

## Session 20

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### *Structurally Deficient & Functionally Obsolete Bridges*

#### **Topic Description**

The designation of a bridge as structurally deficient or functionally obsolete has impact on decisions for bridge maintenance, rehabilitation or replacement. The actual criteria for this determination is set by the FHWA and is not widely understood. This presentation will provide information on this topic.

#### **Speaker Biography**

BSCE Lehigh University 1980  
Professional Engineer PA and FL  
26 years experience.  
16 years with FDOT.  
Experienced in Bridge Design, Inspection, Maintenance and Management.



## Structurally Deficient and Functionally Obsolete Bridges

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## Background

- Federal definition
- FHWA uses in conjunction with sufficiency rating
- Determines allocation for federal bridge replacement funds
- Determines eligibility for use of federal bridge replacement funds



## Background Continued

- Department Executive Board Use
  - Program State Owned Structurally Deficient and Posted Bridges for repair or replacement within 6 years
  - Only Structurally Deficient Bridges are replaced on the local system



## Structurally Deficient Definition

- Deck, Superstructure, Substructure and/or Culvert rated 4 or less (poor or worse condition)
- Structural Condition or Waterway Adequacy Rated 2 or less
  - Very Low Load Rating and Bridge needs replacement
  - Frequently Floods causing traffic delays



## Structurally Deficient Bridges

DISTRICT	STATE	LOCAL
1	4	16
2	7	77
3	10	78
4	11	31
5	10	13
6	7	22
7	8	11
8	2	0
TOTAL	59	238



## Structurally Deficient Bridge



Deteriorated Substructure



## Functionally Obsolete Definition

- Deck Geometry rated 3 or Less – Bridge is too narrow.  
Examples:
  - a 2 lane 2 way bridge with ADT > 5000 narrower than 32'-1"
  - An interstate 2 lane bridge narrower than 34'-1"
  - A non interstate 2 lane 1 way bridge narrower than 29'-10"
- Underclearance rated 3 or Less – Example a bridge over an Interstate Route with a clearance of less than 15 feet





## Not High Enough

- Vertical Underclearance provided = 15' – 2"
- Local Road Bridge would be functionally obsolete if the vertical underclearance was less than 14' – 0"



## Functionally Obsolete Continued

- Approach Roadway Alignment rated 3 or Less – Crossing the bridge requires a major speed reduction due to horizontal or vertical curvature of the roadway at the bridge
- Very Low Load Rating and Bridge needs repair
- Occasional Floods causing traffic delays



## Functionally Obsolete Bridges

DISTRICT	STATE	LOCAL
1	105	272
2	155	76
3	49	176
4	77	195
5	126	114
6	158	114
7	109	126
8	53	0
TOTAL	832	1077



## Functionally Obsolete Bridge



4 Feet Too Narrow



## Caveats

- Bridges that qualify as both structurally deficient and functionally obsolete are categorized as structurally deficient
- Bridges built or reconstructed within the last 10 years are not counted by FHWA as structurally deficient or functionally obsolete – 10 year rule



## Sufficiency Rating

- FHWA Formula
- 0 to 100 scale (100 Best)
- Structural Adequacy and Safety 55 %
- Serviceability 30 %
- Essentiality for Public Use 15 %
- Special Reductions (up to 13 %)



## FHWA Uses

- If a Bridge is Structurally Deficient or Functionally Obsolete with a Sufficiency Rating of less than 50 it qualifies for replacement using federal bridge funds



## FHWA Uses Continued

- FHWA Defines Florida's Bridge Need as the sum of:
  - The total deck area of bridges qualifying for replacement times Florida's average unit cost for bridge construction
  - The total deck area of bridges qualifying for rehabilitation times Florida's average unit cost for bridge construction times one half
  - Bridges that have been built or rehabilitated within the past 10 years are not considered



## FHWA Uses Continued

- Florida's 2004 unit cost is \$102/SF
- 2004 Costs ranged from \$47/SF in Oklahoma to \$331/SF in Connecticut



## FHWA Uses Continued

- Florida's Federal Bridge Funds are determined by:
- Total Federal Money Allocated for Bridge Replacement times Florida's need divided by the total national need
- Florida's annual federal bridge allocation is approximately 100 million dollars



## Deficient Bridges

- FHWA defines a deficient bridge as a bridge that is functionally obsolete or structurally deficient
- The Department defines a deficient bridge as a bridge needing replacement or repair according to the Deficient Bridge List (DBL)



# Questions