I-35/I-80/Iowa 141 Interchange IJR and NEPA

A Practical Approach to Resolving a Decades-Old Traffic Operations Challenge

Client: Iowa DOT
AJR or IJR?

This is a

TO-MAY-TO

This is a

TO-MAH-TO
Practical Design

**PRACTICAL / adjective**
(of an idea, plan, or method) likely to succeed or be effective in real circumstances; feasible.

“neither of these strategies is practical for smaller businesses”

synonyms: feasible, practicable, realistic, viable, workable, possible, reasonable, sensible
Project Location & Study Area
Root of the Problem

- 27% of NB Interstate traffic take exit loop
- 88% of exit loop traffic continue north
- Loop over capacity
- Minimal decision sight distance to exit loop
- Persistent queuing on Interstate
- Crash rates above statewide averages on 141
**Purpose and Need**

**Purpose of Project**
- **Improve** safety and **increase** traffic capacity
- Evaluate **new Interstate System access** between the Douglas Ave and NW 86th Street Interchanges

**Need for Action**
- **Back ups** during peak traffic hours
- Northbound exit loop ramp **over capacity**
- **Crashes** are above statewide average
Other Needs/Constraints

- Rail Corridor
  - Rail Spur
  - High Power Transmission
  - HP Gas
- Access to existing commercial
- New access to developing ground
Multiple Solutions Have Been Studied

Significant systems interchange

- **Feasible?**
  - *Maybe* – limited ability to extend I-80 west

- **Viable?**
  - *Not really* – Cost and ROW impacts too high
Multiple Solutions Have Been Studied

Rebuild existing form of interchange to current standards

- Feasible?
  - Yes

- Viable?
  - Not so much – Limited operations improvement for cost
Rebuild existing form of interchange – add western access point

- Feasible?  
  - Yes

- Viable?  
  - No – Does not solve root capacity and geometric challenges
Solve the Most Critical Problem First
Alternatives Considered
Preferred Alternative

- Dual-Lane Flyover
- New interchange access at Meredith Dr. and 100th St
- Collector-Distributor
- Grade separation at SE 37th
- Achieved adding 4th lane each direction on mainline w/ existing 141 bridge
Preferred Alternative
Initial Build

- Dual-Lane Flyover
- New interchange access at Meredith Dr. and 100th St.
- Partial access at Meredith connected via local network
- Achieved adding 4th lane each direction on mainline w/ existing 141 bridge
Why Can’t the Existing Loop Ramps Remain?

- Existing loops would require rebuild
- Additional cost
- Loops not viable with C/D road concept
- Complex traffic signing required
- Reduces distance from flyover to SE 37th Street
- Department desire to remove loop ramps on curve
Practical Design Elements

Policy Point 4 - Full Access

- Initial Build Way-Finding
- City improved NW Urbandale Drive/Meredith Drive Intersection

Viable Cost Model

- Preferred Alternative: $178M
  - 100th St interchange=$24.4M
    - City-DOT project (2017-2018)
  - Initial Build=$64.5M (2019-2020)
  - Final Build=$89M (TBD)
Project Sequencing for the Initial Build of the Preferred Alternative

Proposed Sequencing – Initial Build

2017/18 – Grade and Pave
2019/20 – Grade and Pave
2019/20 – Bridge
2020 – Ramp/Loop Removal
Project Sequencing for the Final Build of the Preferred Alternative

Proposed Sequencing – Final Build

2017-2020 – Initial Build Construction

Planned Improvements – Final Build
Practical Design Elements

Repurpose loop Accel/Decel lanes on the existing bridge to additional through lanes

Flyover Geometric Design Criteria

<table>
<thead>
<tr>
<th>Semi-Directional Ramp – 2 Lane – Design Criteria</th>
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</thead>
<tbody>
<tr>
<td>Preferred</td>
</tr>
<tr>
<td>------------</td>
</tr>
<tr>
<td>Design Speed</td>
</tr>
<tr>
<td>Radius/Super e</td>
</tr>
<tr>
<td>2480’/4%</td>
</tr>
<tr>
<td>Shoulder - L/R</td>
</tr>
<tr>
<td>Horiz SSD</td>
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</tbody>
</table>
Practical Design Elements
Flyover Bridge Pavement Markings – Sight Distance
Shoulder shift through tangent section

8’ Left – Inside Shoulder
4’ Right – Outside Shoulder

8’ Right – Inside Shoulder
4’ Left – Outside Shoulder
Practical Design Elements

Initial Build at SE 37th

- Expanded intersection
- 1,200 foot weaving section from flyover
- VISSIM simulations
- Influenced flyover geometry
Practical Design Elements

Final Build at SE 37th

- **Bridge** over for NB flyover traffic
- **Mitigate queuing** concerns
Practical Design Elements

Queue Detection Warning System
Practical Design Elements

Queue Detection Warning System
Practical Design Elements

Queue Detection Warning System

- FLASHERS ACTIVATED
- FLASHERS ACTIVATED
- QUEUE DETECTED

QUEUE DETECTED

- NON-TYPICAL OPERATION - QUEUE DETECTION
Design - Bridge Considerations

- Typical Section, Horizontal and Vertical Alignment
  - 2380 foot long horizontally curved steel plate girder
  - 3 horizontal curves with two reverse curves
  - 36’ roadway, 4 girders with 11’ girder spacing
  - 1 vertical curve
  - 3 Units
  - 8’- 12’ girder depth
- Coordination with Mid America Energy and Railroad
Design – Bridge Considerations

- Alignment to account for *existing, proposed and future elements*
- Iowa did **not want mixed girder** types
- **No piers in median** of interstate
- **MSE wall height limits** of 25 feet or less increased spans
Design – Bridge Considerations

- Barriers placed so no collision force on piers
- Design exception of 600 foot radius vs AASHTO 1000 foot minimum
- Inspection walkway over I-80 and railroad
- Superelevation kept to 3% for snooper setup beyond inspection walkway
### Environmental Assessment and Impacts – EA

<table>
<thead>
<tr>
<th>Issue</th>
<th>No Build Alternative</th>
<th>Preferred Alternative</th>
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<tbody>
<tr>
<td>Right of Way Acquisition (acres)</td>
<td>0</td>
<td>8.5</td>
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<tr>
<td>Potential Displacements (number)</td>
<td>0</td>
<td>1 Building / 6 Tenants</td>
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<tr>
<td>Wetland Impacts (acres)</td>
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<td>1.86</td>
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<tr>
<td>Surface Waters and Water Quality (linear feet)</td>
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<td>Floodplains (acres)</td>
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<td>Noise Impacts (number)</td>
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<tr>
<td>Utilities (number of crossings)</td>
<td>0</td>
<td>13</td>
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</tbody>
</table>

**Visual**
- No Change
- Minor Change

*Impacts based on project level data and field study information.*
Project Development

Operations Study
IJR Signed
EA Signed
Prelim Plans (ROW Plans)
FONSI* approved
Final Design Plans
Right-of-Way Acquisition
Begin Construction

2/7/13
6/27/16
9/7/16
1/17/17 and 1/18/17
2017-2018
2018
2018/19

(2) Public Information Meetings
EA Public Hearing 10/24/16
FONSI* approved
ROW Public Info Meeting 3/9/17

*Finding of No Significant Impact
Questions from the Audience?
Contact Information

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