BRIDGE MANAGEMENT

Bridge Management

- History
- Roles & Responsibilities
- Bridge Management Staff
- DelDOT Bridge Inventory
- Corrugated Metal Pipe Culvert Bridges
- HDPE Pipe Solution

Bridge Management
History - Nationwide

- 1967: Silver Bridge Collapse
- 1971: National Bridge Inspection Standards (NBIS)
- Early 1970's: Delaware creates Bridge Inspection & Management Program
- 1979: NBIS updated to include culverts due to tragic failures
- 1983: Mianus River Bridge Failure (Fracture Critical Bridge)
- 1987: Scholarie Creek Bridge Failure (result of scour)
- 2007: Minnesota's I-35 Bridge Collapse

Bridge Management
Roles & Responsibilities

- Perform Bridge Safety Inspections
- Perform Load Rating Analyses
- Manage Bridge Maintenance Work
- Process Overweight/Superload Permits
- Create yearly Bridge Deficiency List
- Other Structures: Dams, Overhead Sign & High Mast Lighting Structures

Bridge Management

Bridge Management Staff

In-House Staff

- 6 Full-time Bridge Inspectors (3 teams)
- 1 PMI – oversees Bridge Inspection Program
- 2 Full-time Load Raters (also process permits)
- 1 employee dedicated to Bridge Maintenance

Consultant Staff

- 1 Underwater Bridge Inspection Consultant
- 1 Routine Bridge Inspection Consultant
- 1 Overhead Sign Structure Inspection Consultant

Bridge Management

DelDOT Bridge Inventory

Covered Bridge

Timber Beam

Bridge Management

DelDOT Bridge Inventory

R/C DECK ARCH

R/C FILLED ARCH

Bridge Management

DelDOT Bridge Inventory

Rising Sun Bridge

Chambers Rock Road

Bridge Management

DelDOT Bridge Inventory

SR273 Over I95

Newport Viaduct

Bridge Management

DelDOT Bridge Inventory

TYLER MCCONNEL BRIDGE

BASCULE BRIDGE

Bridge Management

DelDOT Bridge Inventory

ROLLING LIFT BRIDGE

SWING BRIDGE

Bridge Management

DelDOT Bridge Inventory

P/S CONCRETE BOX BEAM

P/S CONCRETE I-BEAM

Bridge Management

DelDOT Bridge Inventory

R/C BOX CULVERT

R/C PIPE CULVERT

Bridge Management

DelDOT Bridge Inventory

CMP CULVERT

HDPE PIPE CULVERT

Bridge Management

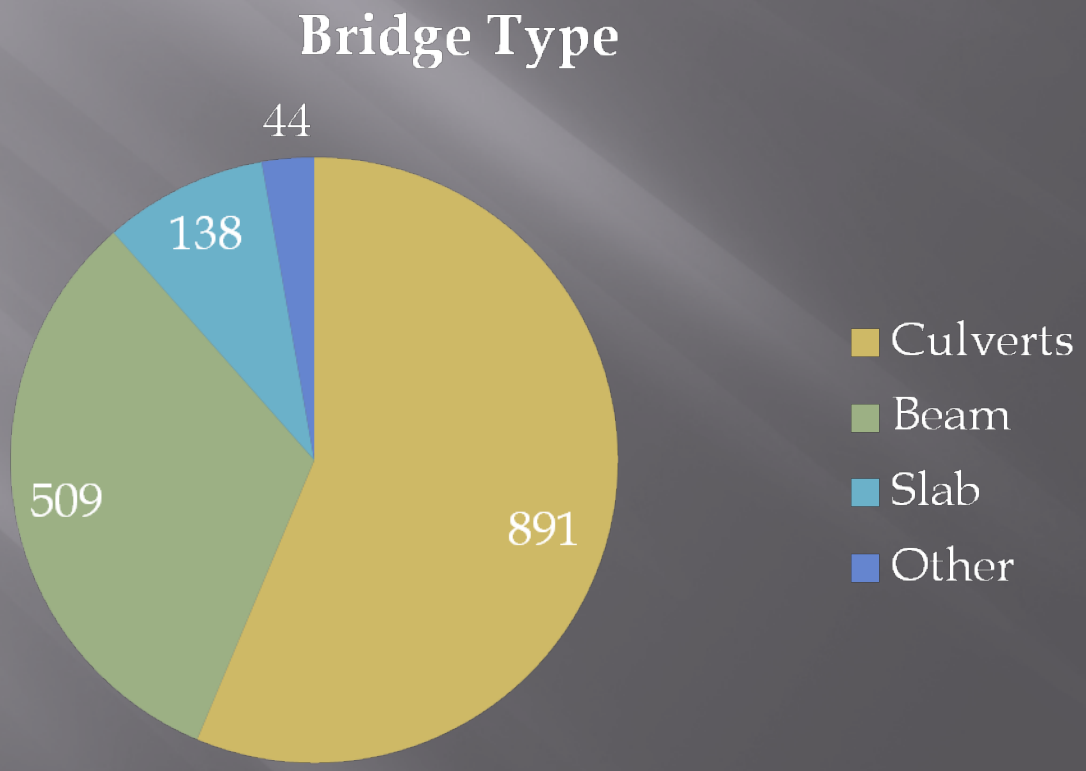
DelDOT Bridge Inventory

Indian River Inlet Bridge

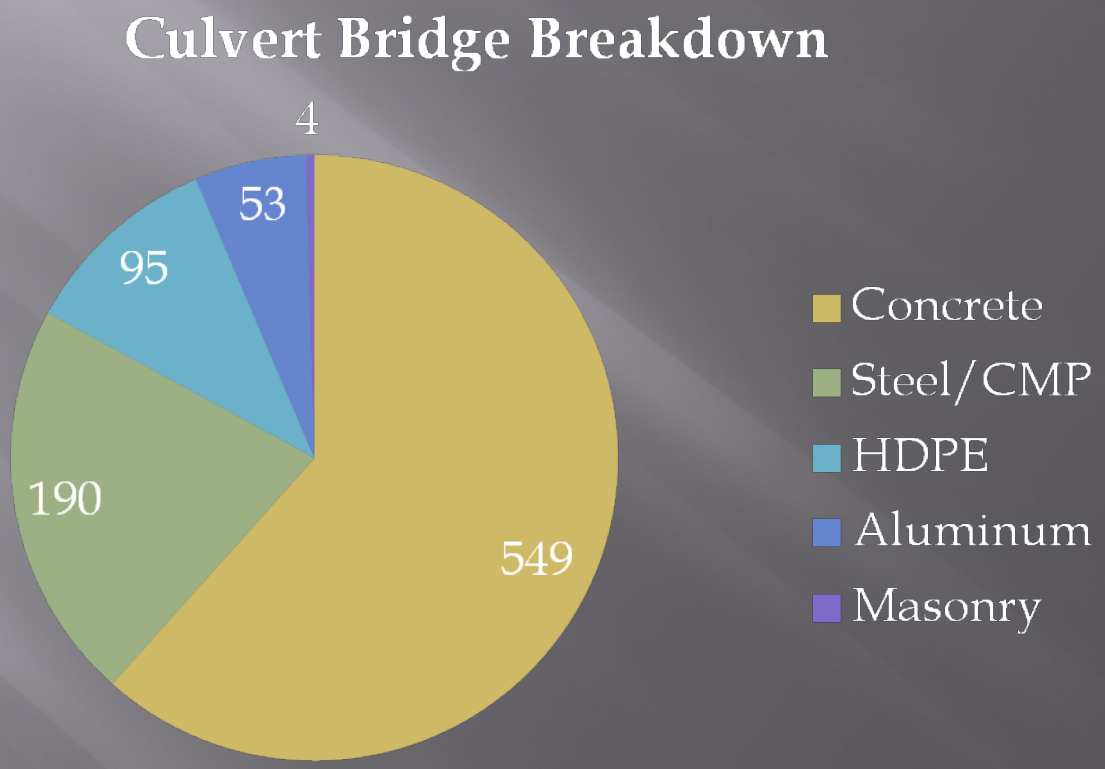
Bridge Management

DelDOT Bridge Inventory

Currently have 1,582 bridges in our inventory and culvert account for ~56% of our bridge inventory



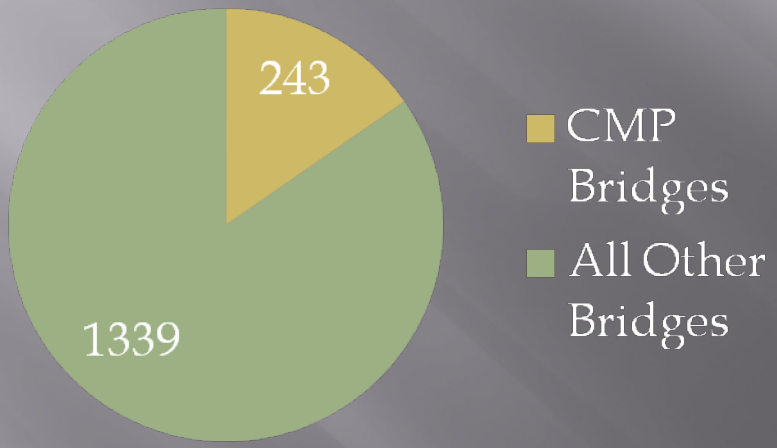
Bridge Management
DelDOT Bridge Inventory



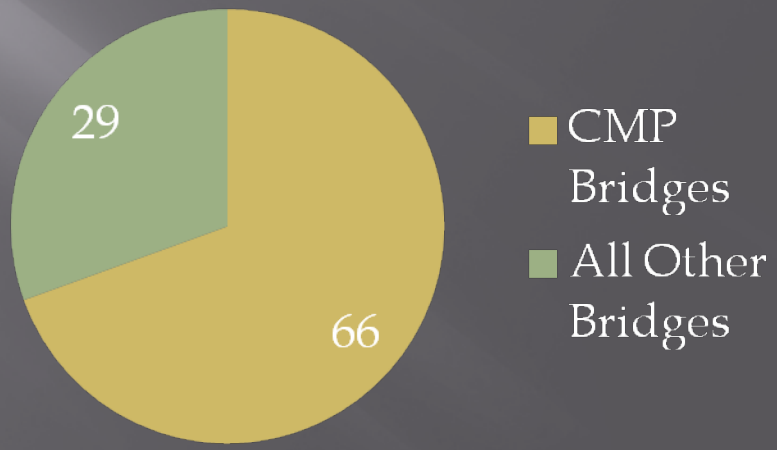
Bridge Management

DelDOT CMP Bridge Inventory

CMP Inventory Comparison



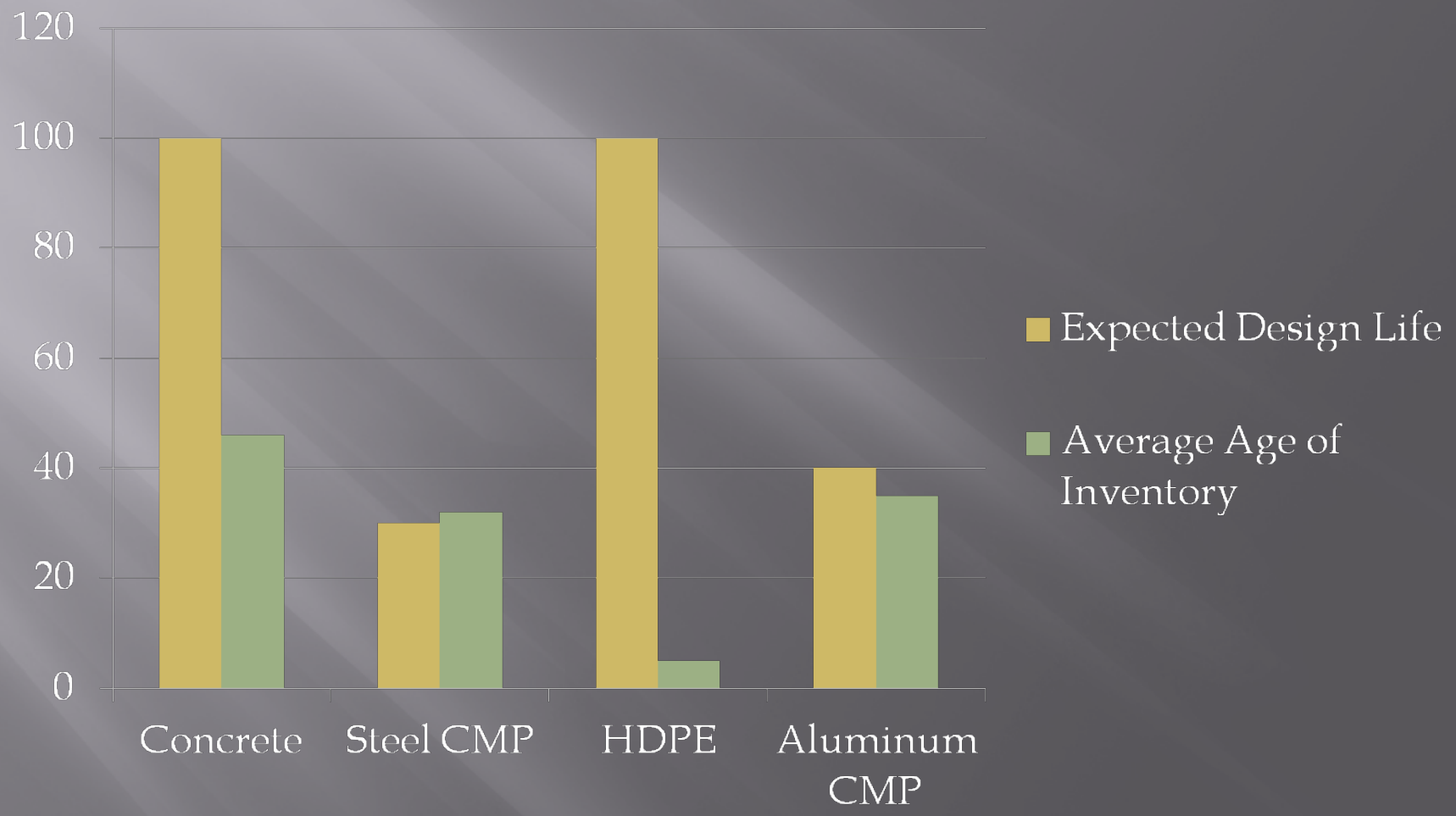
Structurally Deficient CMP Bridge Comparison



CMP bridges account for ~16% of our entire bridge inventory, but they account for ~70% of the number of Structurally Deficient bridges in our inventory

Bridge Management

DelDOT CMP Bridge Inventory



Bridge Management

Recent CMP Failure Examples

October of 2009: Old Furnace Road, Bridge 3-240

Bridge Management

Recent CMP Failure Examples

January of 2010: Lion Hope Road, 2-143A

Bridge Management

Dealing with our CMP Inventory

Modified inspection procedures for CMP bridges

- Increased inspection frequencies correlating to condition.

- Modified inspection and prioritization procedures to identify deficient CMP bridges earlier to allow adequate time for design & construction reducing the need to post or close a bridge.

Bridge Management

Dealing with our CMP Inventory

Getting the CMP's replaced

- Meet quarterly with Bridge Design to address and initiate CMP bridge replacement projects
- Bridge Design has been initiating separate Kent & Sussex Pipe Replacement Projects on a yearly basis
- District forces replace deteriorated CMP bridges with HDPE pipe. To date, 90+ bridges have been replaced.

Bridge Management
Dealing with our CMP Inventory

Summary

- The majority of our CMP inventory has surpassed the 30 year design life.
- Almost 70% of our Structurally Deficient Bridge inventory consist of CMP culvert bridges.
- These structures result in a significant number of bridge load posting restrictions and road closures impacting the traveling public.
- A large number of these structures do not qualify for Federal funding, therefore, state only funding is needed.

Bridge Management

HDPE Pipe Installation Issues

Benefits of utilizing HDPE to Replace CMP

- Lightweight – easy to haul and handle
- Over 3x the design life compared to that of CMP's
- Cost of material is comparable to that of CMP's
- Comes in 20' sections – resulting in less joints
- Better hydraulic capacities over CMP's
- However…

Bridge Management

HDPE Pipe Installation Issues

- **Pipe Spacing (multiple runs of pipe)**

  Manufacturer Typically Recommends (D/2)

- **Deflection**

  DelDOT Spec. restricts deflections to <5%.

  Good subgrade and compaction are important in achieving this requirement.

- **Flotation of Pipe Ends**

  Can be addressed with use of full-length pipe section at ends and/or constructing sacked riprap walls at pipe ends.

Bridge Management

HDPE Pipe Installation Issues

Pipe Spacing Issues

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HDPE Pipe Installation Issues

Deflection Issues

Bridge Management

HDPE Pipe Installation Issues

Deflection Issues

Bridge Management

HDPE Pipe Installation Issues

Flotation

Bridge Management

HDPE Pipe Installation Issues

Flotation Issue

Bridge Management

HDPE Pipe Installation Issues

Flotation Issues

Bridge Management
HDPE Pipe Installation Issues

Summary

- District Forces utilizing HDPE pipe for replacing CMP bridges has been, and will continue to be, instrumental in reducing replacement cost, time and the number of Structurally Deficient bridges.
- Improper pipe spacing, in-adequate compaction, excessive deflections and damaged caused by flotation can reduce the serviceability and life of the pipe.
- We want to get as much out of that 100 year Expected Design Life as possible.