



Michigan Division Office



***FHWA Update***  
***2017 Michigan Bridge Conference***  
***March 22, 2017***

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# Presentation Outline

Michigan Division Office

- ***National Bridge Inspection Program (NBIP) Review***
- ***Every Day Counts (EDC-4) Innovations***
  - Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE)
  - Ultra-High Performance Concrete Connections for PBES
- ***National Tunnel Inspection Standards***
  - National Tunnel Inspection Program
- ***Tunnel Factoids***
- ***National Performance Management Measures for Assessing Bridge Condition***
  - Performance Management Measures
  - Minimum Level for Condition for Bridges





# NBIP Review

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## *2017 Performance Year Accomplishments*

- MDOTs Quality Assurance Program has improved the consistency, completeness and quality of inspections across all agencies.
- All underwater/fracture critical bridge inspections were completed within their required intervals.
- Load Ratings will be completed for all bridges by the end of the 2017 performance year.
- Bridges were posted/restricted when conditions warrant.
- Critical findings were addressed and documented according to established procedures.



# NBIP Review

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## *2017 Performance Year Deficiencies*

- Not all local agency routine bridge inspections were completed within their required interval.
- Not all Local agency bridges have fracture critical details and inspection procedures.
- Not all bridges have documented scour evaluations.
- Not all Team Leaders have the required recurrent training.

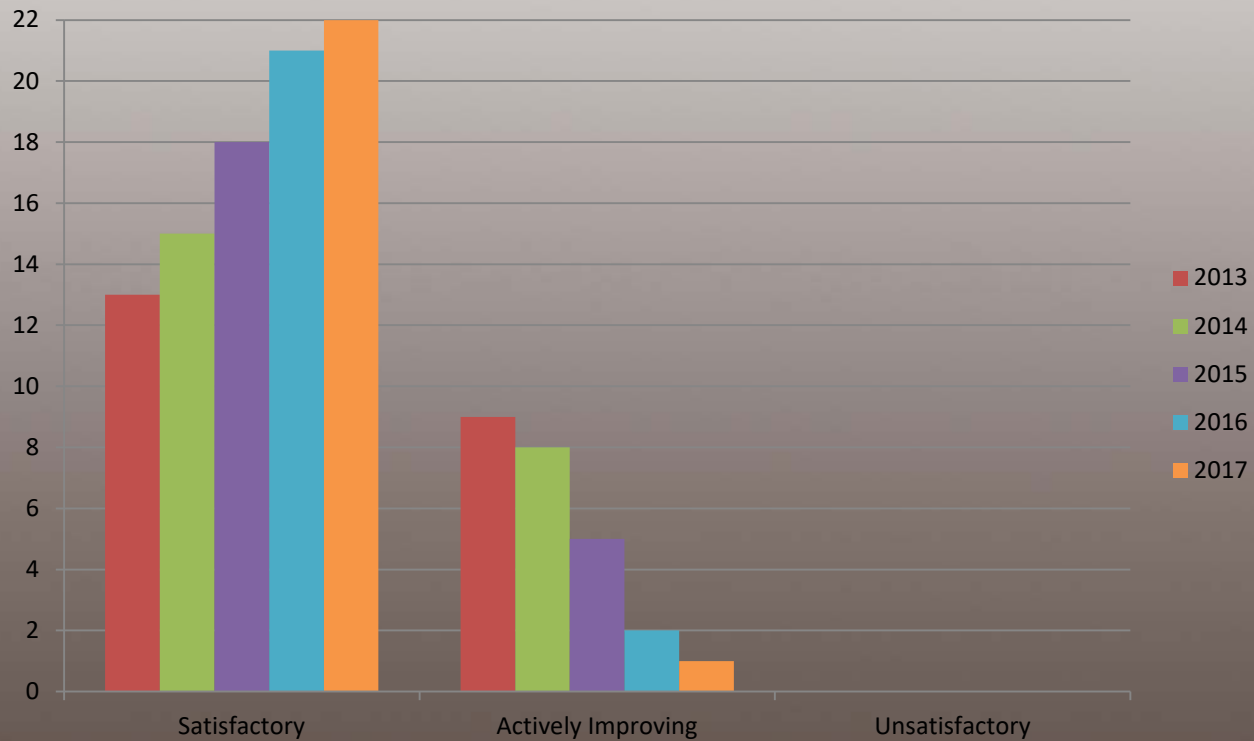


# NBIP Review

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## 5-Year Trend



# NBIP Review



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## Blueprint for the Next Five Years

| Metric | Description  | Year 1  | Year 2  | Year 3  | Year 4  | Year 5  |
|--------|--|---------|---------|---------|---------|---------|
|        |  | PY 2018 | PY 2019 | PY 2020 | PY 2021 | PY 2022 |
| 1      | Bridge Inspection Organization                               |         |         |         |         |         |
| 2      | Qualifications of Personnel -Program Manager                 |         |         |         |         |         |
| 3      | Qualifications of Personnel -Team Leader(s)                  |         |         |         |         |         |
| 4      | Qualifications of Personnel -Load Rating Engineer            |         |         |         |         |         |
| 5      | Qualifications of Personnel -UW Bridge Inspection diver      |         |         |         |         |         |
| 6      | Routine Inspection Frequency - Routine - Lower Risk Bridges  |         |         |         |         |         |
| 7      | Routine Inspection Frequency - Routine - Higher Risk Bridges |         |         |         |         |         |
| 8      | Inspection Frequency - Underwater - Lower Risk Bridges       |         |         |         |         |         |
| 9      | Inspection Frequency - Underwater - Higher Risk Bridges      |         |         |         |         |         |
| 10     | Inspection Frequency - Fracture Critical Member              |         |         |         |         |         |
| 11     | Inspection Frequency - Frequency Criteria                    |         |         |         |         |         |
| 12     | Inspection Procedures - Quality Inspections                  |         |         |         |         |         |
| 13     | Inspection Procedures - Load Rating                          |         |         |         |         |         |
| 14     | Inspection Procedures - Post or Restrict                     |         |         |         |         |         |
| 15     | Inspection Procedures - Bridge files                         |         |         |         |         |         |
| 16     | Inspection Procedures - Fracture Critical Members            |         |         |         |         |         |
| 17     | Inspection Procedures - Underwater                           |         |         |         |         |         |
| 18     | Inspection Procedures - Scour Critical Bridges               |         |         |         |         |         |
| 19     | Inspection Procedures - Complex Bridges                      |         |         |         |         |         |
| 20     | Inspection Procedures - QC/QA                                |         |         |         |         |         |
| 21     | Inspection Procedures - Critical Findings                    |         |         |         |         |         |
| 22     | Inventory - Prepare and Maintain                             |         |         |         |         |         |
| 23     | Inventory - Timely Updating of Data                          |         |         |         |         |         |

| Legend                  |  |
|-------------------------|--|
| Minimum Assessment      |  |
| Intermediate Assessment |  |
| In-Depth Assessment     |  |



# Every Day Counts (EDC-4) Innovations

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## Every Day Counts (EDC-4)



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# Every Day Counts (EDC-4) Innovations

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- Automated Traffic Signal Performance Measures (ATSPMs)
- Collaborative Hydraulics: Advancing to the Next Generation of Engineering (CHANGE)
- Community Connections
- Data-Driven Safety Analysis (DDSA)
- e-Construction and Partnering: A Vision for the Future
- Integrating NEPA and Permitting
- Pavement Preservation (When, Where, and How)
- Road Weather Management – Weather-Savvy Roads
- Safe Transportation for Every Pedestrian (STEP)
- Ultra-High Performance Concrete Connections for PBES
- Using Data to Improve Traffic Incident Management



# Every Day Counts (EDC-4) Innovations

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## ***Benefits of CHANGE***

- ***Improved Quality and Resiliency.***
  - Better representations provide planning and design teams with better data, leading to safer highway infrastructure and improved project quality.
- ***Enhanced Collaboration***
  - 3D graphical visualizations derived from 2D modeling offer better tools for communicating the often complex interaction between waterways, the transportation infrastructure, and the surrounding environment
- ***Streamlined Delivery.***
  - Improved collaboration through 2D and 3D visualizations offers real potential for reducing environmental, regulatory, engineering and other impediments to project delivery.



# Every Day Counts (EDC-4) Innovations



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# Every Day Counts (EDC-4) Innovations

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## *Benefits of UHPC For PBES Connections*

- ***Performance***
  - Improved Durability
    - Low Permeability
    - High Freeze-Thaw Resistance
    - High Abrasion Resistance
- ***Simplify Design/Construction***
  - Stronger/Less Congested Joints
  - Self Consolidating



# National Tunnel Inspection Standards

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## Tunnels

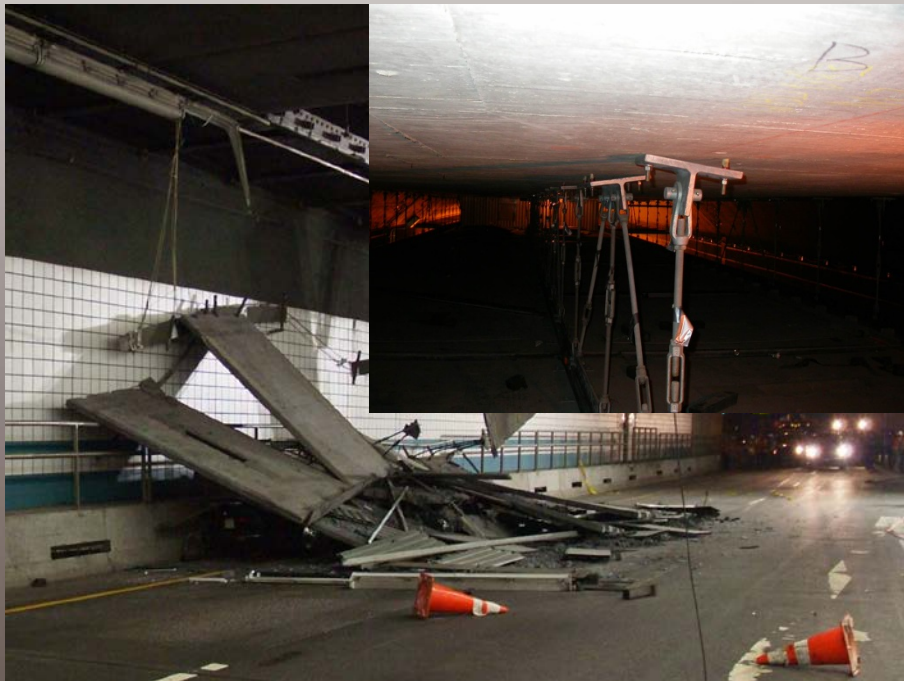


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# National Tunnel Inspection Standards

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## *Impetus for the NTIS*



### *Big Dig Ceiling Collapse*

- I-90 Connector Tunnel (Boston)
- Adhesive Anchor Failure
- One Fatality/One Injury





# Confined Spaces - Limited Access

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# National Tunnel Inspection Standards

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## *Implementation Timeline*

- Big Dig Ceiling Collapse: 07/10/2006
- NTSB Recommendations Adopted: 07/10/2007
- Advance Notice of Proposed Rule Making: 11/18/2008
- Notice of Proposed Rule Making: 07/22/2010
- MAP-21: 07/06/2012
- Supplemental Notice of Proposed Rule Making: 07/30/2013
- Final Rule Effective: 08/13/2015 (Codified in 23 CFR 650, subpart E)
- Initial Inspections Due: **08/13/2017**
- Load Ratings (If Applicable) Due: 11/11/2017
- National Tunnel Inventory Data Due: 03/15/2018



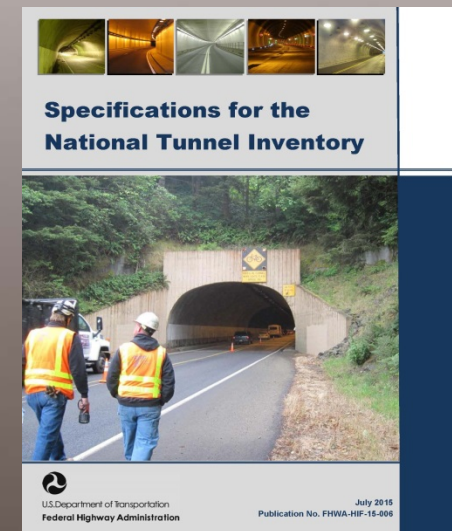


# National Tunnel Inspection Standards

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## *Tunnel Inspection Reference Material*

- Tunnel Operations, Maintenance, Inspection and Evaluation (TOMIE) Manual
- National Tunnel Inspection Standards (NTIS)
- Specifications for the National Tunnel Inventory (SNTI)

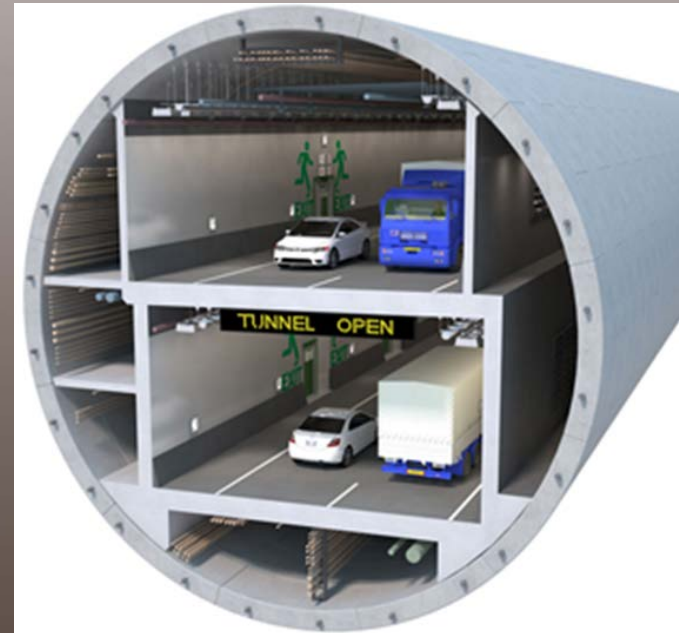


# National Tunnel Inspection Standards

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## *§650.503 Applicability*

Applies to all tunnels on all public roads, on and off Federal-aid highways, including tribally and federally owned structures that are defined as Highway Tunnels.

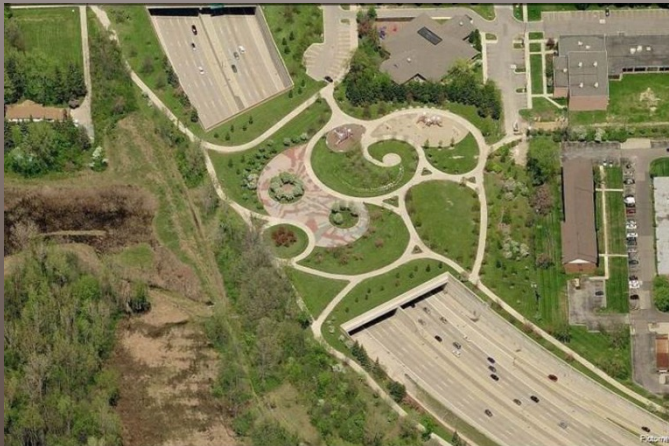


# National Tunnel Inspection Standards

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## *§650.505 Definition*

A tunnel is defined as an enclosed roadway for motor vehicular traffic with vehicle access limited to portals, regardless of structure type or method of construction. Tunnels are structures that require, based on owners determination, special design considerations that may include lighting, ventilation, fire protection systems and emergency egress capacity.





# National Tunnel Inspection Standards

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## *National Tunnel Inspection Program*

### *Draft Metrics*

- Metric #01: Tunnel inspection organization
- Metric #02: Qualifications of personnel – Program Manager
- Metric #03: Qualifications of personnel – Team Leader(s)
- Metric #04: Inspection interval – Routine
- Metric #05: Inspection interval – Damage/In-Depth/Special Inspections
- Metric #06: Inspection procedures – Quality Inspections
- Metric #07: Inspection procedures – TOMIE/Tunnel-Specific
- Metric #08: Inspection procedures – Functional Systems Testing
- Metric #09: Inspection procedures – Load Rating
- Metric #10: Inspection procedures – Post or Restrict
- Metric #11: Inspection procedures – Tunnel Files
- Metric #12: Inspection procedures – QC/QA
- Metric #13: Inspection procedures – Critical Findings
- Metric #14: Inventory – Prepare and Maintain
- Metric #15: Inventory – Timely Updating of Data



# National Tunnel Inspection Standards

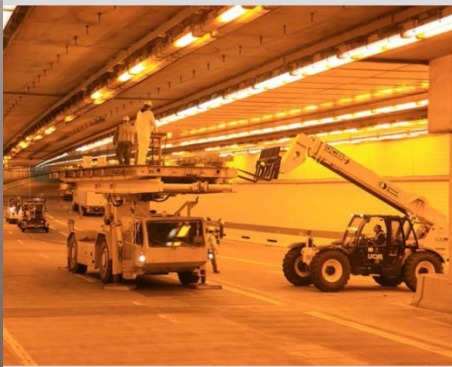
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## *National Tunnel Inspection Program*

### *Draft Metric #07: Inspection procedures – TOMIE/Tunnel-Specific*



**Tunnel Operations,  
Maintenance, Inspection, and  
Evaluation (TOMIE) Manual**



U.S. Department of Transportation  
Federal Highway Administration

July 2015  
Publication No. FHWA-HIF-15-005

#### *Inspection procedures must account for:*

- Design assumptions
- Tunnel Complexity

#### *Inspection procedures must Identify/Detail:*

- Structural and functional systems
- Frequency of inspection for each element/function system
- Inspection methods and required equipment



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# National Tunnel Inspection Standards

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## *National Tunnel Inspection Program*

### *Metric #08: Inspection procedures – Functional Systems Testing*

- Establish requirements for functional system testing, direct observation of critical system checks, and testing documentation in accordance with the inspection guidance in the Tunnel Operations, Maintenance, Inspection, and Evaluation (TOMIE) Manual

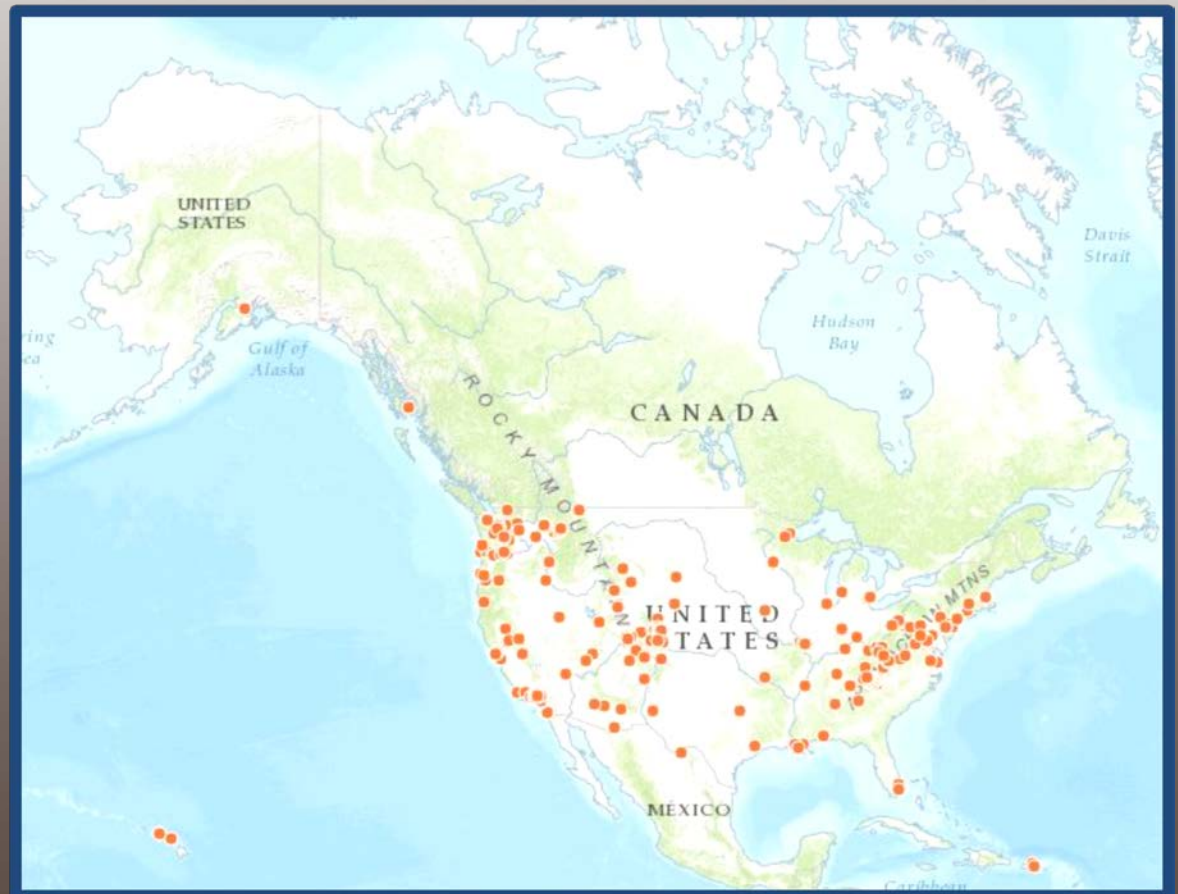


# Tunnel Factoids

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## Highway Tunnels

- United States – 473
- California – 70
- Washington – 62
- Colorado – 42
- Massachusetts – 39
- Pennsylvania – 27
- Virginia – 16
- Michigan – 12
- Nevada – 7
- Indiana – 5
- Illinois – 4
- New Jersey – 2
- Georgia – 1



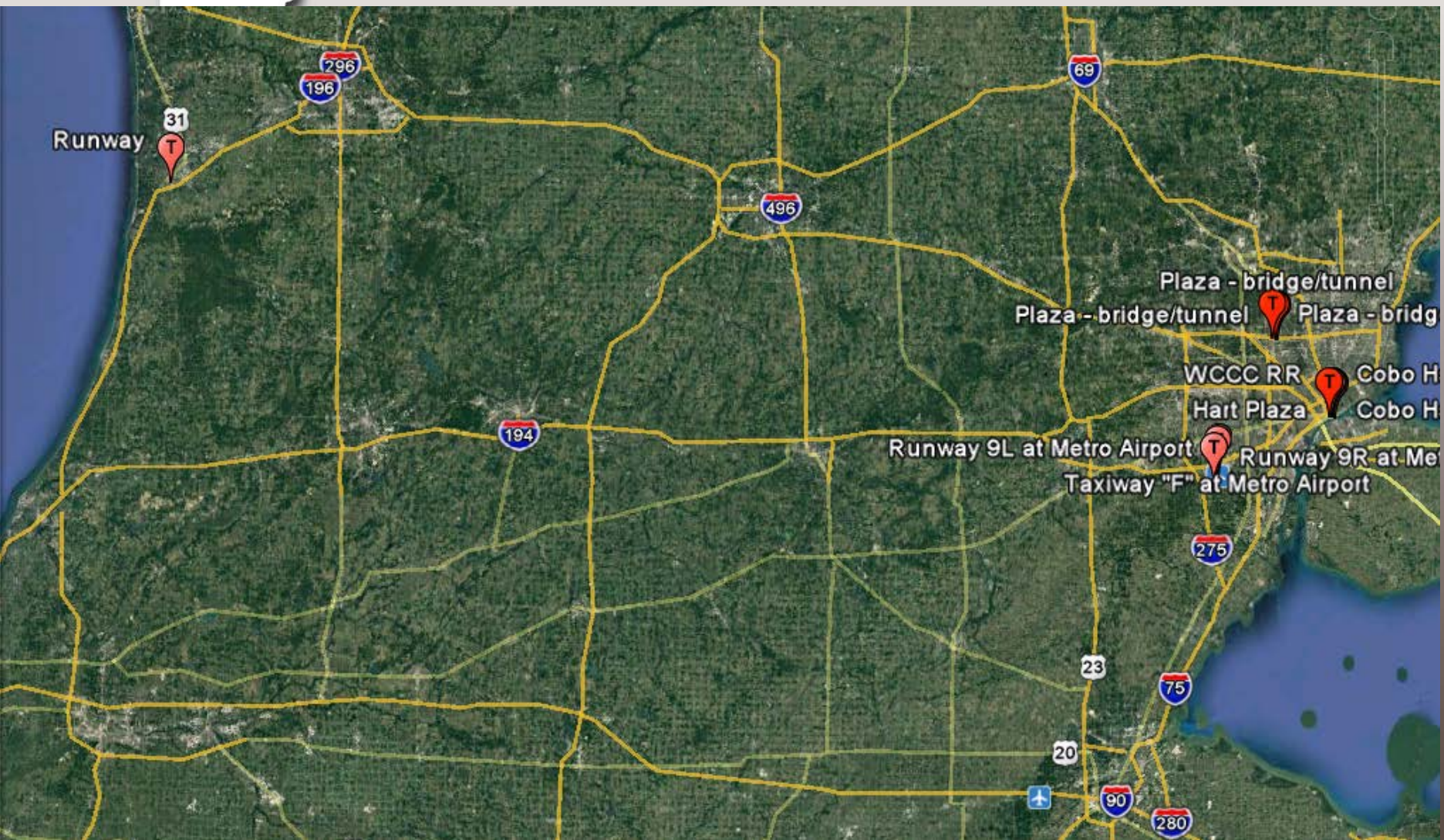


# Tunnel Factoids



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# Tunnel Factoids

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## *Longest Highway Tunnel*

### *United States*

- Anton Anderson Memorial Tunnel – Alaska
  - 13,000 feet

### *Michigan*

- Detroit Windsor Tunnel
  - 5,160 Feet



# Tunnel Factoids

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## *Shortest Highway Tunnel*

### *United States*

- Apishapa Arch – Colorado
  - 11 Feet



### *Michigan*

- M-10 under M-85/Fort Street Plaza
  - 325 Feet



# National Performance Management Measures for Bridge Condition

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## Bridge Performance Measures



# National Performance Management Measures for Bridge Condition

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## **§ 490.411 Establishment of Minimum Level for Condition for Bridges**

- Percent of the deck area of NHS bridges classified as Structurally Deficient does not exceed 10 percent
  - Applicable to all bridges carrying the NHS including on- and off-ramps connected to the NHS.

| <i>Minimum Level for Condition Data Sources</i> |  |
|---|--|
| <i>Current</i>                                  | <i>Future (January 1<sup>st</sup>, 2018)</i> |
| <i>NBI Item 58 – Deck</i>                       | <i>NBI Item 58 – Deck</i>                    |
| <i>NBI Item 59 – Superstructure</i>             | <i>NBI Item 59 – Superstructure</i>          |
| <i>NBI Item 60 – Substructure</i>               |  |
| <i>NBI Item 62 – Culvert</i>                    | <i>NBI Item 60 – Substructure</i>            |
| <i>NBI Item 67 – Structural Evaluation</i>      |  |
| <i>NBI Item 71 – Waterway Adequacy</i>          | <i>NBI Item 62 – Culvert</i>                 |



# National Performance Management Measures for Bridge Condition

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## **§ 490.413 Penalties for Not Maintaining Bridge Condition**

- If for 3 consecutive years the minimum condition level is not met, the State must set aside and obligate NHPP funds for eligible projects on bridges on the NHS.
  - The set aside is an amount equal to 50 percent of the funds apportioned to the State for fiscal year 2009 to carry out the highway Bridge Program.
  - The set aside and obligation requirement for bridges on the NHS in the State shall remain in effect for each subsequent fiscal year until such time that less than 10 percent of the NHS deck area is classified as Structurally Deficient.

| <b>Structurally Deficient Deck Area in Michigan</b> |                               |
|---|-------------------------------|
| <b>Year</b>   | <b>Deck Area (Percentage)</b> |
| <b>2016</b>   | <b>10.4</b>                   |
| <b>2015</b>   | <b>10.2</b>                   |
| <b>2014</b>   | <b>9.1</b>                    |





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# Questions



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