Florida Department of Transportation

Bridge Inventory 2017 Annual Report

August 2017

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 12,267 bridge-structures accounted for in the Florida DOT Bridge Management System. The FDOT has maintenance responsibility for 6,858 of the bridges, or 55.91%. County governments maintain 3,888 bridges (31.69%), city and towns maintain 1,230 bridges (10.03%), with the remaining 291 bridges (2.37%) maintained by others (see Figures 1 & 2).

The 6,858 bridges maintained by FDOT are divided by district and shown in Figures 3 & 4. District 2 has the most bridges, with 1,249 (18.21%), followed by District 5 (1038 bridges – 15.14%), District 1 (934 bridges – 13.62%), District 3 (817 bridges – 11.91%), District 4 (762 bridges - 11.11%), Turnpike District (739 bridges – 10.78%), District 7 (704 bridges – 10.27%), and District 6 (615 bridges – 8.97%). The number of bridges shown includes the 116 bridges maintained by the Dade County Expressway Authority (MDX) and 300 bridges maintained by the Central Florida Expressway Authority (CFX).

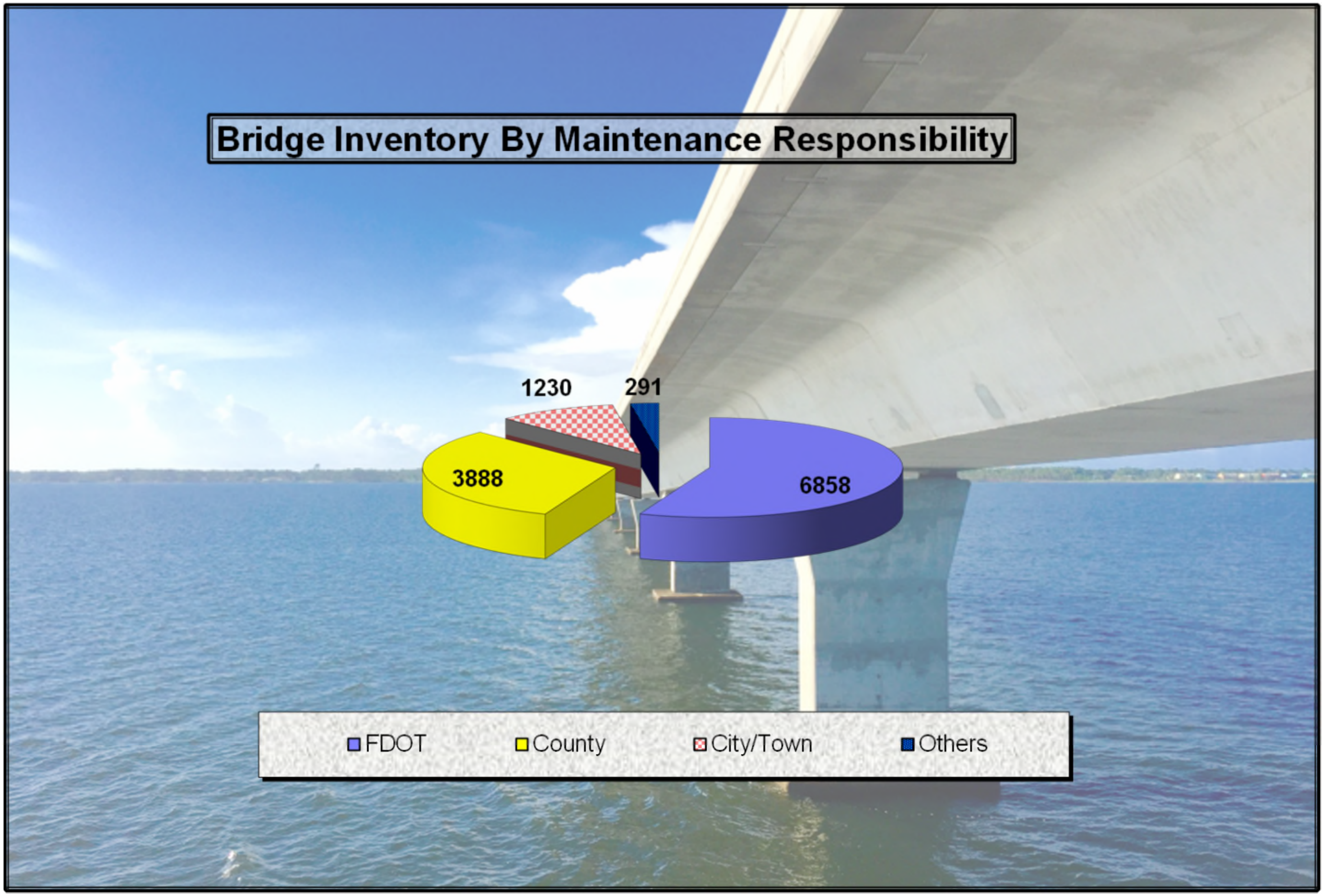


Figure 1

NOTE: The number of FDOT bridges includes 116MDX bridges and 300 CFX bridges.

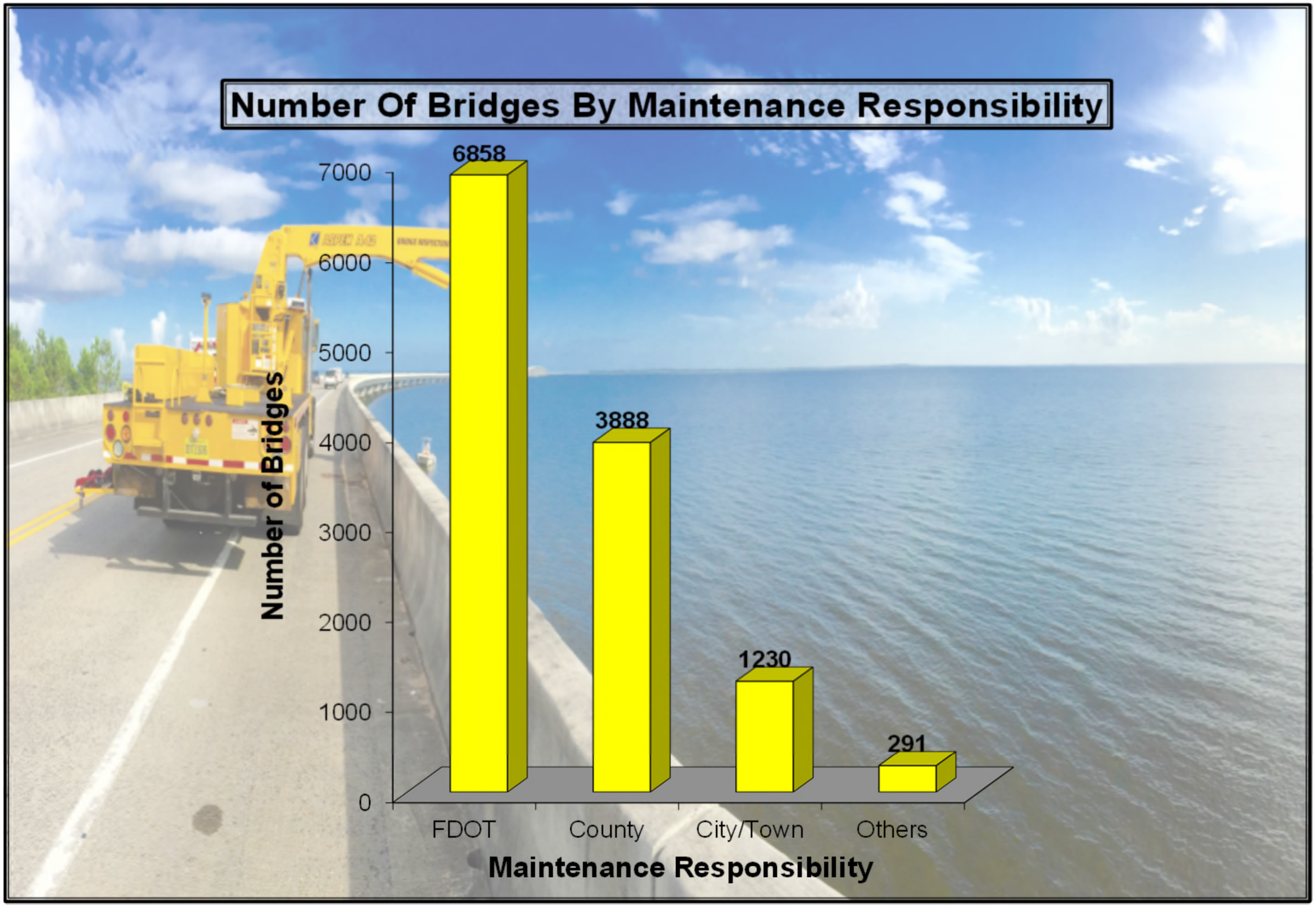


Figure 2

NOTE: The number of FDOT bridges includes 116MDX bridges and 300 CFX bridges.

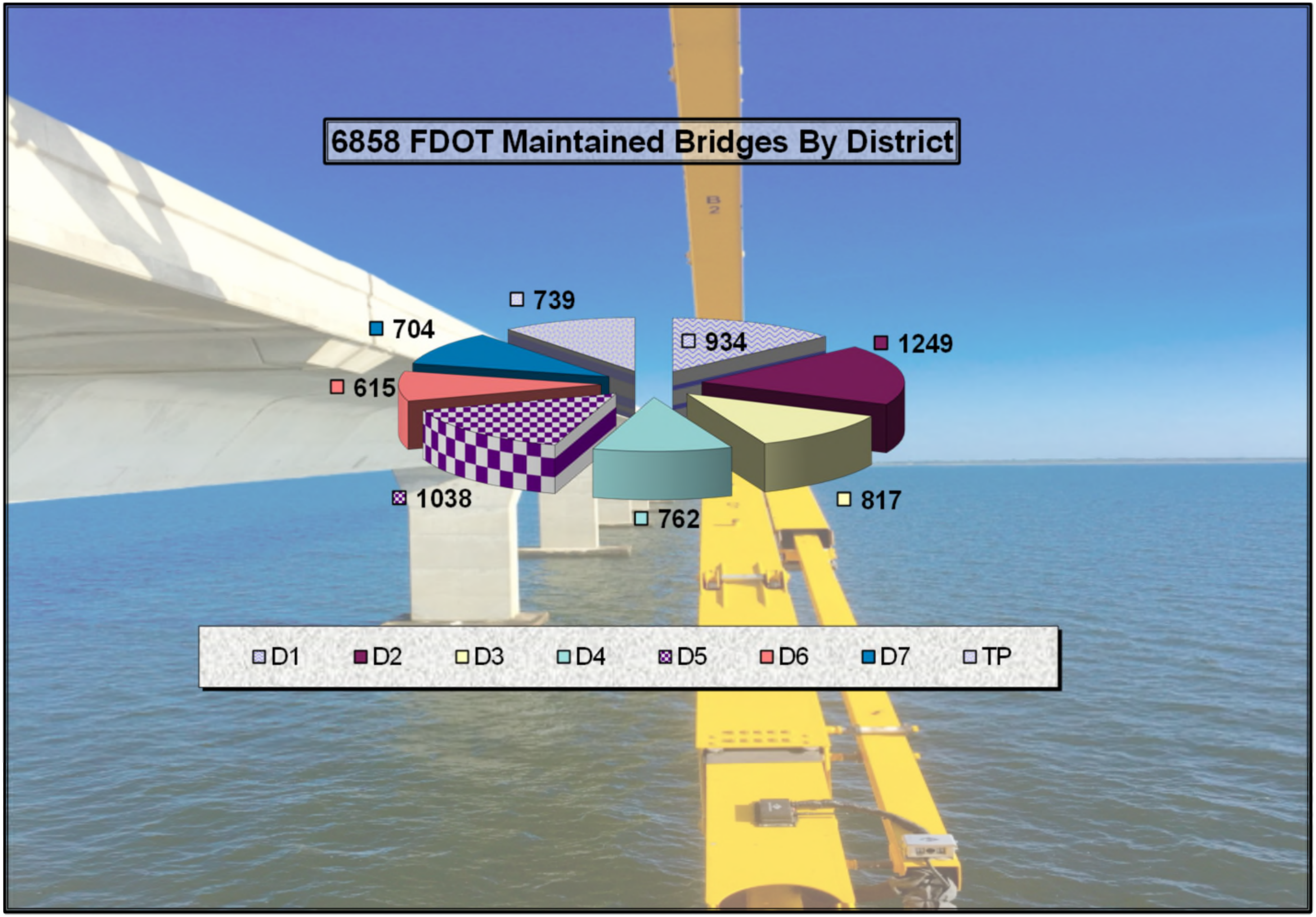


Figure 3

NOTE: The number of FDOT bridges includes 116 MDX bridges and 300 CFX bridges.

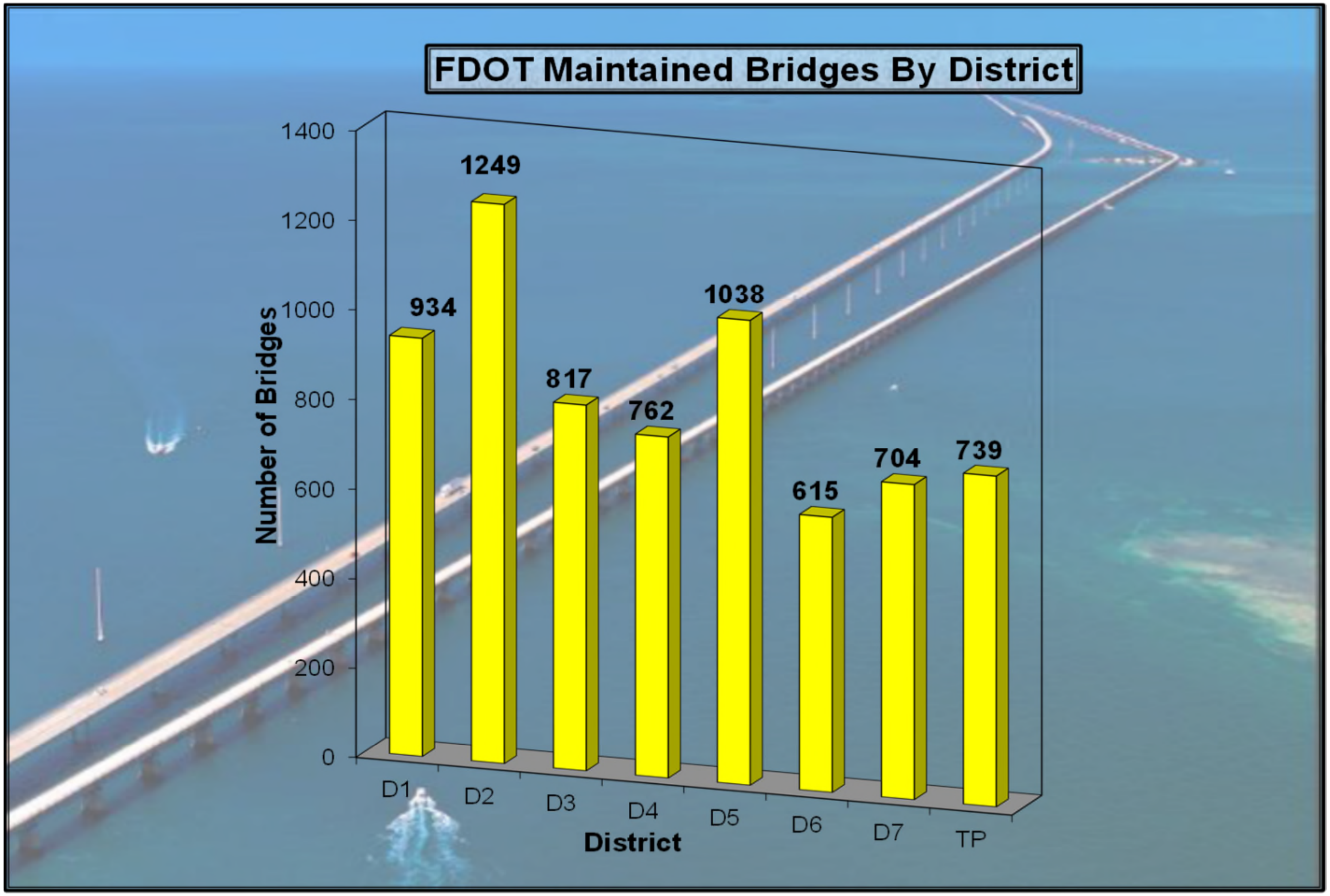


Figure 4

NOTE: The number of FDOT bridges includes 116MDX bridges and 300 CFX bridges.

Age of Bridges

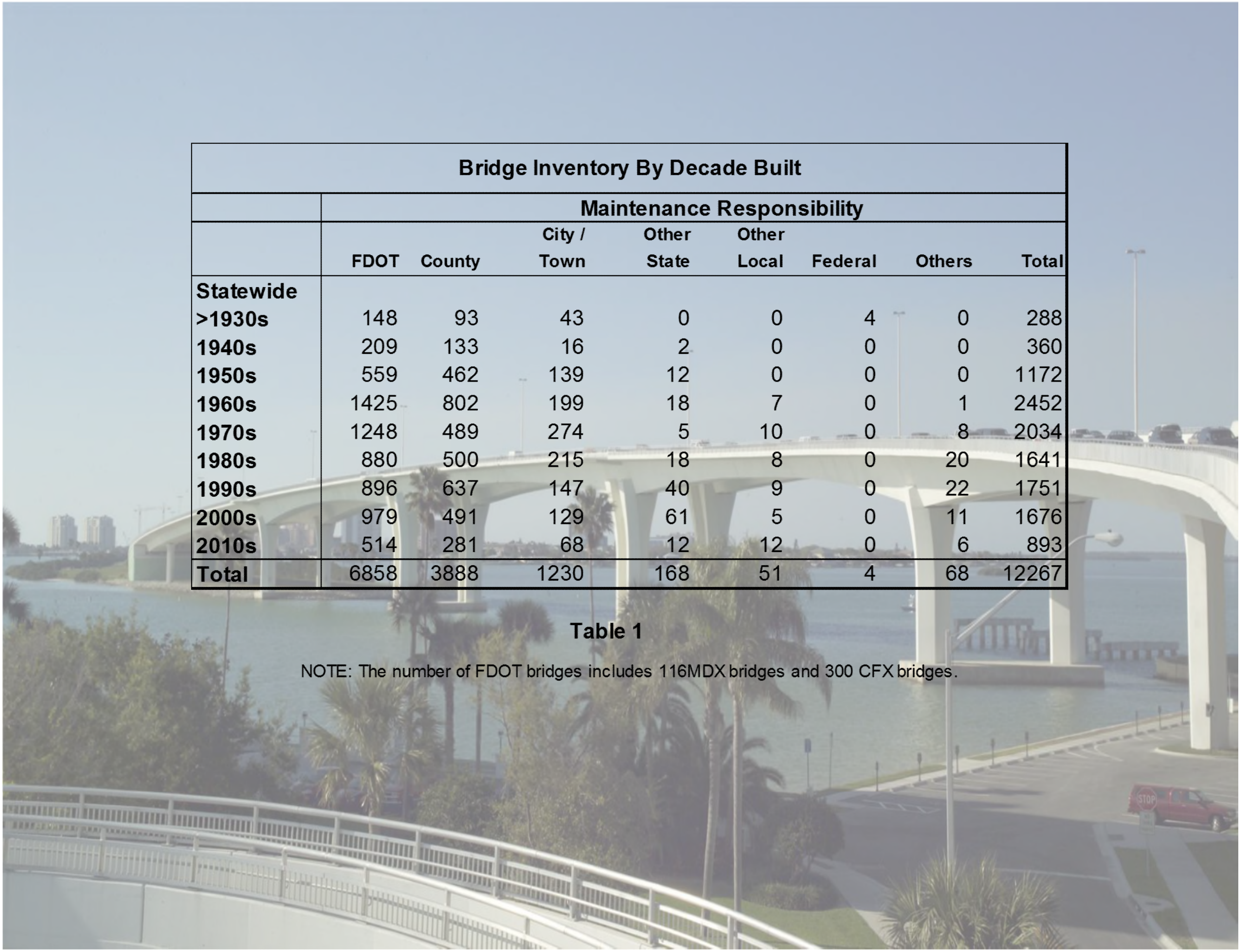
While the industry is now designing bridges to last for 75 years, most bridges built in the past were designed for a service life of 50 years. Looking at bridge age is the most common and simplest method of forecasting long-term budget requirements. This might lead one to conclude that bridges constructed 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 6,858 bridges maintained by FDOT, approximately 13.36% were constructed prior to 1960, about 38.98% were constructed in the 1960's and 1970's, with the remaining 47.67% having been built since 1980 (see Figure 5).

Similar results can be seen with the statewide bridge inventory of county government maintained bridges with 17.70% constructed prior to 1960, 33.20% constructed in the 1960's and 1970's, and 49.10% since 1980 (see Figure 6).

The city and town maintained bridges are very similar as well, with 16.10% constructed prior to 1960, 38.46% constructed in the 1960's and 1970's, and 45.45% since 1980 (see Figure 7).

An examination of the distribution of the decade of construction by FDOT District, for the 6,858 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 2 – 20.50%, District 1 – 22.59%, District 3 – 16.52%, District 5 – 9.15%, District 7 – 9.94%, District 4 – 5.91%, District 6 – 9.76%, and the Turnpike District – 5.95%. 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. See Figure 8 for a graphic comparison of the FDOT Districts.



Bridge Inventory By Decade Built								
	Maintenance Responsibility							
	FDOT	County	City / Town	Other State	Other Local	Federal	Others	Total
Statewide								
>1930s	148	93	43	0	0	4	0	288
1940s	209	133	16	2	0	0	0	360
1950s	559	462	139	12	0	0	0	1172
1960s	1425	802	199	18	7	0	1	2452
1970s	1248	489	274	5	10	0	8	2034
1980s	880	500	215	18	8	0	20	1641
1990s	896	637	147	40	9	0	22	1751
2000s	979	491	129	61	5	0	11	1676
2010s	514	281	68	12	12	0	6	893
Total	6858	3888	1230	168	51	4	68	12267

Table 1

NOTE: The number of FDOT bridges includes 116MDX bridges and 300 CFX bridges.

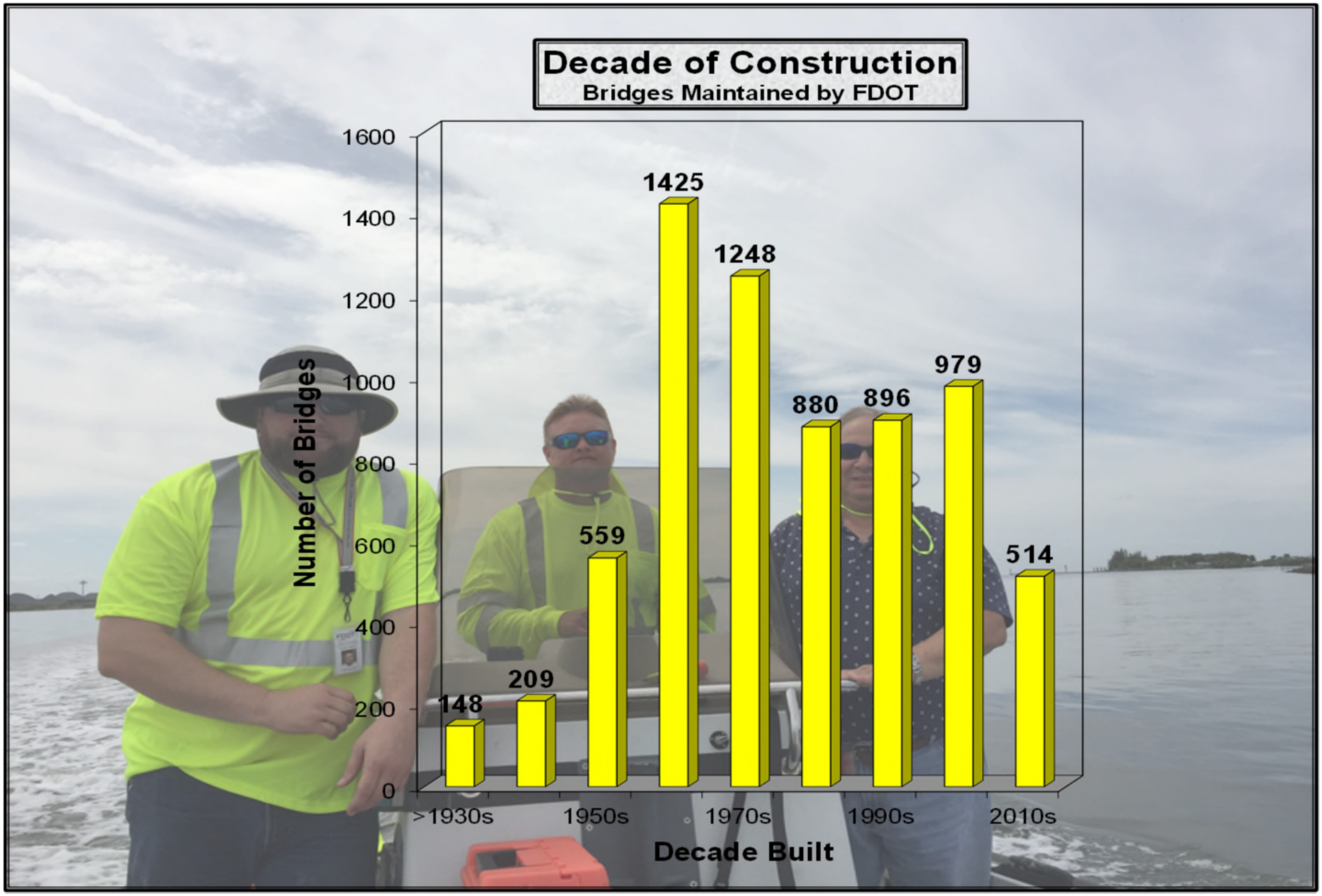


Figure 5

NOTE: The number of FDOT bridges includes 116 MDX bridges and 300 CFX bridges.

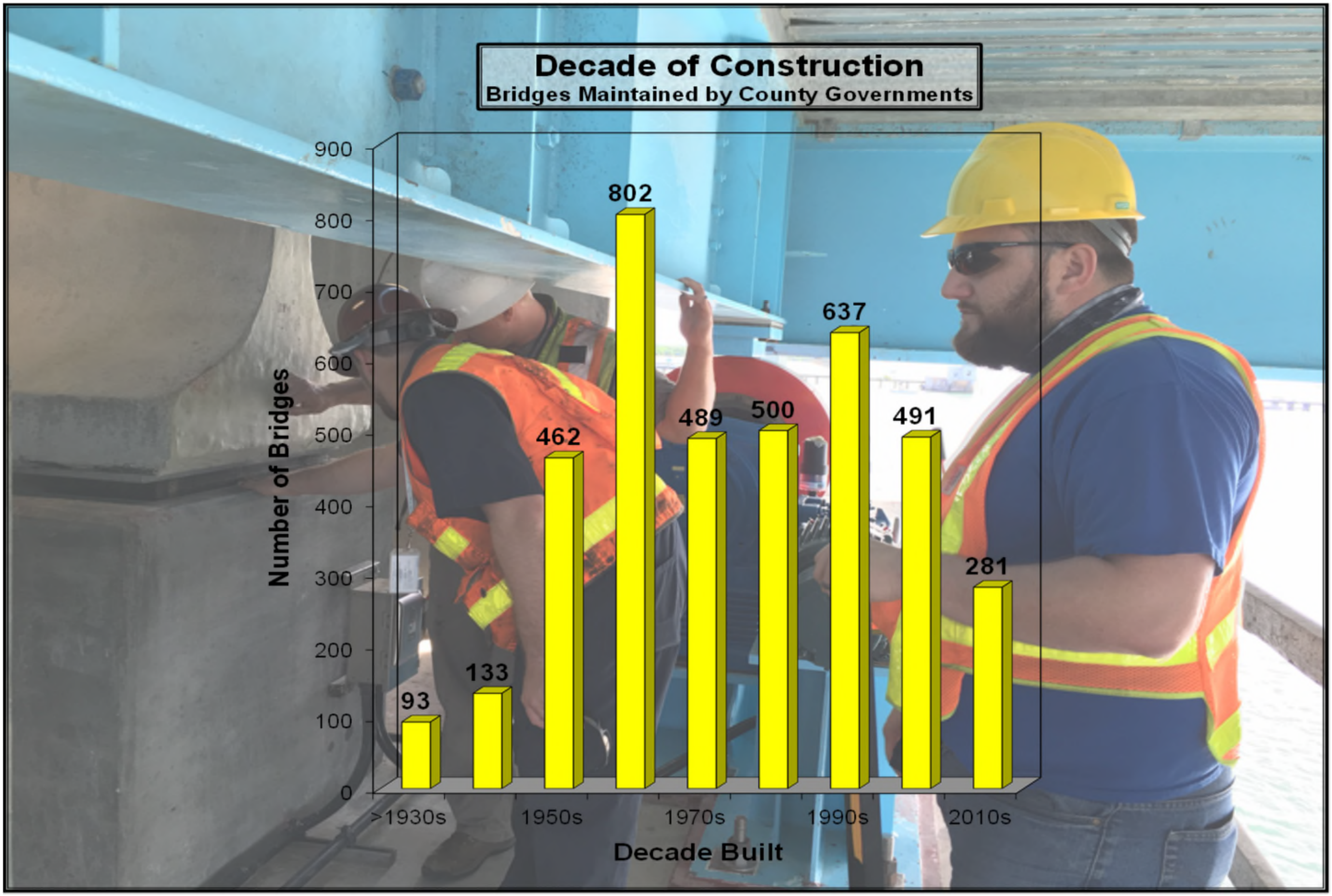


Figure 6

NOTE: The number of FDOT bridges includes 116 MDX bridges and 300 CFX bridges.

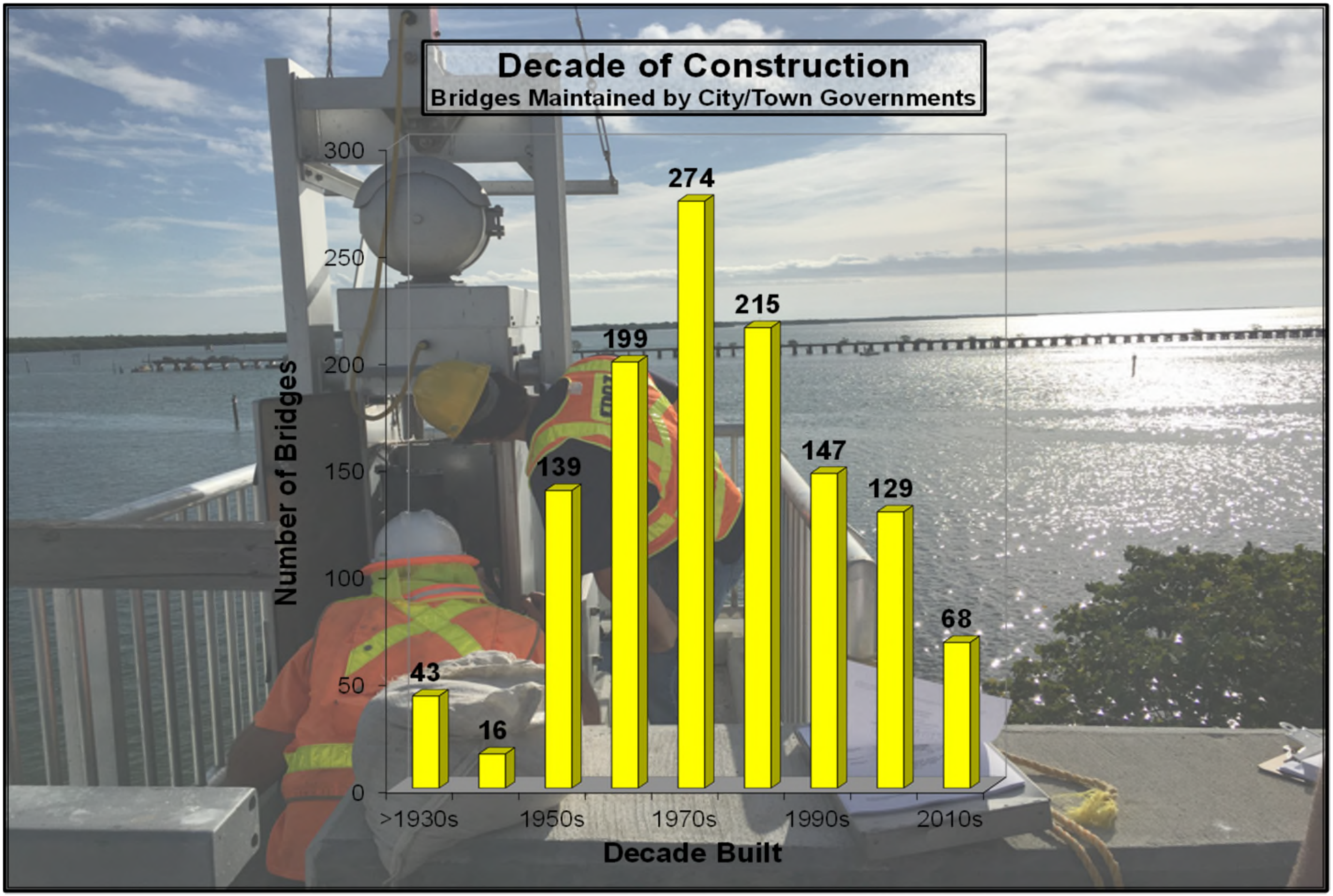


Figure 7

NOTE: The number of FDOT bridges includes 116 MDX bridges and 300 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	10	5	0	0	0	0	38	10	24	0	0	0	0	0	34
1940s	61	24	1	1	0	0	0	87	52	33	2	1	0	0	0	88
1950s	127	101	13	1	0	0	0	242	73	141	5	0	0	0	0	219
1960s	110	212	36	5	6	0	0	369	107	165	5	5	0	0	0	282
1970s	154	133	85	0	3	0	0	375	284	90	9	4	2	0	0	389
1980s	176	137	48	2	5	0	0	368	58	68	9	14	0	0	1	150
1990s	137	128	26	6	8	0	0	305	103	190	11	28	0	0	0	332
2000s	97	101	20	4	0	0	0	222	68	155	10	47	1	0	1	282
2010s	49	68	13	3	1	0	0	134	62	88	2	7	0	0	0	159
Total	934	914	247	22	23	0	0	2140	817	954	53	106	3	0	2	1935
	District 2								District 4							
>1930s	53	16	5	0	0	0	0	74	4	5	6	0	0	0	0	15
1940s	61	52	3	0	0	0	0	116	4	3	2	0	0	0	0	9
1950s	142	116	32	5	0	0	0	295	37	37	55	6	0	0	0	135
1960s	416	95	36	1	0	0	0	548	71	67	56	4	1	0	0	199
1970s	193	40	31	0	0	0	1	265	151	74	64	0	0	0	0	289
1980s	44	46	29	0	0	0	0	119	226	73	53	1	0	0	0	353
1990s	97	45	22	2	0	0	0	166	97	105	17	1	0	0	0	220
2000s	147	51	37	3	0	0	1	239	124	65	17	3	0	0	0	209
2010s	96	25	9	0	0	0	0	130	48	30	17	0	0	0	0	95
Total	1249	486	204	11	0	0	2	1952	762	459	287	15	1	0	0	1524

Table 2

NOTE: The number of FDOT bridges includes 116MDX bridges and 300 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	25	5	0	0	0	0	89	31	19	17	0	0	0	0	67
1960s	267	61	11	0	0	0	1	340	108	105	37	1	0	0	0	251
1970s	121	35	46	1	0	0	7	210	111	85	23	0	5	0	0	224
1980s	79	78	39	1	0	0	19	216	168	72	20	0	3	0	0	263
1990s	149	65	27	3	0	0	22	266	64	90	34	0	1	0	0	189
2000s	234	58	23	4	2	0	8	329	122	38	14	0	2	0	1	177
2010s	93	42	19	1	6	0	6	167	61	15	6	0	1	0	0	83
Total	1038	384	175	10	8	0	63	1678	704	438	168	1	12	0	1	1324
	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	224	97	18	2	0	0	0	341	122	0	0	0	0	0	0	122
1970s	77	32	16	0	0	0	0	125	157	0	0	0	0	0	0	157
1980s	64	26	17	0	0	0	0	107	65	0	0	0	0	0	0	65
1990s	48	14	10	0	0	0	0	72	201	0	0	0	0	0	0	201
2000s	73	23	8	0	0	0	0	104	114	0	0	0	0	0	0	114
2010s	69	13	2	1	4	0	0	89	36	0	0	0	0	0	0	36
Total	615	253	96	3	4	4	0	975	739	0	0	0	0	0	0	739

Table 3

NOTE: The number of FDOT bridges includes 116MDX bridges and 300 CFX bridges.

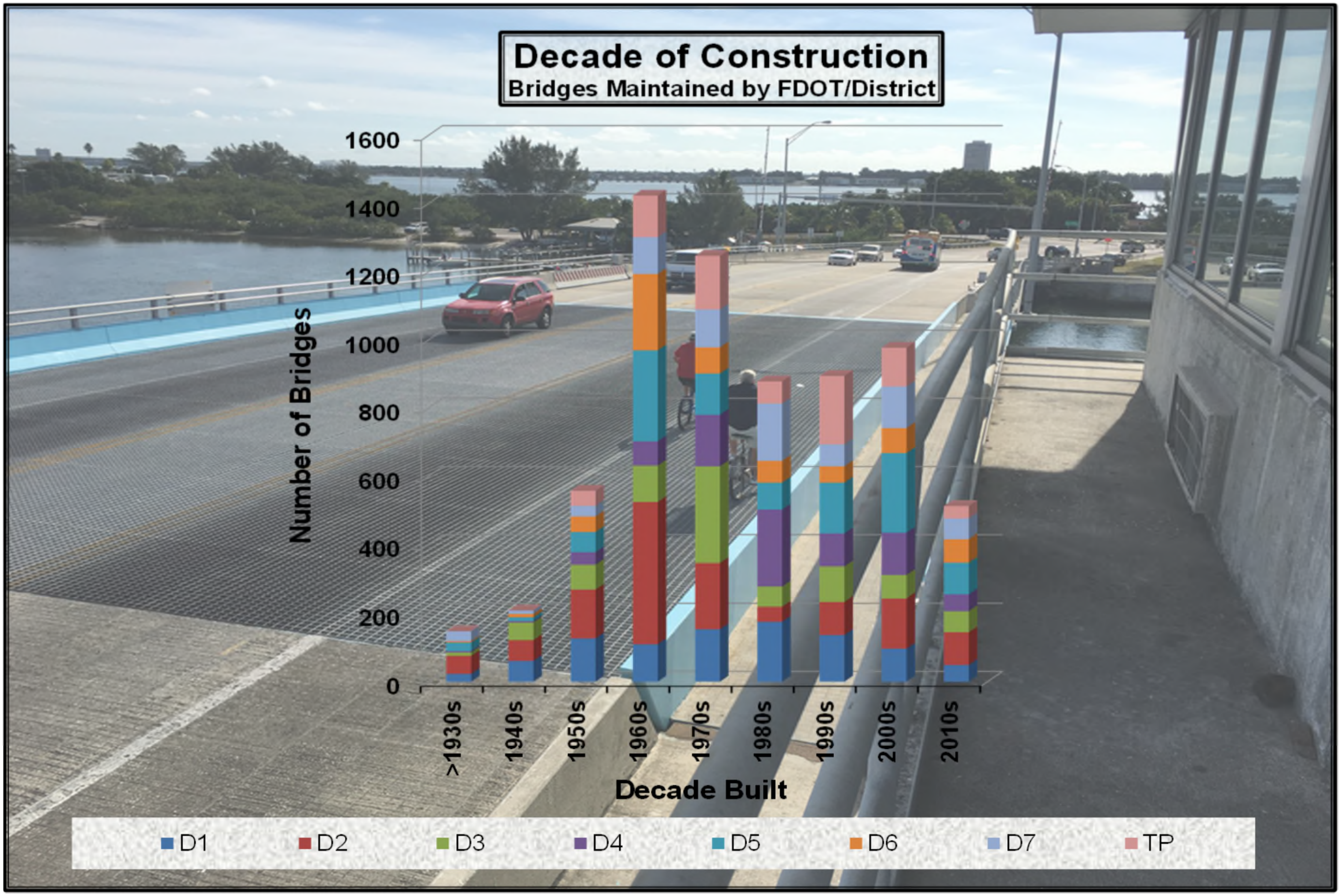


Figure 8

NOTE: The number of FDOT bridges includes 116 MDX bridges and 300 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 16.16% of the total inventory. Similarly, slab bridges maintained by counties are 35.73%, and by cities and towns are 53.90%.

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 62.51% of the state maintained inventory, 34.03% of the county bridges, and 25.12% 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

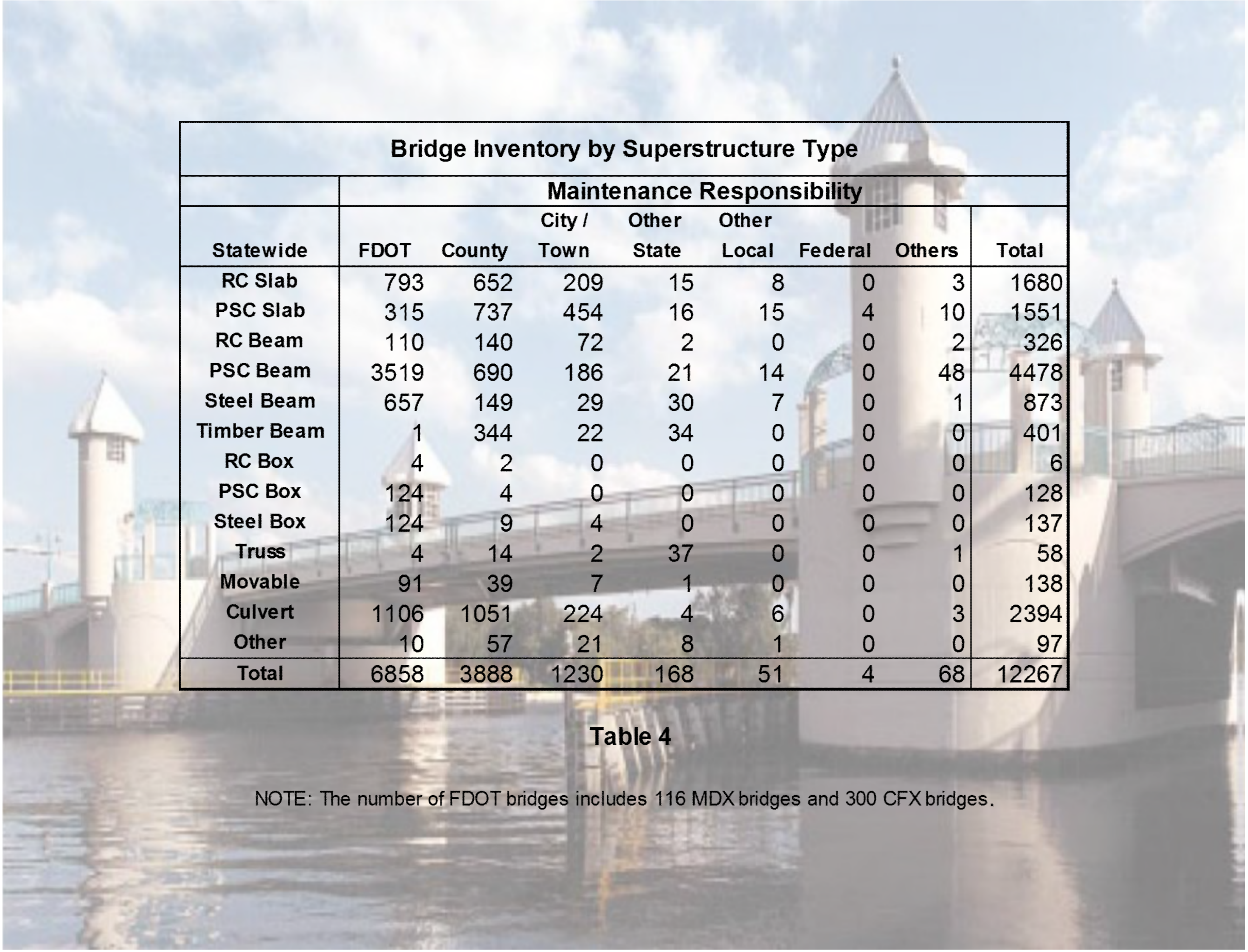
A culvert is typically a buried drainage structure. When the overall opening of the culvert is at least 20 feet it is considered a bridge by the Federal Government, and hence is treated like a bridge for inspection and maintenance purposes. Culverts represent 16.13% of the state maintained bridges. County inventories include 27.03% culverts, and city/towns include 18.21% 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 1.33% of the total state bridge inventory. County inventories include 1.0% movables, and city/towns include 0.57% movable bridges.

Figures

Figures 9 through 12 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	793	652	209	15	8	0	3	1680
PSC Slab	315	737	454	16	15	4	10	1551
RC Beam	110	140	72	2	0	0	2	326
PSC Beam	3519	690	186	21	14	0	48	4478
Steel Beam	657	149	29	30	7	0	1	873
Timber Beam	1	344	22	34	0	0	0	401
RC Box	4	2	0	0	0	0	0	6
PSC Box	124	4	0	0	0	0	0	128
Steel Box	124	9	4	0	0	0	0	137
Truss	4	14	2	37	0	0	1	58
Movable	91	39	7	1	0	0	0	138
Culvert	1106	1051	224	4	6	0	3	2394
Other	10	57	21	8	1	0	0	97
Total	6858	3888	1230	168	51	4	68	12267

Table 4

NOTE: The number of FDOT bridges includes 116 MDX bridges and 300 CFX bridges.

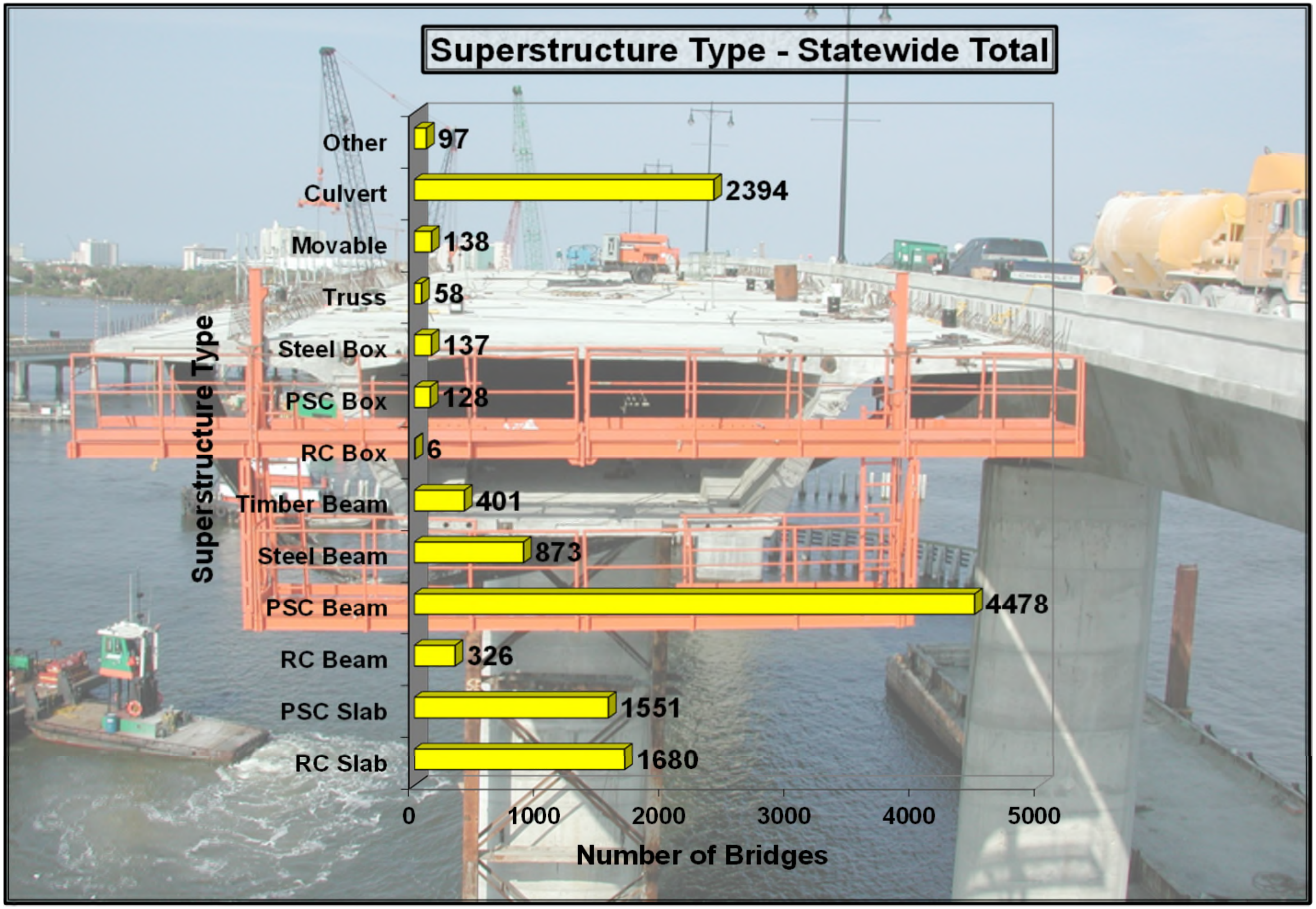

Superstructure Type - Statewide Total
Superstructure Type
Other
97
Culvert
2394
Movable
138
Truss
58
Steel Box
137
PSC Box
128
RC Box
6
Timber Beam
401
Steel Beam
873
PSC Beam
4478
RC Beam
326
PSC Slab
1551
RC Slab
1680
0
1000
2000
3000
4000
5000
Number of Bridges

Figure 9

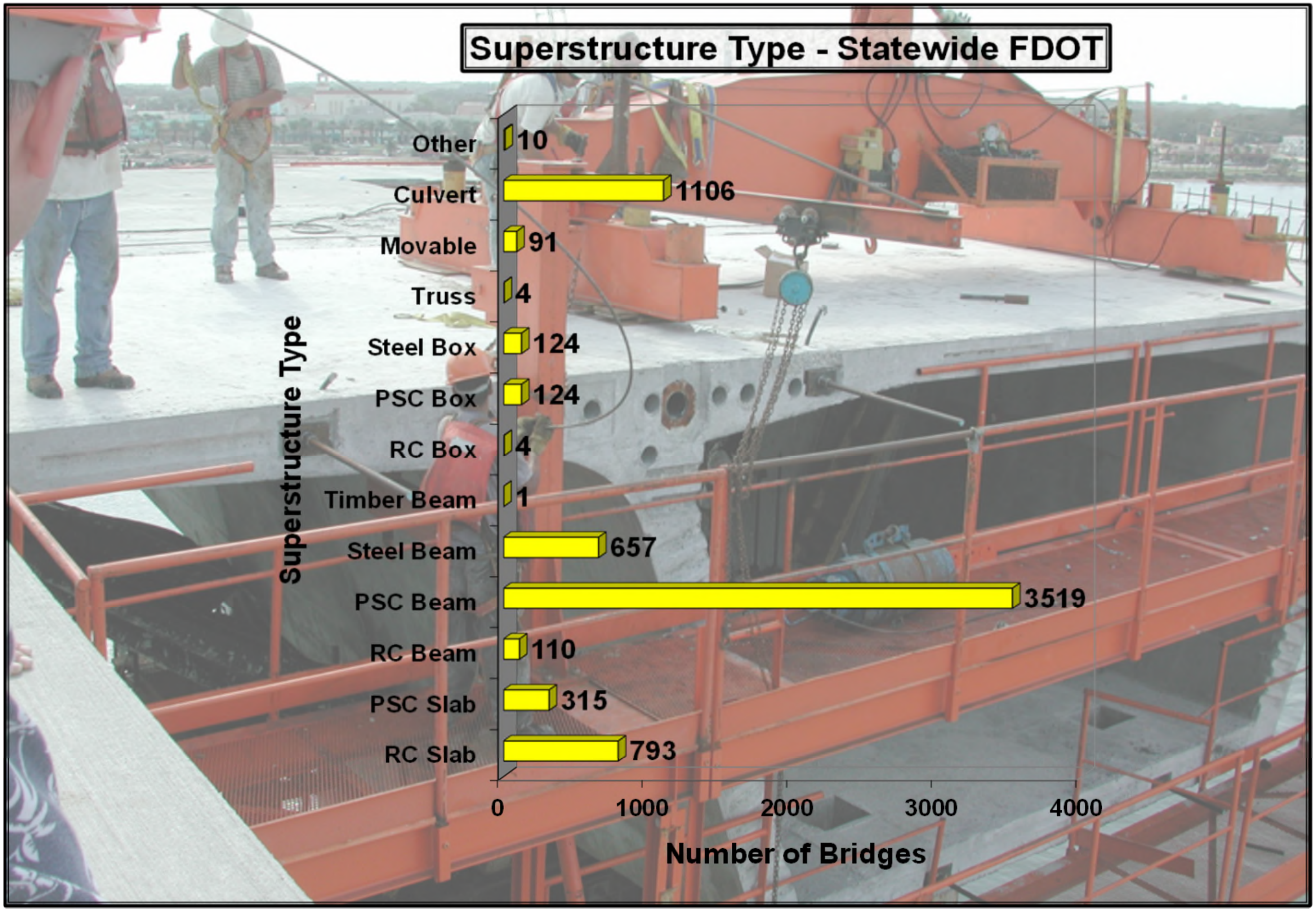

Superstructure Type - Statewide FDOT
Superstructure Type
Other
10
Culvert
1106
Movable
91
Truss
4
Steel Box
124
PSC Box
124
RC Box
4
Timber Beam
1
Steel Beam
657
PSC Beam
3519
RC Beam
110
PSC Slab
315
RC Slab
793
0
1000
2000
3000
4000
Number of Bridges

Figure 10

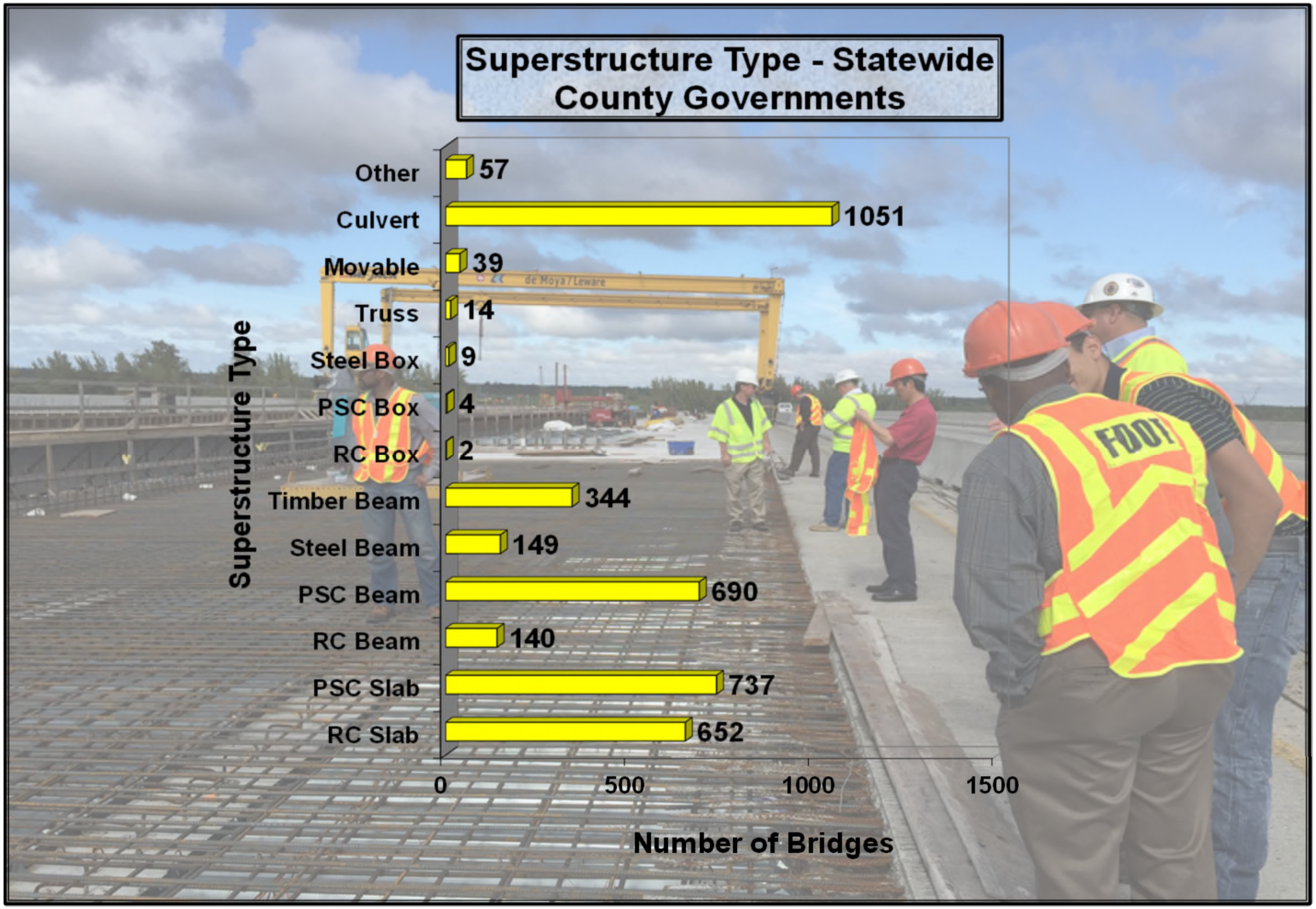

Superstructure Type - Statewide
County Governments
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
57
1051
39
14
9
4
2
344
149
690
140
737
652
0
500
1000
1500
Superstructure Type
Number of Bridges

Figure 11

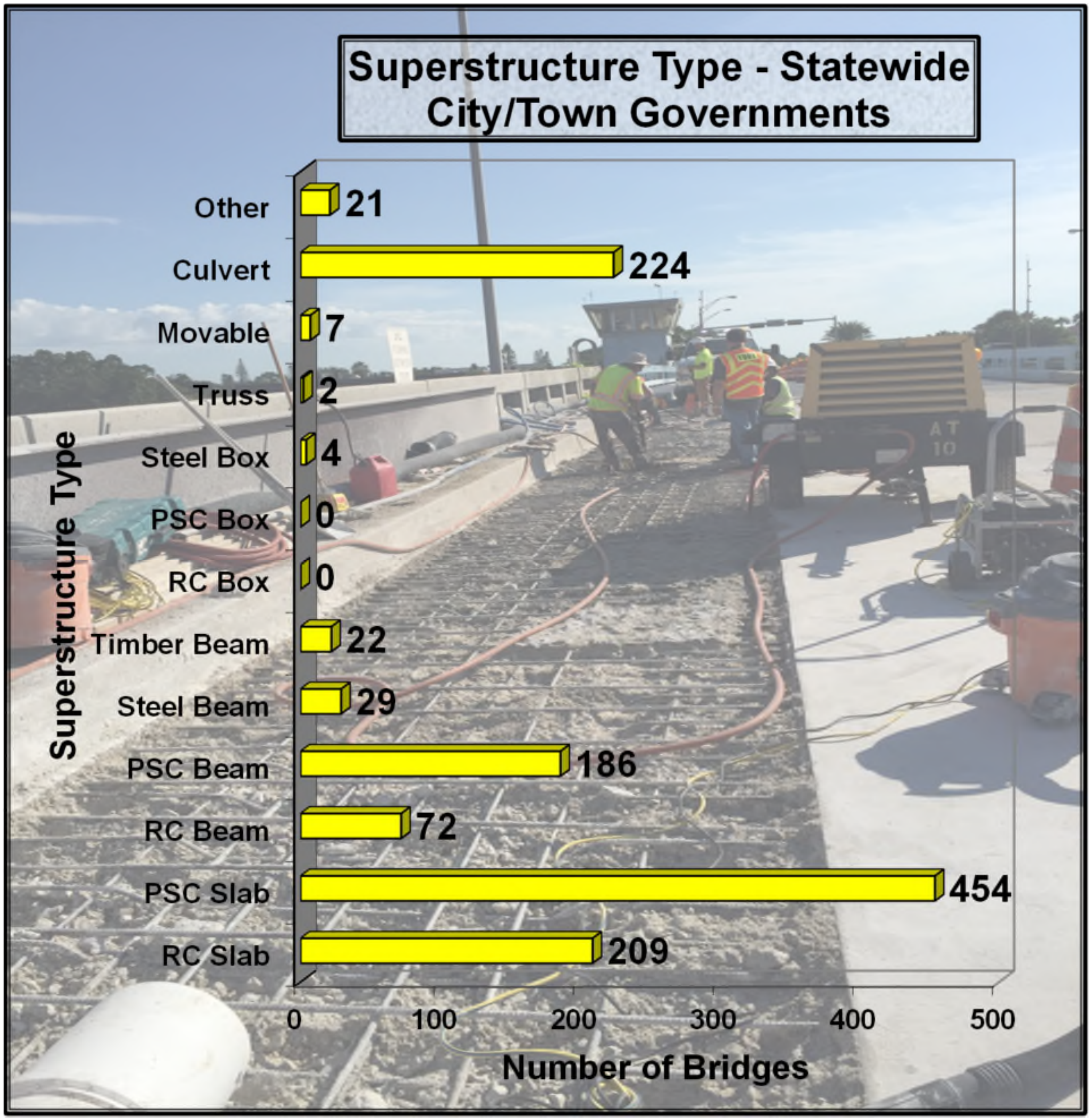

Superstructure Type - Statewide
City/Town Governments
Superstructure Type
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
21
224
7
2
4
0
0
22
29
186
72
454
209
0
100
200
300
400
500
Number of Bridges

Figure 12

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

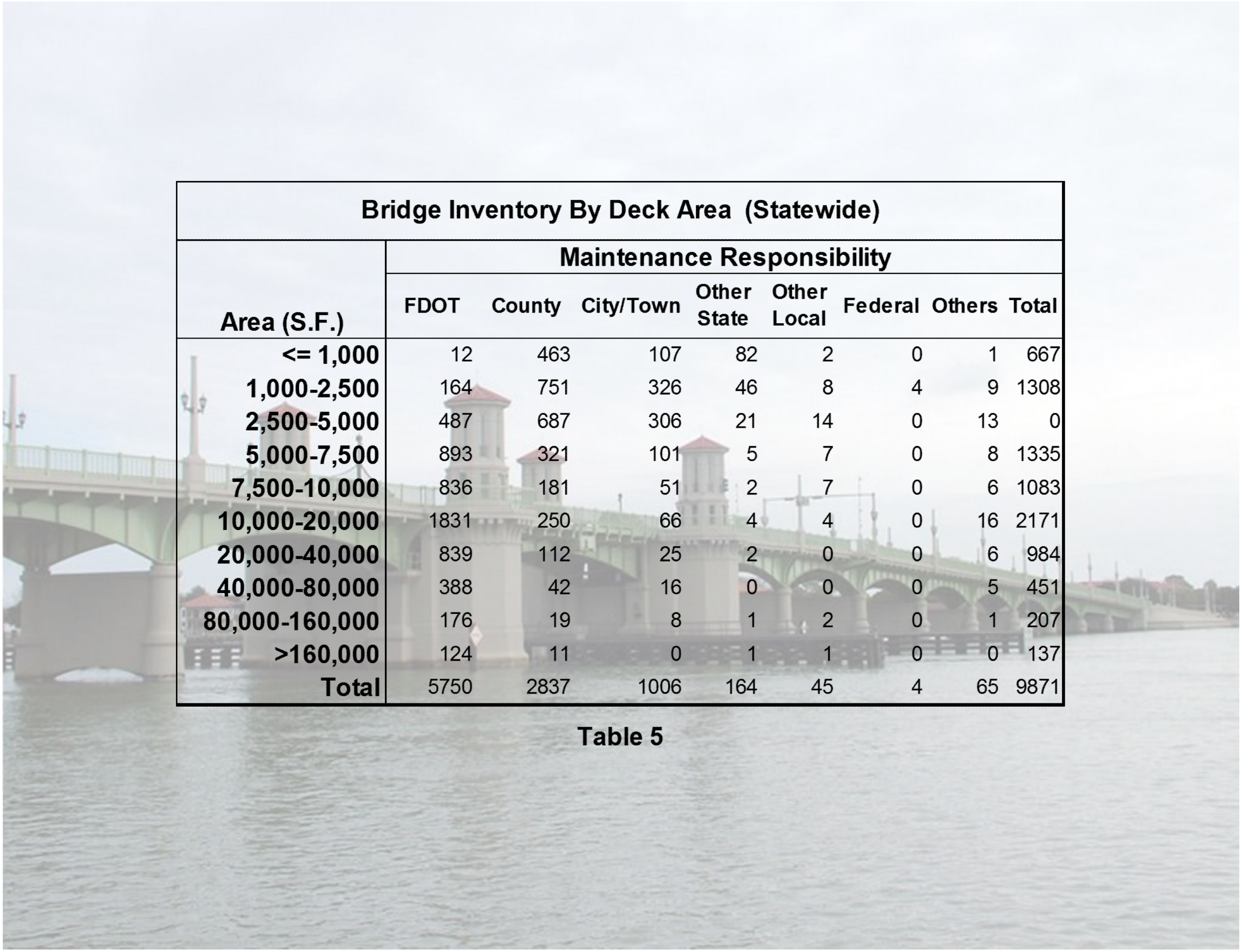
Figure 13 presents the 5,750 FDOT bridges grouped by the deck area ranges (culverts and other miscellaneous structures are not included in this group). The range with the largest number of bridges is the 10,000 to 20,000 square foot range, with 1,831 bridges, 31.84% of the total. 11.53% of the FDOT bridges fall into the 0 to 5,000 square foot range; 30.07% are in the 5,000 to 10,000 square foot range; and 26.56% 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 67.01% of their bridges under 5,000 square feet; with 17.69% between 5,000 and 10,000 square feet; 8.81% between 10,000 to 20,000 square feet; and only 6.49% over 20,000 square feet (see Figure 14). The results for the City/Town and Others groups are similar; with 73.46% of these bridges less than 5,000 square feet (see Figure 15 & 16).

FDOT Bridges by District

Tables 6 and 7 present the statewide data sorted by district. Figure 17 allows graphic comparison between the districts for the FDOT maintained bridges. For example, 21.95% of the District 1 bridges are less than 5,000 square feet and only 16.29% of their bridges are over 20,000 square feet. In contrast, only 9.34% of District 4 bridges are less than 5,000 square feet, while 38.05% 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	463	107	82	2	0	1	667
1,000-2,500	164	751	326	46	8	4	9	1308
2,500-5,000	487	687	306	21	14	0	13	0
5,000-7,500	893	321	101	5	7	0	8	1335
7,500-10,000	836	181	51	2	7	0	6	1083
10,000-20,000	1831	250	66	4	4	0	16	2171
20,000-40,000	839	112	25	2	0	0	6	984
40,000-80,000	388	42	16	0	0	0	5	451
80,000-160,000	176	19	8	1	2	0	1	207
>160,000	124	11	0	1	1	0	0	137
Total	5750	2837	1006	164	45	4	65	9871

Table 5

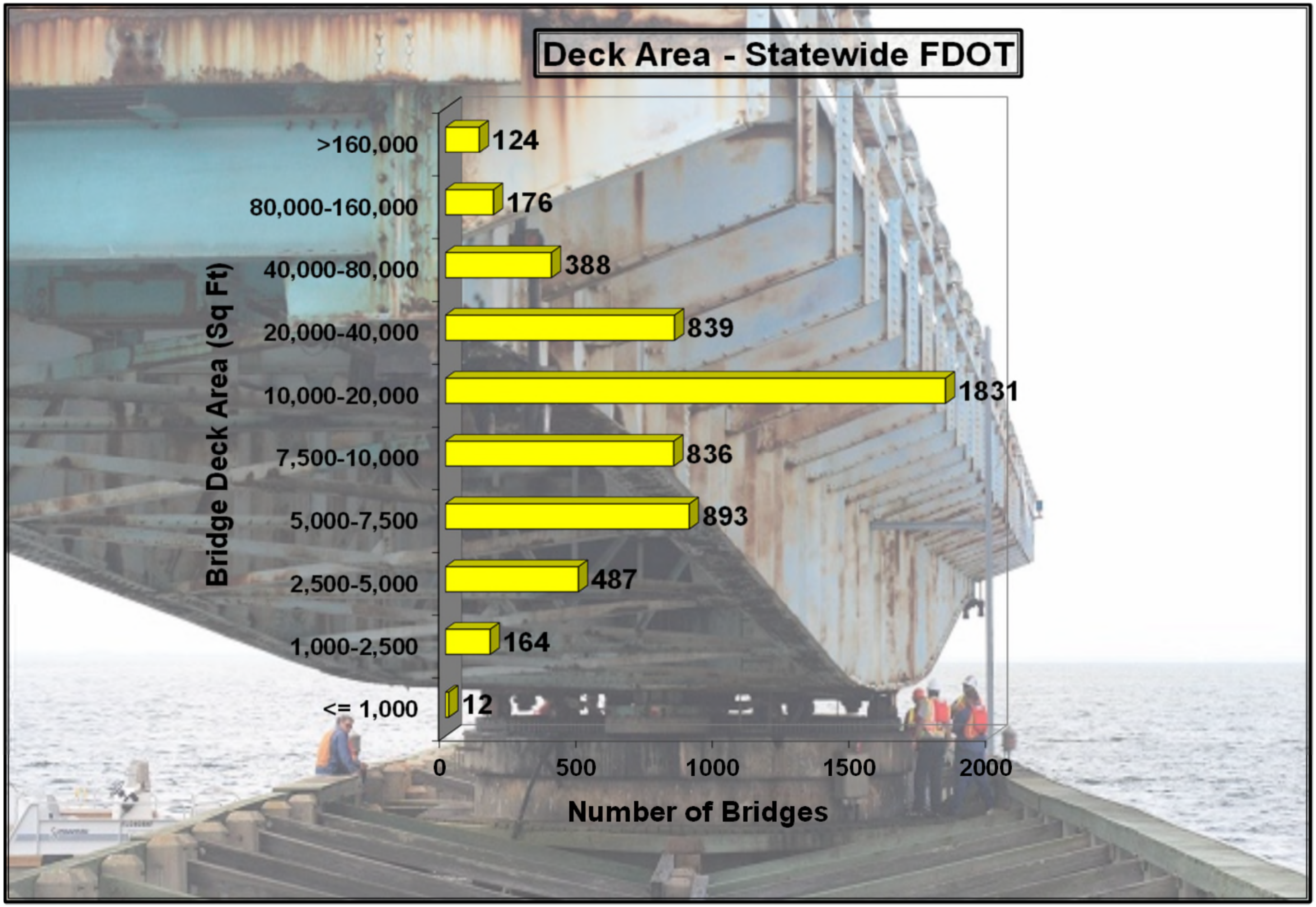

Deck Area - Statewide FDOT
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
124
176
388
839
1831
836
893
487
164
12
0
500
1000
1500
2000
Number of Bridges

Figure 13

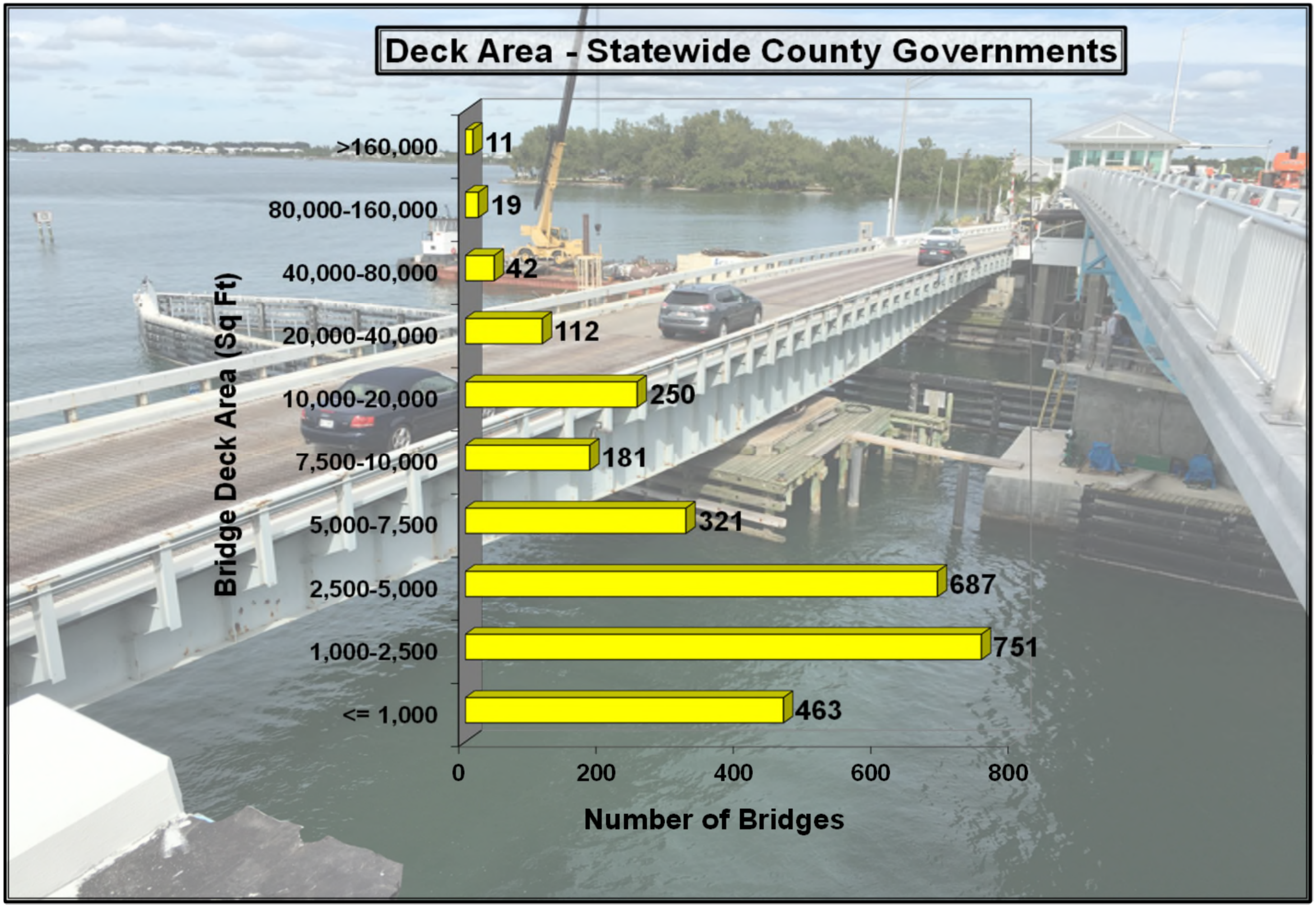

Deck Area - Statewide County Governments
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
11
19
42
112
250
181
321
687
751
463
0
200
400
600
800
Number of Bridges

Figure 14

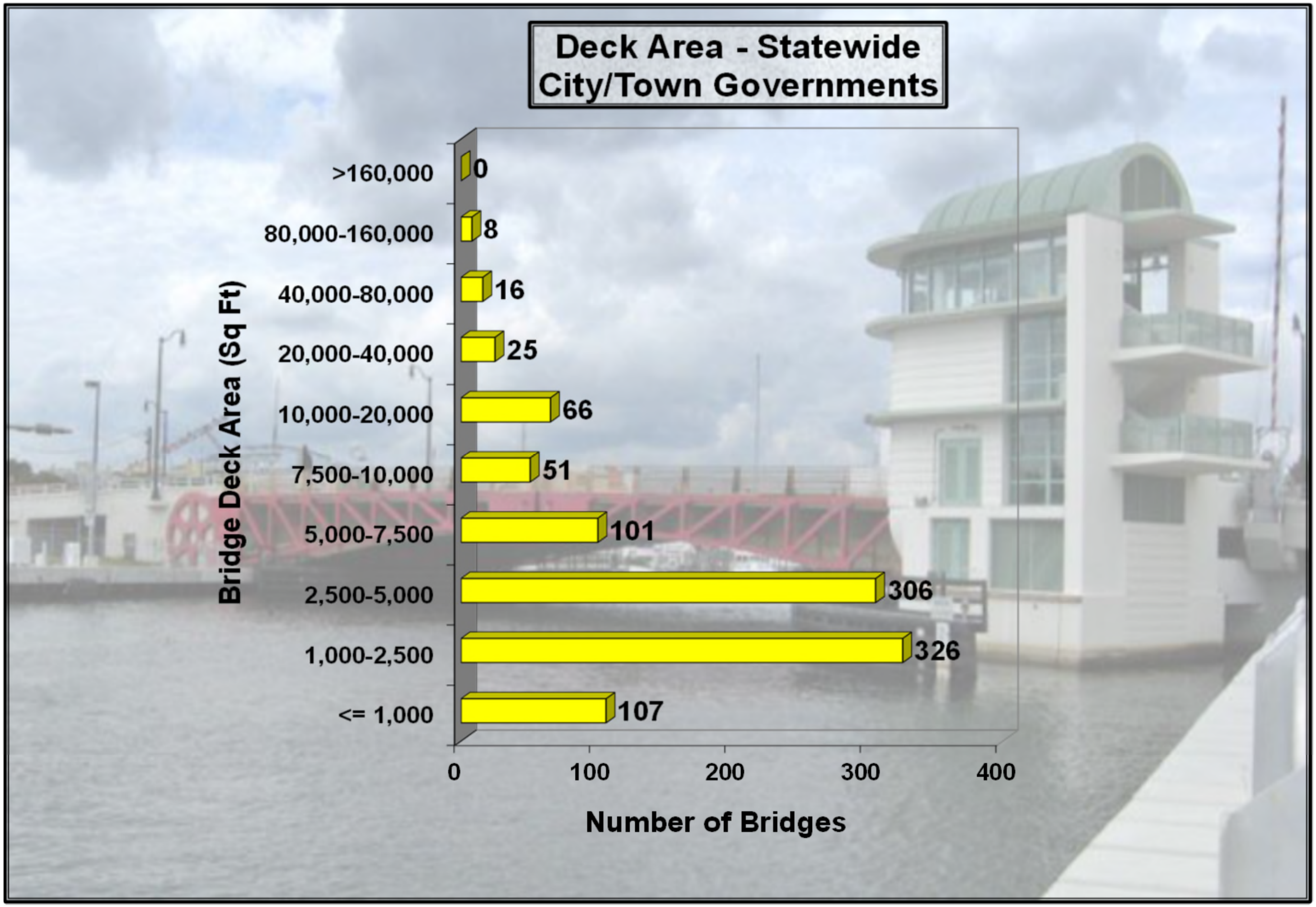

Deck Area - Statewide
City/Town Governments
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
0
8
16
25
66
51
101
306
326
107
0
100
200
300
400
Number of Bridges

Figure 15

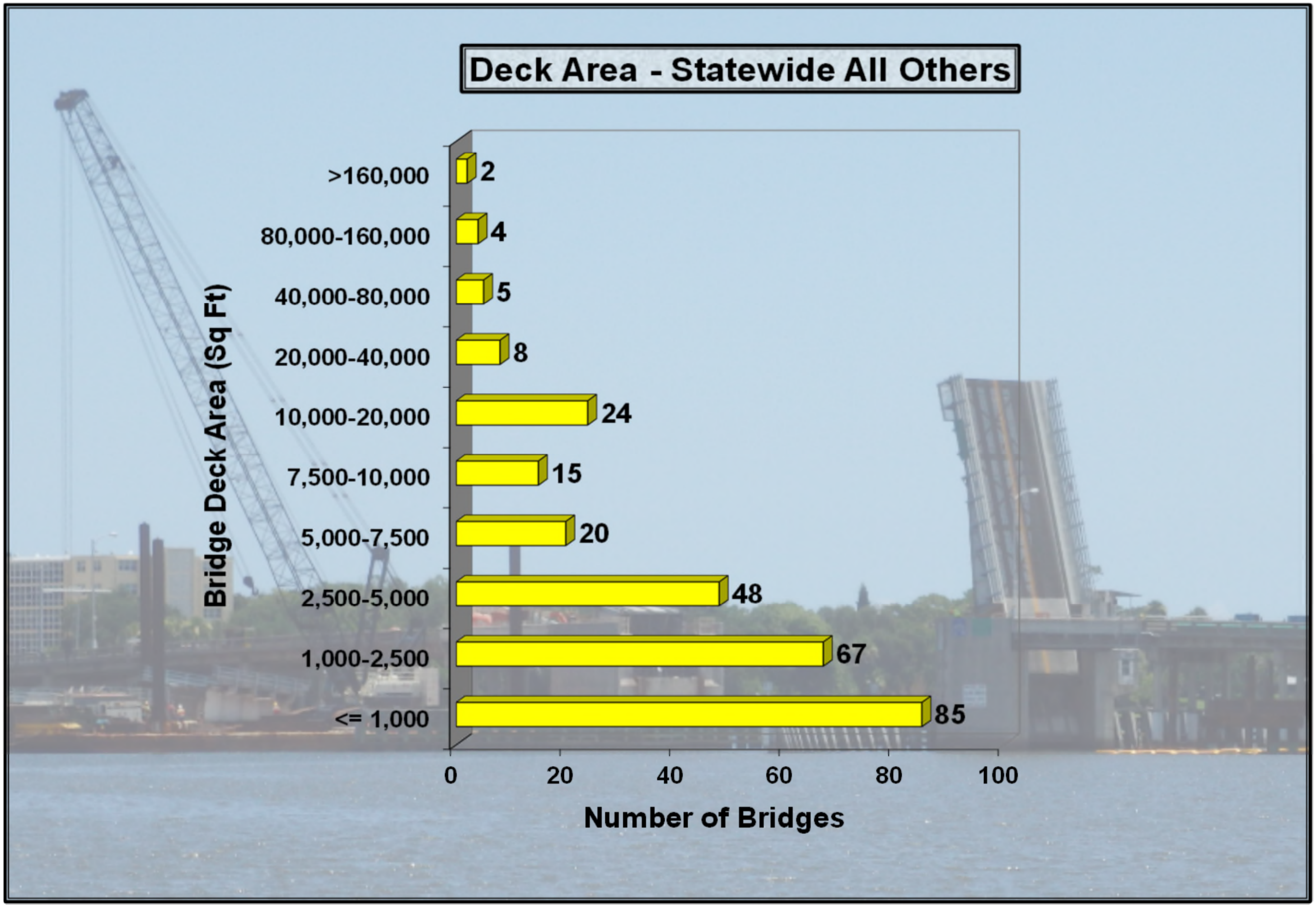

Deck Area - Statewide All Others
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
2
4
5
8
24
15
20
48
67
85
0
20
40
60
80
100
Number of Bridges

Figure 16

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	99	24	1	0	0	0	129	0	226	7	69	1	0	0	303
1,000-2,500	77	194	58	9	6	0	0	344	9	208	11	26	0	0	1	255
2,500-5,000	73	179	76	4	12	0	0	344	53	141	11	7	0	0	0	212
5,000-7,500	149	56	24	2	4	0	0	235	100	55	3	1	0	0	0	159
7,500-10,000	86	36	11	0	0	0	0	133	98	26	0	1	0	0	0	125
10,000-20,000	201	41	8	2	0	0	0	252	181	26	2	0	0	0	0	209
20,000-40,000	62	20	0	2	0	0	0	84	72	15	1	0	0	0	0	88
40,000-80,000	30	5	0	0	0	0	0	35	31	3	2	0	0	0	0	36
80,000-160,000	10	6	0	0	0	0	0	16	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	706	638	201	21	22	0	0	1588	592	703	38	104	3	0	1	1441
	District 2								District 4							
<= 1,000	3	52	13	9	0	0	0	77	2	10	31	0	1	0	0	44
1,000-2,500	22	55	50	1	0	0	0	128	18	98	99	6	0	0	0	221
2,500-5,000	87	69	33	1	0	0	0	190	48	129	102	7	0	0	0	286
5,000-7,500	151	28	16	0	0	0	0	195	70	70	19	2	0	0	0	161
7,500-10,000	166	12	13	0	0	0	0	191	65	40	7	0	0	0	0	112
10,000-20,000	301	16	12	0	0	0	2	331	248	49	14	0	0	0	0	311
20,000-40,000	112	8	5	0	0	0	0	125	168	28	4	0	0	0	0	200
40,000-80,000	53	3	4	0	0	0	0	60	71	10	1	0	0	0	0	82
80,000-160,000	38	0	2	0	0	0	0	40	22	2	1	0	0	0	0	25
>160,000	20	1	0	0	0	0	0	21	16	1	0	0	0	0	0	17
Total	953	244	148	11	0	0	2	1358	728	437	278	15	1	0	0	1459

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	54	41	2	0	0	8	117	13	70	38	0	2	0	0	123
2,500-5,000	77	59	25	2	1	0	13	177	22	51	25	0	0	0	0	98
5,000-7,500	146	33	19	0	1	0	8	207	65	44	10	0	0	0	0	119
7,500-10,000	153	24	9	1	0	0	6	193	88	27	4	0	7	0	0	126
10,000-20,000	284	50	19	1	2	0	14	370	205	42	6	0	1	0	0	254
20,000-40,000	121	17	5	0	0	0	6	149	113	14	6	0	0	0	0	133
40,000-80,000	43	7	5	0	0	0	5	60	64	9	2	0	0	0	0	75
80,000-160,000	28	1	2	0	0	0	1	32	19	3	2	1	0	0	0	25
>160,000	12	0	0	0	1	0	0	13	15	3	0	0	0	0	0	18
Total	876	264	137	9	5	0	62	1353	605	306	109	1	10	0	0	1031
	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	7	72	29	2	0	4	0	114	6	0	0	0	0	0	0	6
2,500-5,000	54	59	34	0	1	0	0	148	73	0	0	0	0	0	0	73
5,000-7,500	75	35	10	0	2	0	0	122	137	0	0	0	0	0	0	137
7,500-10,000	62	16	7	0	0	0	0	85	118	0	0	0	0	0	0	118
10,000-20,000	176	26	5	1	1	0	0	209	235	0	0	0	0	0	0	235
20,000-40,000	121	10	4	0	0	0	0	135	70	0	0	0	0	0	0	70
40,000-80,000	70	5	2	0	0	0	0	77	26	0	0	0	0	0	0	26
80,000-160,000	28	4	0	0	0	0	0	32	8	0	0	0	0	0	0	8
>160,000	18	4	0	0	0	0	0	22	5	0	0	0	0	0	0	5
Total	612	245	95	3	4	4	0	963	678	0	0	0	0	0	0	678

Table 7

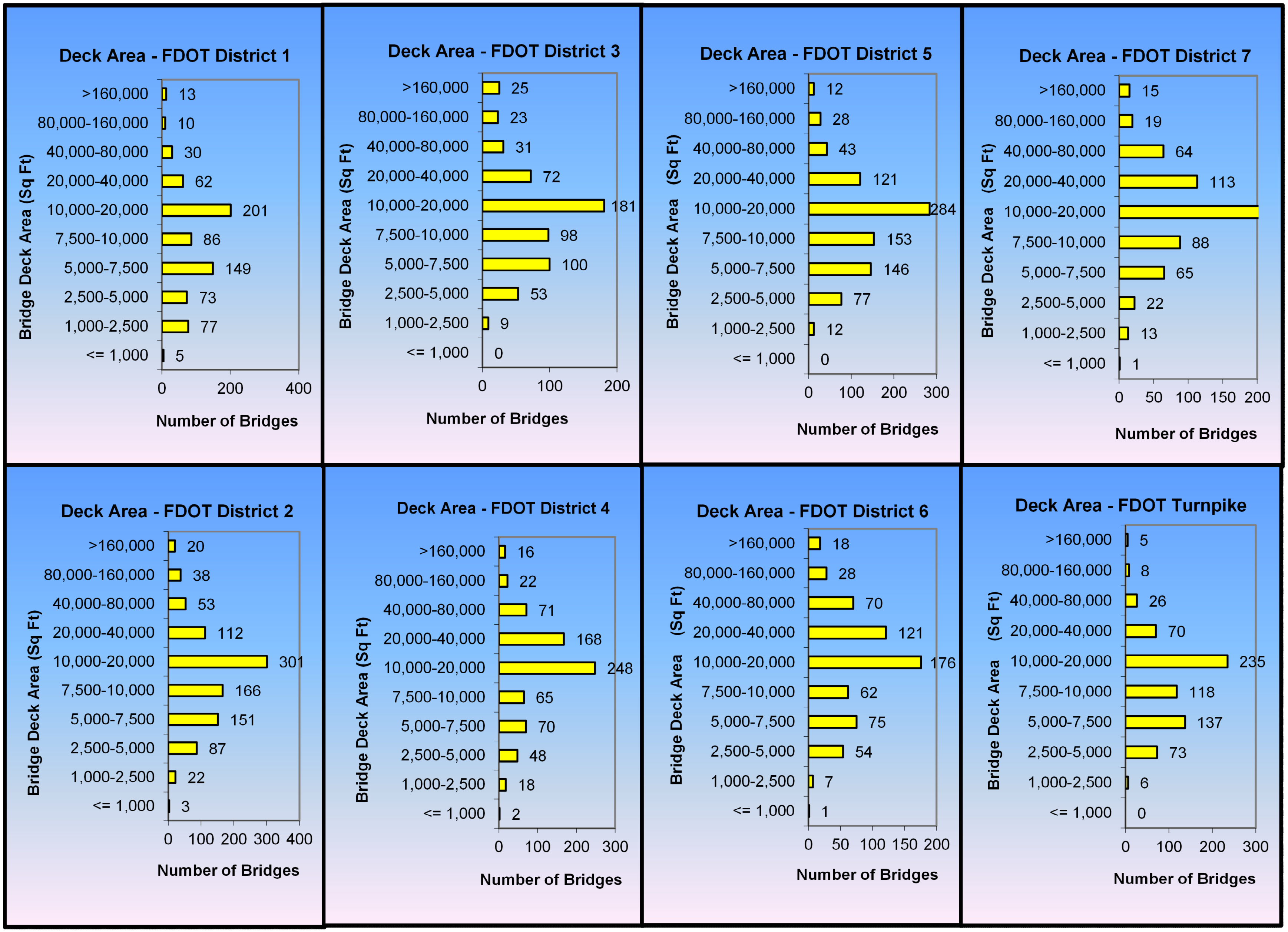

Deck Area - FDOT District 1
Bridge Deck Area (Sq Ft)
>160,000 13
80,000-160,000 10
40,000-80,000 30
20,000-40,000 62
10,000-20,000 201
7,500-10,000 86
5,000-7,500 149
2,500-5,000 73
1,000-2,500 77
<= 1,000 5
0 200 400
Number of Bridges
Deck Area - FDOT District 3
Bridge Deck Area (Sq Ft)
>160,000 25
80,000-160,000 23
40,000-80,000 31
20,000-40,000 72
10,000-20,000 181
7,500-10,000 98
5,000-7,500 100
2,500-5,000 53
1,000-2,500 9
<= 1,000 0
0 100 200
Number of Bridges
Deck Area - FDOT District 5
Bridge Deck Area (Sq Ft)
>160,000 12
80,000-160,000 28
40,000-80,000 43
20,000-40,000 121
10,000-20,000 284
7,500-10,000 153
5,000-7,500 146
2,500-5,000 77
1,000-2,500 12
<= 1,000 0
0 100 200 300
Number of Bridges
Deck Area - FDOT District 7
Bridge Deck Area (Sq Ft)
>160,000 15
80,000-160,000 19
40,000-80,000 64
20,000-40,000 113
10,000-20,000
7,500-10,000 88
5,000-7,500 65
2,500-5,000 22
1,000-2,500 13
<= 1,000 1
0 50 100 150 200
Number of Bridges
Deck Area - FDOT District 2
Bridge Deck Area (Sq Ft)
>160,000 20
80,000-160,000 38
40,000-80,000 53
20,000-40,000 112
10,000-20,000 301
7,500-10,000 166
5,000-7,500 151
2,500-5,000 87
1,000-2,500 22
<= 1,000 3
0 100 200 300 400
Number of Bridges
Deck Area - FDOT District 4
Bridge Deck Area (Sq Ft)
>160,000 16
80,000-160,000 22
40,000-80,000 71
20,000-40,000 168
10,000-20,000 248
7,500-10,000 65
5,000-7,500 70
2,500-5,000 48
1,000-2,500 18
<= 1,000 2
0 100 200 300
Number of Bridges
Deck Area - FDOT District 6
Bridge Deck Area (Sq Ft)
>160,000 18
80,000-160,000 28
40,000-80,000 70
20,000-40,000 121
10,000-20,000 176
7,500-10,000 62
5,000-7,500 75
2,500-5,000 54
1,000-2,500 7
<= 1,000 1
0 50 100 150 200
Number of Bridges
Deck Area - FDOT Turnpike
Bridge Deck Area (Sq Ft)
>160,000 5
80,000-160,000 8
40,000-80,000 26
20,000-40,000 70
10,000-20,000 235
7,500-10,000 118
5,000-7,500 137
2,500-5,000 73
1,000-2,500 6
<= 1,000 0
0 100 200 300
Number of Bridges

Figure 17

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 18 shows, for each of the maintenance responsibility groups, the percentage of bridges in excellent, good, fair, and poor condition. Approximately 95.7% of the FDOT maintained bridges are in excellent or good condition. However, the number drops to 84.90% for County bridges, 89.43% for City/Town bridges, and 84.19% for Other Agency bridges. Figures 19 and 20 provide similar views of the FDOT maintained bridges, by district. An alternative view of the data is presented in Figures 21, 22, and 23, for each of the three maintenance groups.

Figure 24 is provided to show a general graphical view of the location of state maintained bridges within the state based on condition category.

Overall Structural Condition

Maintenance Responsibility

	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total
District 1								
Excellent	67	74	11	3	0	0	0	155
Good	847	790	231	17	23	0	0	1908
Fair	20	46	4	1	0	0	0	71
Poor	0	4	1	1	0	0	0	6
Total	934	914	247	22	23	0	0	2140
District 2								
Excellent	86	35	10	0	0	0	1	132
Good	1102	313	160	5	0	0	1	1581
Fair	50	91	25	4	0	0	0	170
Poor	11	47	9	2	0	0	0	69
Total	1249	486	204	11	0	0	2	1952
District 3								
Excellent	16	33	1	3	0	0	1	54
Good	729	621	41	70	2	0	1	1464
Fair	60	200	6	29	1	0	0	296
Poor	12	100	5	4	0	0	0	121
Total	817	954	53	106	3	0	2	1935
District 4								
Excellent	124	72	24	3	0	0	0	223
Good	606	363	216	10	1	0	0	1196
Fair	27	20	43	2	0	0	0	92
Poor	5	4	4	0	0	0	0	13
Total	762	459	287	15	1	0	0	1524

Maintenance Responsibility

	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total
District 5								
Excellent	153	63	20	1	3	0	8	248
Good	831	296	145	9	5	0	54	1340
Fair	50	20	4	0	0	0	1	75
Poor	4	5	6	0	0	0	0	15
Total	1038	384	175	10	8	0	63	1678
District 6								
Excellent	161	24	10	0	4	0	0	199
Good	429	204	77	3	0	4	0	717
Fair	22	23	7	0	0	0	0	52
Poor	3	2	2	0	0	0	0	7
Total	615	253	96	3	4	4	0	975
District 7								
Excellent	100	22	11	0	3	0	1	137
Good	579	391	143	0	9	0	0	1122
Fair	24	23	12	0	0	0	0	59
Poor	1	2	2	1	0	0	0	6
Total	704	438	168	1	12	0	1	1324
Turnpike								
Excellent	74	0	0	0	0	0	0	74
Good	659	0	0	0	0	0	0	659
Fair	6	0	0	0	0	0	0	6
Poor	0	0	0	0	0	0	0	0
Total	739	0	0	0	0	0	0	739
Statewide								
Excellent	781	323	87	10	10	0	11	1222
Good	5782	2978	1013	114	40	4	56	9987
Fair	259	423	101	36	1	0	1	821
Poor	36	164	29	8	0	0	0	237
Total	6858	3888	1230	168	51	4	68	12267

NOTE: The number of FDOT bridges includes 116 MDX bridges and 300 CFX bridges.

Table 8

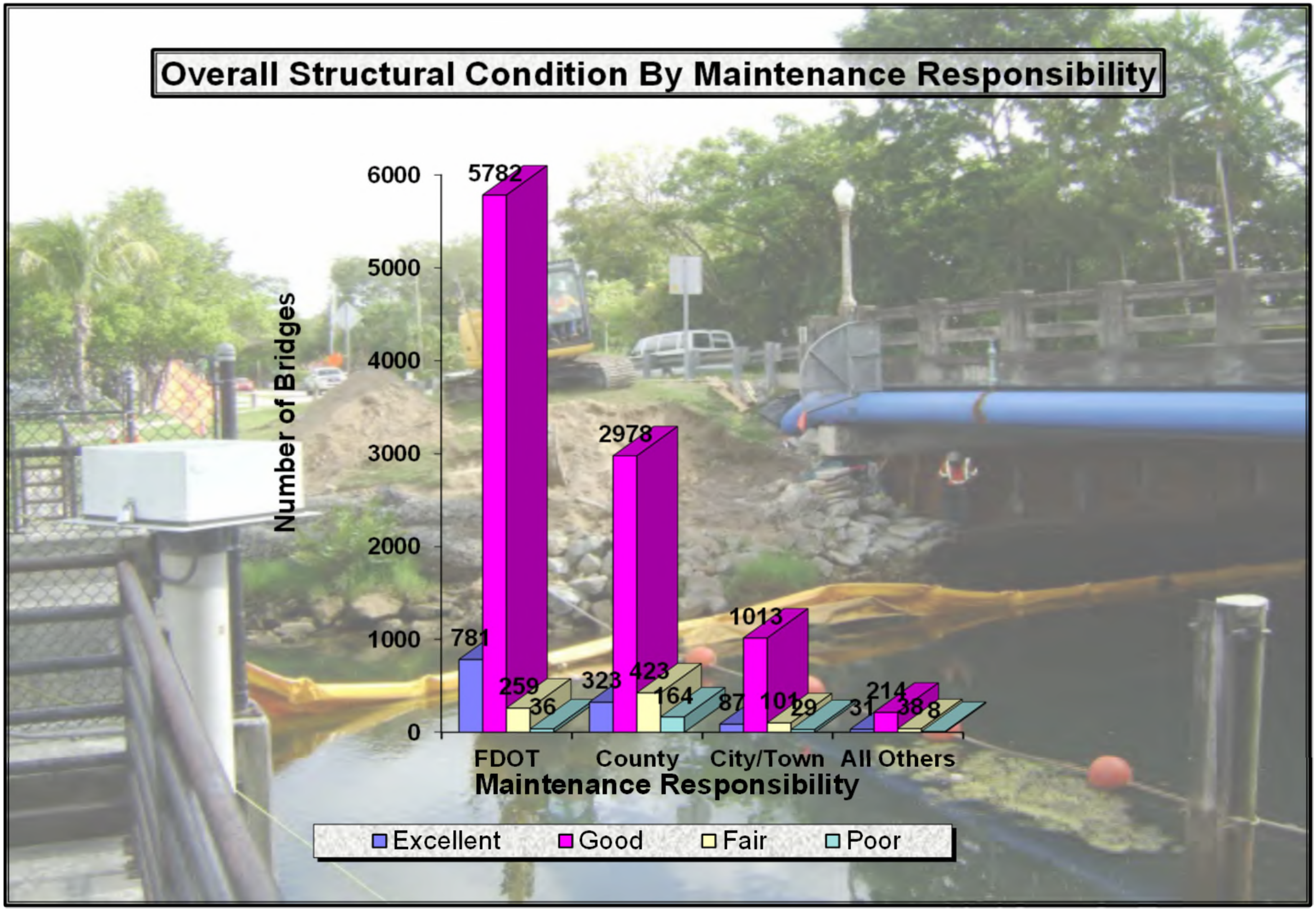

Overall Structural Condition By Maintenance Responsibility
Number of Bridges
6000
5000
4000
3000
2000
1000
0
5782
781
259
36
2978
323
423
164
1013
87
101
29
214
31
38
8
FDOT
County
City/Town
All Others
Maintenance Responsibility
Excellent
Good
Fair
Poor

Figure 18

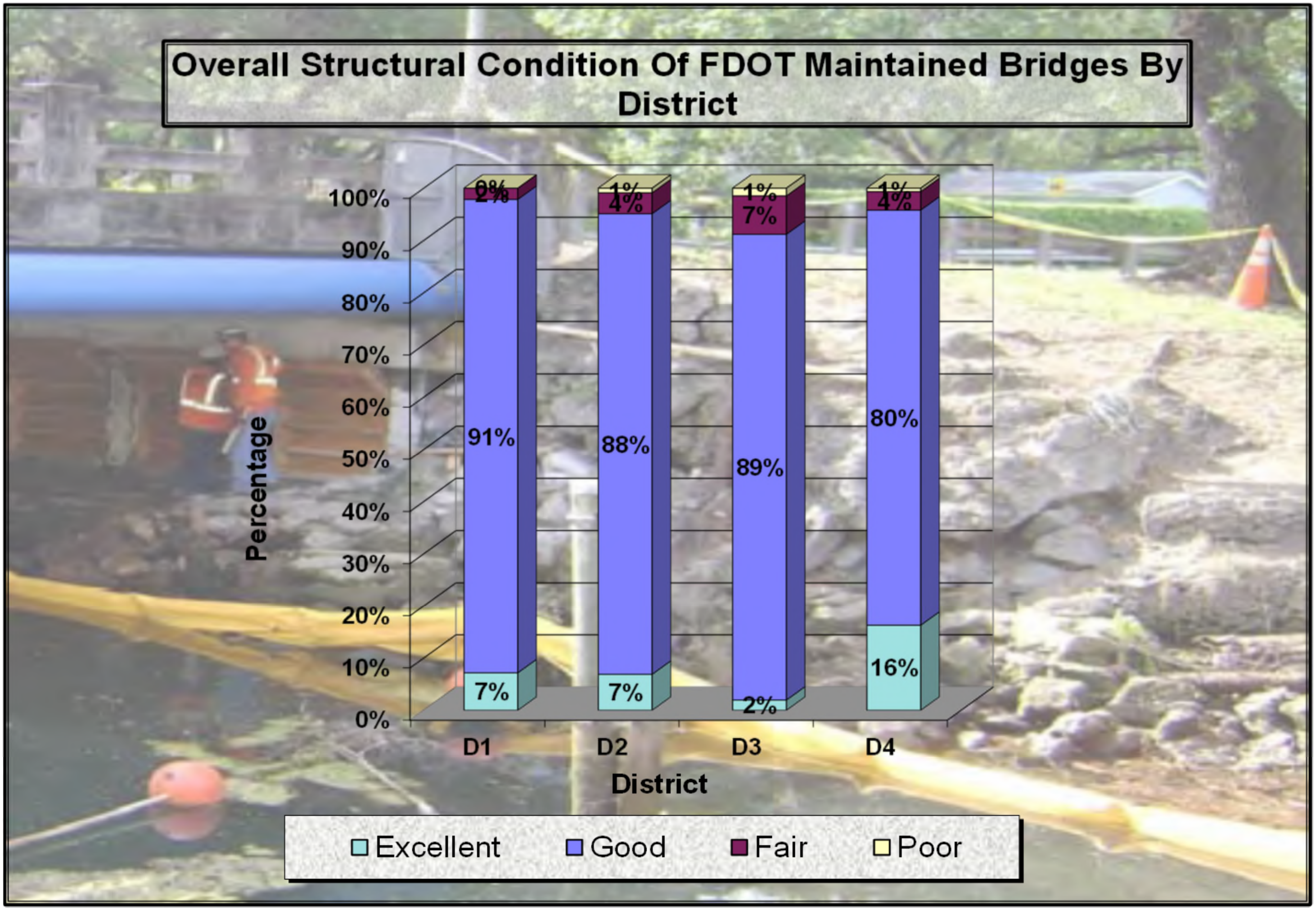

Overall Structural Condition Of FDOT Maintained Bridges By District
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
2%
91%
7%
1%
4%
88%
7%
1%
7%
89%
2%
1%
4%
80%
16%
D1
D2
D3
D4
District
Excellent
Good
Fair
Poor

Figure 19

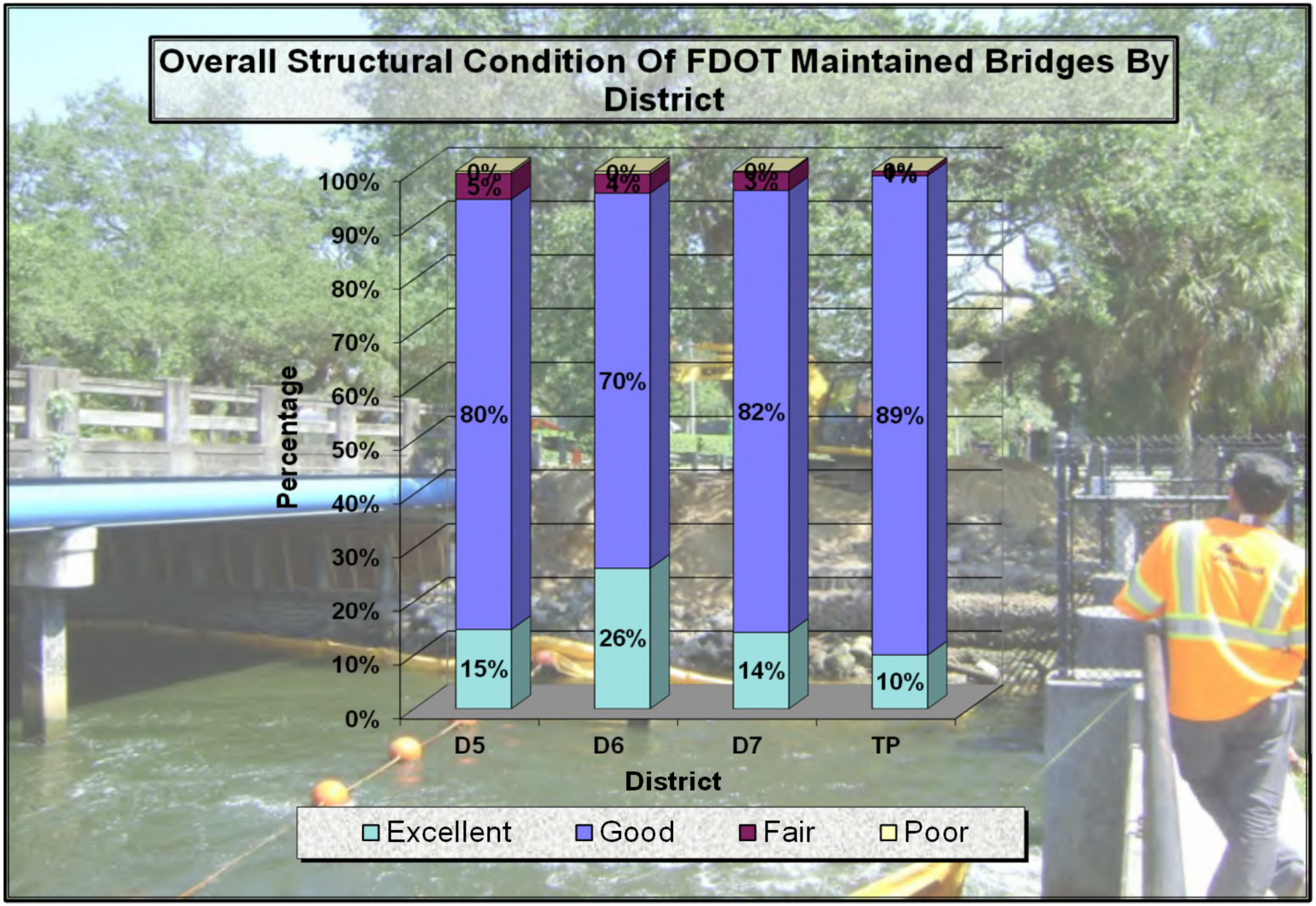

Overall Structural Condition Of FDOT Maintained Bridges By District
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
5%
80%
15%
0%
4%
70%
26%
0%
3%
82%
14%
0%
1%
89%
10%
D5
D6
D7
TP
District
Excellent
Good
Fair
Poor

Figure 20

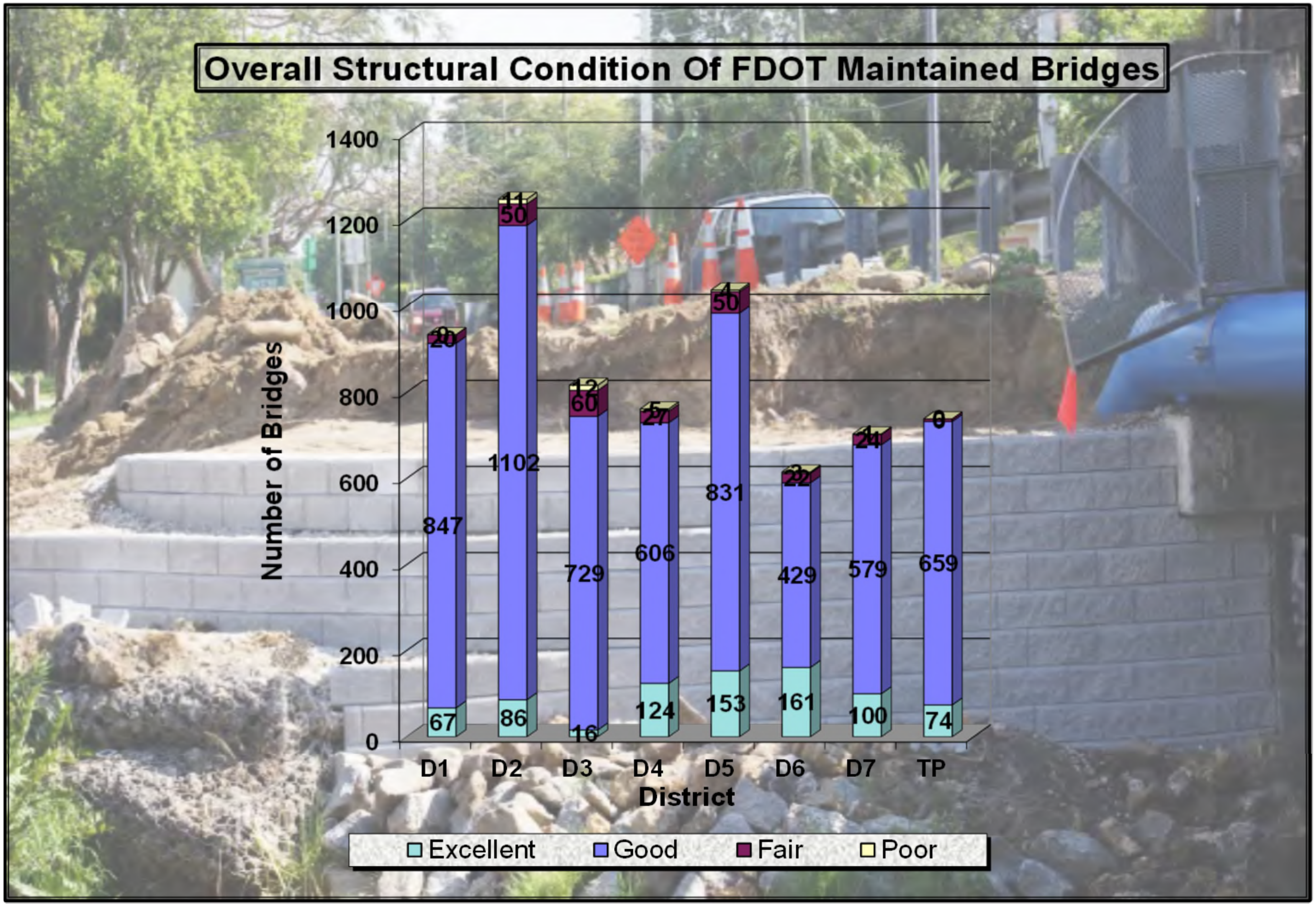

Overall Structural Condition Of FDOT Maintained Bridges
Number of Bridges
1400
1200
1000
800
600
400
200
0
D1
D2
D3
D4
D5
D6
D7
TP
District
67
847
20
86
1102
50
11
16
729
60
124
606
27
153
831
50
161
429
22
100
579
24
74
659
Excellent
Good
Fair
Poor

Figure 21

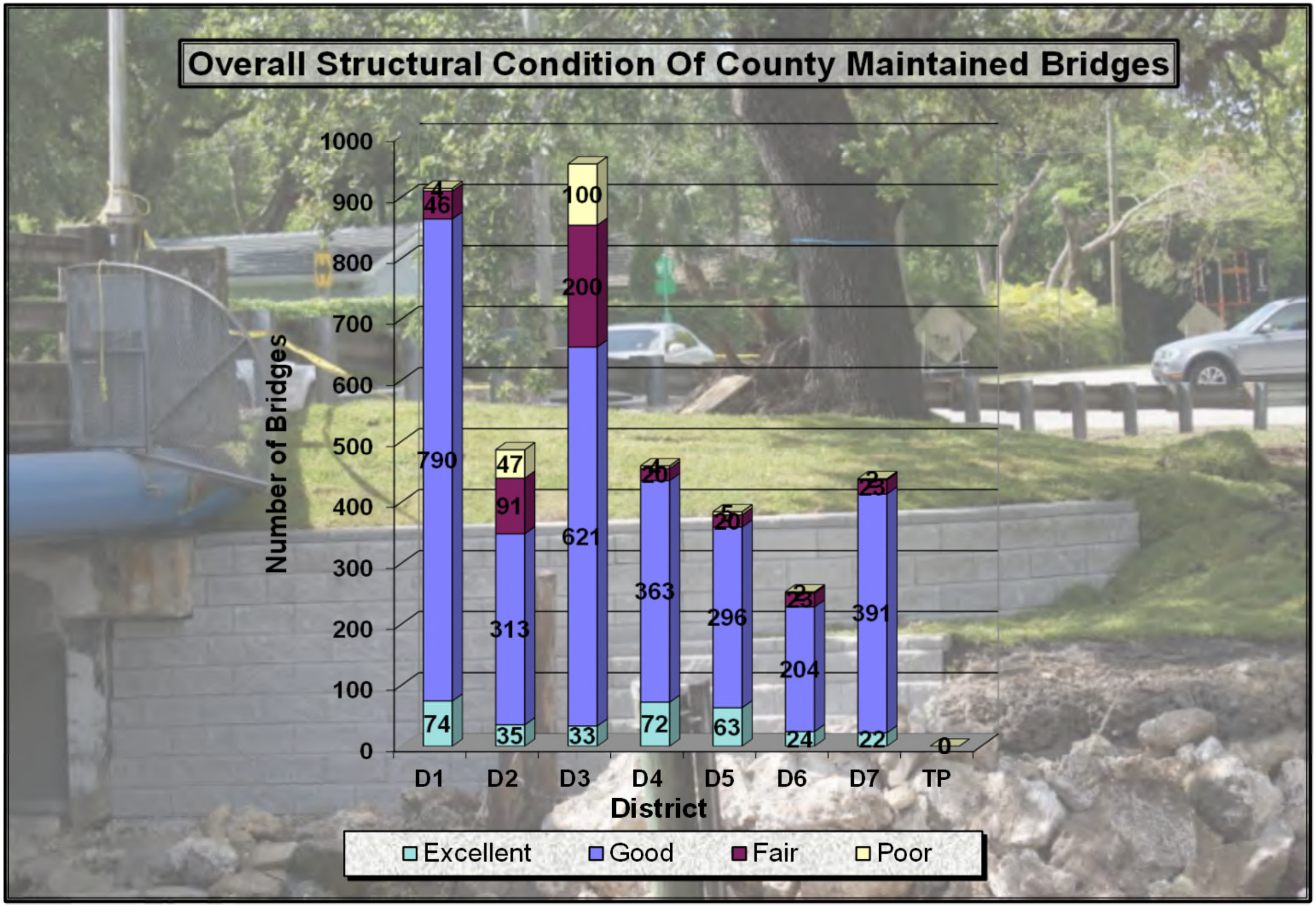

Overall Structural Condition Of County Maintained Bridges
Number of Bridges
1000
900
800
700
600
500
400
300
200
100
0
74
790
46
4
35
313
91
47
33
621
200
100
72
363
20
4
63
296
20
5
24
204
23
2
22
391
23
2
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Excellent
Good
Fair
Poor

Figure 22

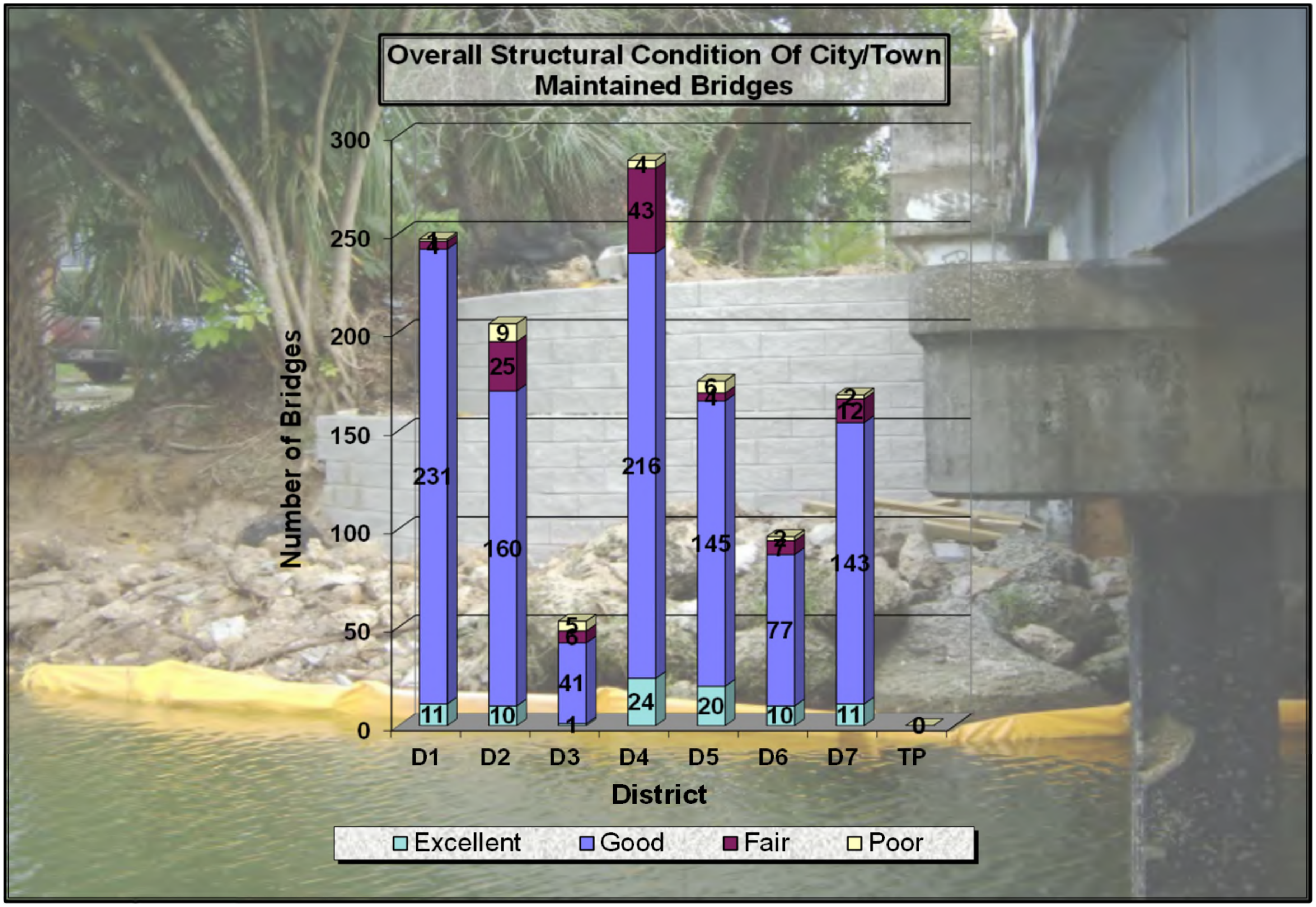

Overall Structural Condition Of City/Town Maintained Bridges
Number of Bridges
300
250
200
150
100
50
0
D1
D2
D3
D4
D5
D6
D7
TP
District
1
4
231
11
9
25
160
10
5
6
41
1
4
43
216
24
6
4
145
20
2
7
77
10
2
12
143
11
0
Excellent
Good
Fair
Poor

Figure 23

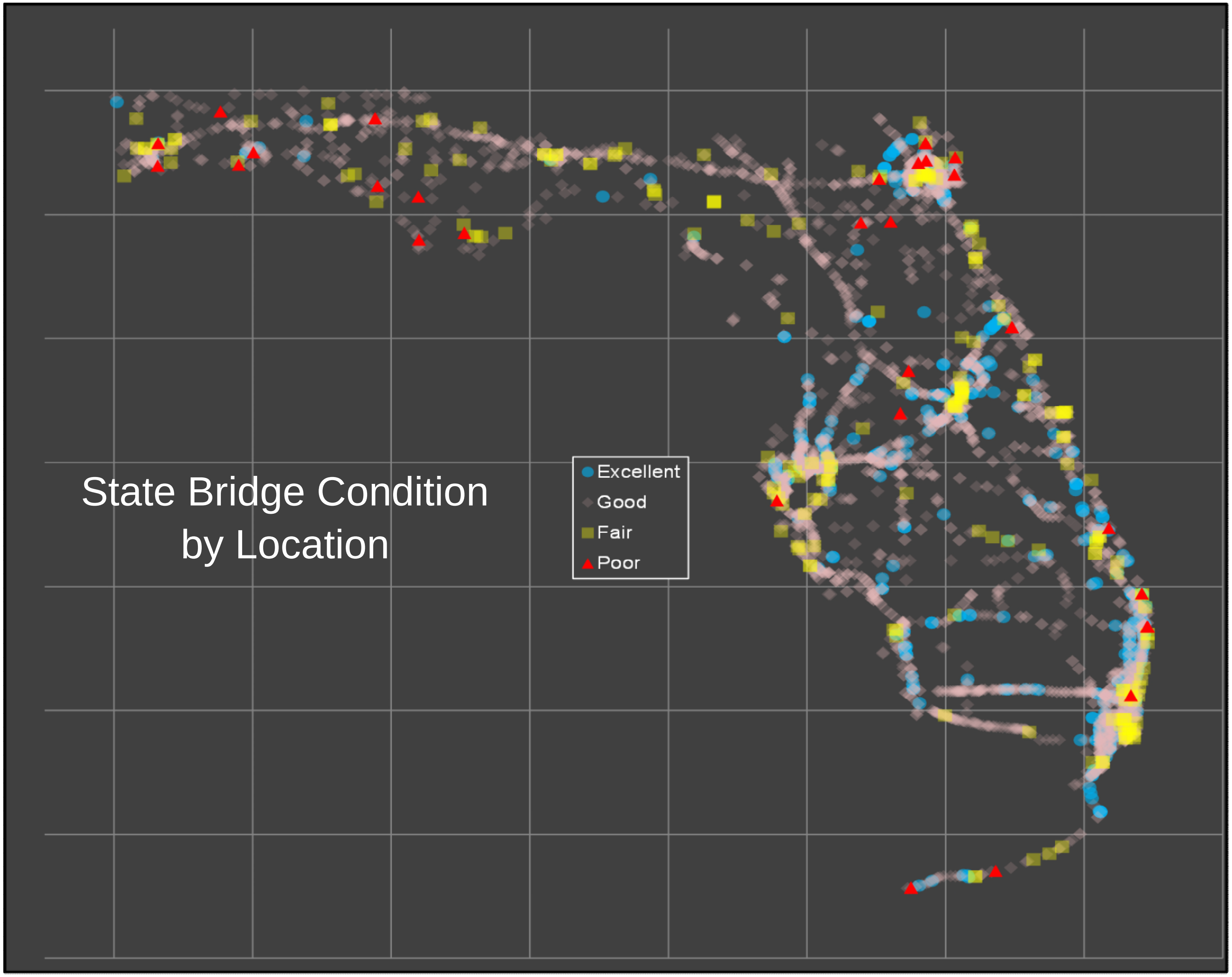
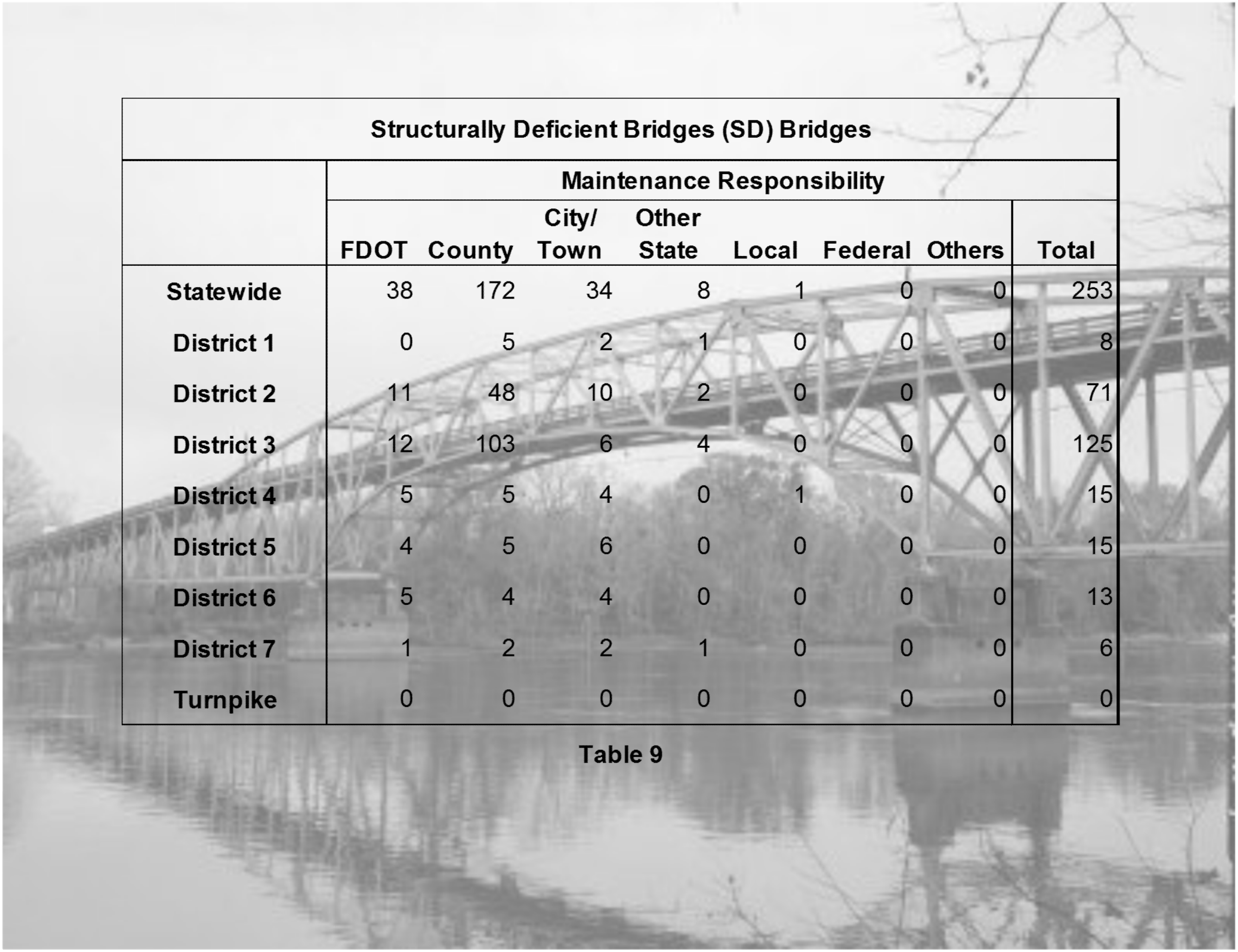

State Bridge Condition
by Location
Excellent
Good
Fair
Poor

Figure 24

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 253 structurally deficient bridges in Florida, with over 67.98% having county maintenance responsibility. Thirty-eight (15.02%) of the structurally deficient bridges are maintained by FDOT (see Figure 25). Refer to Figure 26 for a presentation of structurally deficient bridges, by district, for each of the maintenance responsibility groups. Over 87.79% of the County Government maintained structurally deficient bridges are concentrated within District 2 and 3. Over 41.18% 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	38	172	34	8	1	0	0	253
District 1	0	5	2	1	0	0	0	8
District 2	11	48	10	2	0	0	0	71
District 3	12	103	6	4	0	0	0	125
District 4	5	5	4	0	1	0	0	15
District 5	4	5	6	0	0	0	0	15
District 6	5	4	4	0	0	0	0	13
District 7	1	2	2	1	0	0	0	6
Turnpike	0	0	0	0	0	0	0	0

Table 9

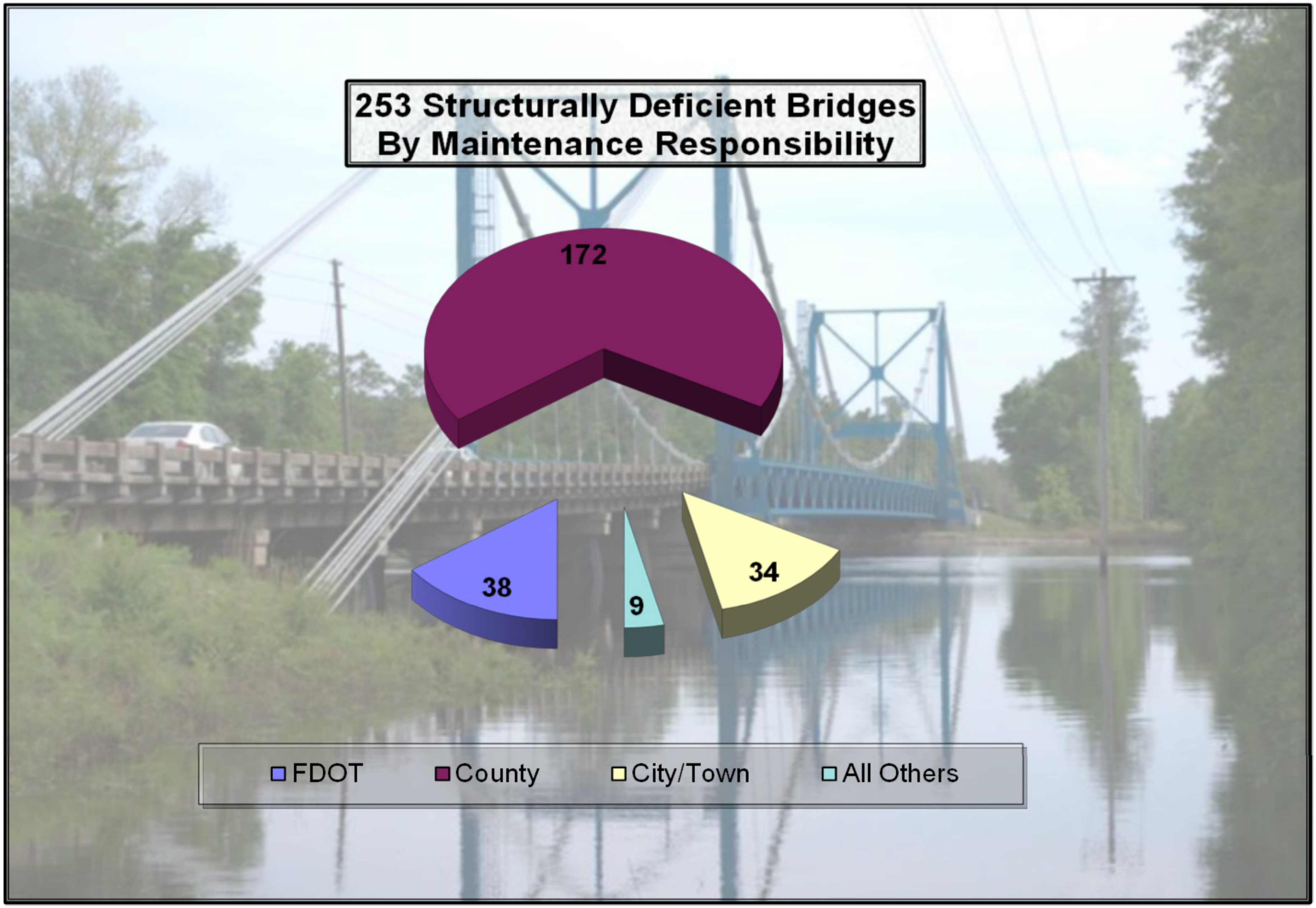

253 Structurally Deficient Bridges
By Maintenance Responsibility
172
38
9
34
FDOT
County
City/Town
All Others

Figure 25

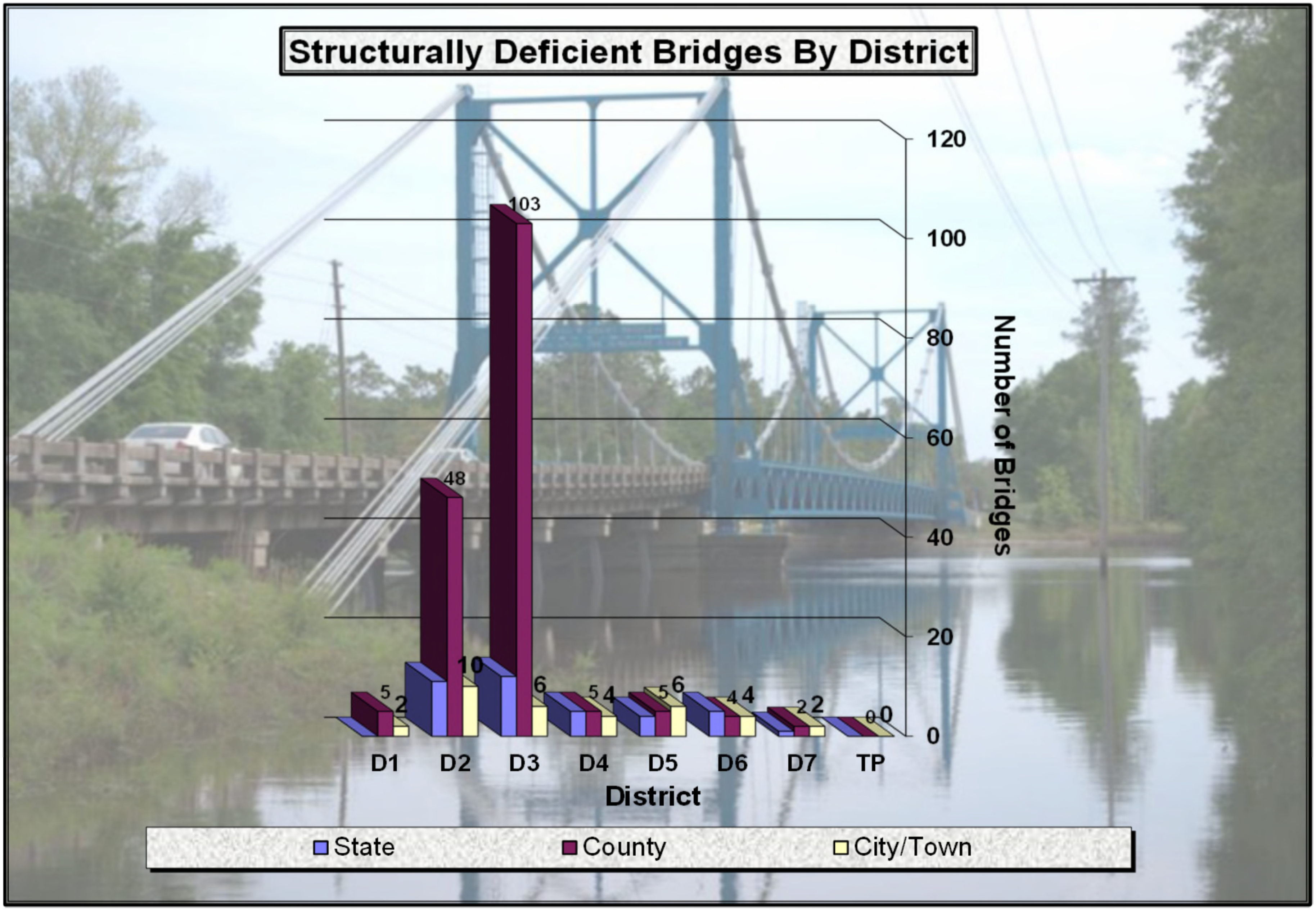

Structurally Deficient Bridges By District
Number of Bridges
0
20
40
60
80
100
120
5
2
48
10
103
6
5
4
5
6
4
4
2
2
0
0
D1
D2
D3
D4
D5
D6
D7
TP
District
State
County
City/Town

Figure 26

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 685 posted or closed bridges in Florida, with County Governments having maintenance responsibility for over 76.06% of the total. City and Town Governments are responsible for the maintenance of over 17.37% of the total, while the FDOT is responsible for only 11 of the 685 bridges (1.61%) (see Figure 27). The number of posted County bridges (521 bridges) is much greater than the number of structurally deficient County bridges (172), which indicated that the majority of County bridge posting restrictions are caused by obsolete design, rather than advanced structural deterioration (see Figure 28).

Of the 11 posted or closed bridges maintained by the FDOT, Districts 1, 4, and Turnpike had none, and Districts 2 and 7 constituted 57.14% of the posted or closed bridges (see Figure 29). Three Hundred and Ninety Seven (71.59%) of the posted or closed bridges maintained by County Governments are concentrated within Districts 2 and 3 (see Figure 30). Seventy-one (55.46%) of the posted or closed bridges maintained by City/Town Governments are concentrated within Districts 2 and 4 (see Figure 31). Statewide, 65.84% of all posted or closed bridges are within the boundaries of Districts 2 and 3.

Posted and Closed Bridges

Maintenance Responsibility

	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total
District 1								
Posted	0	79	14	2	0	0	0	95
Closed	3	2	1	0	0	0	0	6
Total	3	81	15	2	0	0	0	101
District 2								
Posted	2	89	33	5	0	0	0	129
Closed	0	3	4	1	0	0	0	8
Total	2	92	37	6	0	0	0	137
District 3								
Posted	0	275	9	19	0	0	0	303
Closed	2	6	1	2	0	0	0	11
Total	2	281	10	21	0	0	0	314
District 4								
Posted	0	21	29	1	0	0	0	51
Closed	0	1	0	0	1	0	0	2
Total	0	22	29	1	1	0	0	53

Maintenance Responsibility

	FDOT	County	City/ Town	Other State	Other Local	Federal	Others	Total
District 5								
Posted	0	19	19	3	0	0	0	41
Closed	1	0	1	0	0	0	0	2
Total	1	19	20	3	0	0	0	43
District 6								
Posted	0	13	3	0	0	0	0	16
Closed	3	3	2	0	0	0	0	8
Total	3	16	5	0	0	0	0	24
District 7								
Posted	0	8	3	0	0	0	0	11
Closed	0	2	0	0	0	0	0	2
Total	0	10	3	0	0	0	0	13
Turnpike								
Posted	0	0	0	0	0	0	0	0
Closed	0	0	0	0	0	0	0	0
Total	0	0	0	0	0	0	0	0
Statewide								
Posted	2	504	110	30	0	0	0	646
Closed	9	17	9	3	1	0	0	39
Total	11	521	119	33	1	0	0	685

Table 10

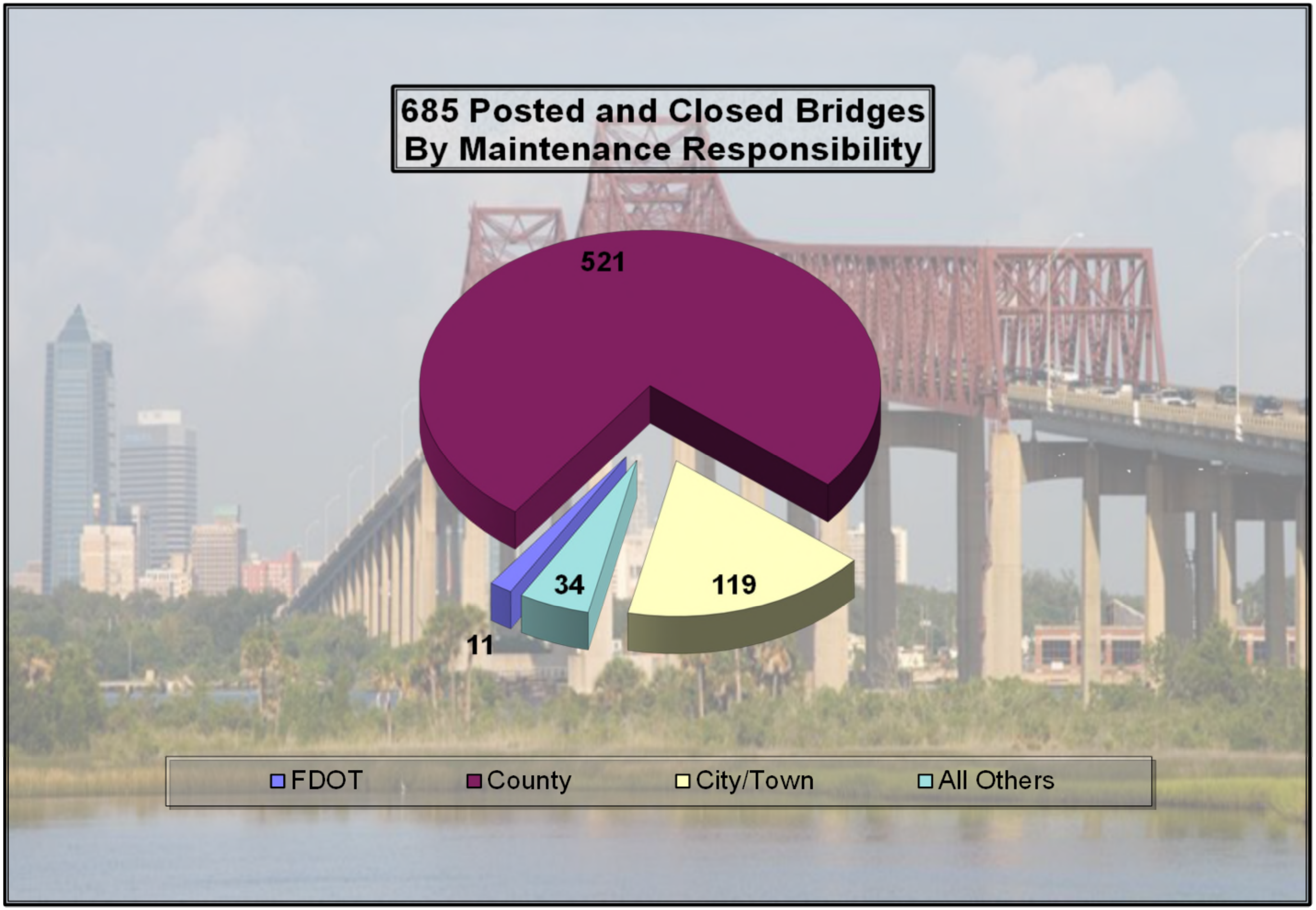

685 Posted and Closed Bridges
By Maintenance Responsibility
521
34
119
11
FDOT
County
City/Town
All Others

Figure 27

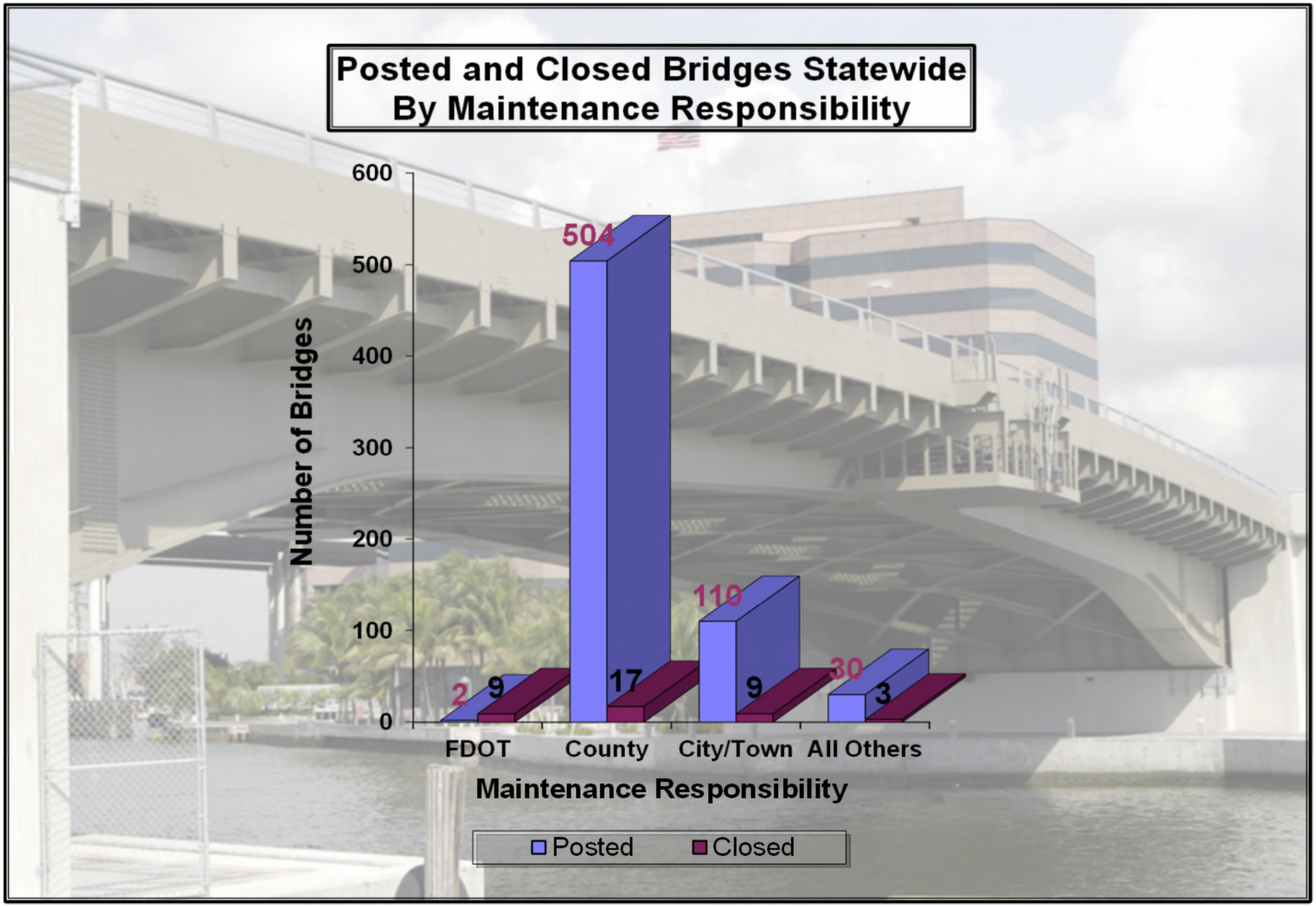

Posted and Closed Bridges Statewide
By Maintenance Responsibility
600
500
400
300
200
100
0
Number of Bridges
504
2
9
17
110
9
30
3
FDOT
County
City/Town
All Others
Maintenance Responsibility
Posted
Closed

Figure 28

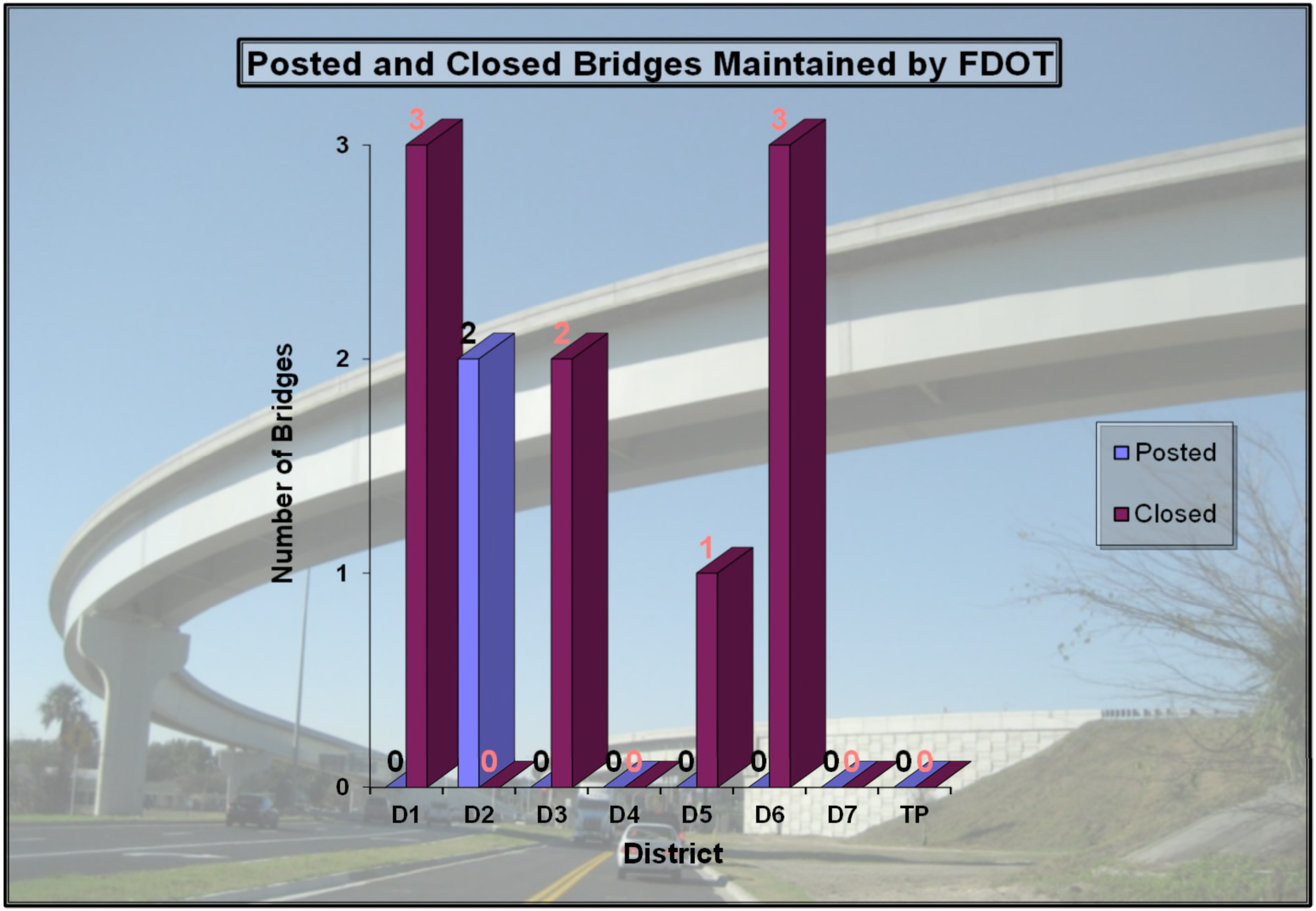

Posted and Closed Bridges Maintained by FDOT
Number of Bridges
3
2
1
0
3
2
0
0
2
0
0
0
1
0
3
0
0
0
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Posted
Closed

Figure 29

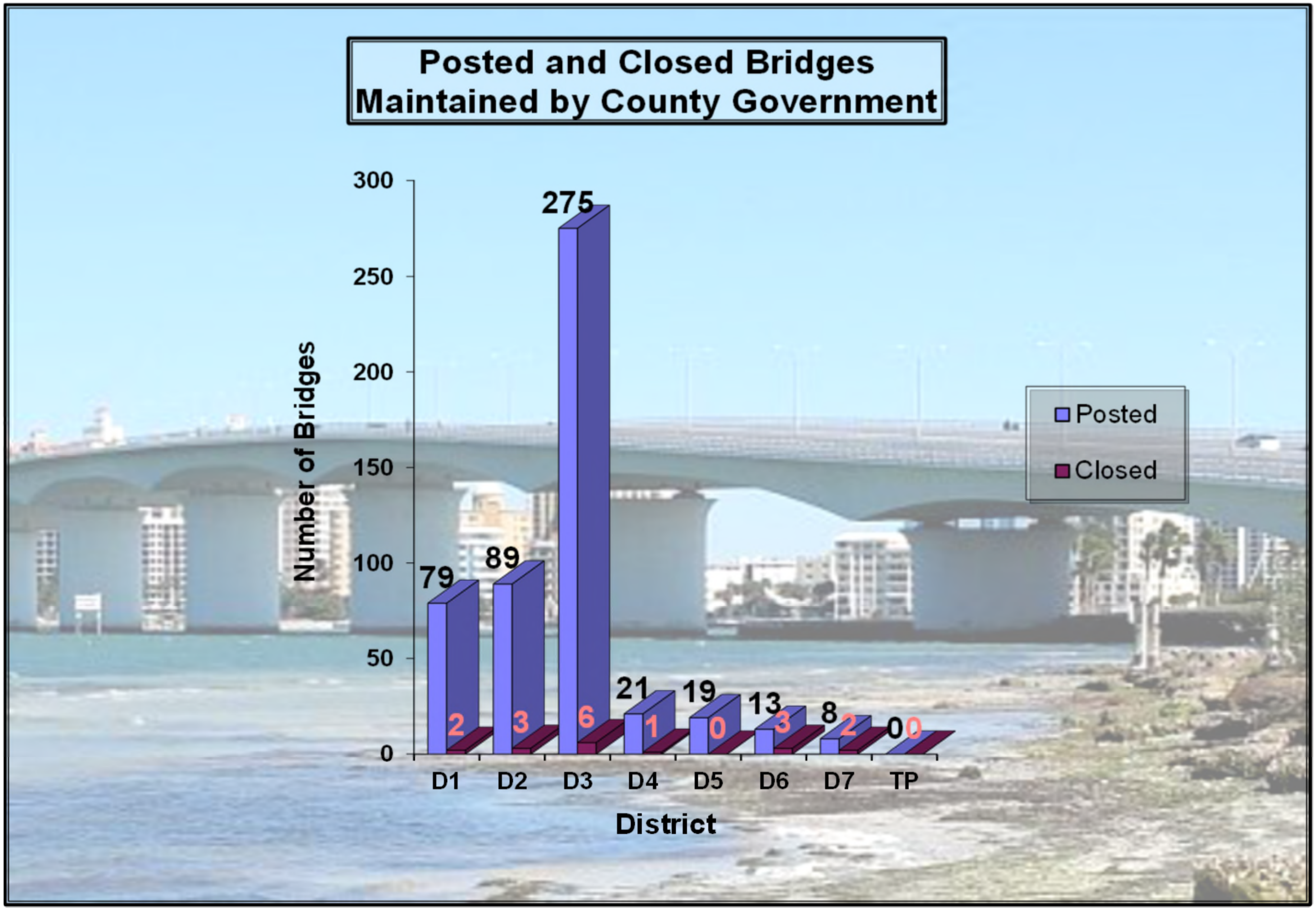

Posted and Closed Bridges
Maintained by County Government
Number of Bridges
300
250
200
150
100
50
0
79
89
275
21
19
13
8
0
2
3
6
1
0
3
2
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Posted
Closed

Figure 30

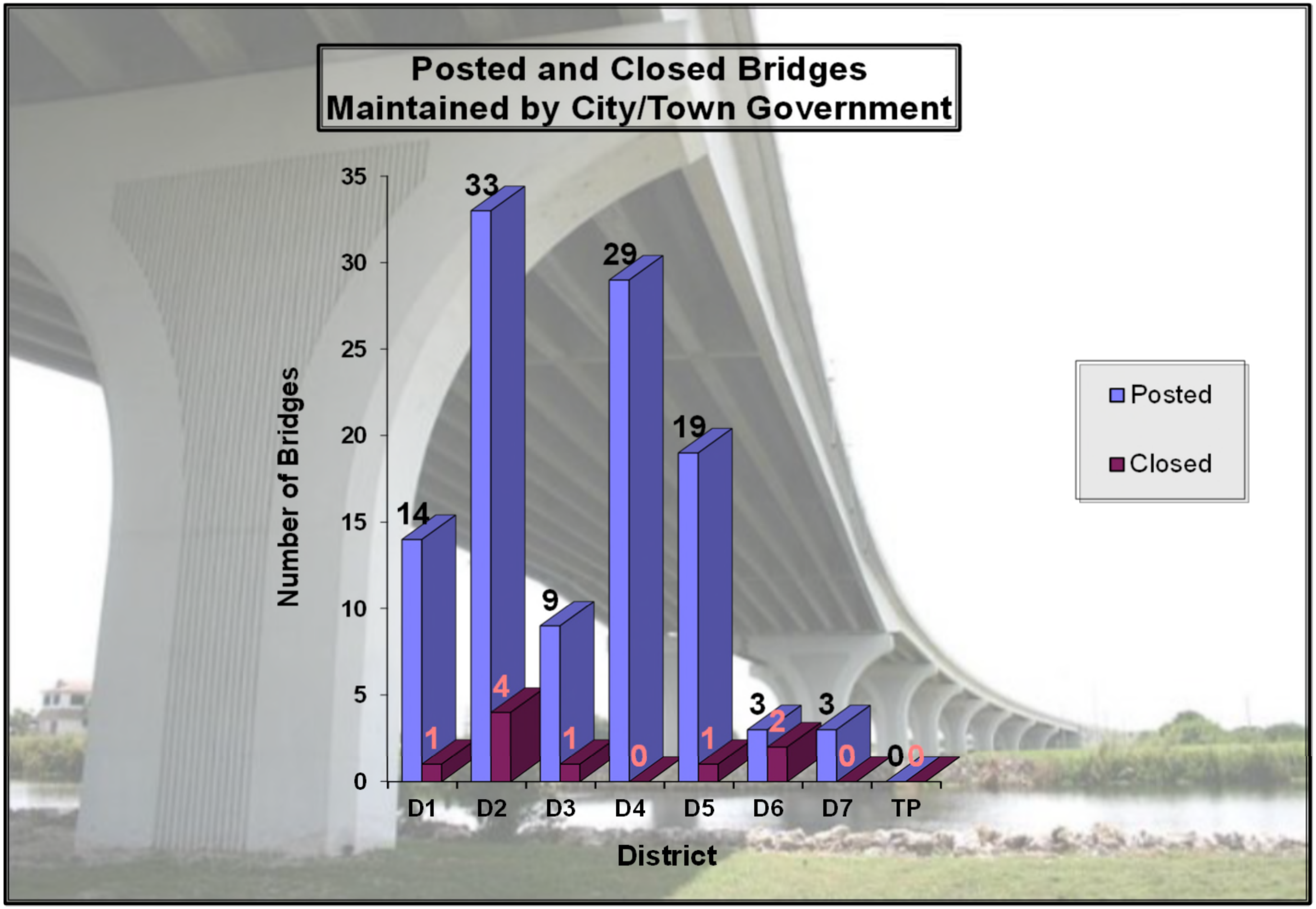
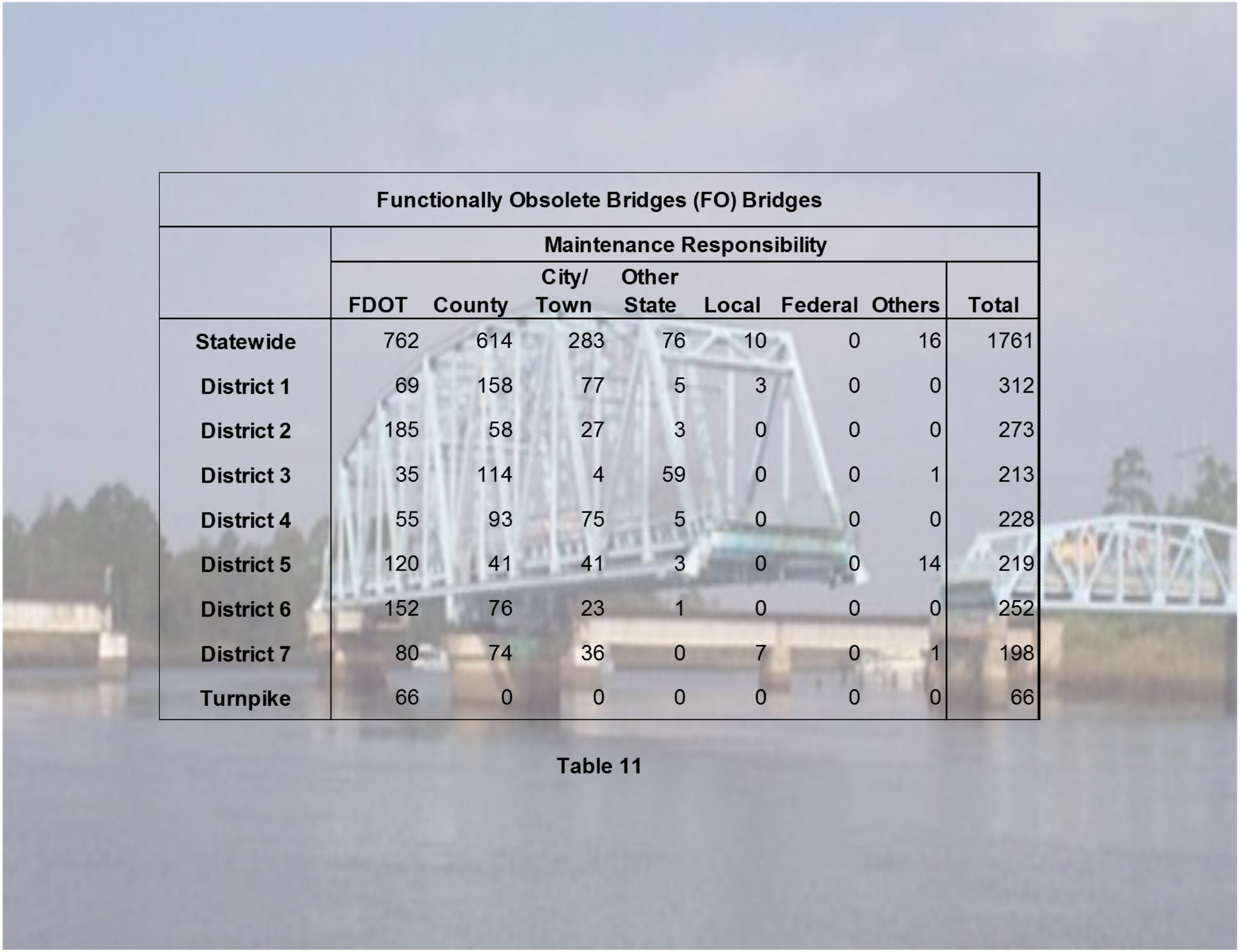

Posted and Closed Bridges
Maintained by City/Town Government
Number of Bridges
35
30
25
20
15
10
5
0
14
1
33
4
9
1
29
0
19
1
3
2
3
0
0
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Posted
Closed

Figure 31

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 1,761 functionally obsolete bridges in Florida, about 14.36% of the total. The FDOT has maintenance responsibility for over 43.27% of all functionally obsolete bridges (see Figure 32). Refer to Figure 33 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	762	614	283	76	10	0	16	1761
District 1	69	158	77	5	3	0	0	312
District 2	185	58	27	3	0	0	0	273
District 3	35	114	4	59	0	0	1	213
District 4	55	93	75	5	0	0	0	228
District 5	120	41	41	3	0	0	14	219
District 6	152	76	23	1	0	0	0	252
District 7	80	74	36	0	7	0	1	198
Turnpike	66	0	0	0	0	0	0	66

Table 11

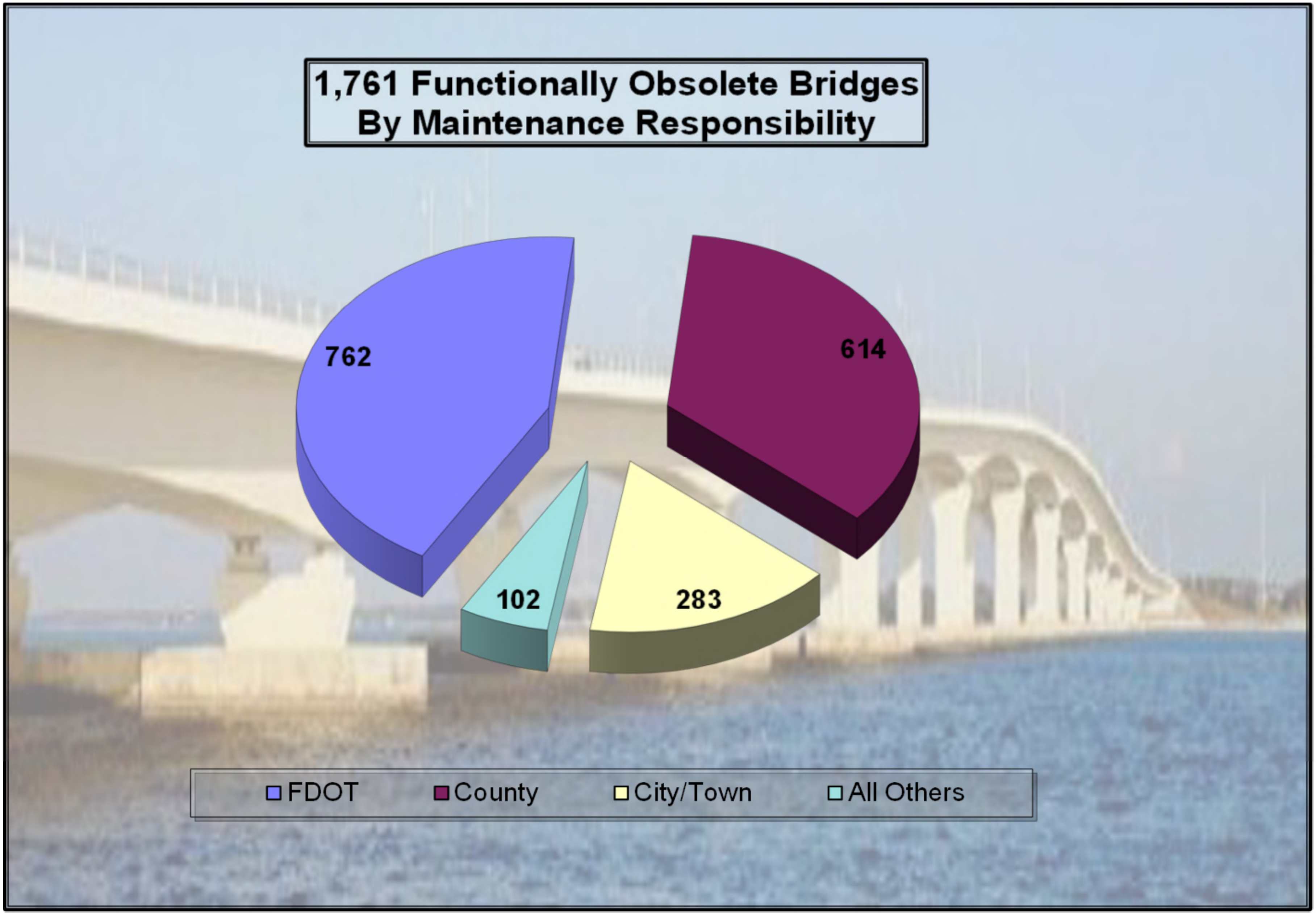

1,761 Functionally Obsolete Bridges
By Maintenance Responsibility
762
614
102
283
FDOT
County
City/Town
All Others

Figure 32

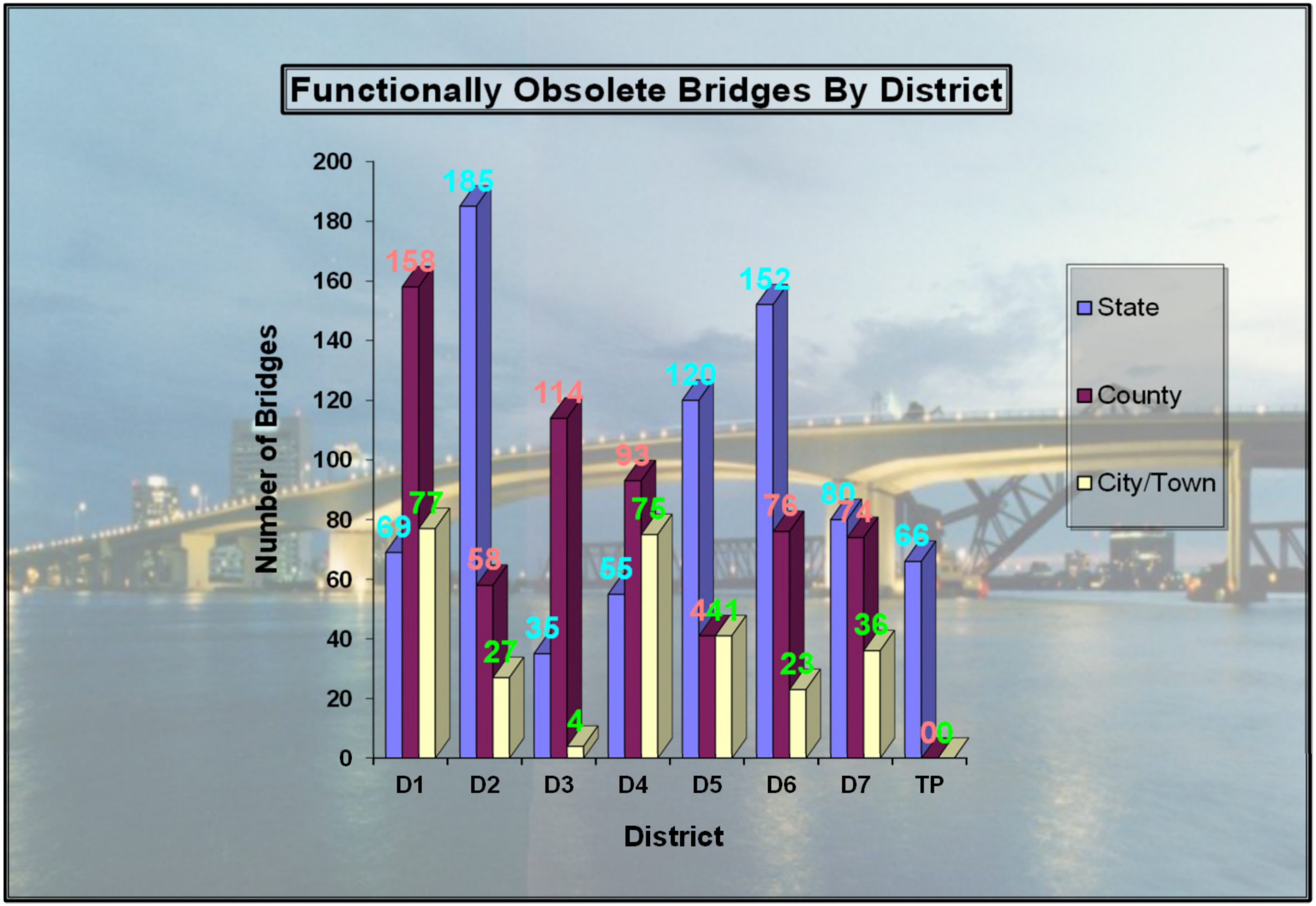

Functionally Obsolete Bridges By District
Number of Bridges
200
180
160
140
120
100
80
60
40
20
0
D1
D2
D3
D4
D5
D6
D7
TP
District
State
County
City/Town
69
158
77
185
58
27
35
114
4
55
93
75
120
41
41
152
76
23
80
74
36
66
0
0

Figure 33

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 Pontis. The Pontis 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 Pontis. Each of these combinations was then assigned an appropriate number from the 13 superstructure types as mentioned above. Then using the bridge in-

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	52,002	225,620	530,678	705,766	642,998	643,316	1,693,318	1,119,630	382,306	5,995,634
P/C Slab	39,383	0	67,606	857,238	758,314	704,075	337,596	23,257	104,108	2,891,576
R/C Beam	220,919	215,260	529,042	0	0	0	0	31,399	331,077	1,327,698
P/C Beam	21,054	0	3,303,965	12,448,903	16,117,769	15,386,328	12,556,867	15,432,791	6,688,229	81,955,907
Steel Beam	452,369	185,793	2,037,622	4,815,584	7,545,544	2,849,098	3,189,906	3,652,955	1,085,893	25,814,763
Timber Beam	0	0	0	986	0	0	0	0	0	986
R/C Box	0	0	0	40,831	51,597	0	0	0	0	92,428
P/C Box	0	0	0	0	0	0	0	294,359	24,329	318,688
Steel Box	0	0	0	0	94,258	1,336,412	1,442,752	1,373,801	437,111	4,684,335
Truss	223,224	0	428,255	250,860	0	0	0	0	5,756	908,096
Movable	203,620	87,839	690,495	543,965	659,428	371,777	473,173	564,060	218,477	3,812,833
Culvert	90,055	124,757	321,614	623,084	350,821	145,203	164,235	186,072	71,868	2,077,710
Other	12,521	20,048	133,130	0	0	6,702,270	2,918,131	4,694,665	573,574	15,054,339
Total	1,315,146	859,318	8,042,408	20,287,218	26,220,729	28,138,479	22,933,541	27,372,989	9,922,729	145,092,557

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	27,350	64,296	92,986	92,530	94,576	249,406	160,516	51,230	839,130
P/C Slab	5,907	0	10,141	128,586	113,747	105,611	50,639	3,489	15,616	433,736
R/C Beam	20,987	20,450	50,259	0	0	0	0	2,983	32,942	127,621
P/C Beam	2,211	0	346,916	1,307,135	1,696,516	1,624,224	1,371,585	1,666,925	710,210	8,725,722
Steel Beam	50,342	22,089	236,785	605,660	901,067	360,703	401,445	455,252	137,933	3,171,277
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	13,864
P/C Box	0	0	0	0	0	0	22,847	42,682	3,528	69,056
Steel Box	0	0	0	0	14,139	200,462	216,413	206,070	65,567	702,650
Truss	39,064	0	74,945	43,901	0	0	0	0	1,007	158,917
Movable	76,177	26,894	232,908	220,405	164,868	120,852	153,996	177,396	61,754	1,235,250
Culvert	8,555	11,852	30,553	59,193	33,328	13,794	15,602	17,677	6,827	197,382
Other	1,878	3,007	19,970	0	0	1,005,340	437,720	704,200	86,036	2,258,151
Total	211,362	111,642	1,066,774	2,464,083	3,023,935	3,525,563	2,919,652	3,437,189	1,172,651	17,932,851

Table 13

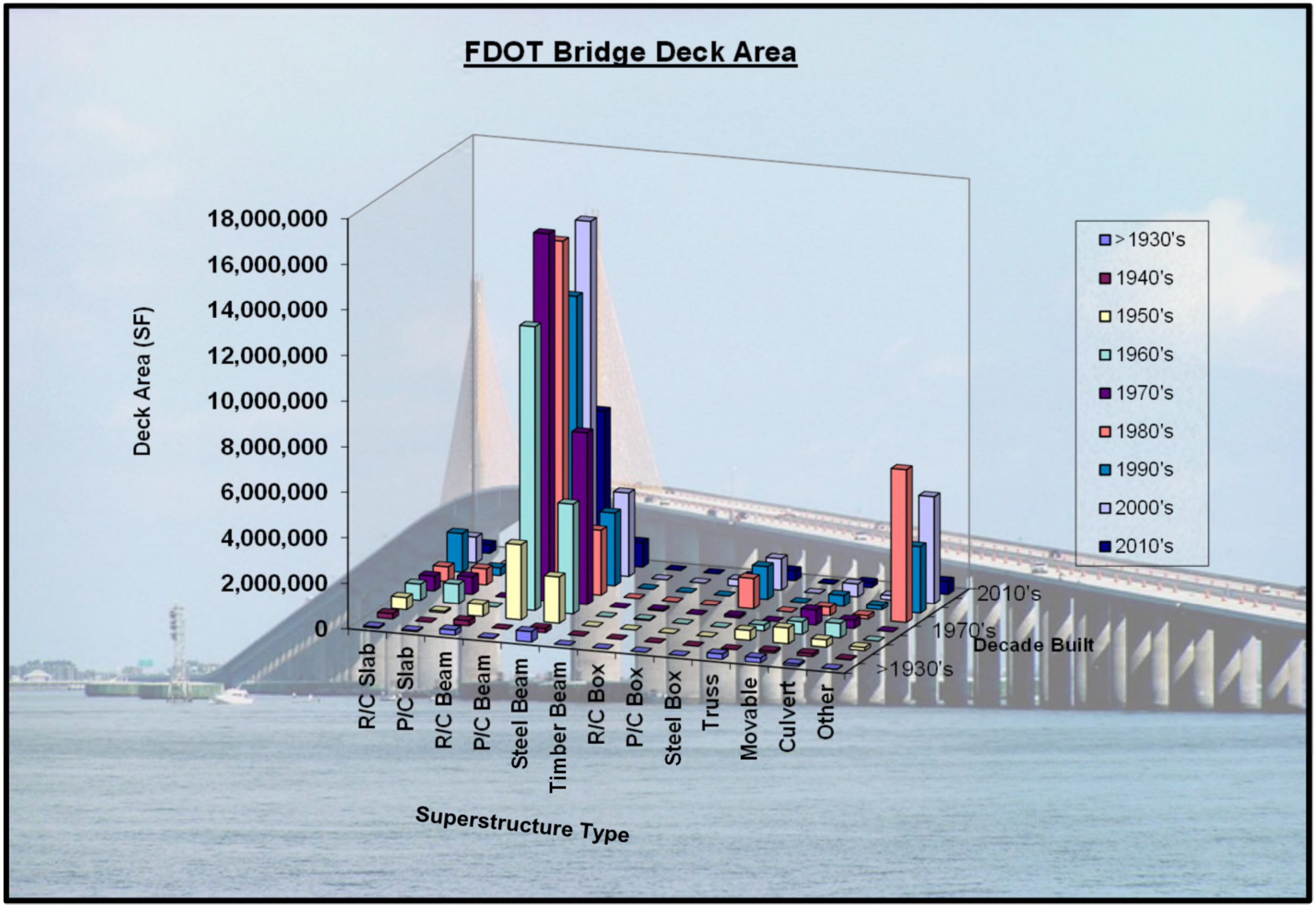

FDOT Bridge Deck Area
Deck Area (SF)
18,000,000
16,000,000
14,000,000
12,000,000
10,000,000
8,000,000
6,000,000
4,000,000
2,000,000
0
R/C Slab
P/C Slab
R/C Beam
P/C Beam
Steel Beam
Timber Beam
R/C Box
P/C Box
Steel Box
Truss
Movable
Culvert
Other
Superstructure Type
>1930's
1970's
2010's
Decade Built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

Figure 34

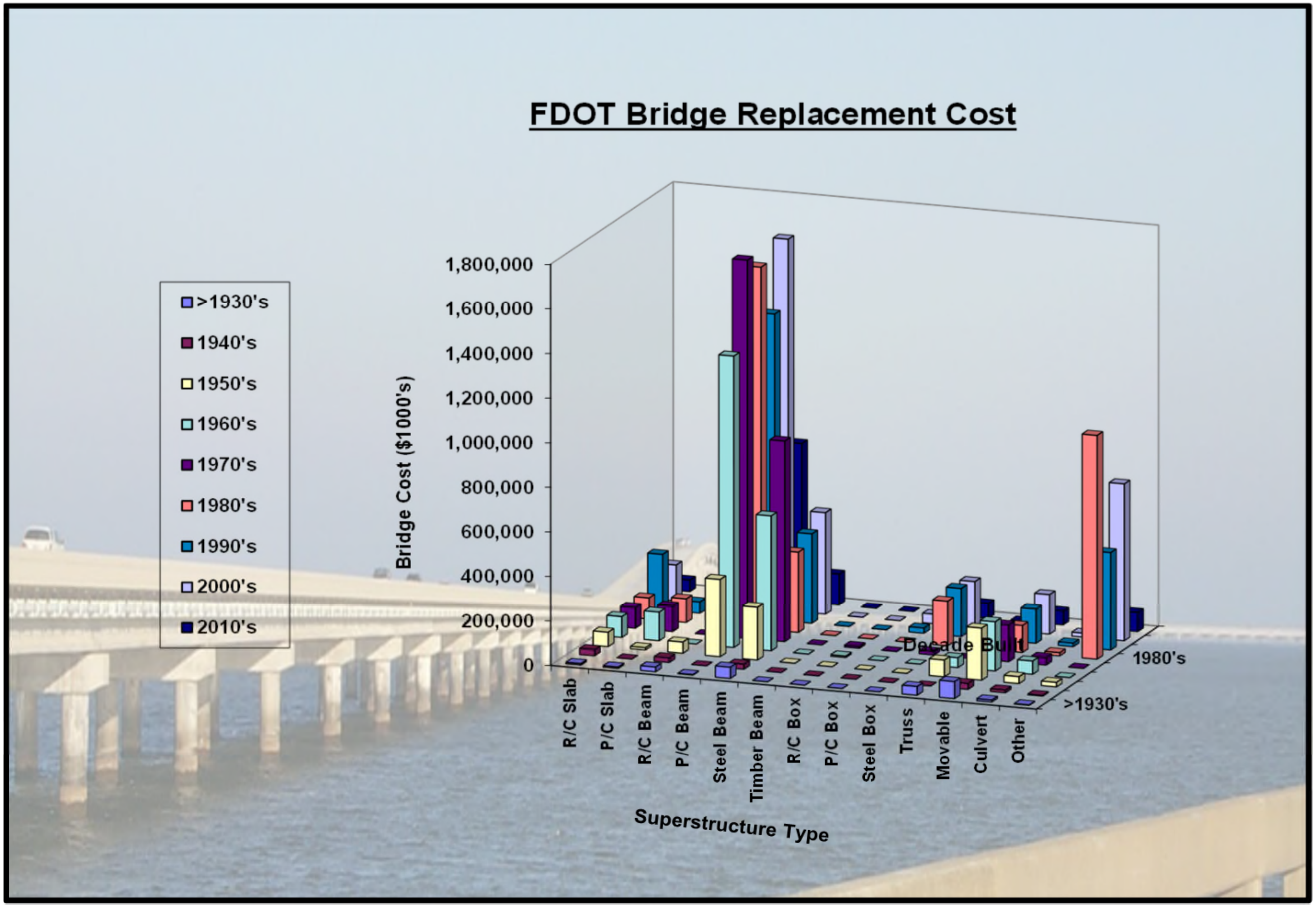
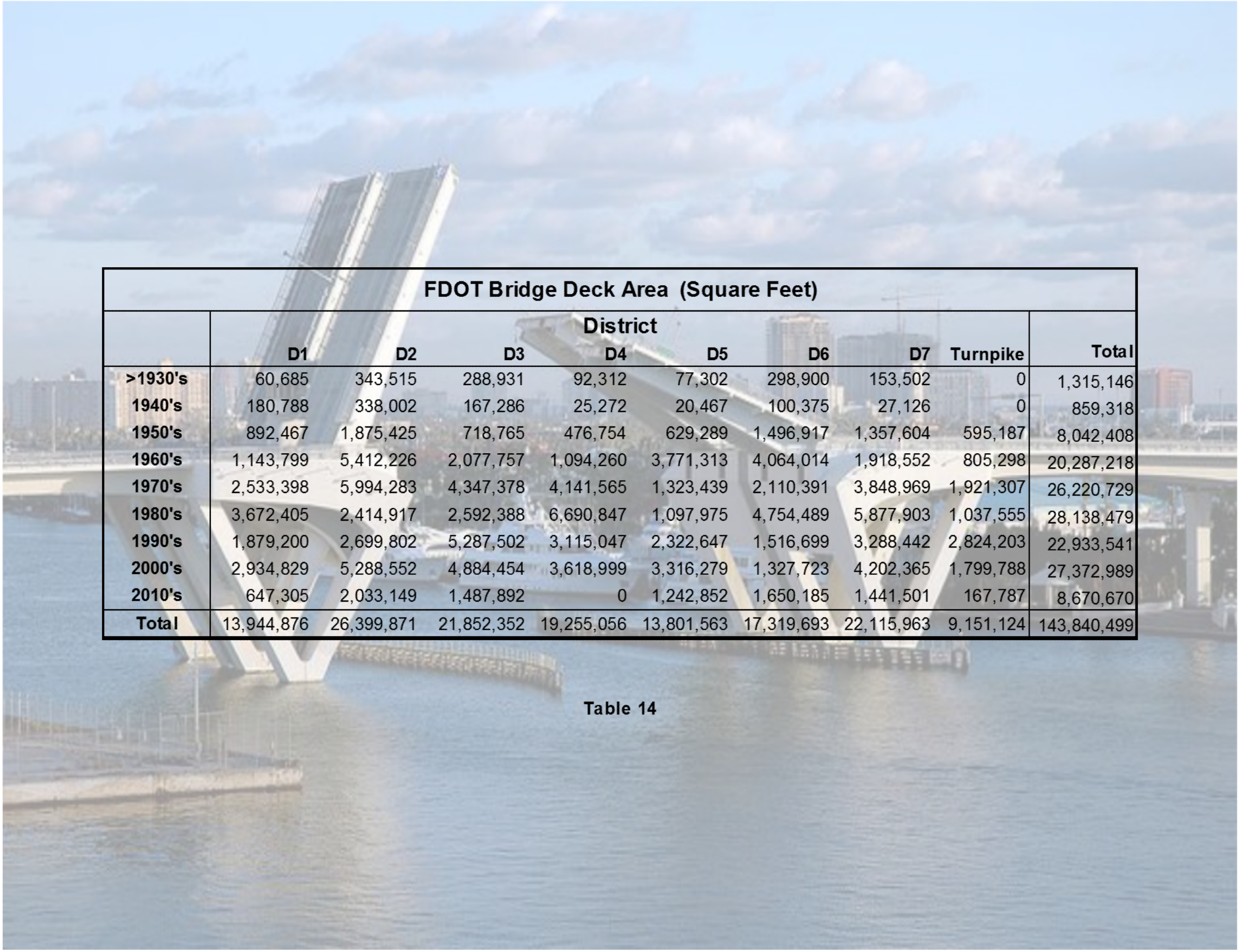

FDOT Bridge Replacement Cost
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's
Bridge Cost ($1000's)
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
R/C Slab
P/C Slab
R/C Beam
P/C Beam
Steel Beam
Timber Beam
R/C Box
P/C Box
Steel Box
Truss
Movable
Culvert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

Figure 35



FDOT Bridge Deck Area (Square Feet)

	District								
	D1	D2	D3	D4	D5	D6	D7	Turnpike	Total
>1930's	60,685	343,515	288,931	92,312	77,302	298,900	153,502	0	1,315,146
1940's	180,788	338,002	167,286	25,272	20,467	100,375	27,126	0	859,318
1950's	892,467	1,875,425	718,765	476,754	629,289	1,496,917	1,357,604	595,187	8,042,408
1960's	1,143,799	5,412,226	2,077,757	1,094,260	3,771,313	4,064,014	1,918,552	805,298	20,287,218
1970's	2,533,398	5,994,283	4,347,378	4,141,565	1,323,439	2,110,391	3,848,969	1,921,307	26,220,729
1980's	3,672,405	2,414,917	2,592,388	6,690,847	1,097,975	4,754,489	5,877,903	1,037,555	28,138,479
1990's	1,879,200	2,699,802	5,287,502	3,115,047	2,322,647	1,516,699	3,288,442	2,824,203	22,933,541
2000's	2,934,829	5,288,552	4,884,454	3,618,999	3,316,279	1,327,723	4,202,365	1,799,788	27,372,989
2010's	647,305	2,033,149	1,487,892	0	1,242,852	1,650,185	1,441,501	167,787	8,670,670
Total	13,944,876	26,399,871	21,852,352	19,255,056	13,801,563	17,319,693	22,115,963	9,151,124	143,840,499

Table 14

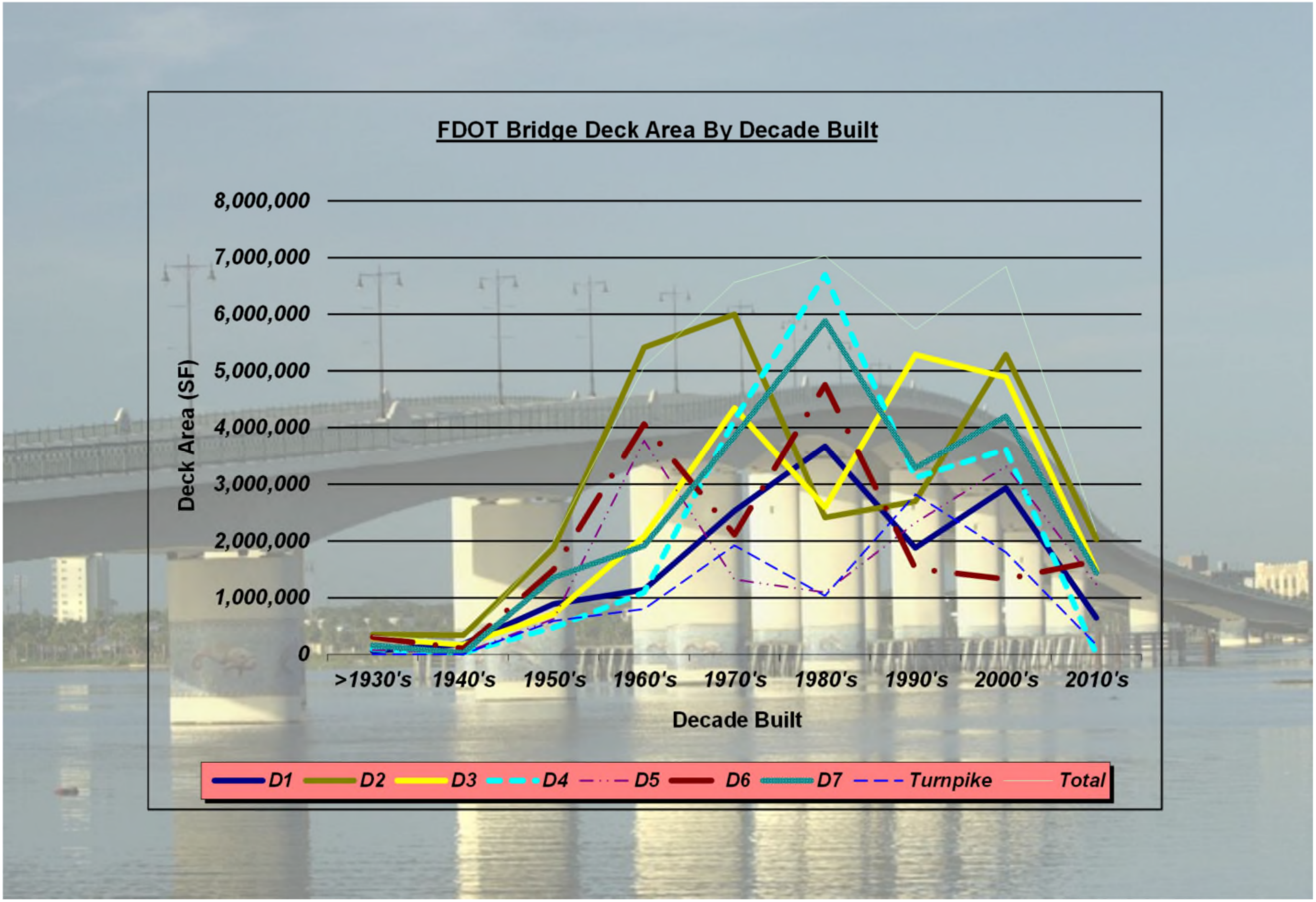
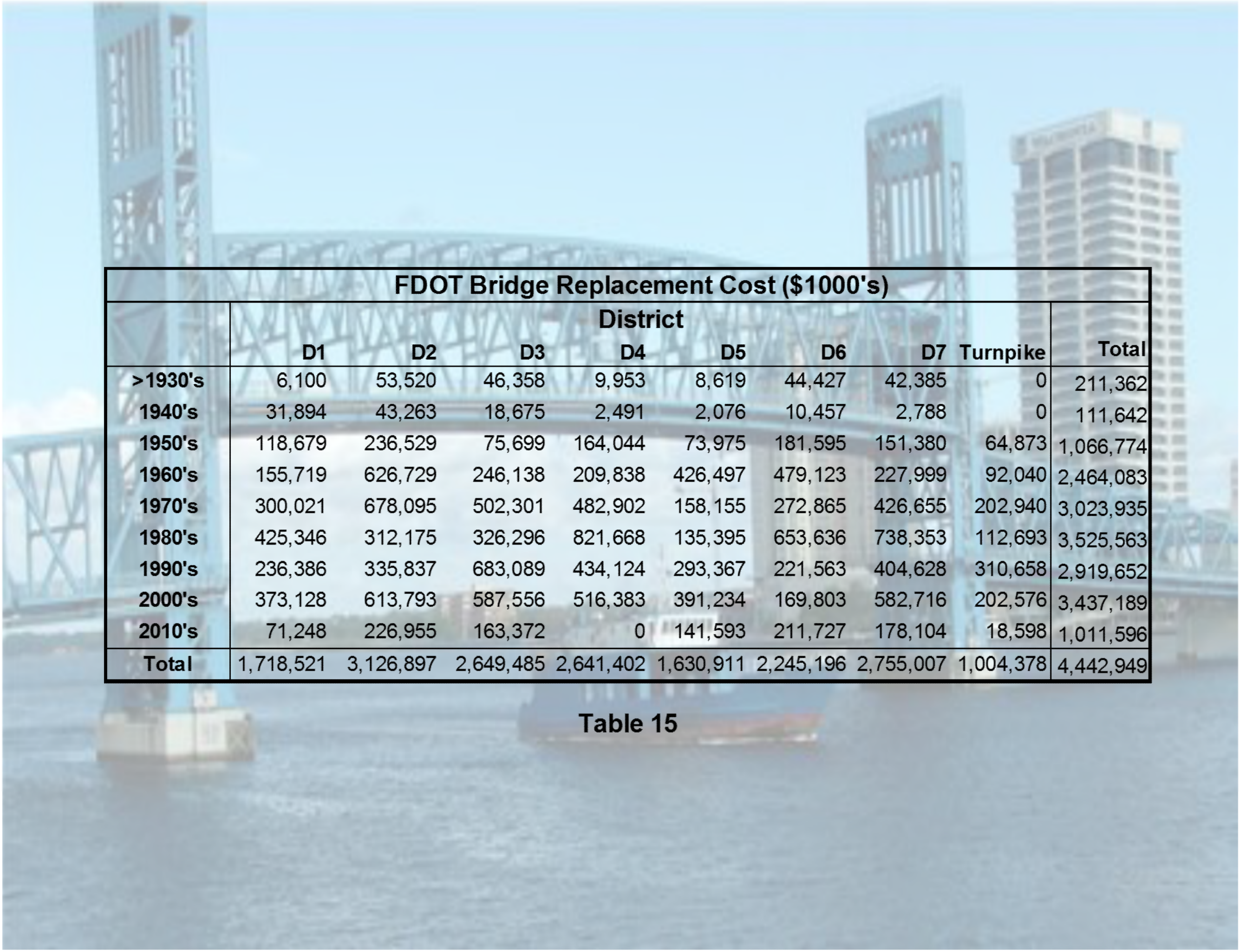

FDOT Bridge Deck Area By Decade Built
Deck Area (SF)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's
Decade Built
D1
D2
D3
D4
D5
D6
D7
Turnpike
Total

Figure 36



FDOT Bridge Replacement Cost ($1000's)									
	District								
	D1	D2	D3	D4	D5	D6	D7	Turnpike	Total
>1930's	6,100	53,520	46,358	9,953	8,619	44,427	42,385	0	211,362
1940's	31,894	43,263	18,675	2,491	2,076	10,457	2,788	0	111,642
1950's	118,679	236,529	75,699	164,044	73,975	181,595	151,380	64,873	1,066,774
1960's	155,719	626,729	246,138	209,838	426,497	479,123	227,999	92,040	2,464,083
1970's	300,021	678,095	502,301	482,902	158,155	272,865	426,655	202,940	3,023,935
1980's	425,346	312,175	326,296	821,668	135,395	653,636	738,353	112,693	3,525,563
1990's	236,386	335,837	683,089	434,124	293,367	221,563	404,628	310,658	2,919,652
2000's	373,128	613,793	587,556	516,383	391,234	169,803	582,716	202,576	3,437,189
2010's	71,248	226,955	163,372	0	141,593	211,727	178,104	18,598	1,011,596
Total	1,718,521	3,126,897	2,649,485	2,641,402	1,630,911	2,245,196	2,755,007	1,004,378	4,442,949

Table 15

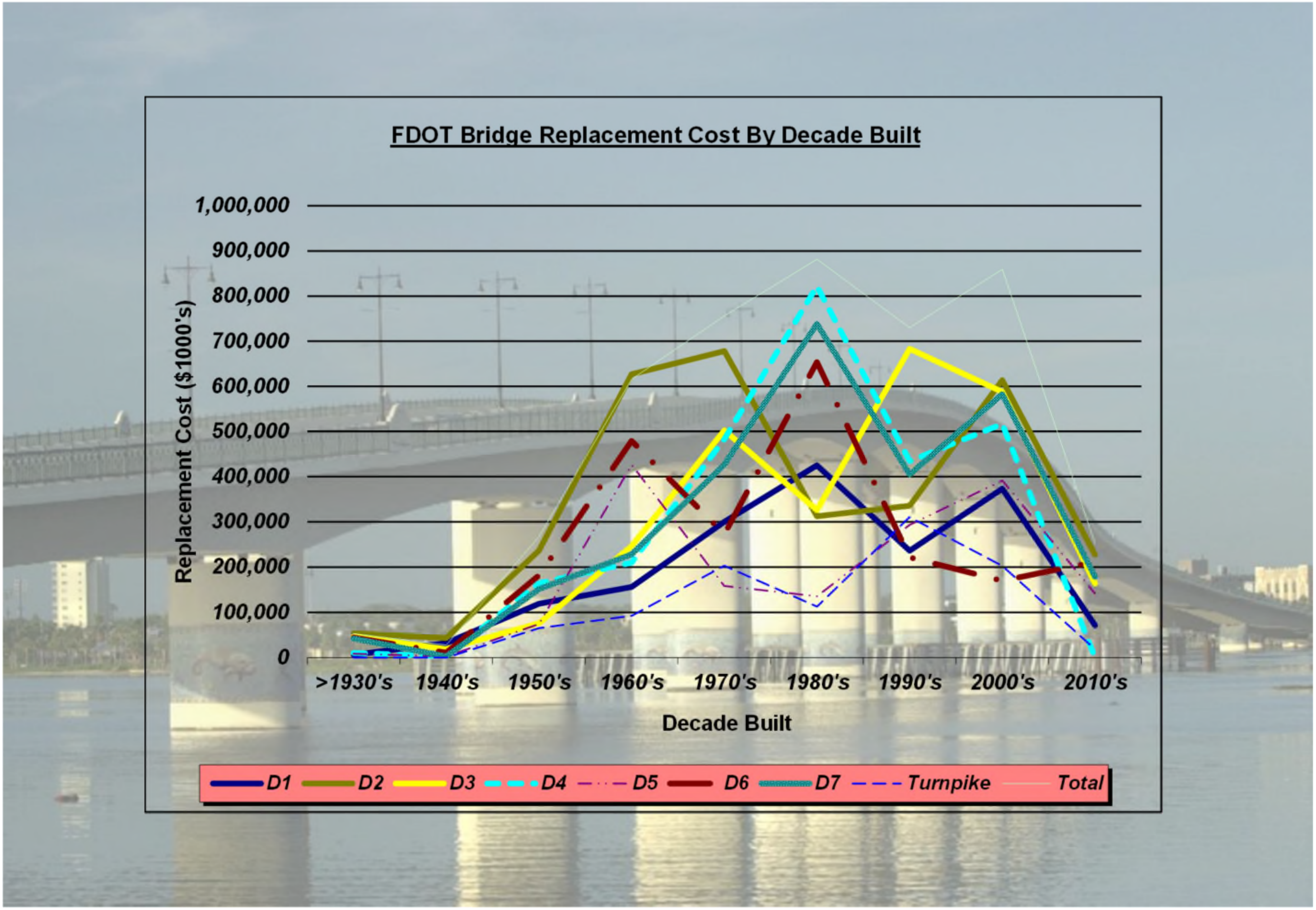
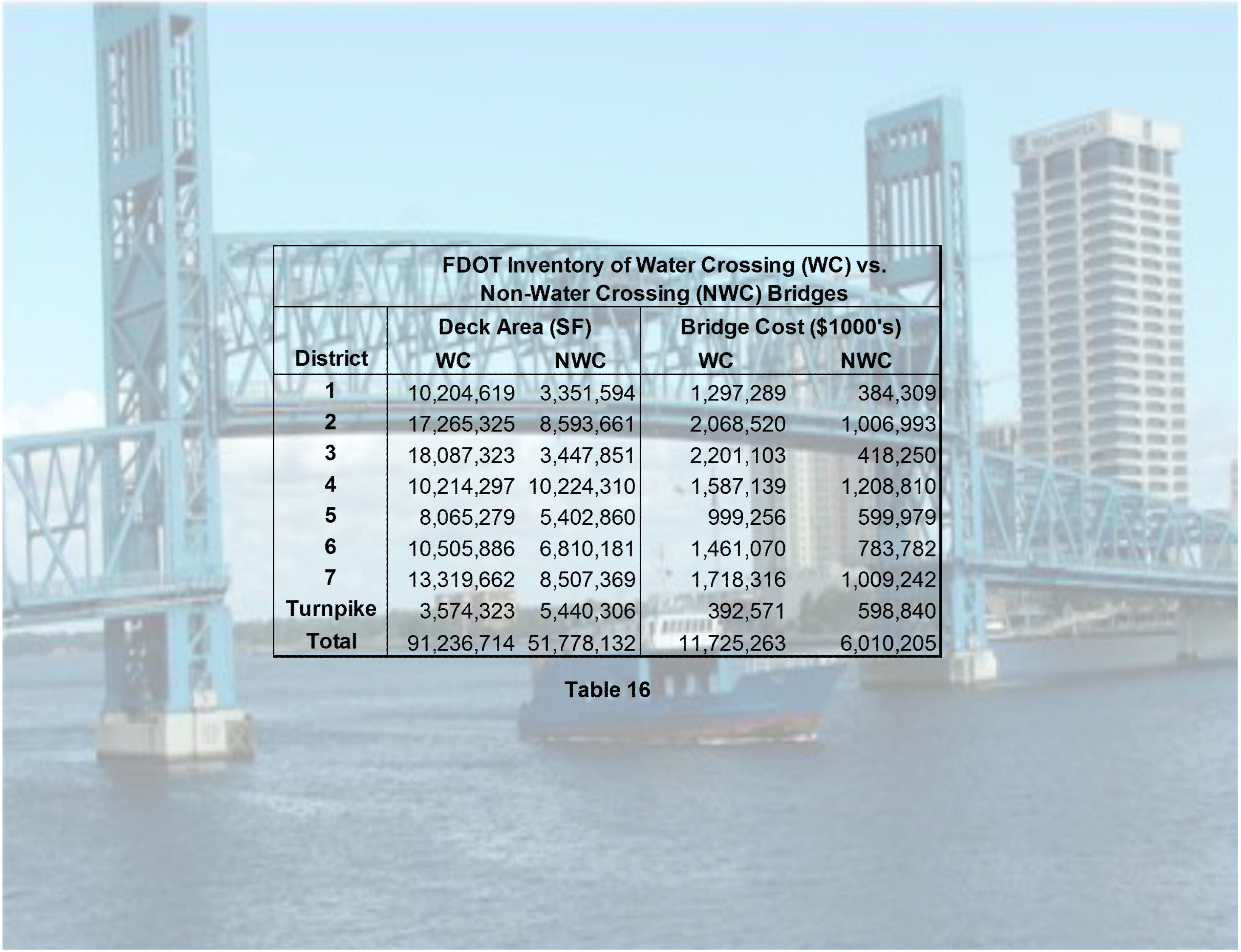

FDOT Bridge Replacement Cost By Decade Built
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
Replacement Cost ($1000's)
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's
Decade Built
D1
D2
D3
D4
D5
D6
D7
Turnpike
Total

Figure 37



FDOT Inventory of Water Crossing (WC) vs. Non-Water Crossing (NWC) Bridges

District	Deck Area (SF)		Bridge Cost ($1000's)	
	WC	NWC	WC	NWC
1	10,204,619	3,351,594	1,297,289	384,309
2	17,265,325	8,593,661	2,068,520	1,006,993
3	18,087,323	3,447,851	2,201,103	418,250
4	10,214,297	10,224,310	1,587,139	1,208,810
5	8,065,279	5,402,860	999,256	599,979
6	10,505,886	6,810,181	1,461,070	783,782
7	13,319,662	8,507,369	1,718,316	1,009,242
Turnpike	3,574,323	5,440,306	392,571	598,840
Total	91,236,714	51,778,132	11,725,263	6,010,205

Table 16

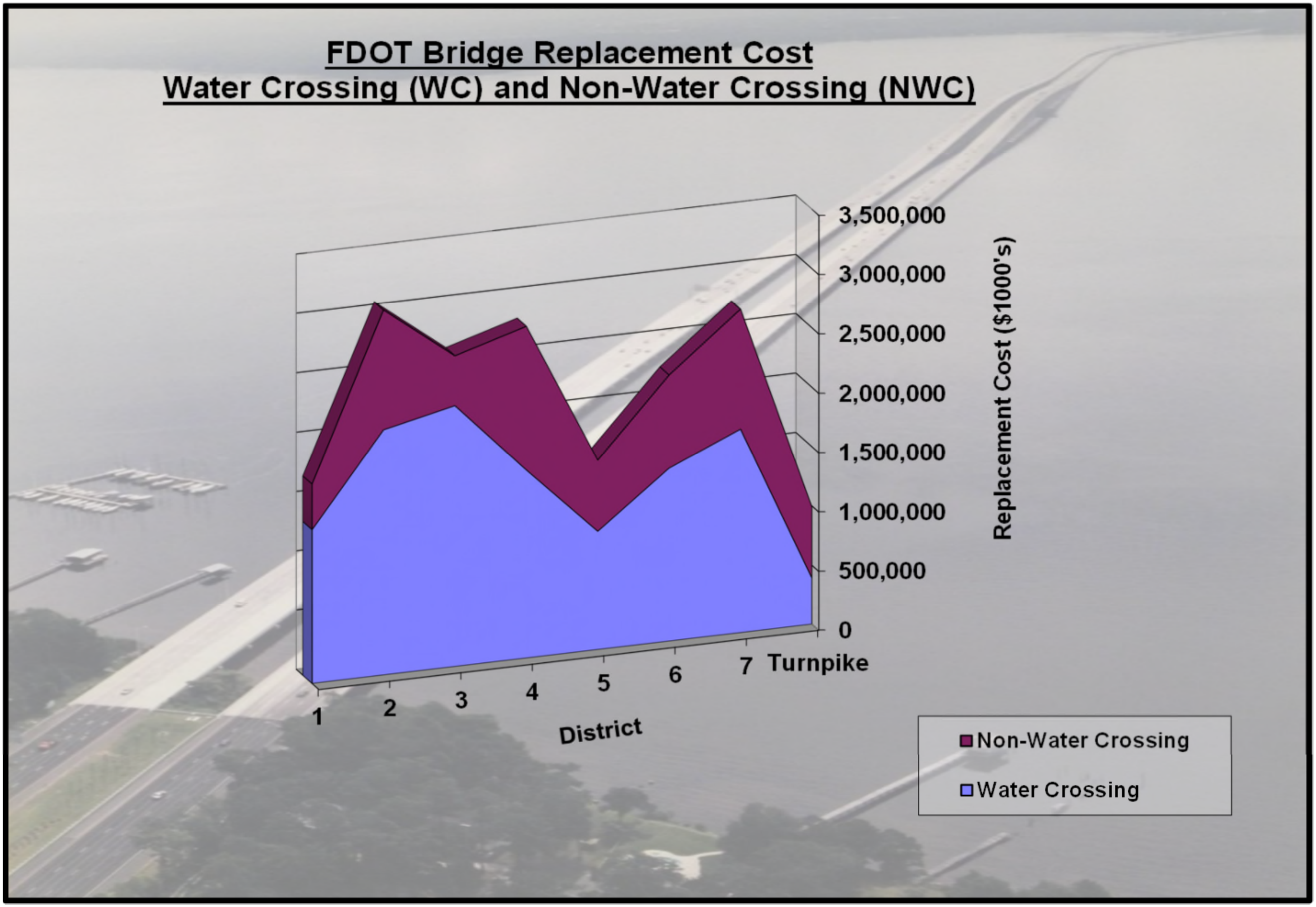

FDOT Bridge Replacement Cost
Water Crossing (WC) and Non-Water Crossing (NWC)
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
Replacement Cost ($1000's)
1
2
3
4
5
6
7
Turnpike
District
Non-Water Crossing
Water Crossing

Figure 38

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 12,267 bridges accounted for in Florida. The FDOT has maintenance responsibility for 6,858 of the bridges, or 55.91%. County governments maintain 3,888 bridges (31.69%), city and towns maintain 1,230 bridges (10.03%), with the remaining 291 bridges (2.37%) maintained by others. 14.84% of all bridges currently in service in Florida were constructed prior to 1960; 36.57% were constructed in the 1960's and 1970's, while the remaining 48.59% 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 (36.57% of the inventory) of bridges built during the 1960's and 1970's.

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