

AECOM

US 52 / Southwest Arterial Project

2021 ACEC Transportation Conference

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US 52 / Southwest Arterial Project

- Connects US Hwy 20 with US Hwy 61/151
- 4-lane Divided Freeway (6.1 Miles)
- Priority 1 Access Control
- Three Interchanges
 - US Hwy 20, US Hwy 61/151,
 - N. Cascade Connector Road
- Construct Cost of \$160 Million

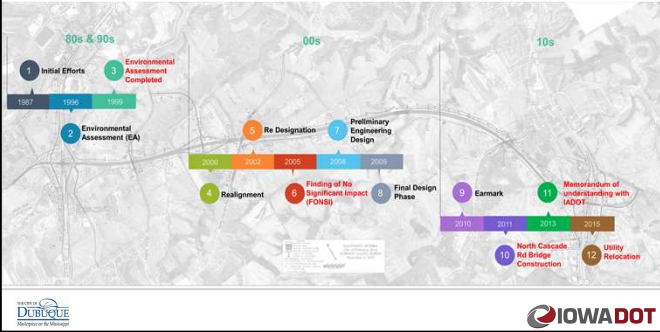
US 52 / Southwest Arterial Project

US 52 / Southwest Arterial Project - History

- 1987 - Cedar Cross Arterial Alignment
- 1996 - Policy makers and Iowa DOT determined an arterial farther to west would better serve community needs
- 1999 - Initial corridor alignment Environmental Assessment completed
- 2000 - Iowa DOT concluded SW Arterial should connect US 20 to US 61/151 further west of Seippel and west of FDR Park
- 2002 - Iowa DOT stopped work on the project
- May 2002 - the City executed an Agreement with the Iowa DOT for the City to take over SW Arterial



US 52 / Southwest Arterial Project



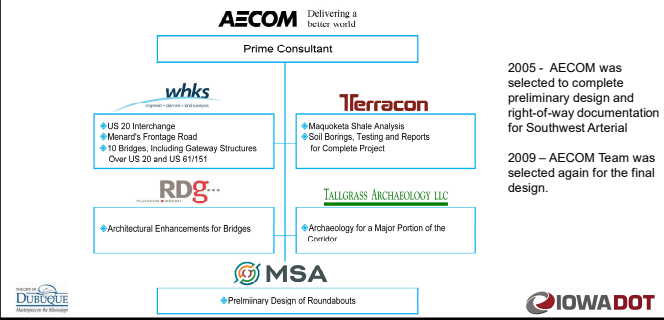
US 52 / Southwest Arterial Project

History and Timeline

- Environmental NEPA Clearance - Started 1999 / Completed 2004
- Preliminary Engineering Design - Started 2005 / Completed 2008
- Final Engineering Design - Started 2009 / Completed 2019
- Archaeological & Cultural Resource Mitigation - Completed 2019
- Construction - Started 2009 / Completed 2020



US 52 / Southwest Arterial Project Team



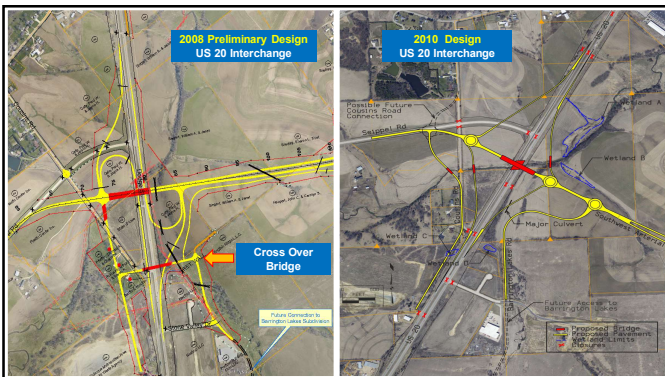
US 52 / Southwest Arterial Project

Value Engineering Workshop (Completed in 2009)

- AECOM Team Completed Workshop as First Task to Review the Preliminary Design Completed by Others
- Workshop Lasted a Week and Included Highly Experienced Road Designers, Structural Engineers, Planners and Contractors
- Included Presentation to the City of Dubuque and Value Engineering Report
- The Result Was Over \$8 million in Cost Savings

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US 52 / Southwest Arterial Project – Property Acquisition

56 Partial Acquisitions
12 Total Acquisitions
93 Affected Parcels

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US 52 / Southwest Arterial Project

25 Construction Contracts - \$160 Million

North Cascade Road Bridge	2011	SWA East Grading, Phase I (from Military Road to EOP)	2017	SWA East Grading, Phase II (from Catfish Creek to Military Road)	2018
North Cascade Road Grade and Pave	2011	SWA West Grading (from U.S. 20 Interchange to Catfish Creek)	2017	Enhancements (N.C. Rd. Bridge, E.M. Rd. Bridge and Mill Rd. Bridge)	2018
Triple RCB at Granger Creek	2015	Military Road Grade, Pave and Bridge	2017	U.S. 20 Interchange Paving	2019
English Mill Road Grade, Pave and Bridge	2015	US 20 Interchange, EB Ramp 'C' Bridge	2018	U.S. 61/151 paving (from Catfish Creek to EOP)	2019
Menard's Frontage Road	2016	U.S. 20 Bridges Over Catfish Creek	2018	SW Arterial paving (from U.S. 20 interchange to Catfish Creek)	2019
U.S. Hwy. 20 Interchange Grading	2017	Southwest Arterial Bridge Over U.S. Hwy. 20	2018	EB Bridge over Catfish Creek	2019
US 20 Interchange, WB Ramp 'D' Bridge	2017	Southwest Arterial Bridges Over U.S. Hwy. 61	2018	N. Cascade Road Connector Bridge	2019
Paving WB Ramps, U.S. Hwy. 20 Interchange	2017	Elmwood Drive Bridge Over Granger Creek	2018		
SWA East Grading (Tree Felling Project)	2017	WB bridge over Catfish Creek	2018		

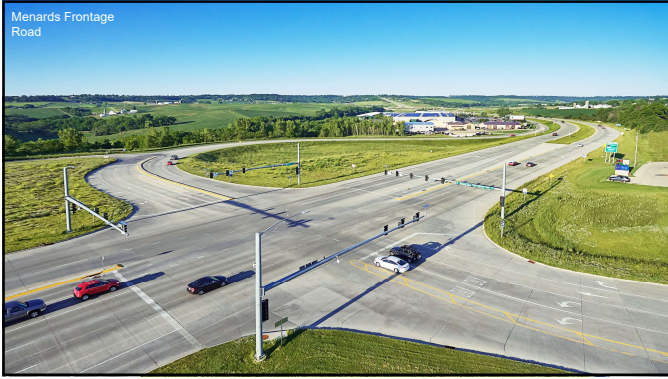
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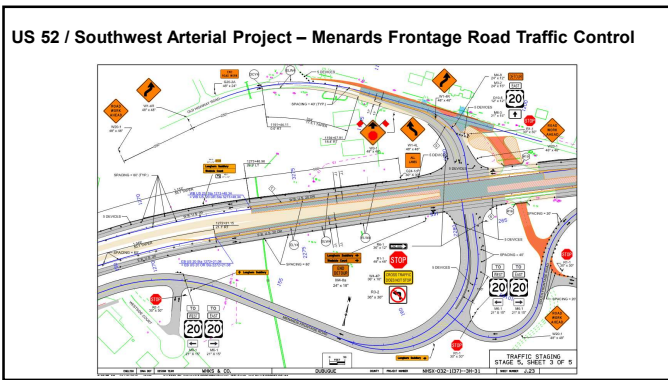
Menards Frontage Road

Project included relocating Menards entrance off of US 20 north to Old Hwy. Road and constructing frontage road.

- WHKS & Co. Led the Design
- Designed and Constructed to Maintain 23,000 VPD on US 20
- Maintained 4-lanes of Traffic on US 20 Throughout Construction
- 44,000 SY of Paving and 12,000 SY of Temp Paving
- Let in June of 2016 / Construction Cost of \$9.8 million

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US 20 Interchange
 The US 20 Interchange is the western beginning of the Southwest Arterial. The features of this interchange include:

- WHKS & Co. Led the Design, MSA Preliminary RDBT Design and RDG with Lighting and Aesthetics
- Designed and Constructed to Maintain 23,000 VPD on US 20
- 8 Separate Contracts and 5 Bridges
- First Letting in July of 2016 / Construction Cost of \$34 million

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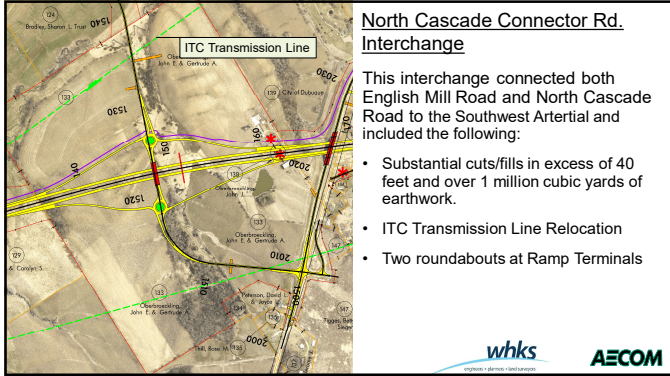
Southwest Arterial / US20 Interchange
Roundabout



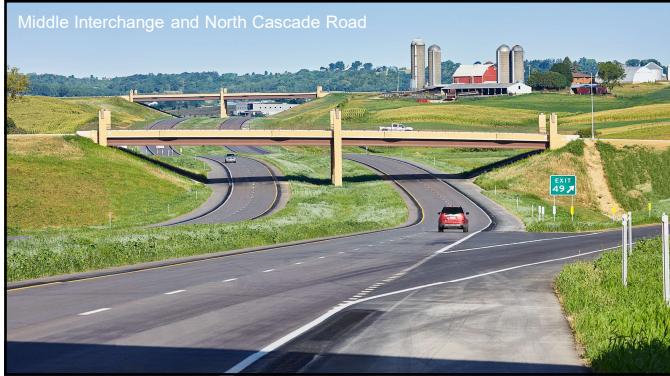
Southwest Arterial / US20 Interchange
Video – Provided by the City of Dubuque

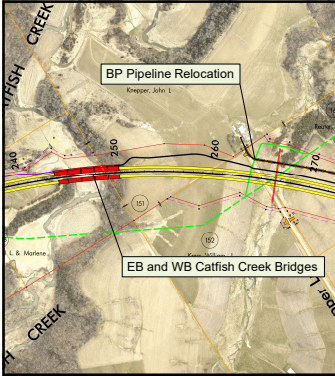












Catfish Creek Crossing

The natural halfway point in the Southwest Arterial is the Catfish Creek Crossing.

- Two bridges that traverse the Catfish Creek valley that are over 70 feet above the valley floor.
- Rock cuts highlighting the geology of the area.
- Architectural enhancements and shared-use path accommodation.
- BP Pipeline relocation required an agreement and coordination.







EB and WB Catfish Creek Bridges



US 61 / 151 Interchange



The US 61/151 interchange includes a folded diamond interchange with controlled intersections with Elmwood Drive and Tamarack Drive.

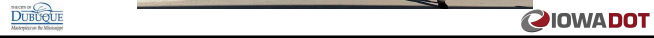
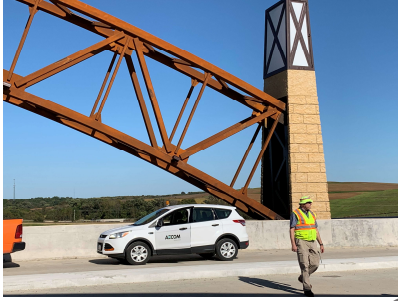
- Closed Three At-Grade Access Locations Along US 61/151
- AECOM provided the preliminary and final design of the interchange and sideroads, Elmwood Drive Bridge and the wetland mitigation site.
- WHKS completed the design of the Gateway Bridge over US 61/151 and the Triple 12'x12' box culvert.



Elmwood Drive Bridge Over Granger Creek

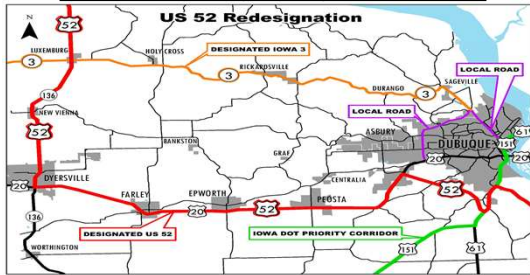


Roger Walton, PE - Iowa DOT District 6

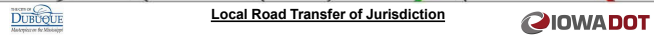
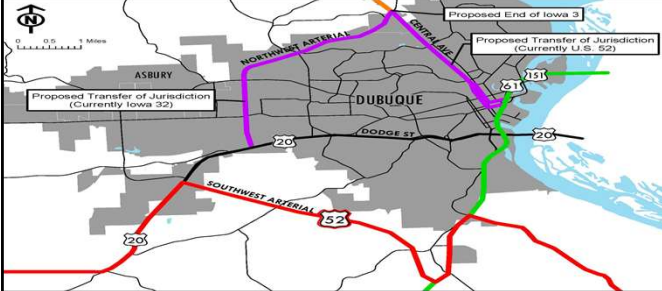


US 52 / Southwest Arterial Project

Transfer of Jurisdiction - Agreement Signed, November 17, 2016



US 52 / Southwest Arterial Project




THE CITY OF **DUBUQUE** *Masterpiece on the Mississippi* **US52 / Southwest Arterial** **IOWA DOT**
 Memorandum of Understanding

City Responsible to Complete	
Final Engineering Design	North Cascade Rd Reconstruction
Property Acquisition	English Mill Rd Reconstruction
Utility Relocations	Military Road Reconstruction


Southwest Arterial - Geology

Project Delayed in the 1980s due to Geology

- Karst Topography
- Vertical Mine Shafts
- Maquoketa Shale



IOWA DOT

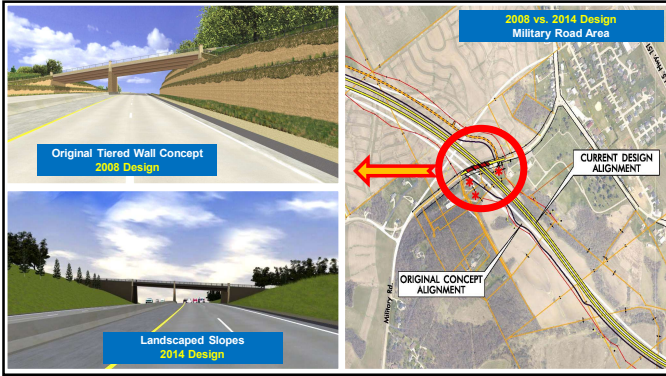


Southwest Arterial - Geology

Maquoketa Shale

- Area covered with eight to ten feet of water
- Volcanos in the middle of the Atlantic Ocean
- Westward prevailing winds over the area led to a layer of ash
- The volcanic ash has always been wet
- Construction
 - Flat backslopes
 - The shale had to be drained
 - \$ 1 million in soil nails

IOWA DOT





Southwest Arterial – Project Accomplished

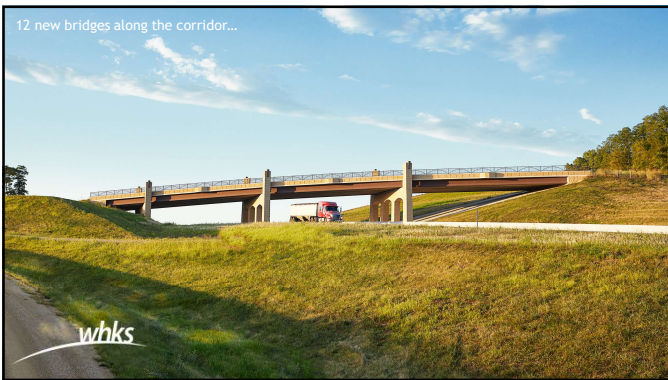
Nearly 40 years after it was originally proposed, the U.S. 52 project, known to locals as the Southwest Arterial, in Dubuque is nearing completion. The joint project between the Iowa Department of Transportation and the City of Dubuque proves that perseverance pays off.

Connecting local industrial centers to each other and the rest of the Midwest and the world is the driving force for completion of this 6.1-mile, four-lane divided freeway that will provide a modern transportation alternative through southwestern Dubuque, linking the Dubuque Technology Park on US 61/151 with the new Dubuque Industrial Center West and the existing Dubuque Industrial Center near U.S. 20.

Dubuque Industrial Park

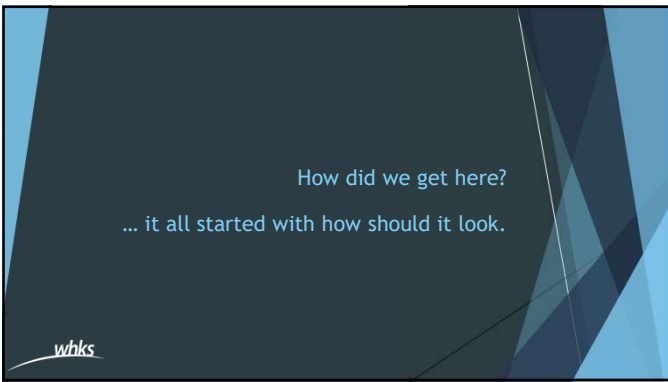
<https://www.transportationmatters.iowadot.gov/2019/12/us-52-dubuques-sw-arterial-they-said-it-couldnt-be-built.html>



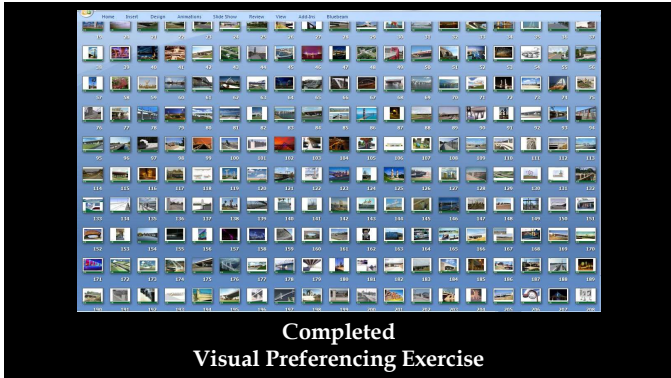




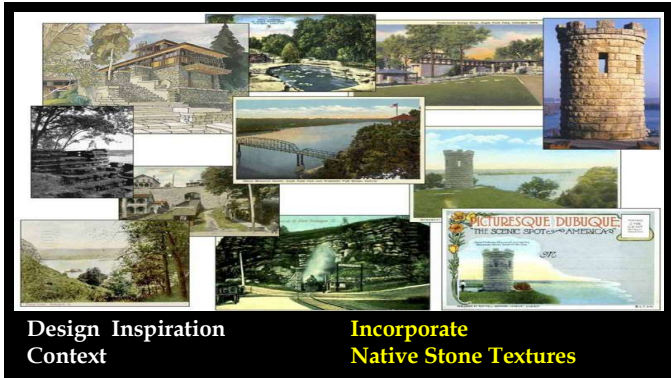














How can we make this work?

Long spans - 150'+ and 200'+
 Balance aesthetics
 Large truss over major highways - US 20 and US 151/61

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Design Criteria

Started with a call to the Bridges and Structures Bureau...

Relevant Codes & Design Guides

- AASHTO LRFD Bridge Design Spec. 2014 (AASHTO LRFD)
- AASHTO LRFD Spec. for Structural Supports for Highway Signs, Luminaires, and Traffic Signals (2015 w/ 2017 Interims), (AASHTO LTS)
- Iowa DOT Bridge Design Manual Sec. 10 - Sign Supports (BDM)
- CIDECT (International Committee for the Development and Study of Tubular Construction) Design Guide 3 for Rectangular Hollow Section (RHS) Joints Under Predominantly Static Loading. [STI]
- CIDECT Design Guide 8 for Circular and Rectangular Hollow Section Welded Joints Under Fatigue Loading

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Structural Configurations

- ▶ Option 1 - Single member tube top and bottom chord truss - too massive 26"
- ▶ Option 2 - Double member tube top and bottom chord truss - still double 16"
- ▶ Option 3 - Use W-shape chords - too flexible for long span
- ▶ Option 4 - Space frame truss - down to 12" chords



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Design concept complete! Time to get buy in.

- RDG - aesthetics
- City - aesthetics, maintenance
- IDOT - safety, maintenance

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Design Meeting with RDG...then City



Decisions:

- ✓ Radial Design Selected
- ✓ Weathering Steel Selected


Continued Evaluation:

- Weathering Steel Staining Control & Clean-up
- Inspection & Maintenance Access
- Salt Spray

Concept complete! Time to get buy in

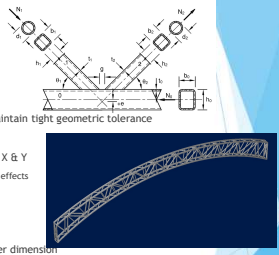

- RDG - aesthetics
- City - aesthetics, maintenance
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→ Schedule a presentation meeting

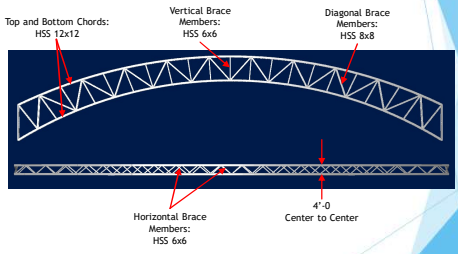



IDOT Review Meeting

- ▶ Design Considerations
 - ▶ Space Truss Option
 - ▶ Connection layout - weld unless field splice to maintain tight geometric tolerance
 - ▶ Finite Element Model - verified with hand calcs.
 - ▶ Boundary Conditions - bottom pinned, top free in X & Y
 - ▶ Reduced large compressive force from temperature effects
- ▶ Loading
 - ▶ Wind - used various codes for max wind impacts
 - ▶ Ice - based on BDM
- ▶ Truss Width - balance with impacts on tapered pier dimension
- ▶ Deflection Limits - various codes, max calculated 200' span: 1.4" vert, 1.9" horiz.
- ▶ Fatigue - Design for Infinite Fatigue Life...max stresses: 4.5ksi chords, 1.5 ksi cross members

Preliminary Structural Layout

Work with Pedestrian Bridge Fabricators

- ▶ Loading/Economy - balancing aesthetics with economy
- ▶ Shipping - with the arch, how can we splice into 3 sections
- ▶ Staging/Sequencing - contractor options:
 - ▶ 3 cranes, splice in air
 - ▶ Assemble on ground, set in one piece
 - ▶ Lowering into boxout on side of pier



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Arch Installation

Time Lapse Video of Architectural Arch Installation



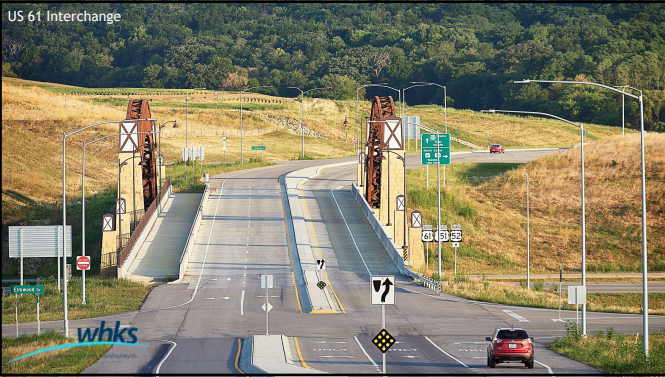
Time Lapse of Architectural Arch Installation on US 61-151 Overpass 7/16/2019

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US 20 Interchange

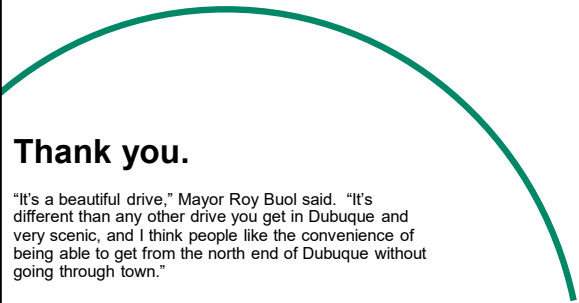


US 61 Interchange



US 61 Interchange






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Thank you.

"It's a beautiful drive," Mayor Roy Buol said. "It's different than any other drive you get in Dubuque and very scenic, and I think people like the convenience of being able to get from the north end of Dubuque without going through town."

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