Transportation Resilience & Sustainability

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DelDOT Mission
Excellence in Transportation

• Every Trip • Every Mode • Every Dollar • Everyone

Our Vision

• Every Trip -
  We strive to make every trip taken in Delaware safe, reliable and convenient for people and commerce.

• Every Mode -
  We provide safe choices for travelers in Delaware to access roads, rails, buses, airways, waterways, bike trails, and walking paths.

• Every Dollar -
  We seek the best value for every dollar spent for the benefit of all.

• Everyone -
  We engage our customers and employees with respect and courtesy as we deliver our services.
Transportation Resilience & Sustainability
~ Newly created division - Established summer 2021~

Mission:

To provide the citizens of Delaware the most resilient and sustainable transportation infrastructure through effective project planning, design, construction, and maintenance along with incorporation of innovative solutions such as alternative energy and electrification of our infrastructure to address the challenges associated with climate change.
Transportation Resilience & Sustainability

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Goals:

• To centralize our efforts to improve the resiliency of our transportation network and focus on sustainability.

• To examine the impacts climate change and sea-level rise are having on transportation infrastructure, incorporating resiliency and sustainability measures in the planning, design, construction and maintenance of our projects.

• To implement the electronification of our infrastructure and fleet; incorporating the use of alternative energy, such as solar; and minimizing the environmental impacts cause by our transportation system.
Transportation Resiliency & Sustainability

- Items of DOT interest:
  - Integrate and include social and transportation equity in all decision making associated with transit opportunities
  - Zero-emission transportation
  - Alternative energy (solar in the ROW)
  - Green infrastructure
    - Wetland sites
    - Pollinator sites
    - Living shorelines
  - Infrastructure flooding challenges
Roadway Flooding Challenges

- Due to the low-lying topography of the state, creating resilient infrastructure in the face of roadway flooding becomes a challenge. DelDOT has been and continues to be challenged by the effects of seal level rise and frequently flooded roadways.
Roadway Flooding Challenges

- More and more concerns/inquiries
- Some storm-related, some not ("sunny day flooding")
- Caused by low-lying nature of the state
- Additional factors include:
  - Tide cycles
  - Wind speed/direction
  - Sea level rise
  - Land use
Strategic Thinking

- No “one size fits all” solution
- Careful considerations – data, operations, investment, etc.
- More future strategies/future case studies – innovative solutions
- Stakeholder input **ensuring equity**
  - Public
  - Other governmental agencies
  - Non-governmental organizations
  - Subject matter experts
Possible Options

- Planning Study/Review
  - Tolerate
  - Relocation/Realignment (if possible)
  - Elevate
  - Harden
  - Abandon
  - Buy-outs
  - New, other innovative solutions?
Possible Options (cont.)

- **Tolerate**
  - Long-Term Maintenance
    - Pre-staged barricade/signs/gates
    - Monitoring of water elevations
  - Notification
    - Electronic messaging (texts, apps, Facebook, Twitter)
    - Dynamic message boards
    - Virtual message boards
Possible Options (cont.)

- Relocation/Realignment (if possible)
  - Engineering review
  - Right of Way impacts
  - Utility coordination/relocation
  - Detour route
    - ADT
    - Emergency response time
    - Convenience
Possible Options (cont.)

• Elevate
  ▪ Pavement Overlay
    □ Settlement (total and time rate)
    □ Address drop-offs
    □ Adjust guardrail
    □ Ensure appropriate drainage
    □ Address right of way, utilities, wetlands impact
  ▪ Structure
    □ Statement of need
    □ Engineering analysis
    □ (Benefit) Cost analysis
Example – Elevation of SR 54

SR 54 East of Fenwick
Example – Elevation of SR 54

SR 54 East of Fenwick
Example – Elevation of SR 54

• Solution
  ▪ Construct viaduct over low marshy areas to raise road above flooding elevation
  ▪ Could not simply raise roadway using fill because of adjacent wetland impacts
  ▪ Viaduct consists of two separate structures, total of 2400’ long and cost $16M in 2001
  ▪ Elevating the roadway is not cheap
Example – Elevation of SR 54

Rendering of SR 54 Viaduct
Example – Elevation of SR 54

Elevation View of SR 54 Viaduct From old SR 54 Alignment
Prime Hook Road
Prime Hook Road
Possible Options (cont.)

- Harden
  - Statement of need
    - Cost analysis
    - Site conditions
  - Engineering analysis
    - Green infrastructure
      - Living shorelines
      - Stream restoration
      - Floodplain/wetland creation
    - Gray infrastructure
Example – IRIB Approach Hardening

Looking north down the center of SR 1 after Hurricane Sandy
Example – IRIB Approach Hardening

Erosion of the approach embankments to SR 1
Example – IRIB Approach Hardening

• Solution
  ▪ Construct sheet pile seawall so that we don’t lose SR 1 in the event of storm events
  ▪ Wall was 800’ long and had 65 tie backs
  ▪ The work was added to the Indian River Inlet Bridge approach roadway project and cost $1.4M
  ▪ Hardening the roadway is not cheap
Example – IRIB Approach Hardening

Construction of Sheet Pile Sea Wall
Example – IRIB Approach Hardening

Final Product
Possible Options (cont.)

• Abandon
  ▪ Engineering analysis
    □ Safety (emergency response)
    □ Alternate route lengths
    □ Road user costs
    □ Induced congestion
  ▪ Cost/benefit analysis
  ▪ Emergency services accessibility review
Example – Abandon Old Corbitt Road?
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- Abandon or elevate?
- Proposed bridge solution was a 5 span, 250’ long concrete structure and was estimated to cost $2.5M.
- Is this the best way to spend our limited State resources?
Abandon

• 340 ADT is the result of the automatic traffic recorder counts
• Overtops daily (2x/day) due to tide cycles
• Travel time increased by approximately 2 to 3 ½ minutes
Example – Abandon Old Corbitt Road?

Mother Nature won … We closed the road permanently.
New Options/Innovation

- South Bowers Road
  - Small, local, one-way-in-one-way out beach community road
  - Roadway overtopping
  - Encroaching wetlands along roadway; limited area
  - Build on existing roadway footprint
  - How much to elevate?
South Bowers Road – Possible Pavement Section
Summary

✓ DelDOT has been and continues to be challenged by the affects of SLR (conditions are becoming more frequent and critical)

✓ DelDOT currently makes decisions about SLR on a case-by-case basis (developing a flooding matrix options tool)

✓ DelDOT needs to develop policies on how we will spend our capital to protect and maintain assets affected by SLR (asset management/risk assessments through TAMP)

✓ DelDOT’s policies need to line up with Statewide policies for all agencies (working in conjunction//cooperation with other key stakeholders)

✓ State government needs political support for policies as we move forward
Thank you for your time and attention