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

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

Client: IOWA DOT

HRGreen

AJR or IJR?

This is a

TO-MAY-TO

This is a

TO-MAH-TO

Practical Design

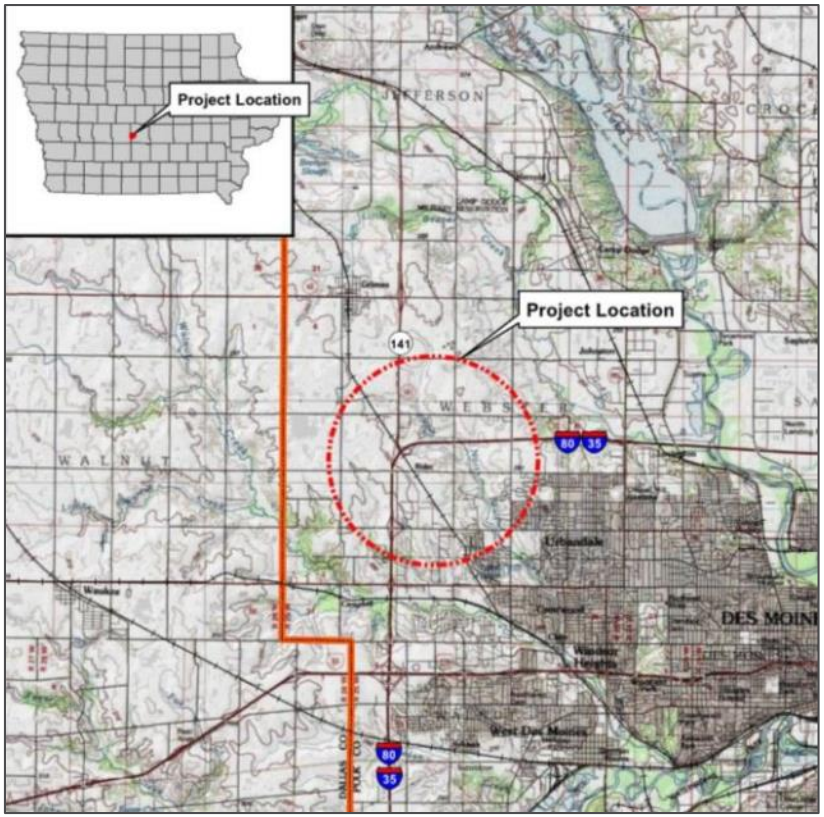
PRACTICAL / *adjective*

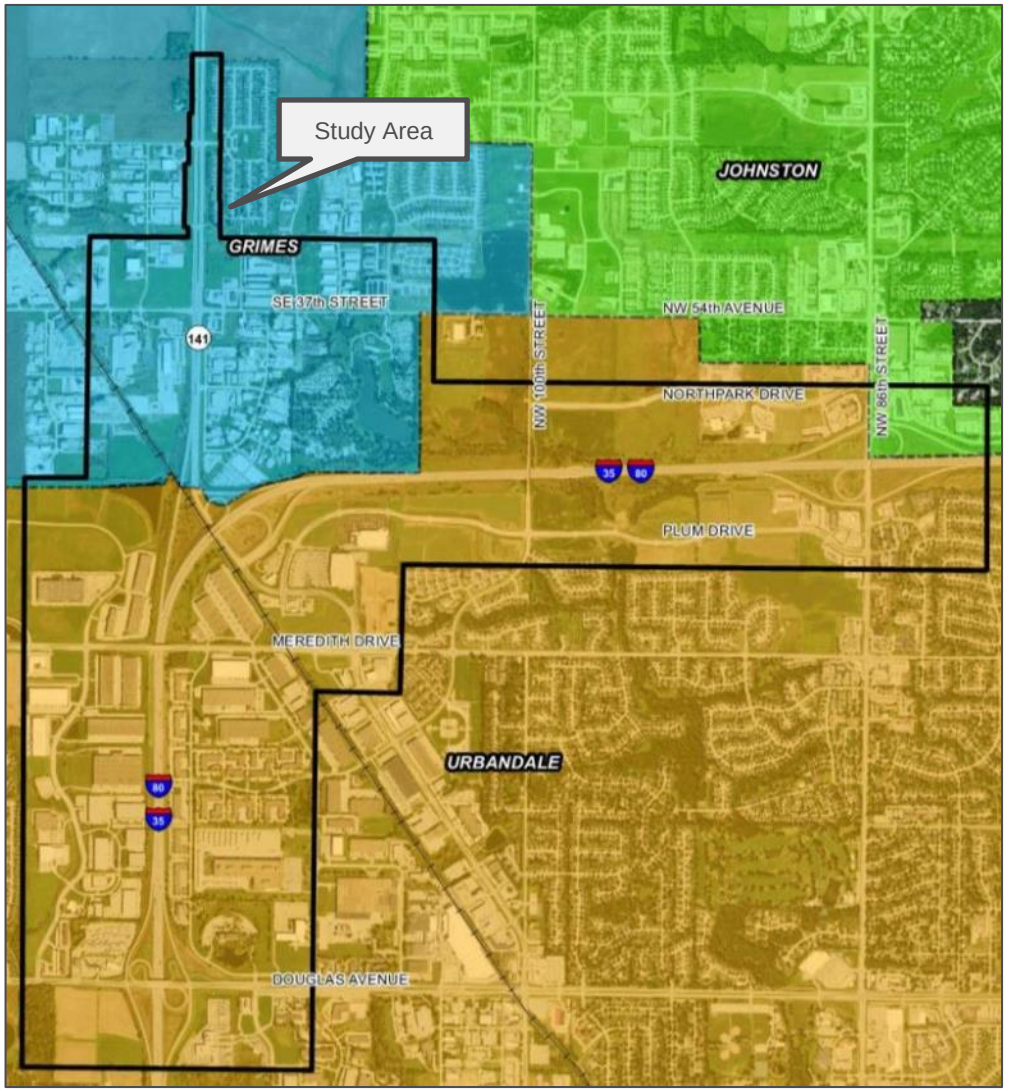
(of an idea, plan, or method) likely to succeed or be effective in real circumstances; feasible.

"neither of these strategies is practical for smaller businesses"

synonyms: feasible, practicable, realistic, viable, workable, possible, reasonable, sensible

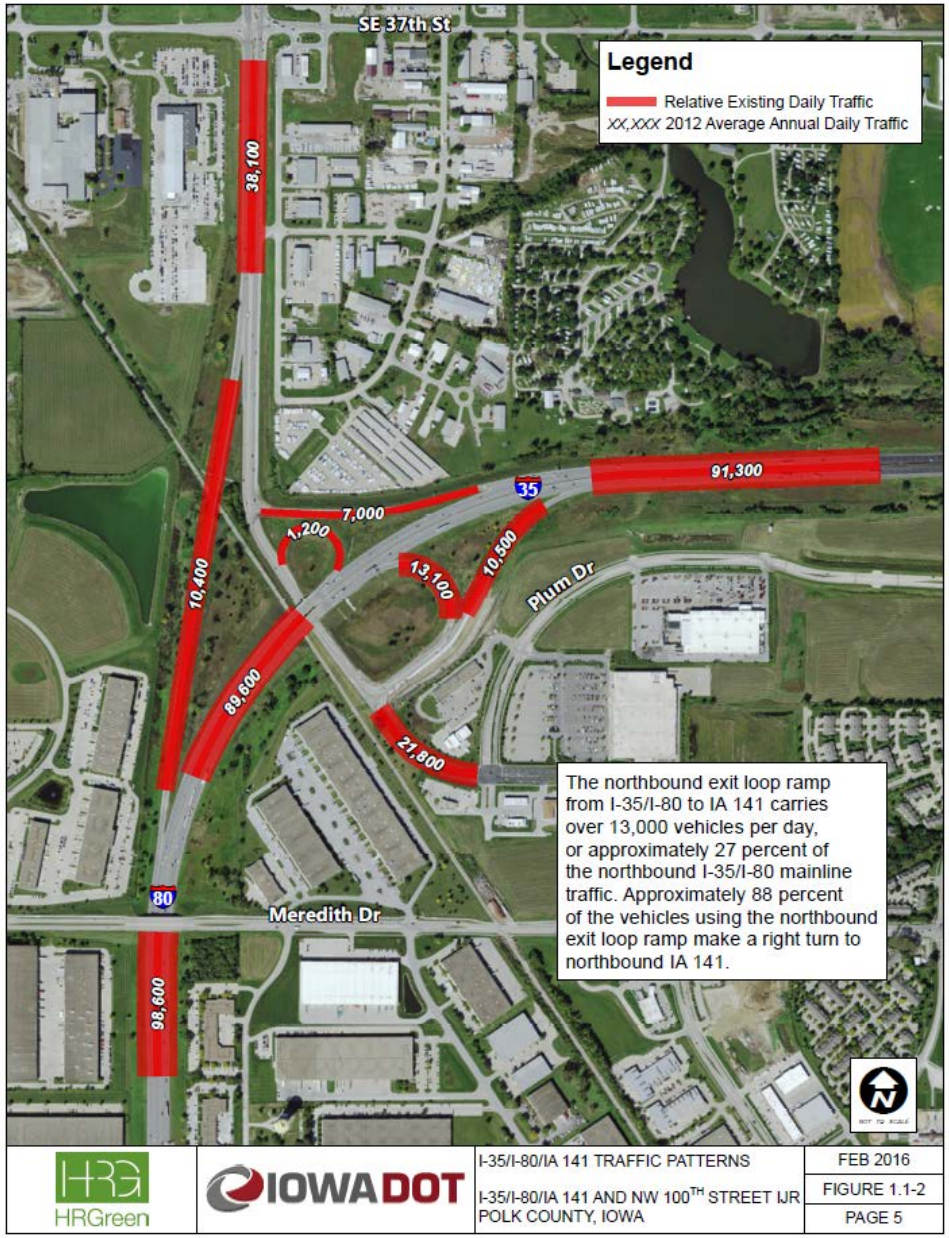
Project Location & Study Area





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

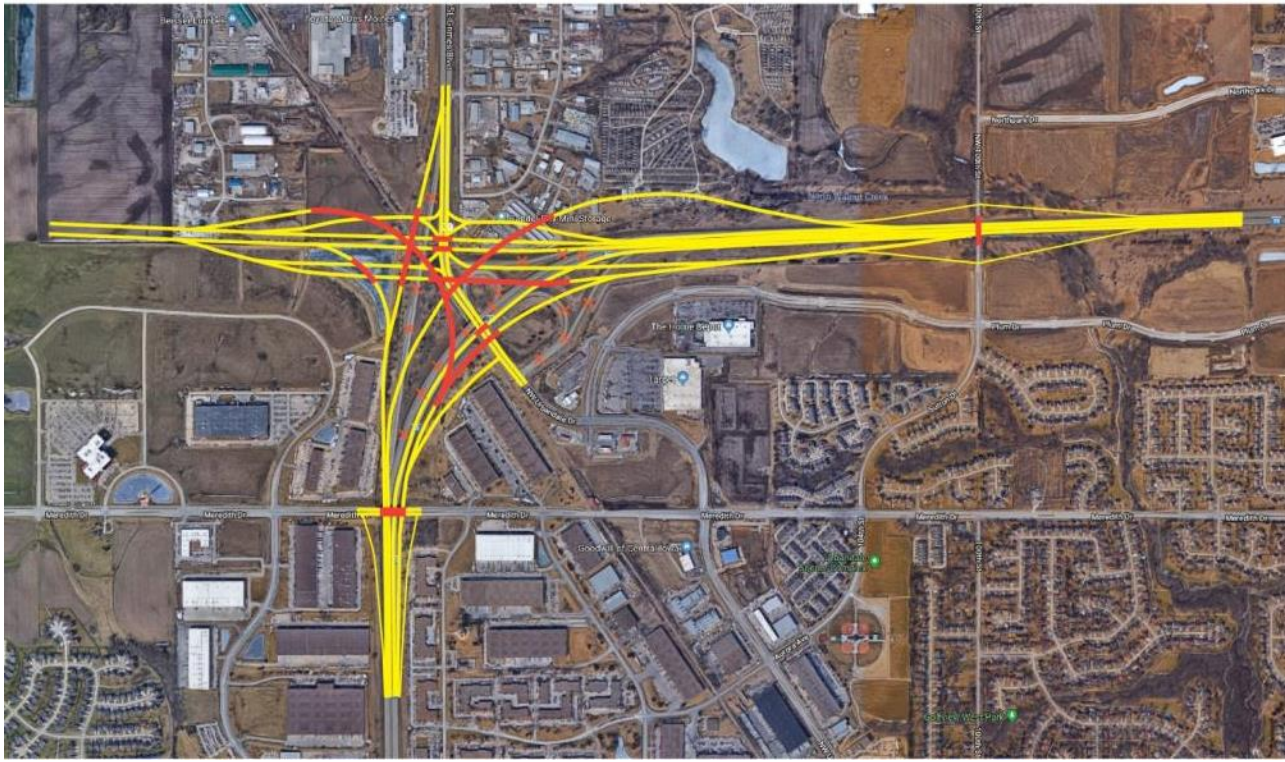
Other Needs/Constraints

- 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

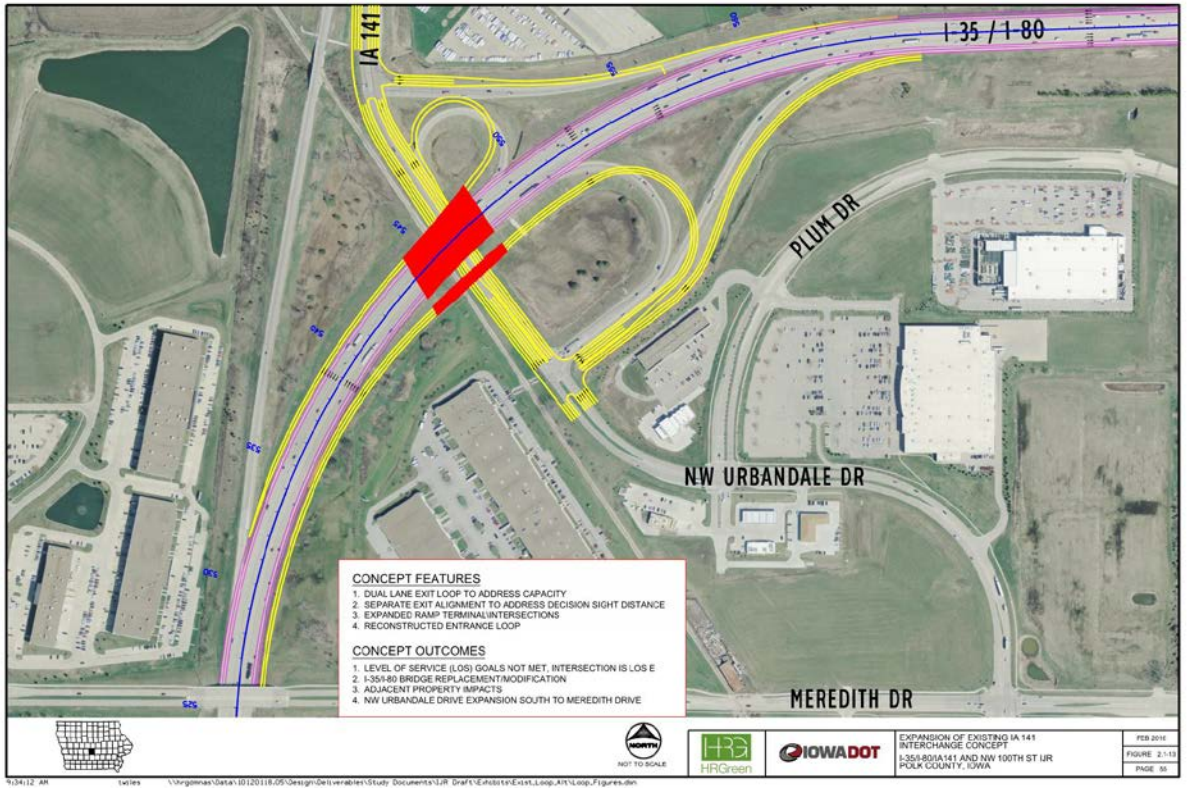
- Feasible?
  - Maybe – limited ability to extend I-80 west
- Viable?
  - Not really – Cost and ROW impacts too high



Multiple Solutions Have Been Studied

Rebuild existing form of interchange to current standards

- Feasible?
  - Yes
- Viable?
  - Not so much – Limited operations improvement for cost



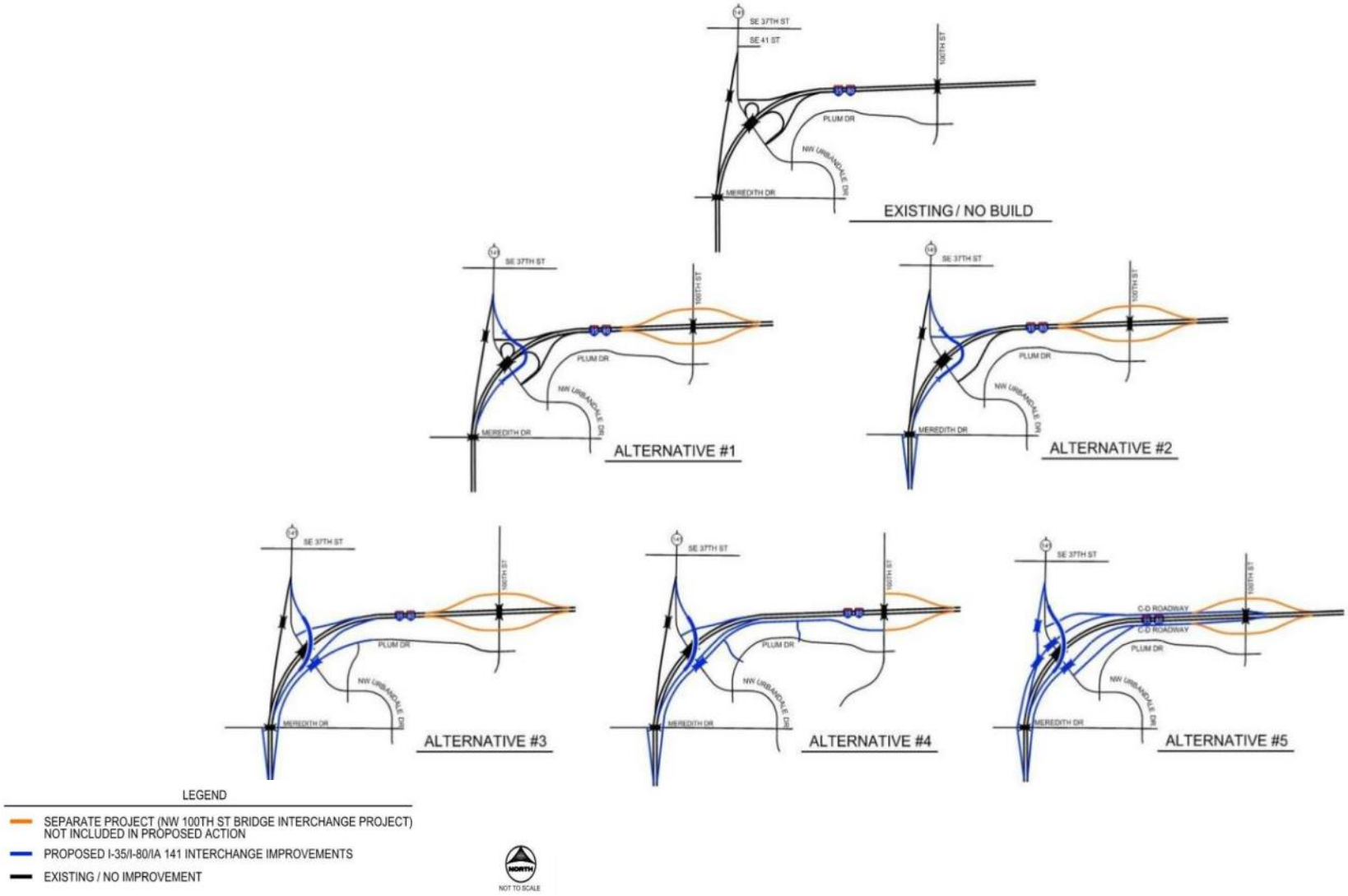
Multiple Solutions Have Been Studied

Rebuild existing form of interchange – add western access point

- Feasible?
  - Yes
- Viable?
  - No – Does not solve root capacity and geometric challenges

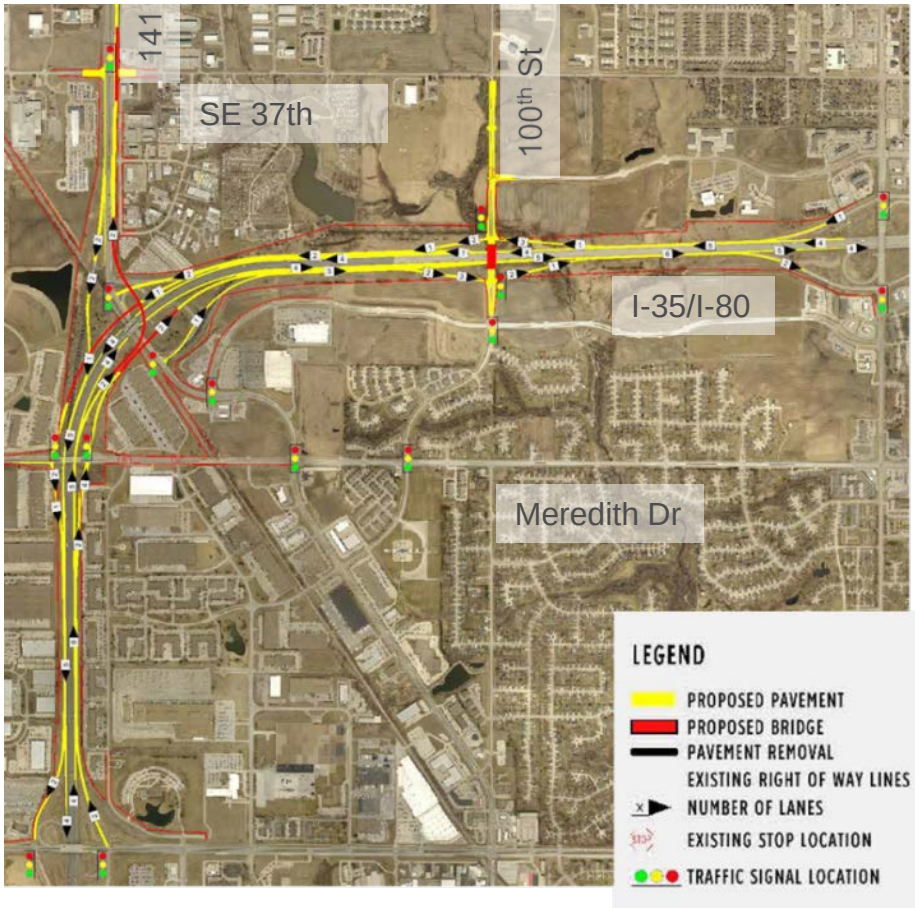
Solve the Most Critical Problem First

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

ILLUSTRATIVE RENDERING FINAL BUILD-1

VIEW LOOKING NORTHEAST

PUBLIC HEARING

I-35/ I-80/ Iowa 141 Interchange Study

Interchange Justification Report and Environmental Assessment

Polk County, IA

IOWA DOT SMARTER | SIMPLER | CUSTOMER DRIVEN

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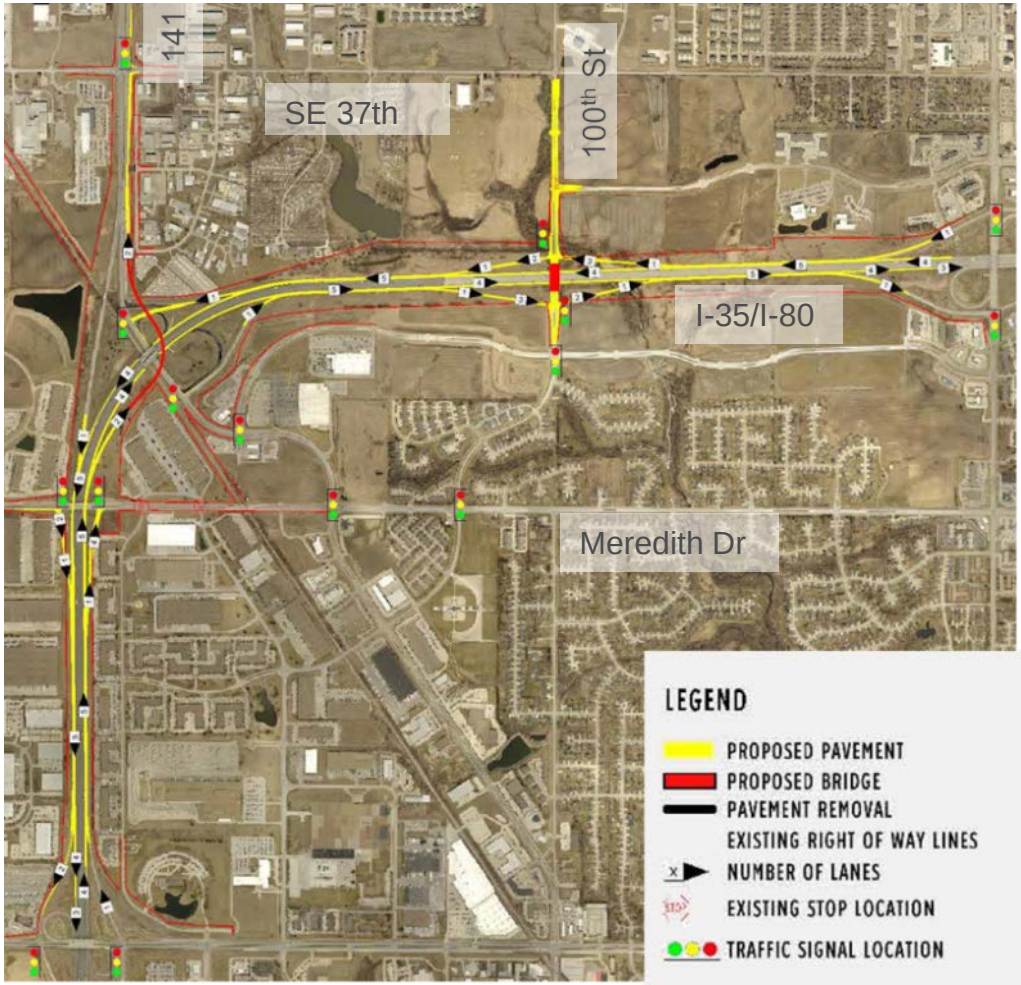
Initial Build

- 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



Initial Build

ILLUSTRATIVE RENDERING INITIAL BUILD-1

VIEW LOOKING NORTHEAST

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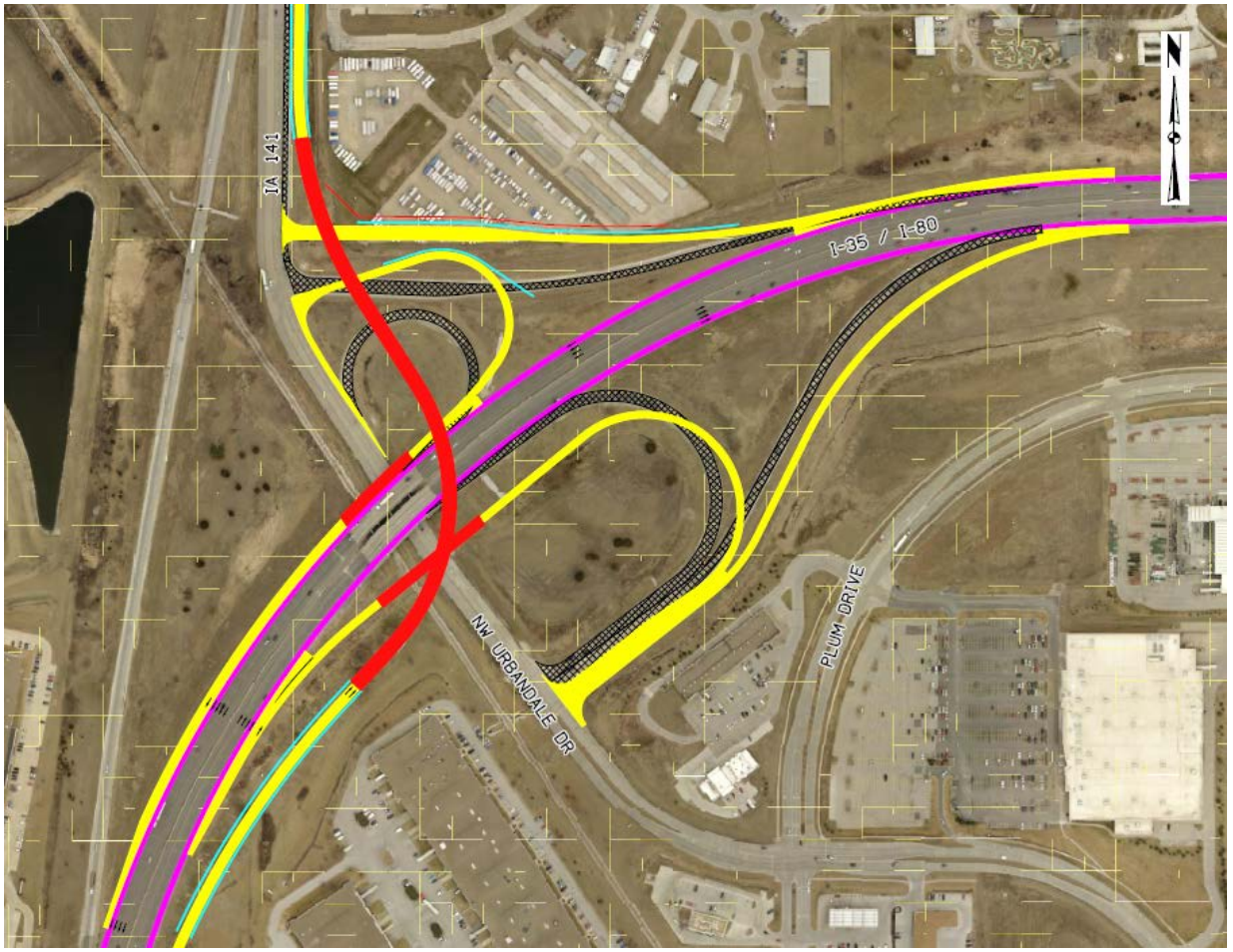
Why Can't the Existing Loop Ramps Remain?

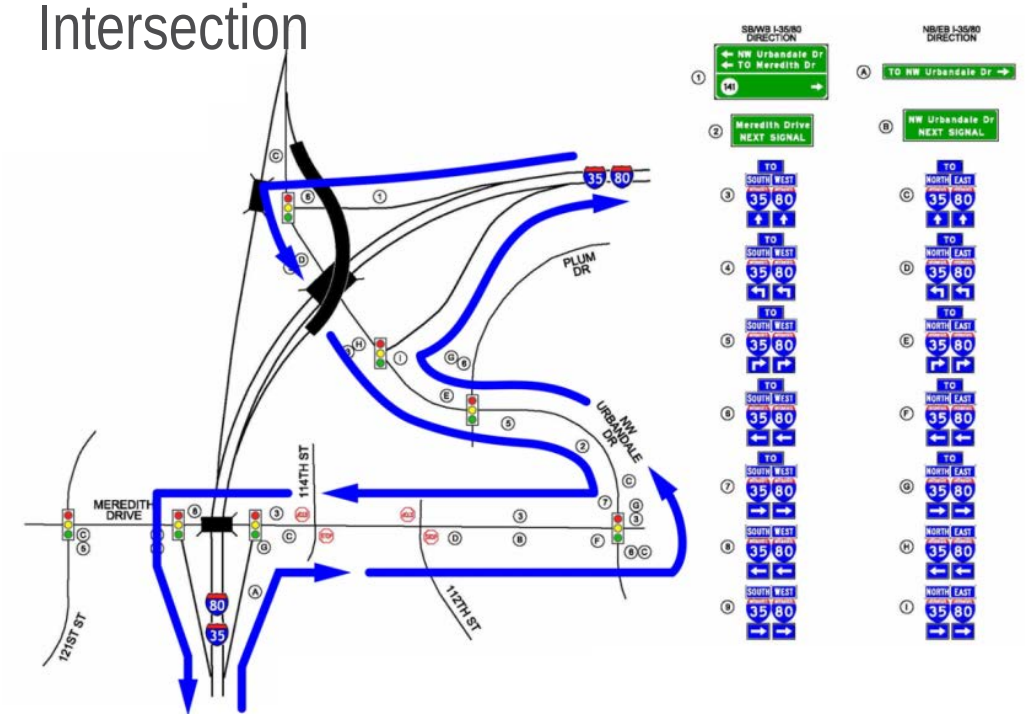
- Existing loops would require rebuild
- Additional cost
- Loops not viable with C/D road concept
- Complex traffic signing required
- Reduces distance from flyover to SE 37th Street
- Department desire to remove loop ramps on curve



Practical Design Elements

Policy Point 4 - Full Access

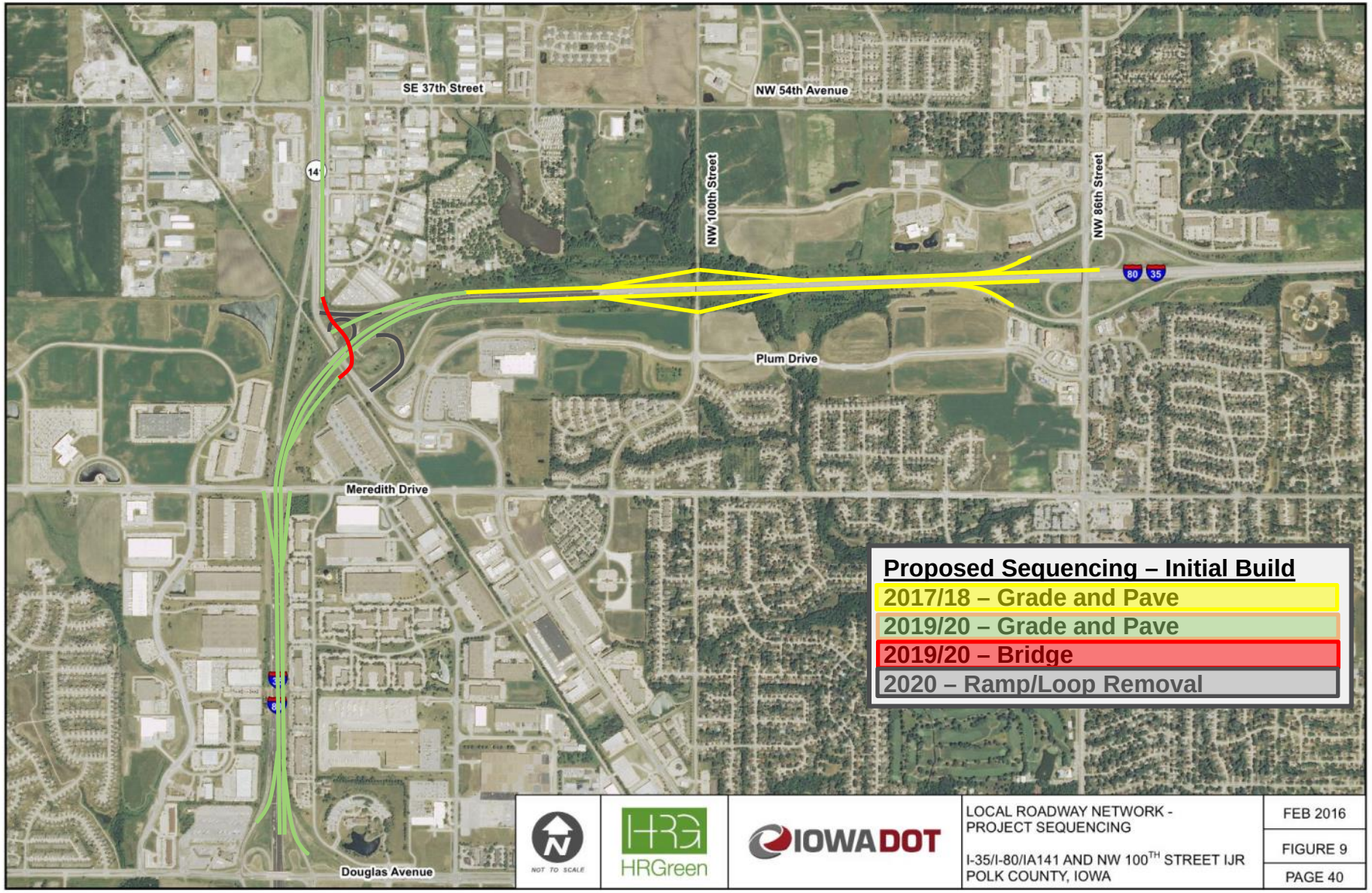
- Initial Build Way-Finding
- City improved NW Urbandale Drive/Meredith Drive Intersection



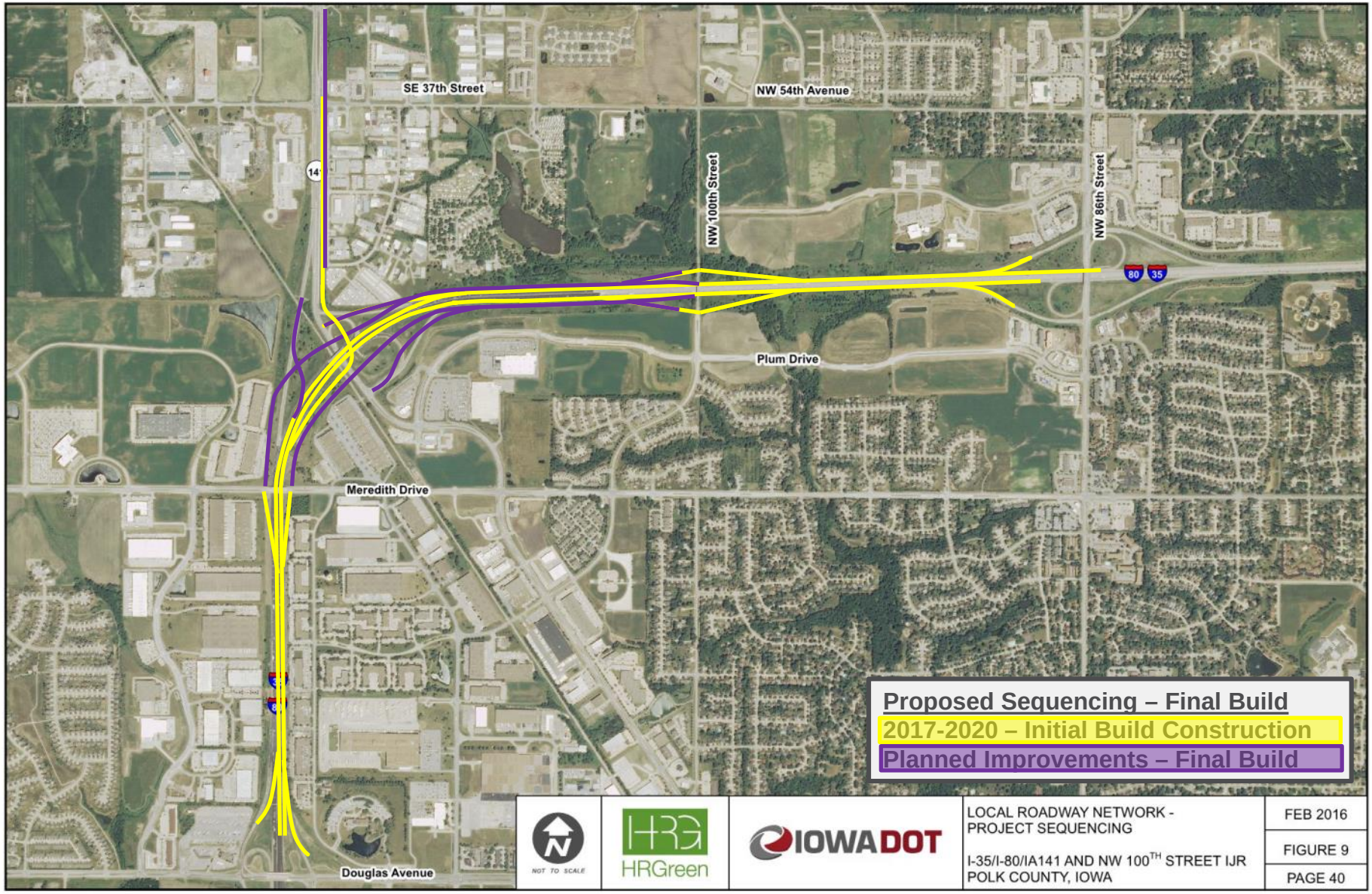
Viable Cost Model

- 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

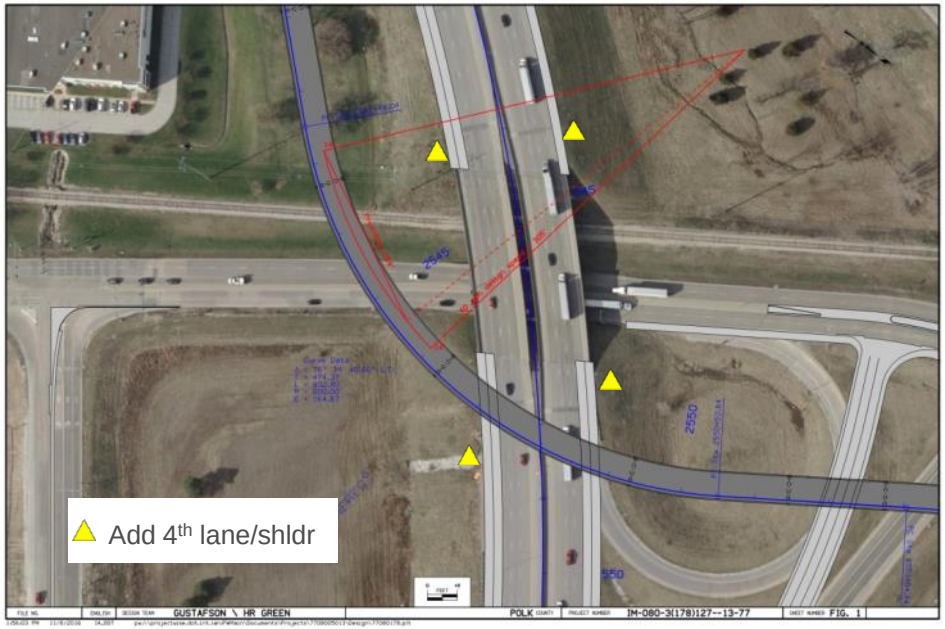


Project Sequencing for the Final Build of the Preferred Alternative



Practical Design Elements

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



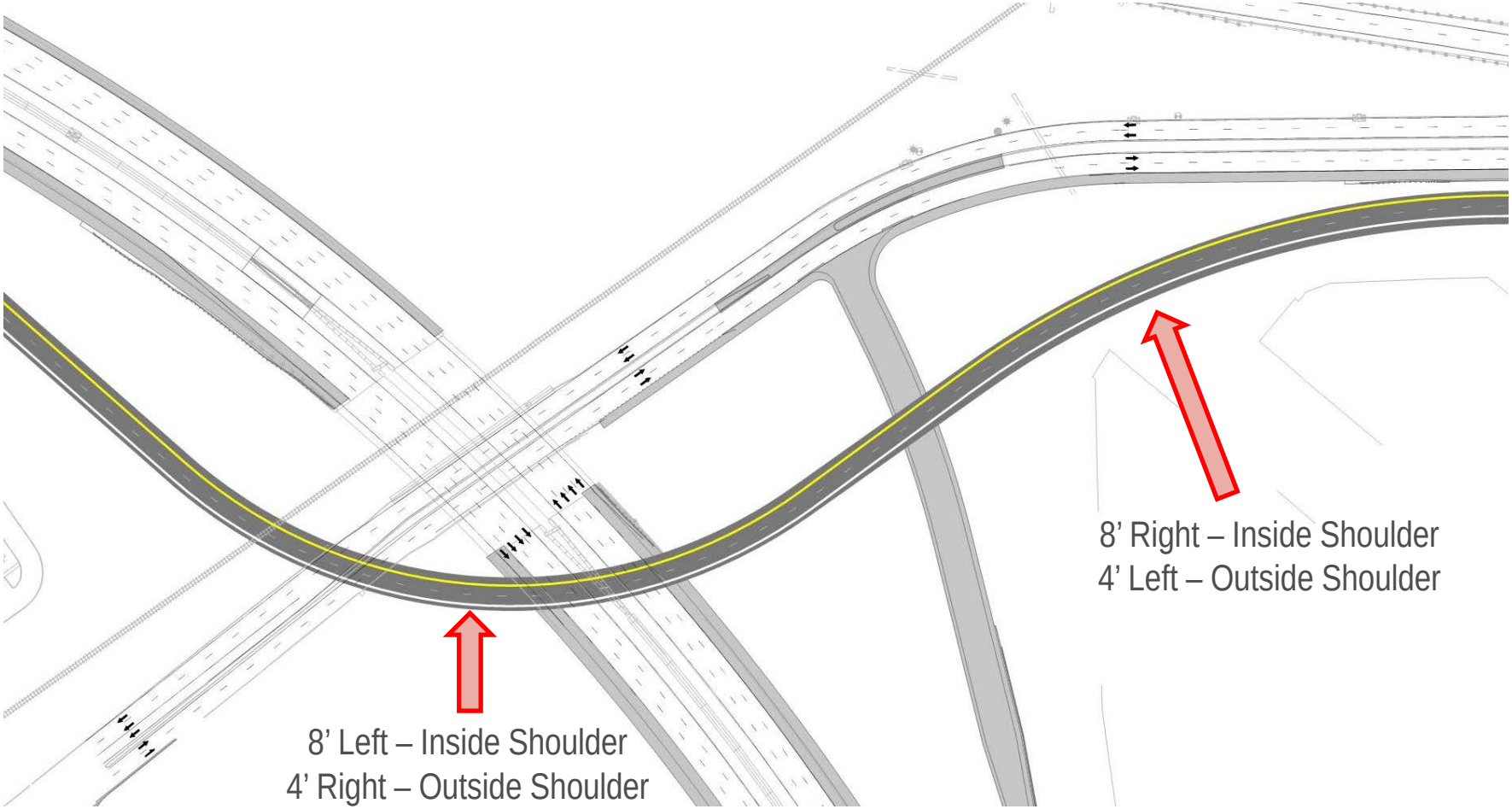
Flyover Geometric Design Criteria

Semi-Directional Ramp – 2 Lane – Design Criteria

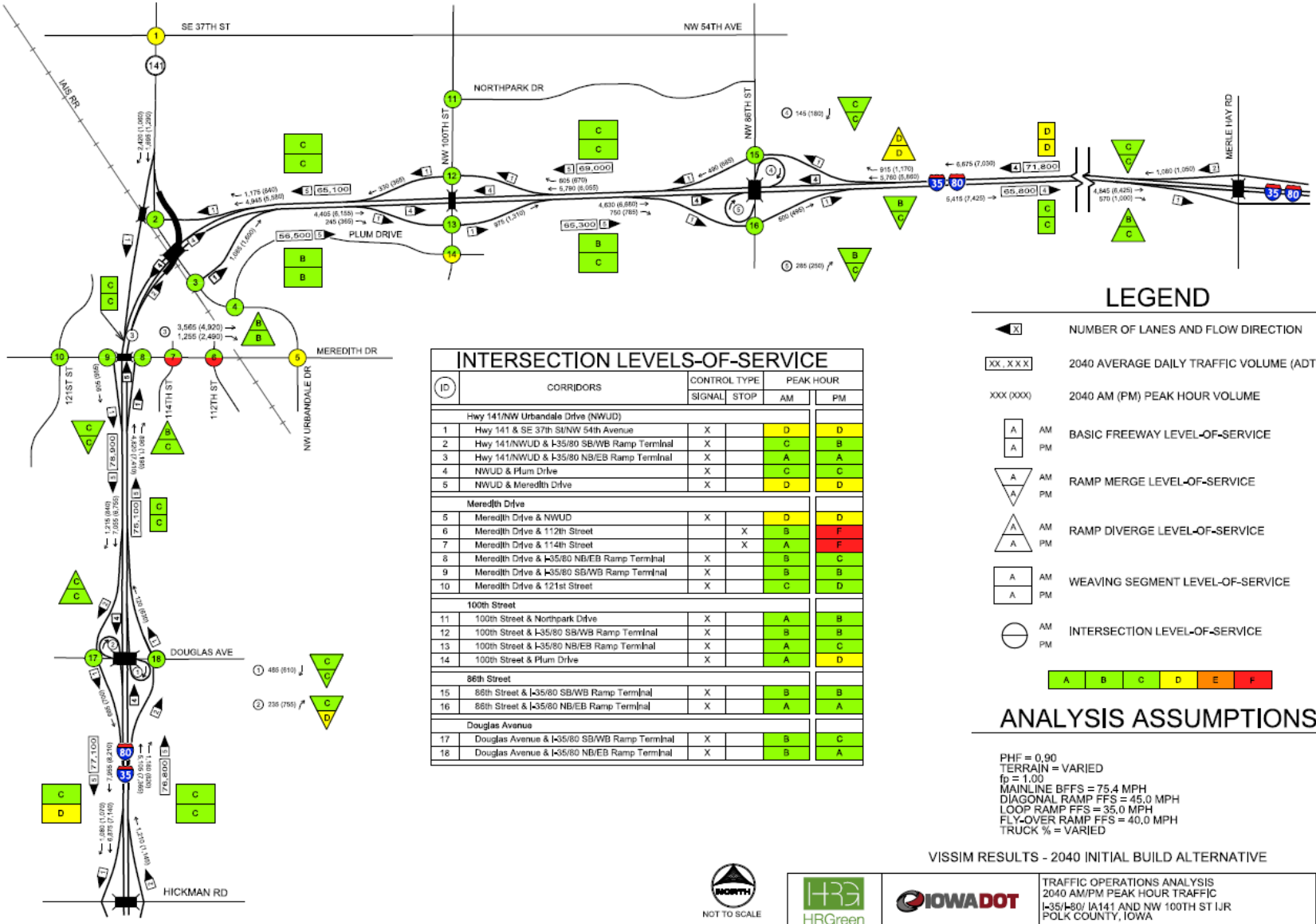
	Preferred	Acceptable	Project	Notes
Design Speed	50 mph	40 mph	40 mph	
Radius/Super e	1530'/5% 2480'/4%	950'/5% 1530'/4%	600'/3%*	*Low Speed Urban Criteria Winter conditions & inspection equipment
Shoulder - L/R	4'/6'	4'/6'	8'/4'	
Horiz SSD	425'	305'	254'*	*w/ 8' Shldr on Left. Adequate for 35mph. 44" Bridge Rail

Practical Design Elements

Flyover Bridge Pavement Markings – Sight Distance
Shoulder shift through tangent section



2040 Initial Traffic Operations



INTERSECTION LEVELS-OF-SERVICE

ID	CORRIDORS	CONTROL TYPE: SIGNAL	CONTROL TYPE: STOP	PEAK HOUR: AM	PEAK HOUR: PM
	Hwy 141/NW Urbandale Drive (NWUD)				
1	Hwy 141 & SE 37th St/NW 54th Avenue	X		D	D
2	Hwy 141/NWUD & I-35/80 SB/WB Ramp Terminal	X		C	B
3	Hwy 141/NWUD & I-35/80 NB/EB Ramp Terminal	X		A	A
4	NWUD & Plum Drive	X		C	C
5	NWUD & Meredith Drive	X		D	D
	Meredith Drive				
5	Meredith Drive & NWUD	X		D	D
6	Meredith Drive & 112th Street		X	B	F
7	Meredith Drive & 114th Street		X	A	F
8	Meredith Drive & I-35/80 NB/EB Ramp Terminal	X		B	C
9	Meredith Drive & I-35/80 SB/WB Ramp Terminal	X		B	B
10	Meredith Drive & 121st Street	X		C	D
	100th Street				
11	100th Street & Northpark Drive	X		A	B
12	100th Street & I-35/80 SB/WB Ramp Terminal	X		B	B
13	100th Street & I-35/80 NB/EB Ramp Terminal	X		A	C
14	100th Street & Plum Drive	X		A	D
	86th Street				
15	86th Street & I-35/80 SB/WB Ramp Terminal	X		B	B
16	86th Street & I-35/80 NB/EB Ramp Terminal	X		A	A
	Douglas Avenue				
17	Douglas Avenue & I-35/80 SB/WB Ramp Terminal	X		B	C
18	Douglas Avenue & I-35/80 NB/EB Ramp Terminal	X		B	A

LEGEND

- X — NUMBER OF LANES AND FLOW DIRECTION
- XX, XXX — 2040 AVERAGE DAILY TRAFFIC VOLUME (ADT)
- XXX (XXX) — 2040 AM (PM) PEAK HOUR VOLUME
- A / A — AM / PM — BASIC FREEWAY LEVEL-OF-SERVICE
- A / A — AM / PM — RAMP MERGE LEVEL-OF-SERVICE
- A / A — AM / PM — RAMP DIVERGE LEVEL-OF-SERVICE
- A / A — AM / PM — WEAVING SEGMENT LEVEL-OF-SERVICE
- AM / PM — INTERSECTION LEVEL-OF-SERVICE

A B C D E F

ANALYSIS ASSUMPTIONS

PHF = 0.90
TERRAIN = VARIED
fp = 1.00
MAINLINE BFFS = 75.4 MPH
DIAGONAL RAMP FFS = 45.0 MPH
LOOP RAMP FFS = 35.0 MPH
FLY-OVER RAMP FFS = 40.0 MPH
TRUCK % = VARIED

VISSIM RESULTS - 2040 INITIAL BUILD ALTERNATIVE

NORTH
NOT TO SCALE

HRGreen | IOWADOT

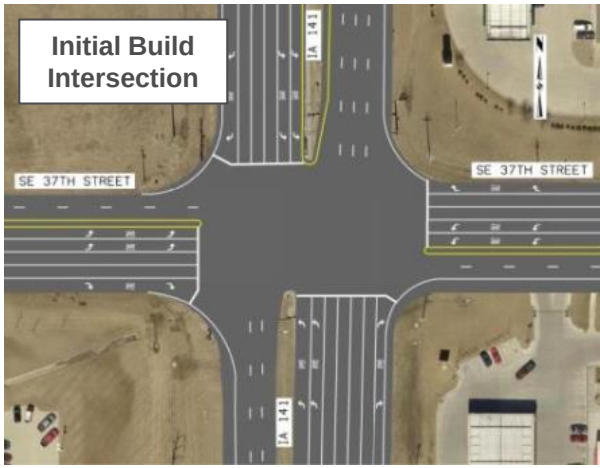
TRAFFIC OPERATIONS ANALYSIS
2040 AM/PM PEAK HOUR TRAFFIC
I-35/I-80/ IA141 AND NW 100TH ST IJR
POLK COUNTY, IOWA

FEB 2016
FIGURE 2.3-18
PAGE 119

Practical Design Elements

Initial Build at SE 37th

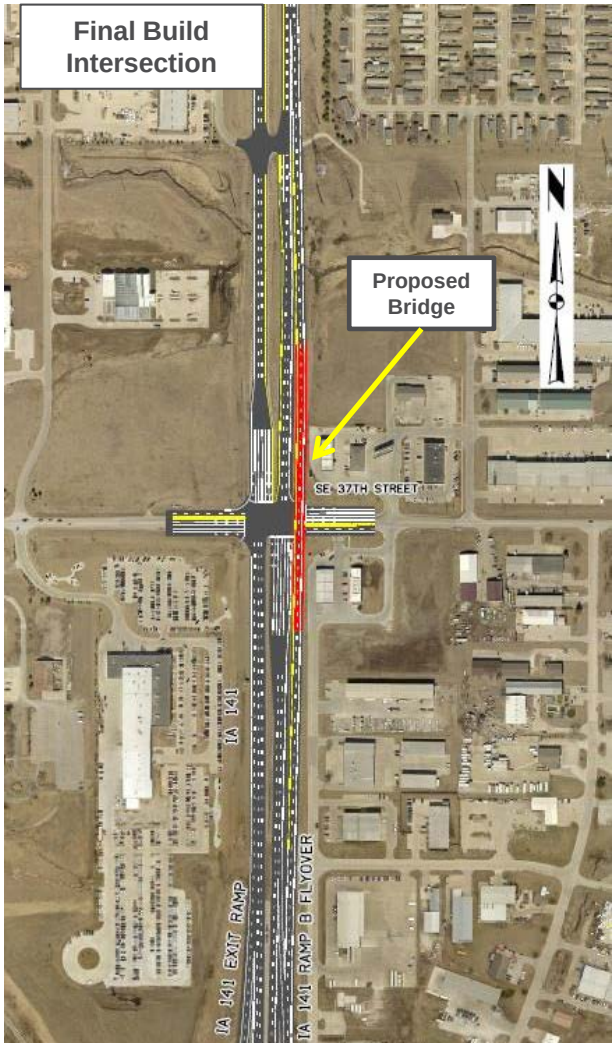
- Expanded intersection
- 1,200 foot weaving section from flyover
- VISSIM simulations
- Influenced flyover geometry



Practical Design Elements

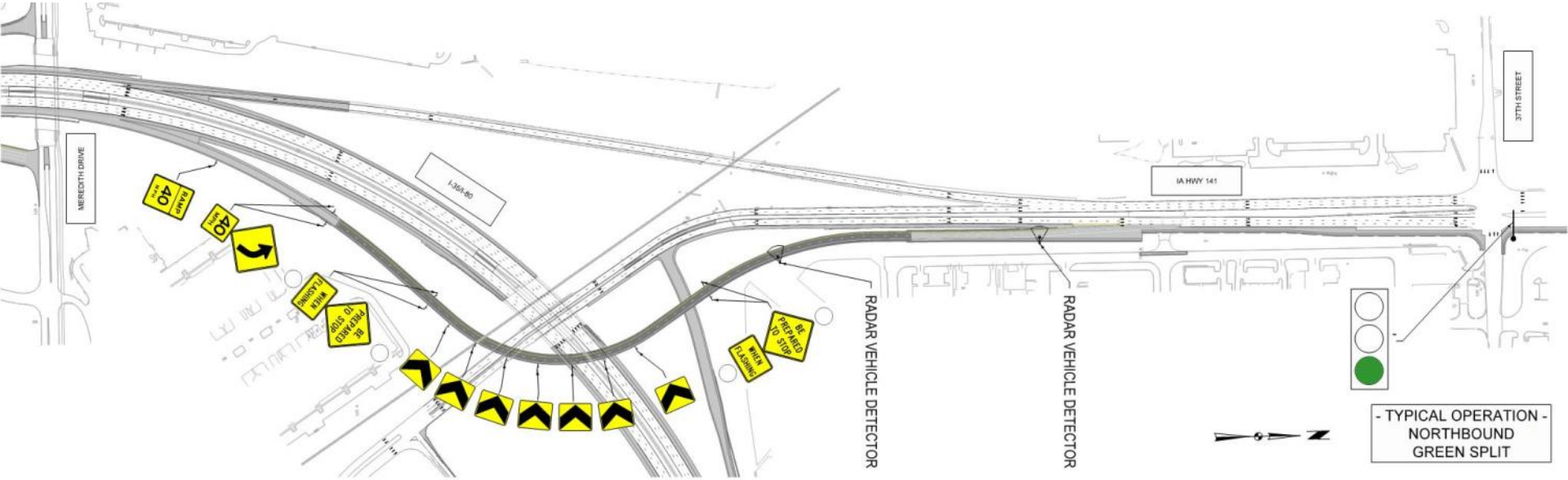
Final Build at SE 37th

- Bridge over for NB flyover traffic
- Mitigate queuing concerns



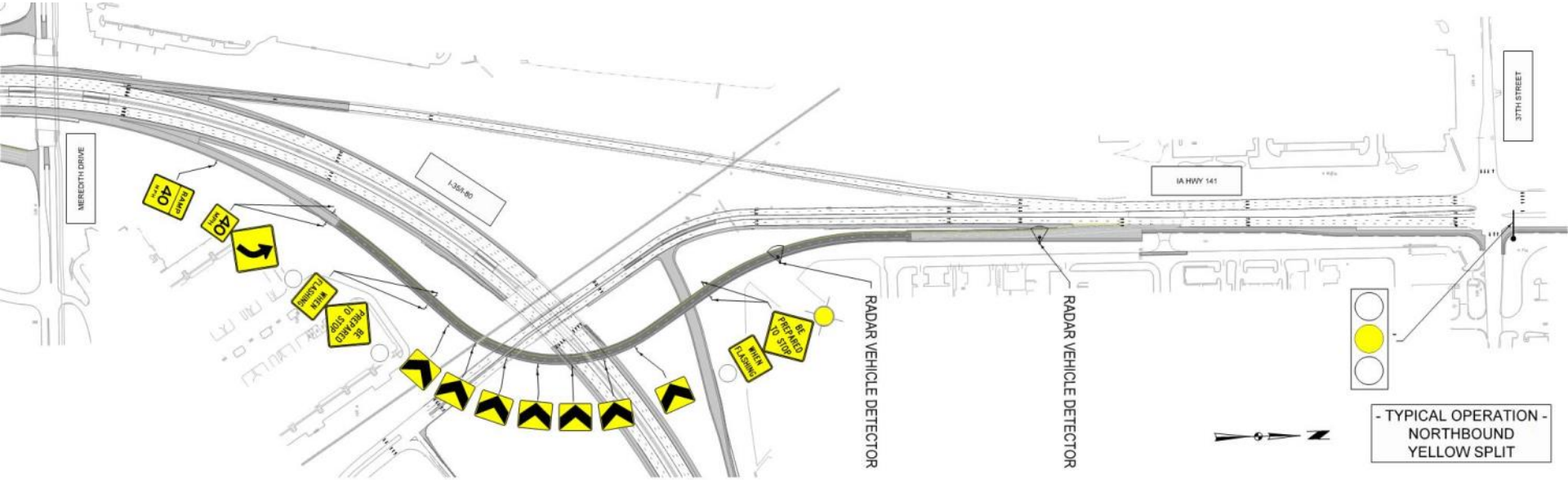
Practical Design Elements

Queue Detection Warning System



Practical Design Elements

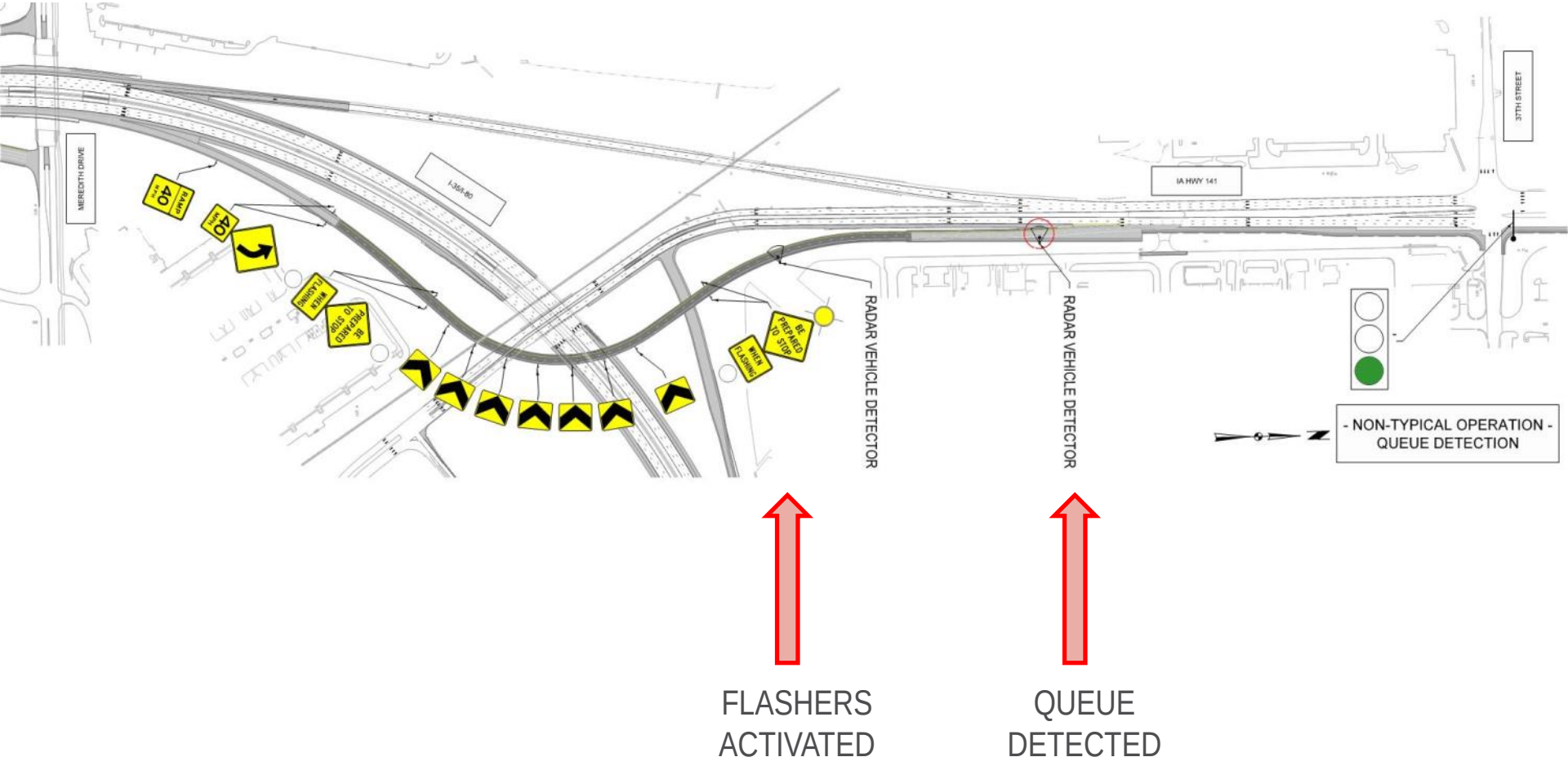
Queue Detection Warning System



FLASHERS
ACTIVATED

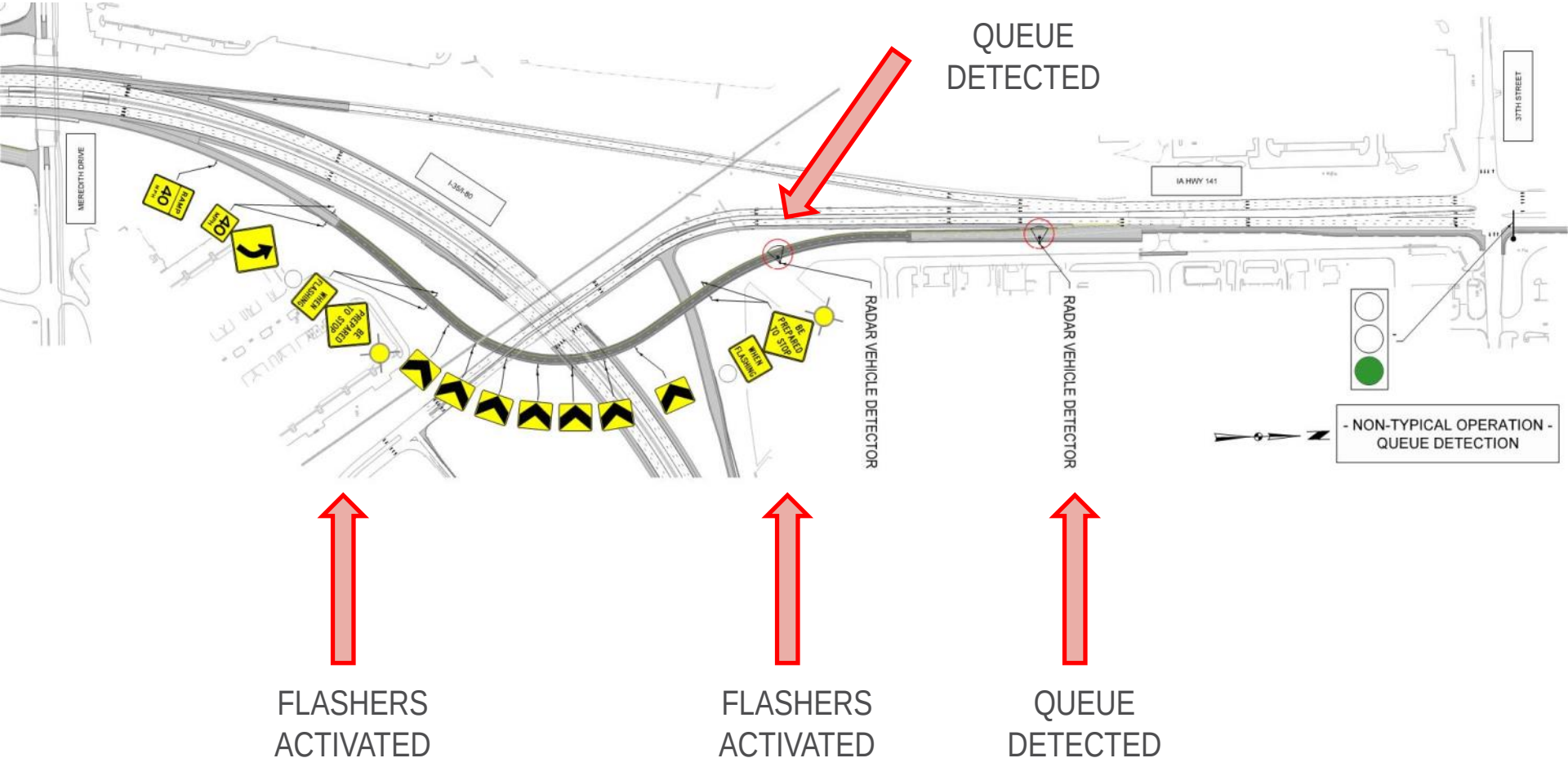
Practical Design Elements

Queue Detection Warning System



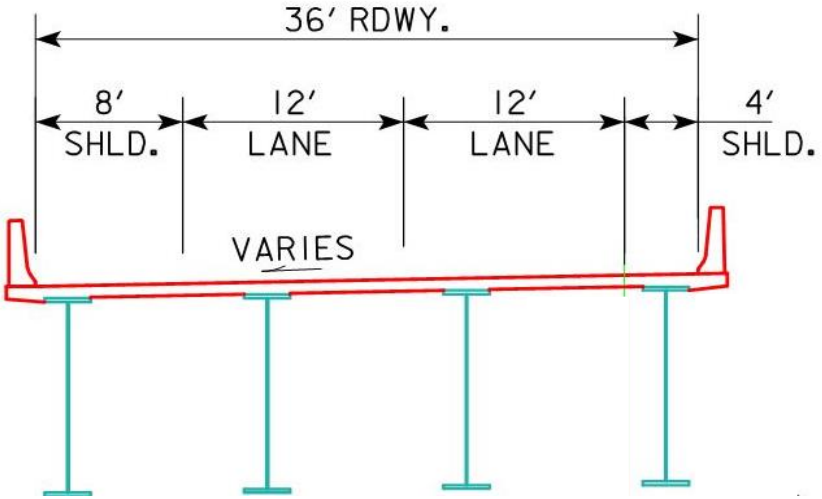
Practical Design Elements

Queue Detection Warning System

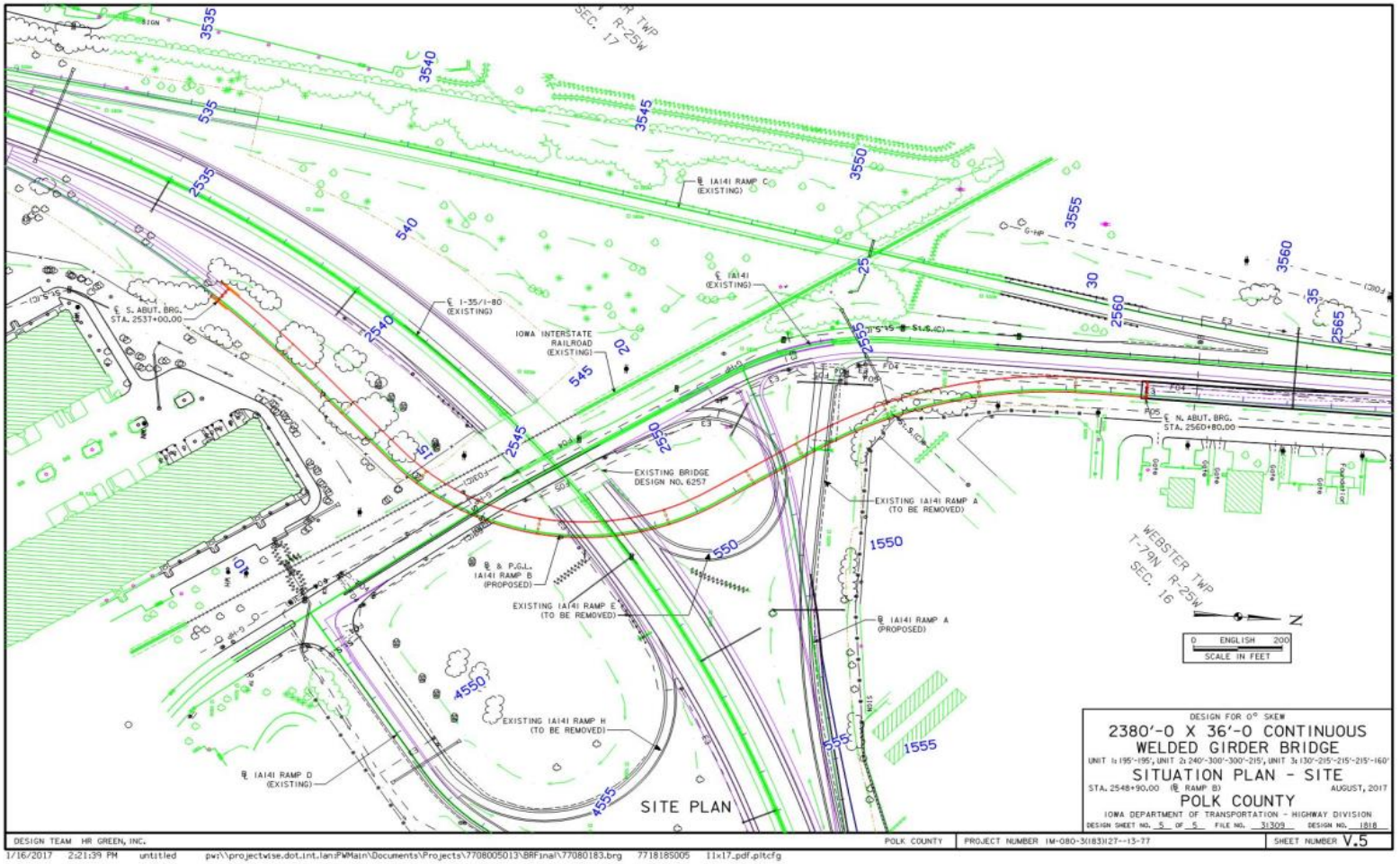


Design - Bridge Considerations

- 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



Design - Bridge Considerations



- 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

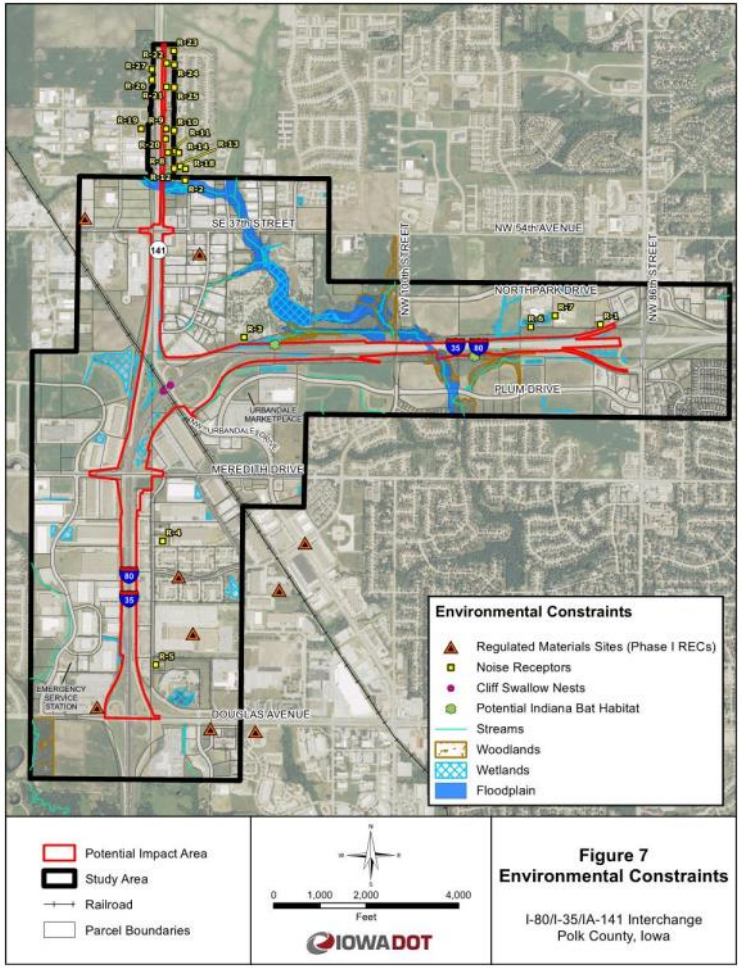
Design – Bridge Considerations

- 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

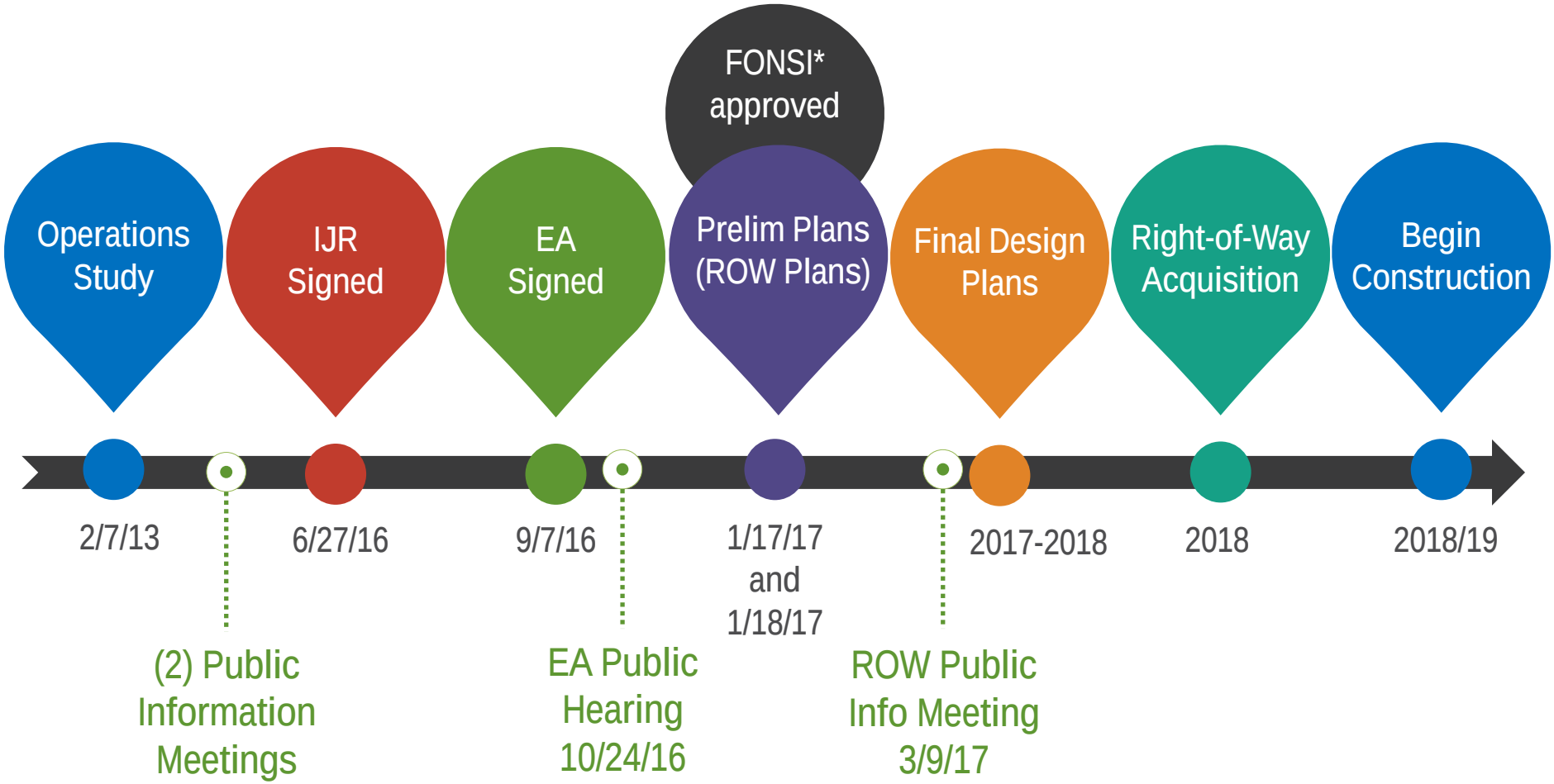
Environmental Assessment and Impacts – EA

Issue	No Build Alternative	Preferred Alternative
Right of Way Acquisition (acres)	0	8.5
Potential Displacements (number)	0	1 Building / 6 Tenants
Wetland Impacts (acres)	0	1.86
Surface Waters and Water Quality (linear feet)	0	948
Floodplains (acres)	0	1.9
Noise Impacts (number)	1	7
Utilities (number of crossings)	0	13
Visual	No Change	Minor Change

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



Project Development



*Finding of No Significant Impact

Questions from the Audience?

Contact Information

David Dougherty, PE
515.657.5265
ddougherty@hrgreen.com

Caroline Epperly, PE
636.812.4221
cepperly@hrgreen.com