TODAY’S AGENDA

- I-75 over Rouge River/Fort Street Deck & Goddard Bridge Replacements
- 2017-2018 I-75 Work Coordination with GHIB
- I-75 Modernization (Segment 1 D/B)
- MDOT 2017-2018 Statewide Bridge Program
- I-94 Modernization (Advanced Bridges)

We need your input!
I-75 over Rouge River deck replacement

- Originally opened in 1967, with an initial construction cost of $25 million

Photo courtesy of Bing Maps
I-75 over Rouge River deck replacement

- 8,627 feet (1.63 miles) long
- 26 acres of concrete deck area
- 39 million pounds of structural steel
- **Largest Bridge in Michigan**
- River piers bear on 50’ diameter hollow caissons anchored to bedrock
- Four 12’ lanes, 5’ inside shoulder and 9.5’ outside shoulder in each direction
- River span has 100’ clearance over the Rouge River (lowest crossing in the corridor)
- Bridge ADT = 100,500 vpd (2014 data)
- **Equates to 36.7 million vehicles per year**
I-75 over Rouge River deck replacement

- 106 steel girder spans, main span over the Rouge River is 300 feet long, consisting of 10’-9” deep steel plate girders
### I-75 over Rouge River deck replacement

- **Size comparison to other large bridges**

<table>
<thead>
<tr>
<th>FACILITY</th>
<th>FEATURE CROSSED</th>
<th>LENGTH (ft)</th>
<th>WIDTH (ft)</th>
<th>DECK AREA (ft²)</th>
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</thead>
<tbody>
<tr>
<td>I-75</td>
<td>ROUGE RIVER,DEARBORN ST &amp; RR</td>
<td>8,627.00</td>
<td>132.40</td>
<td>1,142,215</td>
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<tr>
<td>I-75</td>
<td>STRAITS OF MACKINAC</td>
<td>19,247.70</td>
<td>53.80</td>
<td>1,035,526</td>
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<tr>
<td>I-75 SB</td>
<td>SAGINAW R, M-13, GTWRR (Zilwaukee)</td>
<td>8,084.97</td>
<td>74.50</td>
<td>602,331</td>
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<tr>
<td>I-75 NB</td>
<td>SAGINAW R, M13, GTWRR (Zilwaukee)</td>
<td>8,061.02</td>
<td>74.50</td>
<td>600,546</td>
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<tr>
<td>I-75, INTERNATIONAL BRIDGE</td>
<td>ST MARY RIV/PORTAGE AV W</td>
<td>9,280.18</td>
<td>34.50</td>
<td>320,166</td>
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<tr>
<td>I-94 EB</td>
<td>ST CLAIR RIVER, CN RR (Black River)</td>
<td>6,110.60</td>
<td>51.50</td>
<td>314,696</td>
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<tr>
<td>I-94</td>
<td>GTW,NS,CR RR &amp; RUSSEL</td>
<td>2,184.00</td>
<td>132.60</td>
<td>289,598</td>
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<td>I-675</td>
<td>SAG RIV, H&amp;E,SBS RR, M13 (Henry Marsh)</td>
<td>2,948.49</td>
<td>94.20</td>
<td>277,748</td>
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<td>I-94 WB</td>
<td>ST CLAIR RIVER, CN RR (Black River)</td>
<td>6,178.51</td>
<td>37.40</td>
<td>231,076</td>
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<td>BELLE ISLE TRAFFIC</td>
<td>DETROIT RIVER (McArthur)</td>
<td>2,291.31</td>
<td>87.90</td>
<td>201,406</td>
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<tr>
<td>M-231</td>
<td>GRAND RIVER</td>
<td>3,708.70</td>
<td>49.40</td>
<td>183,210</td>
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<tr>
<td>WOODSIDE AVE</td>
<td>SAGINAW RIVER AND MCRR</td>
<td>2,344.49</td>
<td>76.70</td>
<td>179,822</td>
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<tr>
<td>I-196 WB</td>
<td>GRAND R,I-296,SCRIB&amp;TURN</td>
<td>2,277.56</td>
<td>47.20</td>
<td>107,501</td>
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<tr>
<td>Year</td>
<td>Scope of Work</td>
<td>Cost</td>
<td></td>
<td></td>
</tr>
<tr>
<td>------</td>
<td>------------------------------------------------------------------------------</td>
<td>------------</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1975</td>
<td>Latex overlay on SB</td>
<td>$2,534,250</td>
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<tr>
<td>1977</td>
<td>Latex overlay on NB, glare screen</td>
<td>$1,897,205</td>
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<tr>
<td>1981</td>
<td>Fencing &amp; Railing retrofit</td>
<td>$92,742</td>
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<tr>
<td>1989</td>
<td>Pin &amp; Hanger replacement, joint replacement, railing repairs &amp; lighting</td>
<td>$20,680,095</td>
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<tr>
<td>1994</td>
<td>Emergency pier repair (37, 38, 39 &amp; 40), external post tensioning</td>
<td>$3,493,526</td>
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<tr>
<td>1996</td>
<td>Emergency pier replacement</td>
<td>$2,399,198</td>
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<tr>
<td>1998</td>
<td>Emergency pier repair (38 &amp; 39), external post tensioning</td>
<td>$1,153,722</td>
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<tr>
<td>2002</td>
<td>Modular joint replacement, shoulder overlay, deck patching</td>
<td>$6,581,000</td>
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<tr>
<td>2003</td>
<td>Steel beam full paint</td>
<td>$15,745,197</td>
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<tr>
<td>2007</td>
<td>Emergency pier cap repair (7 &amp; 11)</td>
<td>$269,180</td>
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<tr>
<td>2008</td>
<td>Pier repair due to tanker accident</td>
<td>$623,010</td>
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<tr>
<td>2009</td>
<td>Pressure relief joints</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>2009</td>
<td>Partial paint to repair high load hit</td>
<td>$587,474</td>
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<td></td>
</tr>
<tr>
<td>2010</td>
<td>Substructure repair (42 piers), downspout replacement, railing repair, steel repairs</td>
<td>$7,496,891</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

- Rehabilitation life cycle investment: **$65,553,490 total**
I-75 over Rouge River deck replacement

- Deck replacement, with some superstructure and substructure repairs
- Project scheduled to be let in October 2016, with construction anticipated to begin in early Spring 2017
- Project is anticipated to last 2 years
- SB I-75 will be closed and detoured during the 2017 construction season (SB I-75 traffic to be detoured throughout the project)
- NB I-75 will be closed and traffic detoured onto newly reconstructed SB I-75 roadway during the 2018 construction season
I-75 over Rouge River deck replacement

- Proposed project staging and traffic scheme
The existing 29 span bridge will be replaced with multiple shorter bridges as shown.
- Proposed durable prestressed concrete bulb-T beams
- Use of innovative materials:
  - Lightweight backfill such as EPS or cellular concrete to fill in spans
  - CFRP prestressing
MDOT is currently in discussions with WDBA on coordination of I-75 closures for the benefit of all parties.

Additional GHIB work in 2019 and 2020 will also impact I-75.
Segment 1 D/B from Coolidge to South Boulevard – including the Square Lake Road Interchange
Segment 1 D/B anticipated contract award by May 2016
Bridge program summary:
- 2016: $129 million
- 2017: $255 million
- 2018: $160 million

Does not take into account additional revenues from recent transportation funding legislation
## I-94 Modernization Project Goals

- Maintain regional mobility during construction for freight users and access to businesses and homes.
- Deliver Advanced Bridges within programmed budget.
- Construct Advanced Bridges in three years (2016-2018)
- County residents & users give MDOT 90% approval rating for performance on project before and after construction.
- Exceed workforce goals for county and city residents as defined by the community.
- Utilize contracting mechanisms to exceed stakeholder goals for Michigan businesses and DBE participation.
### Bridges Over I-94

<table>
<thead>
<tr>
<th>Bridges Over I-94</th>
<th>Year Built</th>
<th>Condition*</th>
<th>Reconstruction Year*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Trumbull Avenue</td>
<td>1954</td>
<td>Critical</td>
<td>2016</td>
</tr>
<tr>
<td>Gratiot Avenue</td>
<td>1958</td>
<td>Poor</td>
<td>2017</td>
</tr>
<tr>
<td>Second Avenue</td>
<td>1954</td>
<td>Poor</td>
<td>2017-2018</td>
</tr>
<tr>
<td>Cass Avenue</td>
<td>1955</td>
<td>Poor</td>
<td>2017-2018</td>
</tr>
<tr>
<td>Brush Street</td>
<td>1955</td>
<td>Poor</td>
<td>2017-2018</td>
</tr>
<tr>
<td>Chene Street</td>
<td>1956</td>
<td>Poor</td>
<td>2017-2018</td>
</tr>
<tr>
<td>Mt. Elliott Street</td>
<td>1955</td>
<td>Poor</td>
<td>2017-2018</td>
</tr>
<tr>
<td>Concord Avenue</td>
<td>1958</td>
<td>Poor</td>
<td>2017-2018</td>
</tr>
<tr>
<td>Cadillac Avenue</td>
<td>1957</td>
<td>Poor</td>
<td>2017-2018</td>
</tr>
<tr>
<td>French Road</td>
<td>1957</td>
<td>Poor</td>
<td>2017-2018</td>
</tr>
</tbody>
</table>

*Design to be completed in 2016. Construction letting dates dependent on ROW Certification and available funding.
OVERVIEW - CONDITION

1956
Chene over I-94

1955
Mt Elliott over I-94

1958
Concord over I-94

1957
Cadillac over I-94

1957
French over I-94
Construction on I-94 impacts:

- 2.6 million jobs in metro Detroit
- Freight mobility ($80 billion annual commodity flow)
- Michigan’s international border crossings
- 140,000 to 160,000 vehicles per day
- Over 10,000 trucks per day
Mobility impacts from I-94 Advanced Bridge construction include:

- 10-20% increase in observed crash rates during work zone construction*
- 5 – 9 mph observed speed reduction during work zone construction*

*Source: Regional Mobility Impact Analysis Technical Memorandum dated September 2015.
ABC CONCEPTS UNDER STUDY

PROPOSED RENDERING (BEFORE I-94 WORK)

CLEAR SPAN CONCEPT

- At the clear span locations, the proposed centerline of I-94 is in a different location than the existing I-94 centerline.
- A clear span of both the existing and proposed alignments eliminates the need for both temporary and permanent piers.

Heavy move of Arch
ABC CONCEPTS UNDER STUDY

PROPOSED RENDERING (AFTER I-94 WORK)

CLEAR SPAN CONCEPT

- The locations that can benefit from a clear span alternative are Chene Street, Cass Avenue and 2nd Avenue.
- A network tied arch is capable of spanning the entire width of I-94.

Heavy move of Superstructure
BENEFITS OF CLEAR SPAN CONCEPT

- Eliminates “throw away” work by eliminating temporary median pier construction and permanent median pier construction with future I-94 freeway.
- Has a structure depth less than traditional multi-span bridges allowing for increased underclearance.
- The structure concept addresses redundancy and maintenance concerns that are sometimes associated with this structure type.
- Expedites schedule to a 3 - 5 week local roadway closure period depending on the ABC technology.
- Simplifies construction staging for the future I-94 freeway.
- Opportunity to provide economical Gateway structures
KEY FEATURES

- Tie girder built up using bolted connections provides internal redundancy.
- Arch rib is an open H-section.
- Inspection holes provided in the bottom tie girder.
- Inspection and load rating manual will be provided for future maintenance.
- Cables are galvanized steel strand.
Figure 4 – Proposed Typical Arch Rib Section
ARCH ERECTION OPTIONS
ARCH ERECTION OPTIONS
ABC CONCEPTS UNDER STUDY

We need your input!

POTENTIAL CLEAR SPAN
STAGING AREA (2ND AVENUE)

Constructability considerations:

- Temporary Easements
- Travel Path for Heavy Move
- Site Preparation and Restoration
- Utility Impacts
- Environmental Compliance
- Other?
We need your input!

**POTENTIAL CLEAR SPAN STAGING AREA (CASS AVENUE)**

Constructability considerations:
- Temporary Easements
- Travel Path for Heavy Move
- Site Preparation and Restoration
- Utility Impacts
- Environmental Compliance
- Other?
ABC CONCEPTS UNDER STUDY

We need your input!

POTENTIAL CLEAR SPAN STAGING AREA (CHENE STREET)
Constructability considerations:
- Temporary Easements
- Travel Path for Heavy Move
- Site Preparation and Restoration
- Utility Impacts
- Environmental Compliance
- Other?
ABC CONCEPTS UNDER STUDY

MULTI-SPAN CONCEPT

- At the Multi-Span Locations, the proposed and existing centerline of I-94 remains the same, as in French Road, Brush Street, Concord Avenue, Gratiot (M-3) and Cadillac Avenue.

- Or the alignment shift is significant enough that the proposed median pier will not be in conflict with the existing I-94 traffic lanes, as in Mt. Elliott Street.

5-Week ABC Period (Part-Width)
3-Week ABC Period (Full Closure)

Bridge Modules Transported on Flatbed Truck

French Road: Crane Based Erection areas
MULTI-SPAN CONCEPT

- At these locations, the additional cost associated with the clear span option is substantial, or not practical.

- To accelerate construction at these locations Prefabrication Bridge Element Systems (PBES) may be needed for some substructure elements.

- Superstructure modules can be constructed off site and transported and erected on site with minimal disruption to traffic at both the cross streets and I-94 level.
ABC CONCEPTS UNDER STUDY

POTENTIAL MULTI-SPAN STAGING AREA (MT. ELLIOTT)

Constructability considerations:
- Temporary Easements
- Site Preparation and Restoration
- Utility Impacts
- Environmental Compliance
- Other?

We need your input!
ABC CONCEPTS UNDER STUDY

BENEFITS OF ABC

- Rapid Replacement reduces User Delays impacting MDOT’s customers and the Economy
- Minimizes Work Zone Mobility Impacts on I-94 freeway by reducing total construction duration for each bridge
- Rapid Replacement accelerates construction over I-94 from months to weeks
- No long term lane reductions
- Off-site quality and on-site mobility

<table>
<thead>
<tr>
<th>Work Zone Length (MI)</th>
<th>Construction Method</th>
<th>Duration (Weeks)</th>
<th>Duration (Days)</th>
<th>Freeway User Delay Cost ($ / Day)</th>
<th>Total I-94 User Delay Cost ($)</th>
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</thead>
<tbody>
<tr>
<td>1.5</td>
<td>ABC</td>
<td>3</td>
<td>21</td>
<td>$14,050</td>
<td>$295,050</td>
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<tr>
<td>1.5</td>
<td>Conventional</td>
<td>20</td>
<td>140</td>
<td>$14,050</td>
<td>$1,967,000</td>
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<tr>
<td><strong>Difference</strong></td>
<td></td>
<td></td>
<td></td>
<td><strong>$1,671,950</strong></td>
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</table>
Package multiple Bridges of similar Structure Type to:

- Take advantage of Economies of Scale
- Streamline MOT Coordination at multiple locations while minimizing freeway closures
- Apply Lessons Learned on early work to improve overall project performance

<table>
<thead>
<tr>
<th>Bridges Over I-94</th>
<th>Proposed Bridge Type/Concept*</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gratiot Avenue</td>
<td>MULTI-SPAN</td>
</tr>
<tr>
<td>Second Avenue</td>
<td>CLEAR SPAN</td>
</tr>
<tr>
<td>Cass Avenue</td>
<td>CLEAR SPAN</td>
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<td>CLEAR SPAN</td>
</tr>
<tr>
<td>Mt. Elliott Street</td>
<td>MULTI-SPAN</td>
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<td>Concord Avenue</td>
<td>MULTI-SPAN</td>
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<tr>
<td>Cadillac Avenue</td>
<td>MULTI-SPAN</td>
</tr>
<tr>
<td>French Road</td>
<td>MULTI-SPAN</td>
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</table>

*I-94 Modernization Project Advanced Bridges ABC Concept Report (June 2015)*
QUESTIONS?

We need your input!