Florida Department of Transportation

Bridge Inventory 2018 Annual Report

July 2018

Office of Maintenance

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Introduction

This report on Florida's bridge inventory represents a static view, or "snapshot" of the ever- changing bridge inventory database. Presented here are various ways to view the bridge inventory that are used in the bridge management industry. The objectives of this report are to establish benchmarks of bridge inventory characteristics and conditions that can be used in the future to measure progress in managing the inventory, and to present the current state of the bridge inventory.

The Department has responsibility for inspecting and rating most of the bridges in Florida. This report divides the inventory into groups that are responsible for maintaining (preserving) the bridges. The largest group includes all bridges maintained by the Florida Department of Transportation (FDOT), divided into the seven geographic districts and the Florida's Turnpike. The next largest maintenance responsibility group is that of county governments. The FDOT hires consulting engineers to inspect and rate county bridges, while the responsibility for maintaining the bridges remains with the individual county government. The next maintenance responsibility group includes city and town governments. Like the county bridges, FDOT hires consulting engineers to inspect most of the city and town maintained bridges. Maintenance of the remainder of the inventory is done by state agencies other than the FDOT, other local agencies, the federal government, railroads, private citizens and organizations.

This report presents the bridge inventory by various characteristics (number of bridges, age, structure types, and deck areas) and conditions (overall structural condition, structurally deficient bridges, posted and closed bridges, and functionally obsolete bridges). Also included for comparison are relative construction costs of bridges by structure type.

Number of Bridges

Currently there are 12,358 bridge-structures accounted for in the Florida DOT Bridge Management System. The FDOT has maintenance responsibility for 6,929 of the bridges, or 56.07%. County governments maintain 3,902 bridges (31.57%), city and towns maintain 1,247 bridges (10.09%), with the remaining 280 bridges (2.27%) maintained by others (see Figure 1).

The 6,929 bridges maintained by FDOT are divided by district and shown in Figure 2. District 2 has the most bridges, with 1,261 (18.2%), followed by District 5 (1100 bridges – 15.88%), District 1 (934 bridges – 13.48%), District 3 (821 bridges – 11.85%), District 4 (771 bridges - 11.13%), District 7 (725 bridges – 10.46%), Turnpike District (695 bridges – 10.03%), and District 6 (622 bridges – 8.98%). The number of bridges shown includes the 153 bridges maintained by the Dade County Expressway Authority (MDX) and 321 bridges maintained by the Central Florida Expressway Authority (CFX).

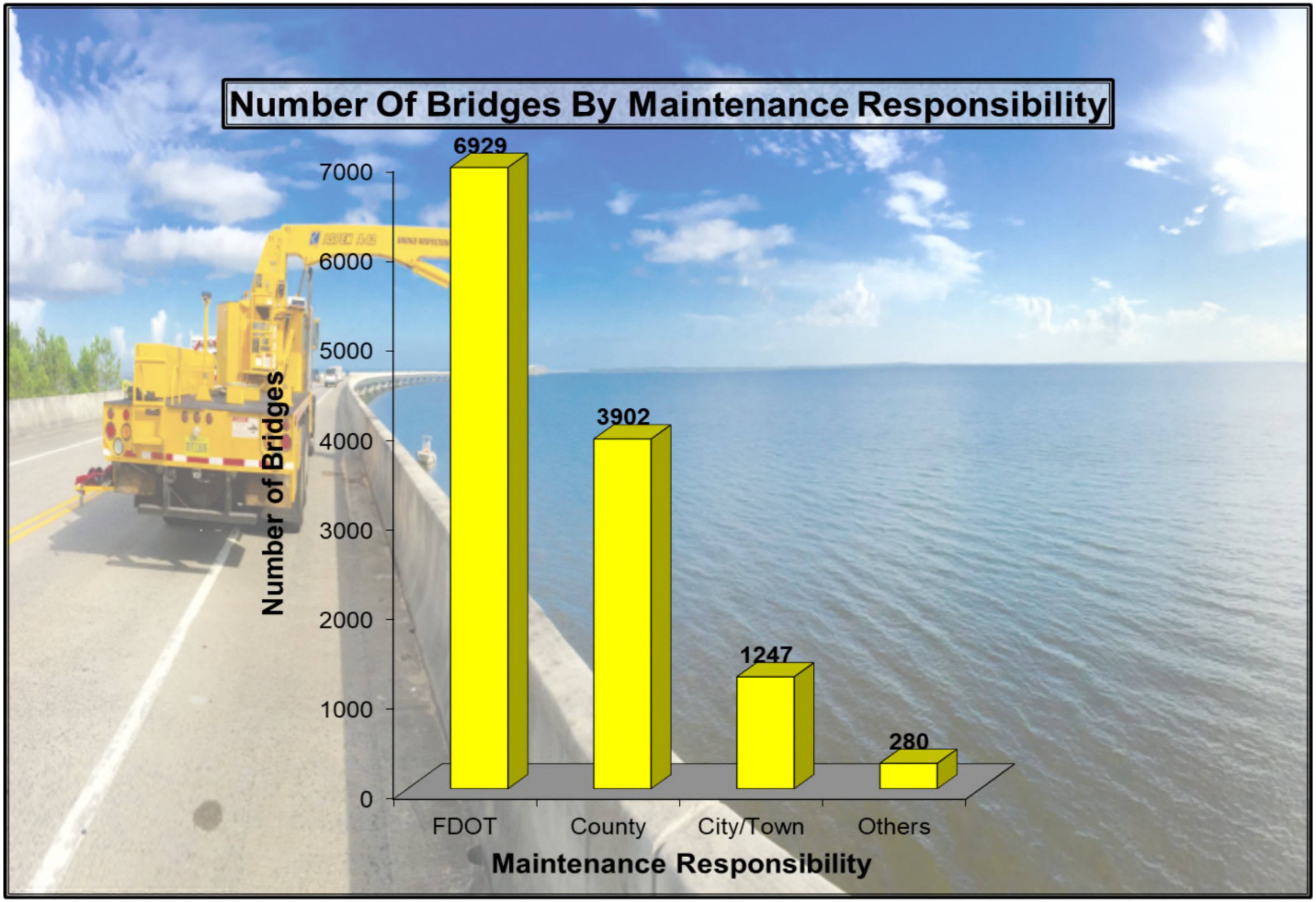


Figure 1

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

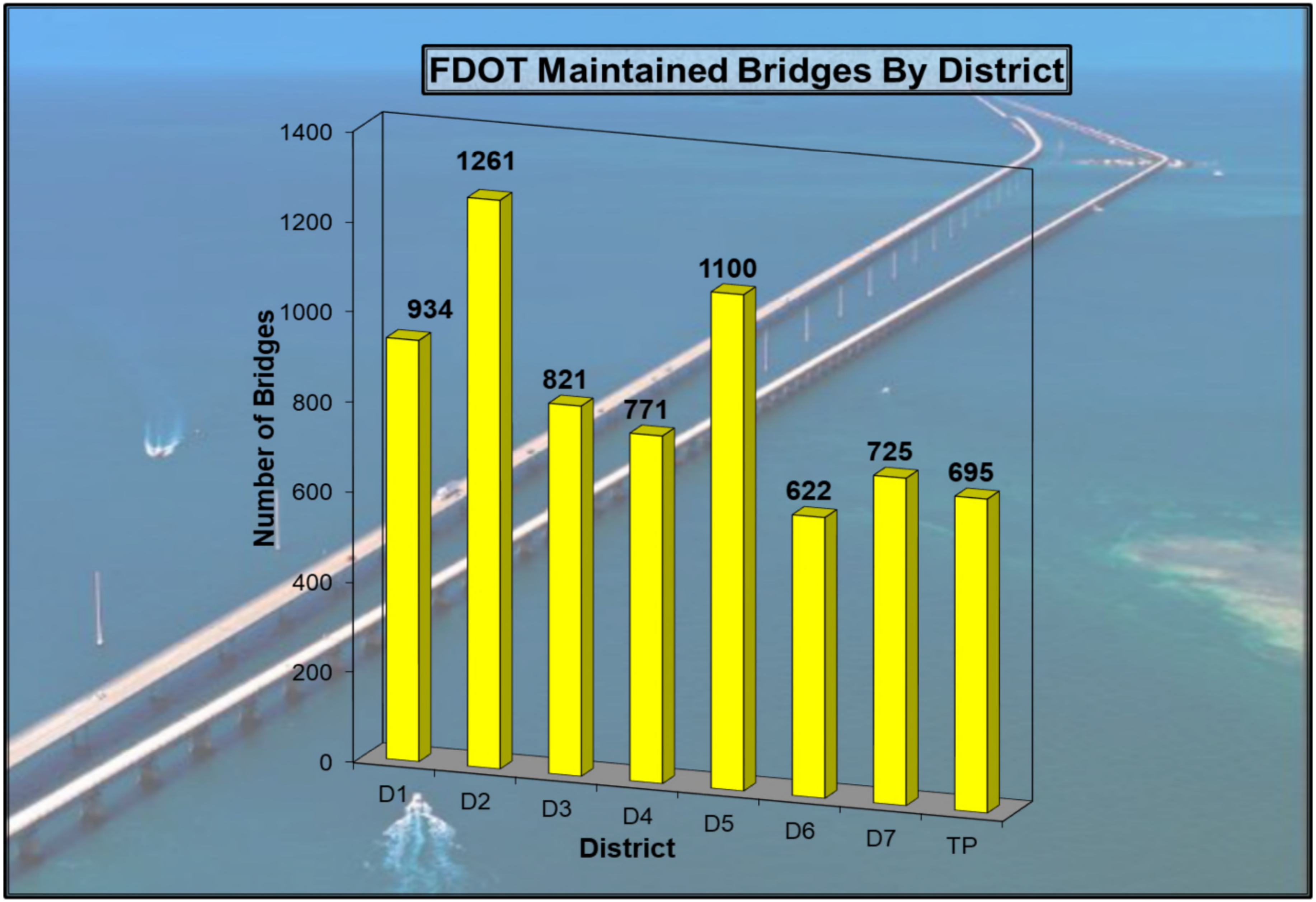


Figure 2

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

Age of Bridges

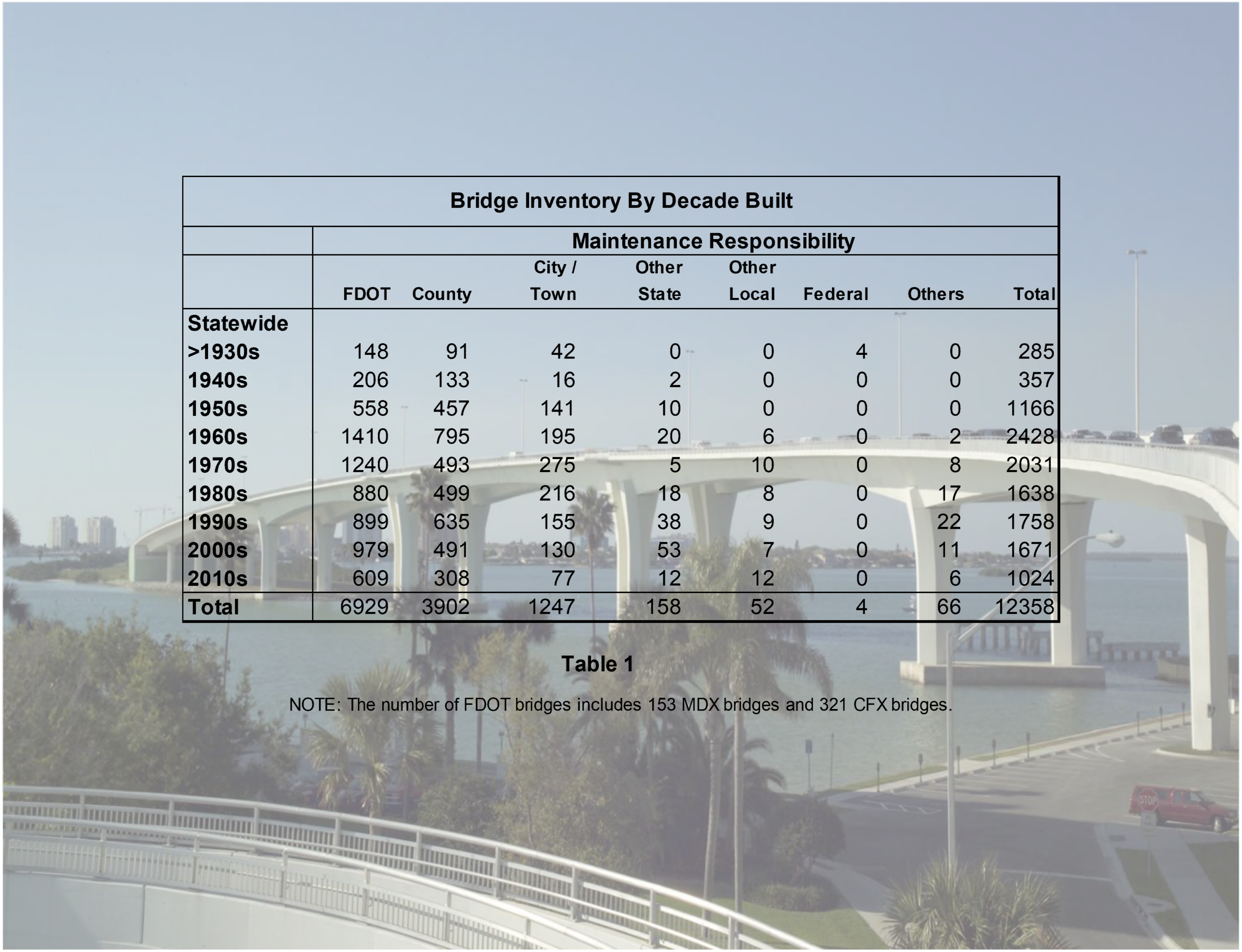
While the industry is now designing bridges to last for 75 years, most bridges built in the past were designed for a service life of 50 years. Looking at bridge age is the most common and simplest method of forecasting long-term budget requirements. This might lead one to conclude that bridges constructed before 1960 are at the end of the service life. Fortunately, advances in material science, design practices, and construction methods, along with a generally favorable climate, inspection and maintenance practices have contributed in many bridges functioning well past their original design life, despite the tremendous growth in traffic volume over the years. The strategy of bridge maintenance is to leverage these advances using an aggressive maintenance program to extend the useful life of the bridges, thereby minimizing the need to replace a large number of bridges within a short time period (see Table 1).

For the 6,929 bridges maintained by FDOT, approximately 13.16% were constructed prior to 1960, about 38.25% were constructed in the 1960's and 1970's, with the remaining 48.59% having been built since 1980 (see Figure 3).

Similar results can be seen with the statewide bridge inventory of county government maintained bridges with 17.45% constructed prior to 1960, 33.01% constructed in the 1960's and 1970's, and 49.54% since 1980 (see Figure 4).

The city and town maintained bridges are very similar as well, with 15.96% constructed prior to 1960, 37.69% constructed in the 1960's and 1970's, and 46.35% since 1980 (see Figure 5).

An examination of the distribution of the decade of construction by FDOT District, for the 6,929 FDOT maintained bridges show that the older bridge populations are concentrated in the rural and older urban areas, as one would expect (see Tables 2 & 3). The percentage of District bridge inventories built prior to the 1960's are as follows: District 1 – 22.38%, District 2 – 20.14%, District 3 – 16.57%, District 4 – 5.71%, District 5 – 8.64%, District 6 – 9.65%, District 7 – 9.66%, and the Turnpike – 6.33%. While expansion and growth in South Florida has led to relatively younger bridge inventories for Districts 4 & 6, and the Turnpike, one would anticipate that the older bridge inventories, especially in Districts 1 and 2, would require a larger share of resources as their bridges reach the end of their service life.



Bridge Inventory By Decade Built

	Maintenance Responsibility							
	FDOT	County	City / Town	Other State	Other Local	Federal	Others	Total
Statewide								
>1930s	148	91	42	0	0	4	0	285
1940s	206	133	16	2	0	0	0	357
1950s	558	457	141	10	0	0	0	1166
1960s	1410	795	195	20	6	0	2	2428
1970s	1240	493	275	5	10	0	8	2031
1980s	880	499	216	18	8	0	17	1638
1990s	899	635	155	38	9	0	22	1758
2000s	979	491	130	53	7	0	11	1671
2010s	609	308	77	12	12	0	6	1024
Total	6929	3902	1247	158	52	4	66	12358

Table 1

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

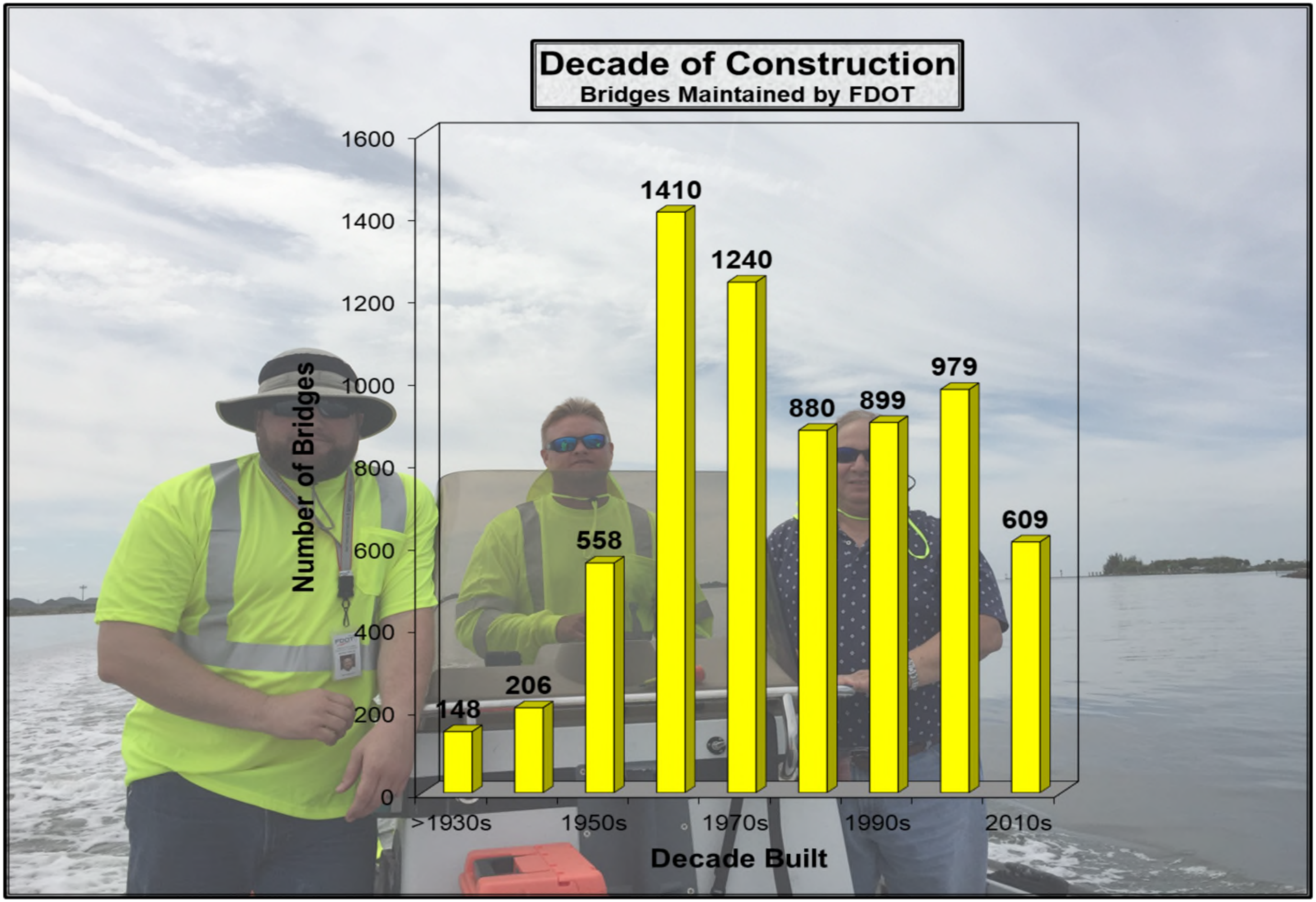


Figure 3

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

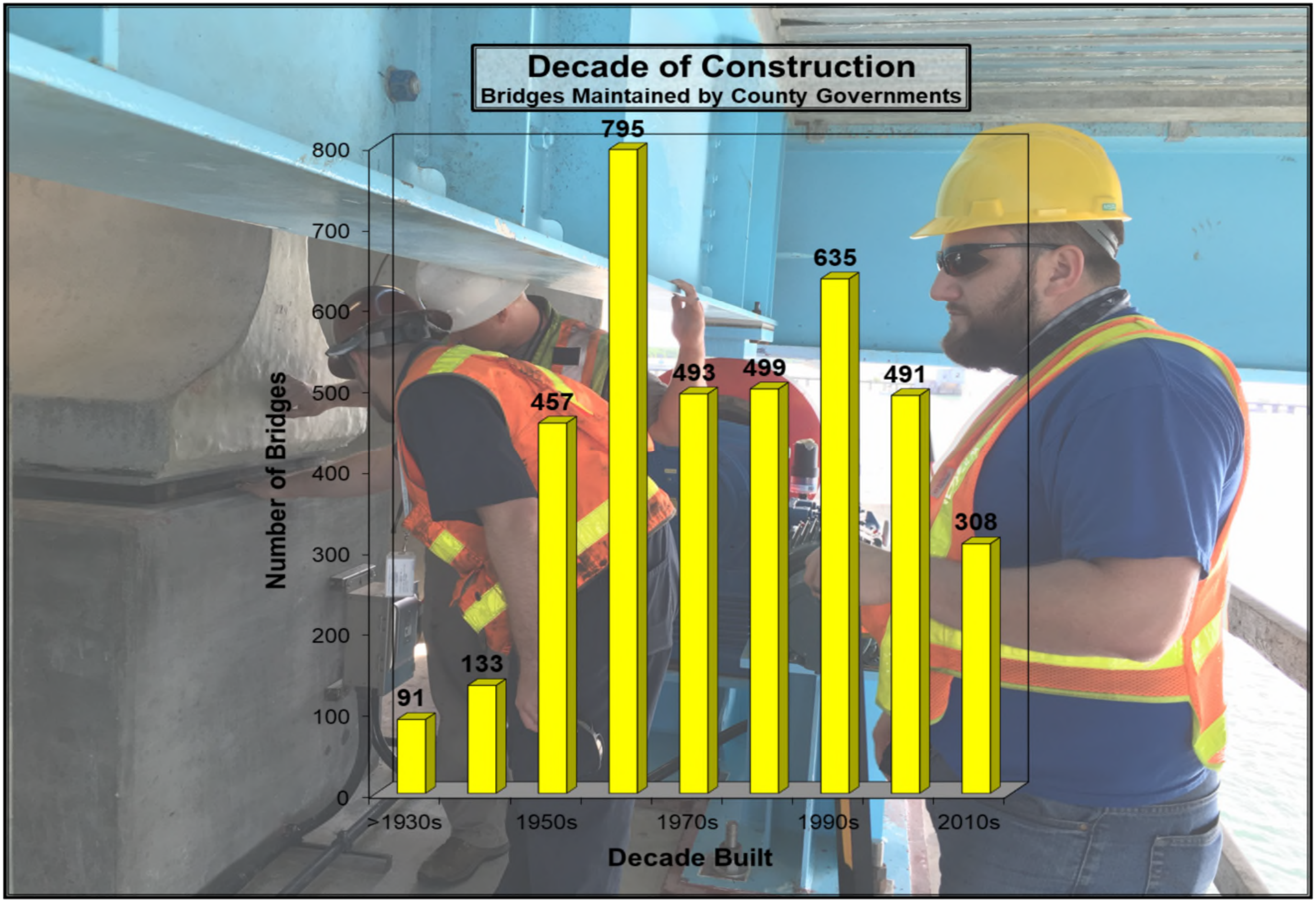


Figure 4

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

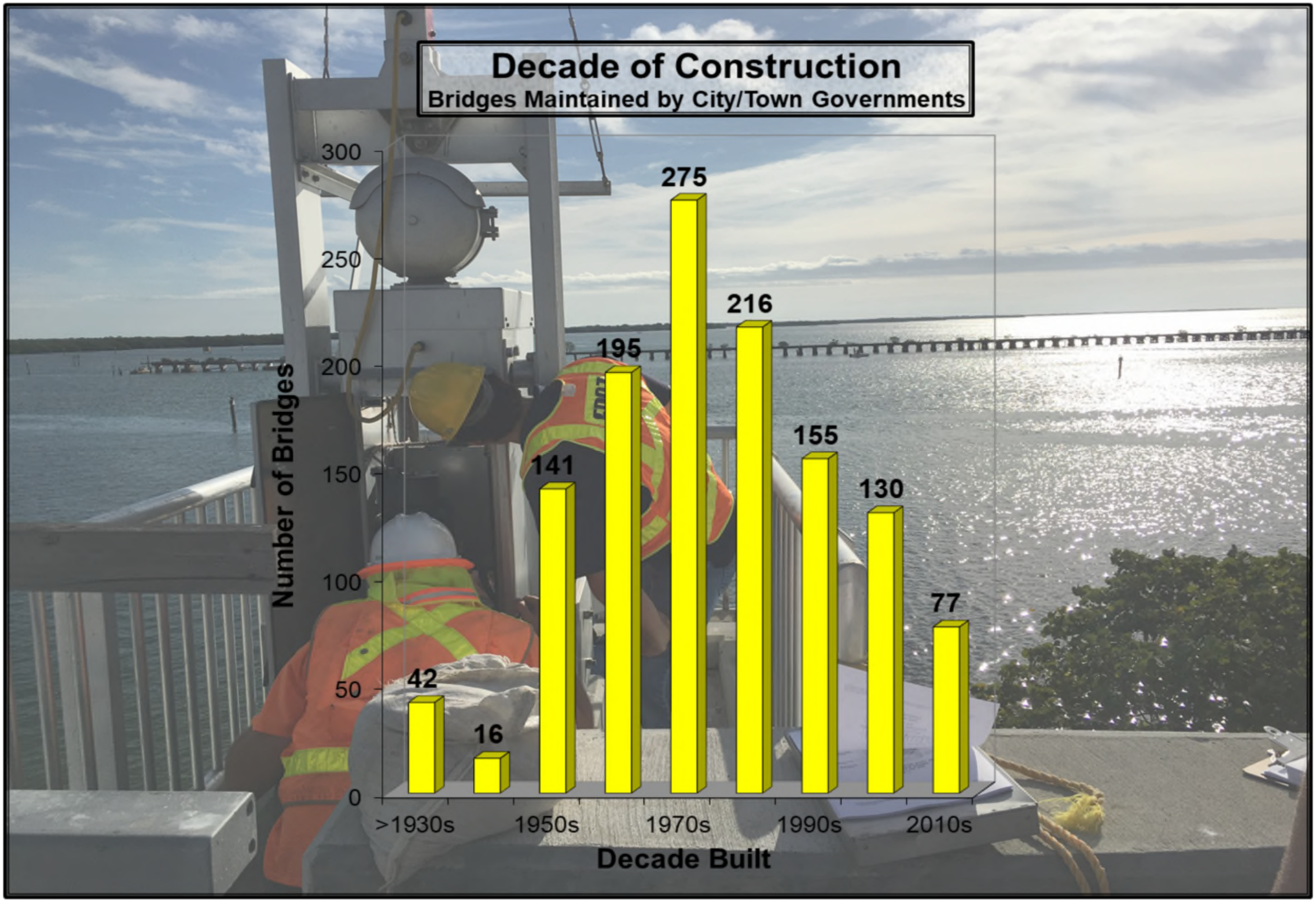


Figure 5

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

Bridge Inventory by Decade Built (Districts 1 thru 4)

	Maintenance Responsibility								Maintenance Responsibility							
	FDOT	County	City/Town	Other State	Other Local	Federal	Others	Total	FDOT	County	City/Town	Other State	Other Local	Federal	Others	Total
	District 1								District 3							
>1930s	23	9	5	0	0	0	0	37	10	24	0	0	0	0	0	34
1940s	59	24	1	1	0	0	0	85	52	33	2	1	0	0	0	88
1950s	127	99	13	1	0	0	0	240	74	137	4	0	0	0	0	215
1960s	110	209	36	7	6	0	0	368	103	162	5	5	0	0	0	275
1970s	152	134	85	0	3	0	0	374	284	89	8	4	2	0	0	387
1980s	176	136	48	2	5	0	0	367	58	67	9	14	0	0	1	149
1990s	138	127	26	6	8	0	0	305	103	188	11	26	0	0	0	328
2000s	97	102	20	4	0	0	0	223	68	154	10	41	1	0	0	274
2010s	52	82	14	3	1	0	0	152	69	97	4	7	0	0	0	177
Total	934	922	248	24	23	0	0	2151	821	951	53	98	3	0	1	1927
	District 2								District 4							
>1930s	53	16	4	0	0	0	0	73	4	4	6	0	0	0	0	14
1940s	61	52	3	0	0	0	0	116	3	3	2	0	0	0	0	8
1950s	140	116	32	3	0	0	0	291	37	37	58	6	0	0	0	138
1960s	416	94	33	1	0	0	0	544	70	68	55	4	0	0	1	198
1970s	193	40	31	0	0	0	1	265	151	74	66	0	0	0	0	291
1980s	44	46	29	0	0	0	0	119	228	73	54	1	0	0	0	356
1990s	97	46	25	2	0	0	0	170	99	105	17	1	0	0	0	222
2000s	147	51	37	3	0	0	1	239	124	65	18	3	0	0	0	210
2010s	110	27	11	0	0	0	0	148	55	31	20	0	0	0	0	106
Total	1261	488	205	9	0	0	2	1965	771	460	296	15	0	0	1	1543

Table 2

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

Bridge Inventory by Decade Built (Districts 5 thru 8)

	Maintenance Responsibility								Maintenance Responsibility							
	FDOT	County	City/Town	Other State	Other Local	Federal	Others	Total	FDOT	County	City/Town	Other State	Other Local	Federal	Others	Total
	District 5								District 7							
>1930s	25	10	3	0	0	0	0	38	29	10	14	0	0	0	0	53
1940s	11	10	2	0	0	0	0	23	10	4	3	0	0	0	0	17
1950s	59	26	5	0	0	0	0	90	31	19	17	0	0	0	0	67
1960s	261	61	11	0	0	0	1	334	106	104	37	1	0	0	0	248
1970s	139	37	46	1	0	0	7	230	111	87	23	0	5	0	0	226
1980s	79	78	39	1	0	0	16	213	168	73	20	0	3	0	0	264
1990s	153	65	27	3	0	0	22	270	64	90	39	0	1	0	0	194
2000s	234	58	23	2	4	0	9	330	122	38	14	0	2	0	1	177
2010s	139	43	19	1	6	0	6	214	84	15	6	0	1	0	0	106
Total	1100	388	175	8	10	0	61	1742	725	440	173	1	12	0	1	1352
	District 6								Turnpike							
>1930s	4	18	10	0	0	4	0	36	0	0	0	0	0	0	0	0
1940s	10	7	3	0	0	0	0	20	0	0	0	0	0	0	0	0
1950s	46	23	12	0	0	0	0	81	44	0	0	0	0	0	0	44
1960s	222	97	18	2	0	0	0	339	122	0	0	0	0	0	0	122
1970s	76	32	16	0	0	0	0	124	134	0	0	0	0	0	0	134
1980s	64	26	17	0	0	0	0	107	63	0	0	0	0	0	0	63
1990s	48	14	10	0	0	0	0	72	197	0	0	0	0	0	0	197
2000s	73	23	8	0	0	0	0	104	114	0	0	0	0	0	0	114
2010s	79	13	3	1	4	0	0	100	21	0	0	0	0	0	0	21
Total	622	253	97	3	4	4	0	983	695	0	0	0	0	0	0	695

Table 3

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

Types of Bridge Superstructures

With the exception of historic, gateway, or "signature" bridges, the type of bridge superstructure is generally of little interest to most people. However, the superstructure type is the most common method used by bridge engineers to categorize bridges. Superstructures are the unsupported component of a bridge that carries the intended loads across the span opening. Superstructure types are generally described by their structural configuration along with their material of construction. As a result, superstructure types can accurately define a bridge's service life, performance, and maintainability. In the broadest sense, there are three types of structural configurations for categorizing bridge superstructures. These are shells, which would include the arch culvert superstructure type. The second category is plates including slabs, orthotropic plates, and box culverts. Also included in the plate category is a special type of plate, called a beam. Superstructure types for a beam would include girders, boxes, and movable superstructure spans. The third category is the truss. The material of construction is generally concrete, steel, or timber. For recording purposes, these superstructure and material types have been reduced to twelve specific categories with a thirteenth (other) category for unusual and seldom used superstructure types (see Table 4).

Slabs

These would include both Reinforced Concrete Slabs and Prestressed Concrete Slabs. These superstructure types are characterized by having a generally constant, rectangular cross-section using concrete as the main building component.

Slab bridges maintained by the state represent 15.99% of the total inventory. Similarly, slab bridges maintained by counties are 35.83%, and by cities and towns are 54.05%.

Beams and Girders

Most of the bridges in Florida can be considered as beam or girder bridges. These superstructure types are composed of either singular or groups of individual linear elements positioned either in the direction of traffic or transverse to the direction of traffic. The categories used for this type include Reinforced Concrete Beam, Prestressed Concrete Beam, Steel Beam, Timber Beam, Reinforced Concrete Box, Prestressed Concrete Box, Steel Box, and Movable Spans. Beam and Girder type bridges comprise 62.68% of the state maintained inventory, 33.75% of the county bridges, and 24.86% of the city/town bridges.

Trusses

The members of a truss work in either tension or compression. Bending is assumed not to occur in this type of bridge superstructure. The external loads from the deck and traffic are applied only at the joints of a truss.

At present 0.06% of the state maintained bridges use truss superstructures. Likewise, 0.36% of the county bridges and 0.16% of the city/town bridges use trusses.

Culverts

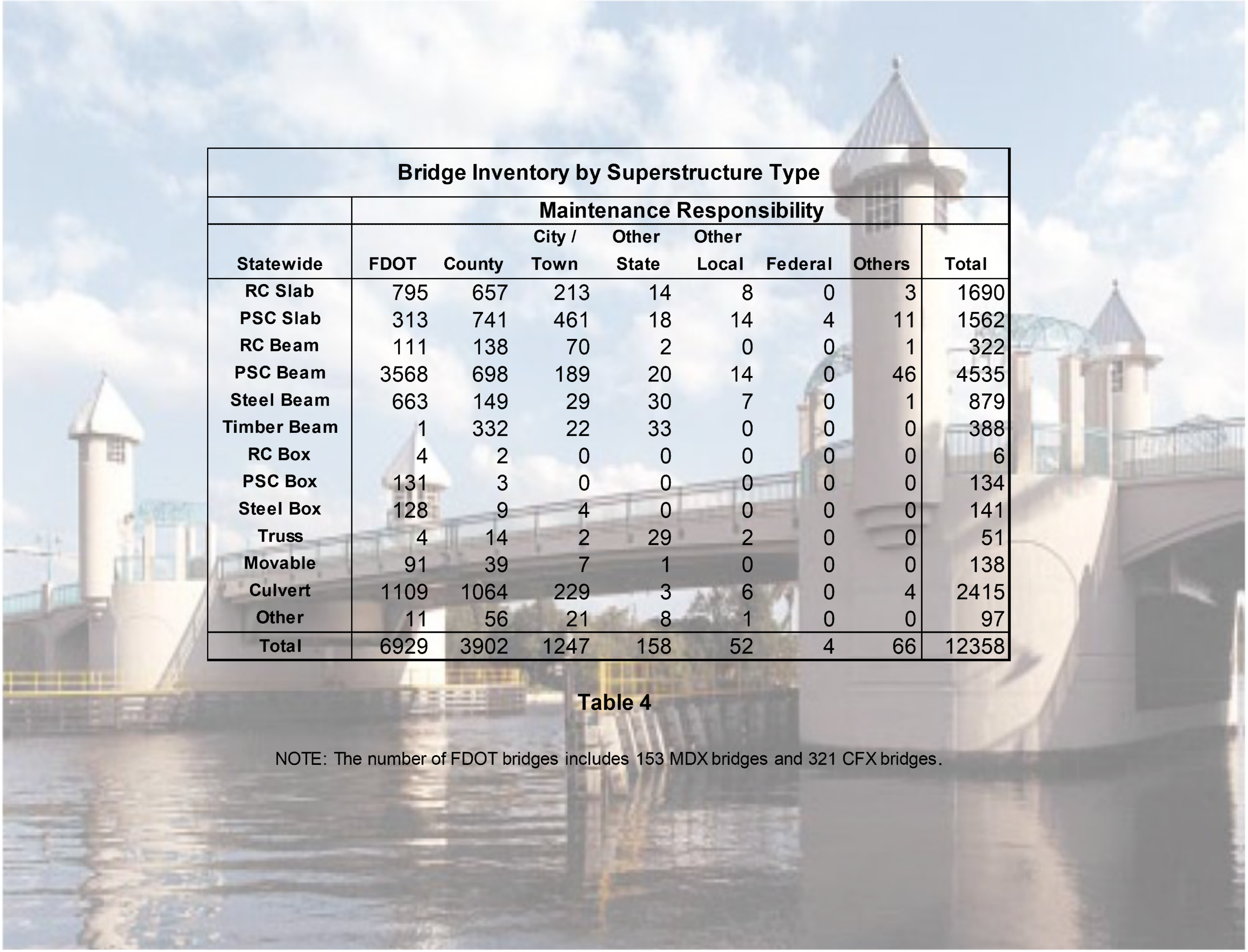
A culvert is typically a buried drainage structure. When the overall opening of the culvert is at least 20 feet it is considered a bridge by the Federal Government, and hence is treated like a bridge for inspection and maintenance purposes. Culverts represent 16.01% of the state maintained bridges. County inventories include 27.27% culverts, and city/towns include 18.36% culverts.

Movables

The general classification known as movable bridge includes the specific superstructure type describing the way it moves. This could be either a bascule, swing, or lift bridge. The movable bridge can either stand alone, or include fixed approach spans. Movable bridges represent 1.31% of the total state bridge inventory. County inventories include 1.0% movables, and city/towns include 0.56% movable bridges.

Figures

Figures 6 through 9 present graphic views of Table 4, which shows superstructure type by maintenance responsibility.



Bridge Inventory by Superstructure Type								
	Maintenance Responsibility							
Statewide	FDOT	County	City / Town	Other State	Other Local	Federal	Others	Total
RC Slab	795	657	213	14	8	0	3	1690
PSC Slab	313	741	461	18	14	4	11	1562
RC Beam	111	138	70	2	0	0	1	322
PSC Beam	3568	698	189	20	14	0	46	4535
Steel Beam	663	149	29	30	7	0	1	879
Timber Beam	1	332	22	33	0	0	0	388
RC Box	4	2	0	0	0	0	0	6
PSC Box	131	3	0	0	0	0	0	134
Steel Box	128	9	4	0	0	0	0	141
Truss	4	14	2	29	2	0	0	51
Movable	91	39	7	1	0	0	0	138
Culvert	1109	1064	229	3	6	0	4	2415
Other	11	56	21	8	1	0	0	97
Total	6929	3902	1247	158	52	4	66	12358

Table 4

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

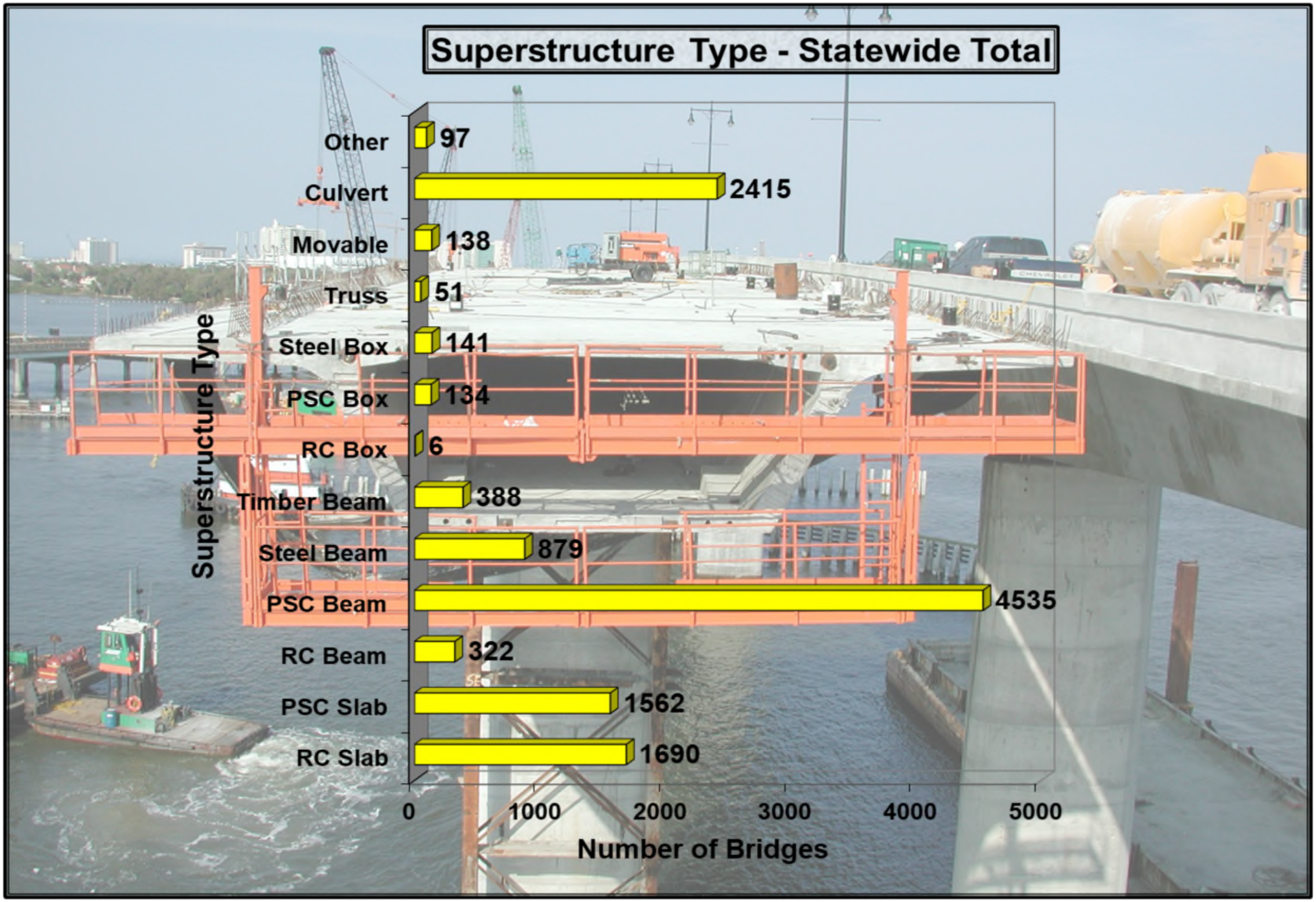

Superstructure Type - Statewide Total
Superstructure Type
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
97
2415
138
51
141
134
6
388
879
4535
322
1562
1690
0
1000
2000
3000
4000
5000
Number of Bridges

Figure 6

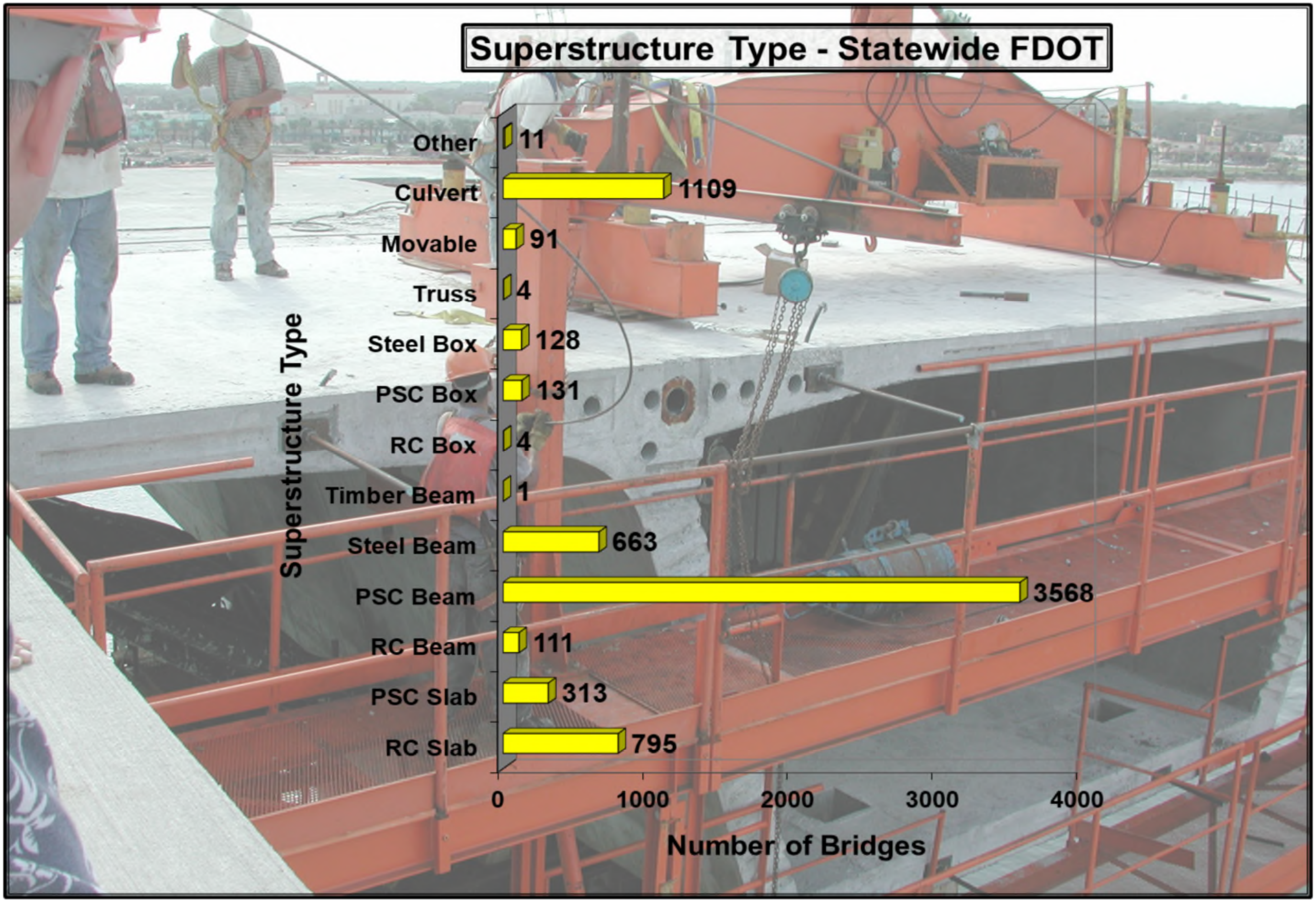

Superstructure Type - Statewide FDOT
Superstructure Type
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
11
1109
91
4
128
131
4
1
663
3568
111
313
795
0
1000
2000
3000
4000
Number of Bridges

Figure 7

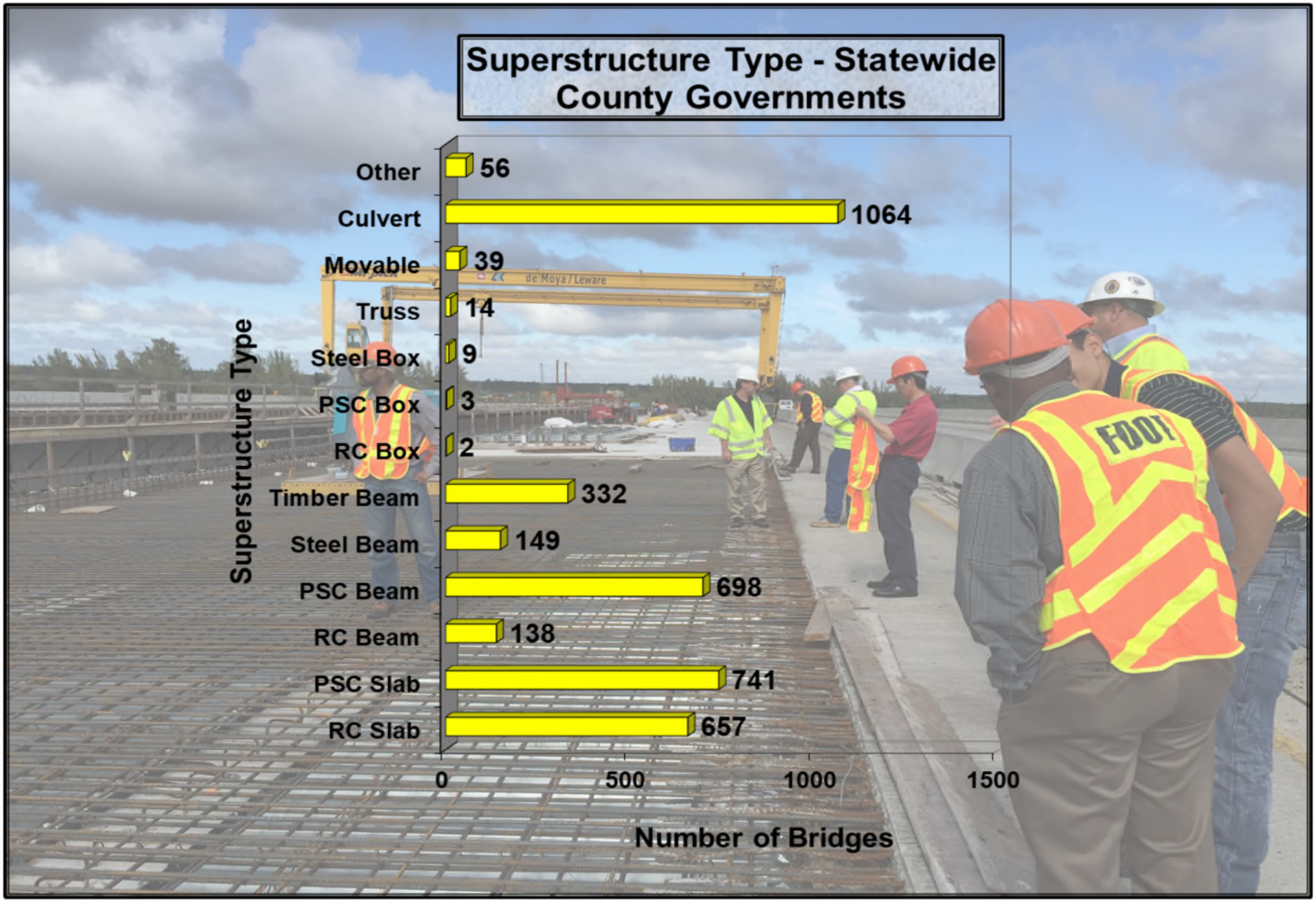

Superstructure Type - Statewide
County Governments
Superstructure Type
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
56
1064
39
14
9
3
2
332
149
698
138
741
657
0
500
1000
1500
Number of Bridges
FDOT
de Moya / Leware

Figure 8

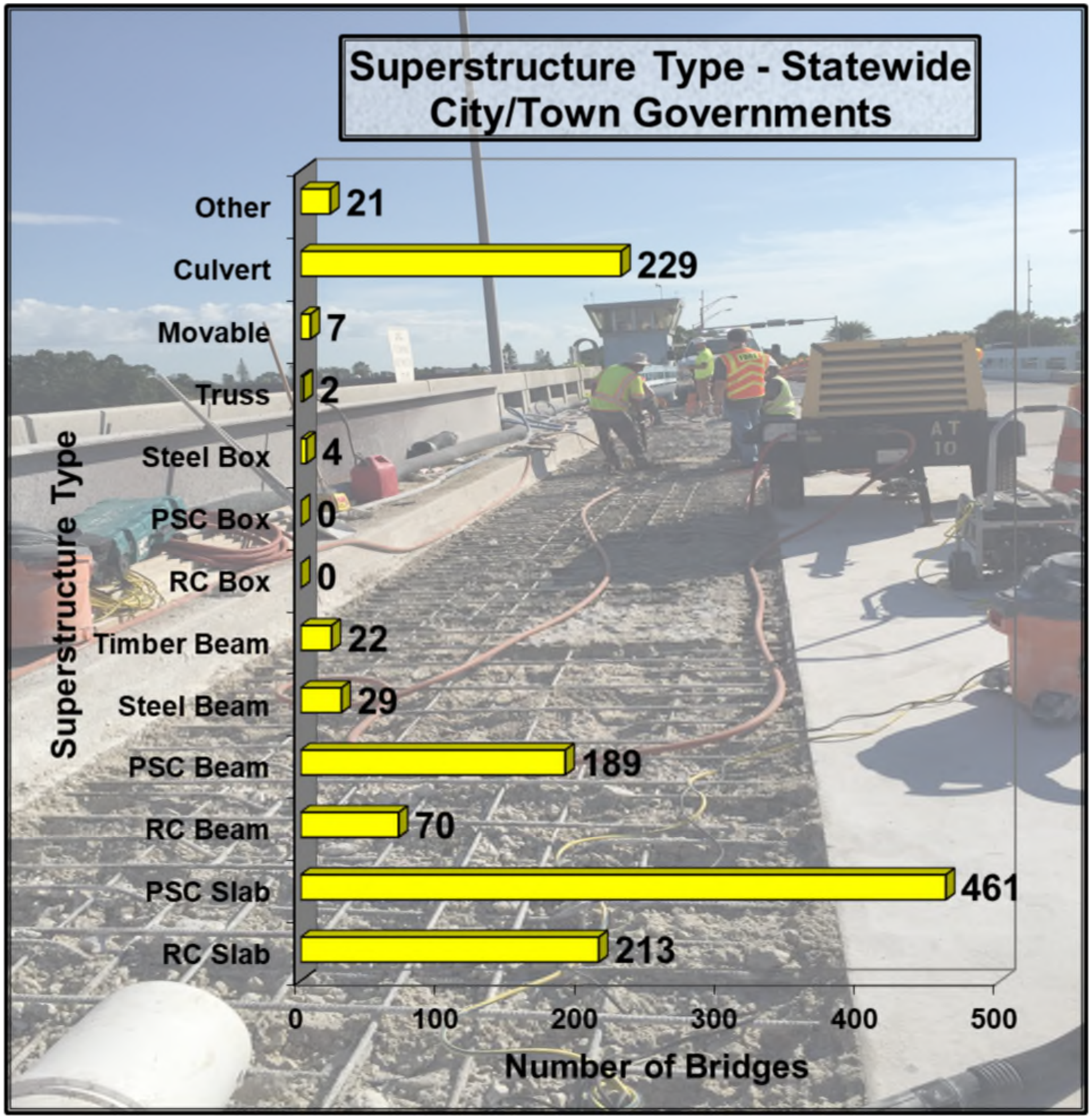

Superstructure Type - Statewide
City/Town Governments
Superstructure Type
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
21
229
7
2
4
0
0
22
29
189
70
461
213
0
100
200
300
400
500
Number of Bridges

Figure 9

Deck Area of the Bridge Inventory

Most bridges are one-of-a-kind structures. However, to simplify categorizing and evaluation, a method often used to compare bridges relies on the area of the deck or riding surface. Rather than listing bridges individually, this method groups bridges in ranges based on total deck area. Table 5 presents these deck area ranges by maintenance responsibility.

FDOT Bridges Statewide

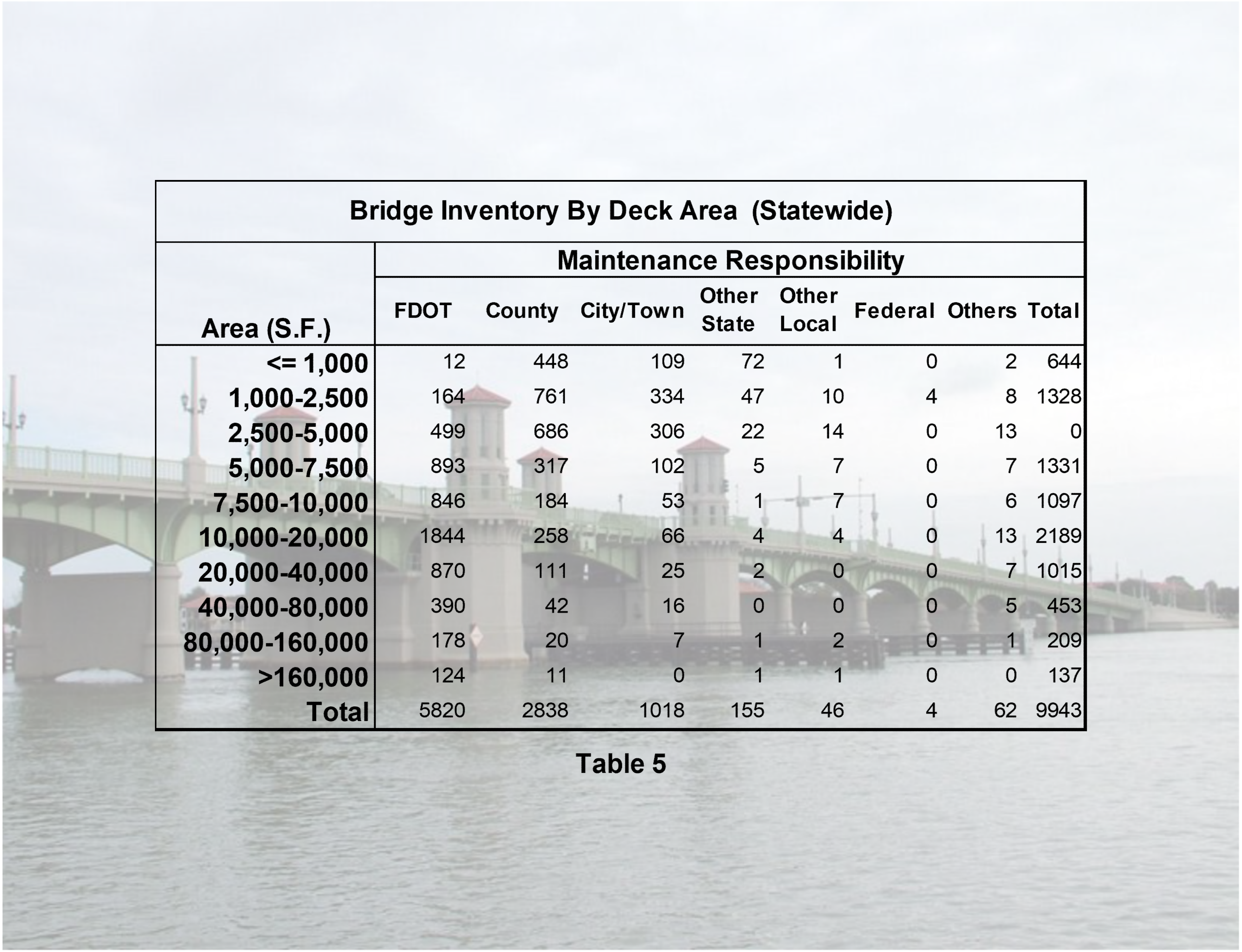
Figure 10 presents the 5,820 FDOT bridges grouped by the deck area ranges (culverts and other miscellaneous structures are not included in this group). The range with the largest number of bridges is the 10,000 to 20,000 square foot range, with 1,844 bridges, 31.68% of the total. 11.60% of the FDOT bridges fall into the 0 to 5,000 square foot range; 29.88% are in the 5,000 to 10,000 square foot range; and 26.84% of the bridges have deck areas greater than 20,000 square feet.

County and City/Town Bridges

As one might expect, bridges maintained by county governments are generally smaller than those maintained by FDOT. The statewide county maintenance responsibility group has 66.77% of their bridges under 5,000 square feet; with 17.65% between 5,000 and 10,000 square feet; 9.09% between 10,000 to 20,000 square feet; and only 6.48% over 20,000 square feet (see Figure 11). The results for the City/Town and Others groups are similar; with 73.58% of these bridges less than 5,000 square feet (see Figures 12 & 13).

FDOT Bridges by District

Tables 6 and 7 present the statewide data sorted by district. Figure 14 shows graphic comparison between the districts for the FDOT maintained bridges. For example, 21.84% of the District 1 bridges are less than 5,000 square feet and only 16.31% of their bridges are over 20,000 square feet. In contrast, only 9.35% of District 4 bridges are less than 5,000 square feet, while 38.21% are over 20,000 square feet.



Bridge Inventory By Deck Area (Statewide)

Area (S.F.)	Maintenance Responsibility							
	FDOT	County	City/Town	Other State	Other Local	Federal	Others	Total
<= 1,000	12	448	109	72	1	0	2	644
1,000-2,500	164	761	334	47	10	4	8	1328
2,500-5,000	499	686	306	22	14	0	13	0
5,000-7,500	893	317	102	5	7	0	7	1331
7,500-10,000	846	184	53	1	7	0	6	1097
10,000-20,000	1844	258	66	4	4	0	13	2189
20,000-40,000	870	111	25	2	0	0	7	1015
40,000-80,000	390	42	16	0	0	0	5	453
80,000-160,000	178	20	7	1	2	0	1	209
>160,000	124	11	0	1	1	0	0	137
Total	5820	2838	1018	155	46	4	62	9943

Table 5

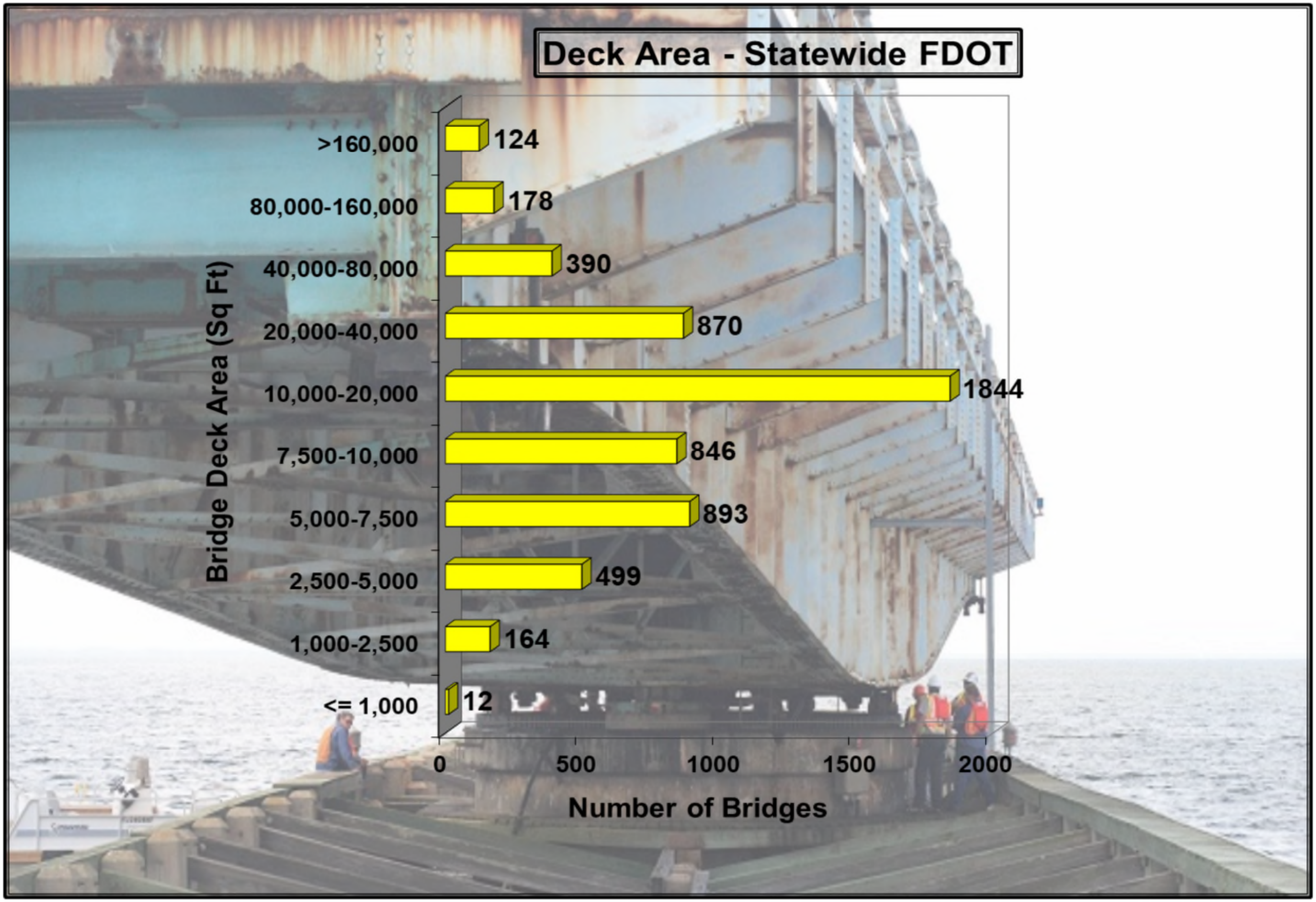

Deck Area - Statewide FDOT
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
124
178
390
870
1844
846
893
499
164
12
0
500
1000
1500
2000
Number of Bridges

Figure 10

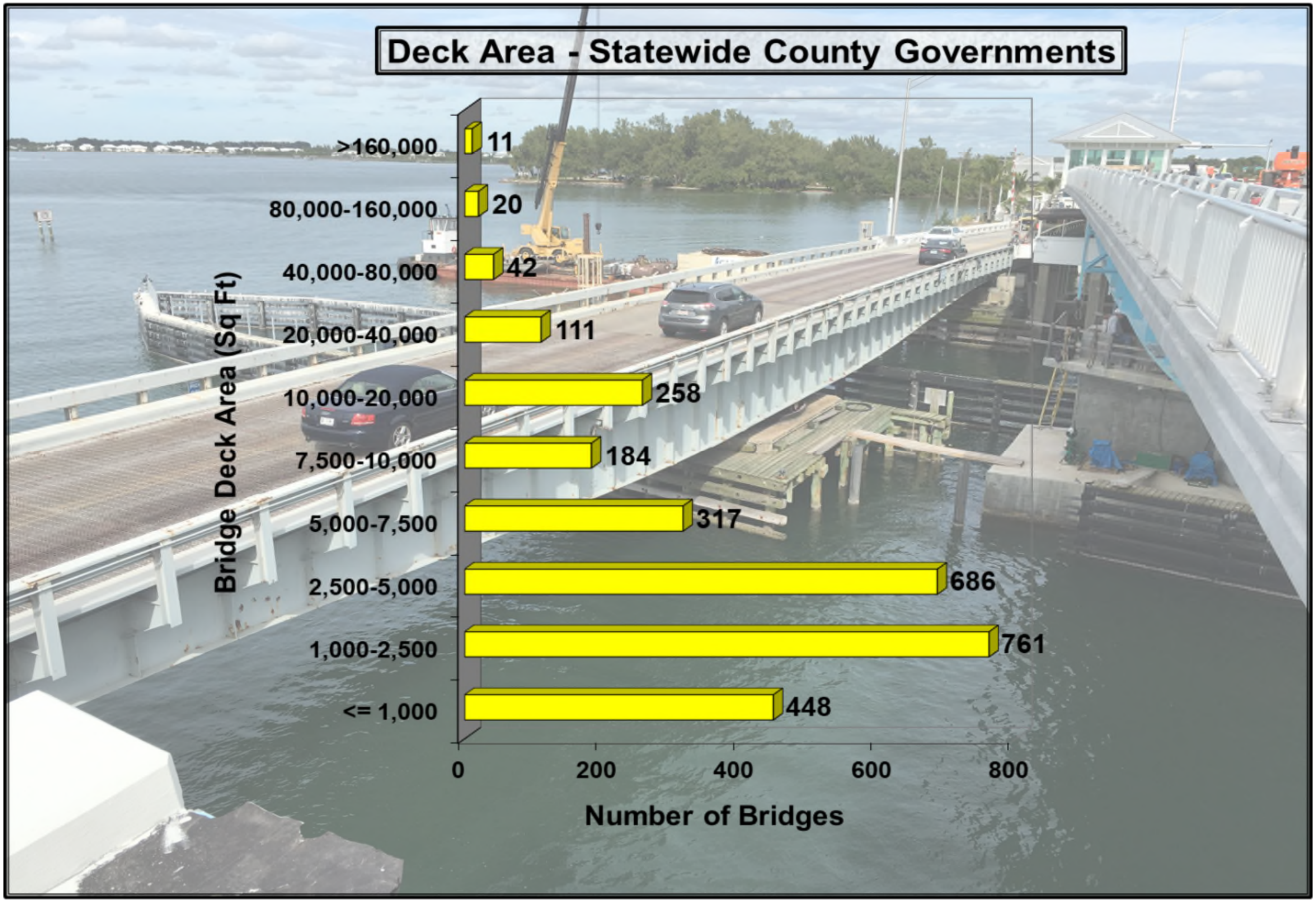

Deck Area - Statewide County Governments
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
11
20
42
111
258
184
317
686
761
448
0
200
400
600
800
Number of Bridges

Figure 11

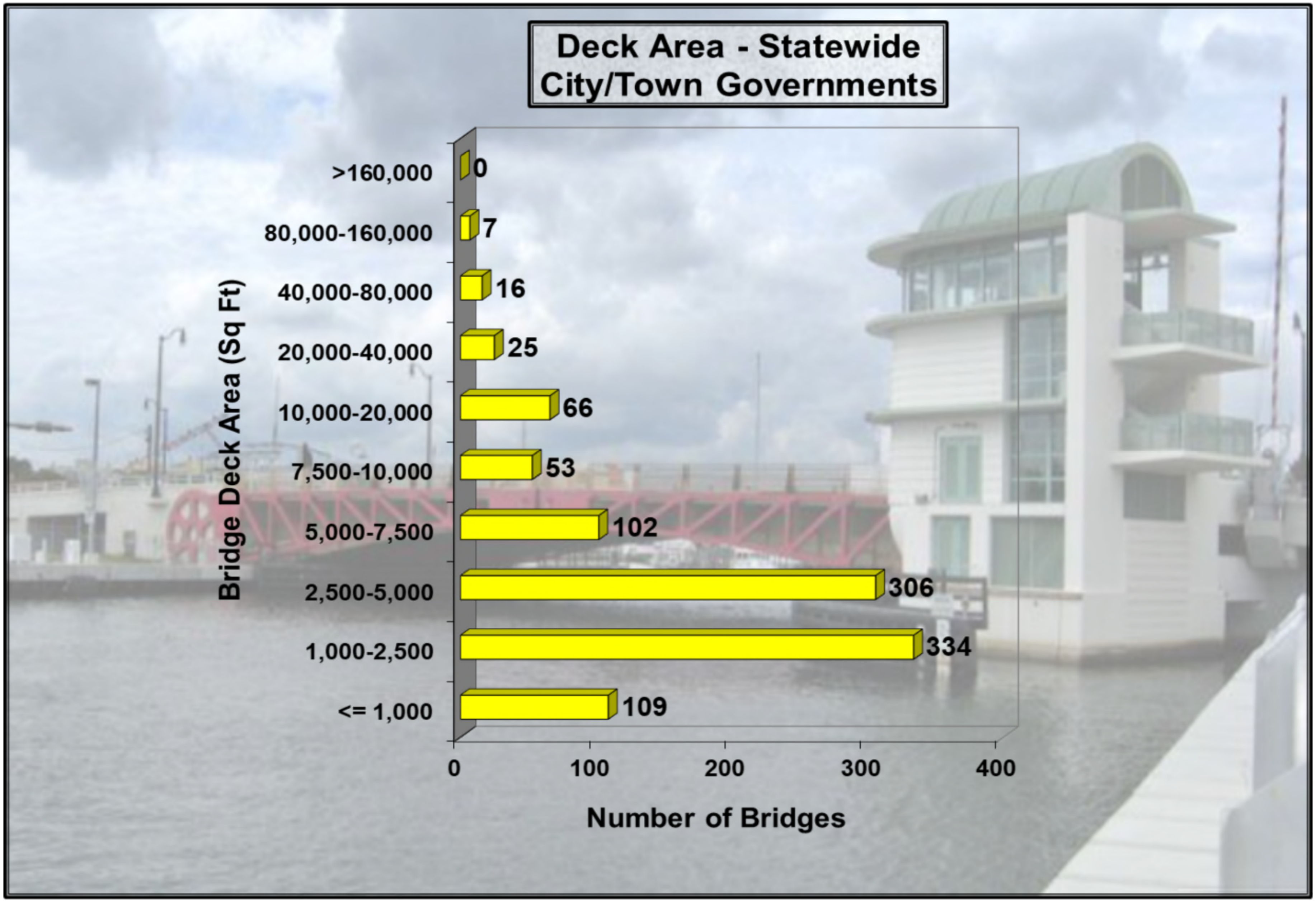

Deck Area - Statewide
City/Town Governments
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
0
7
16
25
66
53
102
306
334
109
0
100
200
300
400
Number of Bridges

Figure 12

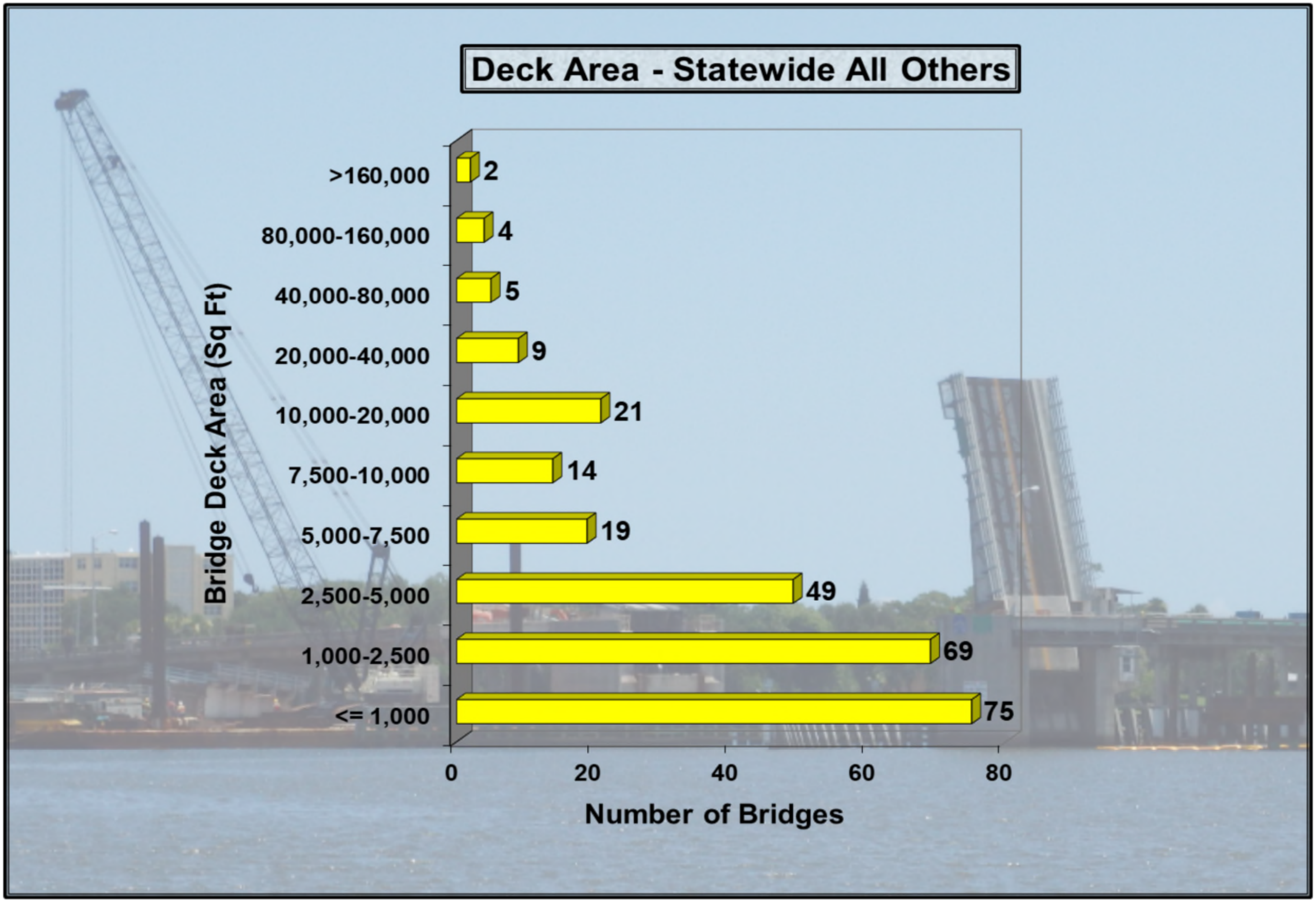
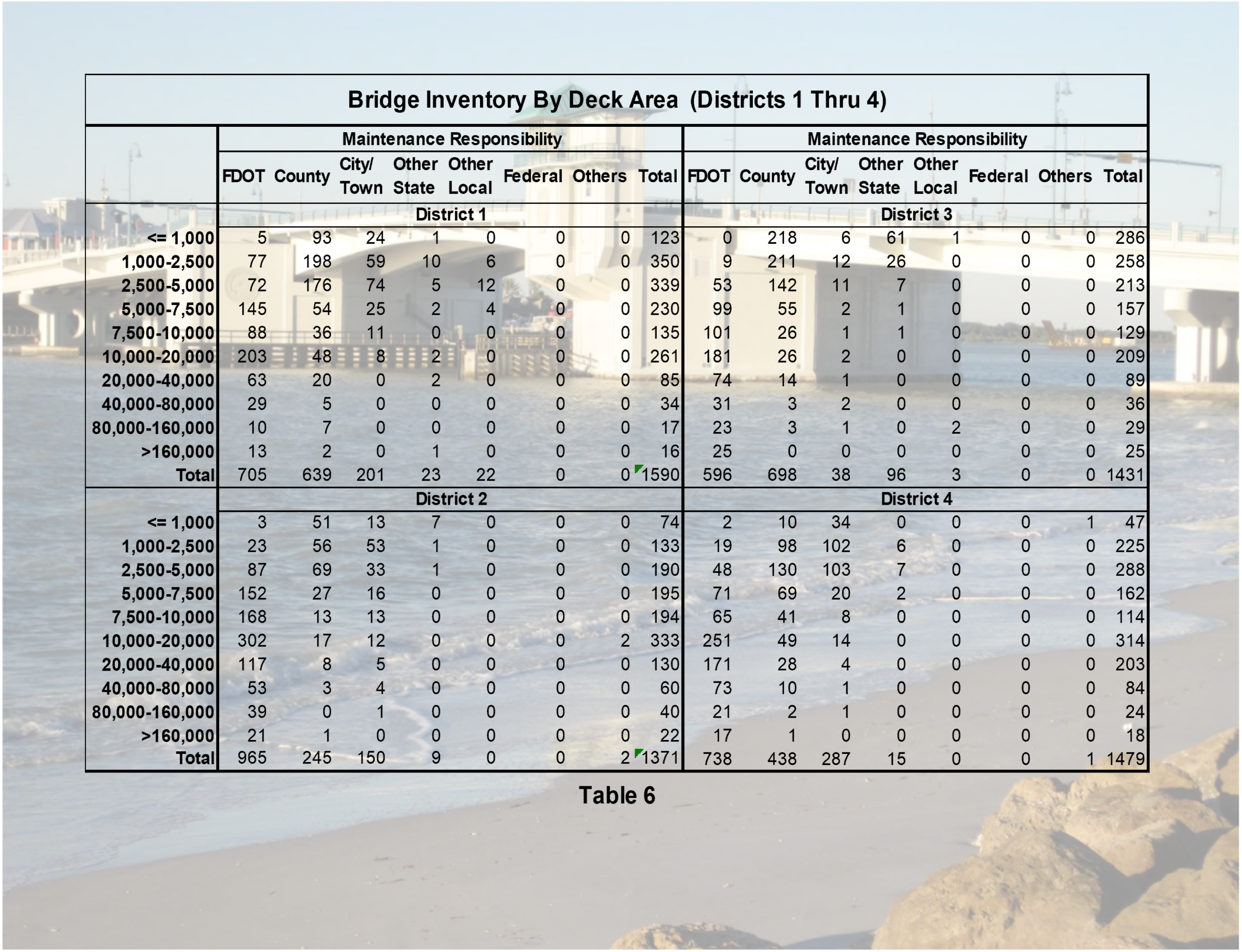

Deck Area - Statewide All Others
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
2
4
5
9
21
14
19
49
69
75
0
20
40
60
80
Number of Bridges

Figure 13



Bridge Inventory By Deck Area (Districts 1 Thru 4)

	Maintenance Responsibility								Maintenance Responsibility							
	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total
	District 1								**District 3**							
<= 1,000	5	93	24	1	0	0	0	123	0	218	6	61	1	0	0	286
1,000-2,500	77	198	59	10	6	0	0	350	9	211	12	26	0	0	0	258
2,500-5,000	72	176	74	5	12	0	0	339	53	142	11	7	0	0	0	213
5,000-7,500	145	54	25	2	4	0	0	230	99	55	2	1	0	0	0	157
7,500-10,000	88	36	11	0	0	0	0	135	101	26	1	1	0	0	0	129
10,000-20,000	203	48	8	2	0	0	0	261	181	26	2	0	0	0	0	209
20,000-40,000	63	20	0	2	0	0	0	85	74	14	1	0	0	0	0	89
40,000-80,000	29	5	0	0	0	0	0	34	31	3	2	0	0	0	0	36
80,000-160,000	10	7	0	0	0	0	0	17	23	3	1	0	2	0	0	29
>160,000	13	2	0	1	0	0	0	16	25	0	0	0	0	0	0	25
Total	705	639	201	23	22	0	0	1590	596	698	38	96	3	0	0	1431
	District 2								**District 4**							
<= 1,000	3	51	13	7	0	0	0	74	2	10	34	0	0	0	1	47
1,000-2,500	23	56	53	1	0	0	0	133	19	98	102	6	0	0	0	225
2,500-5,000	87	69	33	1	0	0	0	190	48	130	103	7	0	0	0	288
5,000-7,500	152	27	16	0	0	0	0	195	71	69	20	2	0	0	0	162
7,500-10,000	168	13	13	0	0	0	0	194	65	41	8	0	0	0	0	114
10,000-20,000	302	17	12	0	0	0	2	333	251	49	14	0	0	0	0	314
20,000-40,000	117	8	5	0	0	0	0	130	171	28	4	0	0	0	0	203
40,000-80,000	53	3	4	0	0	0	0	60	73	10	1	0	0	0	0	84
80,000-160,000	39	0	1	0	0	0	0	40	21	2	1	0	0	0	0	24
>160,000	21	1	0	0	0	0	0	22	17	1	0	0	0	0	0	18
Total	965	245	150	9	0	0	2	1371	738	438	287	15	0	0	1	1479

Table 6

Bridge Inventory By Deck Area (Districts 5 Thru 8)

	Maintenance Responsibility								Maintenance Responsibility							
	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total
	District 5								District 7							
<= 1,000	0	19	12	3	0	0	1	35	1	43	16	0	0	0	0	60
1,000-2,500	12	56	41	2	2	0	8	121	13	70	38	0	2	0	0	123
2,500-5,000	87	59	25	2	1	0	13	187	23	51	25	0	0	0	0	99
5,000-7,500	153	34	19	0	1	0	7	214	64	43	10	0	0	0	0	117
7,500-10,000	160	24	9	0	0	0	6	199	88	28	4	0	7	0	0	127
10,000-20,000	302	50	19	1	2	0	11	385	205	42	6	0	1	0	0	254
20,000-40,000	136	17	5	0	0	0	7	165	120	14	6	0	0	0	0	140
40,000-80,000	45	7	5	0	0	0	5	62	70	9	2	0	0	0	0	81
80,000-160,000	30	1	2	0	0	0	1	34	25	3	2	1	0	0	0	31
>160,000	10	0	0	0	1	0	0	11	16	3	0	0	0	0	0	19
Total	935	267	137	8	7	0	59	1413	625	306	109	1	10	0	0	1051
	District 6								Turnpike							
<= 1,000	1	14	4	0	0	0	0	19	0	0	0	0	0	0	0	0
1,000-2,500	6	72	29	2	0	4	0	113	5	0	0	0	0	0	0	5
2,500-5,000	59	59	35	0	1	0	0	154	70	0	0	0	0	0	0	70
5,000-7,500	75	35	10	0	2	0	0	122	134	0	0	0	0	0	0	134
7,500-10,000	64	16	7	0	0	0	0	87	112	0	0	0	0	0	0	112
10,000-20,000	178	26	5	1	1	0	0	211	222	0	0	0	0	0	0	222
20,000-40,000	119	10	4	0	0	0	0	133	70	0	0	0	0	0	0	70
40,000-80,000	71	5	2	0	0	0	0	78	18	0	0	0	0	0	0	18
80,000-160,000	28	4	0	0	0	0	0	32	2	0	0	0	0	0	0	2
>160,000	18	4	0	0	0	0	0	22	4	0	0	0	0	0	0	4
Total	619	245	96	3	4	4	0	971	637	0	0	0	0	0	0	637

Table 7

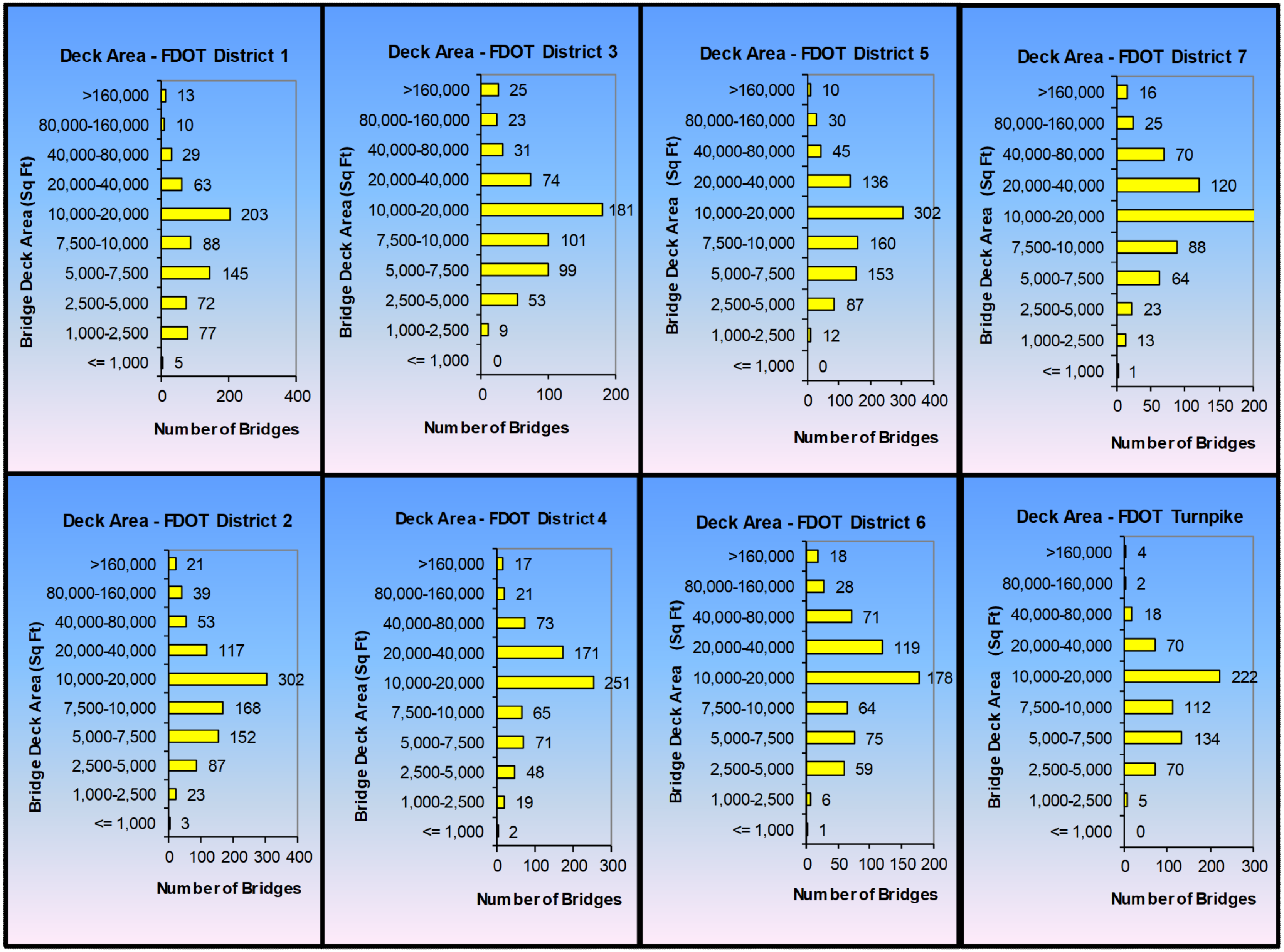

Deck Area - FDOT District 1
>160,000 13
80,000-160,000 10
40,000-80,000 29
20,000-40,000 63
10,000-20,000 203
7,500-10,000 88
5,000-7,500 145
2,500-5,000 72
1,000-2,500 77
<= 1,000 5
0 200 400
Number of Bridges
Bridge Deck Area (Sq Ft)
Deck Area - FDOT District 3
>160,000 25
80,000-160,000 23
40,000-80,000 31
20,000-40,000 74
10,000-20,000 181
7,500-10,000 101
5,000-7,500 99
2,500-5,000 53
1,000-2,500 9
<= 1,000 0
0 100 200
Number of Bridges
Bridge Deck Area (Sq Ft)
Deck Area - FDOT District 5
>160,000 10
80,000-160,000 30
40,000-80,000 45
20,000-40,000 136
10,000-20,000 302
7,500-10,000 160
5,000-7,500 153
2,500-5,000 87
1,000-2,500 12
<= 1,000 0
0 100 200 300 400
Number of Bridges
Bridge Deck Area (Sq Ft)
Deck Area - FDOT District 7
>160,000 16
80,000-160,000 25
40,000-80,000 70
20,000-40,000 120
10,000-20,000
7,500-10,000 88
5,000-7,500 64
2,500-5,000 23
1,000-2,500 13
<= 1,000 1
0 50 100 150 200
Number of Bridges
Bridge Deck Area (Sq Ft)
Deck Area - FDOT District 2
>160,000 21
80,000-160,000 39
40,000-80,000 53
20,000-40,000 117
10,000-20,000 302
7,500-10,000 168
5,000-7,500 152
2,500-5,000 87
1,000-2,500 23
<= 1,000 3
0 100 200 300 400
Number of Bridges
Bridge Deck Area (Sq Ft)
Deck Area - FDOT District 4
>160,000 17
80,000-160,000 21
40,000-80,000 73
20,000-40,000 171
10,000-20,000 251
7,500-10,000 65
5,000-7,500 71
2,500-5,000 48
1,000-2,500 19
<= 1,000 2
0 100 200 300
Number of Bridges
Bridge Deck Area (Sq Ft)
Deck Area - FDOT District 6
>160,000 18
80,000-160,000 28
40,000-80,000 71
20,000-40,000 119
10,000-20,000 178
7,500-10,000 64
5,000-7,500 75
2,500-5,000 59
1,000-2,500 6
<= 1,000 1
0 50 100 150 200
Number of Bridges
Bridge Deck Area (Sq Ft)
Deck Area - FDOT Turnpike
>160,000 4
80,000-160,000 2
40,000-80,000 18
20,000-40,000 70
10,000-20,000 222
7,500-10,000 112
5,000-7,500 134
2,500-5,000 70
1,000-2,500 5
<= 1,000 0
0 100 200 300
Number of Bridges
Bridge Deck Area (Sq Ft)

Figure 14

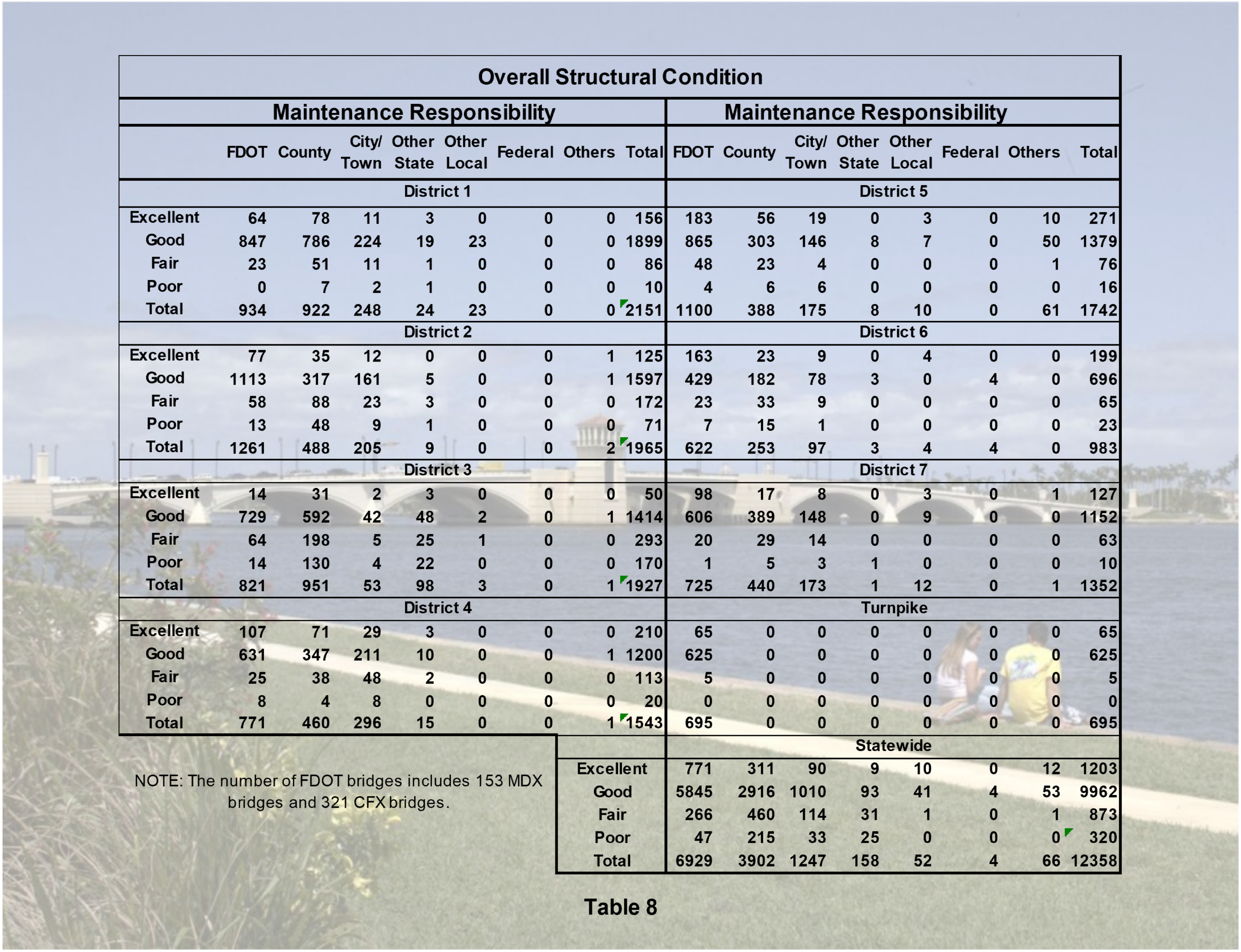
Overall Structural Condition

The performance of maintenance and repair activities in a timely manner keeps bridges in good condition, avoids more expensive repair or replacement costs in the future, and ensures that the bridges are safe for use by the public. The identification of bridge work needs generally begins with the bridge inspection. Like most states, Florida's bridge inspection program began in the late 1960's. Since then, much has been learned in the field of bridge inspection. Areas of emphasis have changed and expanded as new problems became apparent, as newer bridge types became more common, and as these newer bridges aged enough to require corrective actions. Guidelines for inspection condition rating have evolved to increase uniformity and consistency of inspections. Today's program is large in scope, well organized, and professionally managed. Data collected from bridge inspections is critical input into a variety of analyses and decisions within the FDOT to determine the most cost effective mix of preventive maintenance, routine maintenance, repair, rehabilitation, replacement, and other actions over the life of the bridges.

Bridges generally consist of three components: the deck or riding surface; the superstructure for supporting the deck; and the substructure which functions to transfer the superstructure loads to the ground. Bridge inspectors assign a numerical condition rating to each of the components, from 0 being the worst to 9 being the best. The Overall Condition Rating for a bridge represents the component with the lowest rating. The ratings are divided into four categories. They are Excellent = 8 to 9; Good = 6 to 7; Fair = 5; and Poor = 4 or less. Bridge culverts use the same scale, except there is only one overall component. Grouping the bridges as excellent, good, fair, or poor, as described above, and presenting them by maintenance responsibility and FDOT District a view of the overall condition of Florida's bridges is obtained. (see Table 8)

Figure 15 shows, for each of the maintenance responsibility groups, the percentage of bridges in excellent, good, fair, and poor condition. Approximately 95.48% of the FDOT maintained bridges are in excellent or good condition. However, the number drops to 82.70% for County bridges, 88.21% for City/Town bridges, and 79.29% for Other Agency bridges. Figures 16 and 17 provide similar views of the FDOT maintained bridges, by district. An alternative view of the data is presented in Figures 18, 19, and 20, for each of the three maintenance groups.

Figures 21 and 22 show a general graphical view of state maintained bridges, by location, comparing the bridge conditions for years 2014 and 2018.



Overall Structural Condition

Maintenance Responsibility	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total
District 1								
Excellent	64	78	11	3	0	0	0	156
Good	847	786	224	19	23	0	0	1899
Fair	23	51	11	1	0	0	0	86
Poor	0	7	2	1	0	0	0	10
Total	934	922	248	24	23	0	0	2151
District 2								
Excellent	77	35	12	0	0	0	1	125
Good	1113	317	161	5	0	0	1	1597
Fair	58	88	23	3	0	0	0	172
Poor	13	48	9	1	0	0	0	71
Total	1261	488	205	9	0	0	2	1965
District 3								
Excellent	14	31	2	3	0	0	0	50
Good	729	592	42	48	2	0	1	1414
Fair	64	198	5	25	1	0	0	293
Poor	14	130	4	22	0	0	0	170
Total	821	951	53	98	3	0	1	1927
District 4								
Excellent	107	71	29	3	0	0	0	210
Good	631	347	211	10	0	0	1	1200
Fair	25	38	48	2	0	0	0	113
Poor	8	4	8	0	0	0	0	20
Total	771	460	296	15	0	0	1	1543

Maintenance Responsibility	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total
District 5								
Excellent	183	56	19	0	3	0	10	271
Good	865	303	146	8	7	0	50	1379
Fair	48	23	4	0	0	0	1	76
Poor	4	6	6	0	0	0	0	16
Total	1100	388	175	8	10	0	61	1742
District 6								
Excellent	163	23	9	0	4	0	0	199
Good	429	182	78	3	0	4	0	696
Fair	23	33	9	0	0	0	0	65
Poor	7	15	1	0	0	0	0	23
Total	622	253	97	3	4	4	0	983
District 7								
Excellent	98	17	8	0	3	0	1	127
Good	606	389	148	0	9	0	0	1152
Fair	20	29	14	0	0	0	0	63
Poor	1	5	3	1	0	0	0	10
Total	725	440	173	1	12	0	1	1352
Turnpike								
Excellent	65	0	0	0	0	0	0	65
Good	625	0	0	0	0	0	0	625
Fair	5	0	0	0	0	0	0	5
Poor	0	0	0	0	0	0	0	0
Total	695	0	0	0	0	0	0	695
Statewide								
Excellent	771	311	90	9	10	0	12	1203
Good	5845	2916	1010	93	41	4	53	9962
Fair	266	460	114	31	1	0	1	873
Poor	47	215	33	25	0	0	0	320
Total	6929	3902	1247	158	52	4	66	12358

NOTE: The number of FDOT bridges includes 153 MDX bridges and 321 CFX bridges.

Table 8

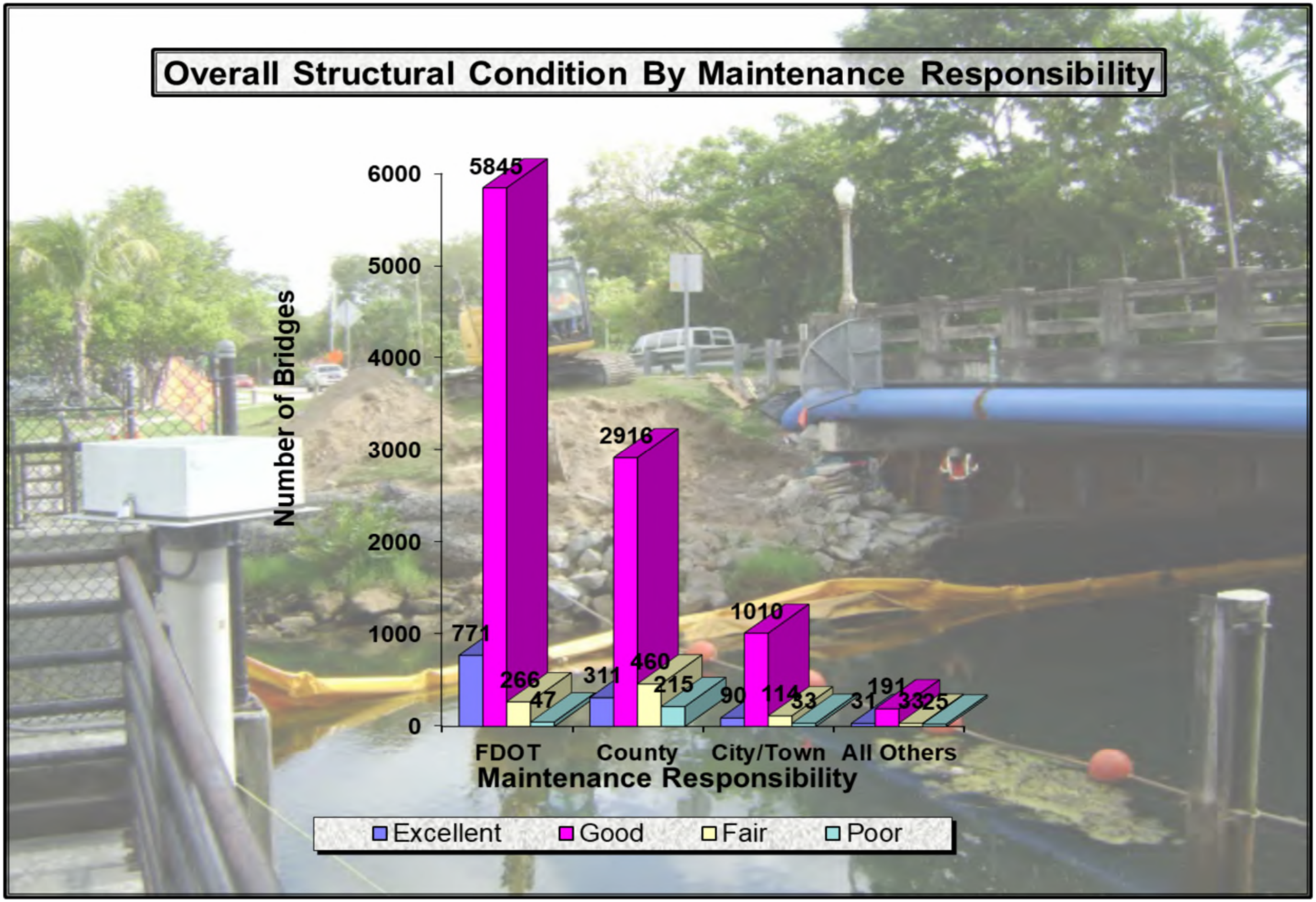

Overall Structural Condition By Maintenance Responsibility
Number of Bridges
6000
5000
4000
3000
2000
1000
0
5845
771
266
47
2916
311
460
215
1010
90
114
33
191
31
33
25
FDOT
County
City/Town
All Others
Maintenance Responsibility
Excellent
Good
Fair
Poor

Figure 15

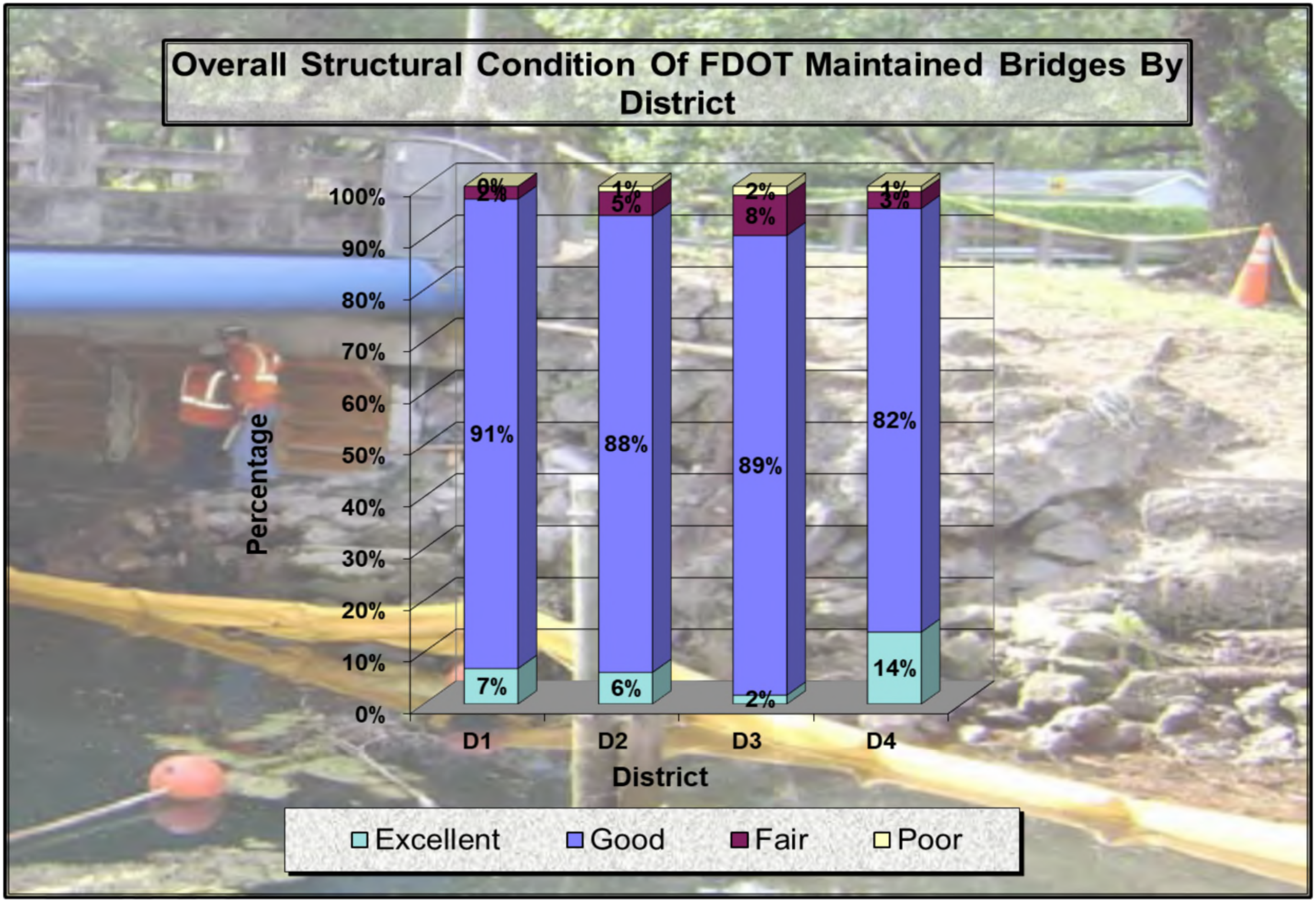

Overall Structural Condition Of FDOT Maintained Bridges By District
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
D1
D2
D3
D4
District
0%
2%
91%
7%
1%
5%
88%
6%
2%
8%
89%
2%
1%
3%
82%
14%
Excellent
Good
Fair
Poor

Figure 16

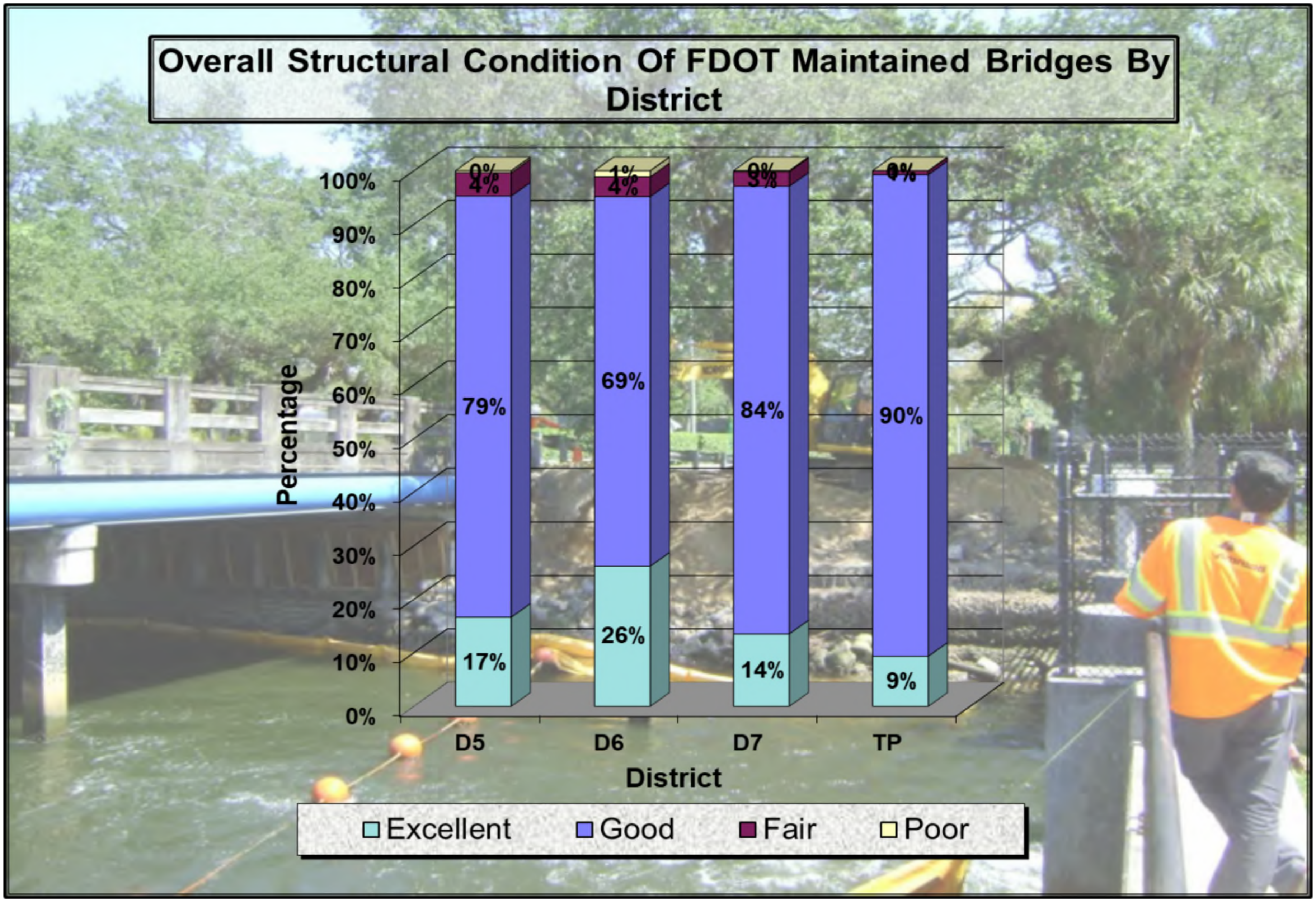

Overall Structural Condition Of FDOT Maintained Bridges By District
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
4%
79%
17%
1%
4%
69%
26%
0%
3%
84%
14%
90%
9%
D5
D6
D7
TP
District
Excellent
Good
Fair
Poor

Figure 17

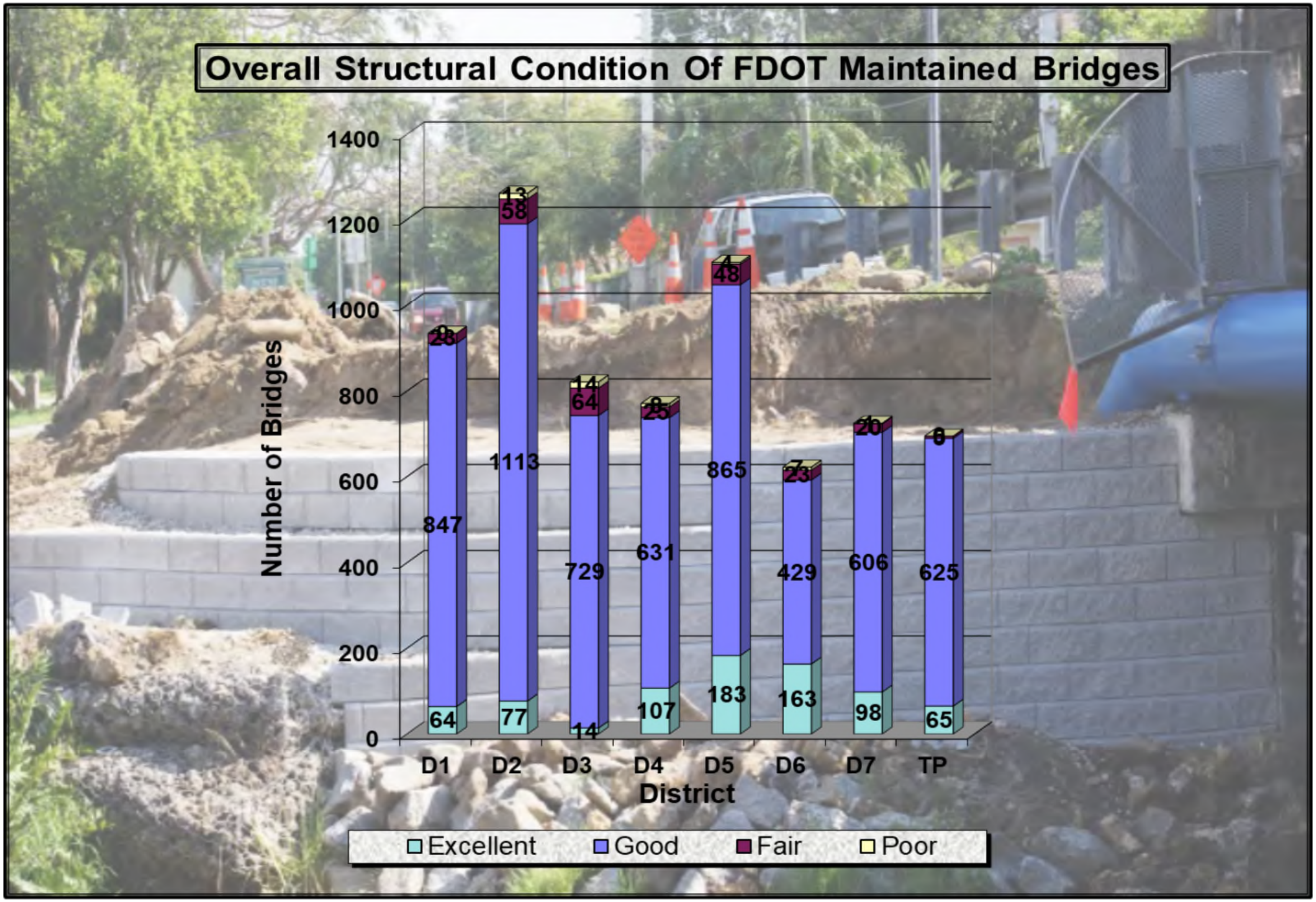

Overall Structural Condition Of FDOT Maintained Bridges
Number of Bridges
1400
1200
1000
800
600
400
200
0
13
58
14
64
4
48
7
23
20
847
1113
729
631
865
429
606
625
64
77
14
107
183
163
98
65
D1
D2
D3
D4
D5
D6
D7
TP
District
Excellent
Good
Fair
Poor

Figure 18

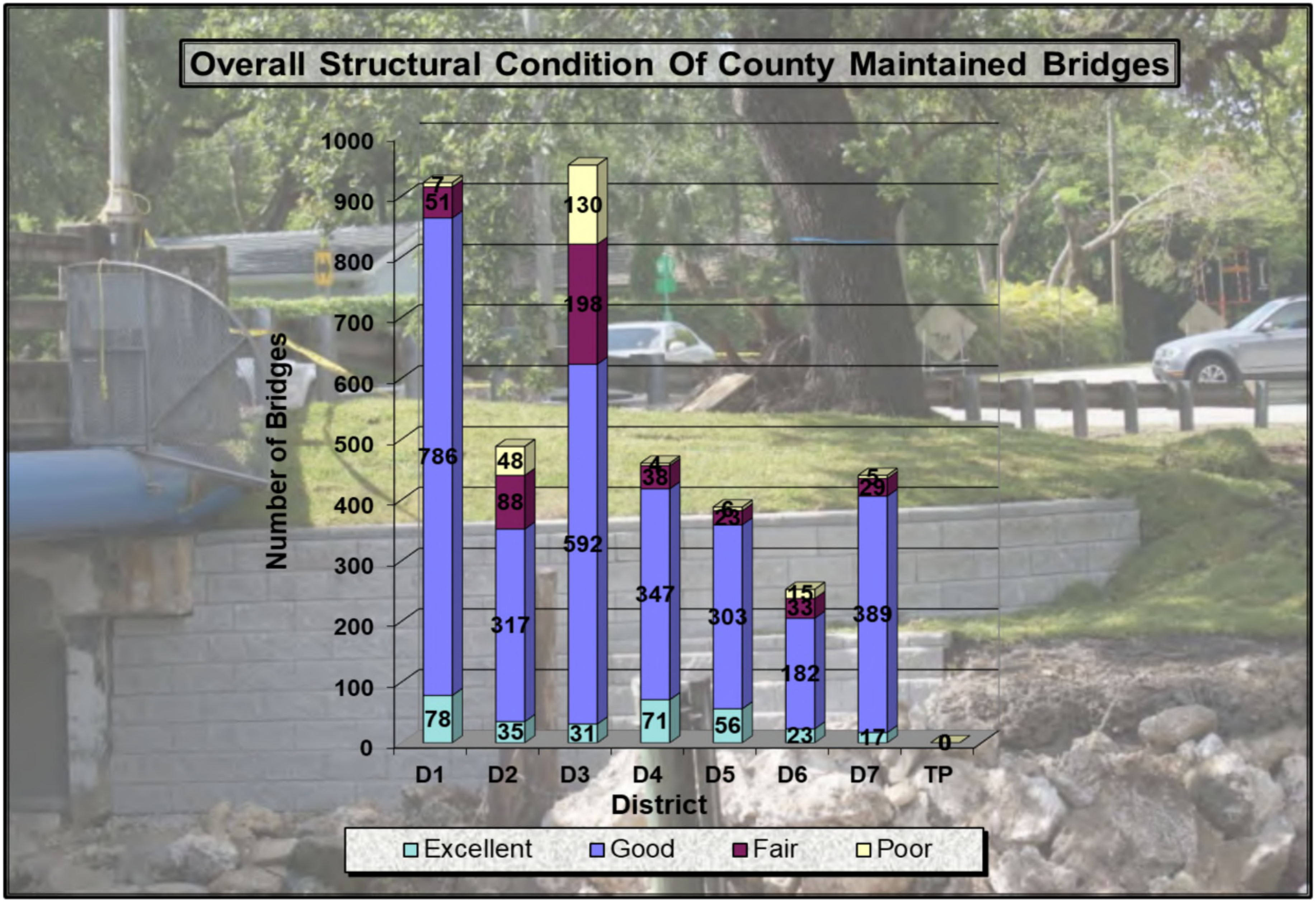

Overall Structural Condition Of County Maintained Bridges
Number of Bridges
1000
900
800
700
600
500
400
300
200
100
0
D1
D2
D3
D4
D5
D6
D7
TP
District
7
51
786
78
48
88
317
35
130
198
592
31
4
38
347
71
6
23
303
56
15
33
182
23
5
29
389
17
0
Excellent
Good
Fair
Poor

Figure 19

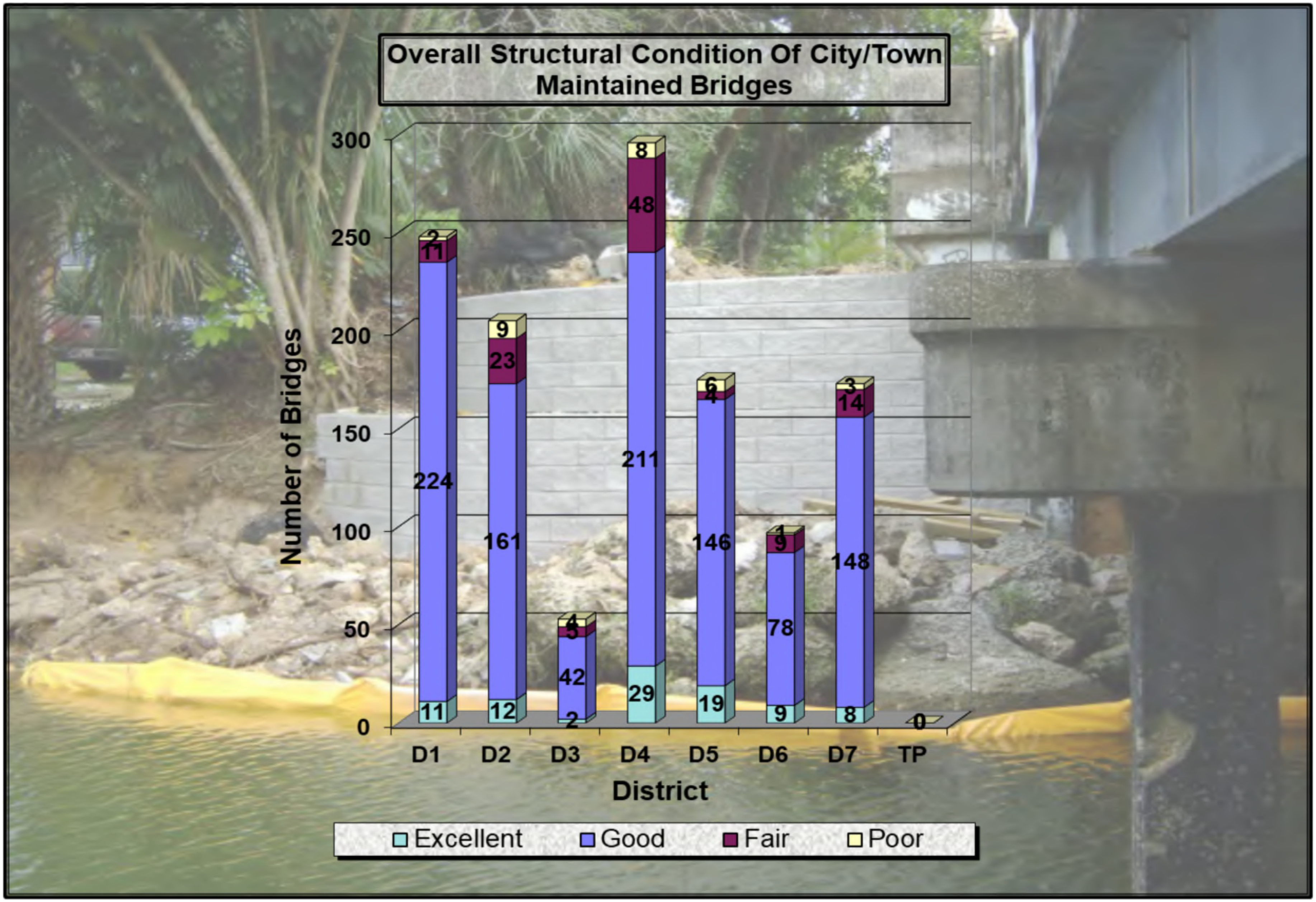

Overall Structural Condition Of City/Town Maintained Bridges
300
250
200
150
100
50
0
Number of Bridges
2
11
224
11
9
23
161
12
4
5
42
2
8
48
211
29
6
4
146
19
1
9
78
9
3
14
148
8
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Excellent
Good
Fair
Poor

Figure 20

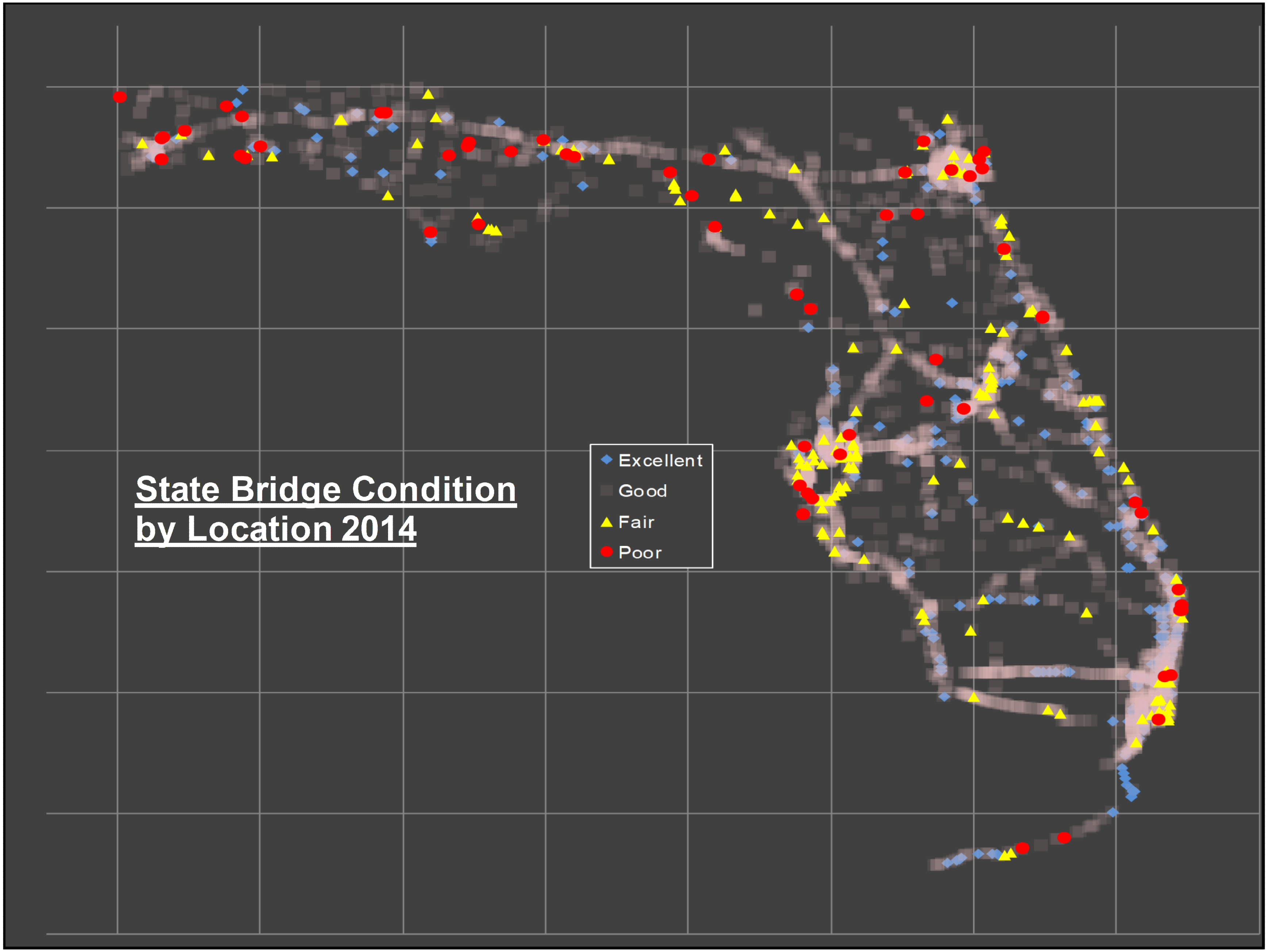

State Bridge Condition
by Location 2014
Excellent
Good
Fair
Poor

Figure 21

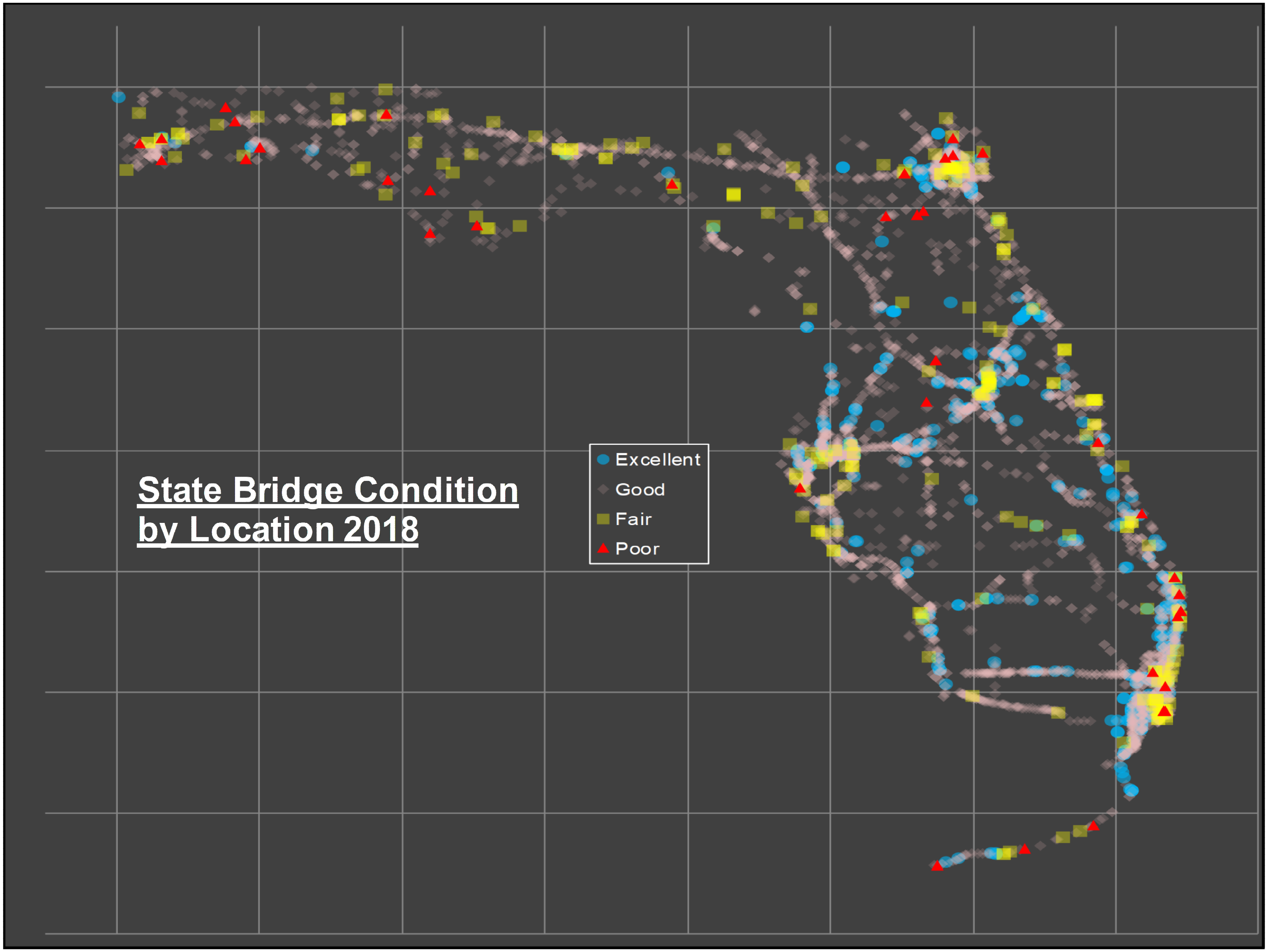
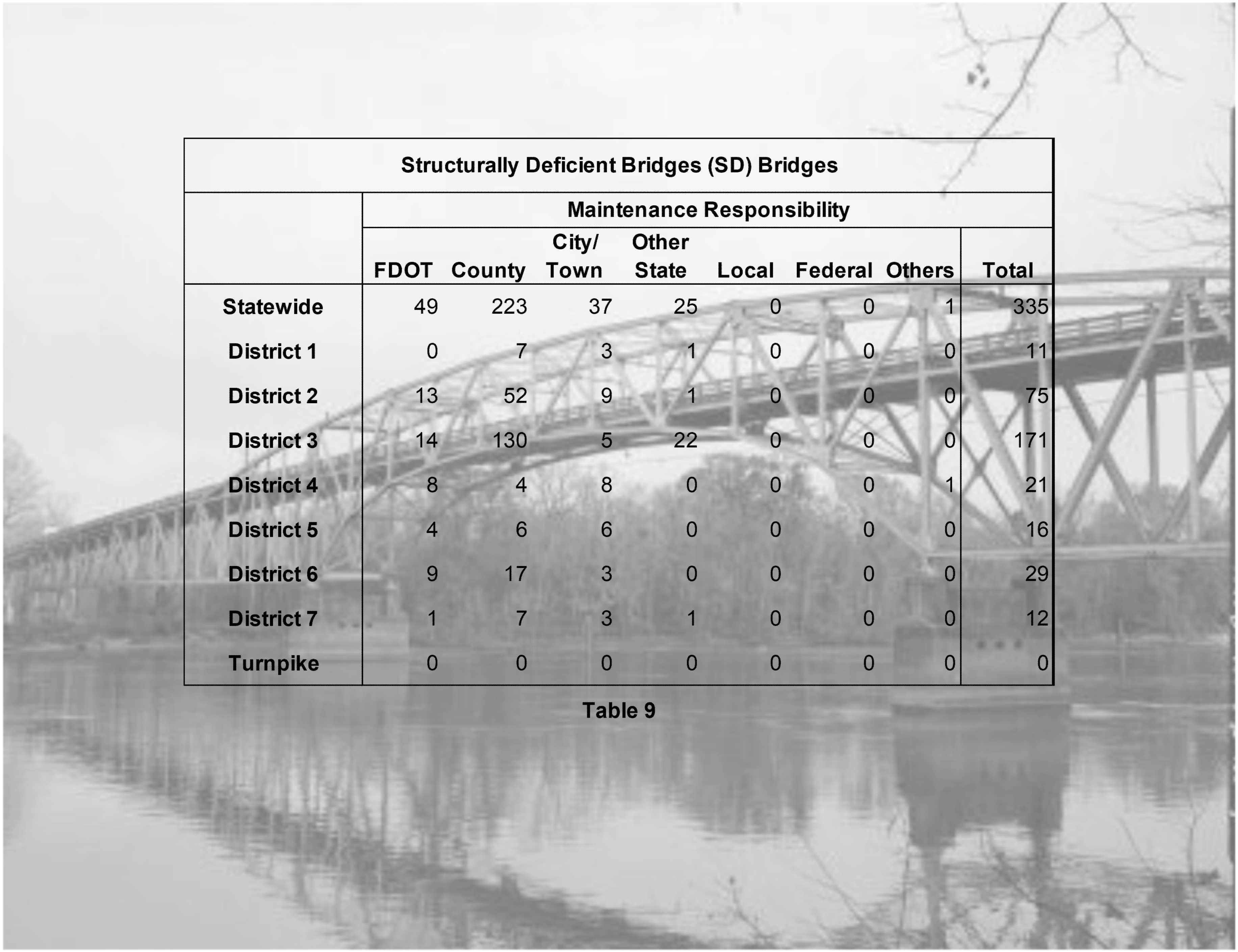

State Bridge Condition
by Location 2018
Excellent
Good
Fair
Poor

Figure 22

Structurally Deficient Bridges

The FDOT follows the Federal Highway Administration's (FHWA) definition to identify structurally deficient bridges. A bridge can have structural deterioration but not be considered structurally deficient, mostly due to the material safety factors and conservatism inherent in bridge design practices. The FHWA defines a structurally deficient bridge to have a poor (numerical rating of 4), or worse, condition rating for the deck, superstructure, or substructure component, or culvert. Additionally, if the bridge is considered intolerable with regards to its ability to carry legal loads or its serviceability during floods, it is also considered to be structurally deficient. FDOT's work program requires that structurally deficient bridges, once identified, have corrective actions (repair or replacement) initiated within six years. Structurally deficient bridges are not considered unsafe for public use unless the bridge is also closed.

There are currently 335 structurally deficient bridges in Florida, with over 66.57% having county maintenance responsibility. Forty-nine (14.63%) of the structurally deficient bridges are maintained by FDOT (see Figure 23). Refer to Figure 24 for a presentation of structurally deficient bridges, by district, for each of the maintenance responsibility groups. Over 81.61% of the County Government maintained structurally deficient bridges are concentrated within District 2 and 3. Over 45.95% of the City/Town maintained structurally deficient bridges are concentrated within Districts 2, 3, and 4.



Structurally Deficient Bridges (SD) Bridges								
	Maintenance Responsibility							
	FDOT	County	City/ Town	Other State	Local	Federal	Others	Total
Statewide	49	223	37	25	0	0	1	335
District 1	0	7	3	1	0	0	0	11
District 2	13	52	9	1	0	0	0	75
District 3	14	130	5	22	0	0	0	171
District 4	8	4	8	0	0	0	1	21
District 5	4	6	6	0	0	0	0	16
District 6	9	17	3	0	0	0	0	29
District 7	1	7	3	1	0	0	0	12
Turnpike	0	0	0	0	0	0	0	0

Table 9

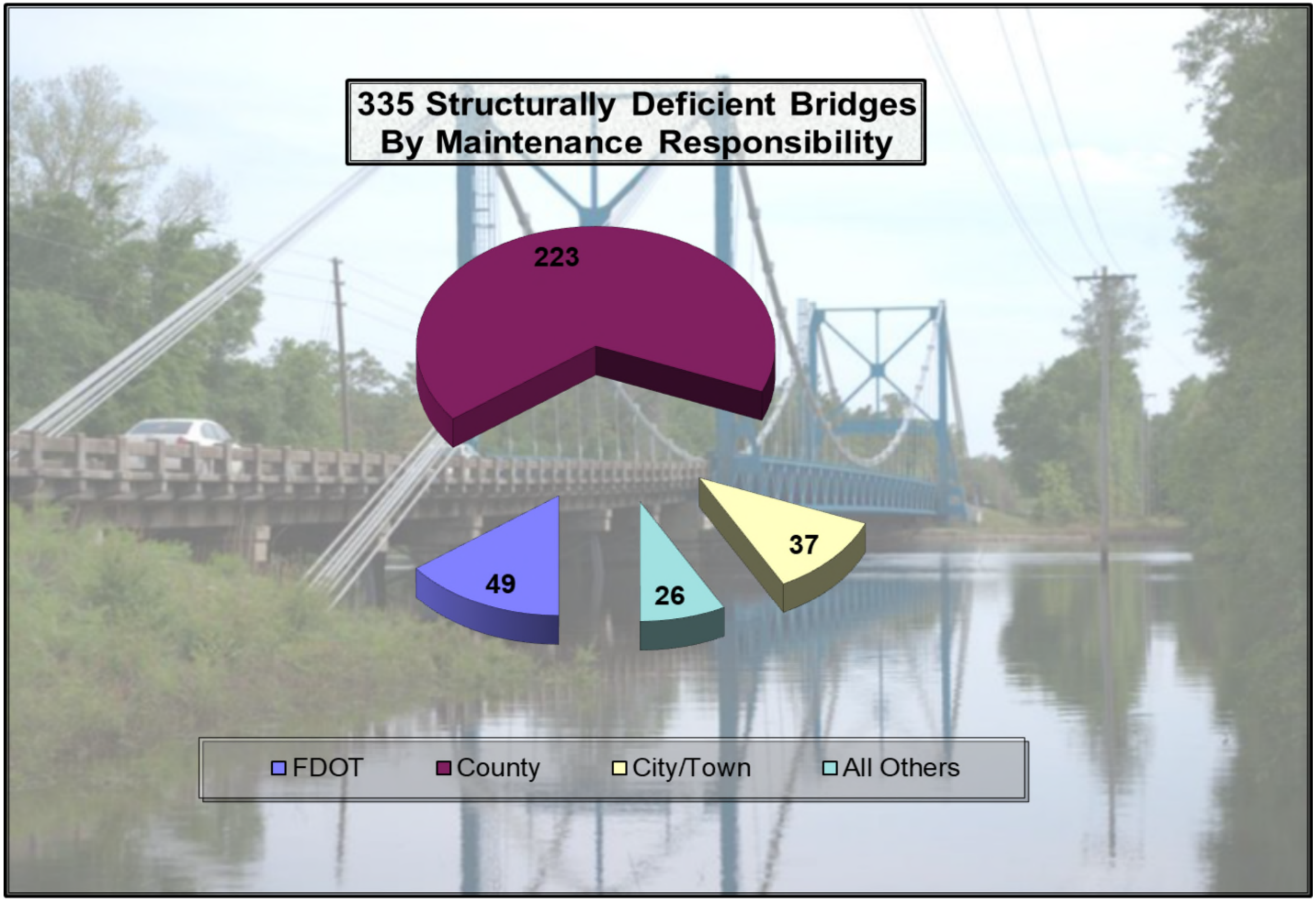

335 Structurally Deficient Bridges
By Maintenance Responsibility
223
49
26
37
FDOT
County
City/Town
All Others

Figure 23

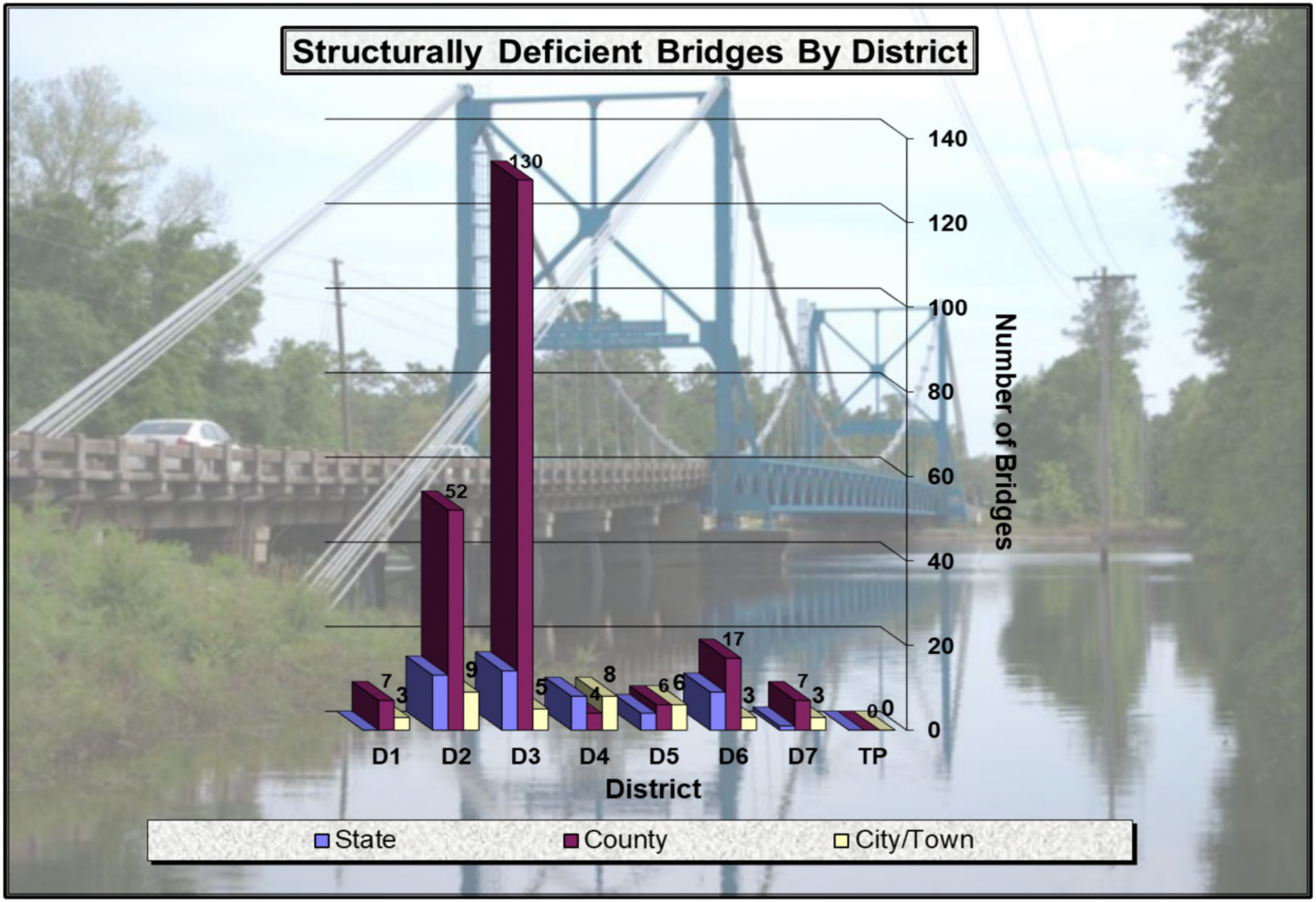

Structurally Deficient Bridges By District
140
120
100
80
60
40
20
0
Number of Bridges
7
3
52
9
130
5
4
8
6
6
17
3
7
3
0
0
D1
D2
D3
D4
D5
D6
D7
TP
District
State
County
City/Town

Figure 24

Posted and Closed Bridges

The operational status of a bridge indicates whether the bridge is unrestricted or open to all traffic, closed to all traffic, or posted for some sort of traffic restriction. Posting restrictions generally refer to gross vehicular weights of truck traffic. The needs to post weight restrictions at on bridges are generally caused by the inability of individual bridge members to adequately carry the applied legal loads. The inability to carry the applied legal loads can be the result of either advanced structural deterioration that results in a loss of material strength, obsolete member proportions, or a combination of these two factors. Older bridges were typically designed for smaller loads than today's standards would require, and as a result, the member sizes are often smaller in relation to what would be designed today. Like structurally deficient bridges, posted bridges receive the highest priority in the FDOT bridge construction program. Construction to replace the bridge or rehabilitation to strengthen the bridge must be initiated within six years from the time the posting requirement is first determined.

Table 10 presents the number of posted and closed bridges by maintenance responsibility group, for each of the districts. There are currently 675 posted or closed bridges in Florida, with County Governments having maintenance responsibility for over 76.59% of the total. City and Town Governments are responsible for the maintenance of over 17.19% of the total, while the FDOT is responsible for only 9 of the 675 bridges (1.33%) (see Figure 25). The number of posted County bridges (517 bridges) is much greater than the number of structurally deficient County bridges (223), which indicated that the majority of County bridge posting restrictions are caused by obsolete design, rather than advanced structural deterioration.

Of the 9 posted or closed bridges maintained by the FDOT, Districts 1, 4, 7, and Turnpike had none (see Figure 26). Three Hundred and Seventy Three (72.15%) of the posted or closed bridges maintained by County Governments are concentrated within Districts 2 and 3 (see Figure 27). Sixty-four (55.17%) of the posted or closed bridges maintained by City/Town Governments are concentrated within Districts 2 and 4 (see Figure 28). Statewide, 65.63% of all posted or closed bridges are within the boundaries of Districts 2 and 3.

Posted and Closed Bridges

	Maintenance Responsibility								Maintenance Responsibility							
	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total
	District 1								District 5							
Posted	0	75	14	2	0	0	0	91	0	19	19	3	2	0	0	43
Closed	0	2	1	0	0	0	0	3	2	1	0	0	0	0	0	3
Total	0	77	15	2	0	0	0	94	2	20	19	3	2	0	0	46
	District 2								District 6							
Posted	2	89	33	4	0	0	0	128	0	13	4	0	0	0	0	17
Closed	0	7	1	0	0	0	0	8	3	3	2	0	0	0	0	8
Total	2	96	34	4	0	0	0	136	3	16	6	0	0	0	0	25
	District 3								District 7							
Posted	0	264	7	18	0	0	0	289	0	7	4	0	0	0	0	11
Closed	2	13	1	2	0	0	0	18	0	3	0	0	0	0	0	3
Total	2	277	8	20	0	0	0	307	0	10	4	0	0	0	0	14
	District 4								Turnpike							
Posted	0	21	30	1	0	0	0	52	0	0	0	0	0	0	0	0
Closed	0	0	0	0	0	0	1	1	0	0	0	0	0	0	0	0
Total	0	21	30	1	0	0	1	53	0	0	0	0	0	0	0	0
									Statewide							
								Posted	2	488	111	28	2	0	0	631
								Closed	7	29	5	2	0	0	1	44
								Total	9	517	116	30	2	0	1	675

Table 10

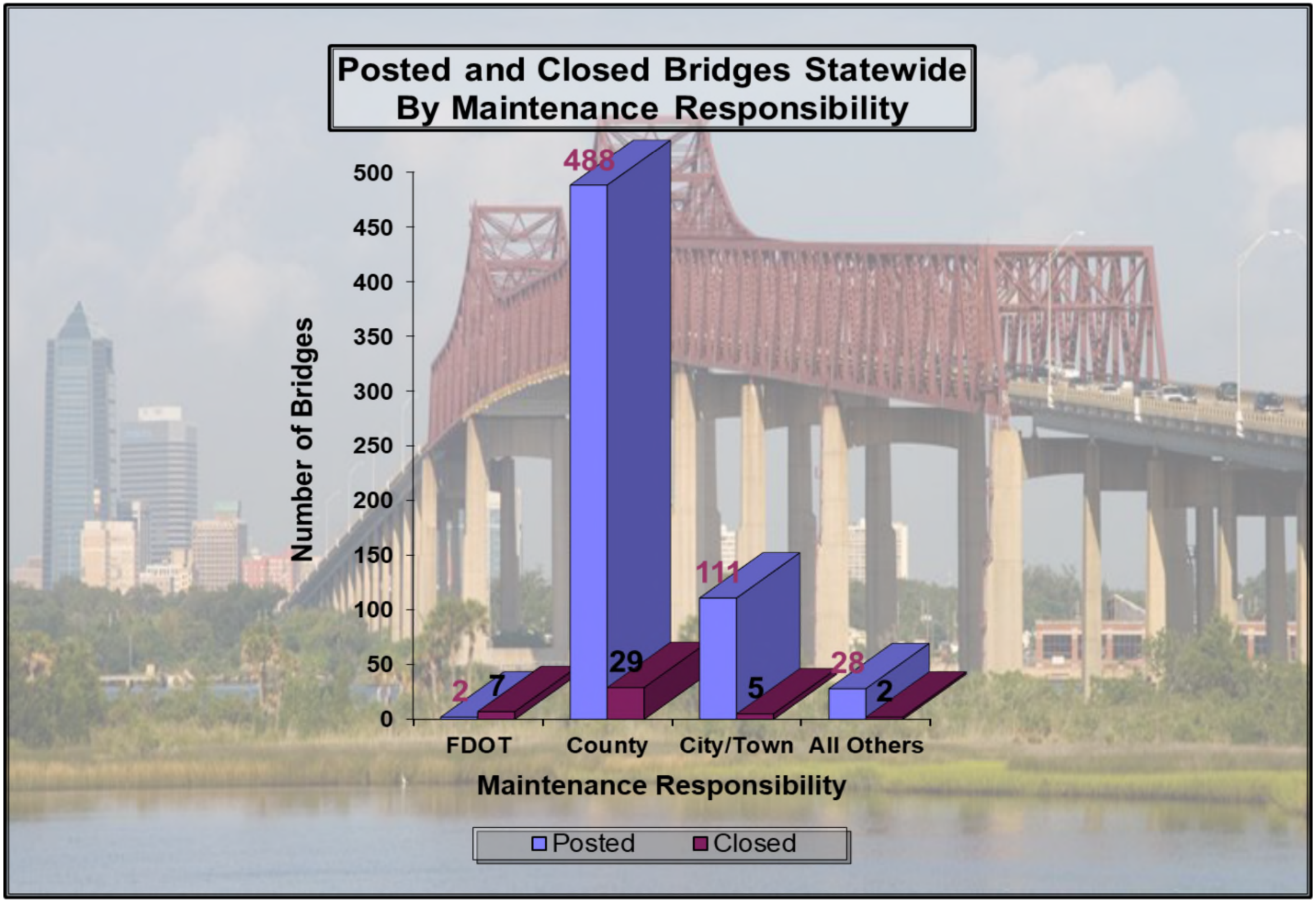
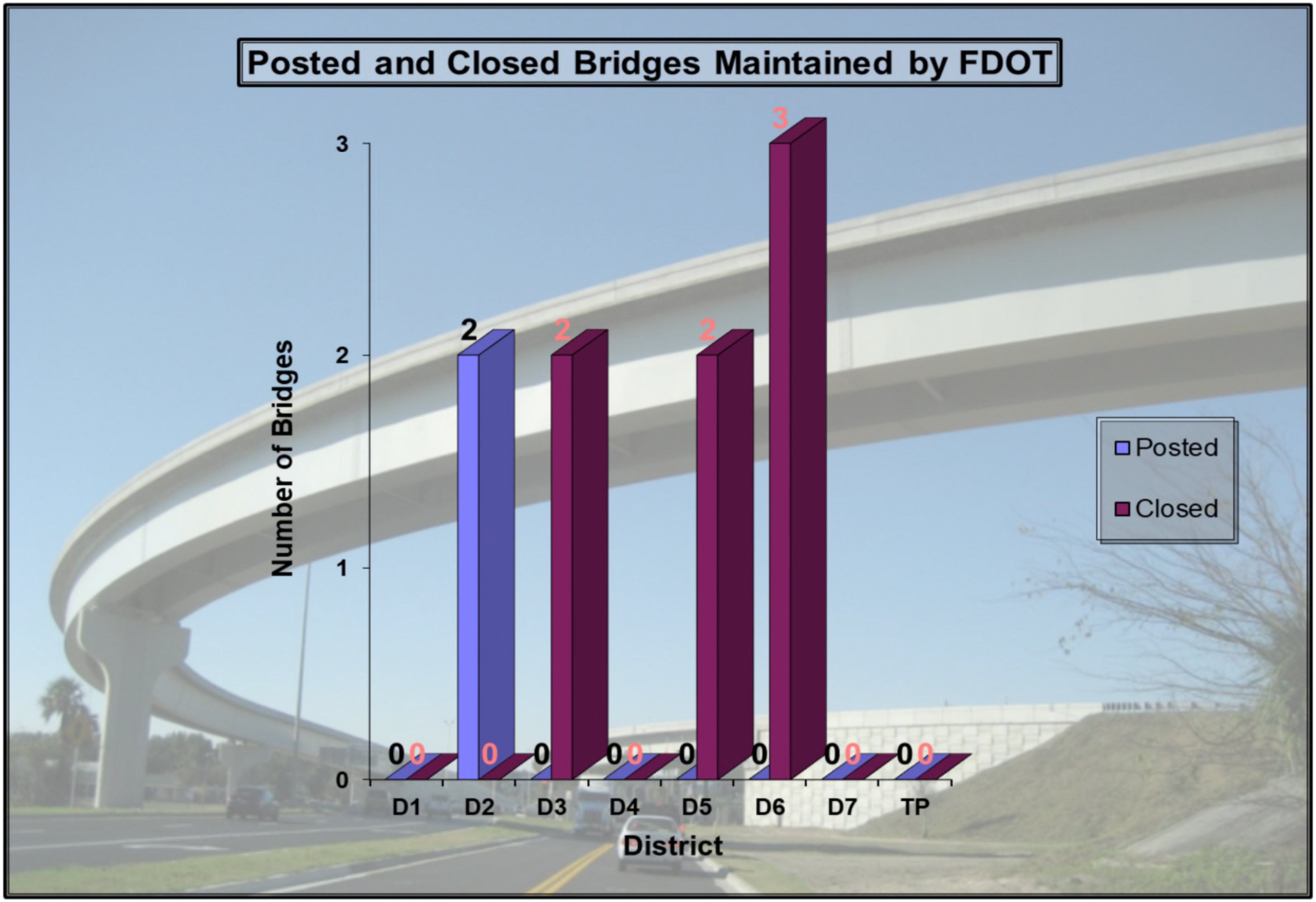

Posted and Closed Bridges Statewide
By Maintenance Responsibility
Number of Bridges
500
450
400
350
300
250
200
150
100
50
0
2
7
488
29
111
5
28
2
FDOT
County
City/Town
All Others
Maintenance Responsibility
Posted
Closed

Figure 25



Posted and Closed Bridges Maintained by FDOT
Number of Bridges
0
1
2
3
District
D1
D2
D3
D4
D5
D6
D7
TP
Posted
Closed
0 0
2 0
0 2
0 0
0 2
0 3
0 0
0 0

Figure 26

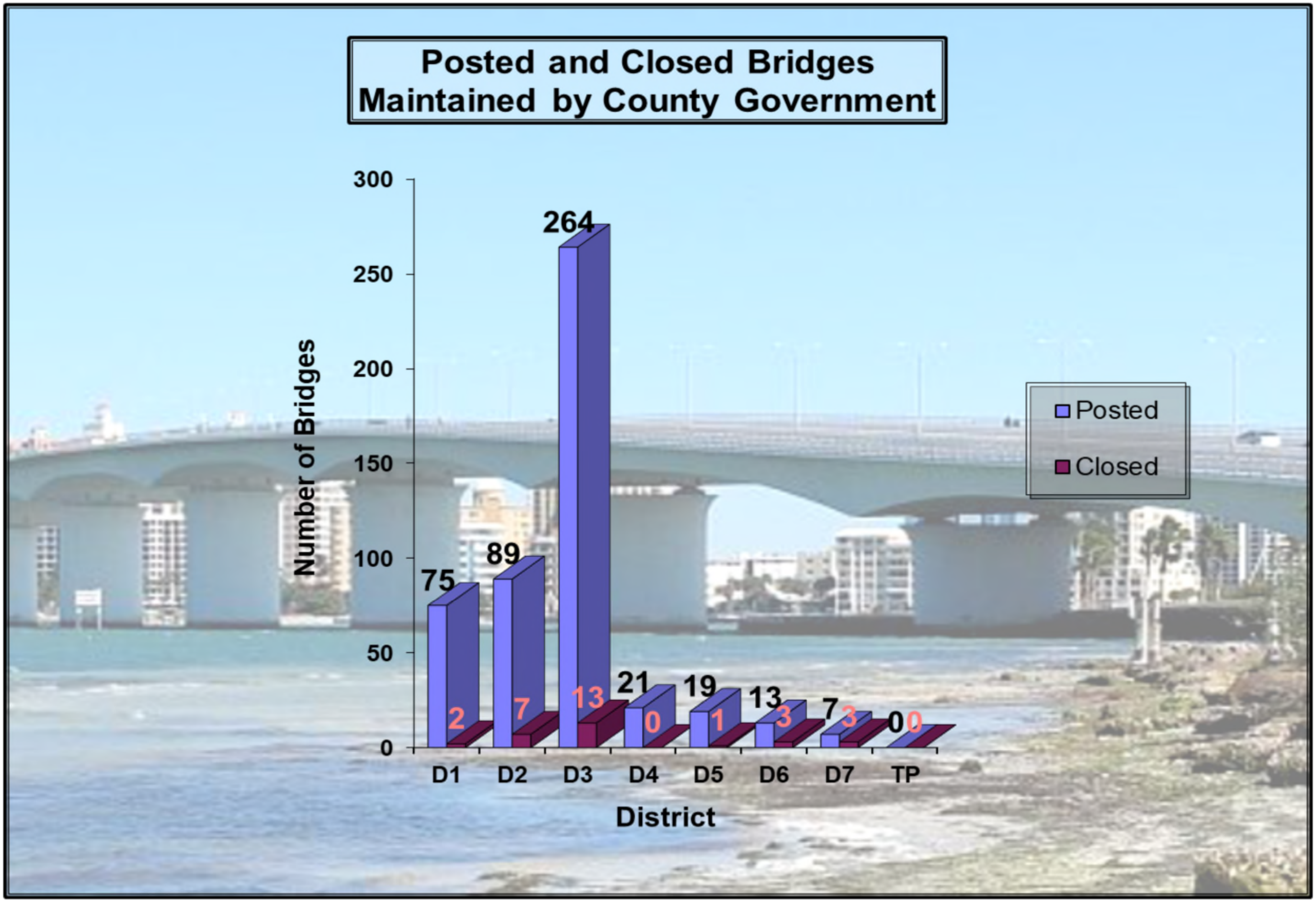

Posted and Closed Bridges
Maintained by County Government
Number of Bridges
300
250
200
150
100
50
0
75
89
264
21
19
13
7
0
2
7
13
0
1
3
3
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Posted
Closed

Figure 27

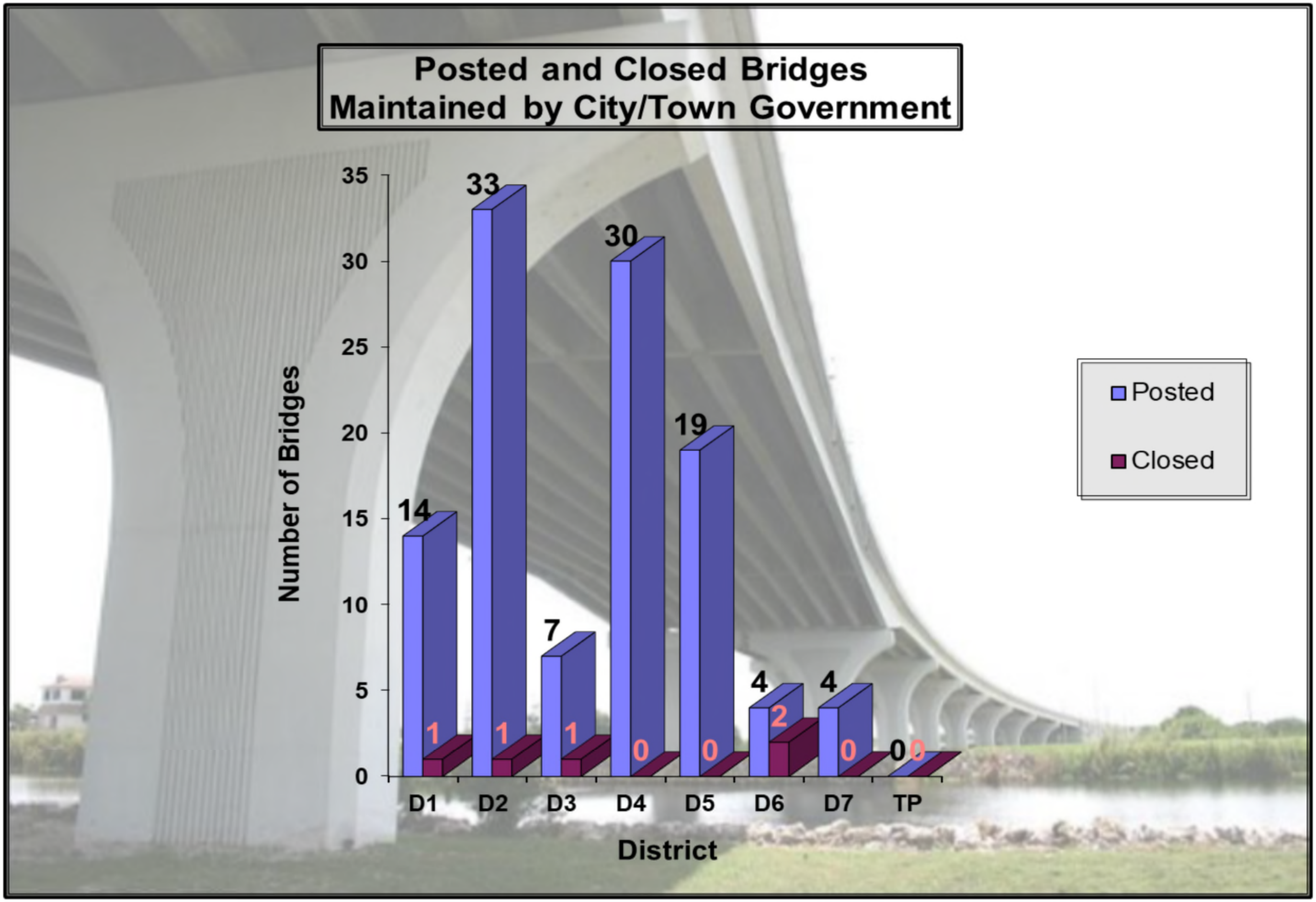
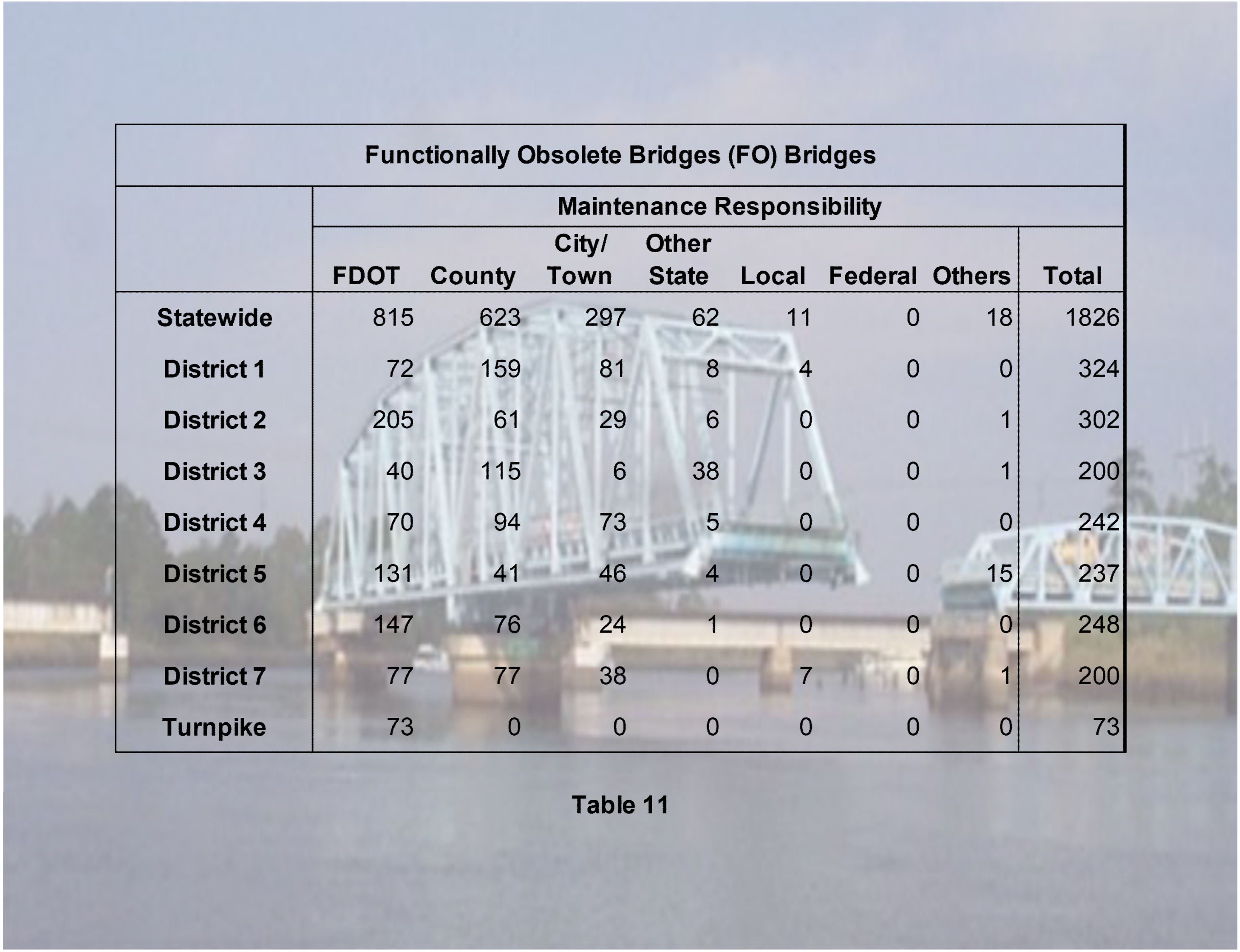

Posted and Closed Bridges
Maintained by City/Town Government
Number of Bridges
35
30
25
20
15
10
5
0
14
33
7
30
19
4
4
0
1
1
1
0
0
2
0
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Posted
Closed

Figure 28

Functionally Obsolete Bridges

The FDOT follows the Federal Highway Administration's (FHWA) definition to identify functionally obsolete bridges. Functional obsolescence attempts to appraise the level of service a bridge provides in relation to the level of service for the highway the bridge is located on. As the level of service for the highway system changes, for example, an increase in traffic volume, a bridge can become functionally obsolete if it has geometric constraints that affect the flow of traffic on, or under, the bridge. Structural deterioration generally does not influence whether a bridge is considered functionally obsolete. Any bridge classified as structurally deficient is excluded from the functionally obsolete category. A functionally obsolete a bridge needs to have at least one of the following five criteria appraised as intolerable and requiring corrective action: 1) deck geometry (the curb-to-curb width of the bridge deck as it relates to number of traffic lanes, traffic volume, and highway classification); 2) vertical and horizontal under clearances (unrestricted clearances as related to highway classification); 3) approach roadway alignment (the inspector's subjective appraisal of the need to reduce vehicle operating speed as the bridge is approached from the highway); 4)structural evaluation (considers the numerical condition ratings for the deck, superstructure, or substructure bridge component, or for the culvert; load carrying capacity; and traffic volume); 5) waterway adequacy (the inspector's subjective appraisal of the bridge site's ability to accommodate the flow of flood water).

There are currently 1,826 functionally obsolete bridges in Florida, about 14.78% of the total. The FDOT has maintenance responsibility for over 44.63% of all functionally obsolete bridges (see Figure 29). Refer to Figure 30 for a presentation of functionally obsolete bridges, by district, for each of the three maintenance responsibility groups.



Functionally Obsolete Bridges (FO) Bridges								
	Maintenance Responsibility							
	FDOT	County	City/ Town	Other State	Local	Federal	Others	Total
Statewide	815	623	297	62	11	0	18	1826
District 1	72	159	81	8	4	0	0	324
District 2	205	61	29	6	0	0	1	302
District 3	40	115	6	38	0	0	1	200
District 4	70	94	73	5	0	0	0	242
District 5	131	41	46	4	0	0	15	237
District 6	147	76	24	1	0	0	0	248
District 7	77	77	38	0	7	0	1	200
Turnpike	73	0	0	0	0	0	0	73

Table 11

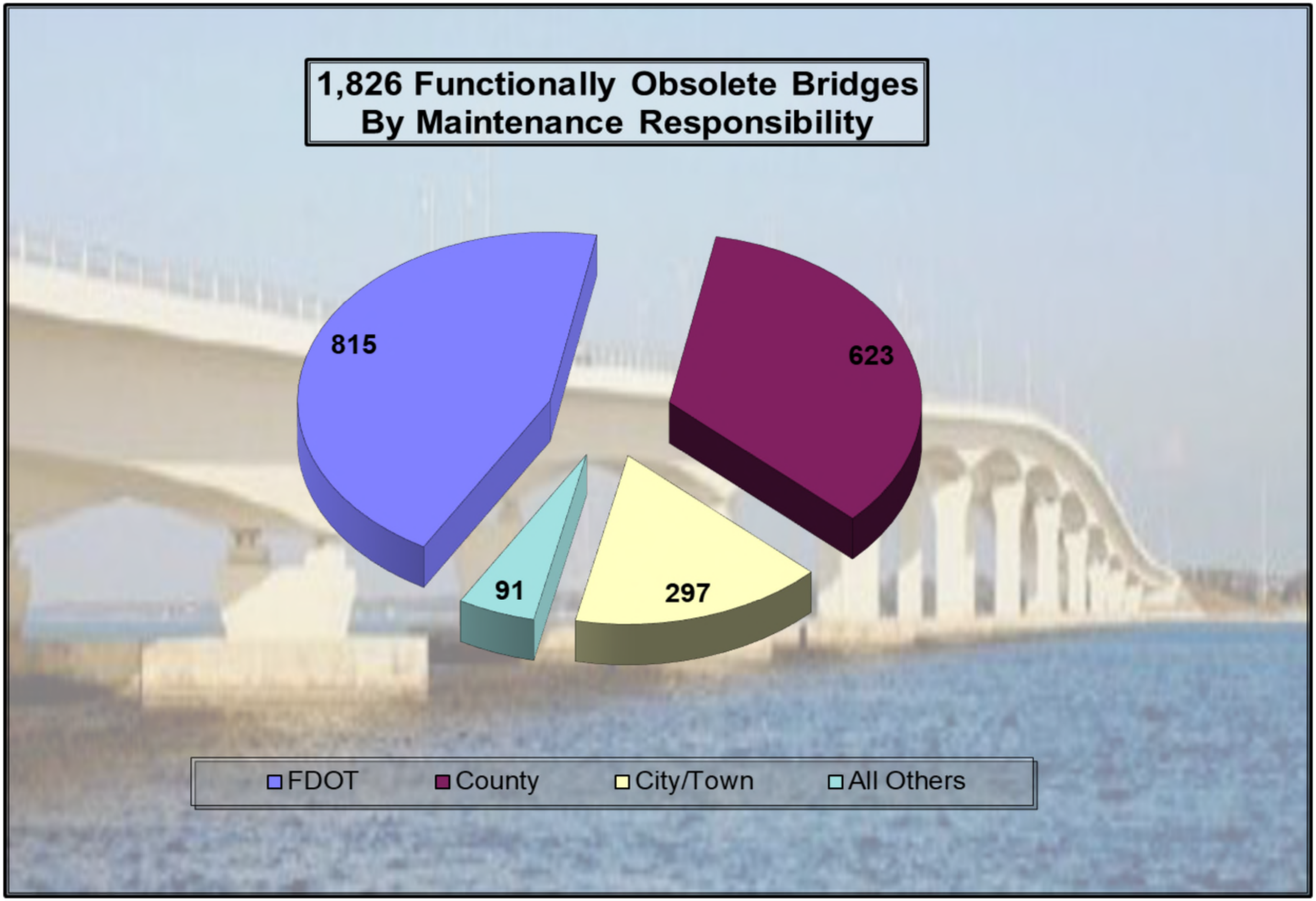

1,826 Functionally Obsolete Bridges
By Maintenance Responsibility
815
623
91
297
FDOT
County
City/Town
All Others

Figure 29

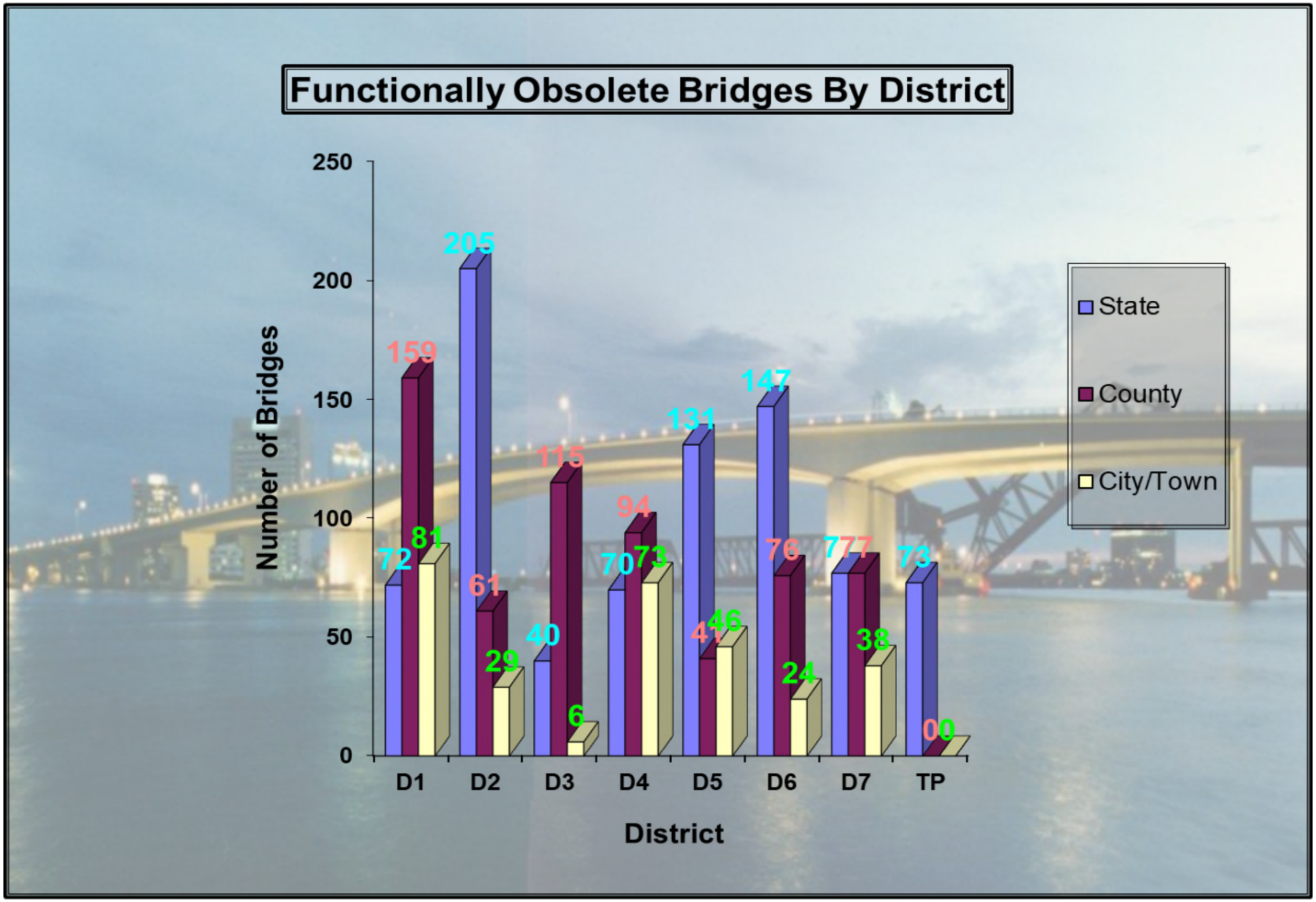

Functionally Obsolete Bridges By District
Number of Bridges
250
200
150
100
50
0
205
159
72
81
61
29
40
115
6
94
70
73
131
41
46
147
76
24
77
77
38
73
0
0
D1
D2
D3
D4
D5
D6
D7
TP
District
State
County
City/Town

Figure 30

Bridge Replacement Cost

This section provides a replacement cost estimate for the bridge inventory. As the unit cost values used in this estimate are based on very general assumptions, they should in no way be construed as adequate for estimating the cost of an individual bridge. However, as they are based on historical cost data, tempered with engineering judgment, these numbers may be useful for identifying relative trends in the distribution of the bridge inventory based on structure cost.

The estimate includes only construction of the structure. There are no values associated with R.O.W., approach work, design engineering, preliminary engineering, future maintenance and operation cost, or any other activity not associated with the actual construction of the bridge.

The bridge-structures (bridges) cost estimate is based on the present day replacement cost of the existing structure. This type of estimate is normally calculated based on the area of bridge deck (square feet) times a unit cost ($ per square foot) for the particular bridge type. The Maintenance Office uses a division of these bridge types by 13 categories based superstructure type. These categories were used to define the unit cost for the bridge types.

The basis for developing the unit costs was taken from the Bridge Development Report Cost Estimating Guide found in the LRFD (Load Resistance Factor Design) Structures Design Guidelines published by the FDOT Structures Design Office in Tallahassee. Using these numbers and engineering judgment average unit costs were developed that could be combined with the bridge data as stored in the bridge inventory database. This data base is managed by the FDOT Maintenance Office Bridge Maintenance System, also known as BrM. The BrM database records bridge superstructure type by two parameters. These are the superstructure design type and the (predominate) superstructure construction material. To summarize this process, average unit superstructure deck costs were derived from the structures guidelines. These numbers were then assigned to all possible combinations of 22 superstructure design types and 9 material types found in BrM. Each of these combinations were then assigned an appropriate number from the 13 superstructure types as mentioned above. Then using the bridge inventory database, the assigned unit cost was multiplied by the superstructure deck area to arrive at a reasonable estimated replacement cost for each bridge.

FDOT Bridge Deck Area (Square Feet)

	Decade Constructed									
	>1930's	1940's	1950's	1960's	1970's	1980's	1990's	2000's	2010's	Total
R/C Slab	52,000	234,922	530,730	698,921	643,010	695,290	1,681,672	1,121,840	414,213	6,072,598
P/C Slab	39,593	0	67,606	855,147	739,581	704,242	337,760	23,259	91,659	2,858,846
R/C Beam	220,913	190,217	530,069	0	0	0	11,260	31,399	432,257	1,416,115
P/C Beam	21,054	0	3,303,952	12,378,582	16,250,315	15,476,986	12,605,635	15,453,232	7,622,063	83,111,819
Steel Beam	452,369	185,796	1,963,408	4,828,591	7,584,504	2,849,111	3,213,836	3,652,958	1,268,483	25,999,056
Timber Beam	0	0	0	986	0	0	0	0	0	986
R/C Box	0	0	0	40,831	51,600	0	0	0	0	92,431
P/C Box	0	0	0	0	0	0	0	294,359	24,075	318,433
Steel Box	0	0	0	0	94,340	1,336,810	1,529,165	1,373,801	578,455	4,912,570
Truss	223,224	0	428,255	250,860	0	0	0	0	5,756	908,096
Movable	203,620	87,839	690,467	543,983	659,422	371,778	403,696	564,063	236,253	3,761,121
Culvert	90,174	124,849	322,694	622,996	359,896	145,205	165,999	186,655	85,126	2,103,594
Other	12,521	20,048	133,130	0	0	6,702,270	2,918,131	4,694,664	1,132,016	15,612,780
Total	1,315,468	843,669	7,970,313	20,220,896	26,382,668	28,281,691	23,024,716	27,396,231	11,890,356	147,326,008

Table 12

FDOT Bridge Replacement Cost ($1000's)										
	Decade Constructed									
	>1930's	1940's	1950's	1960's	1970's	1980's	1990's	2000's	2010's	Total
R/C Slab	6,240	28,466	64,302	92,462	92,532	100,941	247,659	161,150	54,988	848,741
P/C Slab	5,939	0	10,141	128,272	110,937	105,636	50,664	3,489	13,749	428,827
R/C Beam	20,987	18,071	50,357	0	0	0	1,070	2,983	42,554	136,021
P/C Beam	2,211	0	346,915	1,299,751	1,710,433	1,633,747	1,376,778	1,668,951	807,992	8,846,778
Steel Beam	50,342	22,089	228,622	607,091	905,496	360,704	404,079	455,252	161,415	3,195,090
Timber Beam	0	0	0	94	0	0	0	0	0	94
R/C Box	0	0	0	6,125	7,740	0	0	0	0	13,865
P/C Box	0	0	0	0	0	0	22,847	42,682	3,491	69,019
Steel Box	0	0	0	0	14,151	200,521	229,375	206,070	86,768	736,886
Truss	39,064	0	74,945	43,901	0	0	0	0	1,007	158,917
Movable	76,177	26,894	232,906	220,416	164,865	120,852	143,916	177,398	65,155	1,228,580
Culvert	8,567	11,861	30,656	59,185	34,190	13,794	15,770	17,732	8,087	199,841
Other	1,878	3,007	19,970	0	0	1,005,340	437,720	704,200	169,802	2,341,917
Total	211,404	110,388	1,058,814	2,457,295	3,040,344	3,541,537	2,929,877	3,439,908	1,415,008	18,204,575

Table 13

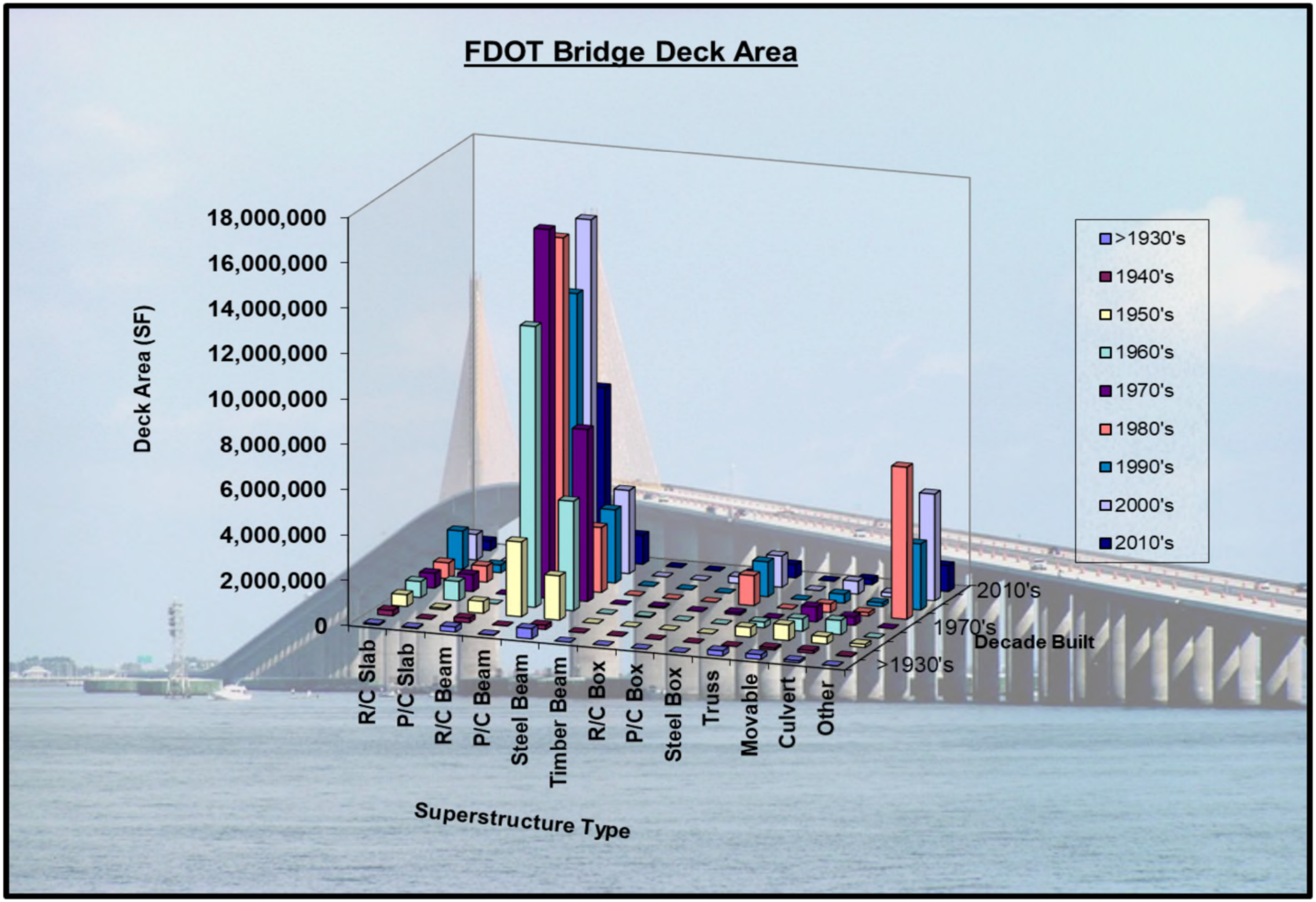

FDOT Bridge Deck Area
Deck Area (SF)
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
R/C Slab
P/C Slab
R/C Beam
P/C Beam
Steel Beam
Timber Beam
R/C Box
P/C Box
Steel Box
Truss
Movable
Culvert
Other
Superstructure Type
>1930's
1970's
2010's
Decade Built
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's

Figure 31

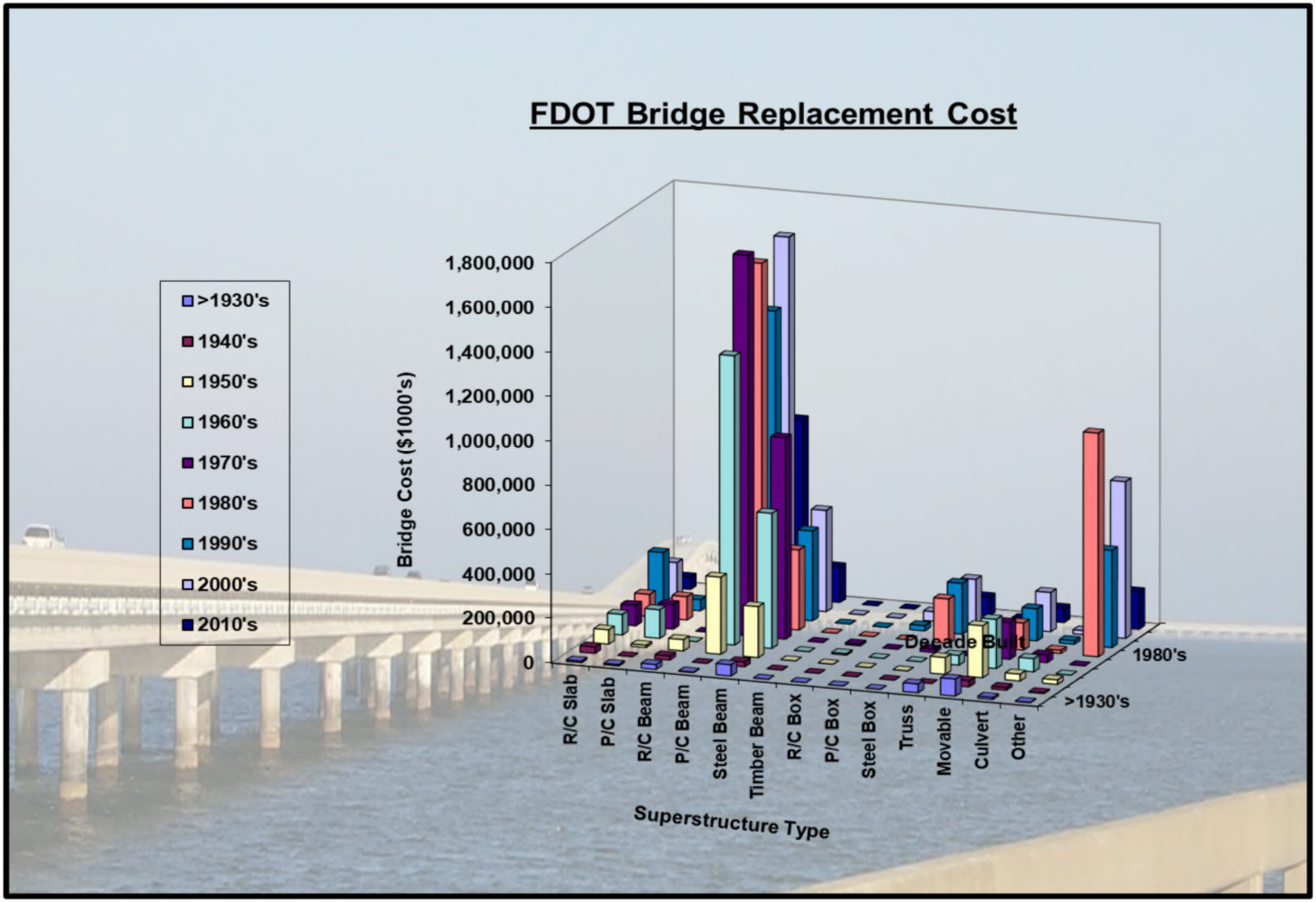
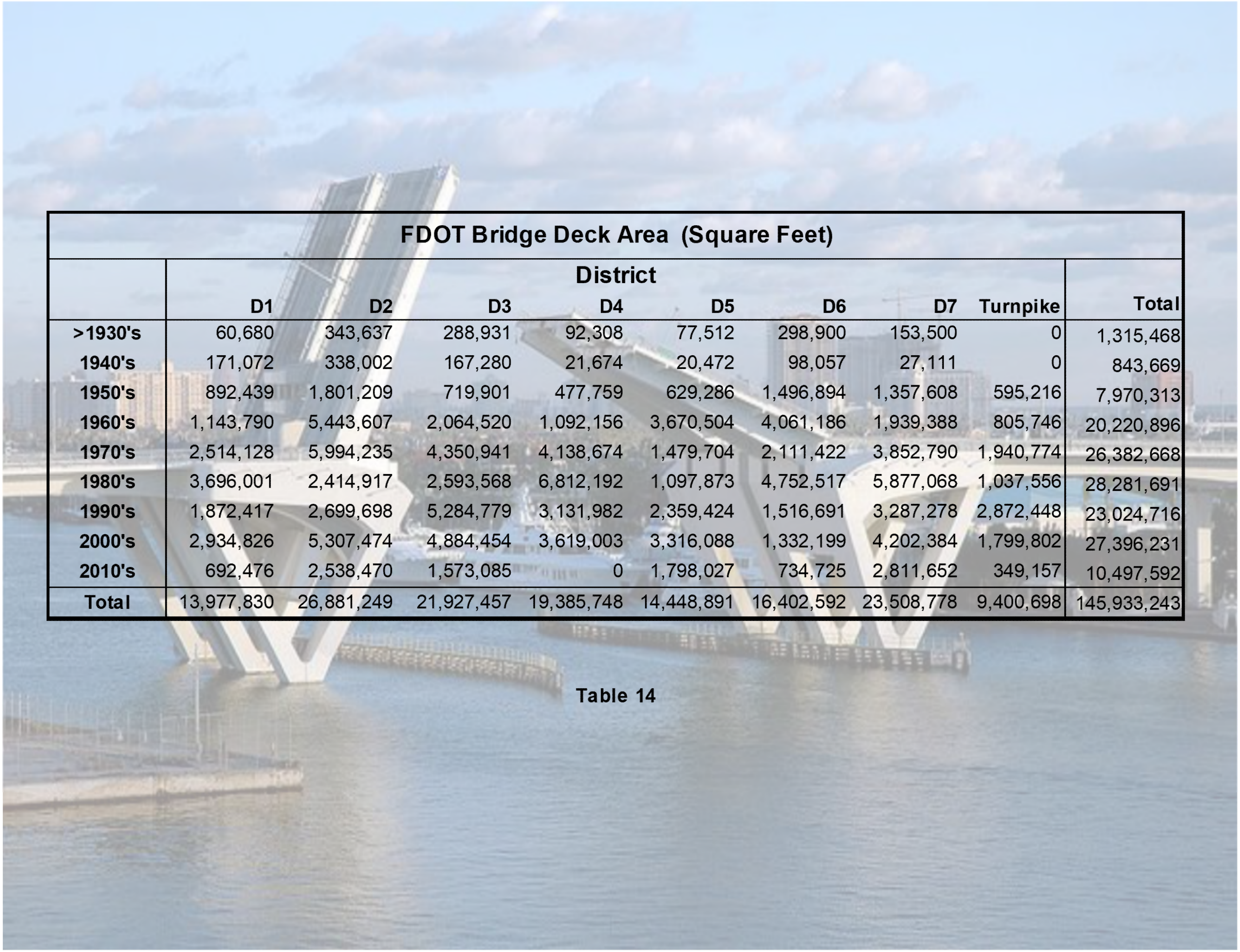

FDOT Bridge Replacement Cost
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's
Bridge Cost ($1000's)
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
R/C Slab
P/C Slab
R/C Beam
P/C Beam
Steel Beam
Timber Beam
R/C Box
P/C Box
Steel Box
Truss
Movable
Culvert
Other
Superstructure Type
Decade Built
1980's
>1930's

Figure 32



FDOT Bridge Deck Area (Square Feet)									
	District								
	D1	D2	D3	D4	D5	D6	D7	Turnpike	Total
>1930's	60,680	343,637	288,931	92,308	77,512	298,900	153,500	0	1,315,468
1940's	171,072	338,002	167,280	21,674	20,472	98,057	27,111	0	843,669
1950's	892,439	1,801,209	719,901	477,759	629,286	1,496,894	1,357,608	595,216	7,970,313
1960's	1,143,790	5,443,607	2,064,520	1,092,156	3,670,504	4,061,186	1,939,388	805,746	20,220,896
1970's	2,514,128	5,994,235	4,350,941	4,138,674	1,479,704	2,111,422	3,852,790	1,940,774	26,382,668
1980's	3,696,001	2,414,917	2,593,568	6,812,192	1,097,873	4,752,517	5,877,068	1,037,556	28,281,691
1990's	1,872,417	2,699,698	5,284,779	3,131,982	2,359,424	1,516,691	3,287,278	2,872,448	23,024,716
2000's	2,934,826	5,307,474	4,884,454	3,619,003	3,316,088	1,332,199	4,202,384	1,799,802	27,396,231
2010's	692,476	2,538,470	1,573,085	0	1,798,027	734,725	2,811,652	349,157	10,497,592
Total	13,977,830	26,881,249	21,927,457	19,385,748	14,448,891	16,402,592	23,508,778	9,400,698	145,933,243

Table 14

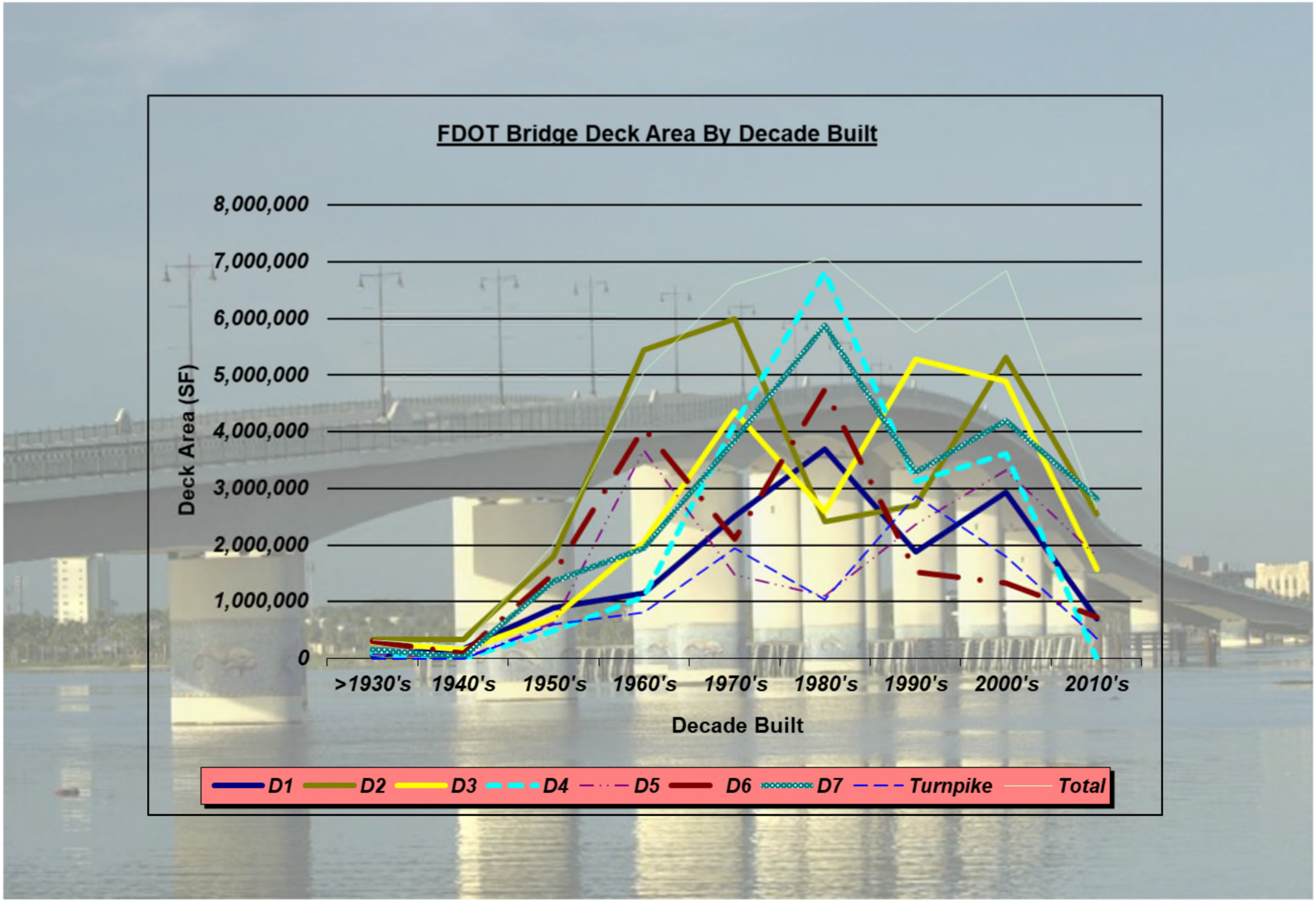
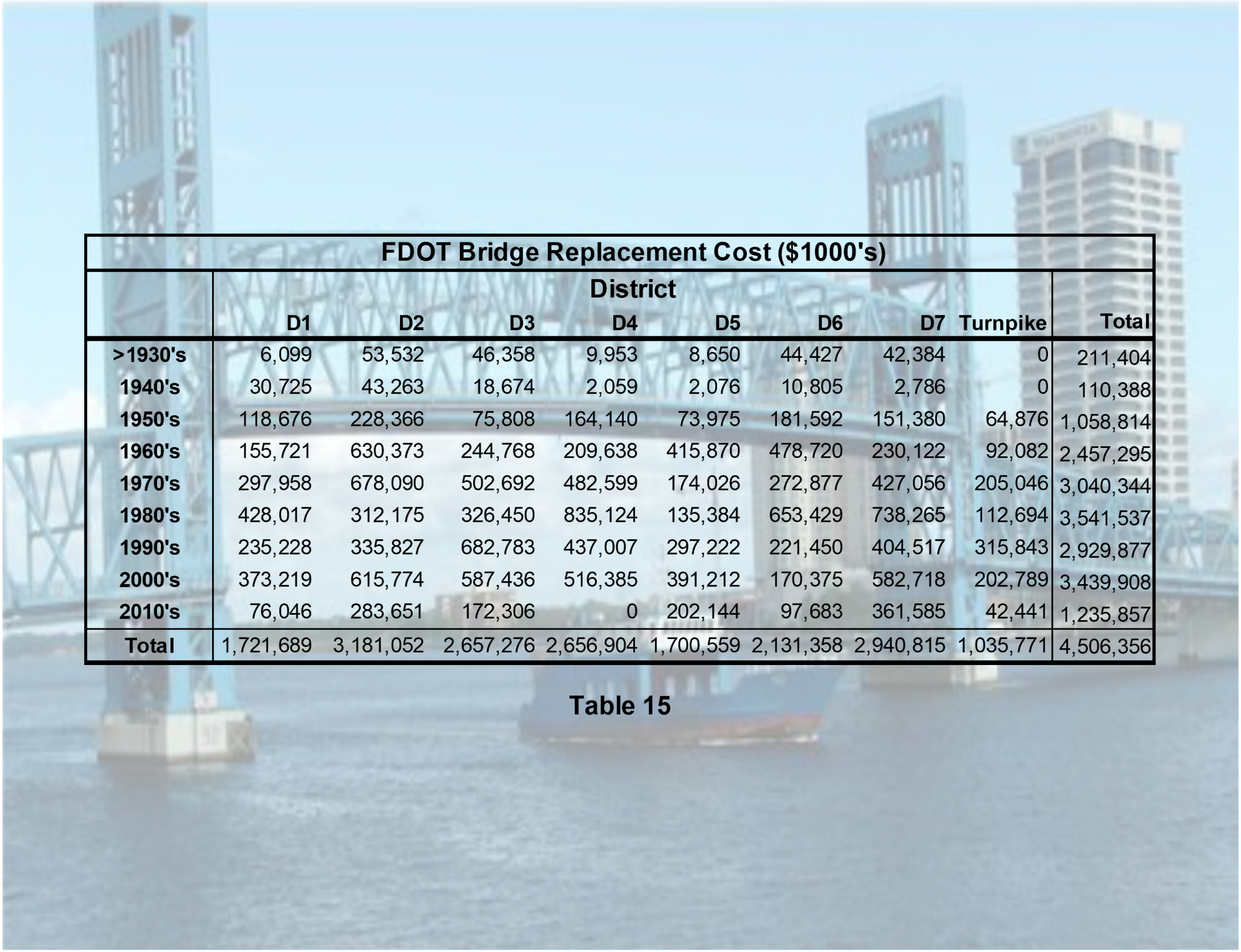

FDOT Bridge Deck Area By Decade Built
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
Deck Area (SF)
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's
Decade Built
D1
D2
D3
D4
D5
D6
D7
Turnpike
Total

Figure 33



FDOT Bridge Replacement Cost ($1000's)									
	District								
	D1	D2	D3	D4	D5	D6	D7	Turnpike	Total
>1930's	6,099	53,532	46,358	9,953	8,650	44,427	42,384	0	211,404
1940's	30,725	43,263	18,674	2,059	2,076	10,805	2,786	0	110,388
1950's	118,676	228,366	75,808	164,140	73,975	181,592	151,380	64,876	1,058,814
1960's	155,721	630,373	244,768	209,638	415,870	478,720	230,122	92,082	2,457,295
1970's	297,958	678,090	502,692	482,599	174,026	272,877	427,056	205,046	3,040,344
1980's	428,017	312,175	326,450	835,124	135,384	653,429	738,265	112,694	3,541,537
1990's	235,228	335,827	682,783	437,007	297,222	221,450	404,517	315,843	2,929,877
2000's	373,219	615,774	587,436	516,385	391,212	170,375	582,718	202,789	3,439,908
2010's	76,046	283,651	172,306	0	202,144	97,683	361,585	42,441	1,235,857
Total	1,721,689	3,181,052	2,657,276	2,656,904	1,700,559	2,131,358	2,940,815	1,035,771	4,506,356

Table 15

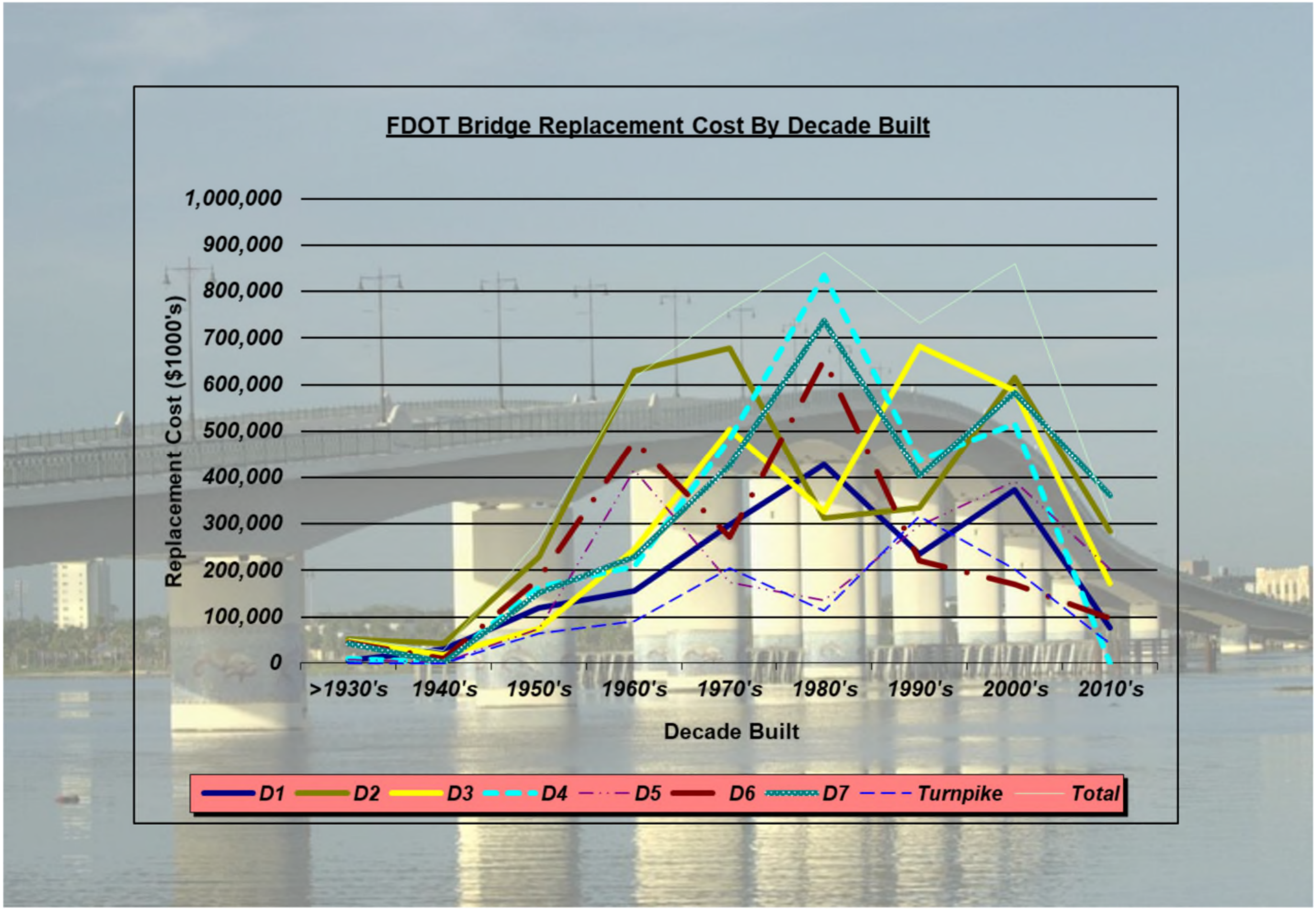
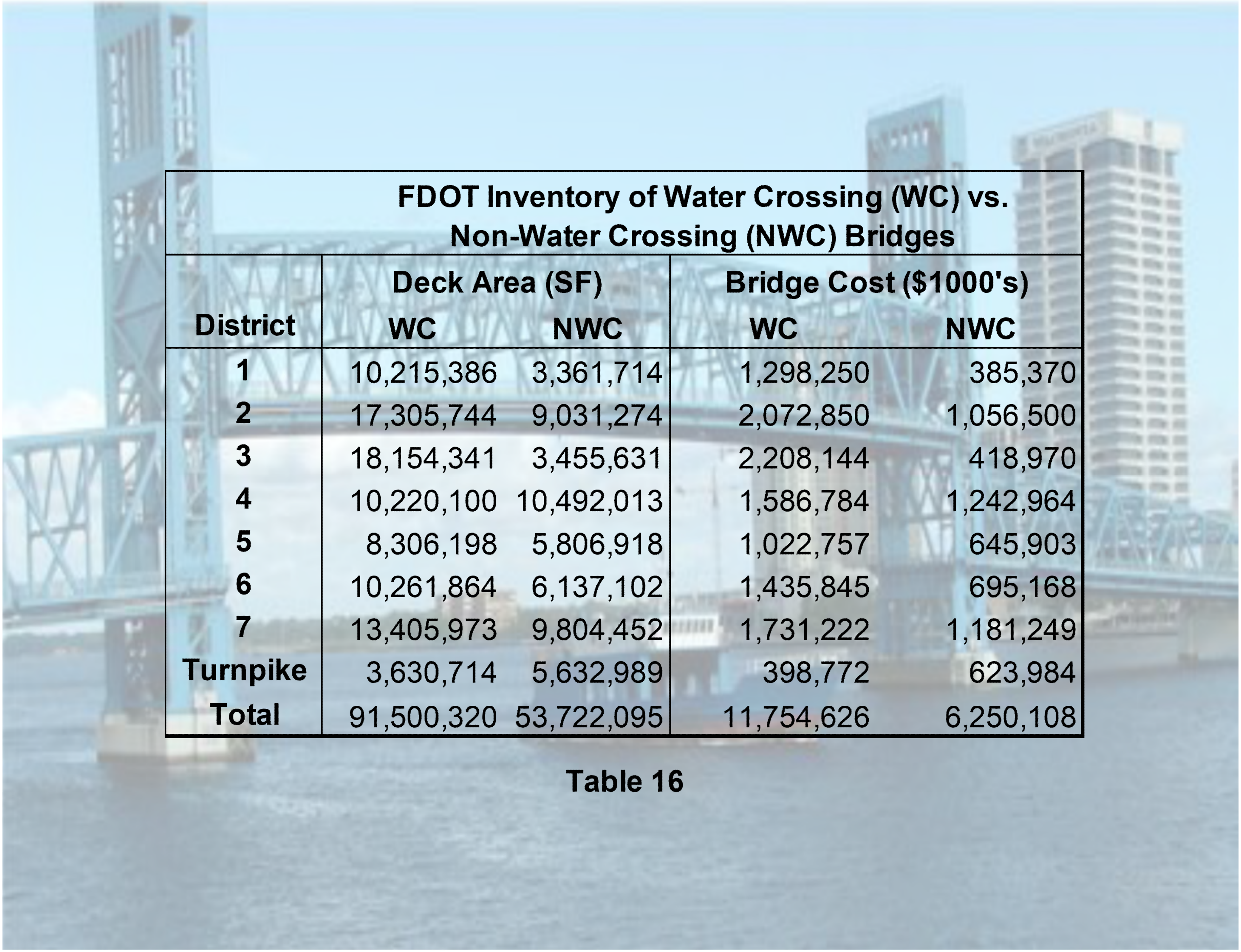
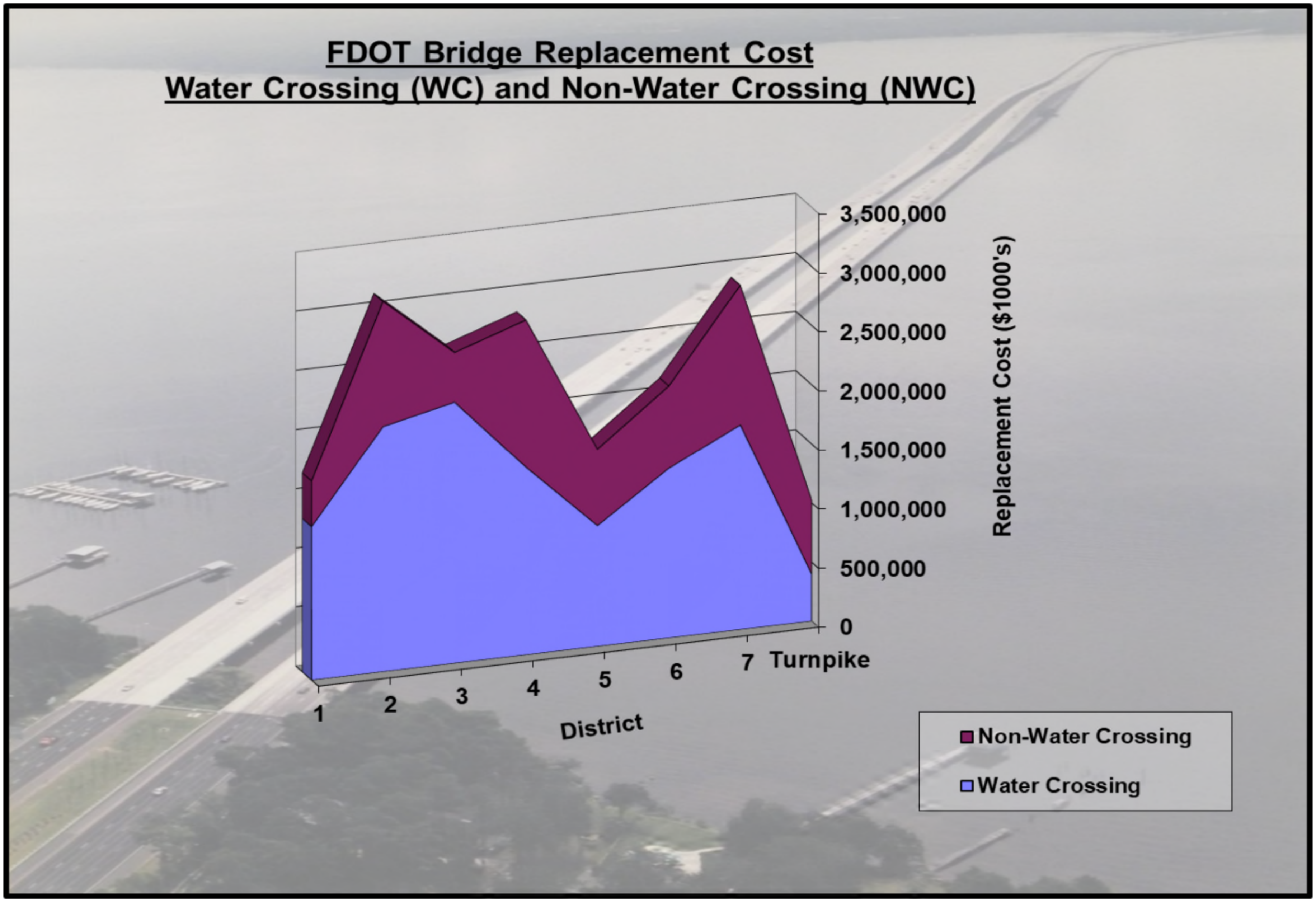

FDOT Bridge Replacement Cost By Decade Built
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Replacement Cost ($1000's)
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's
Decade Built
D1
D2
D3
D4
D5
D6
D7
Turnpike
Total

Figure 34



FDOT Inventory of Water Crossing (WC) vs. Non-Water Crossing (NWC) Bridges				
	Deck Area (SF)		Bridge Cost ($1000's)	
District	**WC**	**NWC**	**WC**	**NWC**
1	10,215,386	3,361,714	1,298,250	385,370
2	17,305,744	9,031,274	2,072,850	1,056,500
3	18,154,341	3,455,631	2,208,144	418,970
4	10,220,100	10,492,013	1,586,784	1,242,964
5	8,306,198	5,806,918	1,022,757	645,903
6	10,261,864	6,137,102	1,435,845	695,168
7	13,405,973	9,804,452	1,731,222	1,181,249
Turnpike	3,630,714	5,632,989	398,772	623,984
Total	91,500,320	53,722,095	11,754,626	6,250,108

Table 16



FDOT Bridge Replacement Cost
Water Crossing (WC) and Non-Water Crossing (NWC)
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Replacement Cost ($1000's)
1
2
3
4
5
6
7
Turnpike
District
Non-Water Crossing
Water Crossing

Figure 35

Conclusion

A goal of the Florida Department of Transportation is the protection of the public's investment in transportation. Bridges represent a significant portion of that investment. One of FDOT's main responsibilities is keeping the State Highway System in acceptable physical condition. To do this, FDOT resurfaces roads, repairs and replaces bridges, and performs routine maintenance activities. An awareness and understanding of the state of the bridge inventory can be used to help identify performance goals, establish resource requirements, and measure progress on meeting the above goals.

There are 12,358 bridges accounted for in Florida. The FDOT has maintenance responsibility for 6,929 of the bridges, or 56.07%. County governments maintain 3,902 bridges (31.57%), city and towns maintain 1,247 bridges (10.0%), with the remaining 280 bridges (2.27%) maintained by others. 14.63% of all bridges currently in service in Florida were constructed prior to 1960; 36.08% were constructed in the 1960's and 1970's, while the remaining 49.29% have been built since 1980. This distribution is relatively consistent for the three maintenance groups (FDOT, Counties, and City/Towns) used in this report. Bridges do not last forever. Through aggressive preventive maintenance, the strategy is to leverage advances in material science, design practices, and construction methods to extend the useful life of the bridges, thereby minimizing the need to replace a large number of bridges within a short time period. The challenge is to determine the most cost effective mix of preventive maintenance, routine maintenance, repair, rehabilitation, replacement, and other actions over the life of the bridges.

Florida's bridges are generally in good condition, with those maintained by the FDOT in better condition than those maintained by local governments or others. The most serious threat to bridges in Florida is the corrosion of steel reinforced concrete substructures in coastal regions. Much has been learned in recent years about corrosion in marine environments, affecting material specifications and design practices that helps new bridges built today. However, the older bridges in the coastal regions are beginning to require careful evaluation and extensive corrective actions. On-going research will continue to provide useful information to help meet this challenge. Other challenges include: confronting the increasingly extensive environmental and public health issues related to protective coatings for steel bridges with lead based paint; completing the statewide bridge scour evaluation program to identify scour critical bridges (bridges that could fail during floods) and to provide scour countermeasures as corrective action where required; to stay on top of movable bridge maintenance and rehabilitation; and to improve preventive maintenance on the large population (36.08% of the inventory) of bridges built during the 1960's and 1970's.

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