Surface Transportation Resiliency Planning in Hillsborough County, FL

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Hillsborough County, Florida

- 158 miles of coastline
- 4th Largest Population in Florida (1.3 Million)
- 25% of the population inside the FEMA floodplain
- Economic Hub of Tampa Bay Metropolitan Region
- Largest seaport in Florida
- Major cruise homeport
- Home to US Central Command & Special Operations Command Center
- Tampa General Hospital – Regional Burn Center
Surface Transportation Assets

- 800 Freeways & Toll Road Lane Miles
- 3,300 Arterial & Collector Lane Miles
- 3 Major Bridges Across Tampa Bay /Evacuation Routes
- Tampa International Airport
- Container, Bulk Cargo & Cruise Ship Terminals
- 9 Transit Centers & 243 Vehicle Fleet
- Heritage Streetcar System
- Class I Rail Lines & Intermodal Yard
Project Inspiration

• Tampa dubbed “most vulnerable & overdue” city for a direct hurricane hit. –Weather Channel Meteorologist Survey

• No direct hit in over 90 Years

• Recent Flooding – 2012 Tropical Storm Debby (20”)

• Updating Long Range Transportation Plan to 2040
Vulnerability Assessment Framework

**2010-2011 Pilots**
- San Francisco Bay-MTC
- New Jersey DOT/TPA
- Virginia DOT
- Washington State DOT
- Oahu MPO

**2013-2015 Pilots**
- 19 Pilots around the country including:
  - Hillsborough County MPO
  - Broward County MPO

http://www.fhwa.dot.gov/environment/climate_change/adaptation/adaptation_framework/
Evaluation Process

Data Collection
- SLR-USGS
- Storm Surge - SLOSH
- Flooding (FEMA)

Analysis
- Mapping (ArcGIS)
- Modeling (TBRPM)

Seek feedback
- LMS Group
- Emergency Mgt.
- FDOT
- Port Tampa Bay
- Aviation Authority

Economic Analysis
- Econometric Modeling-REMI (delay & duration: lost GRP, income, work hrs.)

Evaluation Process
Local Mitigation Strategy Working Group - Selection of Assets
Pre & Post Disaster Planning

- **Post-Disaster Redevelopment Plan**
  - Required of coastal counties & municipalities
  - Addresses long-term redevelopment & recovery

- **Local Mitigation Strategy (LMS)**
  - Addresses all potential hazards
  - Assesses areas vulnerable to various hazards
  - Identifies actions to mitigate potential damage in the future
Assets Studied

- Memorial Highway (Segment)
- South 20th/22nd (Segment)
- Selmon Expressway (Ramps)
- Gandy Boulevard (Segment)
- Courtney Campbell Causeway (Segment)
- I-75 over Alafia River (Bridge)
Memorial Highway Project

- Cost Feasibility based on FDOT Strategic Intermodal System (SIS) 2040 Plan:
  - Part of SR 60/I-275 interchange reconstruction
  - $193 M cost (in YOE)
- Vulnerable area: 0.6 – 1.1 mi. based on Cat 1-Cat 3 storm surge
- Replacement cost: $100 M +
- Protection cost: $4.2 M
- Potential to incorporate into SIS project

Inundation with Cat 3 Surge

Memorial Highway – 158,000 ADT
The Cost-Feasible 2040 Plan
“Status Quo” Funding Scenario

**Preserve the System**
- Roads repaved every 50 years on average
- Aging bridges replaced on time, buses every 16 years

**Reduce Crashes & Vulnerability**
- Continue today’s programs: crashes drop 10%
- Low-lying major roads usable 8 weeks after a Cat. 3 storm

**Minimize Traffic for Drivers & Shippers**
- Intersections work 10% better
- Continue today’s truck “quick fix” program

**Real Choices when Not Driving**
- Add 140 miles of trails & sidepaths by 2040
- Frequent bus service for 16% of people & jobs,
frequent service (every ½-hour) for 45%

The Cost-Feasible 2040 Plan
“Status Quo” Funding Scenario

**Status Quo** Funding Scenario
- Level 2 ½
- Level 2
- Level 2
- Level 2
- Level 2
- Level 2
- Level 2
- Level 1
- Level 1
- Level 1
- Level 1
- Level 1
- Level 1
- Level 1
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- Level 1

planhillsborough.org
What can we get if we invest in 
Reduced Vulnerability

Based on illustrative Cat 3 storm occurring in next 20 years

Investment Level 1 – $988 M (current spending trend x 20 years, in YOE $)
- Routine drainage improvements
- Up to 8 weeks of road network disruption with sample Cat 3 storm
- Economic loss to Hillsborough County: $266 M

Investment Level 2 - $1,025 M (in YOE $)
- Interstates only: drainage improvements, shoreline armoring & wave attenuation
- Up to 6 weeks of road network disruption with sample Cat 3 storm
- Economic loss to Hillsborough County: $153 M or 42% less
- $31 M investment results in $113 M benefit

Investment Level 3 – $1,159 M (in YOE $)
- Interstates & arterials: drainage improvements, shoreline armoring & wave attenuation
- 3 weeks of road network disruption with sample Cat 3 storm
- Economic loss to Hillsborough County: $119 M or 55% less
- $112 M investment results in $147 M benefit

Estimated avoided losses are based on making highway segments
less vulnerable to storm & flood damage
**Investment Level Benefits and Costs**

<table>
<thead>
<tr>
<th>Investment Level</th>
<th>Benefits and Costs</th>
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</thead>
<tbody>
<tr>
<td><strong>$31 Million per year</strong></td>
<td>Continue today's stormwater drainage improvement programs</td>
</tr>
<tr>
<td><strong>Scenario 1</strong></td>
<td>Category 3 storm impacts:</td>
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<tr>
<td></td>
<td>- 8 weeks major roads may be unusable</td>
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<tr>
<td></td>
<td>- $266 million economic loss</td>
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</tbody>
</table>

| **$39 Million per year** | Continue today's stormwater drainage, plus: |
| | raise road profiles, enhance base, protect shorelines from wave damage |
| **Scenario 8b** | Category 3 storm impacts: |
| | - 3 weeks major roads may be unusable |
| | - $119 million economic loss (cut in half!) |

**Level 1**

**Level 3**

**Economic losses cut in half**
Pilot Project Follow-Up Study (2016)

- Gandy Boulevard critical segment in 2014 Vulnerability Assessment
- 1/3-mile segment connecting bridge to planned expressway
- $1.9M estimated for strategies
Inundation Profile – Gandy Blvd (segment)

Note: Profile shown is that of the Florida Digital Elevation Model. Elevations of bridges and other manmade structures may not be accurately reflected.
Gandy Blvd – West End Segment
Gandy Blvd – East End Segment
Strategy Refinement for Implementation

• Refined strategies appropriate Selmon Elevated extension at Gandy Blvd.

• Developed conceptual designs & specific pre-engineering cost estimates
  • Within limit of $1.9M budget
  • Assume strategy mainstreaming as part of a project

• Offer low-risk, high benefit solutions to incorporate into elevated expressway extension PD&E proposal.
Adaptation Strategies - Drainage

• Permeable Pavement
  • Applicable for low speed and low volume roads

• Enhanced Drainage
  • Gandy Blvd existing constraints
  • Areawide watershed study
Adaptation Strategies – Harden Road

• Harden surface or base layers
  • Avoid potential washouts
• Full depth concrete
• New materials and concepts
  • Research underway
Adaptation Strategies – Raise Profile

- Gandy Blvd bridge has low elevation
  - Bridge has longer life than road
  - Eastbound/westbound different elevations

- Several options:
  - Raise Gandy Blvd to match lowest elevation
  - Consider raising one side only
  - Consider raising as companion (or after) bridge project
Adaptation Strategies – Erosion Control

• Wave Attenuation Device
  • Consider in longer term; Protection from Tampa Bay
• Living Shoreline
  • Consider in longer term; Environmental coordination
• Rivetments – Riprap or Vegetation
  • Recommend vegetation (specialty grasses or shrubs)
• Pier / Column Protection
  • Recommend vegetation (specialty grasses or shrubs)
  • Hardened solutions (e.g., concrete, double-wall construction)
## Adaptation Options

<table>
<thead>
<tr>
<th>Treatment</th>
<th>Cost Differential</th>
<th>Level of Risk</th>
</tr>
</thead>
<tbody>
<tr>
<td>Do nothing</td>
<td>None initially. Reconstruction cost is $3,312,000</td>
<td>Highest Risk. Required if roadway is destroyed.</td>
</tr>
<tr>
<td>Upgrade to full-depth concrete pavement</td>
<td>$676,000</td>
<td>Medium Risk. Road damage possible if inundation occurs.</td>
</tr>
<tr>
<td>Raise Profile</td>
<td>$1,119,000</td>
<td>Low Risk. Inundation from storm surge, rain or tide related flooding.</td>
</tr>
<tr>
<td>Erosion control via vegetation</td>
<td>$104,544</td>
<td>Low Risk. Embankment damage or washout if inundation occurs.</td>
</tr>
<tr>
<td>Pier protection via vegetation</td>
<td>$30 per pier (total depends on design)</td>
<td>Low Risk. Pier scour or damage possible if surge occurs.</td>
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Hillsborough governments building sea-level rise into development plans

The Tampa Tribune

Wednesday, Aug 26, 2015

By Christopher O'Donnell
Tribune staff
Published: March 26, 2015

Times editorial
Rising sea levels require unified effort

For a story that could be great, Hillsborough County is a lucky place to live. The county is fortunate to be blessed with an extraordinary combination of qualities: a beautiful natural environment, a strong economy, and a vibrant community. But it is also a place that faces significant challenges, including rising sea levels and the threat of climate change.

The county has taken steps to address these challenges, including the development of a comprehensive sea-level rise plan. This plan, which was adopted in 2013, outlines strategies to prepare for the impacts of rising sea levels, including the construction of sea walls, the implementation of flood control measures, and the development of new green spaces.

The county has also taken steps to reduce its carbon footprint, including the implementation of energy-efficient practices and the use of renewable energy sources. These efforts are critical to helping the county meet its goals of reducing greenhouse gas emissions and promoting sustainable development.

Despite these efforts, however, there is still much work to be done. Rising sea levels are a serious threat to the county's infrastructure and natural resources, and it is important that we continue to work together to address this challenge.

The county is fortunate to have leaders who are committed to addressing these challenges, and it is important that we continue to support their efforts. By working together, we can help ensure that Hillsborough County remains a vibrant and thriving community for generations to come.
Addressing Climate Issues Regionally

Tampa Bay Climate Science Advisory Panel (CSAP)
Unified Projection of Sea-Level Rise in Tampa Bay Region

TBRPC ONE BAY Resilient Communities

- Pinellas County Climate Team
- Hillsborough County EPC Workgroup
- Manatee County Green Team
- Pasco County
Local Comprehensive Plans

**TA CM Policy 1.3.7:** Develop strategies to identify and address issues related to climate adaptation in cooperation with the EPC, the Planning Commission, and other agencies.

**TT LU Policy 1.4.3:** The City shall develop strategies to identify and address issues related to climate adaptation in cooperation with the EPC, the Planning Commission, and other agencies.

**PC LU Policy 6.1.4:** Develop strategies to identify and address issues related to climate adaptation in cooperation with EPC, the Planning Commission and other agencies.
• Continue work in 2045 LRTP update
• Coordinate with local jurisdictions on mainstreaming adaption options for projects.
• More work to be done...
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