I-35/80 & US6 (Hickman Road) Interchange Reconstruction

ACEC

Nathan Carhoff, Snyder & Associates
Matthew Cushman, Terracon
Garret Menard, HDR
Frank Leong, Iowa DOT

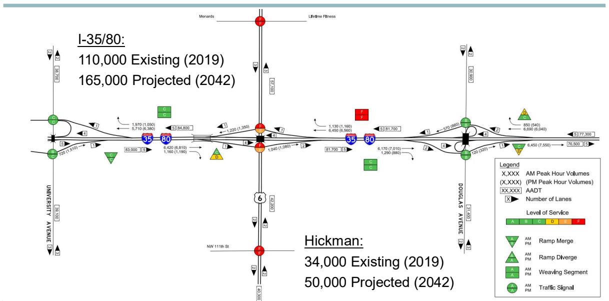
September 26, 2025

Project Stat Sheet

Project Stat Sheet

$138,000,000 Total Project Cost	$11,500,000 Local Participation
430,000 CY Earthwork	220,000 SY Pavement
12,000 LF Storm Sewer	160 Storm Sewer Structures
5,900 CY Structural Concrete	6,028,000 LB Structural Steel
23,500 LF Pile	47,000 LF ITS Conduit
27 Miles of Temporary Barrier Rail	4-Year Construction Timeline

Project Need



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Project Need:

Location	Design Element	Design Guidance Preferred (Acceptable)	Source	Existing Condition	Comments
	Minimum rate of vertical curvature (K): Sag Location	181 (181) at 70 mph	Iowa DOT	104	Does not meet acceptable design criteria. **Curve only provides 455 feet of stopping sight distance, 730 feet is required.**
	Foreslope adjacent to shoulder	10:1 for 4' then 6:1 (4:1)	Iowa DOT 1C-1 AASHTO (2011)	4:1	Lacks 10:1 slope from edge of shoulder and 6:1 slope to clear zone, meets AASHTO minimum.
	Overhead Sign Vertical Clearance	17.5' (17')	Iowa DOT 1C-1	17'	Overhead signs (4) south of U.S. 6 interchange do not meet preferred criteria, meets acceptable criteria.
	Steel Beam Guardrail End Terminal	AASHTO MASH TL-3	Iowa DOT SRP BA-205 AASHTO (2011)	NCHRP 350	Guardrail was replaced in 2013, Iowa DOT has recently updated standard road plans to reflect MASH approved end terminal. FHWA does not require replacement.
I-35/I-80 Bridges over US 6	Vertical Clearance	16.5' (16')	Iowa DOT 1C-1	15'-11"	SB/WB Bridged does not meet acceptable criteria for vertical clearance.
	Shoulder Width - Right	12' (12') 12' (10') Truck DDHV > 250	Iowa DOT AASHTO (2011)	10'	10' does not meet Iowa DOT acceptable criteria for shoulders along through lanes, but meets AASHTO minimum
University Avenue Interchange Ramps	Distance between consecutive ramps (entrance-exit)	1,600'	AASHTO (2011)	1,270' (Ramp A)	**Does not meet recommended minimum ramp terminal spacing**
US 6 Interchange Ramps	Maximum Gradient	4% (5%)	Iowa DOT	4.14% (Ramp A) 4.33% (Ramp B) 4.98% (Ramp D)	Ramps do not meet preferred criteria for maximum grade, acceptable criteria is achieved.
	Minimum Gradient	0.5% (0%) Without Curb	Iowa DOT	0.38% (Ramp C)	Ramp C do not meet preferred criteria for minimum grade, acceptable criteria is achieved.
	Minimum rate of vertical curvature (K): Crest Location	151 (151) at 60 mph	Iowa DOT	61 (Ramp B)	Does not meet preferred or acceptable criteria. **Curve only provides 363 feet of stopping sight distance, 570 feet is required.**
	Distance between consecutive ramps (entrance-exit)	1,600'	AASHTO (2011)	1,270' (Ramp C)	**Does not meet recommended minimum ramp terminal spacing**

Location	Design Element	Design Guidance Preferred (Acceptable)	Source	Existing Condition	Comments
	Foreslope adjacent to shoulder	10:1 for 4' then 6:1 (4:1)	Iowa DOT AASHTO (2011)	4:1 (All Ramps)	Lacks 10:1 slope from edge of shoulder and 6:1 slope to clear zone, meets acceptable criteria.
Douglas Avenue Interchange Ramps	Maximum Gradient	4% (7% -30 mph loop)	Iowa DOT	4.18% (Ramp E)	Entrance Loop Ramp E do not meet preferred criteria for maximum grade, acceptable criteria is achieved.
	Minimum Gradient	0.5% (0%) Without Curb	Iowa DOT	0.26% (Ramp A) 0.48% (Ramp C) 0.02% (Ramp D)	Ramps do not meet preferred criteria for minimum grade, acceptable criteria is achieved.
	Minimum horizontal curve radius - 6% superelevation	231' (231') at 30 mph 144' (144') at 25 mph	Iowa DOT	164' (Ramp E) (Ramp F)	Entrance loop ramps do not meet preferred design criteria for horizontal curvature at preferred 30 mph design speed. Acceptable criteria is achieved.
	Vertical Curvature - minimum curve length	90' at 30 mph (75' at 25 mph)	Iowa DOT	66' (Ramp E) (Ramp F)	Entrance loop ramp vertical curves do not meet preferred or acceptable criteria. Meets stopping sight distance criteria.
	Acceleration length	1,420' 25 mph to 70 mph 1,350' 30 mph to 70 mph	AASHTO (2011)	1,181' (Ramp E) 1,180' (Ramp F)	**Entrance loop ramp acceleration lengths do not meet preferred or acceptable criteria.**
	Foreslope adjacent to shoulder	10:1 for 4' then 6:1 (4:1)	Iowa DOT AASHTO (2011)	6:1 (All Ramps)	Lacks 10:1 slope from edge of shoulder, meets acceptable criteria.
US 6	Right Turn Lane Width	12' (10')	Iowa DOT	10' (Lifetime Fitness/ Loves Intersection)	Right turn lanes do not meet preferred criteria, acceptable criteria is achieved.
	Foreslope adjacent to shoulder	10:1 for 4' then 6:1 (3:1)	Iowa DOT	3:1	Lacks 10:1 slope from edge of shoulder and 6:1 slope to clear zone, meets acceptable criteria.
	Effective Shoulder Width: Outside	10' with 6' Paved (8' with 2' Paved)	Iowa DOT	3' Paved Within I/C 10' (2' Pvd) East of I/C	Existing shoulders through the interchange and east of the interchange do not meet preferred criteria. East of the interchange, meets acceptable criteria

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Roadway / Interchange Design

Image Courtesy of Google Earth - 2024

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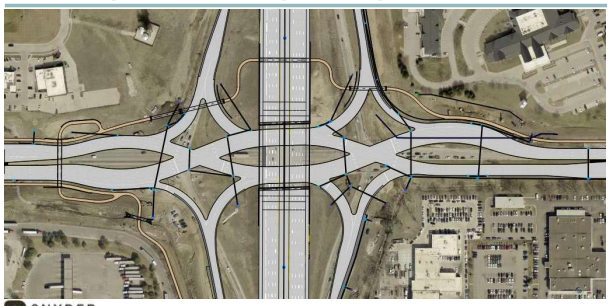
Roadway / Interchange Design



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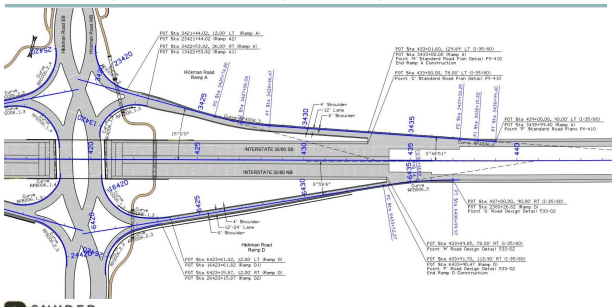

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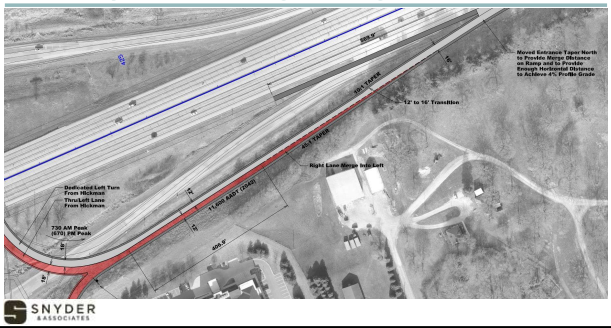

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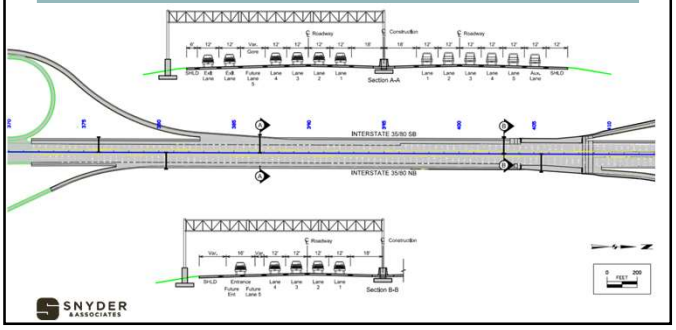

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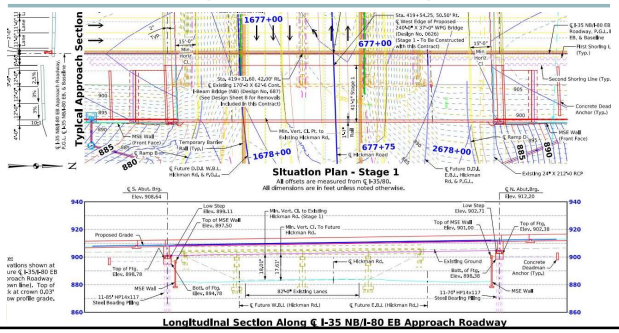
Structural Design: Hickman Bridge



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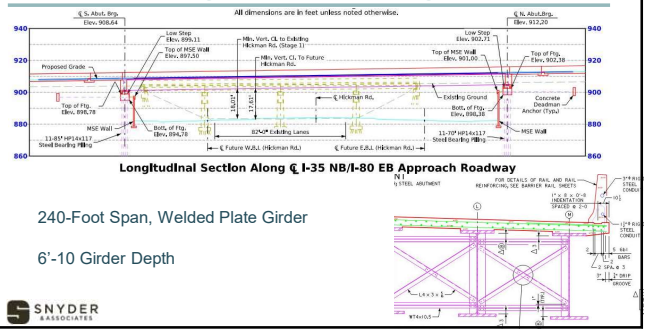

240-Foot Span, Welded Plate Girder

6'-10 Girder Depth

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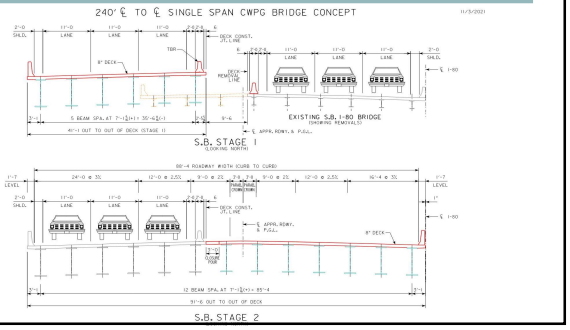

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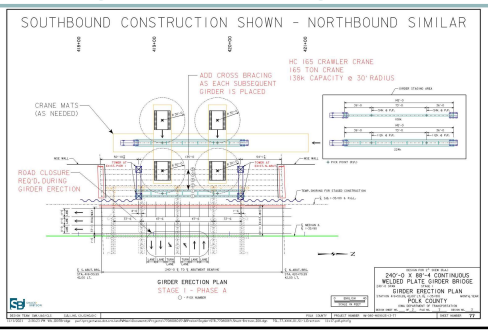

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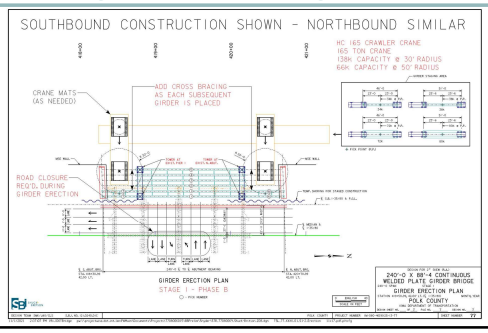

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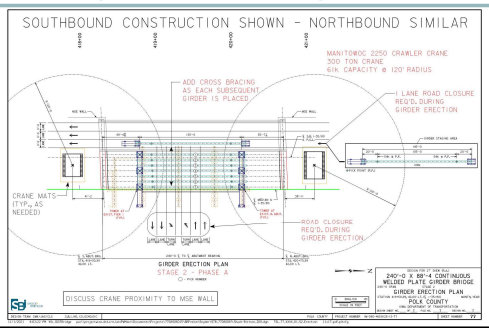
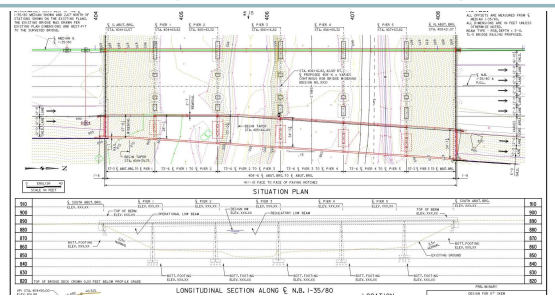


Structural Design: Walnut Creek Bridge



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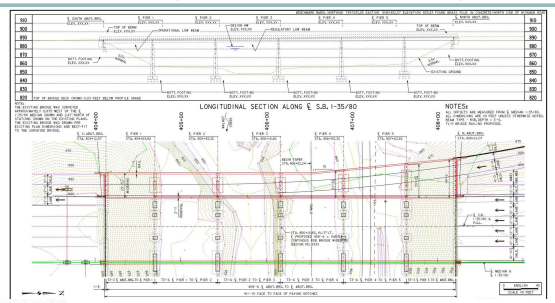

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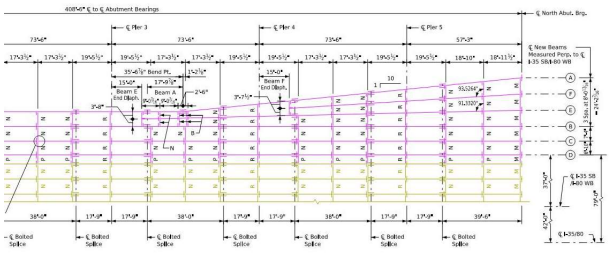

Structural Steel Framing Plan

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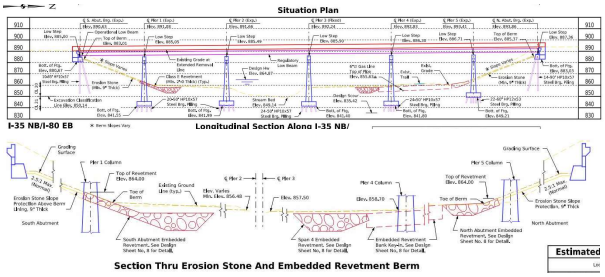

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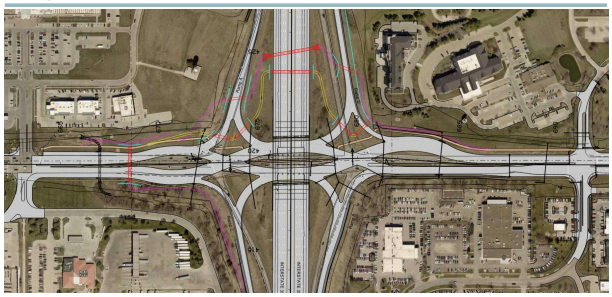
Bicycle / Pedestrian Accommodations



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Landscaping & Aesthetics

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Concept Aesthetics & Landscape Elements – August 2022

Landscaping & Aesthetics

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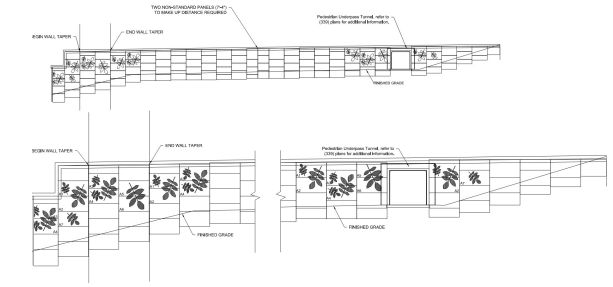
Landscaping & Aesthetics



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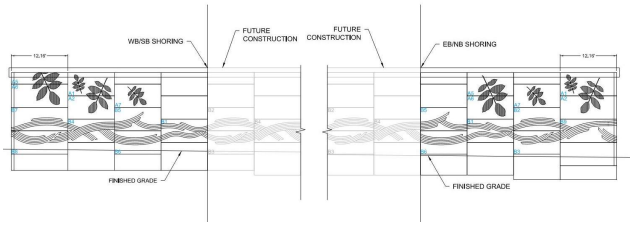

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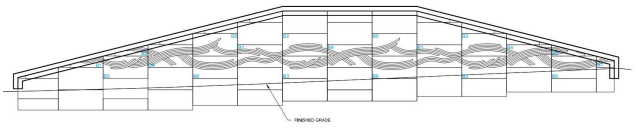

MSE WALL D1 AESTHETIC DETAILS

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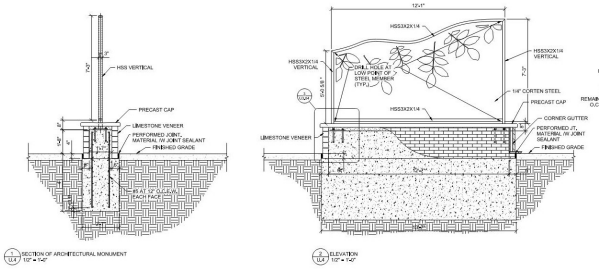

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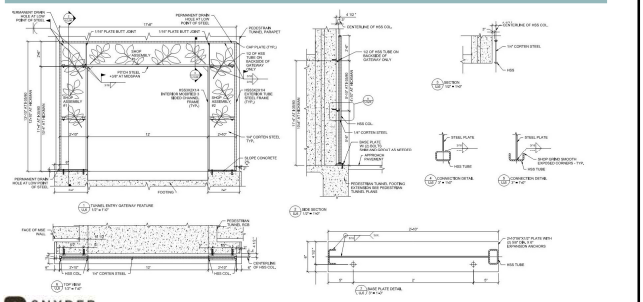

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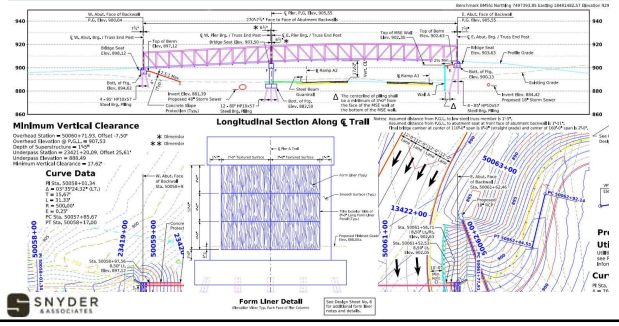

Geotechnical Challenges

I-35/80 & Hickman Road Interchange

2025 ACEC-IA + Iowa DOT + FHWA
Iowa Transportation Conference

Presented by
Matthew D. Cushman, P.E.
September 26, 2025

Terracon

Geotechnical Challenges
I-35/80 & Hickman Road Interchange

- Soils remediation is driven by the need to improve on-site conditions to meet project requirements

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  - IFIs (stone columns, aggregate piers) below retaining walls
  - Subdrains to remove water

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  - Granular blankets in low-lying wet areas
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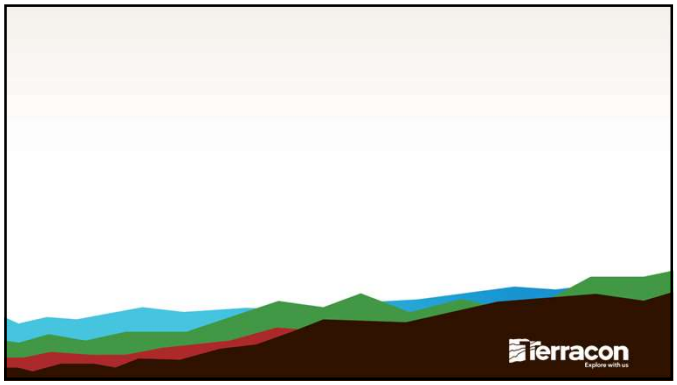
- How we addressed downdrag at three bridge locations and our project successes (from my perspective)



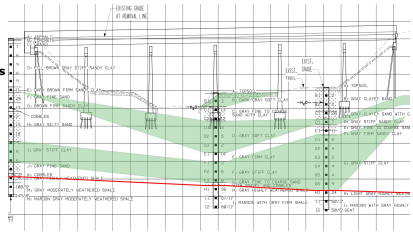
I-35/I-80 at Walnut Creek

Terracon Explore with us

I-35 SB/I-80 WB at Walnut Creek

Alluvial Clays, Typical Properties

- γ_T (pcf): 120 to 125
- %m: 27 to 32
- N-Values: 4 to 7
- $\frac{1}{2}Q_u$ (psf): 300 to 700
- s_u (psf): 250 to 350
- LL: 38 to 43
- c_{ec}: 0.115 to 0.145
- c_{er}: 0.019 to 0.021



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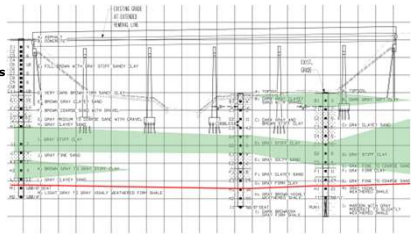

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I-35/I-80 at Walnut Creek

I-35 SB / I-80 WB (red)

- Negligible grade changes across existing roadway, up to 17 feet of fill along the existing side slopes

I-35 NB / I-80 EB (green)

- Negligible grade changes across existing roadway, up to 14 feet of fill along the existing side slopes

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I-35/I-80 at Walnut Creek

I-35 SB / I-80 WB (red)

- Drag loads on bridge piles
- Settlement of approach pavements
- Global slope instability and inadequate bearing resistance below retaining Wall C

I-35 NB / I-80 EB (green)

- Drag loads on bridge piles
- Settlement of approach pavements
- Global slope instability and inadequate bearing resistance below retaining Wall B

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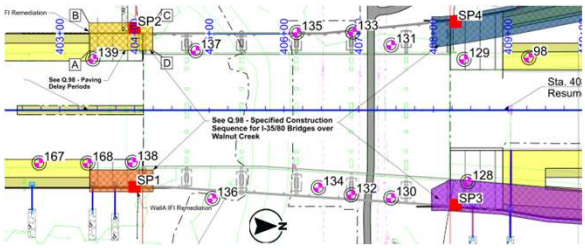
I-35 / I-80 at Walnut Creek Soils Remediation



I-35 / I-80 at Walnut Creek Specified Construction Sequence

- Bench existing roadway embankment

I-35 / I-80 at Walnut Creek Specified Construction Sequence

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- Install IFIs

I-35 / I-80 at Walnut Creek Specified Construction Sequence

- Bench existing roadway embankment
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- Install settlement plates

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I-35 / I-80 at Walnut Creek Specified Construction Sequence

- Bench existing roadway embankment
- Install IFIs
- Install settlement plates
- Place moisture control fill (embankment-in-place)
- Construction delay for monitoring
- Install abutment piles, then proceed with typical sequencing

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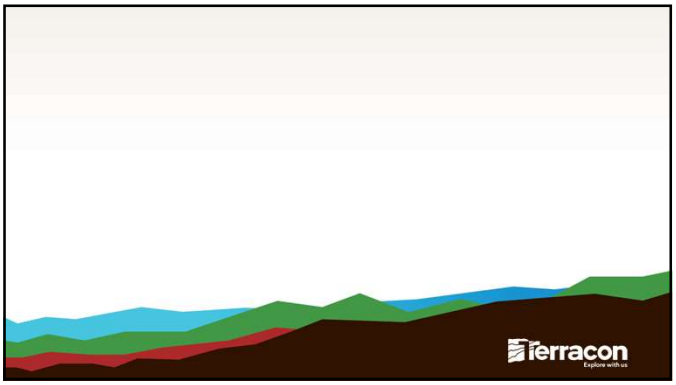

Pedestrian Trail Over Exit Ramp A

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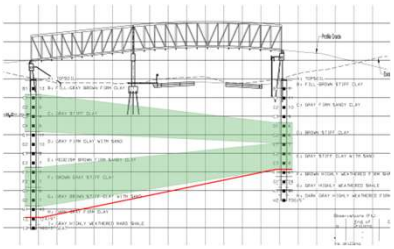
Pedestrian Trail Over Exit Ramp A

Glacial Clays

- Slightly 'better' than the alluvial clays at Walnut Creek



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Pedestrian Trail Over Exit Ramp A

West Abutment

- Up to 10 feet of fill

East Abutment

- Up to 15 feet of fill

Explore with us

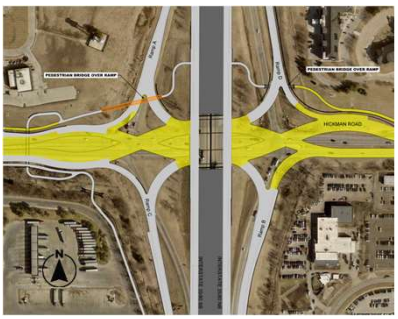
Pedestrian Trail Over Exit Ramp A

West Abutment

- Drag loads on bridge piles
- Settlement of trail at bridge abutment

East Abutment

- Drag loads on bridge piles
- Settlement of trail at bridge abutment
- Inadequate bearing resistance below retaining Wall A1



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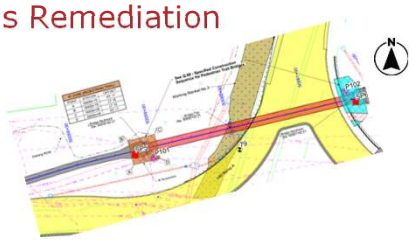
Pedestrian Trail Over Exit Ramp A Soils Remediation



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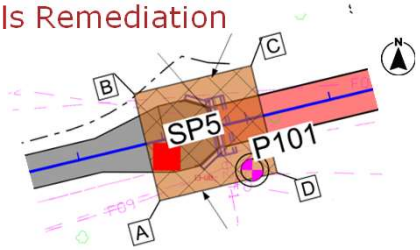
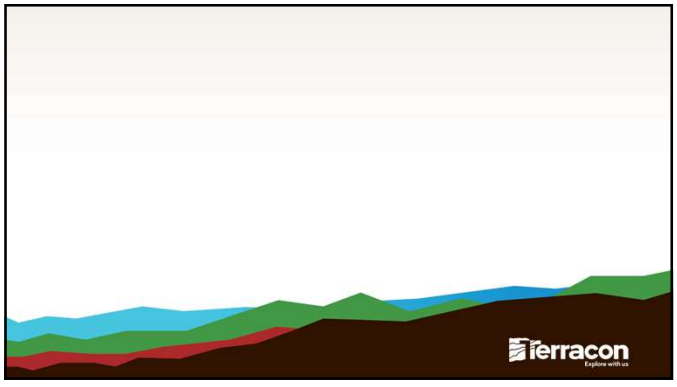
Pedestrian Trail Over Exit Ramp A Soils Remediation

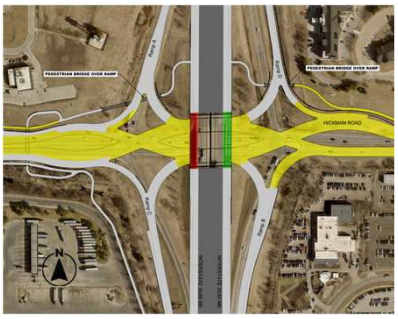


Follow the same Specified Construction Sequence as Walnut Creek bridges

Explore with us



I-35/I-80 at Hickman Road



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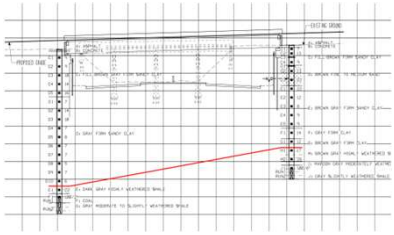
I-35 SB/I-80 WB at Hickman Road

Glacial Clays

- Even 'better' than the glacial clays at the Pedestrian Bridge



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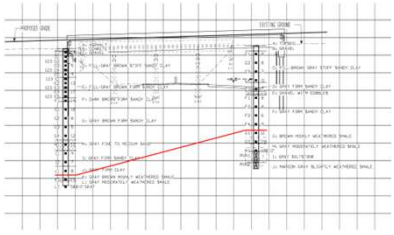
I-35 NB/I-80 EB at Hickman Road

Glacial Clays

- Even 'better' than the glacial clays at the Pedestrian Bridge



terracon Explore with us

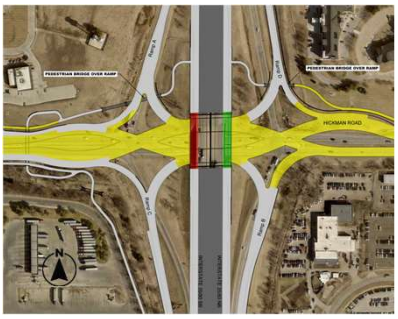
I-35/I-80 at Hickman Road

I-35 SB / I-80 WB (red)

- Fills of 4-6 feet across the existing roadway, 12-13 feet along embankment slopes

I-35 NB / I-80 EB (green)

- Fills of 4-6 feet across the existing roadway, 13-15 feet along embankment slopes



terracon Explore with us

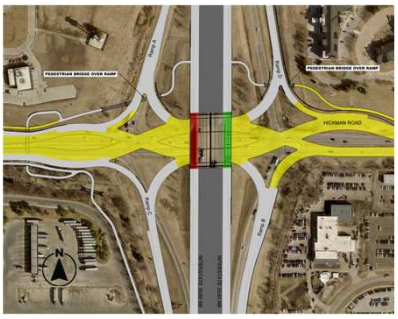
I-35/I-80 at Hickman Road

I-35 SB / I-80 WB (red)

- Global slope instability and inadequate bearing resistance below retaining walls

I-35 NB / I-80 EB (green)

- Global slope instability and inadequate bearing resistance below retaining walls



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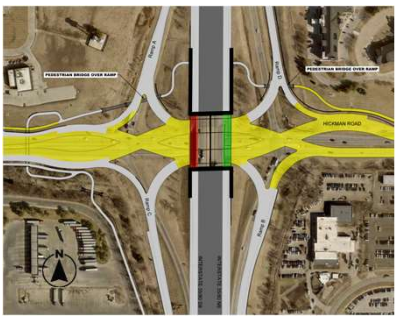

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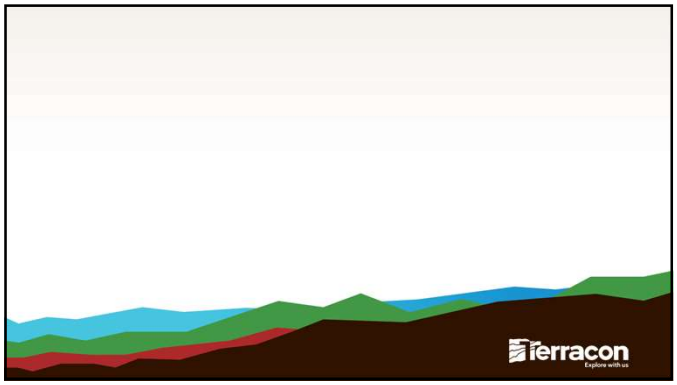

Geotechnical Challenges
I-35/80 & Hickman Road Interchange

- Project successes
  - Geotechnical challenges usually have more than one solution, we started those discussions early in project development

Terracon Explore with us

Geotechnical Challenges
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- Project successes
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  - Not all soils-related challenges need to be solved with a geotechnical solution, we also considered structural solutions or a design change

Terracon Explore with us

Geotechnical Challenges
I-35/80 & Hickman Road Interchange

- Project successes
  - Geotechnical challenges usually have more than one solution, we started those discussions early in project development
  - Not all soils-related challenges need to be solved with a geotechnical solution, we also considered structural solutions or a design change
  - Ultimately, our 'best' solutions were the ones that fit within the space constraints, supported the construction sequencing and schedule, and had the least cost impact

terracon Explore with us

Thank you!

Contacts

Matthew D. Cushman, P.E.
Senior Engineer
D (515) 557 3827
Matthew.Cushman@terracon.com

Zach Bonzer, P.E.
Iowa Transportation Lead – Geotechnical
D (515) 557 3825
Zach.Bonzer@terracon.com

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I-35/80 & US-6 (Hickman Road) Signing / ITS / Lighting

GARRET MENARD

HDR

September 26, 2025

1

SIGNING

The Stats (265)

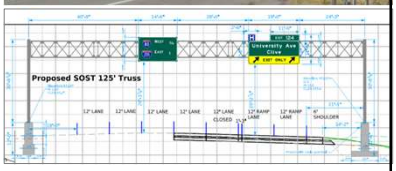
- 13 Sign Trusses (3 Modified)
- 2 Sign Mastarms
- 104 Type 'A' Signs
- 53 Type 'B' Signs
- $5.5 Million Bid (Hawkins)
  - $7.1M estimated
  - 3 other bids around $8M

Staging

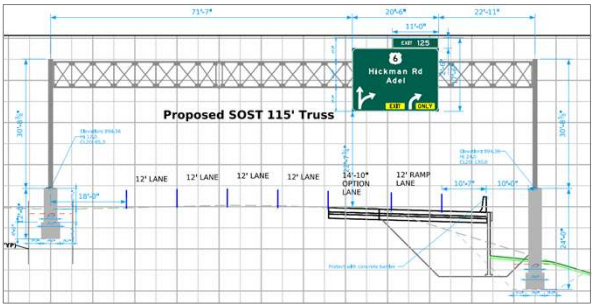
- 7 Interstate Stages, 3 Hickman Road Stages
- Scroll Plots, Supplemental 100 Scale Sheets

Standard Sign Truss

- 10 Standard Sign Trusses
- Modified Drilled Shaft Foundations for the Medians (35' deep)
- Modified Drilled Shaft Foundation for One Outside Foundation behind Wall



Modified Outside Foundation (South of Walnut Creek)



Modified Sign Trusses

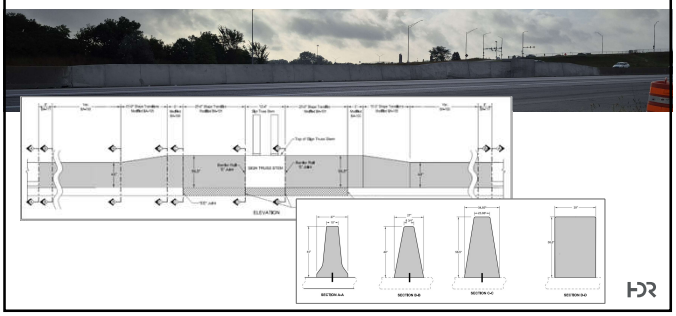
- 3 Modified Sign Trusses for Large DMS (110')

General Notes:
All steel overhead bridge-type sign trusses are designed for 30 lb/ft² wind pressure on support members, 30 lb/ft² on signs and 40 lb/ft² on dynamic message signs (DMS). Each DMS is limited to a weight of 5000 lbs., a width of 32'-0", a height of 10'-0", and a depth of 4'-0". A maximum of one DMS shall be mounted to each overhead truss. A DMS shall not be mounted to any truss with a span exceeding 100 feet without prior review and approval by the Iowa D.O.T. Bridges and Structures Bureau. No additional signs shall be mounted to a truss supporting a DMS.

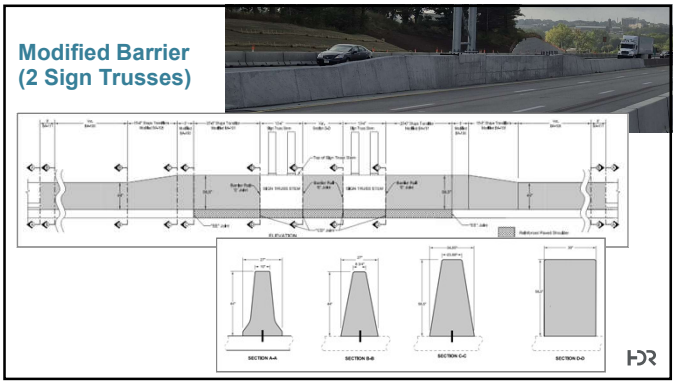
SKYLINE OVERHEAD DMS
Type: VMSLED-WV-20F-112x624-30C-I+-ISC
Pixels: 624 x 112 (width x height)

Height: 9' 4"
Width: 42' 11-1/8"
Depth: 3' 4"
(3' 9" including brackets)
Weight: approx. 6260 lbs.

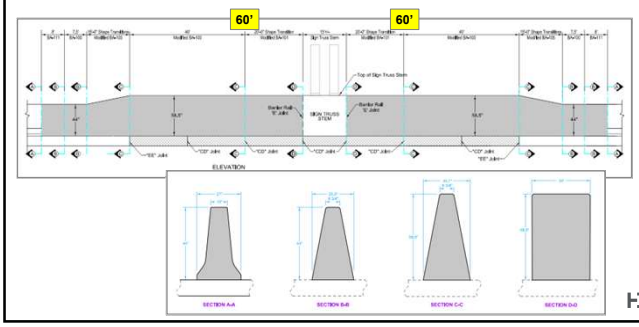
Modified Barrier



Modified Barrier (2 Sign Trusses)



Latest Modified Barrier (based on Zone of Intrusion)



The Stats (270)

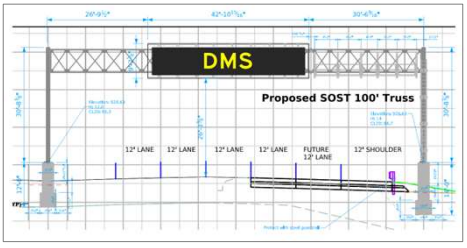
- 2 Modified Sign Trusses
- 17 Type 'A' Signs
- 3 Type 'B' Signs
- 3 Overlay Sign
- $1.2 Million Bid (Cramer & Assoc.)
  - $950k Estimate
  - 1 other $1.3M Bid

Staging

- 5 Interstate Stages

Modified Sign Trusses

- 2 Modified Sign Trusses for Large DMS (100')



Future Work (275)

- 2 Potential Arterial DMS along Hickman Road
- DDI Signage
- Signs Attached to Bridge

Fig. 2D-21. Example of Transposed Alignment Crossroad Guide Signing at Diamond Interchange from MUTCD

2

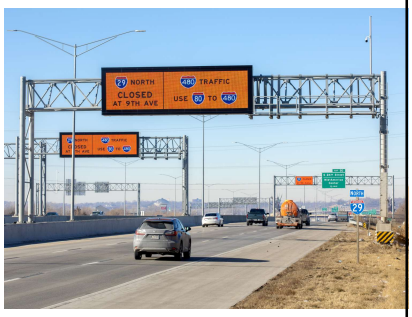
ITS

The Stats (310)

- 17,010 feet of fiber
- 31 handholes
- 3 ITS cameras on poles (2 with sensors)
- 4 cabinets (1 for DMS)
- 312 splices
- $610k Bid (Hawkins)

The Stats (359)

- 5,130 feet of fiber
- 25 handholes
- 2 ITS cameras on trusses
- 3 sensors on trusses
- 5 cabinets (2 for DMS)
- 48 splices
- $435k Bid
  (United or Cramer)



Staging

Roadway staging changes were made after ITS letting, affecting ITS construction timing

(310) & (359) were originally let 1 year apart; however, construction is occurring concurrently

Future Work

- Potential addition of 2 arterial DMS

3

INTERSTATE LIGHTING

Existing Interstate Lighting

- The I-80/I-35 interchange south of University Avenue is illuminated with high mast lighting.
- I-35 north of Douglas Avenue is illuminated with conventional light poles.
- Dark stretch of interstate between University Avenue and Douglas Avenue.

Proposed Lighting

- Continuous interstate lighting to be installed between University Avenue and Douglas Avenue
- Light poles to be installed along the interstate and ramps.
- No high mast tower lighting units will be utilized

Design Considerations

- No light poles in the medians
  - Narrow median barrier section
  - Minimize interaction with sign trusses and storm sewers
  - Would require boring power feeds to the median under live traffic
- Light poles placed along roadway shoulder
  - Improves constructability and maintenance
  - Increased use of luminaires with wide light distribution (Type IV)
  - Required special retaining wall blister design

Construction

- 150 light poles

DISCUSSION & QUESTIONS

IOWA DOT

Number Facts

$ 107.4 Million (Awarded)
Approx. $87 million for July '24 Letting
Approx. $20 million for July '25 Letting

$ 13.3 Million (Programmed)
One more project will be let for completion

There are 13 different projects on this contract

There are 37 funding categories between the 13 projects

There are 6 Stages & 7 Sites!

Interesting Facts

Amount of Dirt: 382,858.0 CY

Amount of Concrete: 51,252.63 CY

Amount of Steel: 4,568,195.0 LB

WOW!

Contract Information

Initial Bid: $87,428,012.02

Average Bi-Weekly Voucher: $2.5 Mil

Total Number of Items: 730

IOWA DOT

Contractor & Subcontractors

There are currently 25 subcontractors working under the Prime

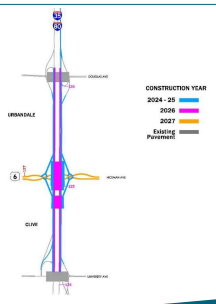
UNITED CONTRACTORS

ABAG CONSULTING
Gus Construction Co. Inc.
Dave Gryp Construction, Inc.
BRAUN INTERTEC
Iron Works, Inc.
CTI
DSI
ALL CONCRETE CUTTING CO
VOLTMER
MANATTS
LINDNER PAINTING, INC
KELLER
DES MOINES STEEL FENCE
ELDER CORPORATION
OCC
THE DRILLER
ADVANCED TRAFFIC CONTROL
COMMUNICATION INNOVATORS
precision
INROADS
ABSOLUTE GROUP
DM2
Iowa Signal Inc

Inspection Staff

- Frank Leong, P.E. Grimes RCE
- Caleb Wright Transportation Engineer Assoc.
- Joseph Ogden, CTS Lead Inspector
- Marshall Berg, HTS Inspector
- Will Eklund Consultant Inspector
- Kevin Yeager, HTS Inspector

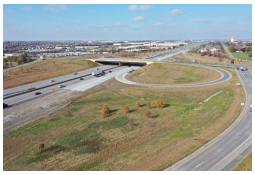
Stages



Stages 1 & 3

Stage 1: Median work for overhead truss & Living History Farms

Stage 3: NB Douglas On-Ramps



IOWA DOT

Stages 2 & 4

Stage 2: SB I-80/35 from Hickman to University

Stage 4: NB I-80/35 from Hickman to Douglas





IOWA DOT

Stages 5 & 6

Stage 5: SB I-80/35 from Douglas to Hickman

Stage 6: NB I-80/35 from University to Hickman





IOWA DOT

Challenges

Summer 2024:
- Rumble Strips Removals
- Bat Habitat Conflict
- ITS Cabinet at Douglas
- IFI Discussions

Fall 2024:
- Douglas Light Poles
- Stage 3 Paving Profiles
- Zayo / UPN Fiber
- Ramp B/C Storm Drain
- Clive Trail Access

Summer 2025:
- Settlement Plate 9
- Signal Modifications
- DMS Boards Hardware
- White PVC Conduit
- WB Walnut Creek Bridge
- DMWW Standpipe
- Regenerative Conveyance
- Bioswale Subdrain
- Stage 6 Emergency Pull-Off
- Raccoon in Keller's Excavator
- Excavator Fire
- Lightning Strike CTI Plant
- TikTok Video
- Erosion Issues at Honda
- Clive Erosion Control
- Pavement Marking Re-Stripe
- Stage 4 Grading
- DMWW Agreement

Winter 2024/2025 :
- RCB Backfill
- Class 12 Rubble
- SNW D Storm Sewer
- Joint Utility Trench Conflict
- HMA Overlay
- Bridge Rail Conduit

Spring 2025:
- DMWW Existing Main
- Lumen Wall E Conflict
- Menards Light Pole Power
- LHF Mid-American Line
- Wall B Dirt Issue

Walnut Creek

Multiple issues were discovered when placing steel for the WB Walnut Creek Bridge


Deck Pour

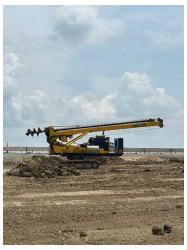

Intermediate Diaphragm Connection


Overhang Brackets


Finishing Operations


Finishing Machine Rail

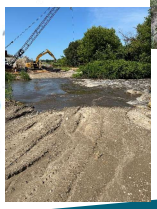
The Raccoon Disaster



In May 2025, a raccoon caused a piece of heavy equipment to break down.

Repairs took several thousands of dollars, and approx. 1 month of time

Weather

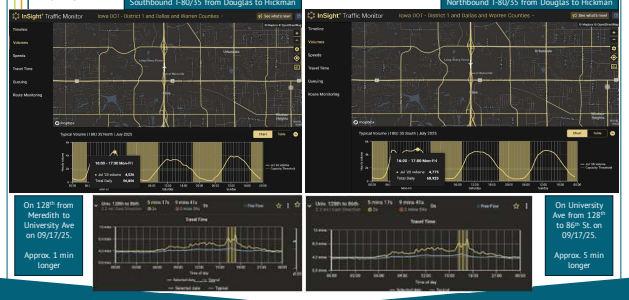


From mid-June, there was 13 days charged to the project

Traffic

Southbound I-80/35 from Douglas to Hickman

Northbound I-80/35 from Douglas to Hickman



On 128th from Meredith to University Ave on 09/17/25.

Approx. 1 min longer

On University Ave from 128th to 86th St. on 09/17/25.

Approx. 5 min longer

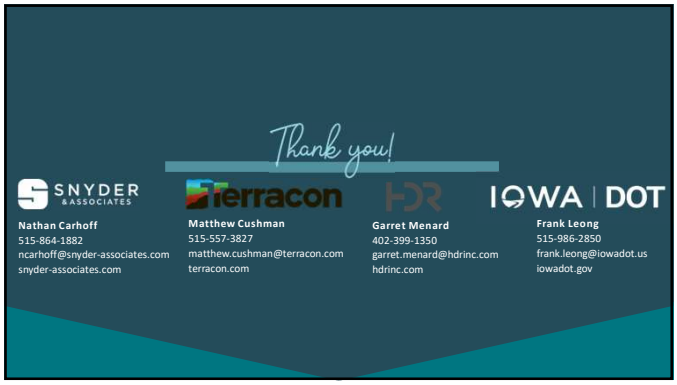
Traffic: Crash Patterns

Crashes the TMC worked on I-80/35 between Meredith Dr. & University Ave. from August 1st, 2023 – August 1st, 2024

Crashes the TMC worked on I-80/35 between Meredith Dr. & University Ave. from August 1st, 2024 – August 1st, 2025

Questions?

Frank Leong, P.E.
Grimes Construction Office
515-986-2850
frank.leong@iowadot.us


Thank you!
SNYDER & ASSOCIATES
Terracon
HDR
IOWA | DOT
Nathan Carhoff
515-864-1882
ncarhoff@snyder-associates.com
snyder-associates.com
Matthew Cushman
515-557-3827
matthew.cushman@terracon.com
terracon.com
Garret Menard
402-399-1350
garret.menard@hdrinc.com
hdrinc.com
Frank Leong
515-986-2850
frank.leong@iowadot.us
iowadot.gov