.,SPOKANE CO.	C	C	PC	PS	BT,RD						
181	WA.,SPOKANE CO.	C	S				RB	Y	Y	A,P	Y	S
182	MI.,OAKLAND CO.	C	C	PC	PS	HS					Y	S
183	MI.,OAKLAND CO.	C	C	PC	PS	AG					Y	C
184	WI.,MILWAUKEE	S	S				RB&PG				Y	S
185	WI.,MILWAUKEE	C-S-C	S				RB&PG	Y-N-Y			Y	S
186	WI.,MILWAUKEE	C	C	PC	PS	AG					Y	S
187	DOT MANITOBA	C	C	PC	PS	CB					Y	S
188	DOT MARYLAND	C	S				RB	O	Y	A,P	Y	C,S
189	AISC		S				RB,PG					

(Match Page 12)

STANDARD BRIDGE DESIGN

BRIDGE SPREADSHEET

(Match Page 11)

#	SOURCE	SPEC,CODE REFERENCED	SOURCE MATERIAL
124	CNTRL PRE-MIX	AASHTO,ASTM	PLAN,BK:INSNT.BR.
125	CNTRL PRE-MIX	AASHTO,ASTM	PLAN,BK:INSNT.BR.
126	CNTRL PRE-MIX	AASHTO,ASTM	PLAN,BK:INSNT.BR.
127	CNTRL PRE-MIX	AASHTO,ASTM	PLAN,BK:INSNT.BR.
128	WPCI	AASHTO	PLAN,SUPERSTR.
129	DOT WA.	AASHTO	PLAN
130	DOT WA.	AASHTO	PLAN,BEAM
131	DOT WA.	AASHTO	PLAN,BEAM
132	DOT WY.	AASHTO,DOT WY.	PLAN,COMPLETE
133	DOT WY.	AASHTO,DOT WY.	PLAN,COMPLETE
134	DOT OR.		PLAN,BEAM
135	DOT OR.		PLAN,BEAM
136	DOT OR.		PLAN,BEAM
137	DOT AR.	AASHTO	PLAN,MISC.
138	DOT AR.	AASHTO	PLAN,MISC.
139	DOT AR.	AASHTO	PLAN,MISC.
140	DOT CA.	AASHTO	PLAN,SLAB
141	DOT CA.		PLAN,BEAM
142	DOT CA.		PLAN,BEAM
143	DOT CA.		PLAN BEAM
144	DOT AK.	AASHTO	PLAN,TYPICAL
145	DOT ID.	AASHTO	LETTER
146	DOT SAS.	CSA	PLAN,MISC.
147	DOT NSA.		PLAN,COMPLETE
148	DOT ALB.	CSA	PLAN
149	DOT ALB.	AASHTO,CSA	PLAN,MISC.
150	DOT ALB.	AASHTO,CSA	PLAN,MISC.
151	DOT ALB.	CSA	PLAN,BM.,TYP.
152	FS.R4	AASHTO	PLAN,TYPICAL
153	FS. R5	ASTM	PLAN,COMPLETE
154	FS. R6	FS.SPECS,AASHTO	PLAN,BEAM
155	FS. R9	AASHTO	PLAN,TYPICAL
156	FS. R10	ASHTO,ASTM	PLAN,COMPLETE
157	MO.,JACKSON CO.		LETTER
158	MO.,JACKSON CO.		LETTER
159	MO.,JACKSON CO.		LETTER
160	LA.,JFSN PRSH		LETTER
161	LA.,JFSN PRSH		LETTER
162	OH.,CINCINNATI	AASHTO,ODOT	LETTER
163	OH.,CINCINNATI	AASHTO,ODOT	LETTER
164	OH.,CINCINNATI	AASHTO,ODOT	LETTER
165	OH.,CINCINNATI	AASHTO,ODOT	LETTER
166	WA.,KING CO.	WSDOT,ACI	LETTER
167	WA.,KING CO.	WSDOT,ACI	LETTER
168	WA.,KING CO.	WSDOT	LETTER
169	WA.,KING CO.	WSDOT,FS.	LETTER
170	MI.,DETROIT	AASHTO,MDOT	LETTER
171	OR.,LANE CO.	AASHTO,ODOT	LETTER
172	OR.,LANE CO.	AASHTO,ODOT	LETTER
173	OR.,LANE CO.	AASHTO,ODOT	LETTER
174	AZ.,MARICOPA CO.	AASHTO	LETTER,TYP.PLAN
175	TX.,TRAVIS CO.	AASHTO,TDOT	LETTER
176	TX.,TRAVIS CO.	AASHTO,TDOT	LETTER
177	TX.,TRAVIS CO.	AASHTO,TDOT	LETTER
178	TX.,TRAVIS CO.	AASHTO,TDOT	LETTER
179	SC.,RICHLAND CO.	AASHTO,CSDOT	PLAN,COMPLETE
180	WA.,SPOKANE CO.		LETTER
181	WA.,SPOKANE CO.	AASHTO	PLAN
182	MI.,OAKLAND CO.		PLAN,TYPICAL
183	MI.,OAKLAND CO.		PLAN,TYPICAL
184	WI.,MILWAUKEE	AASHTO,WIDOT	PLAN,TYPICAL
185	WI.,MILWAUKEE	AASHTO,WIDOT	PLAN,TYPICAL
186	WI.,MILWAUKEE	AASHTO,WIDOT	PLAN,TYPICAL
187	DOT MANITOBA	CSA,AASHTO	PLAN,COMPLETE
188	DOT MARYLAND	AASHTO	BOOK,STD.DETAILS
189	AISC		RESEARCH PAPERS

ATTACHMENT 4

WASHINGTON STATE UNIVERSITY
PULLMAN, WASHINGTON 99164

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

MEMORANDUM

TO: All Washington County Engineers

FROM: H. C. Sorensen, Principal Investigator Harold Sorensen c.o.
Associate Professor - Structures

DATE: August 4, 1986

SUBJECT: Standard Bridge Systems

In March 1986, the Washington State Department of Transportation awarded a research grant to Washington State University to study the availability and adaptability of different bridge systems. In gathering information from different agencies in the U.S. and Canada, it was found that several agencies have sets of Standard Bridge Plans which are quite complete; in fact, one State DOT has produced a complete set of Standard Plans solely for use by the counties in that state.

Realizing that Standard Bridge Plans will not cover every design situation, I ask that you take several minutes of your time to fill out the attached questionnaire. Please return the completed questionnaire to me before August 18, 1986. This information will be a big help in determining the directions that should be taken in analyzing the data which have been received and in proposing future research projects which will be of benefit to county engineers in Washington.

Thank you for your attention to this request. A stamped, self-addressed envelope has been enclosed for your convenience.

HCS/cb
Enclosures

STANDARD BRIDGE SYSTEMS QUESTIONNAIRE

1. Would it be useful to you as a Washington county engineer if Standard Bridge Systems which are already available from other government agencies were reprinted and given to you?

31	YES
2	NO

2. Is there a need to develop Standard Bridge Systems which can be used by Washington County Engineers?

29	YES
3	NO

3. If Standards were to be developed, what type of superstructure construction should be designed? (You may indicate more than one.)

PRIORITY	YES	
1.38	29	PRE-STRESSED CONCRETE DECK GIRDERS
2.32	22	PRE-STRESSED CONCRETE WITH CAST-IN-PLACE DECK
2.96	16	CAST-IN-PLACE SLAB BRIDGES
3.09	10	STEEL I GIRDERS WITH PRE-CAST DECK
4.96	8	STEEL I GIRDERS WITH CAST-IN-PLACE DECK
3.86	11	TIMBER GLULAM GIRDERS WITH TIMBER DECK
6.67	3	TIMBER GLULAM GIRDERS WITH CONCRETE DECK *P.S. P.C. SLAB W/3T & 4T, *EXTRUDED SLAB
---	8	OTHER *LONG SPAN & BOX CULVERTS, *SUPERSPAN CULVERTS ***P.S. CONCRETE SLAB, *P.C. BOX GIRDER

4. What type of substructure construction should be developed as Standards?

YES	
30	ABUTMENT WALL TYPE PIERS
12	SPILL THROUGH OR PERCHED ABUTMENTS

5. If Standards were developed, what type of foundation construction would you like to have designed?

PRIORITY	YES	
1.59	27	SPREAD FOOTINGS
1.64	22	STEEL OR CONCRETE PILING USING 55 TON BEARING
2.73	11	STEEL OR CONCRETE PILING USING 70 TON BEARING
3.00	10	TIMBER PILING
		OTHER _____

6. What range of span lengths should be covered by Standards?

PRIORITY	YES	
1.56	25	20' TO 40'
2.00	28	40' TO 60'
2.48	24	60' TO 80'
2.81	19	80' TO 110'
4.00	7	OVER 110'
	1	0' TO 10'

7. Should Standards be developed for:

YES	
30	SINGLE SPAN BRIDGES
15	MULTISPAN BRIDGES

8. What roadway widths should be included in the Standards?

YES					
10	24'	2	26'	3	40'
23	28'	4	34'	1	44'
15	32'	2	36'		
11	OTHER	1	38'		

9. What is the average number of bridges in the 20' to 110' range which are built in your county each year?

1.44	NEW	(4 responses)
1.67	REPLACEMENT	(27 responses)

10. What superstructure type or types do you currently rely most heavily upon for spans ranging from 20' to 110'?

PRIORITY	YES	
1.34	28	PRE-STRESSED CONCRETE DECK GIRDERS
1.94	20	PRE-STRESSED CONCRETE WITH CAST-IN-PLACE DECK
3.00	10	CAST-IN-PLACE SLAB BRIDGES
---	---	STEEL I GIRDERS WITH PRE-CAST DECK
3.75	5	STEEL I GIRDERS WITH CAST-IN-PLACE DECK
3.50	4	TIMBER GLULAM GIRDERS WITH TIMBER DECK
---	---	TIMBER GLULAM GIRDERS WITH CONCRETE DECK *P.C. SLAB, *TIMBER GIRDER AND DECK
---	7	OTHER**P.S. SLAB DECKS, *EXTRUDED SLAB **TIMBER, *STEEL GIRDER AND DECK *SPAN DECK, *SUPERSPAN CULVERTS

11. Do you perceive a need for alternates to the primary types listed in (3)?

12	YES
18	NO

12. Comments:

SEE ATTACHED SUMMARY

Please return this questionnaire to:

Dr. Harold C. Sorensen
Structures Section
Dept. of Civil & Environmental Engineering
Washington State University
Pullman, WA 99164-2914

THANK YOU!

SUMMARY OF SURVEY COMMENTS

1. I think any designs for this purpose should be for utilitarian structures without the flossy detail of some state bridges. Attention should be given to ease of building from a contractor's standpoint.

2. Standards should include bridge rail and approach rail systems.

3. Excellent idea--could also use information on major culvert installations/design.

4. Short span "cookbook" designs are already done (rib deck, tri deck, span deck). Let's don't reinvent the wheel.

5. Douglas County has not needed to replace any of its bridges for several years.

6. Refer to local agency guidelines for roadway width standards. Interested in more information on glulam.

7. Our county uses WSDOT standard bridge plans for prestressed girders and slabs, along with WSDOT standard plans and specifications. We do not see the need for obtaining additional plans at this time.

8. The 10'-20' structures are also important even though they are not technically classed as bridges.

9. In 1968 we contracted with a consultant to develop standard designs for length of bridges most common to our area. All but three bridges built have used these standard designs. We think this method has saved considerable money.

10. Re: Question 11. Not in type necessarily, but units designed in such a way that installation time is shortened. For bridge replacements the public hates to see a bridge closed for very long.

11. Too many variables affecting bridge type selection to answer #3 and #10 with any credibility.

12. Design loading should be greater than HS20. Provide for protection from stream erosion. Foundation design should consider retaining embankments for bridges high over the stream.

13. A. Are you aware that WSDOT has some pretty good voided slab standards--but one local consultant prefers a double "T" because of the economy of material and less D.L. for erection.

    B. We have had two bridges where the contractor had the option of bidding precast or cast-in-place and in both cases the cast-in-place option was low bid. Guess the contractor can make more money without buying precast. We are sure there are limits to this.

14. An area of concern within the Bridge System that has not yet been developed is the standard guardrail approaches to the bridge. An example of this is the fact that a bridge with standard bridge rail on a county rural road (ADT 400) is required to have the same approach rail as a bridge on I-5 in downtown Seattle. There has to be an alternate way of protecting the bridge rail on low volume roadways.

15. It has been our experience that standard designs soon become obsolete in terms of availability of standard industry components. If a large variety of standard bridges are established, some will hardly ever be used. Fabricators will not sustain forms and beds for units that do not have an active market.

16. Any standard bridge plans adapted should encompass as many types of material combinations possible, since bridge construction is so cost-intensive and a cost analysis on all options determines the type used. Very few new or replacement bridges have been constructed in our county in the last decade, however this will probably not hold true for the next ten years as some of our older bridges reach their designed life expectancy.

ATTACHMENT 5

STANDARD BRIDGE DESIGN

SHORTLIST

BRIDGE TYPES USED BY BEST STANDARDS

CONCRETE **********

P.I.P. SLAB SPAN,SIMPLE

WI.	SINGLE
OH.	SINGLE
LA.	MULTIPLE

P.I.P. CONTINUOUS SLAB SPAN

WI.	TWO SPAN
OH.	TWO OR MORE SPANS

PS. PC. GIRDERS

WI.	SINGLE
OK.	
PA.	
WV.	
OH.	

PS. BOX GIRDERS

WI.	
PA.	
WV.	
OH.	

DOUBLE T

OK.

PAN GIRDER

OK.

PS CHANNEL BEAMS

WV.

PS PLANK BEAMS

WV.

RC PC PLANKS

LA.

STEEL **********

NON COMPOSITE

OK.	CONC.
WV.	TIMBER
WV.	STL. GRID
OH.	TIMBER
OH.	CONC.

COMPOSITE

OK.

PA.

TIMBER **********

INCLUDING GLUE LAM.

WI.

WV.

DOT WISCONSIN BRIDGE TYPE

MISC.

ALSO INCLUDED ARE TWO QUANTITY ESTIMATING SHEETS

(Match Page 2)

(Match Page 1)

	DOT OKLAHOMA BRIDGE TYPE	PAGE
1	STEEL I BEAM,NON COMP.	
	PLAN GENERAL	C11-C12
	ABUTMENT	C13-C14,C75-C77
2	STEEL BEAM,COMPOSITE	
	PLAN GENERAL	C52-C55
	ABUTMENT	C13-C14,C71-C74
	PIER,PILE BENT	C61-C62,C36,C64
3	CONCRETE DOUBLE T	
	PLAN GENERAL	C17-C21
	ABUTMENT	C22-C30
	PIER,PILE BENT	C31-C33,C35
4	CONCRETE PC.PS.GIRDER	
	PLAN GENERAL	C42-C50
	ABUTMENTS	C38-C40
	PIER	C61-C63
5	CONCRETE PAN GIRDER	
	PLAN GENERAL	C57-C60
	ABUTMENTS	C68-C70
	PIER,PILE BENT	C31-C34
	PILE BENT	C15-C16

MISC.
ALSO INCLUDED ARE
BRIDGE APPROACH RAIL
CONC. AND STEEL BRIDGE RAIL
STD. PILING DETAILS
CULVERT STANDARDS

	DOT PENNSYLVANIA BRIDGE TYPE		PAGE
1	STEEL BEAM COMPOSITE		
	PLAN GENERAL	BLC 502	1-5
	DETAILS	BLC 502	6-12
	ABUTMENT	BLC 505	1-12
		BLC 506	1-5
2	CONCRETE PS.PC GIRDER		
	PLAN GENERAL	BLC 503	1-5
	DETAILS	BLC 503	6-11
		BLC 502	11,12
	ABUTMENT	BLC 505	1-12
		BLC 506	1-5
3	CONCRETE BOX BEAM		
	PLAN GENERAL	BLC 504	1-3
	DETAILS	BLC 504	4-8
		BLC 502	11,12
	ABUTMENT	BLC 505	1-12
		BLC 506	1-5

MISC.
ALSO INCLUDED ARE 13 DATA ASSEMBLY SHEETS

(Match Page 3)

(Match Page 2)

DOT WEST VIRGINIA BRIDGE TYPE		PAGE
SUPERSTRUCTURE **********		
1 PC PS PT CONC. BM.		
PLAN GENERAL	BR1,BR1A	
NOTES GENERAL	BR2	
2 STEEL BEAM,TIMBER DECK		
PLAN GENERAL	BR10	
DOWEL LAM. DECK	BR10A	
3 STEEL BEAM,STEEL GRID DECK		
PLAN GENERAL	BR11	
GRID DETAILS	BR11M	
SHOE DETAILS	BR12-BR12L	
4 PS BOX BEAM (HS ALSO)		
PLAN GENERAL	BRB17-BRB101	
5 PS CHANNEL BEAMS		
PLAN GENERAL	BRC24-BRC101	
6 PS PLANK BEAMS		
PLAN GENERAL	BRS8-BRS100	
7 TIMBER,GLUE LAM.		
PLAN GENERAL	BRT1	
NOTES GENERAL	BRT2	
DETAILS	BRT3-BRT6	
ABUTMENT **********		
8 ABUTMENT,CONC.CRIBBING	BR5-BR7,BR8-BR9	
9 ABUTMENT,CONCRETE	BR7S	
10 ABUTMENT CONCRETE		
PLAN GENERAL	BR13-BR17A	
	BR13	P13
	BR14	S
	BR15	P15
	BR16	P16
	BR17	P17,A
11 ABUTMENT,PILE CAP	BR18-BR19	
MISC.		
ALSO INCLUDED ARE GUARDRAIL AND PLATE ARCH CULVERT SHEETS		

DOT OHIO BRIDGE TYPE		PAGE
1 CONCRETE SLAB CONT.		
PLAN GENERAL	CS 2 73	
ABUTMENT	CPA 2 73	
PIER	CPP 2 73	
2 STEEL BEAM AND GIRDER		
SUPERSTR.DETAILS	SD 1 69	
ABUTMENT,FLEXIBLE	ICD 1 82	
BEARING DETAILS	FB 1 82	
ROCKERS	RB 1 55	
EXP JTS	EXJ 2 81	
3 CONCRETE BOX BEAM PS.		
DETAILS	PSBD 1 81	
EXP JTS	EXJ 3 82	
4 CONCRETE PS I SECTION		
DECK PANELS	DP 1 84	
5 CONCRETE PIP SINGLE SPAN		
PLAN GENERAL	SB 2 73	
6 TIMBER SS ON STEEL BEAMS		
PLAN GENERAL	WSB 60,WSB 1 62	
7 ABUTMENT, U TYPE (STUB)		
PLAN GENERAL	A 1 69	
MISC.		
ALSO INCLUDED ARE APPROACH SLABS (3 SHEETS)		
BRIDGE RAILING STDS.(3 SHEETS)		

(Match Page 4)

(Match Page 3)

DOT LOUISIANA BRIDGE TYPE PAGE	ADDITIONAL BRIDGE TYPES UNDER CONSIDERATION
SUPERSTRUCTURE **********	1 INVERTED BRIDGE,OKLAHOMA A COMPOSITE STEEL BEAM AND P.I.P. SLAB CAST IN AN UPSIDEDOWN POSITION.THIS DESIGN IS CURRENTLY CONSIDERED PROPRIETARY.
1 CONCRETE PRECAST MODULAR RC.	2 AISC CONTINUOUS STEEL BRIDGE IN AN EFFORT TO MAKE STEEL MORE COMPETITIVE WITH CONCRETE IN BRIDGE DESIGN AISC IS CURRENTLY FUNDING RESEARCH IN A NUMBER OF AREAS.OF PRIMARY INTEREST IS THE CONTINUOUS BRIDGE WITHOUT COVER PLATES,THE STRUCTURE IS SUPPOSED TO YIELD THEREBY REDISTRIBUTING THE MOMENTS.RESEARCH IN ELIMINATING EXPANSION JOINTS IS ALSO OF INTEREST FOR LONG BRIDGES.
2 CONCRETE CIP,SLAB SPAN	
SUPPORT DRAWINGS **********	
3 PILE BENTS CONCRETE PC CONCRETE CIP TIMBER W/PC CONC CAP STEEL W/PC CONC CAP	
4 APPROACH SLAB CONCRETE PC CONCRETE CIP	SURVEY NOTES THE COUNTY ENGINEER SURVEY WHICH WAS CONDUCTED IN AUGUST 1986 ENABLED US TO REFINE OUR STUDY DATA WITH RESPECT TO THE CONCERNS OF THE TYPICAL COUNTY ENGINEER IN WASHINGTON.COUNTY ENGINEERS ARE OVERWELMINGLY IN FAVOR OF HAVING SOME FORM OF BRIDGE STANDARDS AVAILABLE. A) ROAD WIDTHS SHOULD BE DETERMINED USING THE CURRENT VOLUME/WIDTH STANDARDS, 28' AND 34' WIDTHS WOULD COVER MOST OF THE COUNTIES NEEDS. B) SPAN LENGTHS RANGING FROM 20' TO 110' WERE ALL CONSIDERED IMPORTANT.FOR SHORTER SPANS (LESS THAN 40') THERE ALREADY EXIST SEVERAL GOOD MANUFACTURERS BRIDGE PACKAGES WHICH APPARENTLY ARE NOT BEING UTILIZED TO THEIR BEST ADVANTAGE.THEREFORE STANDARDS IN THE 40' TO 110' RANGE SHOULD BE DEVELOPED AND EXISTING PACKAGE PLANS FOR SHORTER SPANS SHOULD BE DISTRIBUTED TO THE COUNTY ENGINEERS. SEVERAL COUNTIES WERE UNAWARE OF STANDARD CULVERT PLANS AND THESE ALSO SHOULD BE DISTRIBUTED. C) SUPERSTRUCTURE TYPES OF INTEREST TO THE COUNTIES INCLUDED DESIGNS BASED ON CONCRETE, STEEL AND WOOD.PRESTRESSED CONCRETE DECK GIRDERS WERE FAVORED BY THE COUNTIES FOR STANDARD SUPERSTRUCTURE CONSTRUCTION.THE STUDY REVEALED THAT RELATIVELY FEW STANDARDS HAVE BEEN DEVELOPED FOR PS. DECK GIRDERS.THE OTHER CONCRETE SUPERSTRUCTURE TYPES OF INTEREST, PS. CONC. W/P.I.P. DECK AND P.I.P. SLAB BRIDGES, HAVE BOTH BEEN DEVELOPED AS STANDARDS BY SEVERAL STATES.STEEL GIRDERS WITH PC.DECK WERE OF INTEREST TO ONE FOURTH OF THE COUNTIES. MANY STATES HAVE DESIGNS FOR STEEL,BOTH COMPOSITE AND NONCOMPOSITE WHICH COULD BE USEFUL.WOOD CONSTRUCTION,ESPECIALLY TIMBER GLULAM WITH TIMBER DECK,IS OF INTEREST TO COUNTY ENGINEERS.MOST DESIGNS IN WOOD WERE OUTDATED AND NEW DESIGNS ARE CLEARLY NEEDED.
NOTE: THE TWO SUPERSTRUCTURE TYPES ARE SHOWN FOR A VARIETY OF ROAD WIDTHS,SKEW ANGLES. LA. HAS SOME 1600 SHEETS TO COVER EACH COMBINATION.	