Florida Department of Transportation

Bridge Inventory
2015 Annual Report

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Office of Maintenance
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Bridge Inventory - 2015 Annual Report

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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 12,225 bridge-structures accounted for in the Florida DOT Bridge Management System. The FDOT has maintenance responsibility for 6,814 of the bridges, or 55.74%. County governments maintain 3,878 bridges (31.72%), city and towns maintain 1,236 bridges (10.1%), with the remaining 297 bridges (2.43%) maintained by others (see Figures 1 & 2).

The 6,814 bridges maintained by FDOT are divided by district and shown in Figures 3 & 4. District 2 has the most bridges, with 1,230 (18.05%), followed by District 5 (1046 bridges – 15.35%), District 1 (928 bridges – 13.62%), District 3 (810 bridges – 11.89%), District 4 (769 bridges - 11.29%), Turnpike District (716 bridges – 10.51%), District 7 (710 bridges – 10.42%), and District 6 (605 bridges – 8.88%). The number of bridges shown includes the 119 bridges maintained by the Dade County Expressway Authority (MDX) and 292 bridges maintained by the Orlando Orange County Expressway Authority (OOCEA).

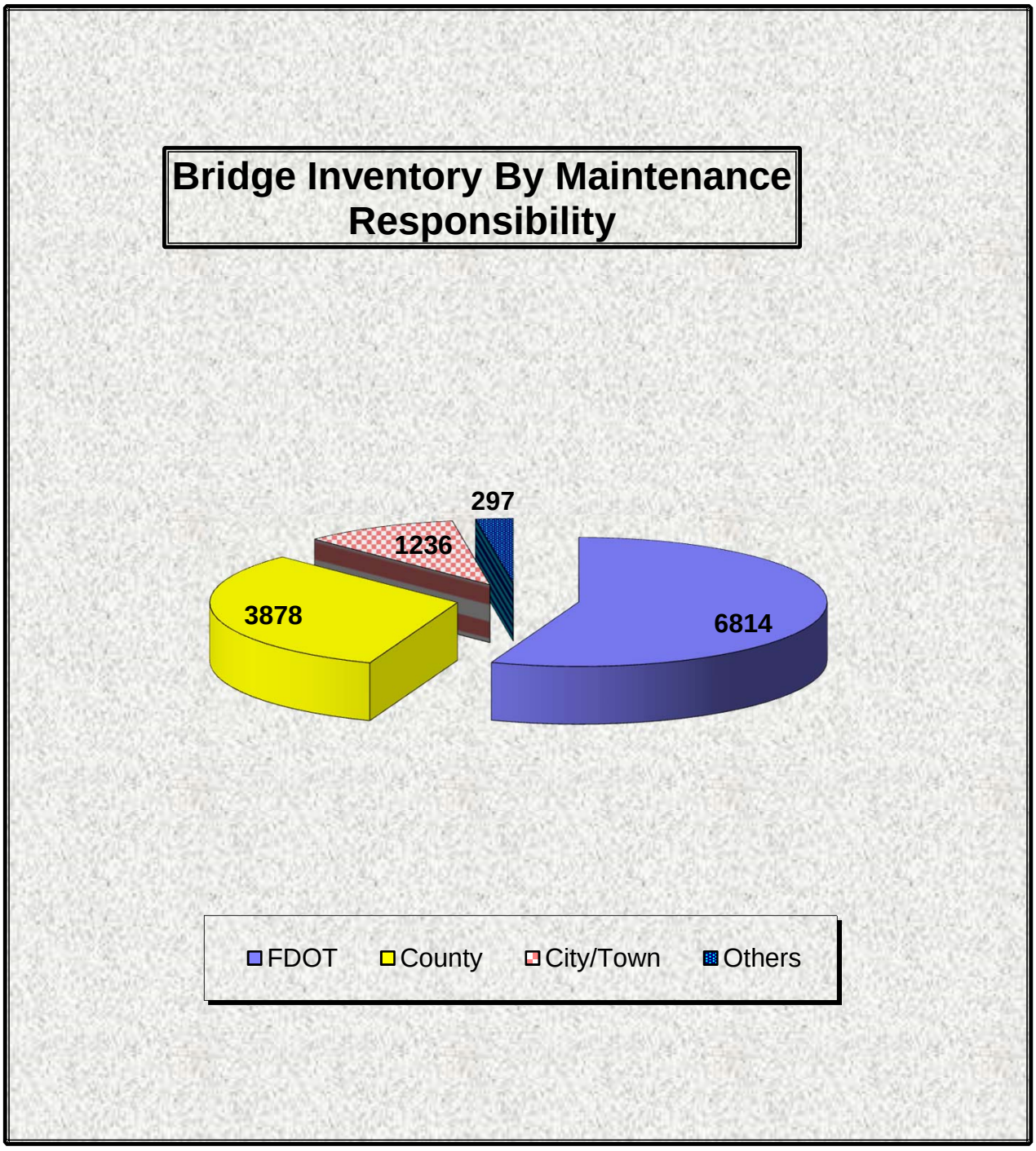

Figure 1

NOTE: The number of FDOT bridges includes 119MDX bridges and 292 OOCEA bridges.

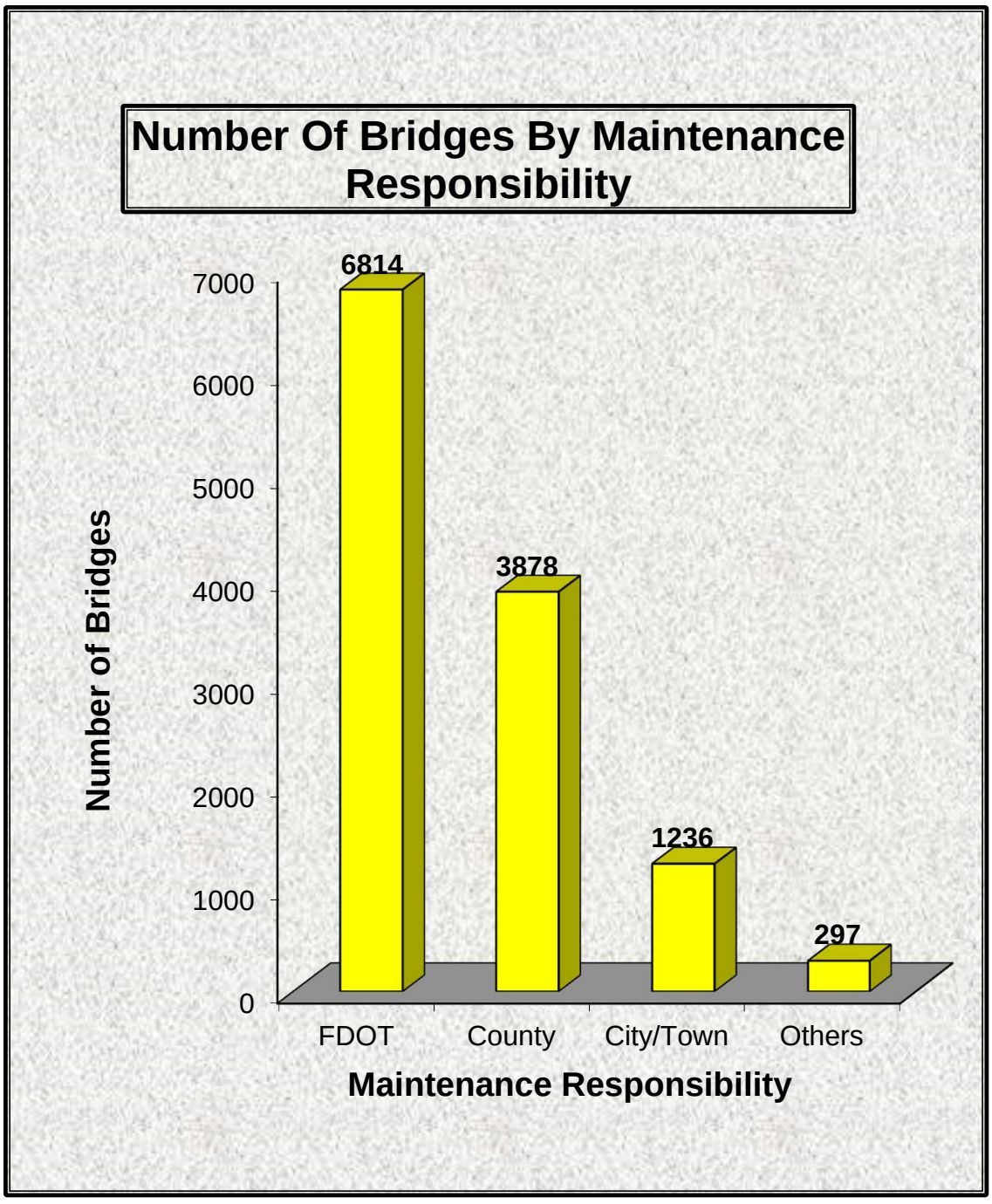

Figure 2

NOTE: The number of FDOT bridges includes 119MDX bridges and 292 OOCEA bridges.

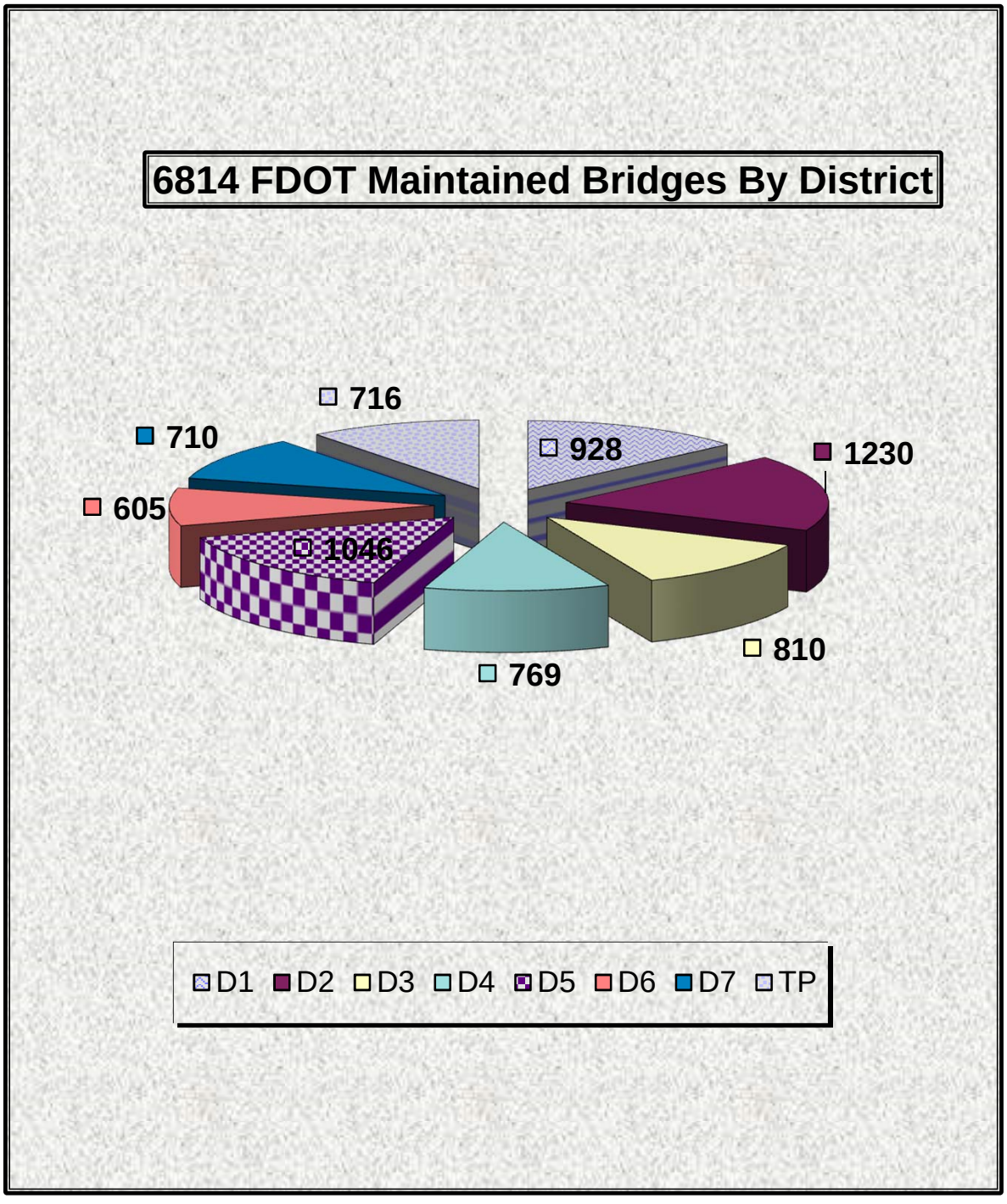

Figure 3

NOTE: The number of FDOT bridges includes 119MDX bridges and 292 OOCEA bridges.

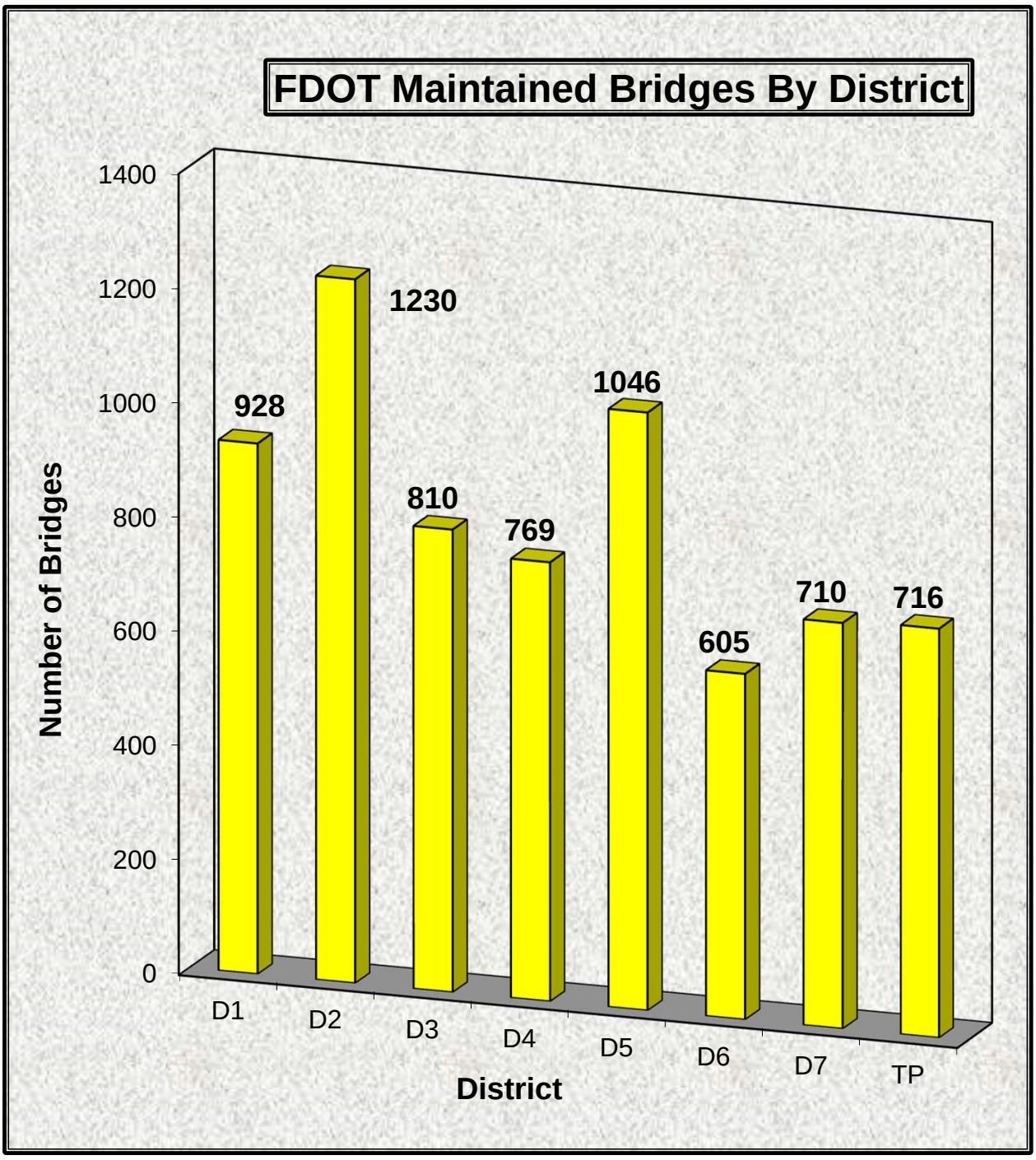

Figure 4

NOTE: The number of FDOT bridges includes 119MDX bridges and 292 OOCEA bridges.

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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 6,814 bridges maintained by FDOT, approximately 13.84% were constructed prior to 1960, about 40.15% were constructed in the 1960's and 1970's, with the remaining 46.01% having been built since 1980 (see Figure 5).

Similar results can be seen with the statewide bridge inventory of county government maintained bridges with 18.02% constructed prior to 1960, 33.94% constructed in the 1960's and 1970's, and 48.04% since 1980 (see Figure 6).

The city and town maintained bridges are very similar as well, with 17.23% constructed prior to 1960, 39.40% constructed in the 1960's and 1970's, and 43.37% since 1980 (see Figure 7).

An examination of the distribution of the decade of construction by FDOT District, for the 6,814 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 – 21.30%, District 1 – 22.84%, District 3 – 17.78%, District 5 – 9.27%, District 7 – 10.14%, District 4 – 6.37%, District 6 – 10.25%, and the Turnpike District – 6.28%. 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	151	95	44	0	0	4	0	294
1940s	220	135	21	2	0	0	0	378
1950s	572	469	148	13	0	0	0	1202
1960s	1473	817	206	24	7	0	1	2528
1970s	1263	499	281	4	10	0	8	2065
1980s	883	506	213	18	10	0	20	1650
1990s	903	648	148	41	9	0	24	1773
2000s	982	492	128	64	6	0	10	1682
2010s	367	217	47	8	14	0	0	653
Total	6814	3878	1236	174	56	4	63	12225

Table 1

NOTE: The number of FDOT bridges includes 119MDX bridges and 292 OOCEA bridges.

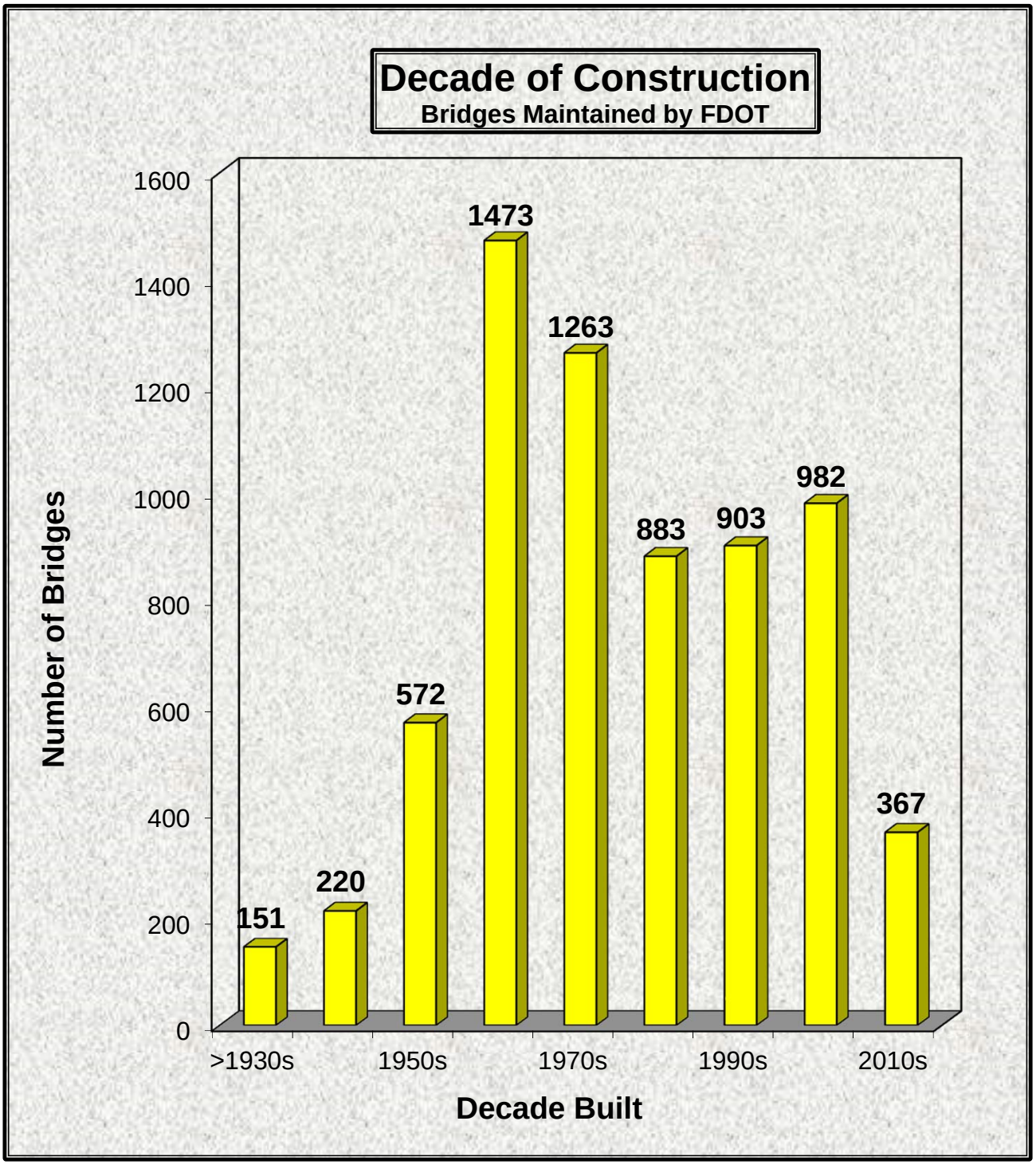

Figure 5

NOTE: The number of FDOT bridges includes 119MDX bridges and 292 OOCEA bridges.

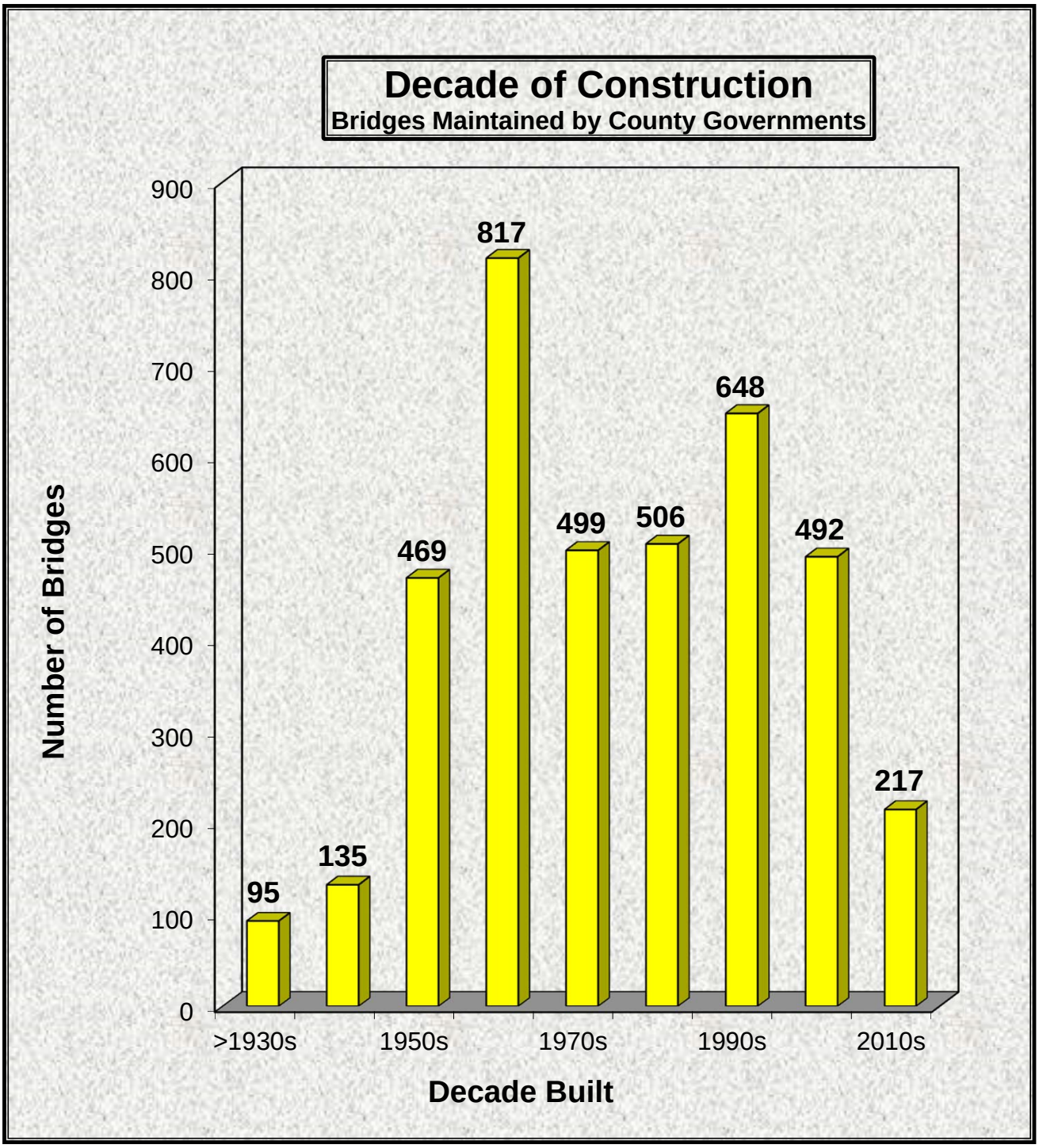
Decade of Construction
Bridges Maintained by County Governments
Number of Bridges
900
800
700
600
500
400
300
200
100
0
95
135
469
817
499
506
648
492
217
>1930s
1950s
1970s
1990s
2010s
Decade Built

Figure 6

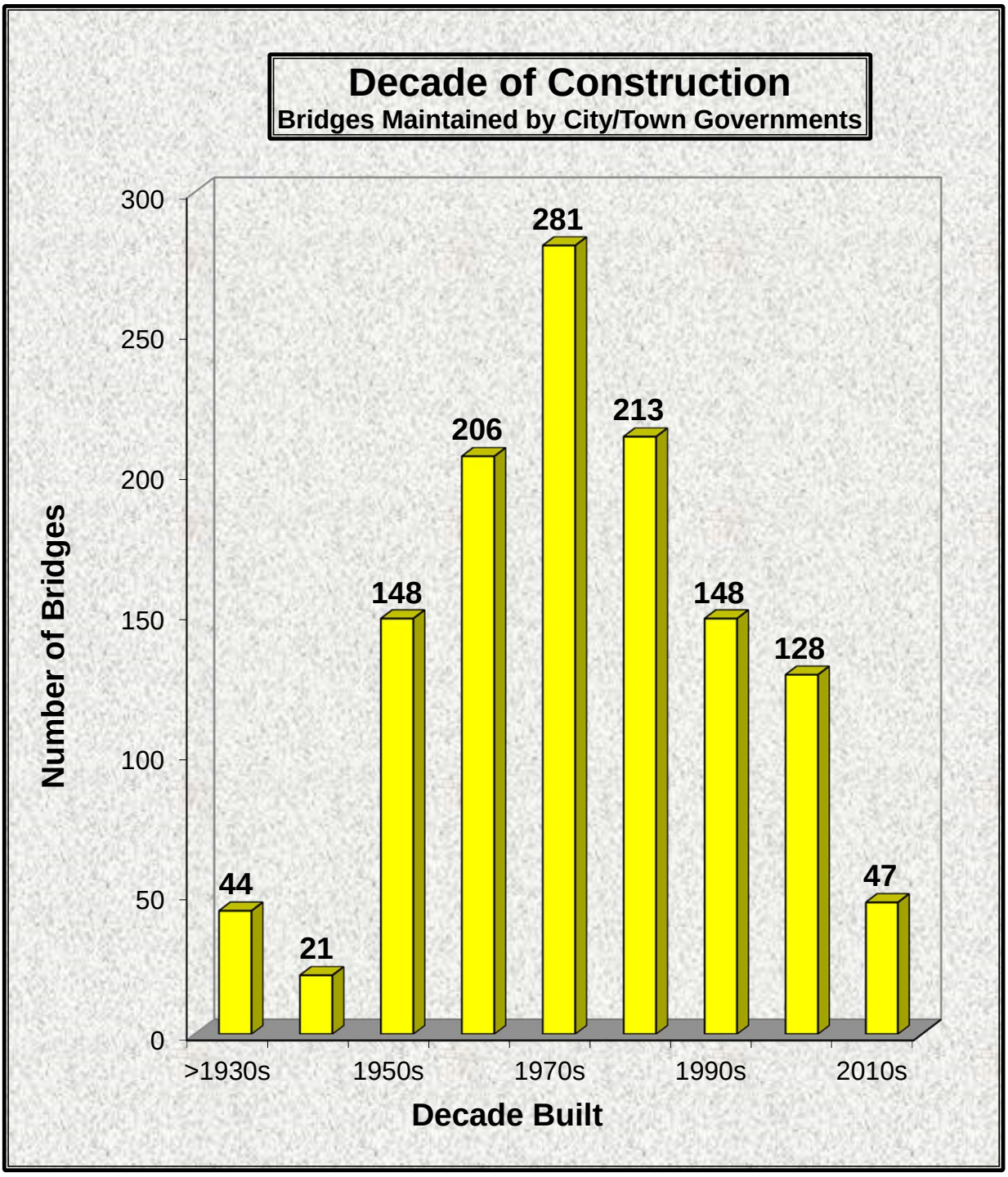
Decade of Construction
Bridges Maintained by City/Town Governments
Number of Bridges
300
250
200
150
100
50
0
44
21
148
206
281
213
148
128
47
>1930s
1950s
1970s
1990s
2010s
Decade Built

Figure 7

Bridge Inventory by Decade Built (Districts 1 thru 4)								
	Maintenance Responsibility							
	FDOT	County	City/Town	Other State	Other Local	Federal	Others	Total
District 1								
>1930s	23	10	5	0	0	0	0	38
1940s	61	25	1	1	0	0	0	88
1950s	128	101	13	2	0	0	0	244
1960s	116	214	37	8	6	0	0	381
1970s	157	136	86	0	3	0	0	382
1980s	177	139	48	2	5	0	0	371
1990s	137	132	26	6	8	0	0	309
2000s	97	100	19	4	0	0	0	220
2010s	32	55	10	2	1	0	0	100
Total	928	912	245	25	23	0	0	2133
District 2								
>1930s	54	16	6	0	0	0	0	76
1940s	62	52	3	0	0	0	0	117
1950s	146	119	35	5	0	0	0	305
1960s	418	96	37	1	0	0	0	552
1970s	193	40	32	0	0	0	1	266
1980s	44	47	28	0	0	0	0	119
1990s	100	48	21	2	0	0	0	171
2000s	147	51	37	3	0	0	1	239
2010s	66	18	4	1	0	0	0	89
Total	1230	487	203	12	0	0	2	1934
District 3								
>1930s	10	25	0	0	0	0	0	35
1940s	60	33	2	1	0	0	0	96
1950s	74	142	5	0	0	0	0	221
1960s	114	169	5	6	0	0	0	294
1970s	286	94	9	4	2	0	0	395
1980s	58	71	8	14	0	0	1	152
1990s	103	195	12	28	0	0	0	338
2000s	68	157	10	49	1	0	0	285
2010s	37	64	2	4	0	0	0	107
Total	810	950	53	106	3	0	1	1923
District 4								
>1930s	6	5	6	0	0	0	0	17
1940s	4	3	6	0	0	0	0	13
1950s	39	37	60	6	0	0	0	142
1960s	73	75	60	3	0	0	0	211
1970s	159	75	68	0	0	0	0	302
1980s	229	73	53	1	0	0	0	356
1990s	96	105	17	1	0	0	0	219
2000s	125	65	17	3	0	0	0	210
2010s	38	23	8	0	0	0	0	69
Total	769	461	295	14	0	0	0	1539

Table 2

Bridge Inventory by Decade Built (Districts 5 thru 8)								
	Maintenance Responsibility							
	FDOT	County	City/Town	Other State	Other Local	Federal	Others	Total
District 5								
>1930s	25	10	3	0	0	0	0	38
1940s	13	11	2	0	0	0	0	26
1950s	59	27	5	0	0	0	0	91
1960s	278	62	11	2	0	0	1	354
1970s	141	36	47	0	0	0	7	231
1980s	79	79	39	1	2	0	19	219
1990s	154	65	27	3	0	0	24	273
2000s	234	58	23	5	3	0	8	331
2010s	63	34	16	0	8	0	0	121
Total	1046	382	173	11	13	0	59	1684
District 6								
>1930s	4	19	10	0	0	4	0	37
1940s	10	7	4	0	0	0	0	21
1950s	48	24	12	0	0	0	0	84
1960s	231	95	18	3	1	0	0	348
1970s	77	32	16	0	0	0	0	125
1980s	64	26	17	0	0	0	0	107
1990s	49	14	10	1	0	0	0	74
2000s	73	23	8	0	0	0	0	104
2010s	49	10	2	1	4	0	0	66
Total	605	250	97	5	5	4	0	966
District 7								
>1930s	29	10	14	0	0	0	0	53
1940s	10	4	3	0	0	0	0	17
1950s	33	19	18	0	0	0	0	70
1960s	121	106	38	1	0	0	0	266
1970s	113	86	23	0	5	0	0	227
1980s	168	71	20	0	3	0	0	262
1990s	64	89	35	0	1	0	0	189
2000s	122	38	14	0	2	0	1	177
2010s	50	13	5	0	1	0	0	69
Total	710	436	170	1	12	0	1	1330
Turnpike								
>1930s	0	0	0	0	0	0	0	0
1940s	0	0	0	0	0	0	0	0
1950s	45	0	0	0	0	0	0	45
1960s	122	0	0	0	0	0	0	122
1970s	137	0	0	0	0	0	0	137
1980s	64	0	0	0	0	0	0	64
1990s	200	0	0	0	0	0	0	200
2000s	116	0	0	0	0	0	0	116
2010s	32	0	0	0	0	0	0	32
Total	716	0	0	0	0	0	0	716

Table 3

NOTE: The number of FDOT bridges includes 119MDX bridges and 292 OOCEA bridges.

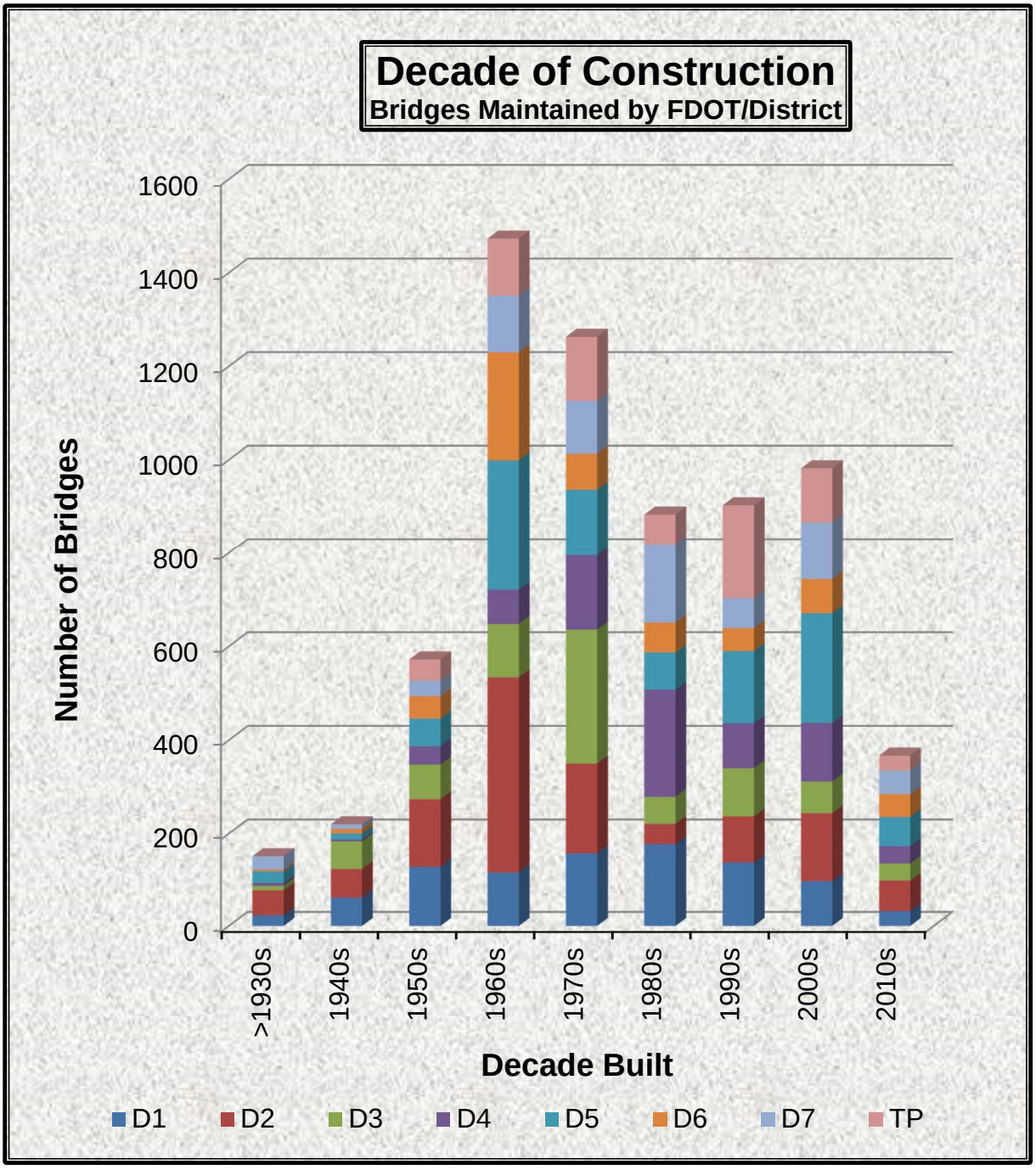
Decade of Construction
Bridges Maintained by FDOT/District
Number of Bridges
1600
1400
1200
1000
800
600
400
200
0
>1930s
1940s
1950s
1960s
1970s
1980s
1990s
2000s
2010s
Decade Built
D1
D2
D3
D4
D5
D6
D7
TP

Figure 8

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 16.29% of the total inventory. Similarly, slab bridges maintained by counties are 35.69%, and by cities and towns are 54.21%.

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 62.21% of the state maintained inventory, 34.19% of the county bridges, and 25.16% 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 0.04% of the state maintained bridges use truss superstructures. Likewise, 0.34% 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 16.35% of the state maintained bridges. County inventories include 27.00% culverts, and city/towns include 17.64% 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 1.35% of the total state bridge inventory. County inventories include 1.03% 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	785	651	217	15	8	0	1	1677
PSC Slab	325	733	453	19	14	4	10	1558
RC Beam	113	139	75	1	0	0	1	329
PSC Beam	3456	681	186	19	14	0	47	4403
Steel Beam	669	142	28	29	7	0	1	876
Timber Beam	1	364	22	35	0	0	0	422
RC Box	4	1	0	0	0	0	0	5
PSC Box	119	3	2	0	0	0	0	124
Steel Box	123	10	4	0	0	0	0	137
Truss	3	13	2	40	0	0	0	58
Movable	92	40	7	1	1	0	0	141
Culvert	1114	1047	218	7	11	0	3	2400
Other	10	54	22	8	1	0	0	95
Total	6814	3878	1236	174	56	4	63	12225

Table 4

NOTE: The number of FDOT bridges includes 119 MDX bridges and 292 OOCEA bridges.

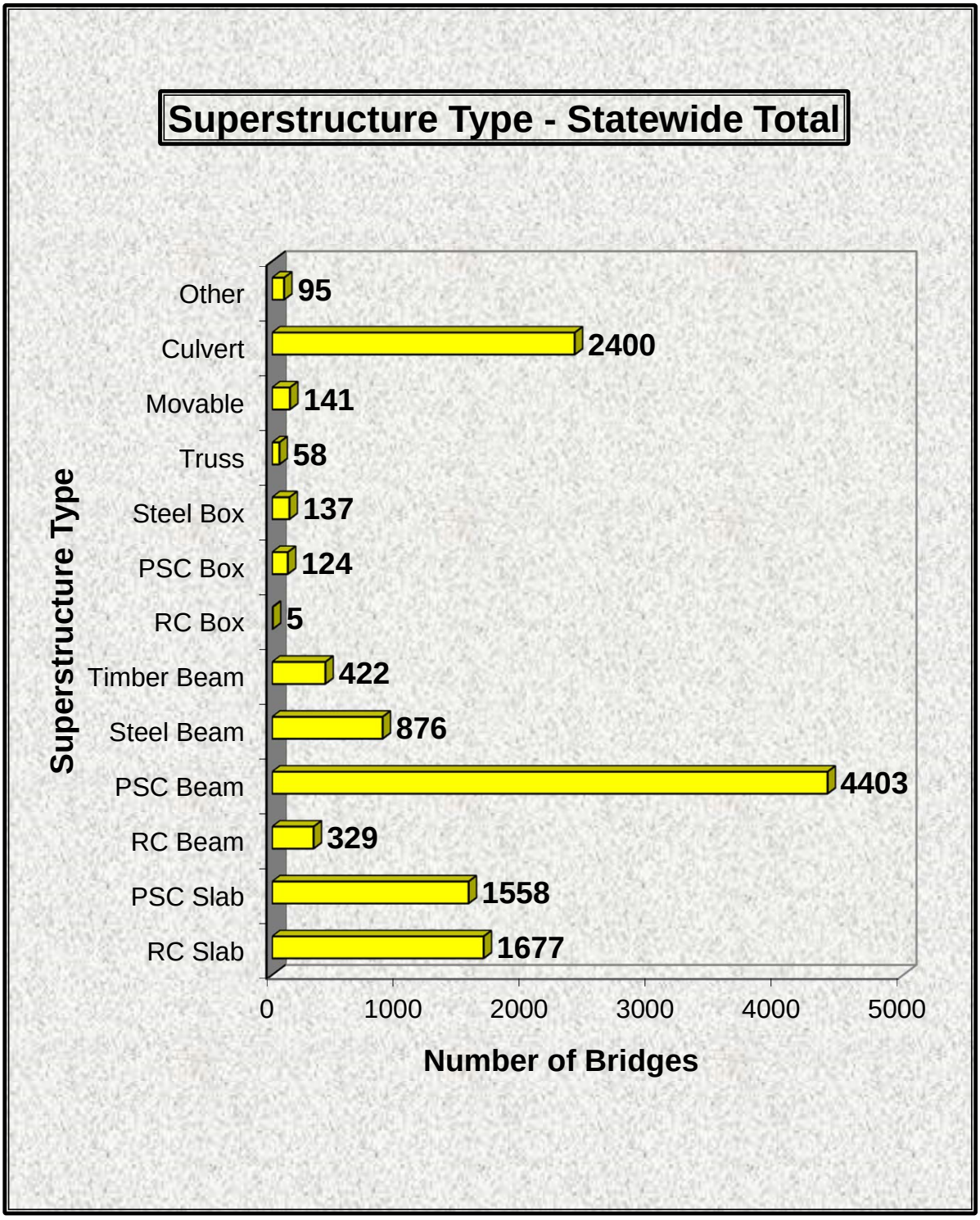
Superstructure Type - Statewide Total
Superstructure Type
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
95
2400
141
58
137
124
5
422
876
4403
329
1558
1677
0
1000
2000
3000
4000
5000
Number of Bridges

Figure 9

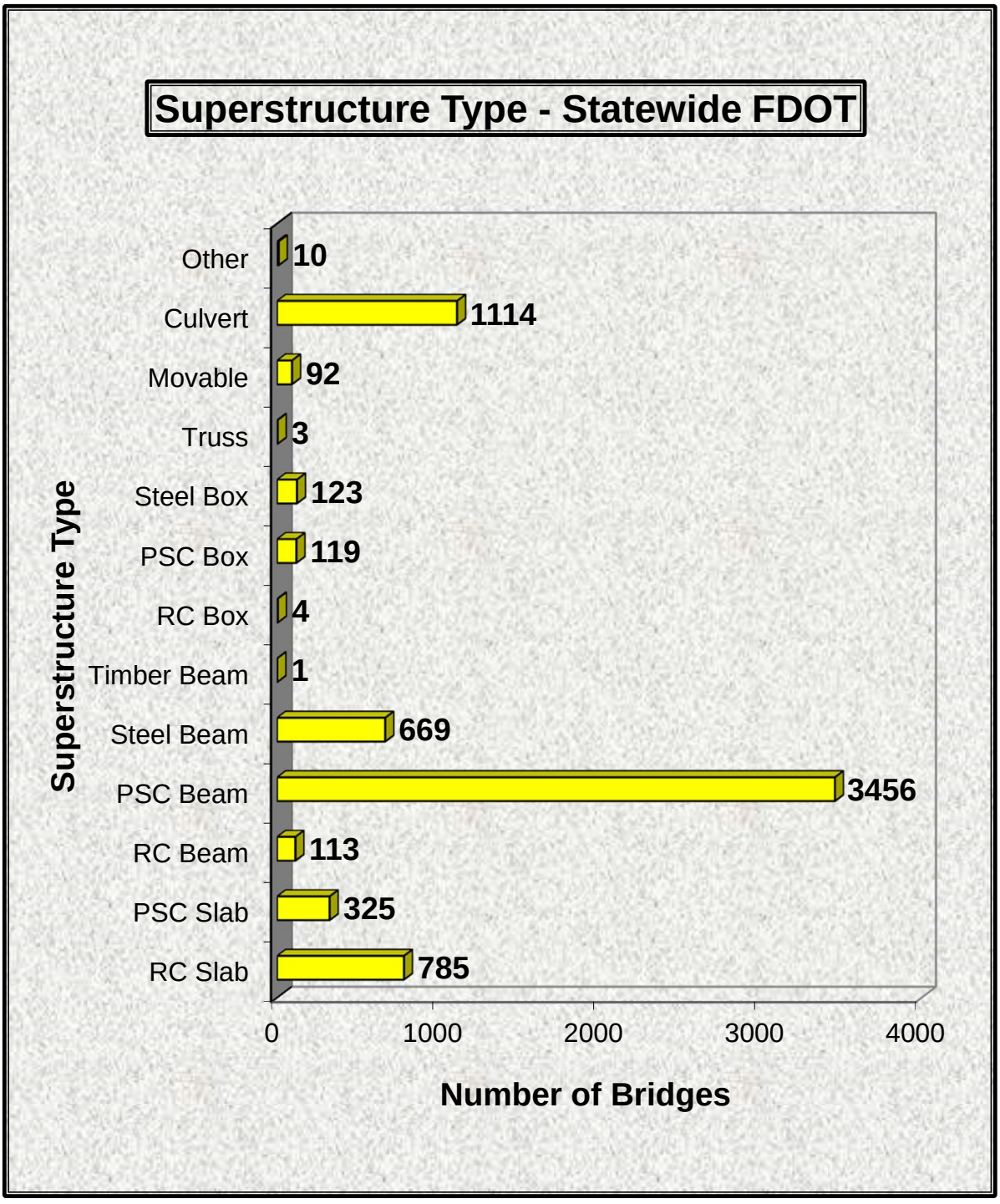
Superstructure Type - Statewide FDOT
Superstructure Type
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
10
1114
92
3
123
119
4
1
669
3456
113
325
785
0
1000
2000
3000
4000
Number of Bridges

Figure 10

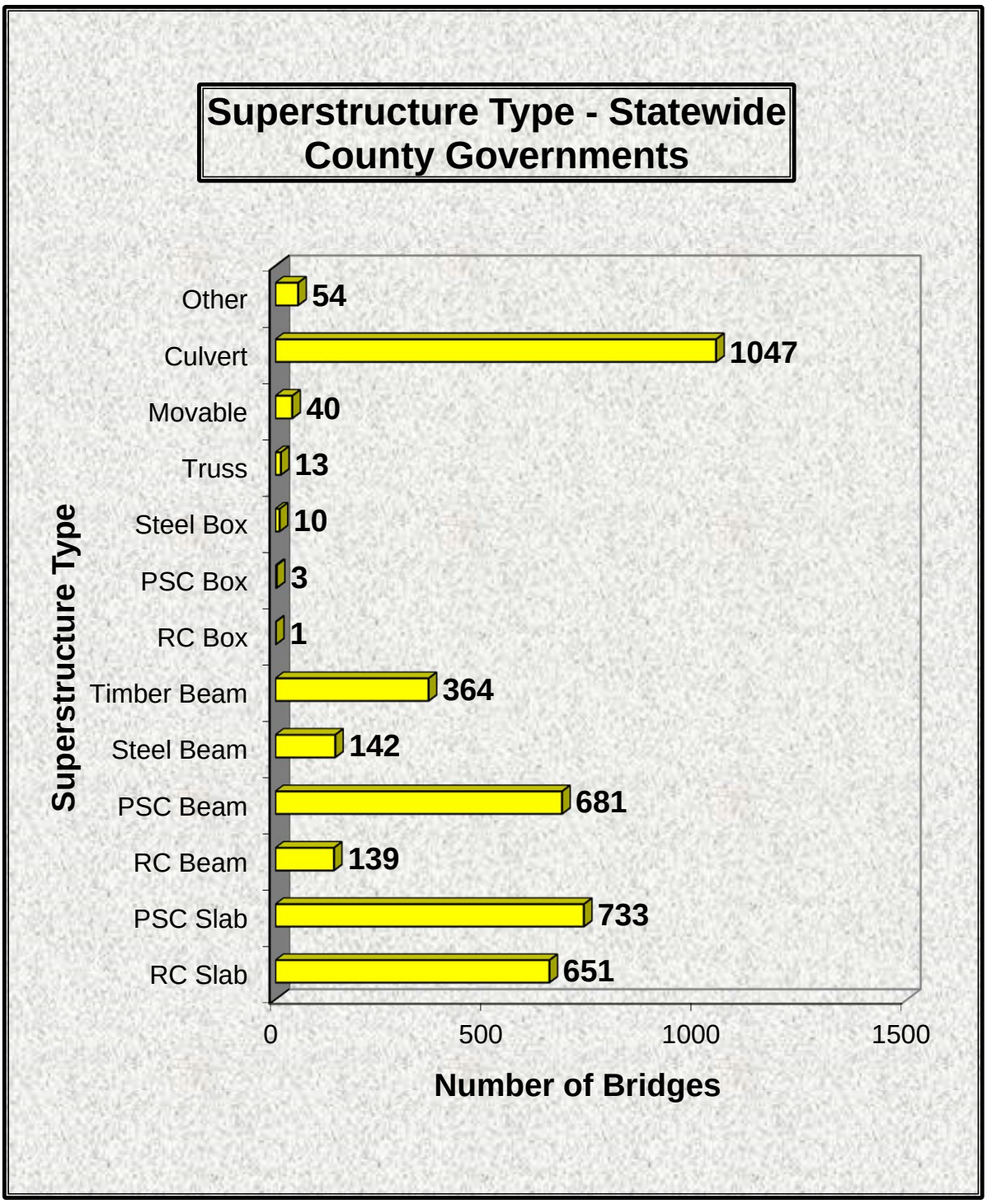
Superstructure Type - Statewide
County Governments
Superstructure Type
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
54
1047
40
13
10
3
1
364
142
681
139
733
651
0
500
1000
1500
Number of Bridges

Figure 11

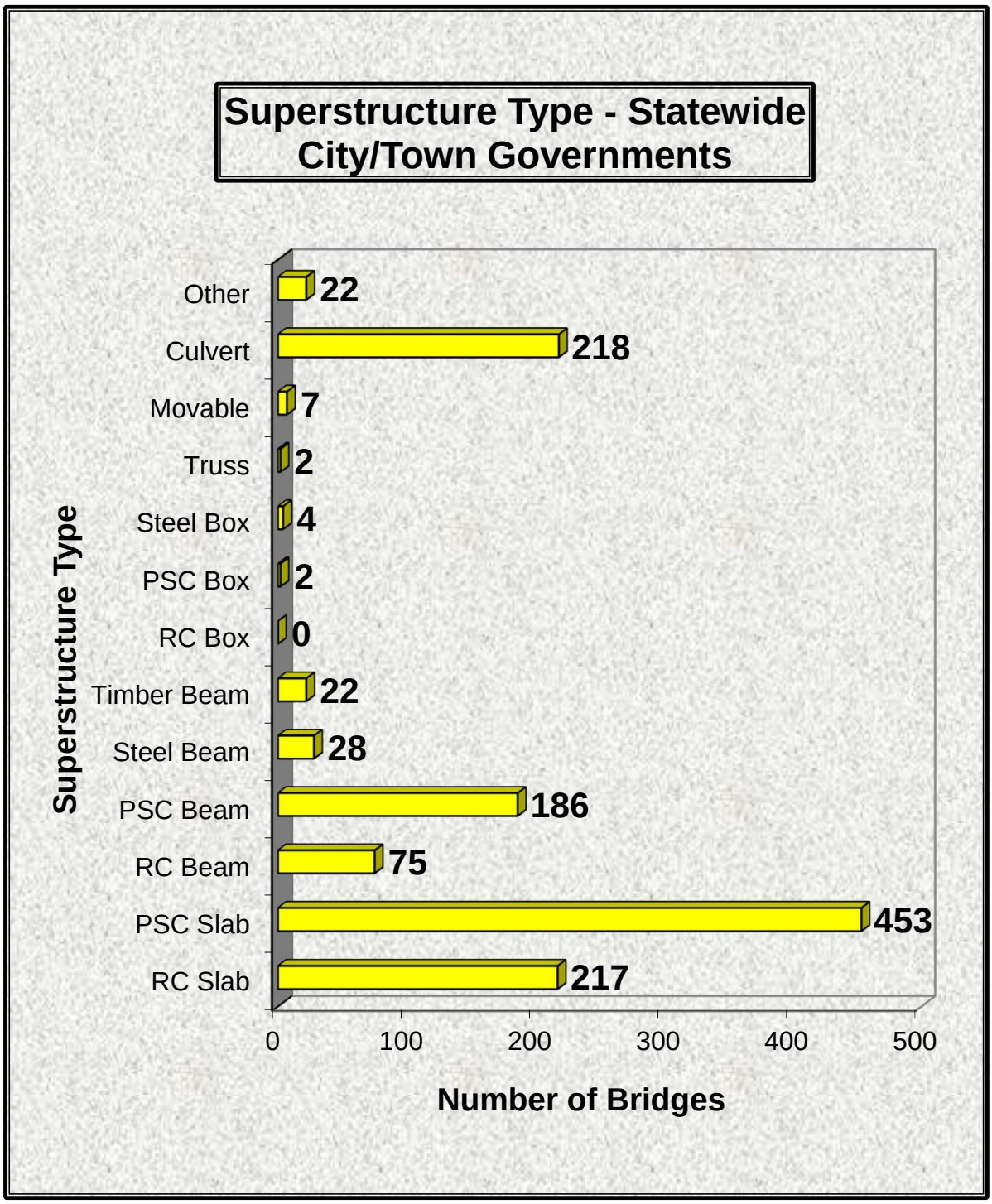
Superstructure Type - Statewide
City/Town Governments
Superstructure Type
Other
Culvert
Movable
Truss
Steel Box
PSC Box
RC Box
Timber Beam
Steel Beam
PSC Beam
RC Beam
PSC Slab
RC Slab
22
218
7
2
4
2
0
22
28
186
75
453
217
0
100
200
300
400
500
Number of Bridges

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 5,683 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 1,671 bridges, 29.40% of the total. 14.90% of the FDOT bridges fall into the 0 to 5,000 square foot range; 31.62% are in the 5,000 to 10,000 square foot range; and 24.07% 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 69.60% of their bridges under 5,000 square feet; with 16.91% between 5,000 and 10,000 square feet; 7.76% between 10,000 to 20,000 square feet; and only 5.73% over 20,000 square feet (see Figure 14). The results for the City/Town and Others groups are similar; with 76.16% 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, 30.71% of the District 1 bridges are less than 5,000 square feet and only 14.57% of their bridges are over 20,000 square feet. In contrast, only 13.72% of District 4 bridges are less than 5,000 square feet, while 34.02% are over 20,000 square feet.

Bridge Inventory By Deck Area (Statewide)								
	Maintenance Responsibility							
Area (S.F.)	FDOT	County	City / Town	Other State	Other Local	Federal	Others	Total
<= 1,000	20	510	130	92	1	0	1	754
1,000-2,500	177	779	358	44	12	4	8	1382
2,500-5,000	650	666	282	18	10	0	11	0
5,000-7,500	920	305	93	4	11	0	12	1345
7,500-10,000	877	170	41	2	4	0	8	1102
10,000-20,000	1671	218	60	4	3	0	13	1969
20,000-40,000	750	95	27	1	0	0	2	875
40,000-80,000	342	42	15	0	1	0	5	405
80,000-160,000	158	14	5	1	3	0	0	181
>160,000	118	10	0	1	0	0	0	129
Total	5683	2809	1011	167	45	4	60	9779

Table 5

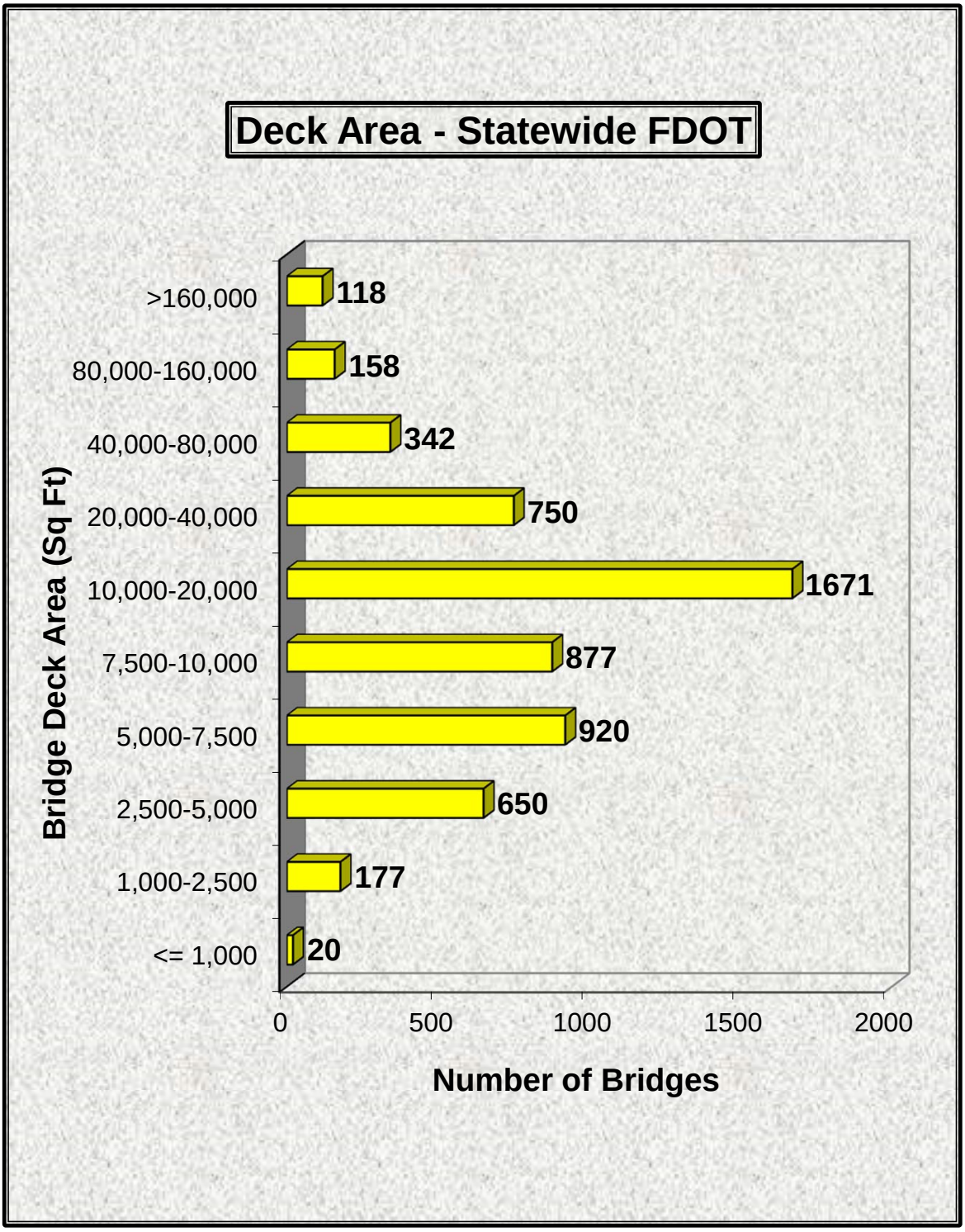
Deck Area - Statewide FDOT
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
118
158
342
750
1671
877
920
650
177
20
0
500
1000
1500
2000
Number of Bridges

Figure 13

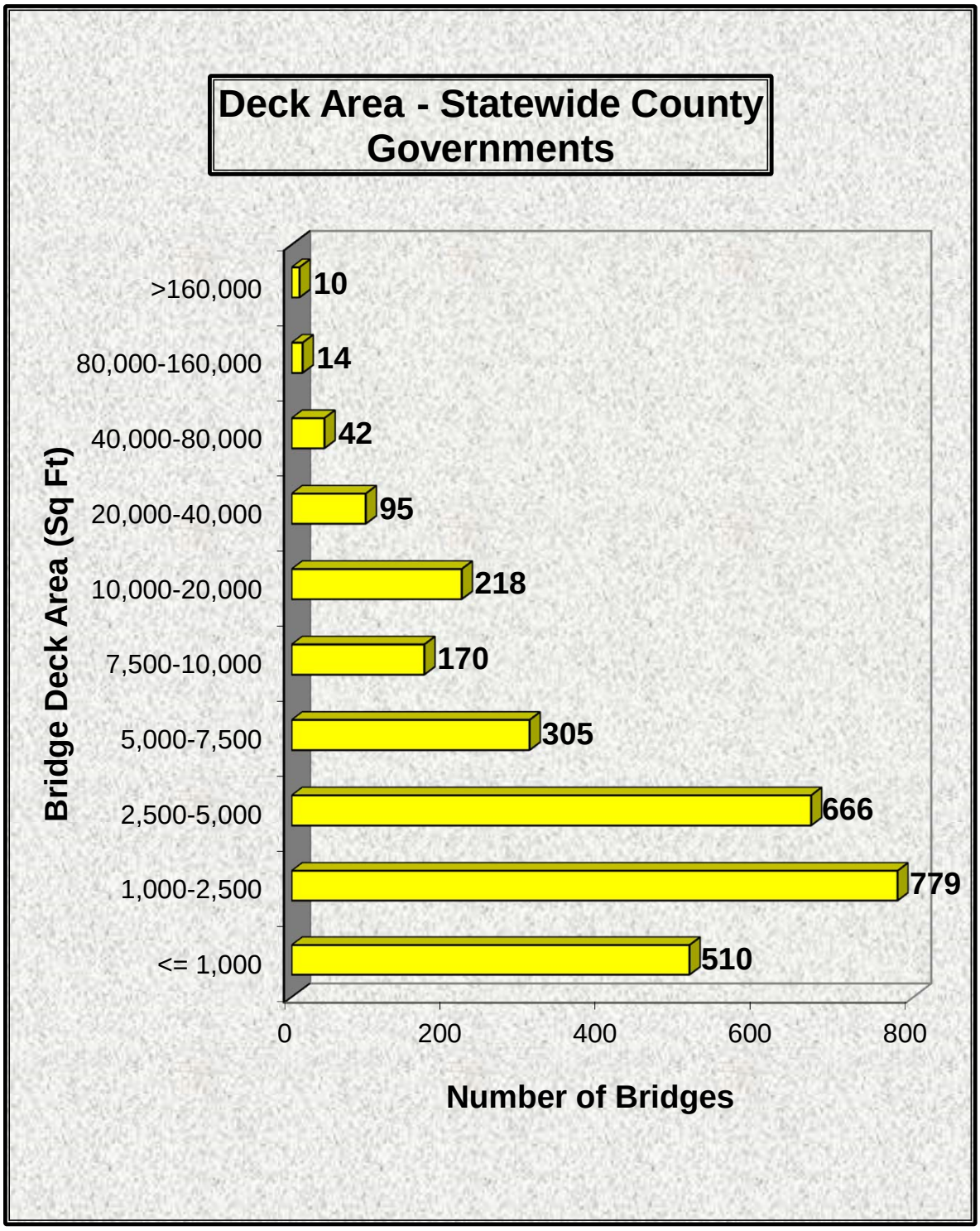
Deck Area - Statewide County Governments
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
10
14
42
95
218
170
305
666
779
510
0
200
400
600
800
Number of Bridges

Figure 14

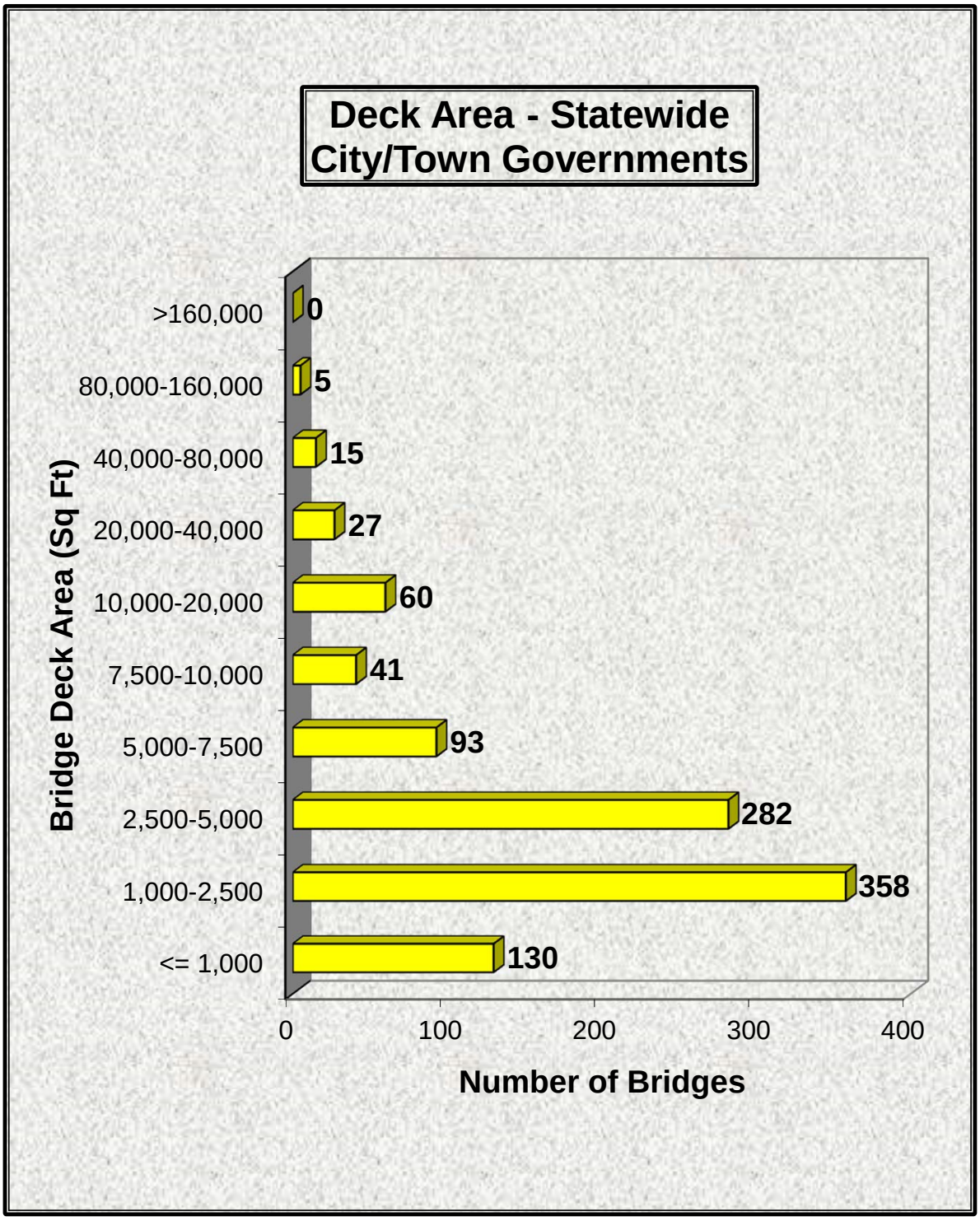
Deck Area - Statewide
City/Town Governments
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
0
5
15
27
60
41
93
282
358
130
0
100
200
300
400
Number of Bridges

Figure 15

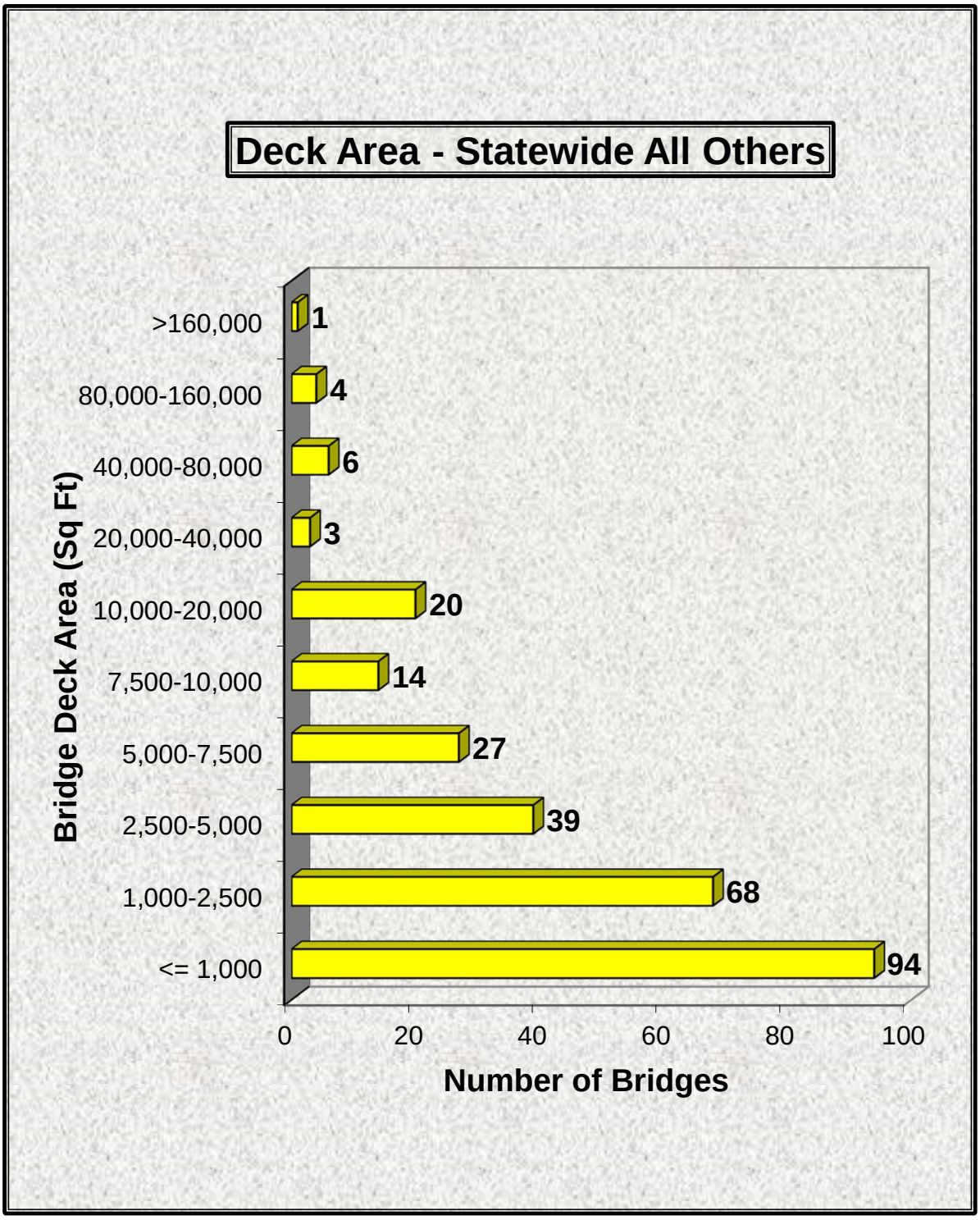
Deck Area - Statewide All Others
Bridge Deck Area (Sq Ft)
>160,000
80,000-160,000
40,000-80,000
20,000-40,000
10,000-20,000
7,500-10,000
5,000-7,500
2,500-5,000
1,000-2,500
<= 1,000
1
4
6
3
20
14
27
39
68
94
0
20
40
60
80
100
Number of Bridges

Figure 16

Bridge Inventory By Deck Area (Districts 1 Thru 4)

	Maintenance Responsibility							
	FDOT	County	City / Town	Other State	Other Local	Federal	Others	Total
District 1								
<= 1,000	8	107	26	5	0	0	0	146
1,000-2,500	76	204	61	7	10	0	0	358
2,500-5,000	131	169	75	6	8	0	0	389
5,000-7,500	122	55	26	1	4	0	0	208
7,500-10,000	94	33	5	1	0	0	0	133
10,000-20,000	167	37	7	2	0	0	0	213
20,000-40,000	58	17	0	1	0	0	0	76
40,000-80,000	22	7	0	0	0	0	0	29
80,000-160,000	11	5	0	0	0	0	0	16
>160,000	11	1	0	1	0	0	0	13
Total	700	635	200	24	22	0	0	1581
District 2								
<= 1,000	4	58	14	9	0	0	0	85
1,000-2,500	22	61	60	2	0	0	0	145
2,500-5,000	97	63	29	0	0	0	0	189
5,000-7,500	165	26	12	0	0	0	0	203
7,500-10,000	170	12	14	0	0	0	0	196
10,000-20,000	274	12	9	0	0	0	2	297
20,000-40,000	92	6	6	0	0	0	0	104
40,000-80,000	50	3	4	0	0	0	0	57
80,000-160,000	35	0	1	0	0	0	0	36
>160,000	20	1	0	0	0	0	0	21
Total	929	242	149	11	0	0	2	1333
District 3								
<= 1,000	1	245	7	74	1	0	0	328
1,000-2,500	13	213	12	24	0	0	0	262
2,500-5,000	60	126	10	5	0	0	0	201
5,000-7,500	105	53	3	0	0	0	0	161
7,500-10,000	106	24	0	1	0	0	0	131
10,000-20,000	157	24	2	0	0	0	0	183
20,000-40,000	62	11	1	0	0	0	0	74
40,000-80,000	32	3	2	0	0	0	0	37
80,000-160,000	19	3	1	0	2	0	0	25
>160,000	24	0	0	0	0	0	0	24
Total	579	702	38	104	3	0	0	1426
District 4								
<= 1,000	0	18	48	0	0	0	0	66
1,000-2,500	21	108	114	5	0	0	0	248
2,500-5,000	79	135	87	7	0	0	0	308
5,000-7,500	64	67	13	2	0	0	0	146
7,500-10,000	60	25	7	0	0	0	0	92
10,000-20,000	257	52	12	0	0	0	0	321
20,000-40,000	148	24	5	0	0	0	0	177
40,000-80,000	65	5	1	0	0	0	0	71
80,000-160,000	20	2	0	0	0	0	0	22
>160,000	15	1	0	0	0	0	0	16
Total	729	437	287	14	0	0	0	1467

Table 6

Bridge Inventory By Deck Area (Districts 5 Thru 8)

	Maintenance Responsibility							
	FDOT	County	City / Town	Other State	Other Local	Federal	Others	Total
District 5								
<= 1,000	2	22	13	3	0	0	1	41
1,000-2,500	16	50	40	4	0	0	8	118
2,500-5,000	90	63	29	0	1	0	11	194
5,000-7,500	180	28	17	1	1	0	12	239
7,500-10,000	159	32	8	0	1	0	8	208
10,000-20,000	250	36	20	1	1	0	11	319
20,000-40,000	107	16	3	0	0	0	2	128
40,000-80,000	40	8	4	0	0	0	5	57
80,000-160,000	23	1	2	0	1	0	0	27
>160,000	13	0	0	0	0	0	0	13
Total	880	256	136	9	5	0	58	1344
District 6								
<= 1,000	2	17	5	1	0	0	0	25
1,000-2,500	11	68	31	2	0	4	0	116
2,500-5,000	63	62	31	0	1	0	0	157
5,000-7,500	68	34	13	0	2	0	0	117
7,500-10,000	70	19	4	0	0	0	0	93
10,000-20,000	172	17	5	1	1	0	0	196
20,000-40,000	121	9	4	0	0	0	0	134
40,000-80,000	51	6	2	0	1	0	0	60
80,000-160,000	25	2	0	0	0	0	0	27
>160,000	16	4	0	0	0	0	0	20
Total	599	238	95	4	5	4	0	945
District 7								
<= 1,000	3	43	17	0	0	0	0	63
1,000-2,500	13	75	40	0	2	0	0	130
2,500-5,000	30	48	21	0	0	0	0	99
5,000-7,500	70	42	9	0	4	0	0	125
7,500-10,000	105	25	3	0	3	0	0	136
10,000-20,000	194	40	5	0	1	0	0	240
20,000-40,000	108	12	8	0	0	0	0	128
40,000-80,000	55	10	2	0	0	0	0	67
80,000-160,000	19	1	1	1	0	0	0	22
>160,000	14	3	0	0	0	0	0	17
Total	611	299	106	1	10	0	0	1027
Turnpike								
<= 1,000	0	0	0	0	0	0	0	0
1,000-2,500	5	0	0	0	0	0	0	5
2,500-5,000	100	0	0	0	0	0	0	100
5,000-7,500	146	0	0	0	0	0	0	146
7,500-10,000	113	0	0	0	0	0	0	113
10,000-20,000	200	0	0	0	0	0	0	200
20,000-40,000	54	0	0	0	0	0	0	54
40,000-80,000	27	0	0	0	0	0	0	27
80,000-160,000	6	0	0	0	0	0	0	6
>160,000	5	0	0	0	0	0	0	5
Total	656	0	0	0	0	0	0	656

Table 7

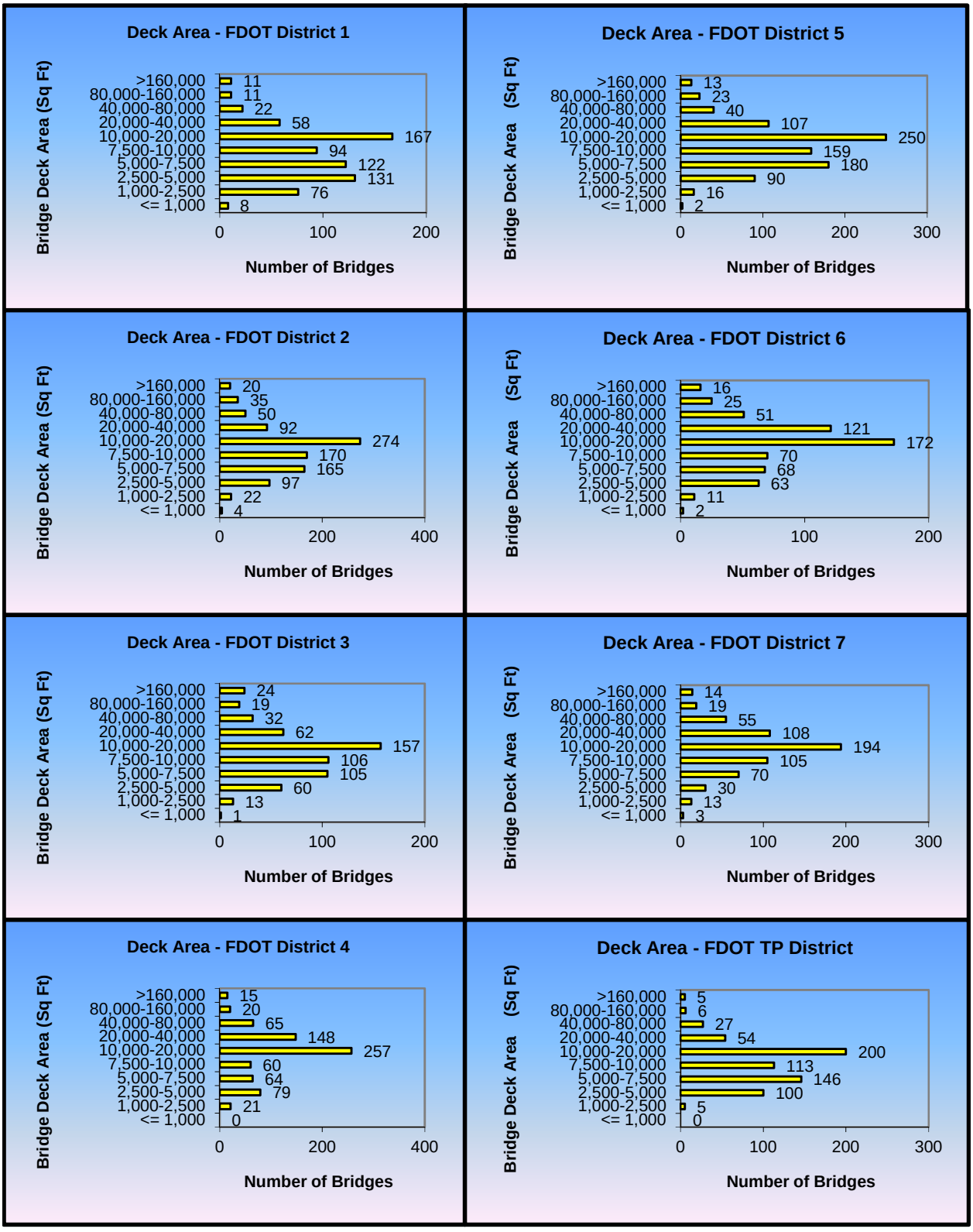
Deck Area - FDOT District 1
Bridge Deck Area (Sq Ft)
>160,000 11
80,000-160,000 11
40,000-80,000 22
20,000-40,000 58
10,000-20,000 167
7,500-10,000 94
5,000-7,500 122
2,500-5,000 131
1,000-2,500 76
<= 1,000 8
0 100 200
Number of Bridges
Deck Area - FDOT District 5
Bridge Deck Area (Sq Ft)
>160,000 13
80,000-160,000 23
40,000-80,000 40
20,000-40,000 107
10,000-20,000 250
7,500-10,000 159
5,000-7,500 180
2,500-5,000 90
1,000-2,500 16
<= 1,000 2
0 100 200 300
Number of Bridges
Deck Area - FDOT District 2
Bridge Deck Area (Sq Ft)
>160,000 20
80,000-160,000 35
40,000-80,000 50
20,000-40,000 92
10,000-20,000 274
7,500-10,000 170
5,000-7,500 165
2,500-5,000 97
1,000-2,500 22
<= 1,000 4
0 200 400
Number of Bridges
Deck Area - FDOT District 6
Bridge Deck Area (Sq Ft)
>160,000 16
80,000-160,000 25
40,000-80,000 51
20,000-40,000 121
10,000-20,000 172
7,500-10,000 70
5,000-7,500 68
2,500-5,000 63
1,000-2,500 11
<= 1,000 2
0 100 200
Number of Bridges
Deck Area - FDOT District 3
Bridge Deck Area (Sq Ft)
>160,000 24
80,000-160,000 19
40,000-80,000 32
20,000-40,000 62
10,000-20,000 157
7,500-10,000 106
5,000-7,500 105
2,500-5,000 60
1,000-2,500 13
<= 1,000 1
0 100 200
Number of Bridges
Deck Area - FDOT District 7
Bridge Deck Area (Sq Ft)
>160,000 14
80,000-160,000 19
40,000-80,000 55
20,000-40,000 108
10,000-20,000 194
7,500-10,000 105
5,000-7,500 70
2,500-5,000 30
1,000-2,500 13
<= 1,000 3
0 100 200 300
Number of Bridges
Deck Area - FDOT District 4
Bridge Deck Area (Sq Ft)
>160,000 15
80,000-160,000 20
40,000-80,000 65
20,000-40,000 148
10,000-20,000 257
7,500-10,000 60
5,000-7,500 64
2,500-5,000 79
1,000-2,500 21
<= 1,000 0
0 200 400
Number of Bridges
Deck Area - FDOT TP District
Bridge Deck Area (Sq Ft)
>160,000 5
80,000-160,000 6
40,000-80,000 27
20,000-40,000 54
10,000-20,000 200
7,500-10,000 113
5,000-7,500 146
2,500-5,000 100
1,000-2,500 5
<= 1,000 0
0 100 200 300
Number of Bridges

Figure 17

Bridge Inventory - 2015 Annual Report

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 95.14% of the FDOT maintained bridges are in excellent or good condition. However, the number drops to 86.90% for County bridges, 87.46% for City/Town bridges, and 87.88% 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
Statewide	Excellent	805	330	88	7	15	0	6	1251
	Good	5684	3040	993	135	39	4	55	9950
	Fair	267	365	110	23	1	0	1	767
	Poor	58	143	45	9	1	0	1	257
	Total	6814	3878	1236	174	56	4	63	12225
District 1	Excellent	61	83	18	2	0	0	0	164
	Good	838	777	222	20	23	0	0	1880
	Fair	27	45	3	2	0	0	0	77
	Poor	2	7	2	1	0	0	0	12
	Total	928	912	245	25	23	0	0	2133
District 2	Excellent	79	32	10	0	0	0	0	121
	Good	1085	317	153	5	0	0	1	1561
	Fair	49	92	26	4	0	0	0	171
	Poor	17	46	14	3	0	0	1	81
	Total	1230	487	203	12	0	0	2	1934
District 3	Excellent	32	42	2	2	0	0	0	78
	Good	706	714	42	87	3	0	1	1553
	Fair	52	143	6	14	0	0	0	215
	Poor	20	51	3	3	0	0	0	77
	Total	810	950	53	106	3	0	1	1923
District 4	Excellent	152	63	17	3	0	0	0	235
	Good	579	367	220	9	0	0	0	1175
	Fair	29	23	52	2	0	0	0	106
	Poor	9	8	6	0	0	0	0	23
	Total	769	461	295	14	0	0	0	1539
District 5	Excellent	139	58	20	0	8	0	5	230
	Good	859	294	144	10	5	0	53	1365
	Fair	44	19	5	1	0	0	1	70
	Poor	4	11	4	0	0	0	0	19
	Total	1046	382	173	11	13	0	59	1684
District 6	Excellent	151	27	10	0	4	0	0	192
	Good	430	192	73	4	0	4	0	703
	Fair	21	23	6	0	1	0	0	51
	Poor	3	8	8	1	0	0	0	20
	Total	605	250	97	5	5	4	0	966
District 7	Excellent	108	25	11	0	3	0	1	148
	Good	564	379	139	0	8	0	0	1090
	Fair	35	20	12	0	0	0	0	67
	Poor	3	12	8	1	1	0	0	25
	Total	710	436	170	1	12	0	1	1330
Turnpike	Excellent	83	0	0	0	0	0	0	83
	Good	623	0	0	0	0	0	0	623
	Fair	10	0	0	0	0	0	0	10
	Poor	0	0	0	0	0	0	0	0
	Total	716	0	0	0	0	0	0	716

Table 8

NOTE: The number of FDOT bridges includes 119 MDX bridges and 292 OOCEA bridges.

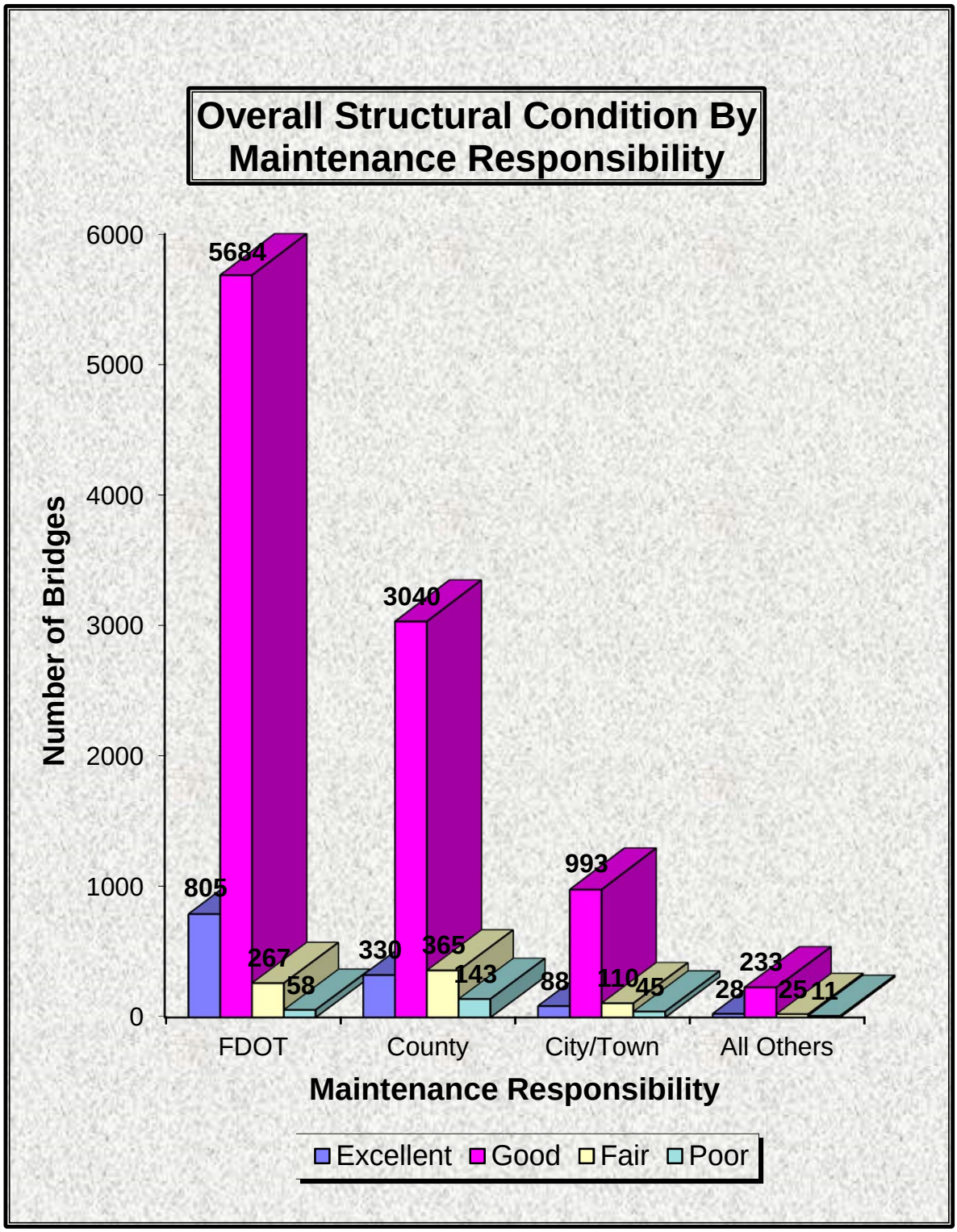
Overall Structural Condition By Maintenance Responsibility
Number of Bridges
6000
5000
4000
3000
2000
1000
0
805
5684
267
58
330
3040
365
143
88
993
110
45
28
233
25
11
FDOT
County
City/Town
All Others
Maintenance Responsibility
Excellent
Good
Fair
Poor

Figure 18

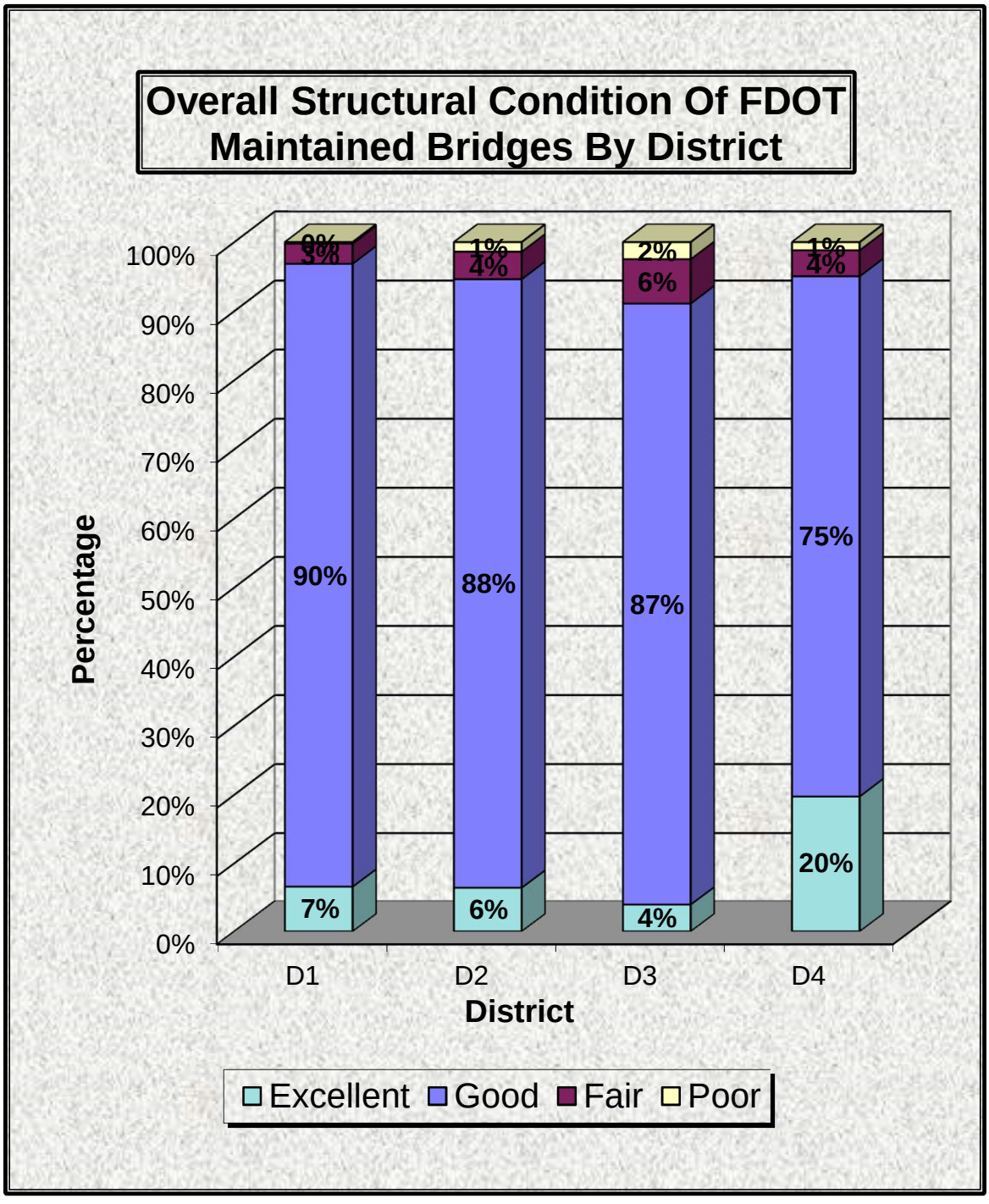
Overall Structural Condition Of FDOT Maintained Bridges By District
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
90%
3%
7%
88%
4%
6%
87%
6%
4%
2%
75%
4%
20%
1%
1%
D1
D2
D3
D4
District
Excellent
Good
Fair
Poor

Figure 19

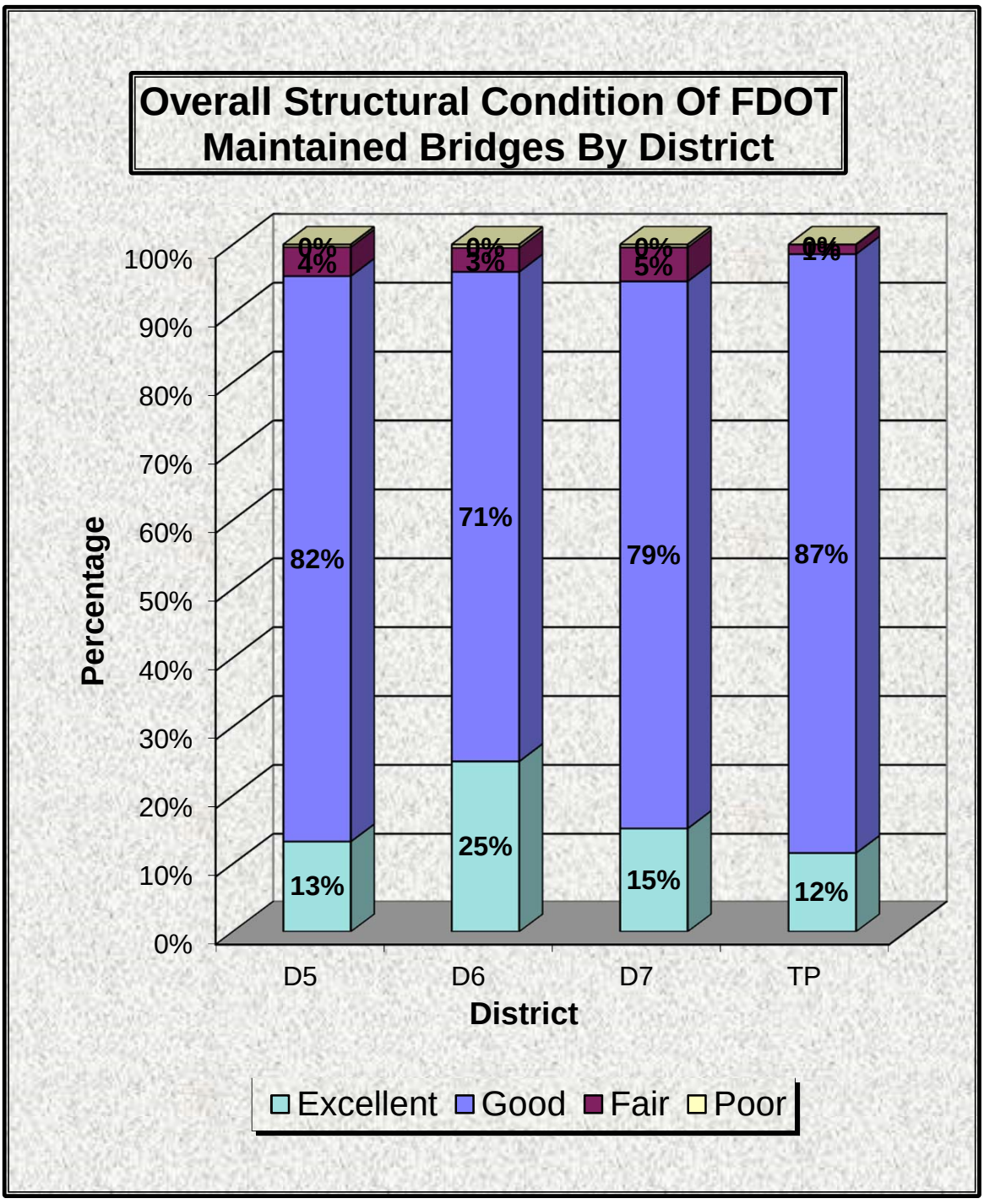
Overall Structural Condition Of FDOT Maintained Bridges By District
Percentage
100%
90%
80%
70%
60%
50%
40%
30%
20%
10%
0%
0%
4%
82%
13%
0%
3%
71%
25%
0%
5%
79%
15%
0%
1%
87%
12%
D5
D6
D7
TP
District
Excellent
Good
Fair
Poor

Figure 20

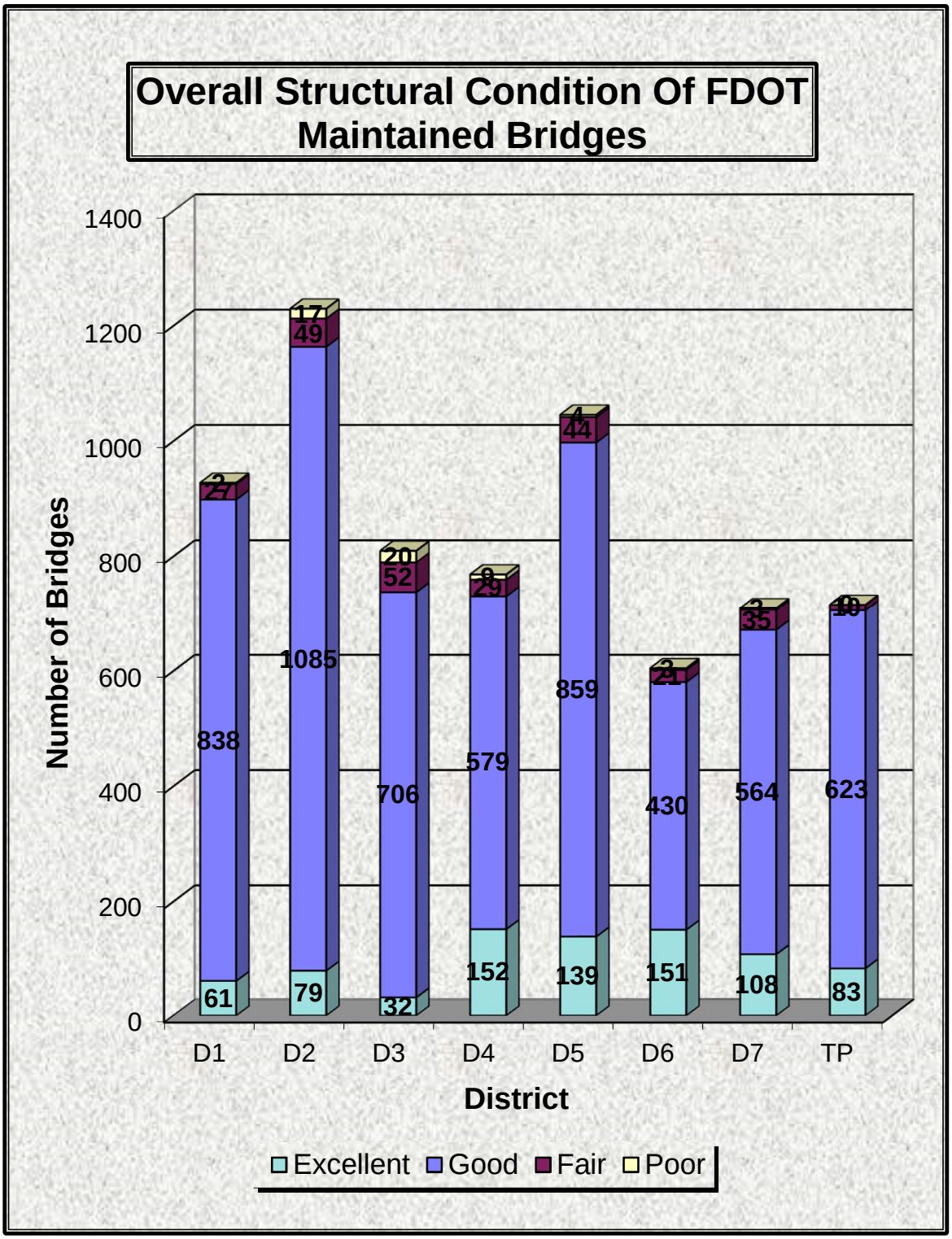
Overall Structural Condition Of FDOT Maintained Bridges
Number of Bridges
1400
1200
1000
800
600
400
200
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Excellent
Good
Fair
Poor
61
838
27
79
1085
49
17
32
706
52
20
152
579
29
9
139
859
44
4
151
430
21
3
108
564
35
3
83
623
10
0

Figure 21

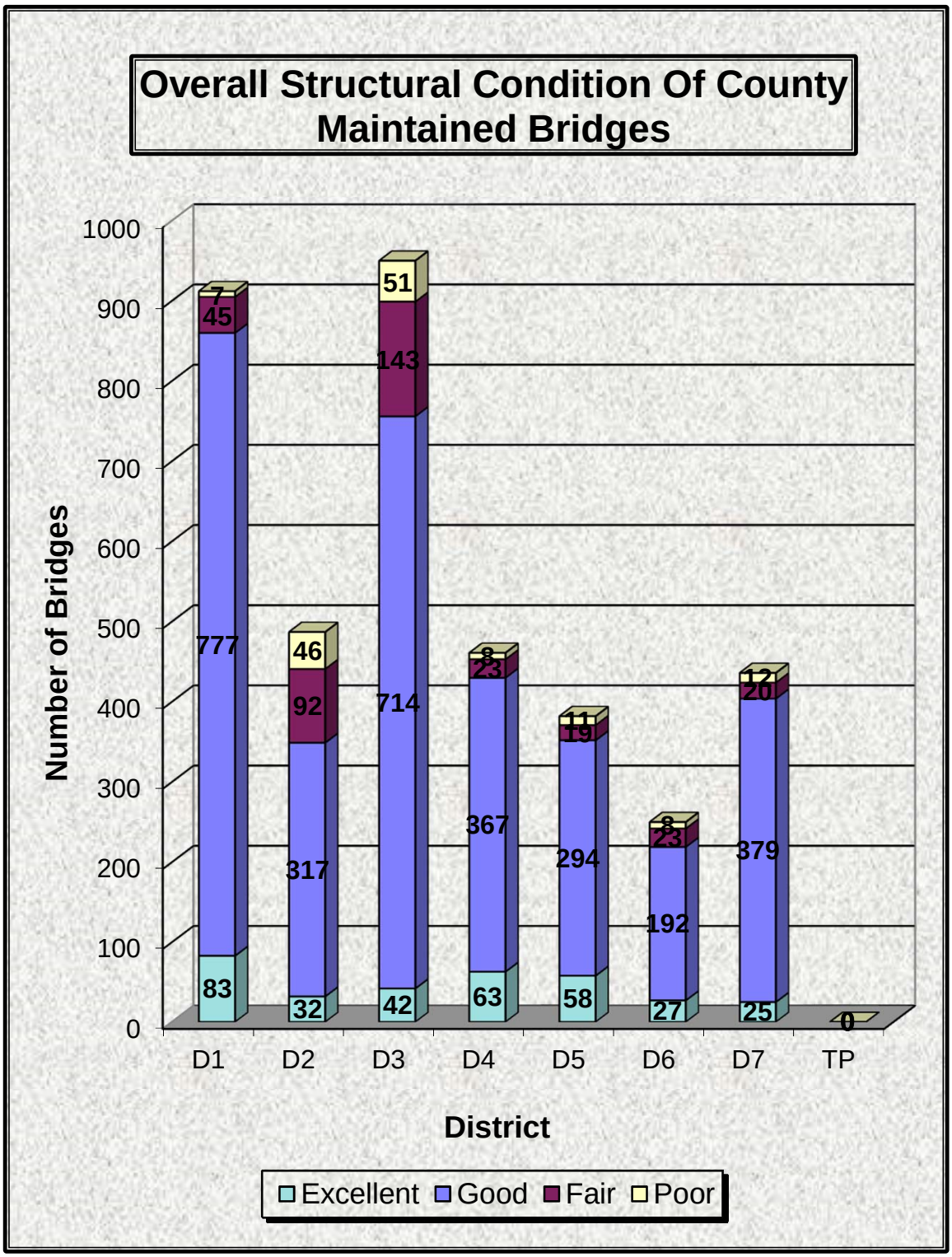
Overall Structural Condition Of County Maintained Bridges
Number of Bridges
1000
900
800
700
600
500
400
300
200
100
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Excellent
Good
Fair
Poor
83
777
45
7
32
317
92
46
42
714
143
51
63
367
23
8
58
294
19
11
27
192
23
8
25
379
20
12
0

Figure 22

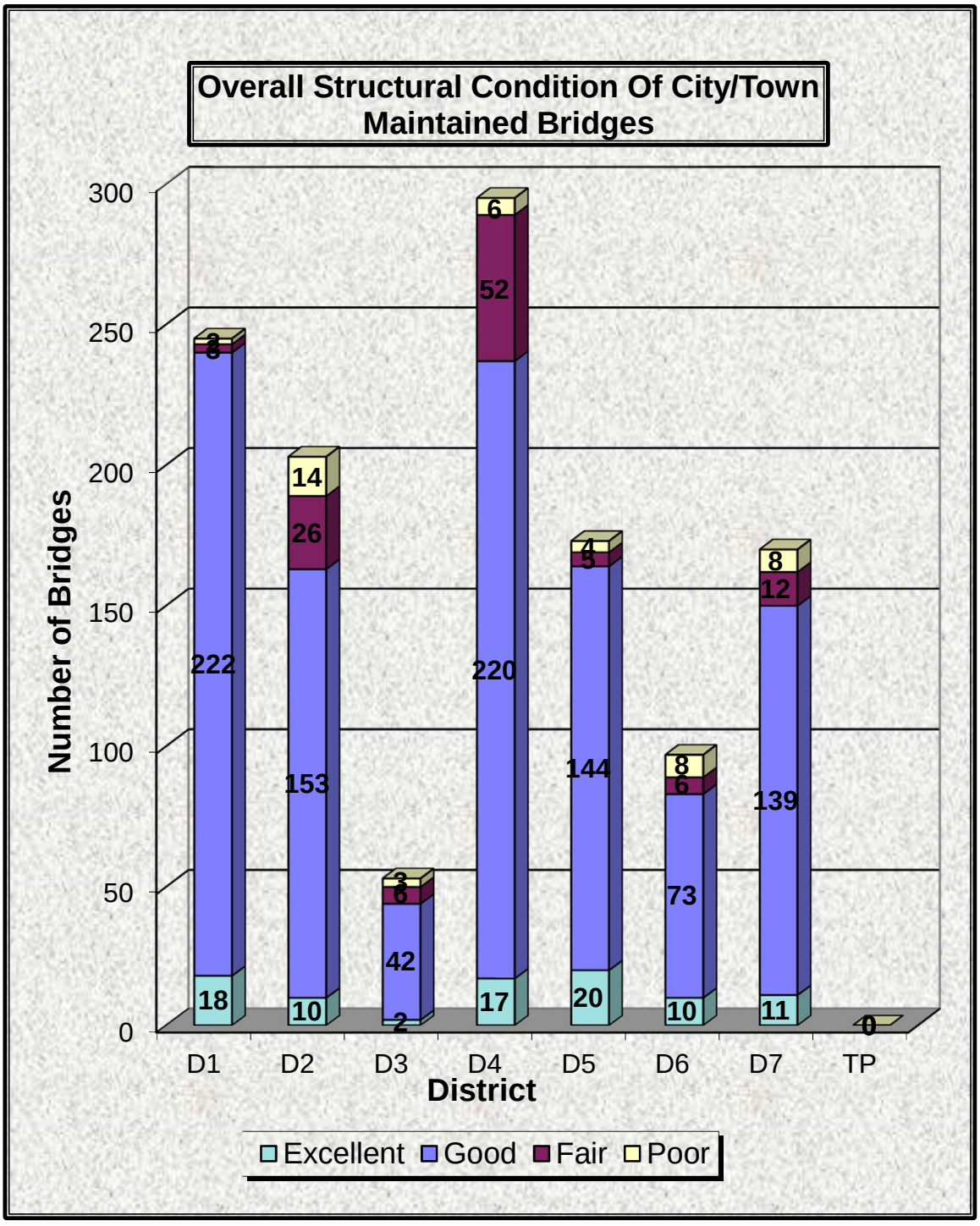
Overall Structural Condition Of City/Town Maintained Bridges
Number of Bridges
300
250
200
150
100
50
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Excellent
Good
Fair
Poor
18
222
3
10
153
14
26
2
42
6
3
17
220
52
6
20
144
5
4
10
73
6
8
11
139
12
8
0

Figure 23

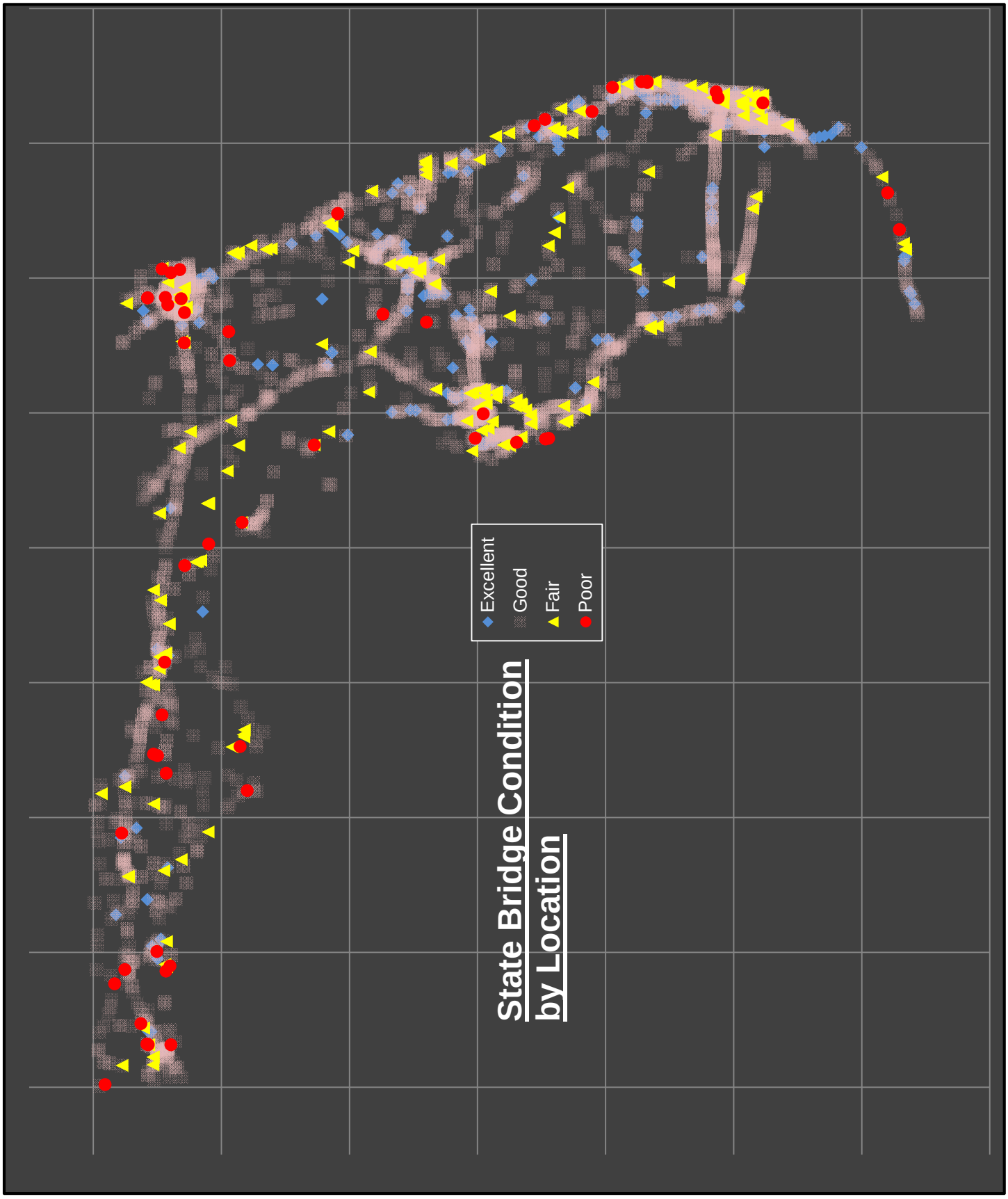
State Bridge Condition
by Location
Excellent
Good
Fair
Poor

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 221 structurally deficient bridges in Florida, with over 54.30% having county maintenance responsibility. Fifty-seven (25.79%) 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 80.83% of the County Government maintained structurally deficient bridges are concentrated within District 2 and 3. Over 63.89% of the City/Town maintained structurally deficient bridges are concentrated within Districts 2 and 4.

Structurally Deficient Bridges (SD) Bridges								
	Maintenance Responsibility							
	FDOT	County	City/ Town	Other State	Local	Federal	Others	Total
Statewide	57	120	36	8	0	0	0	221
District 1	2	5	1	1	0	0	0	9
District 2	17	45	14	3	0	0	0	79
District 3	20	52	3	3	0	0	0	78
District 4	9	5	9	0	0	0	0	23
District 5	4	5	3	0	0	0	0	12
District 6	3	6	4	0	0	0	0	13
District 7	2	2	2	1	0	0	0	7
Turnpike	0	0	0	0	0	0	0	0

Table 9

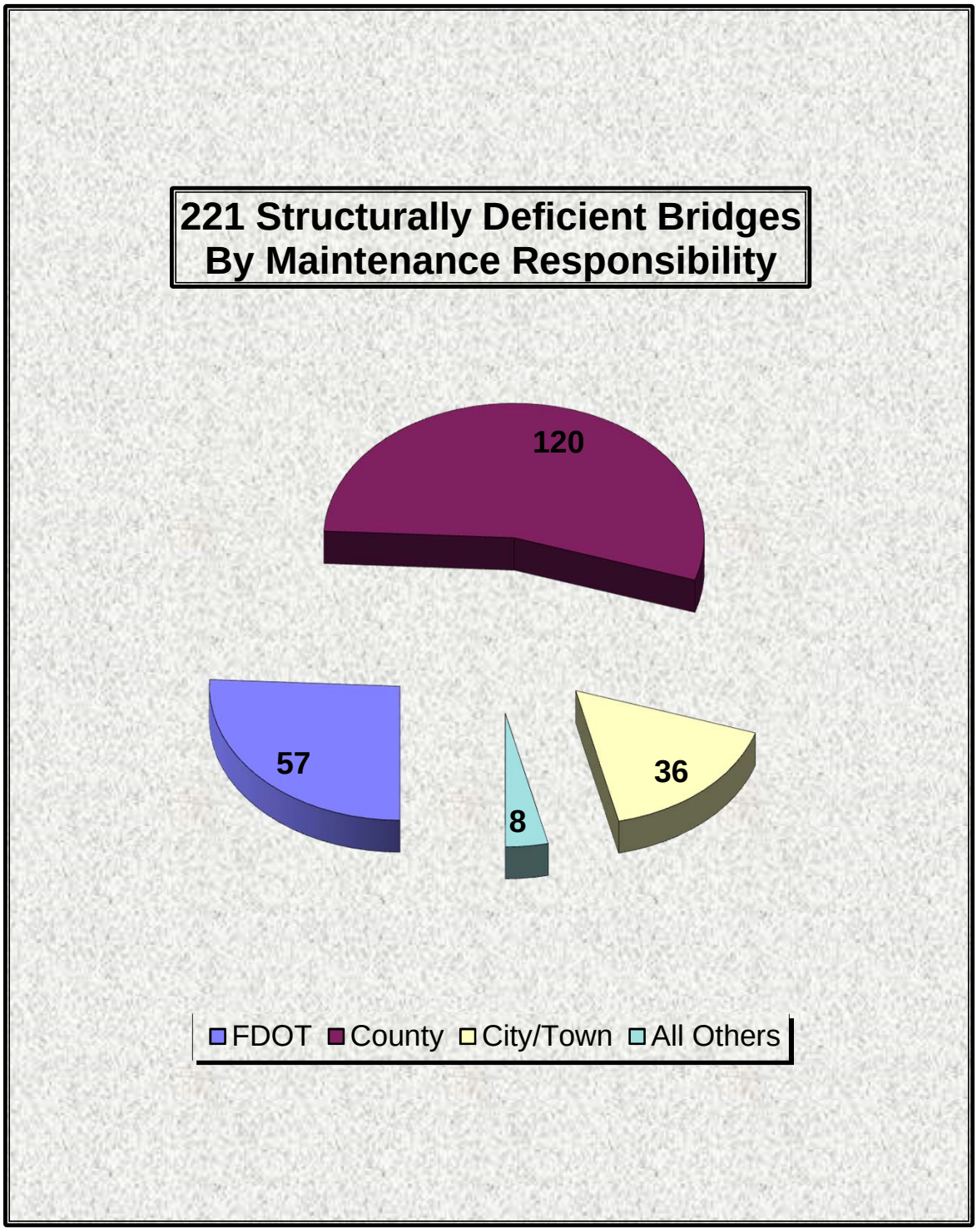
221 Structurally Deficient Bridges
By Maintenance Responsibility
120
57
8
36
FDOT
County
City/Town
All Others

Figure 25

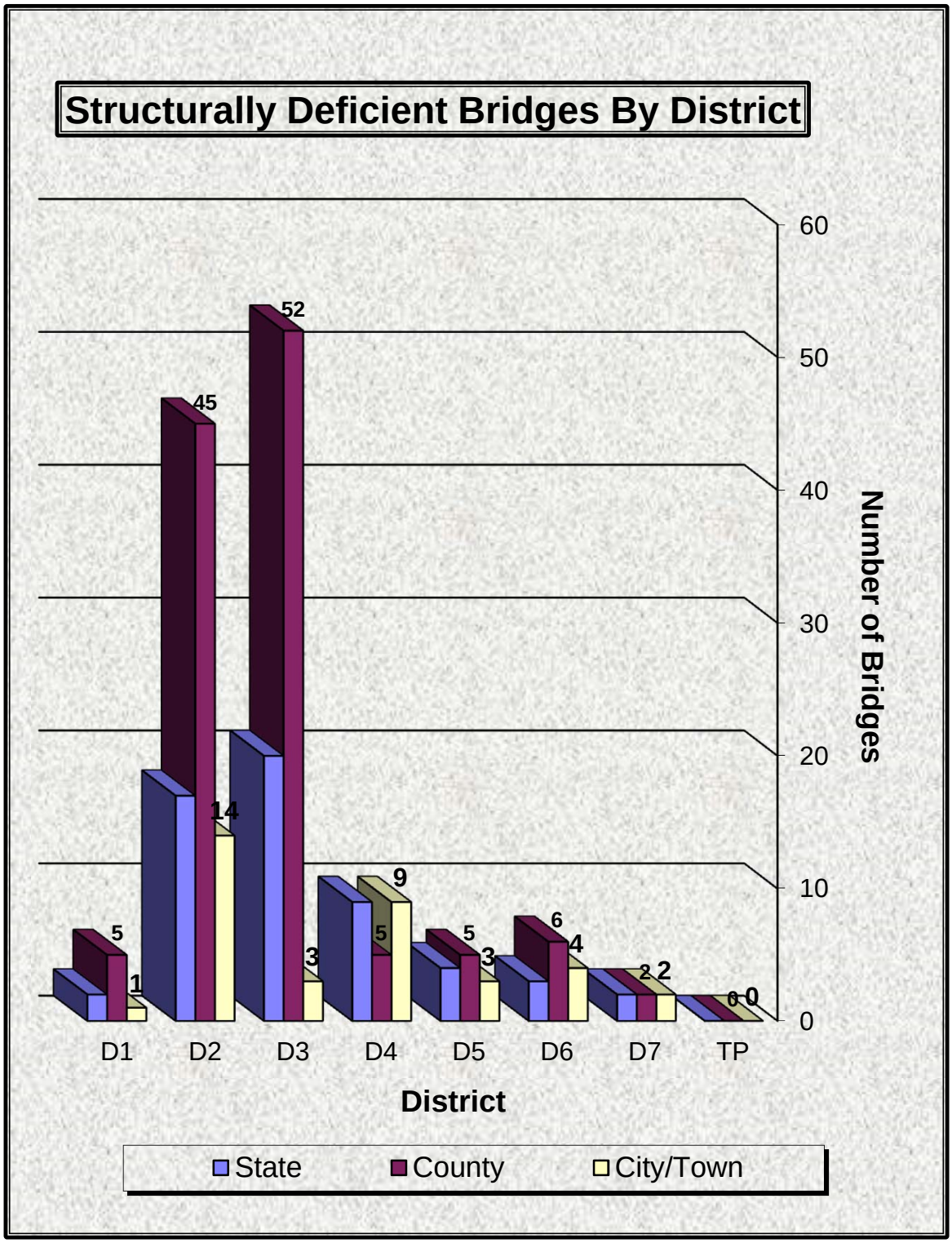
Structurally Deficient Bridges By District
60
50
40
30
20
10
0
Number of Bridges
5
1
45
14
52
3
9
5
5
3
6
4
2
2
0
0
D1
D2
D3
D4
D5
D6
D7
TP
District
State
County
City/Town

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 730 posted or closed bridges in Florida, with County Governments having maintenance responsibility for over 75.75% of the total. City and Town Governments are responsible for the maintenance of over 18.08% of the total, while the FDOT is responsible for only 8 of the 730 bridges (1.10%) (see Figure 27). The number of posted County bridges (553 bridges) is much greater than the number of structurally deficient County bridges (120), 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 8 posted or closed bridges maintained by the FDOT, Districts 1, 3, 4, 7, and Turnpike had none, and District 6 constituted 75% (2 bridges are under MDX Authority) of the posted or closed bridges (see Figure 29). Four Hundred and Seven (55.75%) of the posted or closed bridges maintained by County Governments are concentrated within Districts 2 and 3 (see Figure 30). Seventy-eight (59.09%) of the posted or closed bridges maintained by City/Town Governments are concentrated within Districts 2 and 4 (see Figure 31). Statewide, 66.56% 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
Statewide								
Posted	2	542	125	35	0	0	0	704
Closed	6	11	7	1	1	0	0	26
Total	8	553	132	36	1	0	0	730
District 1								
Posted	0	82	17	3	0	0	0	102
Closed	0	0	0	0	0	0	0	0
Total	0	82	17	3	0	0	0	102
District 2								
Posted	1	88	39	5	0	0	0	133
Closed	0	4	1	1	0	0	0	6
Total	1	92	40	6	0	0	0	139
District 3								
Posted	0	310	8	22	0	0	0	340
Closed	0	5	2	0	0	0	0	7
Total	0	315	10	22	0	0	0	347
District 4								
Posted	0	24	37	1	0	0	0	62
Closed	0	0	1	0	0	0	0	1
Total	0	24	38	1	0	0	0	63
District 5								
Posted	0	19	20	4	0	0	0	43
Closed	1	0	1	0	0	0	0	2
Total	1	19	21	4	0	0	0	45
District 6								
Posted	1	11	1	0	0	0	0	13
Closed	5	2	2	0	1	0	0	10
Total	6	13	3	0	1	0	0	23
District 7								
Posted	0	8	3	0	0	0	0	11
Closed	0	0	0	0	0	0	0	0
Total	0	8	3	0	0	0	0	11
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

Table 10

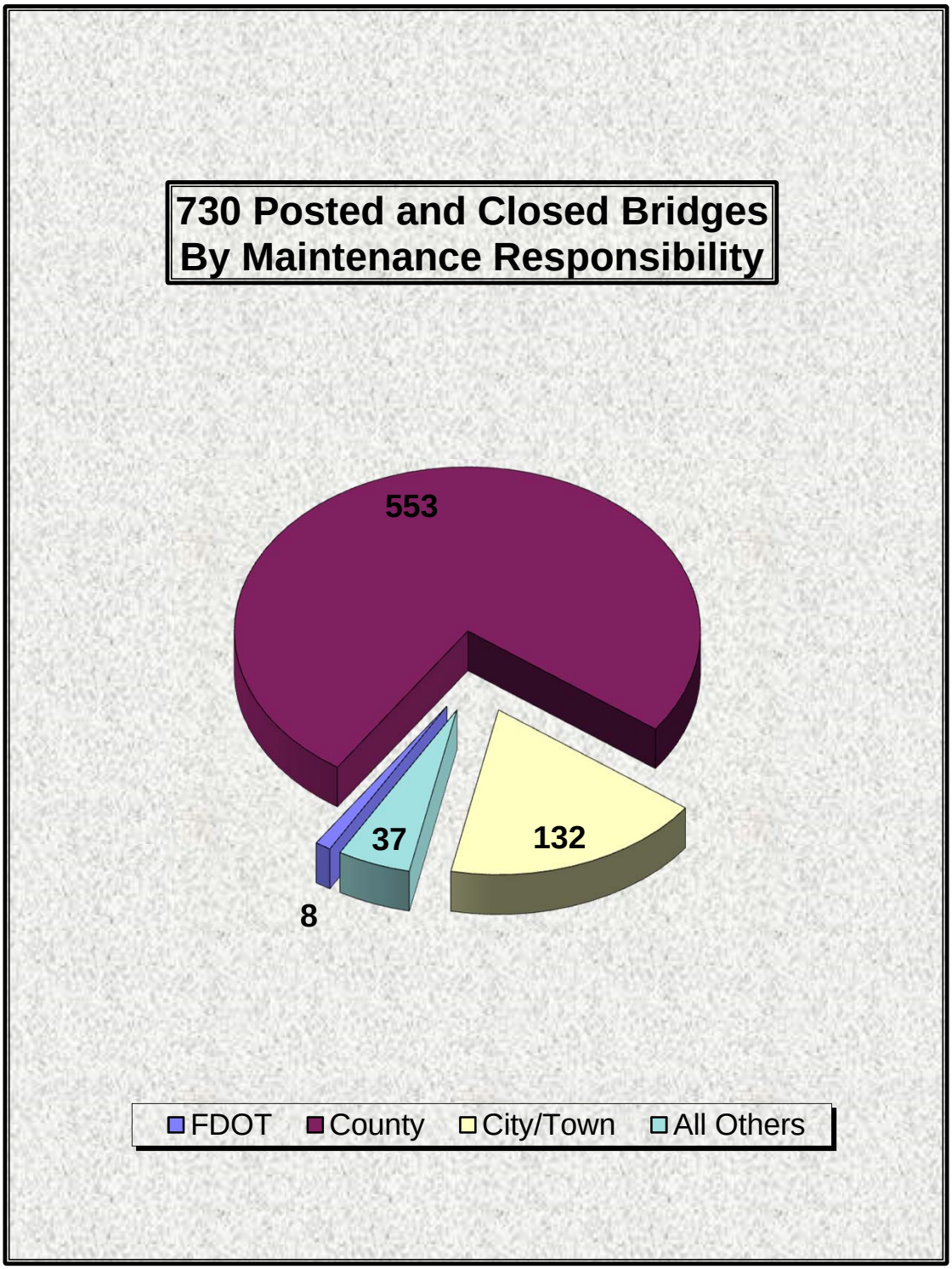
730 Posted and Closed Bridges
By Maintenance Responsibility
553
37
132
8
FDOT
County
City/Town
All Others

Figure 27

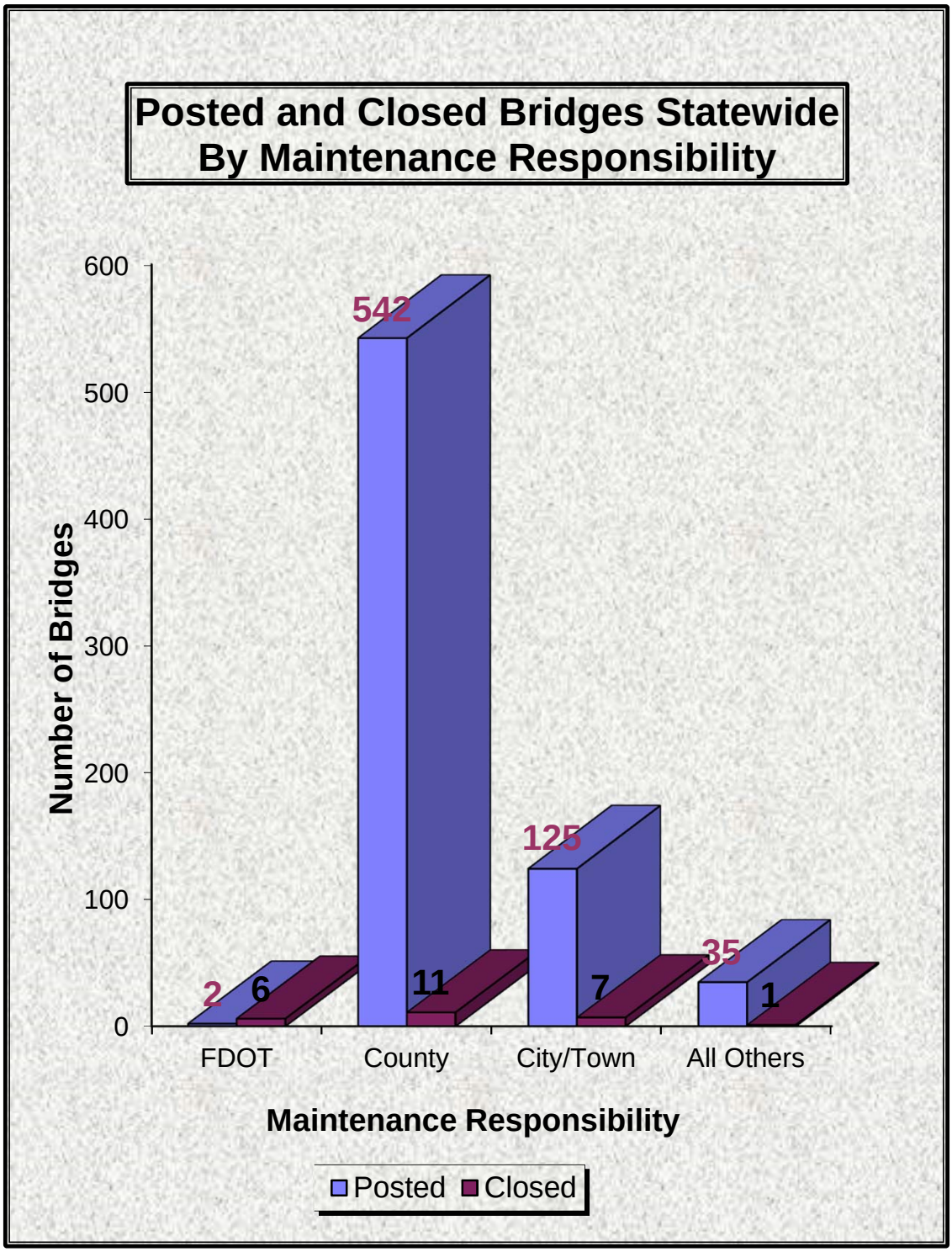
Posted and Closed Bridges Statewide
By Maintenance Responsibility
Number of Bridges
600
500
400
300
200
100
0
542
125
35
2
6
11
7
1
FDOT
County
City/Town
All Others
Maintenance Responsibility
Posted
Closed

Figure 28

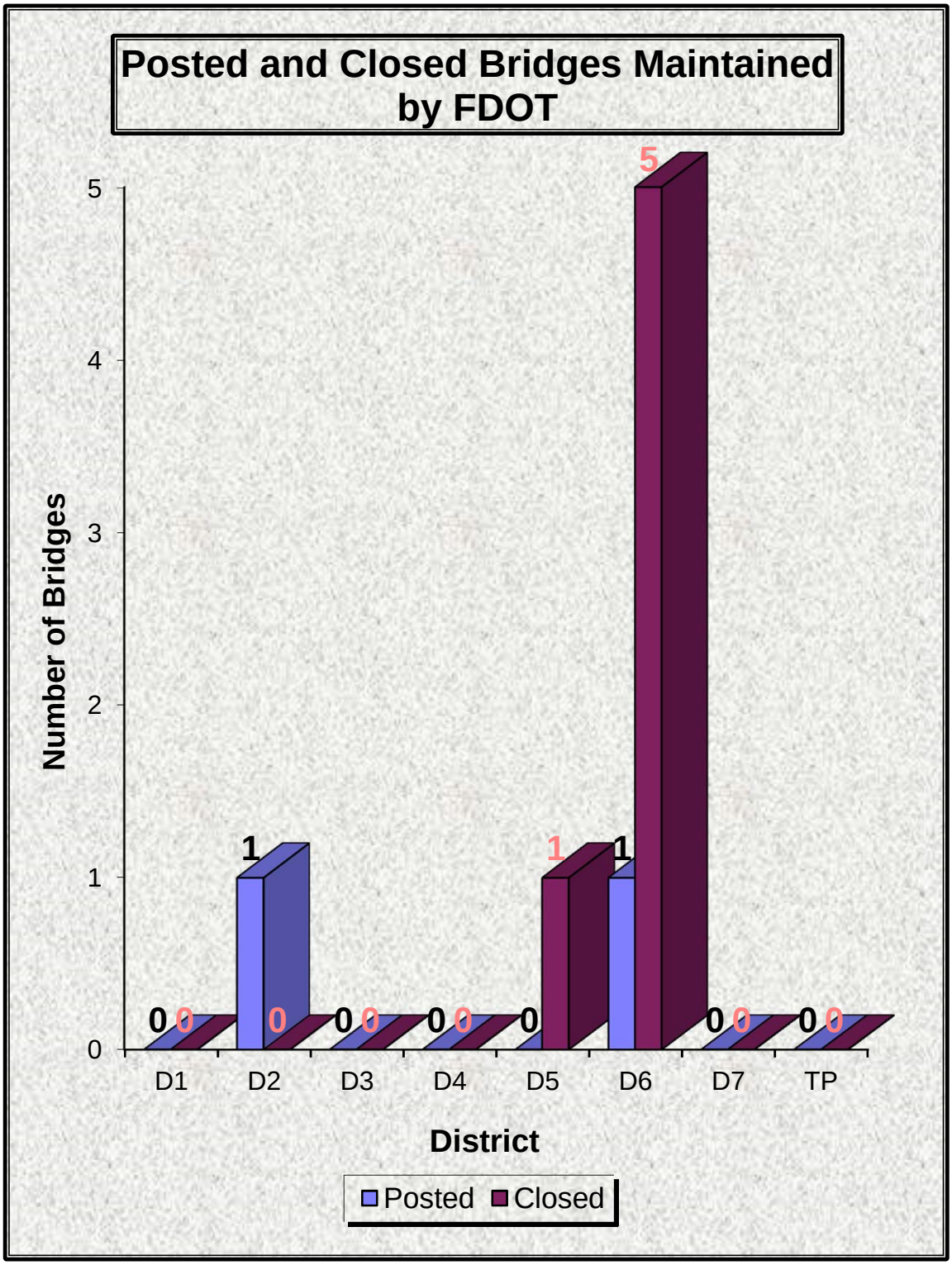
Posted and Closed Bridges Maintained by FDOT
Number of Bridges
0
1
2
3
4
5
0 0
1 0
0 0
0 0
0 1
1 5
0 0
0 0
D1
D2
D3
D4
D5
D6
D7
TP
District
Posted
Closed

Figure 29

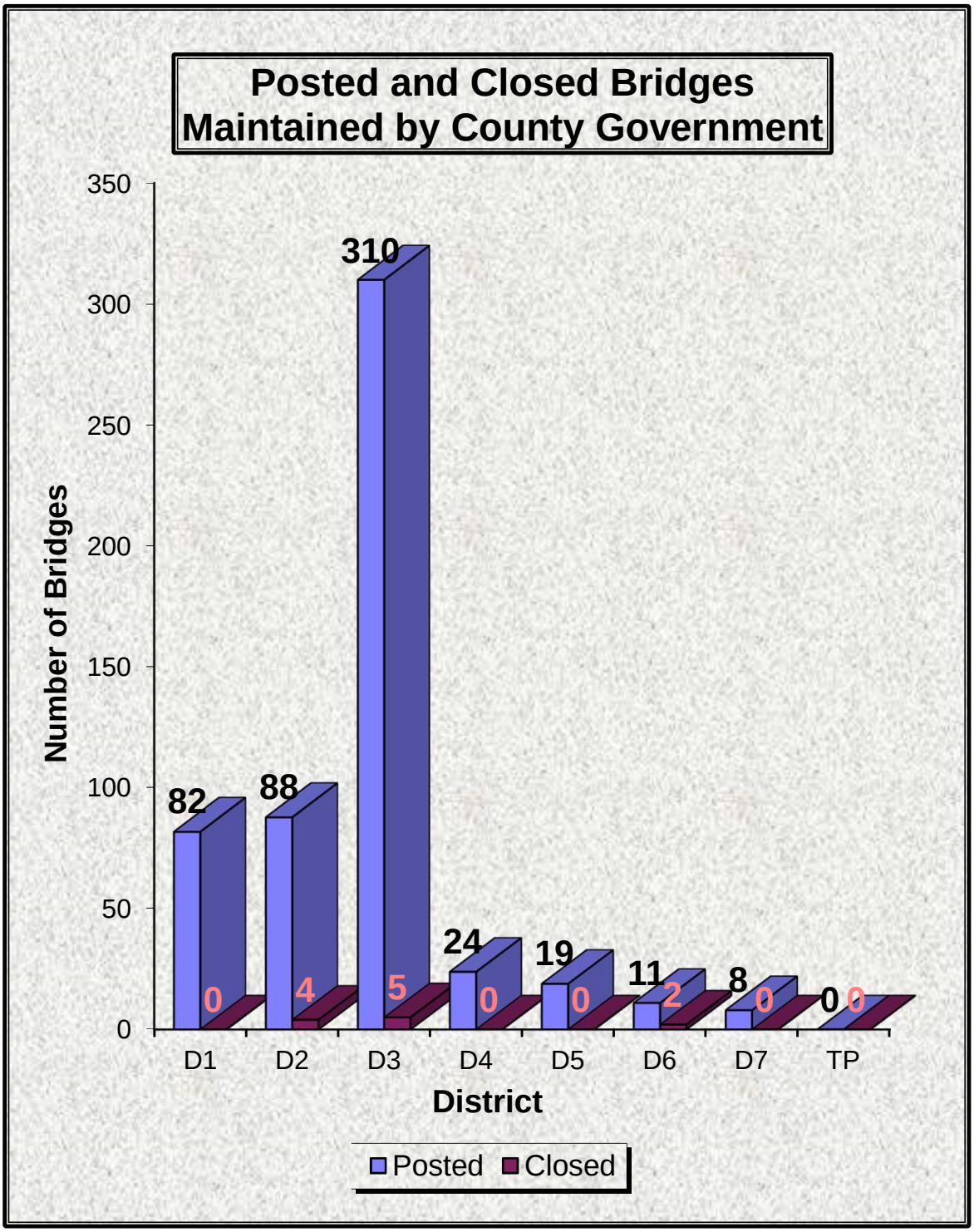
Posted and Closed Bridges
Maintained by County Government
Number of Bridges
350
300
250
200
150
100
50
0
82
0
88
4
310
5
24
0
19
0
11
2
8
0
0
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Posted
Closed

Figure 30

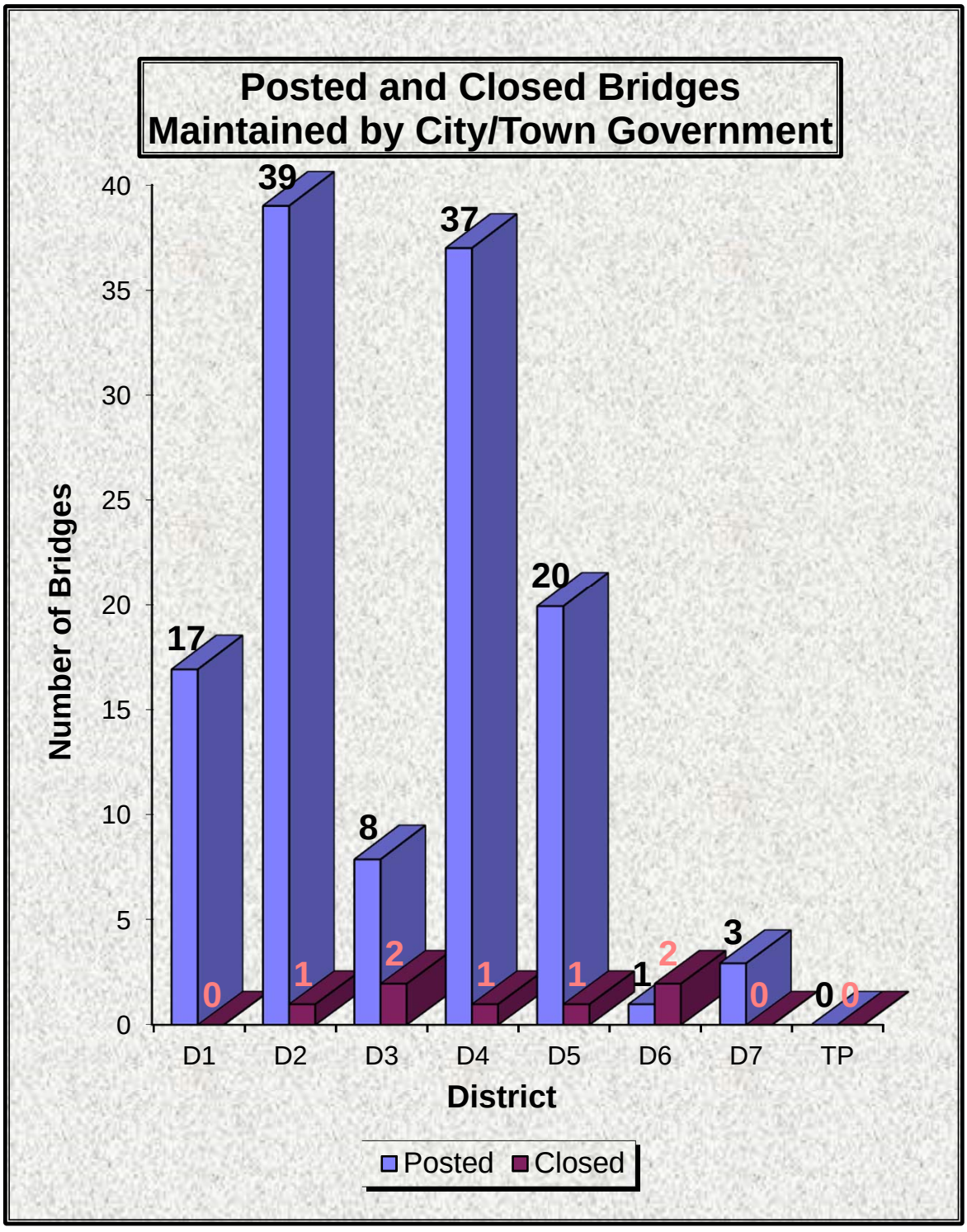
Posted and Closed Bridges
Maintained by City/Town Government
Number of Bridges
40
35
30
25
20
15
10
5
0
17
0
39
1
8
2
37
1
20
1
1
2
3
0
0
0
D1
D2
D3
D4
D5
D6
D7
TP
District
Posted
Closed

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 1,736 functionally obsolete bridges in Florida, about 14.20% of the total. The FDOT has maintenance responsibility for over 41.88% 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	727	621	283	80	11	0	14	1736
District 1	66	154	77	5	3	0	0	305
District 2	169	46	25	3	0	0	0	243
District 3	34	140	3	62	0	0	1	240
District 4	44	93	75	5	0	0	0	217
District 5	113	37	44	3	1	0	12	210
District 6	153	74	22	2	0	0	0	251
District 7	92	77	37	0	7	0	1	214
Turnpike	56	0	0	0	0	0	0	56

Table 11

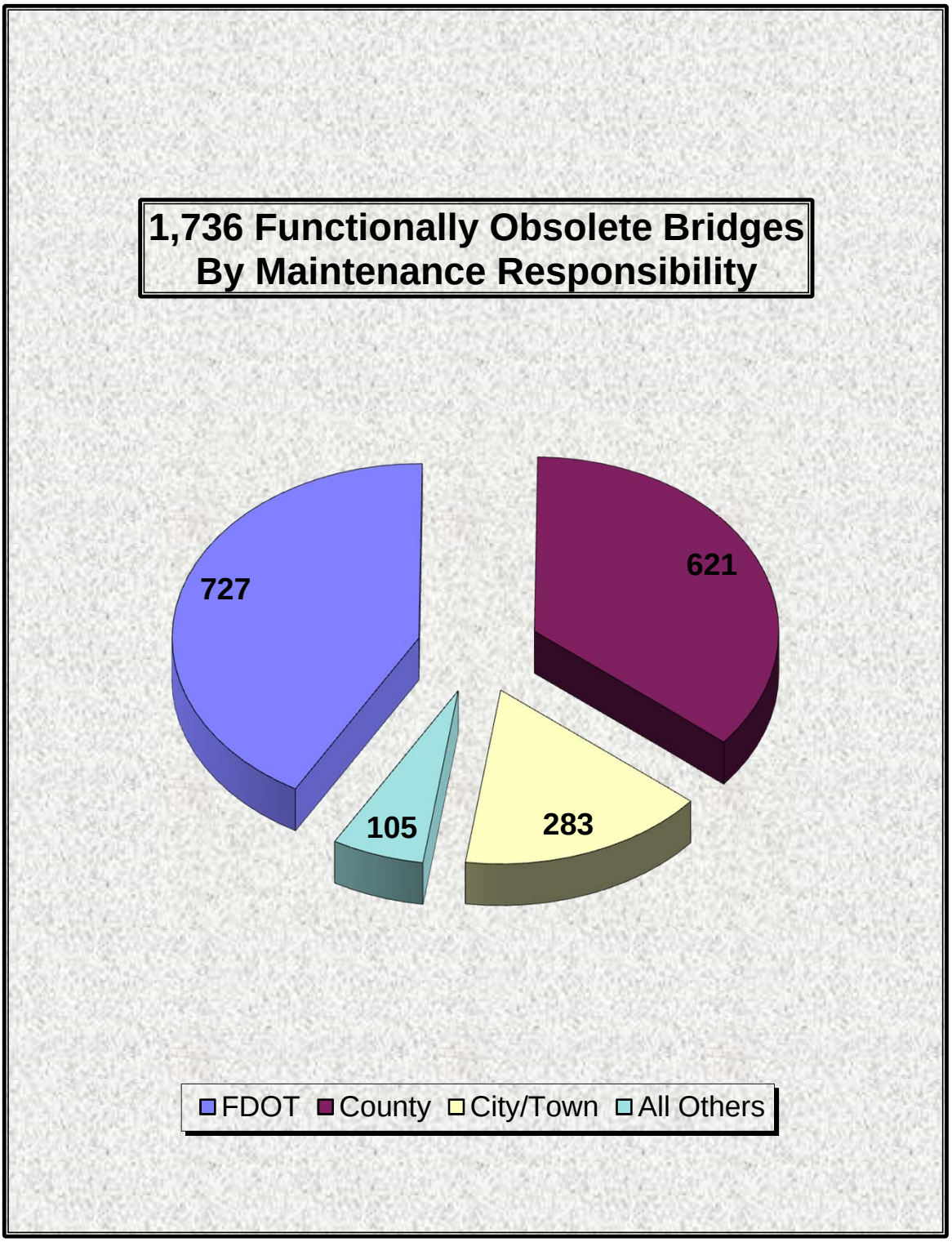
1,736 Functionally Obsolete Bridges
By Maintenance Responsibility
727
621
105
283
FDOT
County
City/Town
All Others

Figure 32

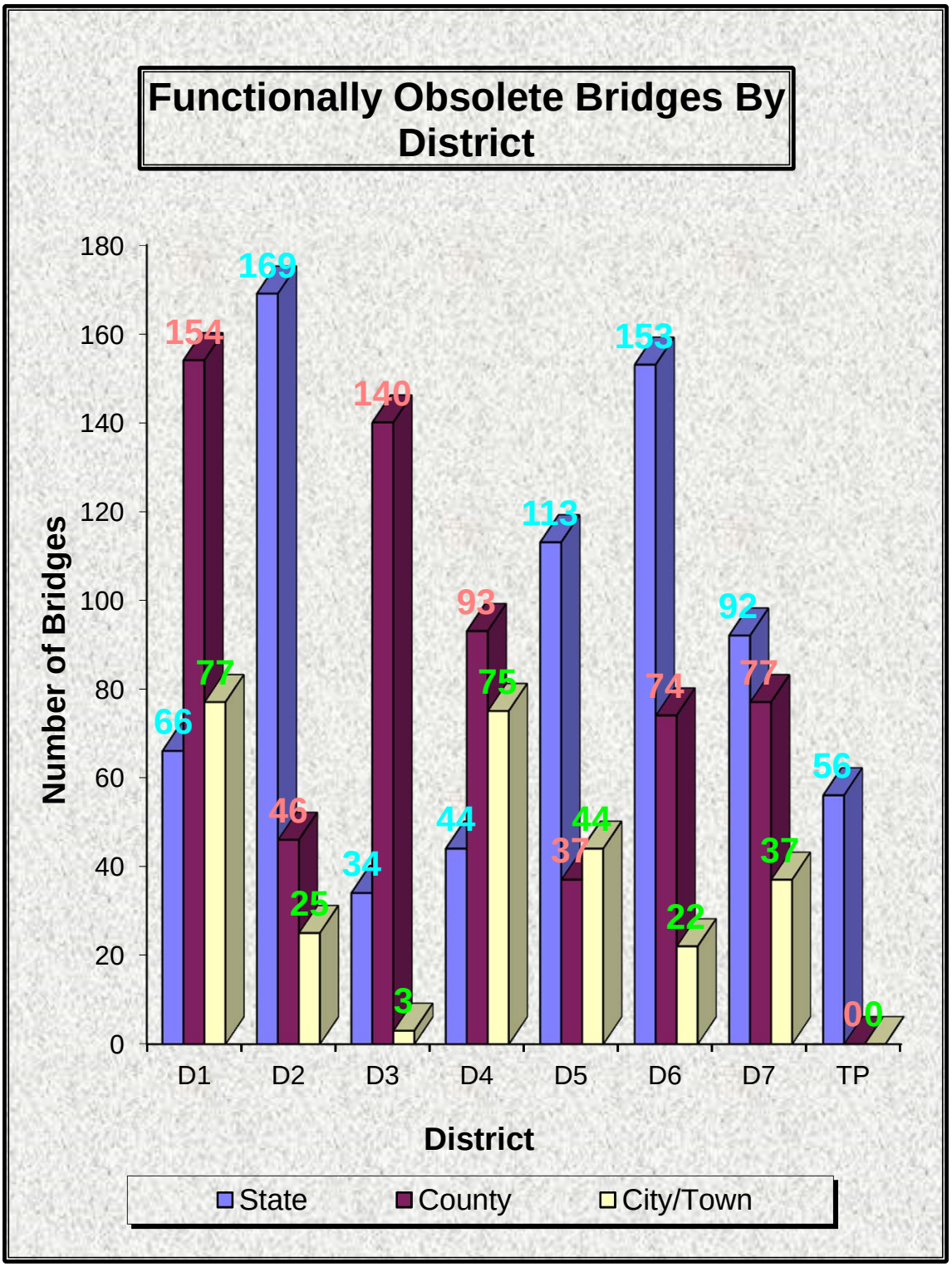
Functionally Obsolete Bridges By District
Number of Bridges
180
160
140
120
100
80
60
40
20
0
D1
D2
D3
D4
D5
D6
D7
TP
District
State
County
City/Town
66
154
77
169
46
25
34
140
3
44
93
75
113
37
44
153
74
22
92
77
37
56
00

Figure 33

Bridge Inventory - 2015 Annual Report

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 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	52,006	251,804	534,003	718,152	634,075	635,505	1,680,797	1,119,806	225,264	5,851,411
P/C Slab	39,386	0	84,882	898,281	760,709	704,092	337,609	23,262	176,551	3,024,772
R/C Beam	228,675	218,657	584,757	0	0	0	0	31,402	333,599	1,397,090
P/C Beam	21,056	0	3,353,319	12,810,891	16,229,718	15,460,067	12,535,067	15,441,041	3,694,563	79,545,723
Steel Beam	462,497	210,806	2,280,228	4,782,170	7,366,689	2,868,995	3,172,459	3,655,719	952,510	25,752,072
Timber Beam	0	0	0	986	0	0	0	0	0	986
R/C Box	0	0	0	40,835	51,587	0	0	0	0	92,422
P/C Box	0	0	0	0	0	0	0	294,388	24,101	318,489
Steel Box	0	0	0	0	110,928	1,336,930	1,442,893	1,373,902	376,633	4,641,286
Truss	223,246	0	428,297	250,885	0	0	0	0	0	902,428
Movable	328,865	87,844	718,302	543,772	659,492	371,813	474,164	564,115	67,337	3,815,704
Culvert	85,958	127,705	323,062	634,768	351,481	146,042	162,610	181,880	44,741	2,058,245
Other	12,401	20,050	130,729	0	0	6,704,858	2,917,085	4,713,443	349,562	14,848,129
Total	1,454,090	916,866	8,437,577	20,680,740	26,164,681	28,228,302	22,880,263	27,398,957	6,244,861	142,406,336

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	6,241	30,492	64,695	94,468	90,816	93,404	247,023	159,759	30,224	817,123
P/C Slab	5,908	0	12,732	134,742	114,106	105,614	50,641	3,489	26,483	453,716
R/C Beam	21,724	20,772	55,552	0	0	0	0	2,983	32,891	133,923
P/C Beam	2,211	0	352,098	1,345,144	1,710,433	1,634,481	1,371,219	1,670,744	390,512	8,476,842
Steel Beam	51,658	25,126	263,604	601,973	877,058	362,892	399,251	455,561	121,160	3,158,284
Timber Beam	0	0	0	94	0	0	0	0	0	94
R/C Box	0	0	0	6,125	7,738	0	0	0	0	13,863
P/C Box	0	0	0	0	0	0	22,849	42,686	3,495	69,030
Steel Box	0	0	0	0	16,639	200,539	216,434	206,085	56,495	696,193
Truss	39,068	0	74,952	43,905	0	0	0	0	0	157,925
Movable	95,083	26,893	242,578	220,251	164,878	120,859	153,593	177,407	32,236	1,233,779
Culvert	8,166	12,132	30,691	60,303	33,391	13,874	15,448	17,279	4,250	195,533
Other	1,860	3,008	19,609	0	0	1,005,729	437,563	707,016	52,434	2,227,219
Total	231,919	118,422	1,116,512	2,507,005	3,015,061	3,537,392	2,914,022	3,443,010	750,180	17,633,524

Table 13

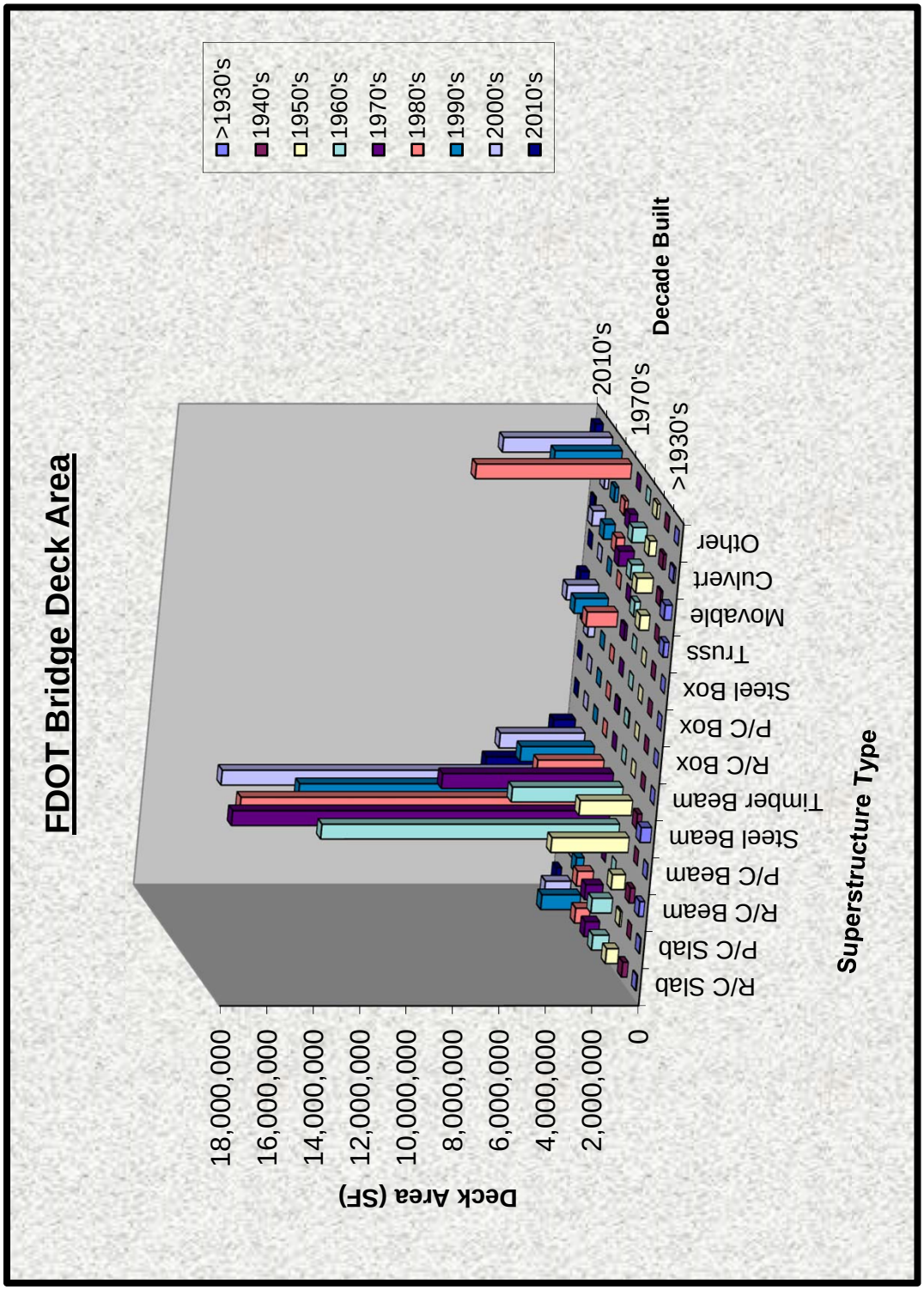
FDOT Bridge Deck Area
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's
Decade Built
2010's
1970's
>1930's
Other
Culvert
Movable
Truss
Steel Box
P/C Box
R/C Box
Timber Beam
Steel Beam
P/C Beam
R/C Beam
P/C Slab
R/C Slab
Superstructure Type
Deck Area (SF)
18,000,000
16,000,000
14,000,000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

Figure 43

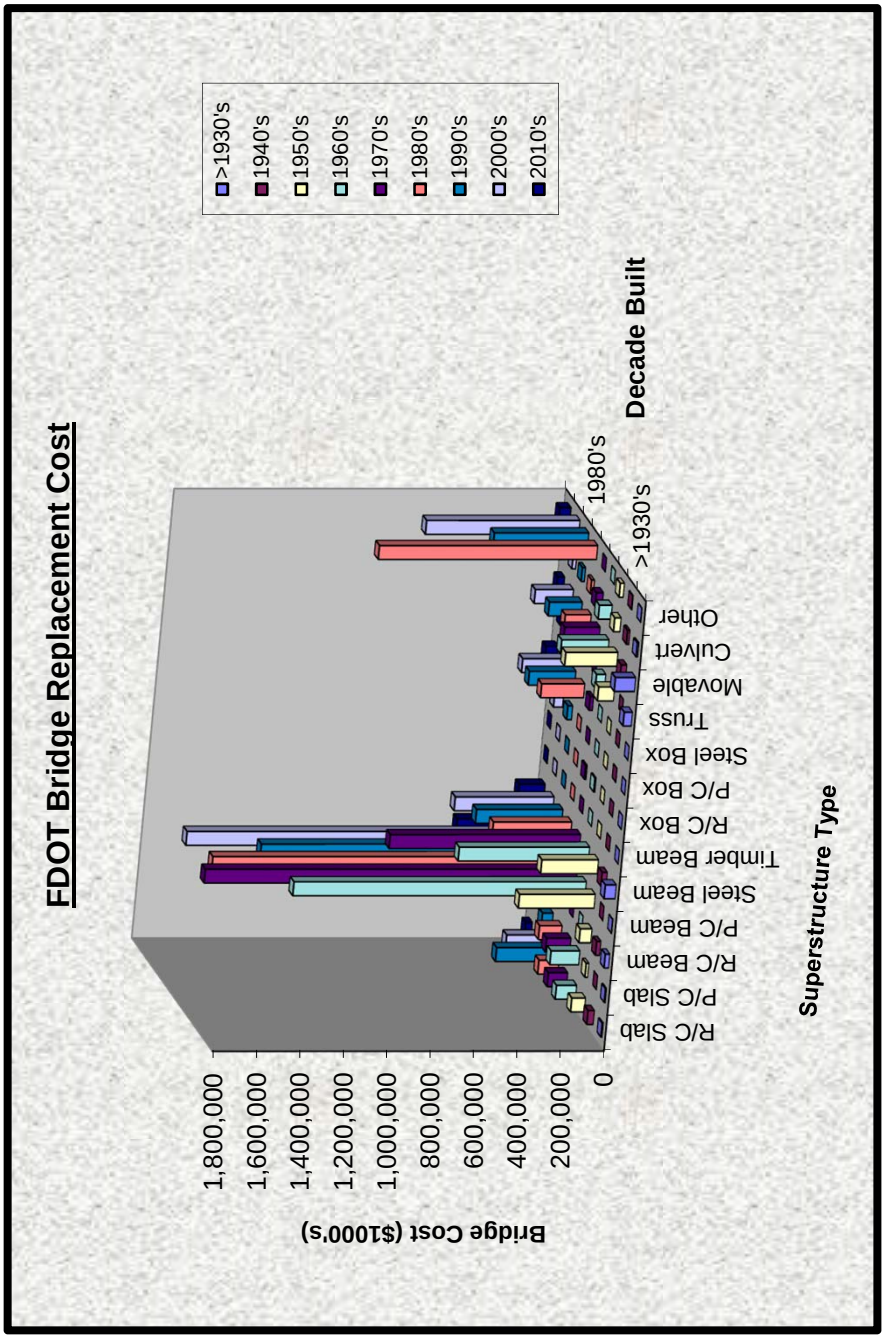
FDOT Bridge Replacement Cost
Bridge Cost ($1000's)
1,800,000
1,600,000
1,400,000
1,200,000
1,000,000
800,000
600,000
400,000
200,000
0
Superstructure Type
R/C Slab
P/C Slab
R/C Beam
P/C Beam
Steel Beam
Timber Beam
R/C Box
P/C Box
Steel Box
Truss
Movable
Culvert
Other
Decade Built
>1930's
1980's
>1930's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

Figure 44

FDOT Bridge Deck Area (Square Feet)									
	District								
	D1	D2	D3	D4	D5	D6	D7	D8	Total
>1930's	60,691	353,648	288,907	222,516	77,309	297,499	153,520	0	1,454,090
1940's	182,505	339,608	213,774	25,275	33,515	95,060	27,129	0	916,866
1950's	895,345	2,126,340	774,887	505,002	629,632	1,533,529	1,376,699	596,144	8,437,577
1960's	1,169,275	5,443,959	2,172,490	1,121,156	3,819,117	4,089,058	2,061,187	804,497	20,680,740
1970's	2,193,579	5,983,159	4,338,262	4,220,937	1,505,372	2,116,882	3,889,417	1,917,074	26,164,681
1980's	3,694,056	2,381,795	2,591,753	6,793,674	1,098,082	4,754,002	5,877,192	1,037,748	28,228,302
1990's	1,867,174	2,753,044	5,286,625	3,095,123	2,359,281	1,527,273	3,287,954	2,703,789	22,880,263
2000's	2,932,437	5,284,454	4,902,734	3,621,477	3,319,125	1,323,812	4,199,726	1,815,192	27,398,957
2010's	400,493	1,408,293	572,458	0	776,110	1,087,529	1,159,682	138,802	5,543,368
Total	13,395,554	26,074,300	21,141,888	19,605,161	13,617,544	16,824,643	22,032,507	9,013,245	141,704,843

Table 14

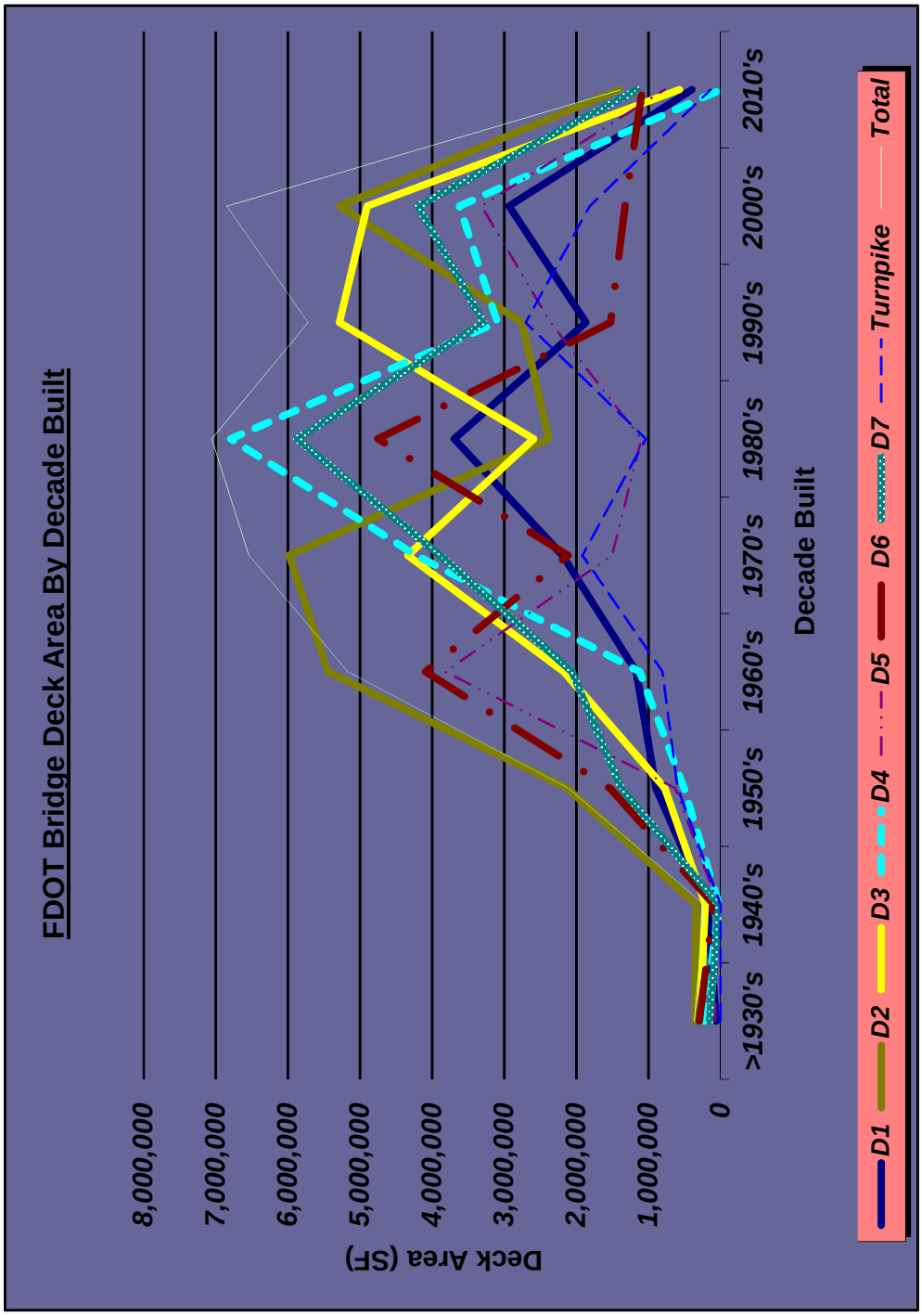
FDOT Bridge Deck Area By Decade Built
Deck Area (SF)
8,000,000
7,000,000
6,000,000
5,000,000
4,000,000
3,000,000
2,000,000
1,000,000
0
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's
Decade Built
D1
D2
D3
D4
D5
D6
D7
Turnpike
Total

Figure 45

FDOT Bridge Replacement Cost ($1000's)									
	District								
	D1	D2	D3	D4	D5	D6	D7	Turnpike	Total
>1930's	6,101	54,837	46,358	29,756	8,619	43,867	42,381	0	231,919
1940's	32,077	43,472	24,050	2,491	3,593	9,952	2,788	0	118,422
1950's	119,040	270,803	81,031	167,894	74,009	185,403	153,368	64,965	1,116,512
1960's	158,612	629,985	256,045	213,497	432,096	481,839	242,965	91,965	2,507,005
1970's	257,831	676,944	503,415	491,635	177,328	273,567	431,645	202,695	3,015,061
1980's	427,284	308,703	328,752	832,557	135,407	653,685	738,289	112,714	3,537,392
1990's	234,055	341,432	684,868	432,064	297,200	222,157	404,593	297,652	2,914,022
2000's	372,135	613,368	593,254	516,632	391,550	169,394	582,483	204,194	3,443,010
2010's	44,562	160,653	62,899	0	90,766	141,421	146,567	14,774	661,642
Total	1,651,696	3,100,197	2,580,672	2,686,527	1,610,569	2,181,287	2,745,079	988,959	4,386,246

Table 15

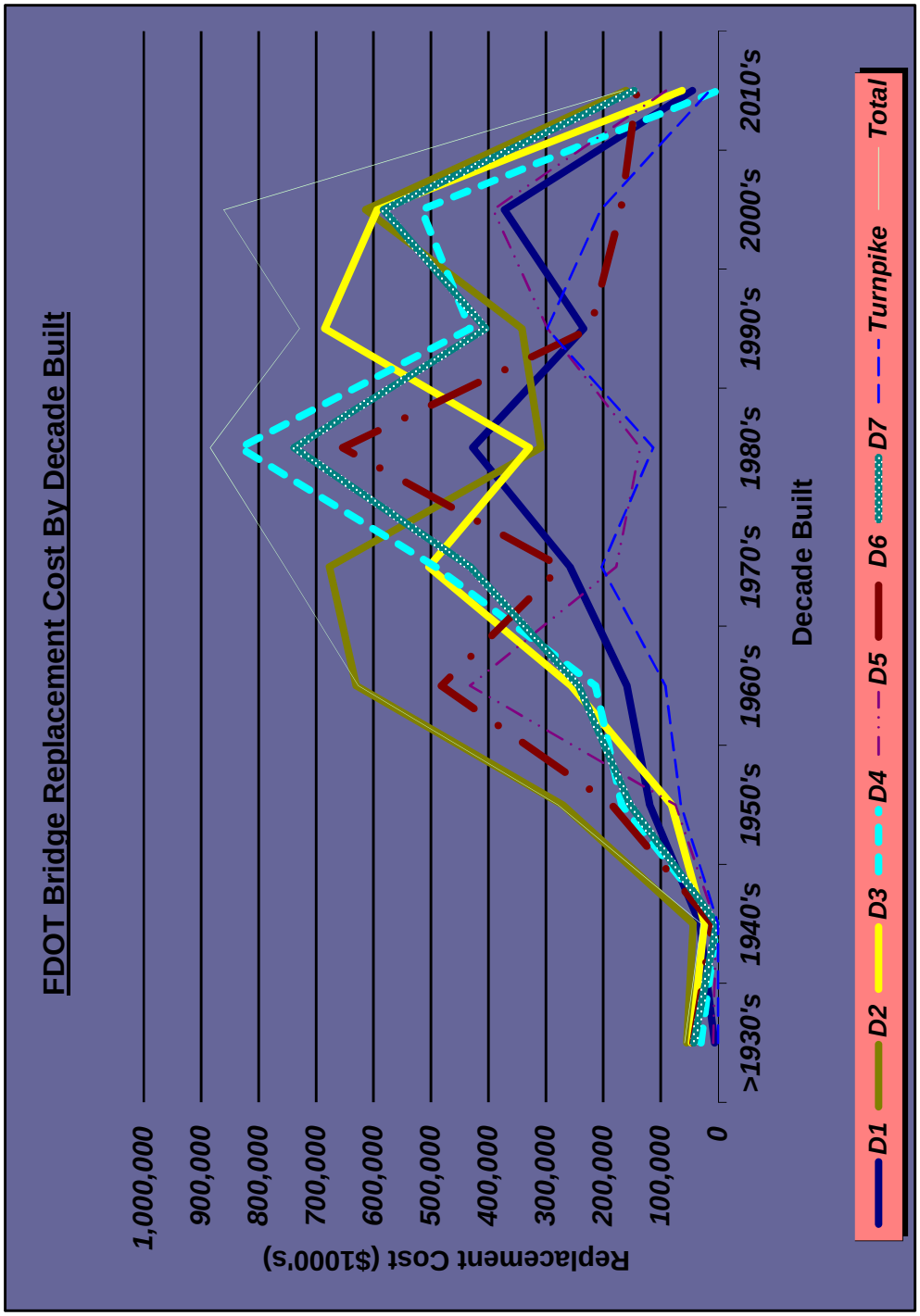
FDOT Bridge Replacement Cost By Decade Built
Replacement Cost ($1000's)
1,000,000
900,000
800,000
700,000
600,000
500,000
400,000
300,000
200,000
100,000
0
>1930's
1940's
1950's
1960's
1970's
1980's
1990's
2000's
2010's
Decade Built
D1
D2
D3
D4
D5
D6
D7
Turnpike
Total

Figure 46

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	9,773,936	3,249,314	1,242,747	373,579
2	17,062,418	8,474,455	2,054,794	994,347
3	17,483,250	3,337,718	2,142,844	407,340
4	10,253,075	9,983,673	1,588,483	1,179,941
5	8,015,665	5,273,131	994,375	584,963
6	10,358,141	6,459,753	1,444,386	736,260
7	13,293,872	8,452,968	1,715,631	1,002,309
Turnpike	3,548,252	5,328,469	389,933	586,056
Total	89,788,609	50,559,482	11,573,194	5,864,796

Table 16

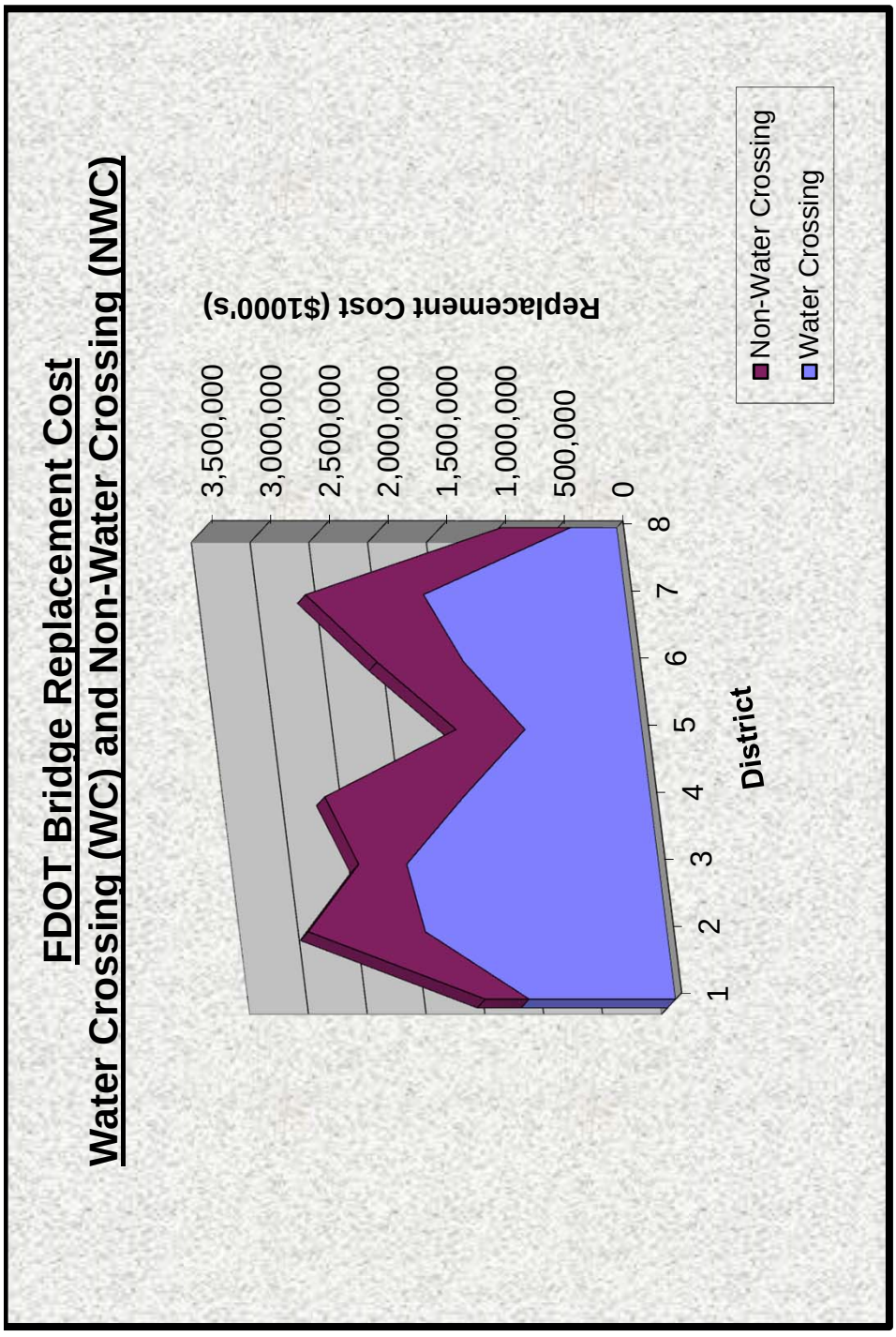
FDOT Bridge Replacement Cost
Water Crossing (WC) and Non-Water Crossing (NWC)
Replacement Cost ($1000's)
3,500,000
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
1
2
3
4
5
6
7
8
District
Non-Water Crossing
Water Crossing

Figure 47

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 12,225 bridges accounted for in Florida. The FDOT has maintenance responsibility for 6,814 of the bridges, or 55.74%. County governments maintain 3,878 bridges (31.72%), city and towns maintain 1,236 bridges (10.11%), with the remaining 297 bridges (2.43%) maintained by others. 15.33% of all bridges currently in service in Florida were constructed prior to 1960; 37.57% were constructed in the 1960's and 1970's, while the remaining 47.10% 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 (37.57% of the inventory) of bridges built during the 1960's and 1970's.

Comments on this report should be directed to:

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