PCC PAVEMENT - REPLACE
NHSX-020-6(73)--3H-07
BLACK HAWK Co.

LETTING DATE 01-17-2024

IOWA DOT

REVISIONS

TOTAL 158
PROJECT IDENTIFICATION NUMBER
16-07-020-030
PROJECT NUMBER
NHSX-020-6(73)--3H-07
R.O.W. PROJECT NUMBER
--

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM

BLACK HAWK COUNTY

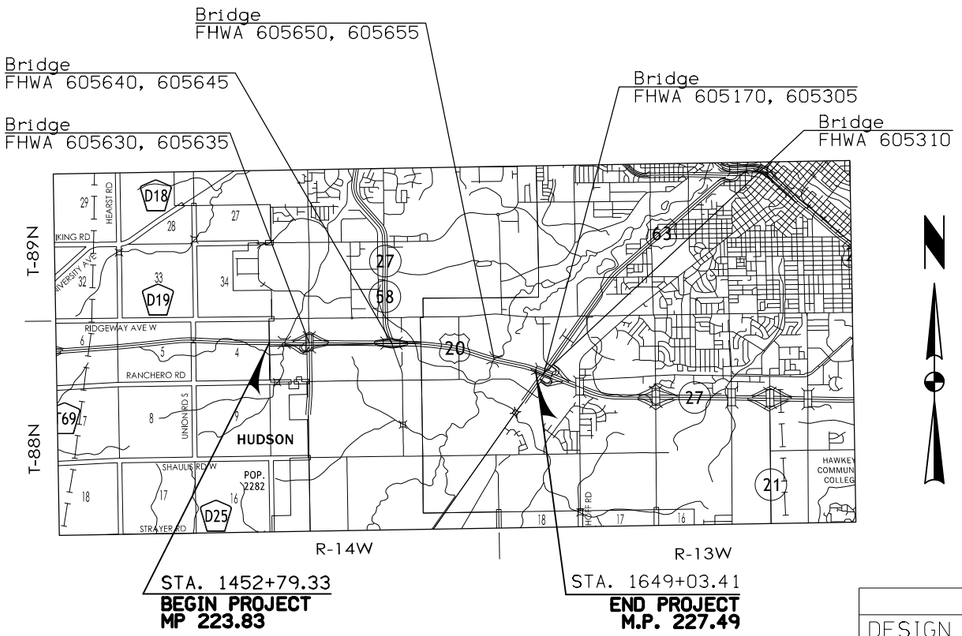
PCC PAVEMENT - REPLACE

IA 58/Hudson Rd. to US 63 in Waterloo (EB / WB)

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

Value Engineering Saves. Refer to Article 1105.14 of the Specifications.



DISTRICT 2:

DESIGN:

TRAFFIC:
OPERATIONS:

INDEX OF SHEETS

No.	DESCRIPTION
A Sheets	**Title Sheets**
A.1	Title Sheet
A.2 - 8	Design Concept
A.9 - A.13	Design Criteria
A.14 - A.15	Field Exam Questions
B Sheets	**Typical Cross Sections and Details**
B.1 -5	Typical Cross Sections and Details
D Sheets	**Mainline Plan and Profile Sheets**
* D.1	Plan & Profile Legend & Symbol Information Sheet
* D.2 - 15	"US 20"
G Sheets	**Survey Sheets**
G.1 - 3	Survey Information
G.4	Control Point Vicinity Map
G.5	Project Control Coordinate Listing
J Sheets	**Traffic Control and Staging Sheets**
J.1	Traffic Control Plan and Staging Notes
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* J.3 - 5	Ramps and Loops Proposed Detours
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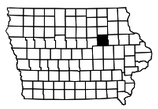
K Sheets	**Interchange Sheets**
* K.1-6	Ramp and Loop Detail Sheets
	* Color Plan Sheets

Schedule
DM5 7-7-2023
D7 11-7-2023



LOCATION MAP SCALE
0 1 2 3
Miles

DESIGN DATA RURAL

2024 AADT	26,400	V.P.D.
2044 AADT	39,700	V.P.D.
2044 DHV	--	V.P.H.
TRUCKS	13	%
Total Design ESALs	--	

INDEX OF SEALS

SHEET NO.	NAME	TYPE
A.1	Earl Harrison, Jr.	Primary Signature Block

PRELIMINARY PLANS

Subject to change by final design.

D2 PLAN - Date: 6/10/22

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER A.1

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IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: District 2

DATE: May 18, 2021

ATTENTION: E. Jon Ranney

PROJECT: Black Hawk County
NHSX-020-6(73)--3H-07
PIN: 16-07-020-030

FROM: John Bartholomew

OFFICE: Design

SUBJECT: 2024-4R Project Concept - **FINAL**

Draft Project Concept sent out for review and comment. Please submit comments to the Office of Design by Monday, May 17, 2021. Comments received during the review period have been considered and resolved.

DATE OF REVIEW: March 30, 2021

PARTICIPANTS: District 2 - Nick Humpal, Tracy Meise and Barry Thede; Design – John Bartholomew and Joe Adams.

PROJECT DATA:
ROUTE: US 20: From IA 58 at Hudson Road (M.P.223.83) to US 63 (M.P. 227.49) in Waterloo
LENGTH: 3.66 miles
PLANNING CLASSIFICATION: B
MAINTENANCE SERVICE LEVEL: __
TRAFFIC: 2024 --- 26,400 ADT with 13% trucks
2044 --- 39,700 ADT with 13% trucks
PRESENT PAVEMENT SURFACE: PCC 10 in
PRESENT PAVEMENT WIDTH: 24 ft. – Median Width 64 ft.
PRESENT SHOULDER WIDTH: 6 ft. inside, 9.5 in PCC 10 ft. outside, 9.5 in

MP to MP	Dir.	Type	Avg. Str. No.	80% Str. No.	Jt. Str. No.	PCI	IRI	K Value
224.33 to 227.49	EB	PCC	7.88	5.71	---	74	103	164
224.33 to 227.49	WB	PCC	7.55	6.46	---	60	117	170

PAVEMENT HISTORY:

M P 224.33 – M P 227.49 Eastbound and Westbound
PAVEMENT: 10". PCC over 4" Cement Treated Base
COARSE AGGREGATE SOURCE: Crushed Limestone at Franta / Class C
YEAR CONTRUCTED: 1985 Project # IX-520-6(13)- -3P-07

RESURFACED: MP 224.69 to 225.38 (WB)
2019, 1.5 in HMA base, 2.25 in HMA overlay, 24 ft. roadway, 6 ft. inside and 10 ft. outside shoulder.


West End Approaches at IA 58


WB exit ramp at US 63

EXISTING CONDITIONS AND CAUSES OF DISTRESS:

This section of US 20 is at the southern edge of the Waterloo City limits between junctions of IA 58 (MP 223.83) and US 63 (MP 227.49). The existing pavement is a Jointed Plain Concrete Pavement (JPCP) with PCC shoulders. The original pavement was constructed in 1985 and is 10" thick JPCP over a 4" cement treated base. The coarse aggregate is a class I limestone from the Franta source. The project length is approximately 3.66 miles long of both the eastbound and westbound lanes. The project includes approximately 2.42 miles of on/off ramps.

Overall the pavement is in fair to poor condition. The pavement was constructed with low quality concrete due to a poor aggregate source. The average IRI is 103 EB and 117 WB. The distress data shows significant cracking/spalling at the joints. The centerline joint and longitudinal shoulder joints show significant deterioration/spalling that has been maintained by surface patching. Transverse joints are also deteriorating and spalling. Because of the joint deterioration and patching the ride is getting rough. Patching needs will continue to rapidly increase based on the mode of deterioration in this pavement. Due to the deterioration of the joints, bridge approaches, patching and a section of a thin overlay; the ride is becoming rough. With the distress the pavement is exhibiting, it is not likely that a rehabilitation would perform for the desired period or provide the desired serviceability.

The shoulders on segments of the mainline and ramps are heaving during the winter and causing maintenance issues when plowing snow. The shoulders have not returned to the same elevation as the edge of the pavement in many areas.

SAFETY CONSIDERATION:

There are 2 overhead bridges and 7 mainline bridges within the proposed project. They are:

Overhead Bridge #1 – IA 58 at JCT. US 20 (Hudson Rd.)
Maintenance Number 0705.0L058, FHWA 605630, (269' x Variable) pretensioned prestressed concrete bridge, MP 5.8, Station 1018+18.96, Design Number 384,
(No major issues & no work is required with this project.)

Overhead Bridge #2 – IA 58 at JCT. US 20 (Hudson Rd.)
Maintenance Number 0705.0R058, FHWA 605635, (269' x 36') pretensioned prestressed concrete bridge, MP 5.8, Station 1018+18.96, Design Number 384,
(No major issues & no work is required with this project.)

Mainline Bridge #1 – US 20 over IA 58 (westbound)
Maintenance Number 0725.4L020, FHWA 605645, (183' x 40') pretensioned prestressed concrete bridge, MP 225.4, Station 242+15.00, Design Number 1783,
(Repair concrete spalls/seal hairline cracks at west approach, seal longitudinal cracks at top of bridge deck at east approach slab, Update guardrail Terminal/Transition to current standard)

Mainline Bridge #2 – US 20 over IA 58 (eastbound)
Maintenance Number 0725.4R020, FHWA 605640, (183' x 40') pretensioned prestressed concrete bridge, MP 225.4, Station 242+15.00, Design Number 1783,
(Update guardrail Terminal/Transition to current standard)

Mainline Bridge #3 – US 20 over Black Hawk Creek (westbound)
Maintenance Number 0726.8L020, FHWA 605655, (416' x 40') pretensioned prestressed concrete bridge, MP 226.8, Station 314+86.25, Design Number 1883,
(Repair concrete spall at left bridge barrier rail in span #1. Update guardrail Terminal/Transition to current standard)

Mainline Bridge #4– US 20 over Black Hawk Creek (eastbound)
Maintenance Number 0726.8R020, FHWA 605650, (416' x 40') pretensioned prestressed concrete bridge, MP 226.8, Station 314+86.25, Design Number 1883,
(Update guardrail Terminal/Transition/Endpost to current standard)

Mainline Bridge #5– US 20 at Jct. US 63 (westbound)
Maintenance Number 0727.5L020, FHWA 605170, (388' x variable) pretensioned prestressed concrete bridge, MP 227.49, Station 352+29.27, Design Number 2183,
(Update guardrail End Terminal/Transition to current standard)

Mainline Bridge #6 – US 20 at Jct. US 63 (eastbound)
Maintenance Number 0727.5R020, FHWA 605305, (388' x 40') pretensioned prestressed concrete bridge, MP 227.49, Station 352+07.87, Design Number 2083,
(Update guardrail End Terminal/Transition to current standard)

Mainline Bridge #7– US 20 at Jct. US 63 (eastbound ramp)
Maintenance Number 0727.5A020, FHWA 605310, (388' x 26') pretensioned prestressed concrete bridge, MP 227.47, Station 351+30.7, Design Number 1983,
(Update guardrail End Terminal/Transition to current standard)

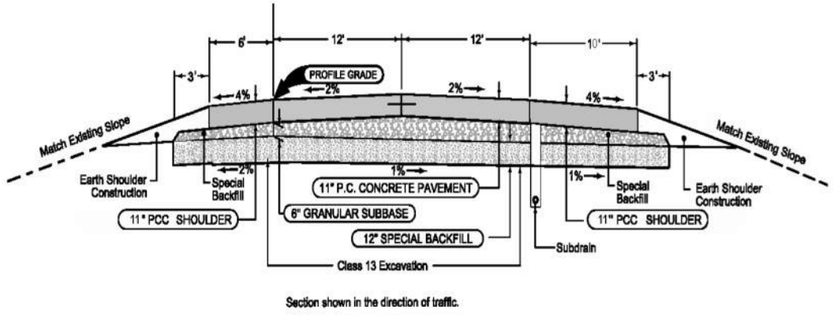
CRASH HISTORY

During the five-year study period from January 1, 2016 through December 31, 2020, there were 70 crashes including, 1 fatal crash, 15 personal injury crashes, and 57 personal property crashes. The crash rate is 40/HMVM which is lower than the statewide rural average of 76/HMVM.

RECONSTRUCTION:

This project proposes to reconstruct both the eastbound and westbound lanes of U.S. 20, from the west ramps of IA 58 at Hudson Road interchange to just west bridge approaches of the US 63 interchange. This roadway is a 4-lane divided highway with 6 ft. inside and 10 ft. outside paved shoulders and a 64 ft. median. The existing vertical and horizontal geometry will remain the same.

This project involves removing and replacing the existing mainline pavement and paved shoulders (40 ft. wide). The new roadway typical section will consist of 11" thick PCC pavement and 6" of granular subbase on 12" of special backfill. The new PCC pavement will be 24 ft. wide with 6 ft. inside and 10 ft. outside full-depth tied shoulders. The earth shoulder construction will match the existing 4:1 slope.



Section shown in the direction of traffic.

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER A.3

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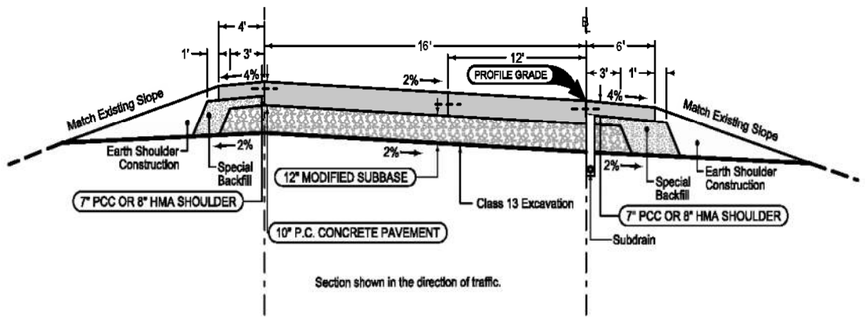
At the east interchange of IA 58 & US 20 (Butterfield Road) the guardrail End Terminal/Transitions for FHWA 605640 will be updated to current standards. For FHWA 605645, the guardrail End Terminal/Transitions will be updated to current standards as well as repairing concrete spalls to seal hairline cracks at the west approach and seal the longitudinal cracks at the top of bridge deck at the east approach slab. On US 20 over Black Hawk Creek, the guardrail End Terminal/Transitions for FHWA 605650 will be updated to current standards as well as repairing the concrete spalls at the left bridge barrier in span #1. The guardrail End Terminal/Transitions/Endposts for FHWA 605650 will be updated to current standards. The US 63 interchange, FHWA 605170, FHWA 605305 and FHWA 605310, the guardrail End Terminal/Transitions will be updated to current standards.

At the west interchange of US 20 and IA 58 (Hudson Road) and the east interchange of US 20 and IA 58 (Butterfield Road.) both eastbound and west bound entrance and exit ramps will be replaced. The ramp cross section will provide a 16 ft. ramps with 4 ft. and 6 ft. wide paved shoulders. During construction, these ramps will be closed, and traffic will be detoured

The west end of the US 20 eastbound exit ramp to US 63 will be replaced. The ramp cross section will provide a 16 ft. ramp with 4 ft. and 6 ft. wide paved shoulders. During construction, this ramp will be closed, and traffic will be detoured.



Guardrail updates include replacing bullnose guardrail with high tension cable rail around median piers at west interchange of IA 58 and beam guardrail between the dual bridges over Black Hawk Creek.

Rumble strips will be milled in both inside and outside shoulders.

Remove and replace all delineators.

Foreslopes will be used as constructed; therefore, Right of Way is not required.

STAGING:

During construction, it will be necessary to shift traffic to accommodate two-lane, two-way traffic. This will be accomplished via the use of median crossovers which one will be constructed at approximately MP 223.8 (0.5 miles west of the IA 58 interchange) and the existing median crossover at MP 227.3 (0.2 miles west of the US 63 interchange)

The crossovers will be removed at the completion of this project. Off-site detours will be established for all ramp closures. During construction it will be necessary to place temporary guardrail on the trailing outside corner of the east and westbound mainline bridges to accommodate the two-lane, two-way traffic. See maps on pages 10 and 12 for crossover locations.

DETOUR ANALYSIS:

STAGE 1 (US 20 eastbound)

The three eastbound US 20 exits at (MP 224), (MP 225) and (MP 227.5) and three of the eastbound entrance ramps (MP 224.2), (MP 225.1) and (MP 225.6) will be closed, and an offsite detour will be utilized. It is anticipated the detour will be in place for approximately 30 calendar days.

Traffic during the ramp closures for the eastbound to IA 58/Hudson Road (Exit 224), IA 58/ Butterfield Road (Exit 225) & US 20 to US 63/Sergeant Road (Exit 227), can utilize the eastbound US 20 (Exit 221) to Grundy Road, (approximately 3 miles west of closure at MP 224 or eastbound US 20 to Ansborough Avenue (Exit 229) and US 20 to IA 21/Hawkeye Road (Exit 230), approximately 3.0 miles east of closure at MP 227.2.

Traffic will be able to access US 20 eastbound at the US 63/ Sergeant Rd. Entrance ramp.

The detour would follow Grundy Road north approximately .5 miles to W. Ridgeway Ave, then east approximately 7.1 miles to US 63/Sargent Road, then southwest approximately 1 mile back to the US 20 Interchange. Out of distance travel is 1.5 miles.

STAGE 2 (US 20 Westbound)

Two westbound US 20 exits at (MP 224.7) and (MP 225.7), plus three of the westbound entrance ramps at (MP 224.4) (MP 224.7) and (MP 225.7) will be closed, and an offsite detour will be utilized. It is anticipated the detour will be in place for approximately 30 calendar days.

Traffic during the ramp closures for westbound US 20 exits at IA 58/Hudson Road, IA 58/Butterfield Road, can utilize the westbound US 20 at US 63/Sergeant Road northbound to Ridgway Ave. At the west end of the project the Grundy Road interchange (Exit 221) can also be used.

Traffic will be able to access US 20 eastbound at the US 63/Sergeant Road entrance ramp.

ESTIMATED COST:

Item	Estimated Cost
Special backfill	1,440,800
Excavation, Class 13 Waste	157,900
Granular Subbase	1,323,200
Modified Subbase	706,300
Paved Shoulder, PCC 7 inch	818,200
PCC Pavement, QM-C CL 3,11"	7,603,200
PCC Pavement, CL C CL 3I,10"	1,712,200
Subdrain, Longitudinal	200,400
Subdrain Outlet, DR-306	26,200
Steel Beam Guardrail	38,100
Steel Beam Guardrail Bar Trans Sect, BA-201	22,100
Steel Beam Guardrail End Anchor, Bolted	2,500
Steel Beam Guardrail Tgnt End Term, BA-205	28,500
High Tension Cable Guardrail	10,000
High Tension Cable Guardrail, End Anchor	15,800
High Tension Cable Guardrail, Spare Part Kit	1,700
Removal Of Pavement	1,284,100
Milled Rumble Strips	24.200
64" Median Dual Crossover	295,100
High Tension Cable for Median Piers	15,500
Intelligent Workzone	100,000
Mobilization (5%)	989,200
Traffic Control (5%)	989,200
M & C (10%)	1,978,300
Total Alternative No. 1	**$19,782,700**

RECOMMENDATIONS:

The recommended method of rehabilitation for this project is reconstructing the PCC pavement of the mainline and connecting ramps, to include replacement of traffic signs. The total estimated cost of **$ 19,782,700** is for grading and paving and $ 450,000 for traffic signs.

Right of way is not required.

The Location and Environment Bureau (LEB) has not reviewed this project to determine potential impacts to wetlands or other protected waters. Based on the information provided to date, they have not determined if a Section 404 Permit is required for this project. If the project concept changes, additional ROW becomes necessary, or extra work is identified during construction, further review by the Location and Environment Bureau may be necessary.

SPECIAL CONSIDERATIONS

The directional design hourly truck volume (DDHV) is approximately 343 vehicles per hour which is based on a design year traffic volume of 26,400 ADT, 13% truck traffic and a peak hour factor of 0.1. AASHTO recommends that if the DDHV exceeds 250 vph, 12 ft. wide paved shoulders should be considered. As a 10 ft. outside paved shoulder will be constructed as part of this project to eliminate the need to grade the outside foreslope, a design exception may be required.

This will be a traffic critical project. Traffic critical projects identifies key construction projects across the state that may cause significant safety or mobility issues to the traveling public. Mitigation strategies could include intelligent work zones, TIM plans, work day restrictions, night work, lane rental etc.

FUNDS PROGRAMMED:

This proposed 4R project is listed in the 2021-2025 program listed at $16,144,000 for grading and paving and $ 450,000 for traffic signs. in 2024. It has been identified by the District 2 office for construction in FY 2024. A schedule of events for plan development will be determined following approval of the Project Concept.

JEB: jaa
cc:

C. Purcell	M. J. Kennerly	K. D. Nicholson
S. J. Megivern	J. S. Nelson	M. Nop
M. A. Swenson	R. A. Younie	D. E. Sprengeler
S. Majors	K. Brink	D. L. Newell
B. Bradley	J. W. Laaser-Webb	W. A. Sorenson
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J. Duncan	C. C. Poole	B. Hofer
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T. Simodynes	G. Tinker	

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER A.6

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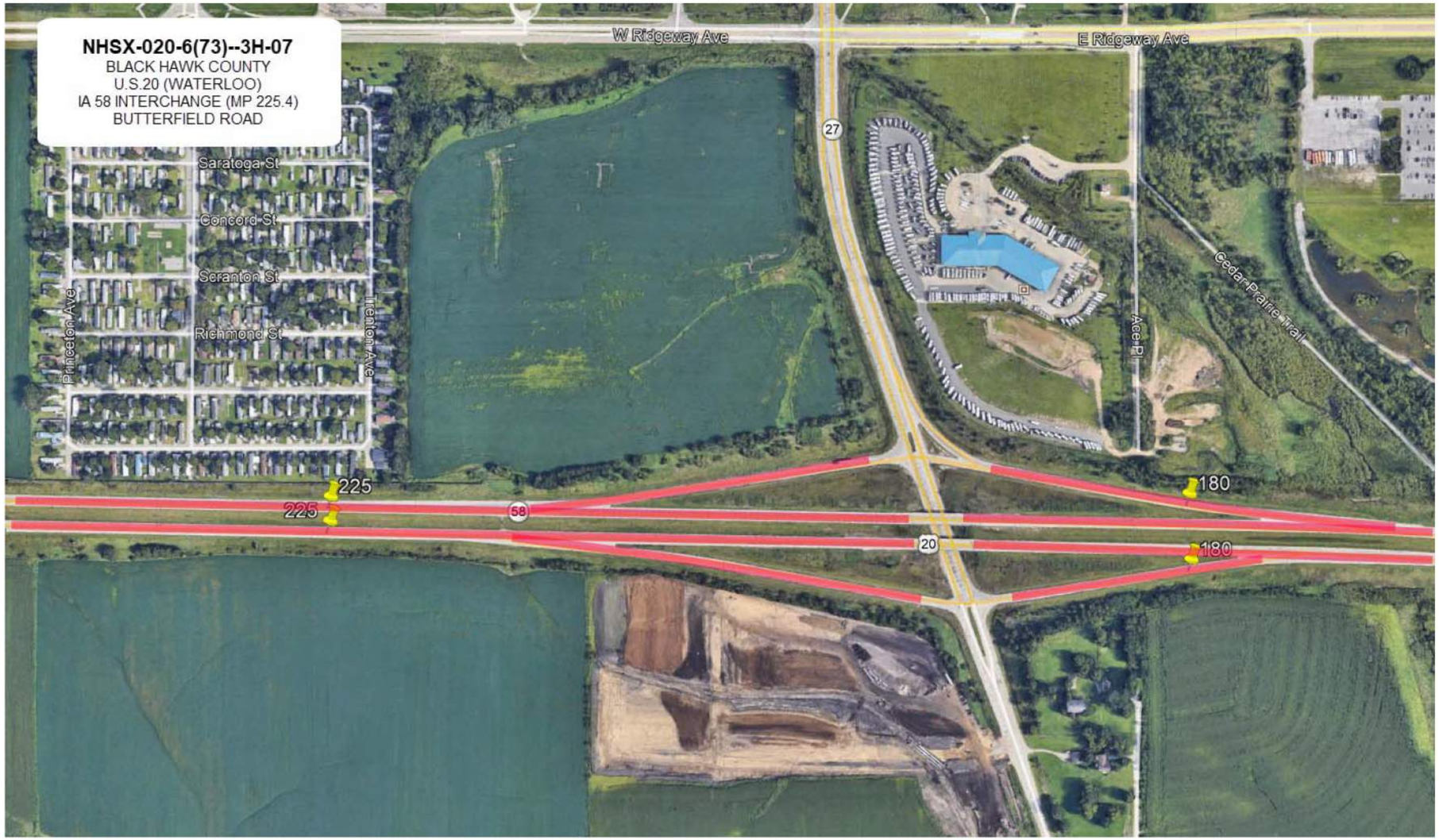

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER A.7	

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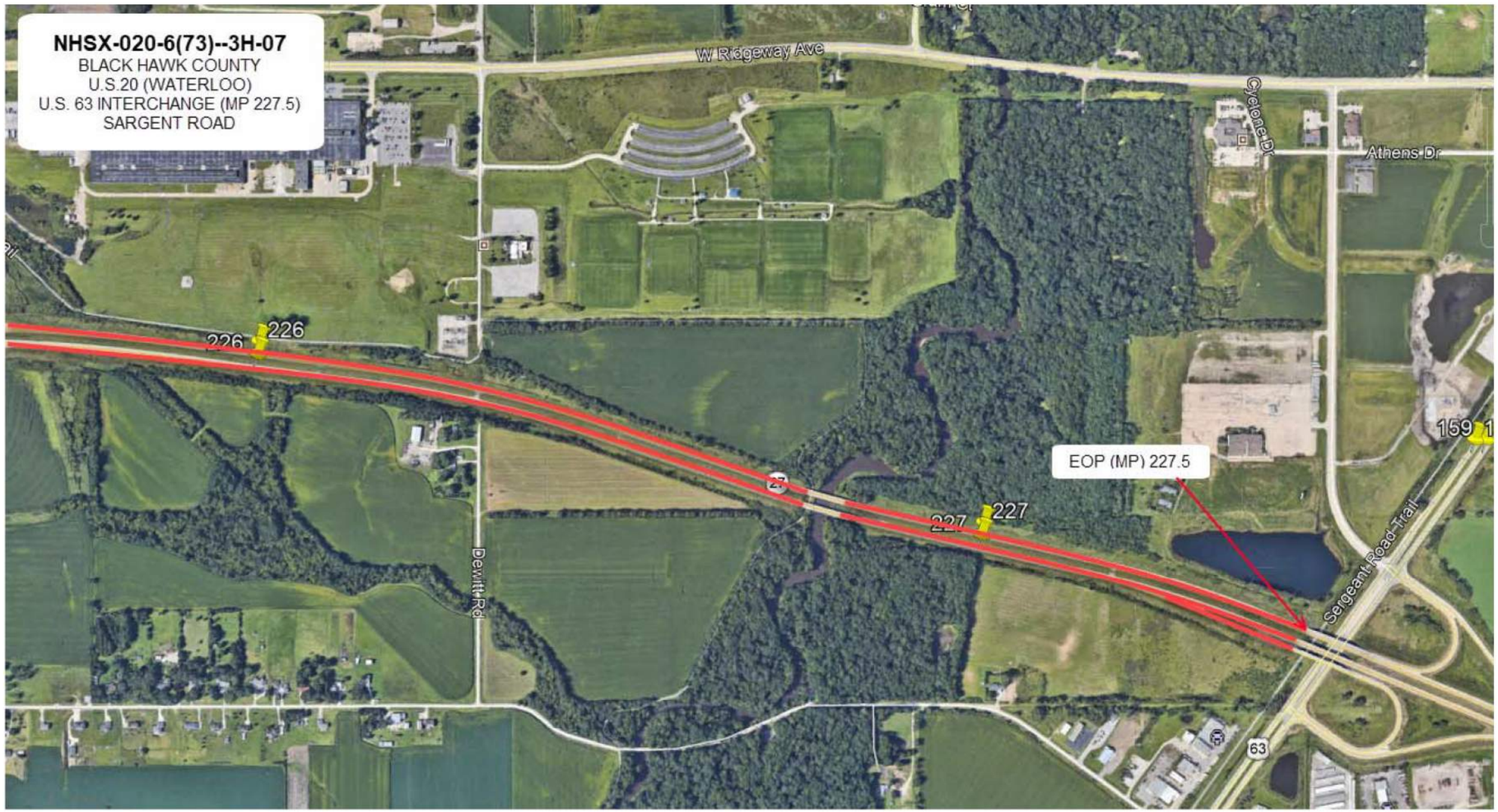

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER A.8

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Roadway	**US 20**			
PIN Number	16-07-020-030		**Submittal Date**	06/10/22
Project Number	NHSX-020-6(73)--3H-07			**Approval Date**
District	District 2	**Assistant District Engineer**		
County	BLACK HAWK	**or**		
Route	US 20	**Office Director**		
Location	From IA 58 at Hudson Road (M.P. 223.83) to US-63 (M.P. 227.49) in Waterloo			
Work Type	Pavement Reconstruction			
Segment Manager				
Designer	Hg Consult			

Design Manual Section 1C-1
Last Updated: 04-29-19

Rural Expressways (Rural Arterials)

Design Element		Preferred	Acceptable Criteria	Project Values
Design speed (mph)		70	50	70
Maximum superelevation rate (Refer to Section 2A-2)		6%	8%	6%
Design lane width (ft)		12	12	12
Full depth paved width (ft)	Outside lane	12'	12	12
	Inside lane(s)	12	12	12
Right turn lane or an auxiliary lane (ft)		12	10	12
Left turn lane (ft)		12	10	12
Pavement cross-slope (on tangent sections)	Through lanes	2%, However, when adjacent lanes slope in the same direction, increase slope by 0.5% per lane up to 3%	1.5% minimum, 3% maximum	2%
	Auxiliary and turn lanes	3%	3% maximum	3%
	Crown break at centerline	4%	4% maximum	4%
Shoulder cross-slope (on tangent sections)		4%	Shoulder cross-slope cannot be less than the adjacent lane, 6% max for paved or granular shoulders, 8% max for earth shoulders	4%
Curb type (Refer to Section 3C-2)	Design speed = 50 or 55 mph	6-inch sloped	6-inch standard	6-inch sloped
	Design speed ≥ 60 mph	4-inch sloped	6-inch sloped	4-inch sloped
Foreslope (For fill areas greater than 40 ft, contact the Soils Design Section for assistance)	Adjacent to shoulder	10:1 for 4' then 6:1	3:1	n/a
	Beyond standard ditch depth and design clear zone	3.5:1	3:1	n/a
	Curbed roadways	2%	not steeper than 3:1	n/a
Backslope (For cut areas greater than 25 feet, contact the Soils Design Section for assistance with backslope benches.)		3:1	2.5:1	n/a
Transverse Slopes	w/ drainage structures	8:1	6:1	n/a
	w/o drainage structures	10:1	6:1	n/a
Ditches (Refer to Section 3G-1)	Outside ditch (depth x width) (ft)	5 x 10	--	n/a
	Median ditch depth (ft)	4	2	n/a
Median width (ft) (Refer to Section 3E-1)		64	50	64
Bridge width—new*	Bridge length ≤ 200 ft	design lane widths + effective shoulder widths	design lane widths + effective shoulder widths	n/a
	Bridge length > 200 ft	design lane widths + effective shoulder widths	design lane width + 4' right and left of the design lane widths	n/a
Bridge width—existing*		design lane widths + no less than 2 ft left and right	design lane widths + 2 ft left and right of the design lane widths	design lane widths + no less than 2 ft left and right
Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks)	Over primary	16.5	16	16.5
	Over non-primary	16.5 at interchange locations, 15 at all other locations	14	16.5
	Over railroad	23.3	23.3	23.3
	Sign trusses and pedestrian crossings	17.5	17	17.5
Structural Capacity		Contact Office of Bridges and Structures	Contact Office of Bridges and Structures	n/a
Level of Service		B	B	B

*FHWA notification via email is required if acceptable criteria is not met on the NHS system (No formal design exception required)

Design year ADT = 26,400

Design Manual Section 1C-1
Last Updated: 04-29-19

Effective Shoulder Width and Type for Multilane Arterials

Preferred (Values shown in feet)					Acceptable (Values shown in feet)					Project Values
	Rural Roadways		Urban Roadways			Rural Roadways		Urban Roadways		
Auxiliary lanes or turn lanes with shoulders	6		6		Auxiliary lanes or turn lanes with shoulders	6		0		6
Turn lanes with curbs	6		See Section 3C-2			6		0		6
Expressways	Outside		Median Side		Expressways	Outside		Median Side		
	Effective Shoulder Width	Paved Width	Effective Shoulder Width	Paved Width		Effective Shoulder Width	Paved Width	Effective Shoulder Width	Paved Width	
Routes where bicycles are to be accommodated	10	10	6	6	Routes where bicycles are to be accommodated	8	4	4	4	10
On roadways approaching urban areas (due to increased bike traffic)	10	10	6	6						
On all curves with a superelevation rate of 7.0% or greater	10	10	6	6	On all other Expressways (Multilane Arterials)	8	0*	4	4	
On roadways with design year ADT > 6500 vpd	10	6	6	6						
On all other Expressways (Multilane Arterials)	10	6	6	6						

*Requires safety edge-See Section 3C-6
Curbs should be located beyond the outer edge of the effective shoulder width in rural areas
Refer to Section 3C-2 for curb offsets in urban areas

Notes:

Roadway Design Speed (mph) =	70

Design Manual Section 1C-1
Last Updated: 04-29-19

Design Criteria for High Speed Roadways

Design Element			Preferred Criteria Design Speed, mph						Acceptable Criteria Design Speed, mph						Project Values
			50	55	60	65	70	75	50	55	60	65	70	75	
Stopping sight distance (ft) (Refer to Section 6D-1)			425	495	570	645	730	820	425	495	570	645	730	820	730
Minimum horizontal curve radius (ft) (Refer to Sections 2A-2 and 2A-3)	Method 5 superelevation and side friction distribution	e_{max} = 6%	833	1060	1330	1660	2040	2500	833	1060	1330	1660	2040	2500	2040
		e_{max} = 8%	--	--	--	--	--	--	758	960	1200	1480	1810	2210	
Minimum vertical curve length (ft) (Refer to Section 2B-1)			150	165	180	195	210	225	150	165	180	195	210	225	210
Minimum rate of vertical curvature (K) (Refer to Section 2B-1)	crest vertical curves		84	114	151	193	247	312	84	114	151	193	247	312	247
	sag vertical curves	roadways without fixed-source lighting	96	115	136	157	181	206	96	115	136	157	181	206	181
		roadways with fixed-source lighting	96	115	136	157	181	206	54	66	78	91	106	121	181
Minimum gradient (%)	(Refer to Section 2B-1)		0.5						0.3% with a curb, 0.0% without a curb						0.5
Maximum gradient (%)	(Refer to Section 2B-1)	Urban roadways	4		3				7	6	6	--	--	--	4
		Rural roadways							5	5	4	4	4	4	4
		Interstates							5	5	4	4	4	4	4
Clear zone			See "Preferred Clear Zone" table in Section 8A-2						See "Acceptable Clear Zone" table in Section 8A-2						34

Roadway	US 20 Ramps (Diagonal)		
PIN Number	16-07-020-030	**Submittal Date**	06/10/22
Project Number	NHSX-020-6(73)--3H-07		**Approval Date**
District	District 2	**Assistant District Engineer**	
County	BLACK HAWK	**or**	
Route	US 20	**Office Director**	
Location	From IA 58 at Hudson Road (M.P. 223.83) to US-63 (M.P. 227.49) in Waterloo		
Work Type	Pavement Reconstruction		
Segment Manager			
Designer	Hg Consult		

Design Manual Section 1C-1
Last Updated: 04-29-19

Ramps

Design Element		Preferred Values	Acceptable Values	Project Values
Design speed (mph)		See Design Speed for Ramps Table Below	See Design Speed for Ramps Table Below	
Design lane width (ft)				
Turn-lane width (ft)	Interstate ramps	12	12	NA
	Non-Interstate ramps	12	10	12
Pavement cross-slope (on tangent sections)		2%	1.5% minimum, 2% maximum	2%
Shoulder cross-slope (on tangent sections)		4	Shoulder cross-slope cannot be less than the adjacent lane, 6% max for paved or granular shoulders, 8% max for earth shoulders	4%
Foreslope (For fill areas greater than 40 ft, contact the Soils Design Section for assistance)	Adjacent to shoulder	10:1 for 4' then 6:1	4:1 for interstates*, 3:1 for other roadways	10:1 then 6:1
	Beyond standard ditch depth and design clear zone	3.5:1	3:1	NA
	Curbed roadways	2%	not steeper than 3:1	NA
Bridge width—new**		design lane widths + effective shoulder widths	design lane widths + effective shoulder widths	NA
Bridge width—existing**		design lane widths + effective shoulder widths	design lane widths + effective shoulder widths	NA
Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks)	Over primary	16.5	16	NA
	over non-primary	16.5 at interchange locations, 15 at all other locations	14	NA
	over railroad	23.3	23.3	NA
	sign truss and pedestrian bridges	17.5	17	17.5
Structural Capacity		Contact Office of Bridges and Structures	Contact Office of Bridges and Structures	

*Design Exception required for ramps on the Interstate system only
**FHWA notification via email is required if acceptable cirteria is not met on the Interstate or NHS systems (No formal design exception required)

Design Manual Section 1C-1
Last Updated: 04-29-19

Effective Shoulder Width and Type for Ramps

Design Element		Ramp Type: Preferred							Ramp Type: Acceptable							Project Values
		Diagonal		Loop	Semi-Directional		Directional		Diagonal		Loop	Semi-Directional		Directional		
		one lane	two lane		one lane	two lane	one lane	two lane	Radius*> 500 feet* one lane	Radius*> 500 feet* two lane		Radius > 500 feet* one lane	Radius > 500 feet* two lane	Radius > 500 feet one lane	Radius > 500 feet two lane	
Full depth paved width (ft)		16	24	18	16	24	16	24	14	22	17	14	22	14	22	16
Design lane width (ft)		16	12	18	16	12	16	12	14	11	17	14	11	14	11	16
Paved shoulder width (ft) (in the direction of travel)**	Left	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Right	6	6	6	6	6	8	8	6	6	6	6	6	8	8	4
***Granular shoulder width (ft) (in the direction of travel)	Left	4	-	-	-	-	-	-	4	-	-	-	-	-	-	0
	Right	6	-	-	-	-	-	-	6	-	-	-	-	-	-	2
Curb type	Interstate	4-inch sloped							4-inch sloped							NA
	Non-Interstate	4-inch sloped							6-inch sloped							4-inch sloped

*For radii less than 500 feet, refer to design widths of pavement for turning roadways in A Policy on Geometric Design of Highways and Streets
**Left and right shoulders widths may be reversed if needed to provide additional sight distance
***Non-Interstate interchanges only

Notes:

4' paved shoulder left
4' paved + 2' granular shoulder right

Ramp Design Speed (mph) = 60, (40)

Design Manual Section 1C-1
Last Updated: 04-29-19

Design Criteria for Ramps Based Upon Design Speed

Design Element			Preferred Criteria Design Speed, mph: 25	30	35	40	45	50	55	60	Acceptable Criteria Design Speed, mph: 25	30	35	40	45	50	55	60	Project Values
Stopping sight distance (ft) (Refer to Section 6D-1)			155	200	250	305	360	425	495	570	155	200	250	305	360	425	495	570	570, (305)
Minimum horizontal curve radius (ft) and superelevation rate (Refer to Sections 2A-2 and 2A-3)	Method 2 superelevation and side friction distribution	e = 4% max	See Table 10 in Section 2A-3					--	--	--	--								NA
	Method 5 superelevation and side friction distribution	e_{max} = 6%	144	231	340	485	643	833	1060	1330	144	231	340	485	643	833	1060	1330	1330, (485)
		e_{max} = 8%	--	--	--	--	--	--	--	--	134	214	314	444	587	758	960	1200	NA
Minimum vertical curve length (ft) (Refer to Section 2B-1)			75	90	105	120	135	150	165	180	75	90	105	120	135	150	165	180	180, (120)
Minimum Rate of Vertical Curvature (Refer to Section 2B-1)	crest vertical curves		12	19	29	44	61	84	114	151	12	19	29	44	61	84	114	151	151, (44)
	sag vertical curves	roadways without fixed source lighting	26	37	49	64	79	96	115	136	26	37	49	64	79	96	115	136	136, (64)
		roadways with fixed-source lighting	26	37	49	64	79	96	115	136	14	20	27	35	44	54	66	78	78, (35)
Minimum gradient (%)	(Refer to Section 2B-1)		0.5								0.3% with a curb, 0.0% without a curb								0.5
Maximum gradient (%) on ramps	(Refer to Sections 2B-1)	Upgrades	4								8	7	6	6	5	5	5	5	4
		Downgrades									Equal to the maximum upgrade gradient. In special cases, may be 2% greater but in no case greater than 8%								4
Clear zone			See "Preferred Clear Zone" table in Section 8A-2								See "Acceptable Clear Zone" table in Section 8A-2								24 (12)

Ramp Design Speed (mph) = 60 (40)

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Last Updated: 04-29-19

Design Speed for Ramps

Design Element	Ramp Type: Preferred — All curves near free flow terminals	Diagonal — Curves near at-grade terminals	Loop	Semi-Directional	Directional	Ramp Type: Acceptable — All curves near free flow terminals	Diagonal — Curves near at-grade terminals	Loop	Semi-Directional	Directional	Project Values
Design speed (mph)	60	40	30	50	60	50	35	25	40	40	60, 40 at-grade
Maximum superelevation rate (Refer to Section 2A-2 for details)	6%	4%	6%			8%					6%, 4% at-grade

Roadway	US 20 Ramps (Loop)		
PIN Number	16-07-020-030	Submittal Date	06/10/22
Project Number	NHSX-020-6(73)--3H-07		Approval Date
District	District 2	Assistant District Engineer	
County	BLACK HAWK	or	
Route	US 20	Office Director	
Location	From IA 58 at Hudson Road (M.P. 223.83) to US-63 (M.P. 227.49) in Waterloo		
Work Type	Pavement Reconstruction		
Segment Manager			
Designer	Hg Consult		

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Last Updated: 04-29-19

Ramps (Loop)

Design Element		Preferred Values	Acceptable Values	Project Values
Design speed (mph)		See Design Speed for Ramps Table Below	See Design Speed for Ramps Table Below	40
Design lane width (ft)				
Turn-lane width (ft)	Interstate ramps	12	12	12
	Non-Interstate ramps	12	10	12
Pavement cross-slope (on tangent sections)		2%	1.5% minimum, 2% maximum	2%
Shoulder cross-slope (on tangent sections)		4	Shoulder cross-slope cannot be less than the adjacent lane, 6% max for paved or granular shoulders, 8% max for earth shoulders	4%
Foreslope (For fill areas greater than 40 ft, contact the Soils Design Section for assistance)	Adjacent to shoulder	10:1 for 4' then 6:1	4:1 for interstates*, 3:1 for other roadways	10:1 for 4' then 6:1
	Beyond standard ditch depth and design clear zone	3.5:1	3:1	3.5:1
	Curbed roadways	2%	not steeper than 3:1	2%
Bridge width—new**		design lane widths + effective shoulder widths	design lane widths + effective shoulder widths	
Bridge width—existing**		design lane widths + effective shoulder widths	design lane widths + effective shoulder widths	
Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks)	Over primary	16.5	16	16.5
	over non-primary	16.5 at interchange locations, 15 at all other locations	14	16.5 at interchange locations, 15 at all other locations
	over railroad	23.3	23.3	23.3
	sign truss and pedestrian bridges	17.5	17	17.5
Structural Capacity		Contact Office of Bridges and Structures	Contact Office of Bridges and Structures	

*Design Exception required for ramps on the Interstate system only
**FHWA notification via email is required if acceptable cirteria is not met on the Interstate or NHS systems (No formal design exception required)

Design Manual Section 1C-1
Last Updated: 04-29-19

Effective Shoulder Width and Type for Ramps

Design Element		Ramp Type: Preferred							Ramp Type: Acceptable							Project Values
		Diagonal		Loop	Semi-Directional		Directional		Diagonal		Loop	Semi-Directional		Directional		
		one lane	two lane		one lane	two lane	one lane	two lane	Radius*> 500 feet*			Radius > 500 feet*		Radius > 500 feet		
									one lane	two lane		one lane	two lane	one lane	two lane	
Full depth paved width (ft)		16	24	18	16	24	16	24	14	22	17	14	22	14	22	18
Design lane width (ft)		16	12	18	16	12	16	12	14	11	17	14	11	14	11	18
Paved shoulder width (ft) (in the direction of travel)**	Left	4	4	4	4	4	4	4	4	4	4	4	4	4	4	4
	Right	6	6	6	6	6	8	8	6	6	6	6	6	8	8	6
***Granular shoulder width (ft) (in the direction of travel)	Left	4	-	-	-	-	-	-	4	-	-	-	-	-	-	n/a
	Right	6	-	-	-	-	-	-	6	-	-	-	-	-	-	n/a
Curb type	Interstate	4-inch sloped							4-inch sloped							n/a
	Non-Interstate	4-inch sloped							6-inch sloped							n/a

*For radii less than 500 feet, refer to design widths of pavement for turning roadways in A Policy on Geometric Design of Highways and Streets
**Left and right shoulders widths may be reversed if needed to provide additional sight distance
***Non-Interstate interchanges only

Notes:

Diagonal Ramp Design Speed (mph) = 40

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Last Updated: 04-29-19

Design Criteria for Ramps Based Upon Design Speed

Design Element			Preferred Criteria, Design Speed, mph: 25	30	35	40	45	50	55	60	Acceptable Criteria, Design Speed, mph: 25	30	35	40	45	50	55	60	Project Values
Stopping sight distance (ft) (Refer to Section 6D-1)			155	200	250	305	360	425	495	570	155	200	250	305	360	425	495	570	200
Minimum horizontal curve radius (ft) and superelevation rate (Refer to Sections 2A-2 and 2A-3)	Method 2 superelevation and side friction distribution	e = 4% max	See Table 10 in Section 2A-3					--	--	--	--								
	Method 5 superelevation and side friction distribution	e_{max} = 6%	144	231	340	485	643	833	1060	1330	144	231	340	485	643	833	1060	1330	231
		e_{max} = 8%	--	--	--	--	--	--	--	--	134	214	314	444	587	758	960	1200	
Minimum vertical curve length (ft) (Refer to Section 2B-1)			75	90	105	120	135	150	165	180	75	90	105	120	135	150	165	180	90
Minimum Rate of Vertical Curvature (Refer to Section 2B-1)	crest vertical curves		12	19	29	44	61	84	114	151	12	19	29	44	61	84	114	151	19
	sag vertical curves	roadways without fixed-source lighting	26	37	49	64	79	96	115	136	26	37	49	64	79	96	115	136	37
		roadways with fixed-source lighting	26	37	49	64	79	96	115	136	14	20	27	35	44	54	66	78	37
Minimum gradient (%)	(Refer to Section 2B-1)		0.5								0.3% with a curb, 0.0% without a curb								0.5
Maximum gradient (%) on ramps	(Refer to Sections 2B-1)	Upgrades	4								8	7	6	6	5	5	5	5	7
		Downgrades									Equal to the maximum upgrade gradient. In special cases, may be 2% greater but in no case greater than 8%								7
Clear zone			See "Preferred Clear Zone" table in Section 8A-2								See "Acceptable Clear Zone" table in Section 8A-2								16

Ramp Design Speed (mph) = 30

Design Manual Section 1C-1
Last Updated: 04-29-19

Design Speed for Ramps (Loops)

Design Element	Ramp Type: Preferred, All curves near free flow terminals	Preferred, Diagonal, Curves near at-grade terminals	Preferred, Loop	Preferred, Semi-Directional	Preferred, Directional	Ramp Type: Acceptable, All curves near free flow terminals	Acceptable, Diagonal, Curves near at-grade terminals	Acceptable, Loop	Acceptable, Semi-Directional	Acceptable, Directional	Project Values
Design speed (mph)	60	40	30	50	60	50	35	25	40	40	30
Maximum superelevation rate (Refer to Section 2A-2 for details)	6%	4%	6%			8%					6%

Notes:

Field Exam Questions?

1. Survey - Note that the US 20 survey stationing did not align with as-builts. We used as-builts to show the paving on K-sheets. Comments?

   Use the survey on the K sheets (not the as-builts). Create new sheets.

2. Project Limits –
   a. Mainline US 20 – Begin and End Project Stations – Is there a good formula for converting Mile Points to Stations? Do the plans indicate the intended beginning and ending of the paving?

      Use the station at the end point of the project (beginning of bridge approach at US 63) then back-in the begin station using the MP to MP converted to feet.

   b. Ramps – What are the limits of the ramp paving? Are any of the ramps in good enough condition to UAC?

      Replace all ramp and loop pavement within project limits up to the intersection curb returns.

3. Bridge Approaches – Are the bridge approaches within the project limits being replaced? Are the west approaches of the bridges over US 63 being replaced?

   Jason? Replace all bridge approaches within project limits.

4. Bridge work – Concept notes to seal cracks and repair concrete spalls specific bridges. Will this require bridge plan development?

   Jason will forward to Bridge Division.
   email received from Bridge Division - no bridge work is required.

5. Guardrail – Concept notes to replace guardrail on FHWA 605170 for WB US 20 at the US 63 Interchange. Was this guardrail replaced with the previous paving project?

   No. Replace guardrail on this project.

6. Is there an incident management plan on this project?

   No.

7. Staging – There have been emails and discussions regarding the Proposed Staging for the project. The concept notes to UAC the west crossover from (72). This will require some additional staging and temporary barrier. Another solution would be to construct a new crossover outside project (73) limits. Thoughts or decisions on the proposed staging options?

   Both crossovers from previous projects have been removed.
   Place 2 new crossovers for this project.
   Contractor will remove entire east crossover and replace the shoulders.
   Contractor may saw-cut the west crossover at edge of shoulder.
   DOT team members are reviewing the proposed crossover locations and detours.

8. Verify temporary guardrail connections can be made to trailing outside corner of east and west mainline bridges.

   We will do a virtual field check (using google earth). Use the same crash barrier as seen at US 63.

9. Patching – Should HMA surface patches and Emergency patches for stage with traffic head-to-head on existing pavement be added to this project?

   ?No?
   ?DOT Maintenance will check and determine what is needed?

10. Emergency Patching bid items were used for (72). Should they be added to this project too?

    HOT MIX ASPHALT SURFACE PATCHES

    2599-9999005 ('EACH' ITEM) EMERGENCY PATCHES, FULL DEPTH, FINISH, BY COUNT
    2599-9999005 ('EACH' ITEM) MOBILIZATION FOR EMERGENCY PATCHING
    2599-9999018 ('SQUARE YARDS' ITEM) EMERGENCY PATCHES, FULL DEPTH, FINISH, BY AREA

    ?DOT Maintenance will check and determine what is needed?

11. Lessons learned from recently constructed project to the East (71) and (72)?

    1. Haul Road - fill and surface material must be removed.
    2.
    3.

12. Any issues with construction of cross-over on (71) or (72)? Any additional notes needed?

    Contractor will remove entire east crossover and replace the shoulders.
    Contractor may saw-cut the west crossover at edge of shoulder.

Additional discussion:
District will design all new signing for this project.

D2 QUESTIONNAIRE

1. Are any of the following needed?

2. Contractor or designated Borrow area adjacent to the site? No

3. Field Laboratory? Yes

4. Construction Survey? Yes

5. Removal and Reinstall Signs? Does the district maintenance crew want to handle this? Or do they prefer the Contractor handle it?
   Yes - Contractor should handle it.

6. Clearing and Grubbing by area or by unit? If by unit, I need District to provide count.
   No

7. Duration of the project? 1 construction season

8. Do the shoulders within the construction limits or beyond need to be reconstructed or resurfaced? Yes within and at the east crossover.

9. Are there existing drainage problems?
   Not aware of any.
   Maintenance question - Barry?.

10. Are rumble strips going to be placed with these projects or a separate project? With this project.

11. Are there areas adjacent to the project where additional ditching needs done?
    Not aware of any.
    Maintenance question.

12. Are there any special events which need to be noted in the plan? Or is there a contact person who could provide this information closer to letting the project?
    Ron - contact Waterloo
    and Cedar Falls.

13. Is special erosion control needed (riprap, silt ditches, silt dikes, etc.)? Nothing special.

14. Tile lines? Location? No

15. Speed Limit during construction? 55 within work zone.

16. Note existing subdrain outlets for Soils Design. Contact Soils Dept.

17. Are there any entrances within the project limits that have not been previously identified? No

18. Note any special features not shown on plan. No

19. Note condition of existing culverts. Maintenance will review.

D2 QUESTIONNAIRE

20. Note existing G-Rail lengths and number of posts. Do any of the utilities need relocated (power/telephone poles) either permanently or temporarily for construction? No

21. Speed limit 55

22. Is sight distance a problem? No

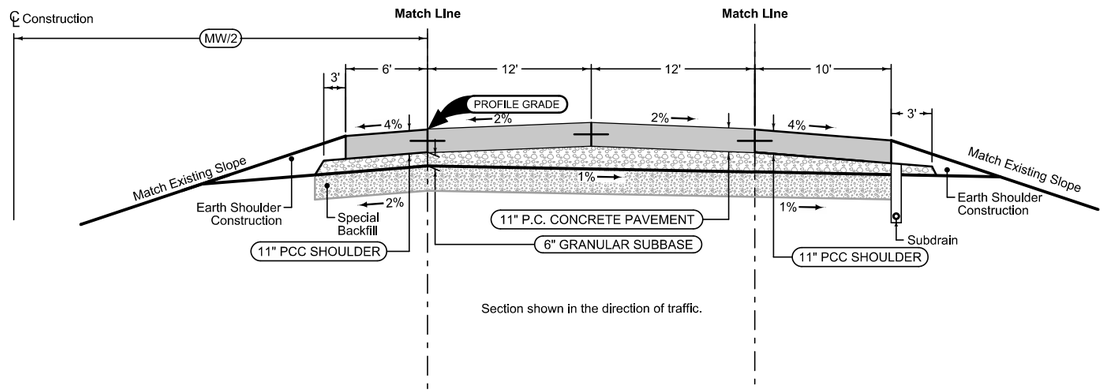
23. Disposition of existing structure, guardrail, signs, etc. (213-1 or the District office)? Replacing GR and Signs (salvage to Maint. Dept?)

24. Any patching need done in the area or do the construction limits need extended? Is the District going to provide locations of patches by milepost? District will provide by station.

25. Are there any historical items within the project? No

26. Are there any endangered species within the area? No

27. Are there any Wetland Impacts or any other Environmental issues? No



4DP_
04-21-20

Direction of Travel	BEGIN STATION	END STATION	(MW) Feet
EB	1452+79.33	1649+03.41	64
WB	1452+79.33	1649+03.41	64

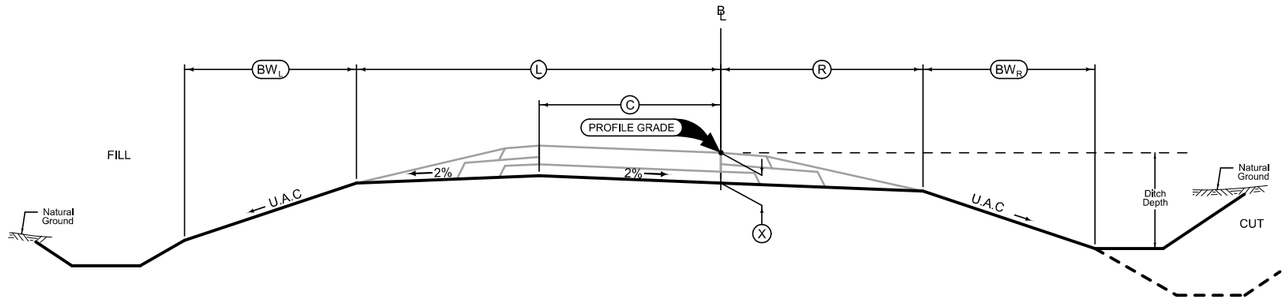
US 20 EB / WB

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER B.1

9:48:13 AM 6/9/2022 Brian Wrisinger \\projectwise.dot.int.lan:PWMain\Documents\Projects\0702003016\Design\CADD_Files\Sheet_Files\SHT_0702007305_B01.dgn

LOCATION		DIMENSIONS					
INTERCHANGE	RAMP/ LOOP	(L) Feet	(R) Feet	(C) Feet	(X) Inches	(BW_L) Feet	(BW_R) Feet
Hudson Rd	A	(1)	(1)	16	22	UAC	UAC
Hudson Rd	B	(1)	(1)	16	22	UAC	UAC
Hudson Rd	C	(1)	(1)	16	22	UAC	UAC
Hudson Rd	D	(1)	(1)	16	22	UAC	UAC
Hudson Rd	F	(1)	(1)	18	22	UAC	UAC
Butterfield Rd	A	(1)	(1)	16	22	UAC	UAC
Butterfield Rd	B	(1)	(1)	16	22	UAC	UAC
Butterfield Rd	C	(1)	(1)	16	22	UAC	UAC
Butterfield Rd	D	(1)	(1)	16	22	UAC	UAC
US 63	B	(1)	(1)	16	22	UAC	UAC

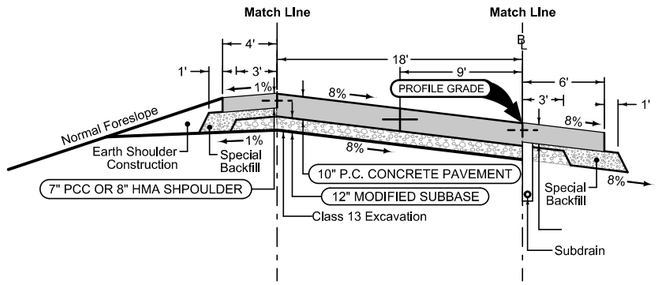
(1) Intercept existing foreslope



Section view is in direction of traffic.

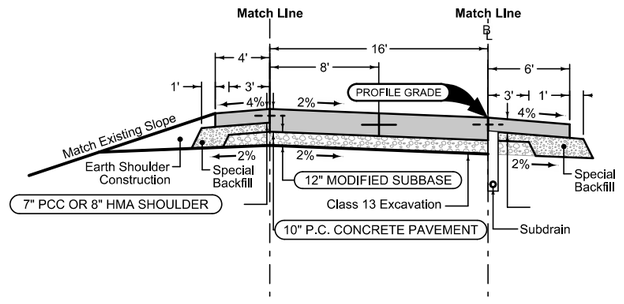
Normal sections shown may be appropriately modified for areas specifically designated by the Engineer such as intersections or superelevated curves.

RAMP/LOOP GRADING



LOOP TYPICAL

			1LP_ 10-17-17
INTERCHANGE	LOOP	BEGIN STATION	END STATION
Hudson Rd	F	6570+71.56	6580+74.53



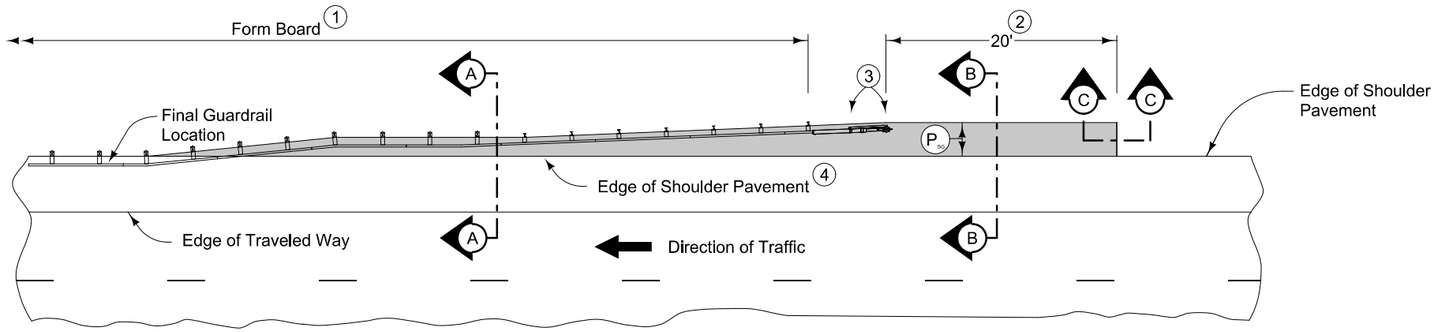
Section shown in the direction of traffic.

RAMP TYPICAL

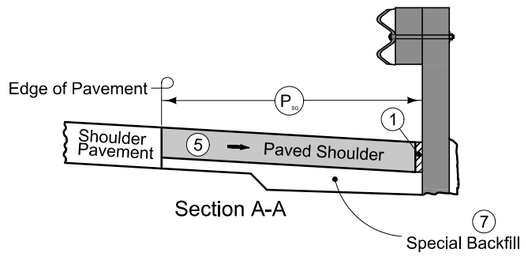
LOCATION			
INTERCHANGE	RAMP	STATION TO STATION	
Hudson Rd	A	1583+62.58	1597+91.19
Hudson Rd	B	2567+76.50	2585+64.66
Hudson Rd	C	3573+88.98	3585+70.39
Hudson Rd	D	4583+09.44	4597+62.70
Butterfield Rd	A	1544+30.27	1553+58.17
Butterfield Rd	B	2530+31.16	2542+81.53
Butterfield Rd	C	3530+28.99	3540+45.31
Butterfield Rd	D	4544+55.71	4552+92.61
US 63	B	2343+19.64	2349+54.39

Ramp and Loop Typicals

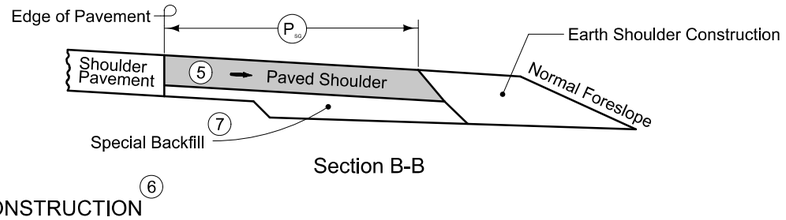
7158
MODIFIED



PLAN VIEW



Section A-A



Section B-B

NEW CONSTRUCTION
6

6" HMA Paved Shoulder at guardrail. 6" PCC may be substituted with the following jointing layout:

Match mainline pavement joint spacing. When mainline pavement is 8" or greater in thickness, place additional transverse 'C' joints in shoulder at mid-panel of the mainline pavement. Place longitudinal 'C' joint at P/2 from edge of mainline pavement when P is greater than 10' wide. Terminate longitudinal joint at transverse joint less than 10' in length.

Compaction of HMA is required to face of guardrail post. Hand compaction will be allowed under guardrail. Removal and reinstallation of guardrail will be allowed with no additional payment.

Refer to Tabulation 112-9 for shoulder quantities.

(1) PCC option only: When guardrail posts are installed prior to construction of PCC paved shoulder, fasten form board to the face of guardrail posts for the length shown.

(2) Continue paved shoulder 20 feet beyond the center of the first post.

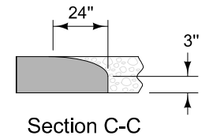
(3) Shoulder may be notched for first 2 posts or post sleeves may be installed through pavement. Do not drive posts through pavement.

(4) 'KT-1 joint for PCC shoulder.
'B' joint for HMA shoulder.

(5) Match shoulder slope.

(6) The Contractor has the option to pave the paved shoulder at guardrail and the full width paved shoulder as one operation.

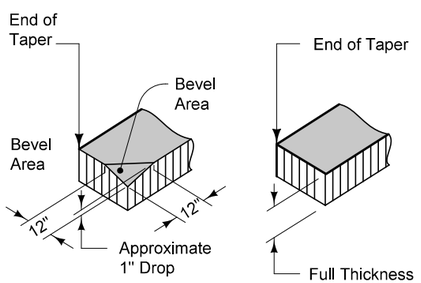
(7) Refer to other details in the plan.



Section C-C
Roll down at granular shoulder or earth.

PAVED SHOULDER AT GUARDRAIL
(ADJACENT TO FULL WIDTH PAVED SHOULDER)

7101
10-19-10



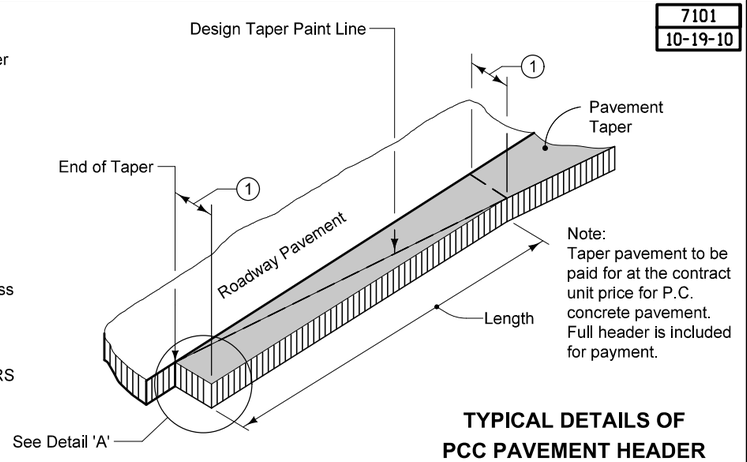
DETAIL 'A'

FOR
GRANULAR SHOULDERS

DETAIL 'A'

FOR
PAVED SHOULDERS

(1) Normal width is 2'-0". Construct 4'-0" width when butting into 4' wide HMA shoulders (See Typical 7154A).



Note:
Taper pavement to be paid for at the contract unit price for P.C. concrete pavement. Full header is included for payment.

TYPICAL DETAILS OF PCC PAVEMENT HEADER

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER B.5

4:36:11 PM 6/10/2022 Brian Wrisinger \\projectwise.dot.int.lan:PWMain\Documents\Projects\0702003016\Design\CADD_Files\Sheet_Files\SHT_07020073Z05_B01.dgn

SURVEY SYMBOLS

- AST, Above Ground Storage Tank
- BB, Billboard
- BBB, Bottom of Bridge Beam
- BCL, Bridge Centerline
- BD, Bridge Deck
- BIN, Grain Bin
- BL, Topo Breakline
- BLD, Building or Foundation
- BLS, Bridge Low Steel
- BM, Bench Mark
- BNK, Stream Bank
- BRG, Bridge
- C, Centerline BL of Road -ML or SR
- CAV, Cave
- CEL, Cell Phone Tower
- CIS, Cistern
- CON, Concrete or A/C Slab
- CP, Control Point
- CRP, Corporation Line
- CS, Curve Point
- CU, Back of Curb
- CUL, Culvert
- D, Centerline Draw or Stream -Down
- DAB, Drainage Area Boundary
- DIK, Centerline of Dike or Dam
- DTM, Photogrammetry Elv Control Check
- DU, Centerline Draw or Stream -Up
- EB, Electrical Box
- EG, Edge of Gravel Road
- ENP, Edge Paved Entrance and Park Lot
- ENT, Centerline BL of Entrance
- ENU, Edge Unpaved Entrance and Parking
- EP, Edge of Paved Roads -ML or SR
- EW, Edge of Water
- FCL, Chain Link and Security Fence
- FENO, FENO Monument
- FHD, Fire Hydrants
- FLG, Flag Poles
- FP, Filler Pipe
- FW, Wire Fence
- FWD, Wood Fence
- GDC, Guard Rail Cable
- GDL, Guard Rail Steel
- GP, Guard Post -Less Than 4 Posts
- GPR, Guard Post -4 or More Posts
- GR, Ground Shot
- GRV, Grave
- GU, Gutter In Front of Curb
- GV, Gas Valve
- HDG, Hedge Row
- HS, Hydric Soil -Wetlands
- HT, Electrical Highline Tower
- IN, Storm Sewer Intake
- INB, Storm Sewer Beehive Intake
- LC, Lot Corner
- LIN, Miscellaneous Line
- LP, L.P. Tank
- LUM, Luminaire
- MH, Utility Access -Manhole
- MIS, Miscellaneous
- MM, Mile Marker Post
- OUT, Tile Outlet
- PC, Curve Point
- PCP, Photo Control Point
- PCT, Photo Control Target
- PI, Tangent Point
- PIP, Pipe Culvert
- PL, Location of Photo -Wetlands
- PLG, Location of General Photo
- POC, Curve Point
- POST, Spiral Point
- PR, Electic Riser Pole
- PRO, Profile Shot
- PT, Curve Point
- REF, Reference Tie Point
- RET, Retaining Walls
- RIP, Rip-Rap
- ROC, Rock Outcropping
- ROW, Right of Way Mark
- RR, Centerline of Railroad Tracks
- RRB, Railroad Signal Box
- RRF, Railroad Frog
- RRR, Railroad Rail
- RRS, Railroad Signal
- RRW, Railroad Switch
- RT, Radio Tower
- S, Soil Sampling Site -Wetlands
- SBR, Size of Bridge
- SC, Spiral Point
- SCR, Section Corner
- SEP, Septic Tank
- SF, Silt Fence -Wetlands
- SG, Staff Gauge -Wetlands
- SH, Paved Shoulder
- SHR, Shrub
- SI, Sign
- SL, Speed Limit Sign
- SLN, Section Line
- SLO, Silo
- SNK, Sink Hole
- SNP, Unpaved Shoulder
- SP, Stream Profile
- STP, Stump
- SWK, Sidewalk
- SWP, Swamp or Marsh
- TA, Tower Anchor
- TBO, Telephone Booth
- TCB, Traffic Signal Box
- TDC, Tree Deciduous
- TDL, Trafic Detection Loop
- TER, Terrace
- TEV, Evergeen Tree
- TFR, Tree Fruit
- TGP, Telegraph Pole
- TIL, Tile Line
- TLNL, Tree Line Left
- TLNR, Tree Line Right
- TOP, Top of Bridge Pier
- TPA, Telephone Pole Co. 1
- TPB, Telephone Pole Co. 2
- TPC, Telephone Pole Co. 3
- TR, Telephone Riser Pole
- TRL, Trail
- TS, Spiral Point
- TSB, Telephone Switch Box
- TSG, Traffic Signal
- TSL, Traffic Signal and Luminare
- TV, Satelite TV Dish
- TVP, TV Pedestal
- TW, Top of Water
- UB, Utility Box
- UE, Utility Elevation
- UPH, Utility Pot Hole - Quality A
- UST, Underground Tank
- UV, Underground Utility Vault
- VS, Channel Cross Section
- WC, Wild Card -Misc. Field Shot
- WEL, Well
- WHD, Water Hydrant
- WHU, RV Water Hook Up
- WM, Wind Mill
- WND, Wind Turbine
- WV, Water Valve

SURVEYED UTILITY OWNER SYMBOLS

Sub-Surface Utility Mapping Quality Level is in accordance with CI/ASCE 38-02 Standard Guidelines for the Collection and Depiction of Existing Subsurface Utility Data.

Remark Abbreviations
QLA Quality Level A Highest guideline quality level
QLD Quality Level D Lowest guideline quality level

- EL1D, Cedar Falls Utilities
- EL2D, MidAmerican Energy
- EL3D, Iowa DOT
- FO1D, Cedar Falls Utilities
- FO2D, Lumen
- FO3D, UPN
- FO4D, Mediacom
- WL1D, City of Waterloo

PLAN VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

LINEWORK	Design Color No.	
Green	(2)	Existing Topographic Features and Labels
Blue	(1)	Proposed Alignment, Stationing, Tic Marks, and Alignment Annotation
Magenta	(5)	Existing Utilities
SHADING	**Design Color No.**	
Yellow	(4)	Highlight for Critical Notes or Features
Red	(3)	Delineates Restricted Areas
Lavender	(9)	Temporary Pavement Shading
Gray, Light	(48)	Proposed Pavement Shading
Gray, Med	(80)	Proposed Granular Shading
Gray, Dark	(112)	Proposed Grade and Pave Shading "In conjunction with a paving project"
Brown, Light	(236)	Grading Shading
Tan	(8)	Proposed Sidewalk Shading
Blue, Light	(230)	Proposed Sidewalk Landing Shading
Pink	(11)	Proposed Sidewalk Ramp Shading

PROFILE VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

LINEWORK	Design Color No.	
Green	(2)	Existing Ground Line Profile
Blue	(1)	Proposed Profile and Annotation
Magenta	(5)	Existing Utilities
Blue, Light	(230)	Proposed Ditch Grades, Left
Black	(0)	Proposed Ditch Grades, Median
Rust	(14)	Proposed Ditch Grades, Right

- Reference Point / Station
- Survey Line
- Section Corner
- Ground Line Intercept
- Saw Cut
- Guardrail
- Trench Drain
- HighTension Cable Guardrail
- Sheet Pile
- Pavement Removal
- Clearing & Grubbing Area

RIGHT-OF-WAY LEGEND

- Proposed Right-of-Way
- Existing Right of Way
- Existing and Proposed Right-of-Way
- Easement and Existing Right-of-Way
- Easement (Temporary)
- Easement
- C/A Access Control
- Property Line

PLAN AND PROFILE LEGEND AND SYMBOL INFORMATION SHEET

(COVERS SHEET SERIES D, E, F, & K)

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER D.1

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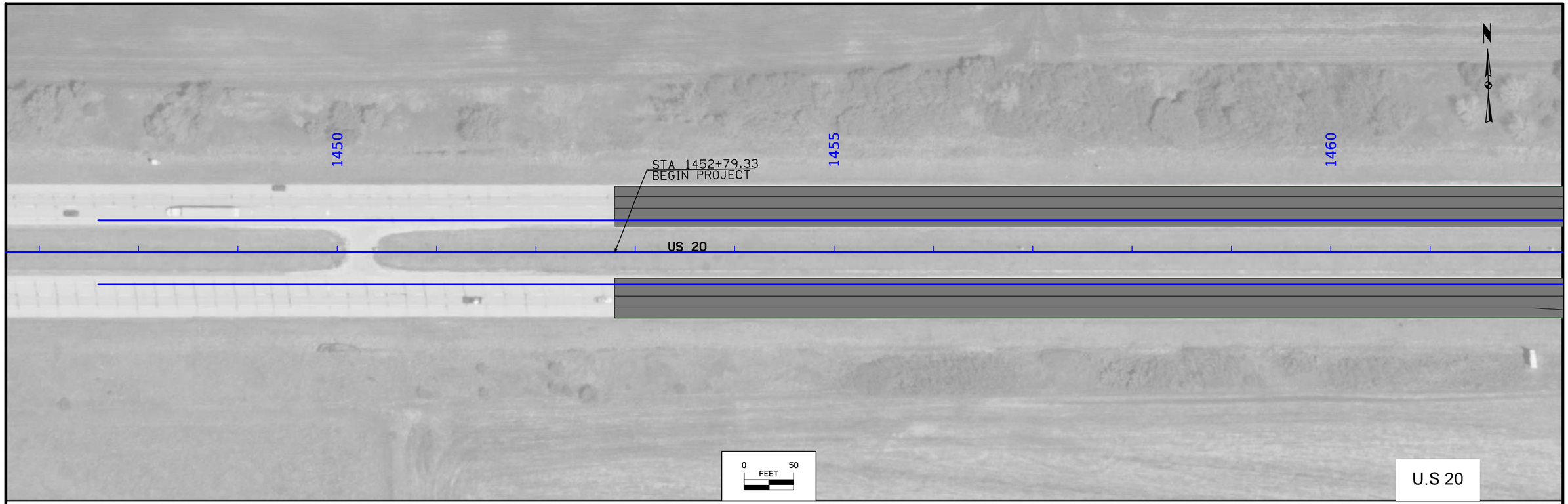

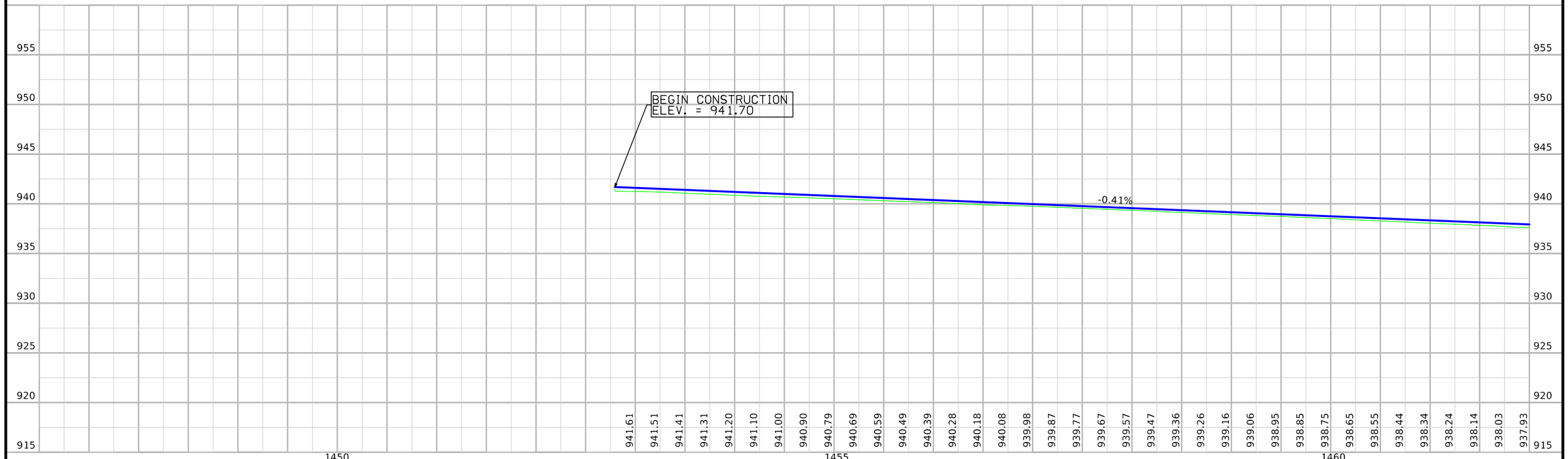

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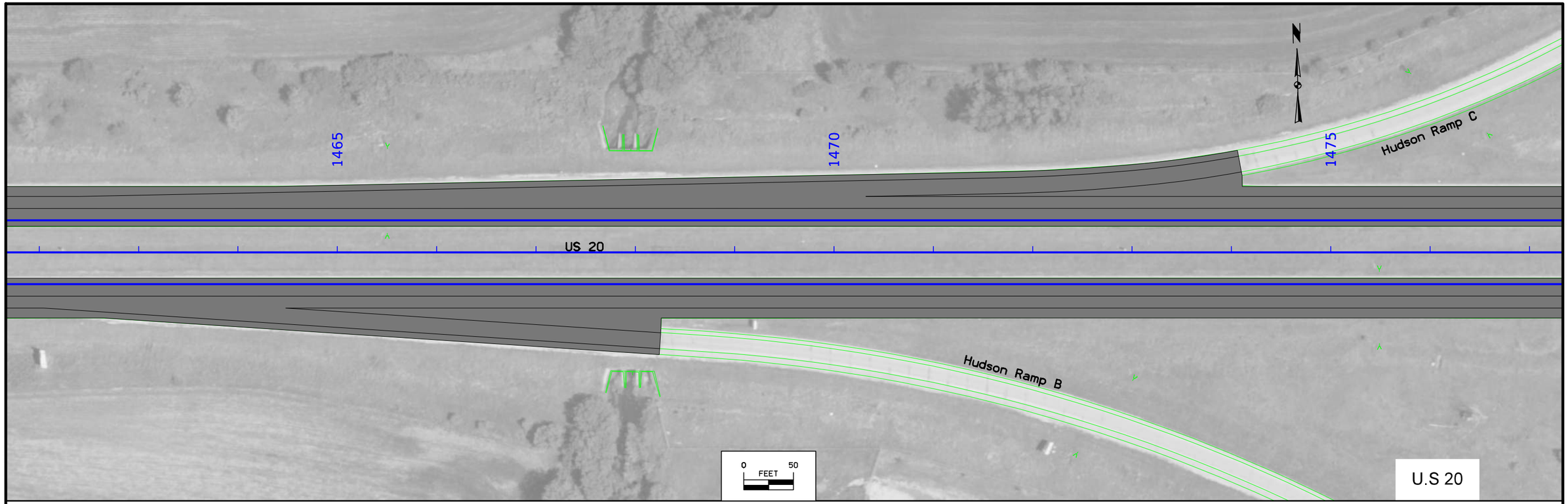

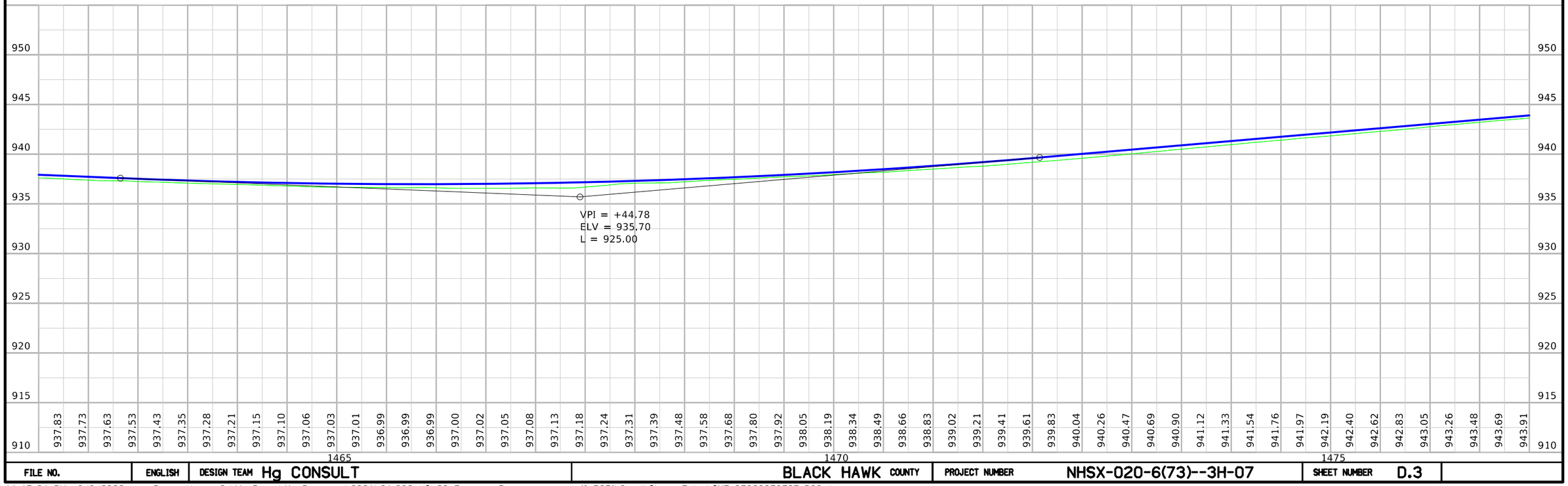

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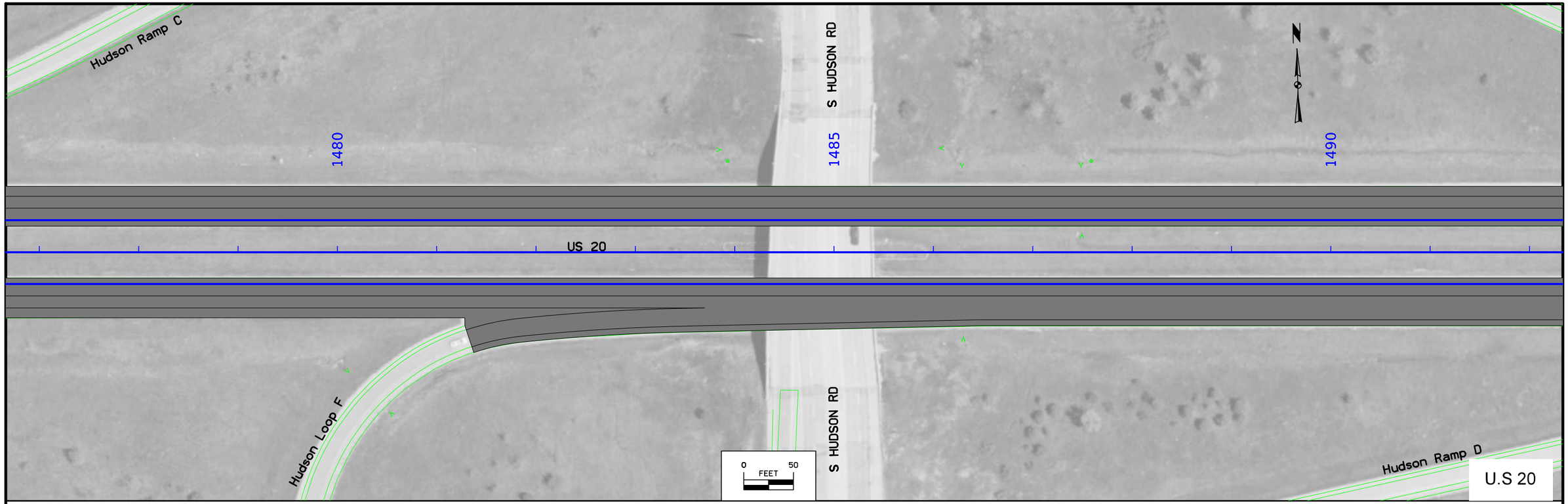

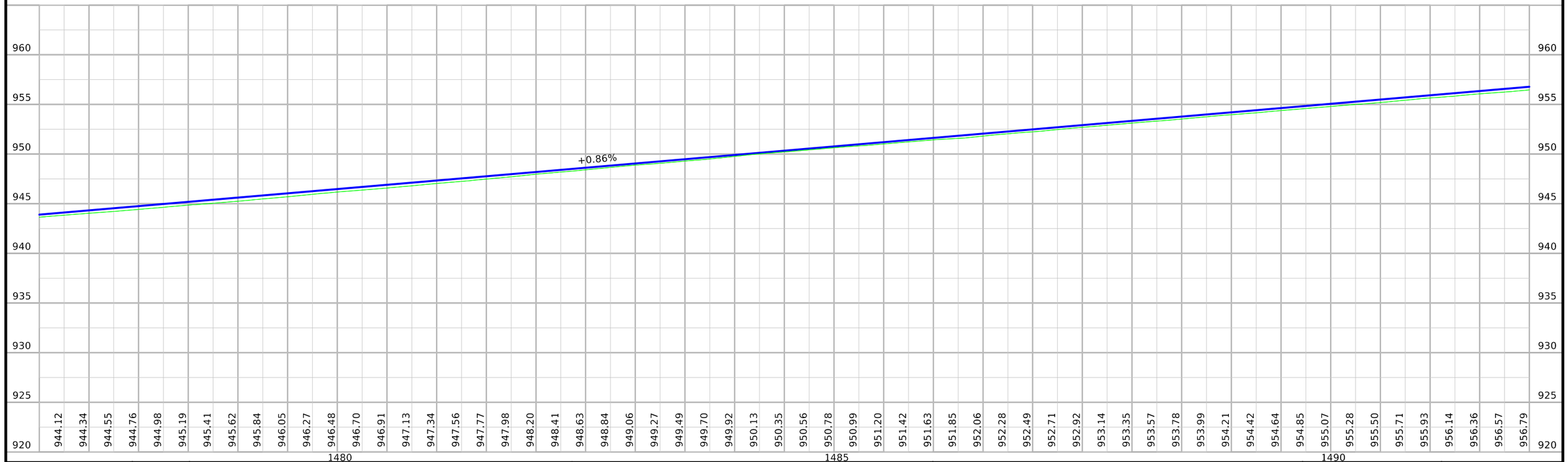

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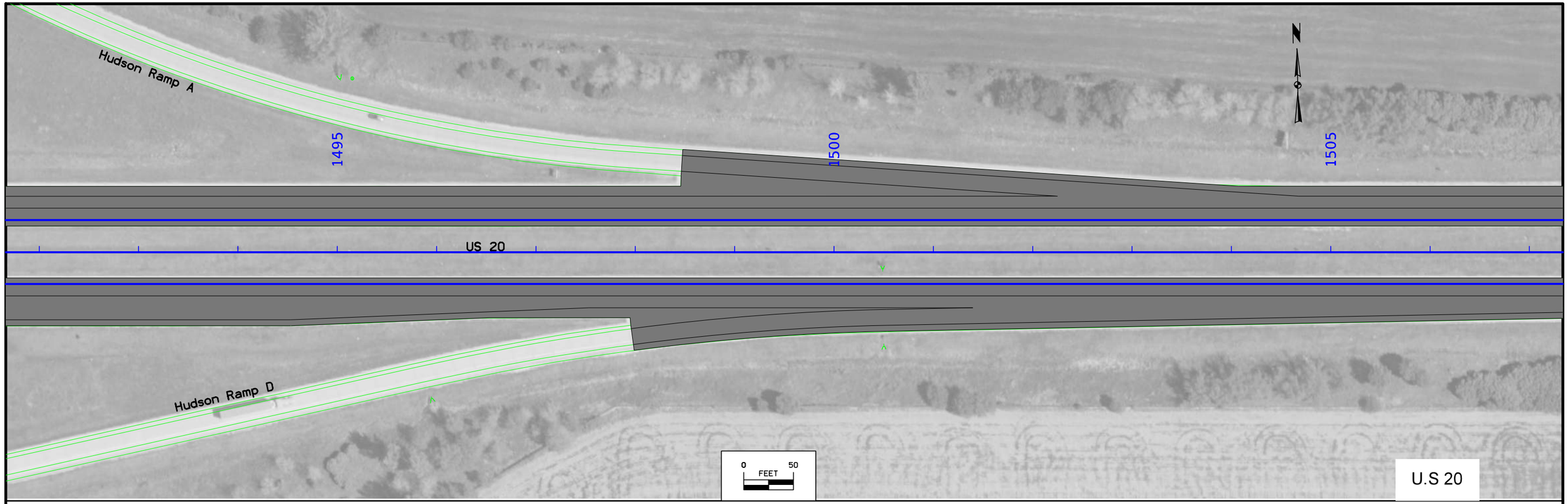

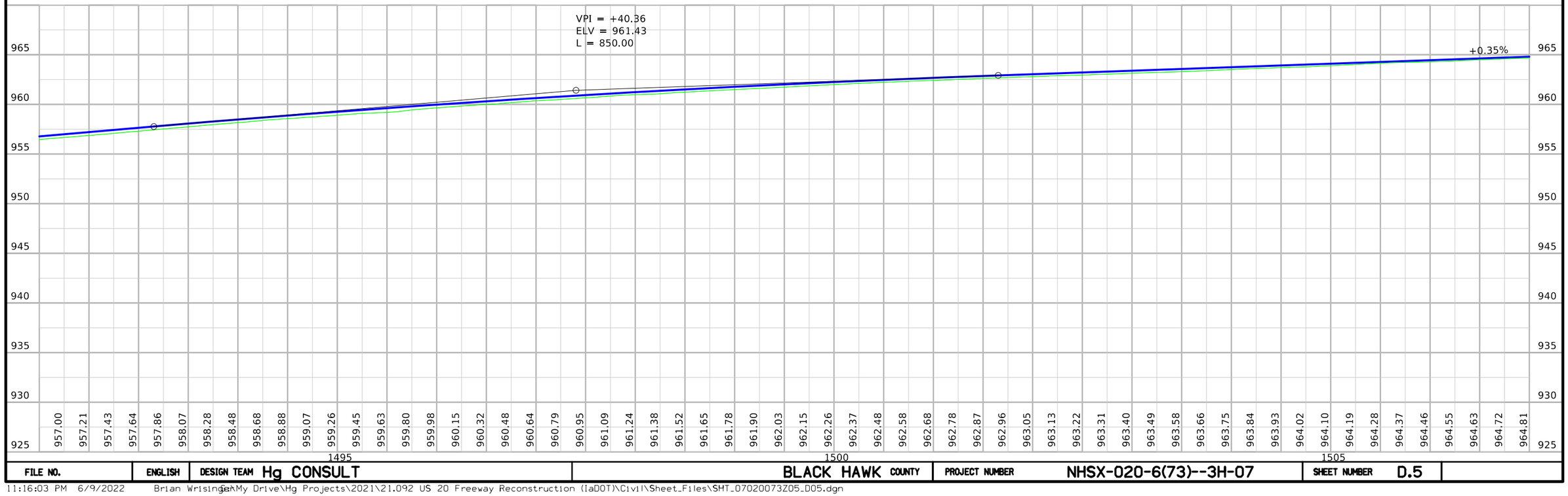

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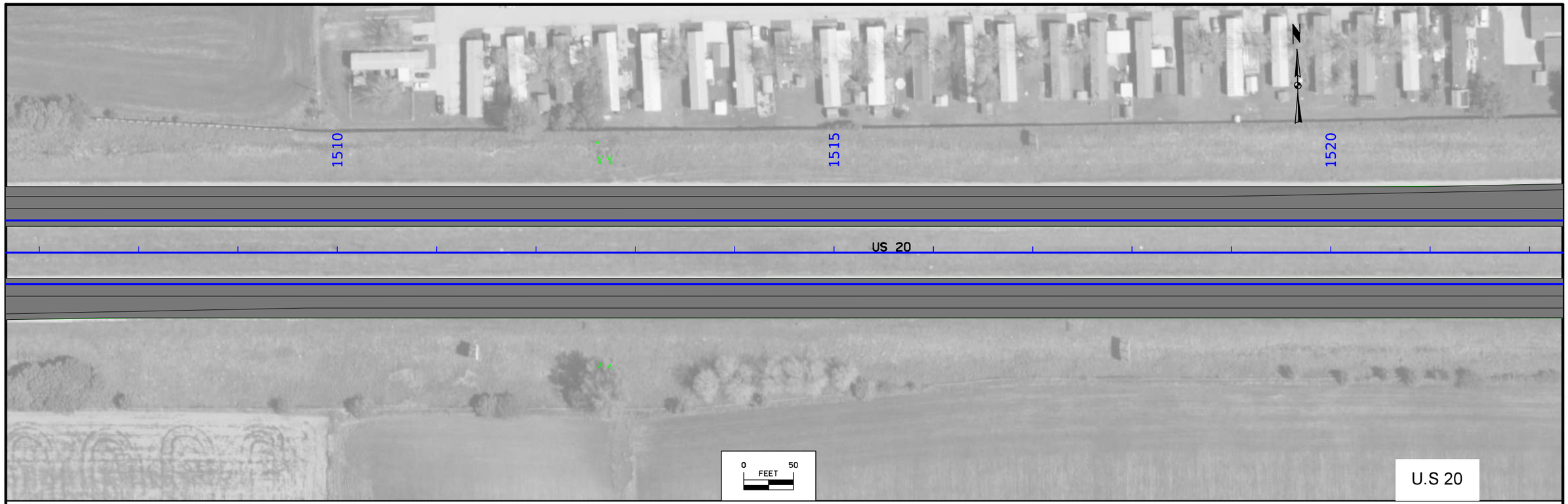

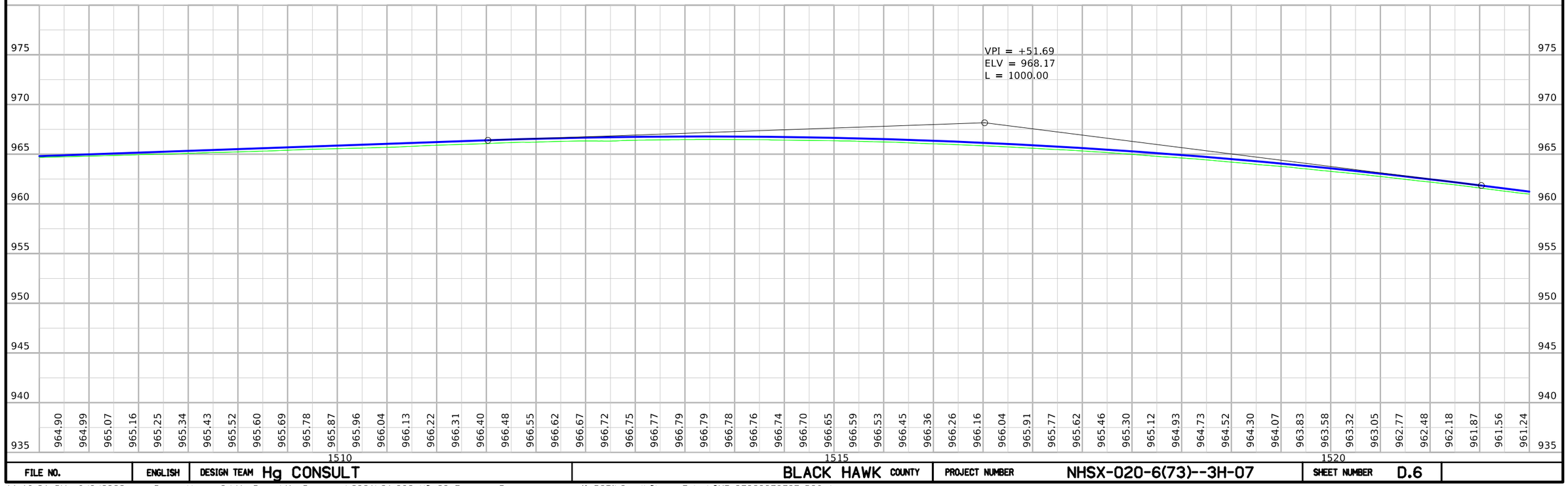

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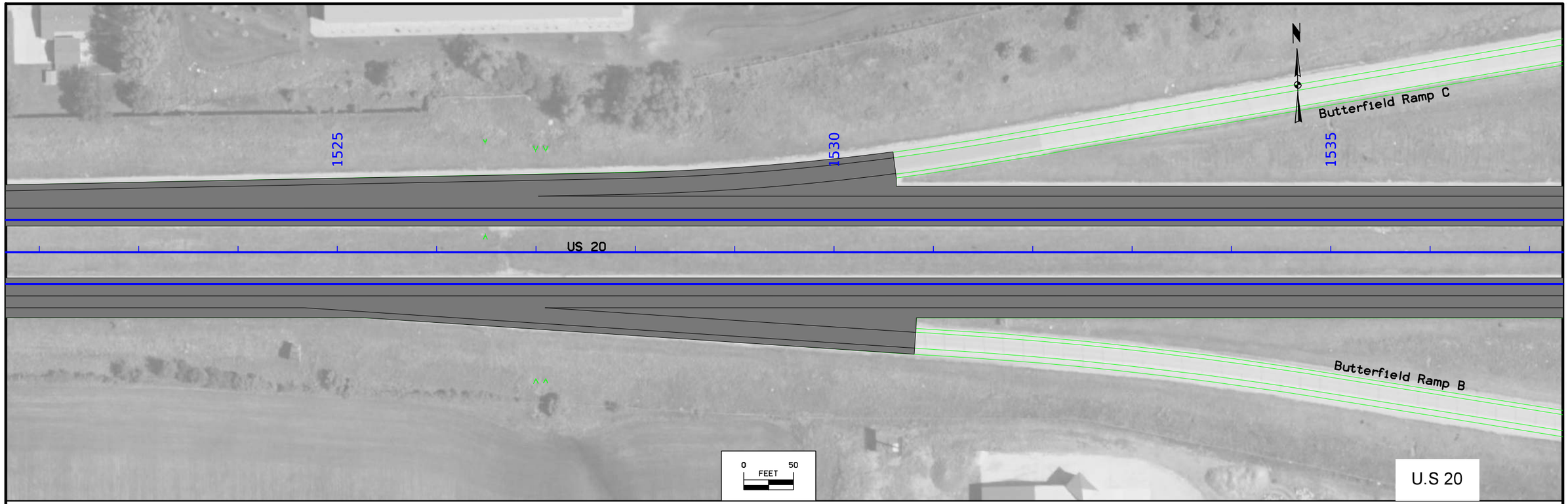

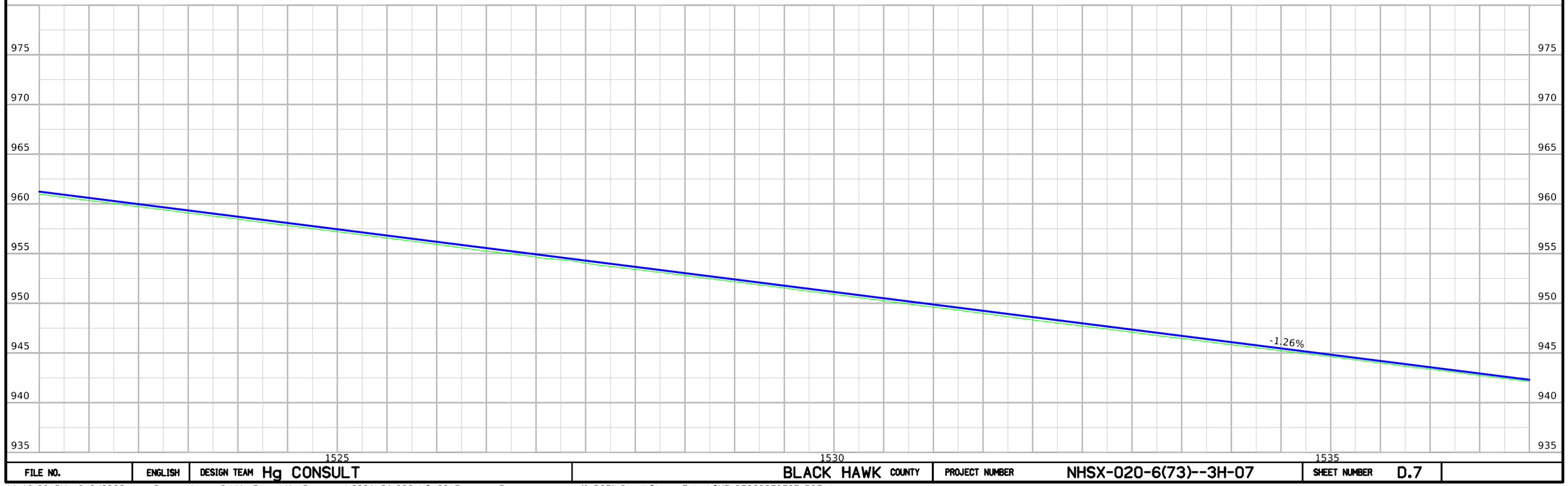

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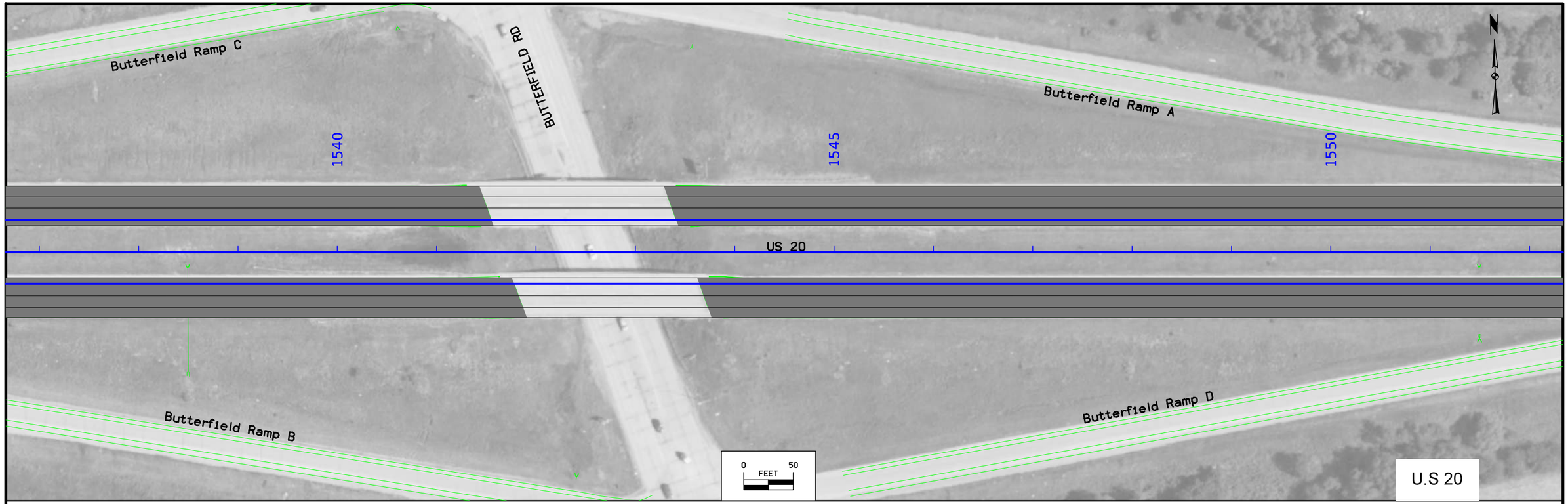

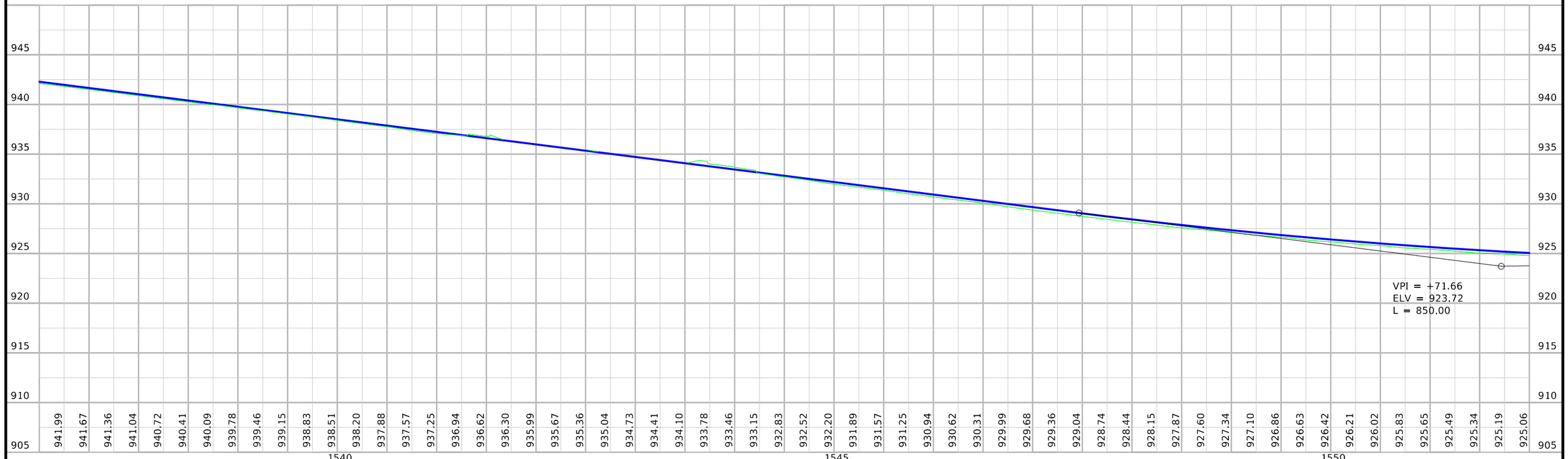

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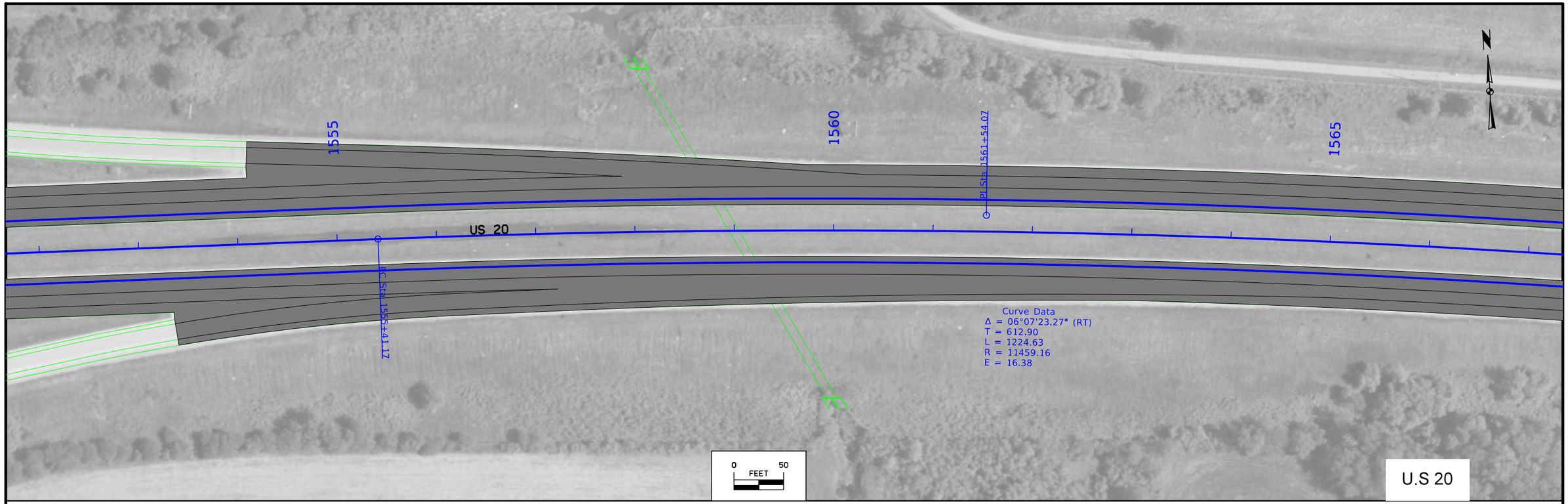

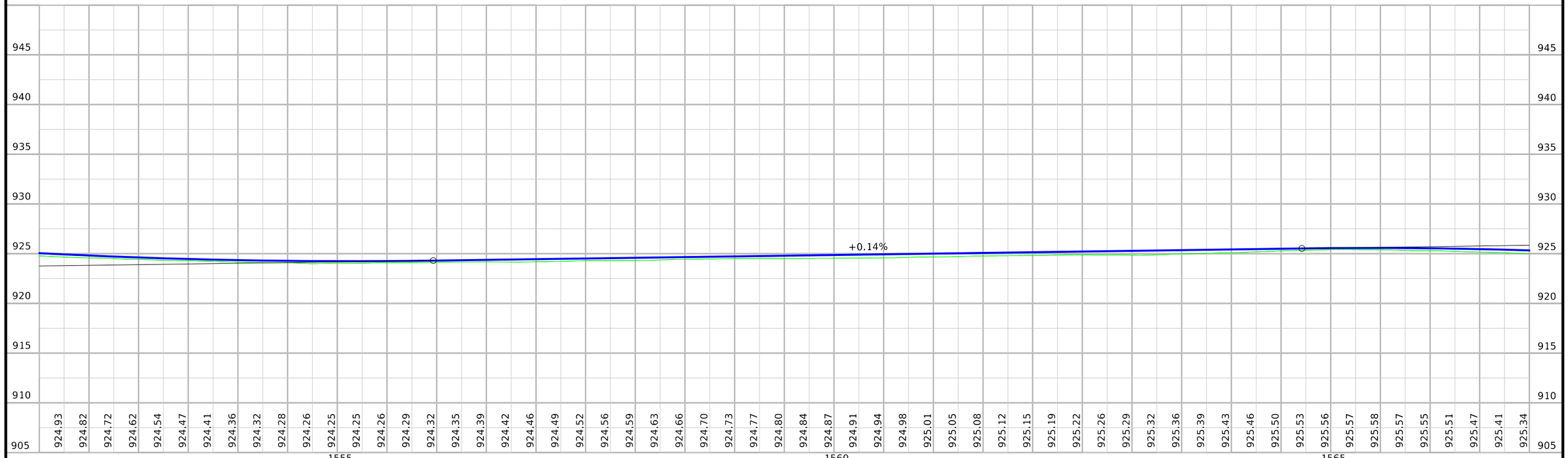

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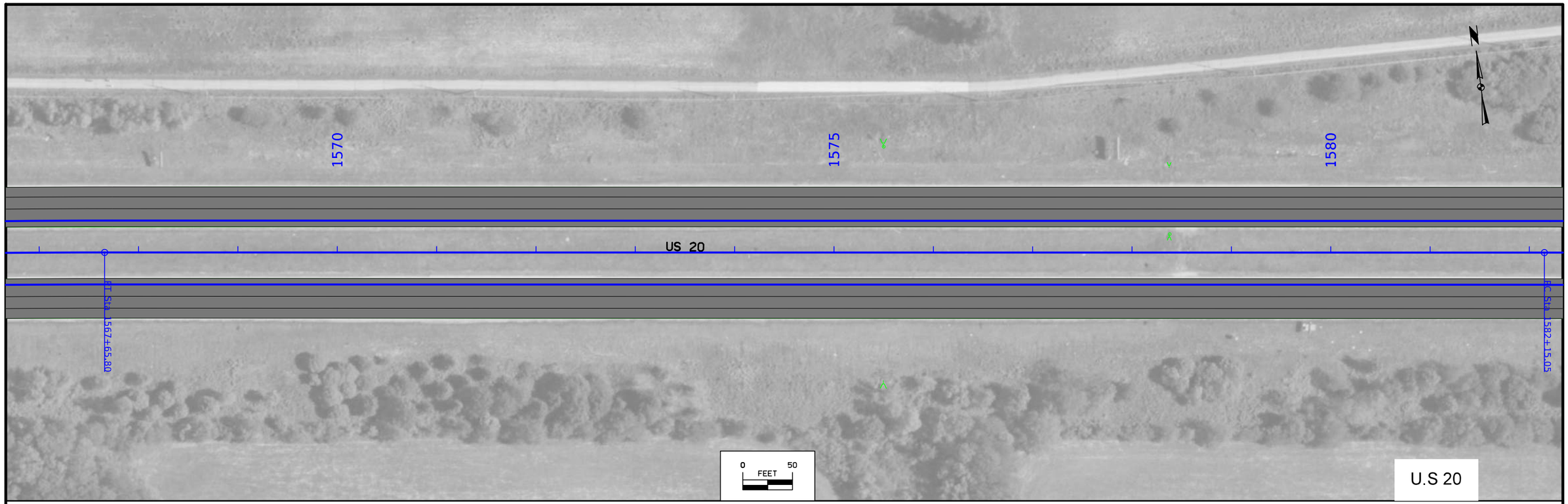

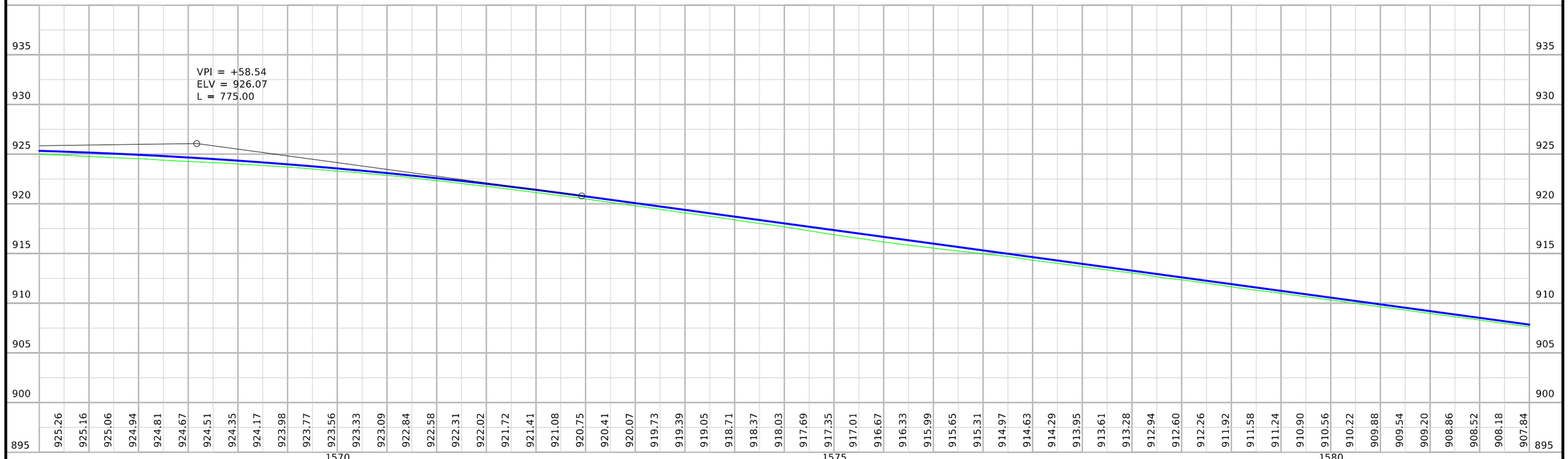

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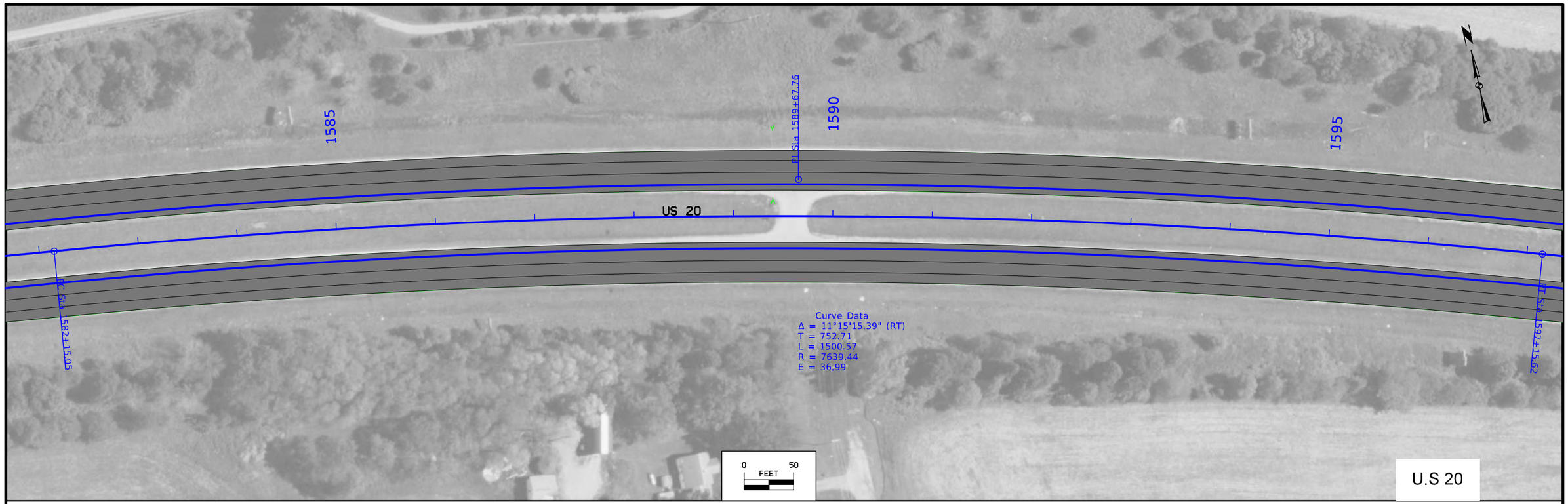

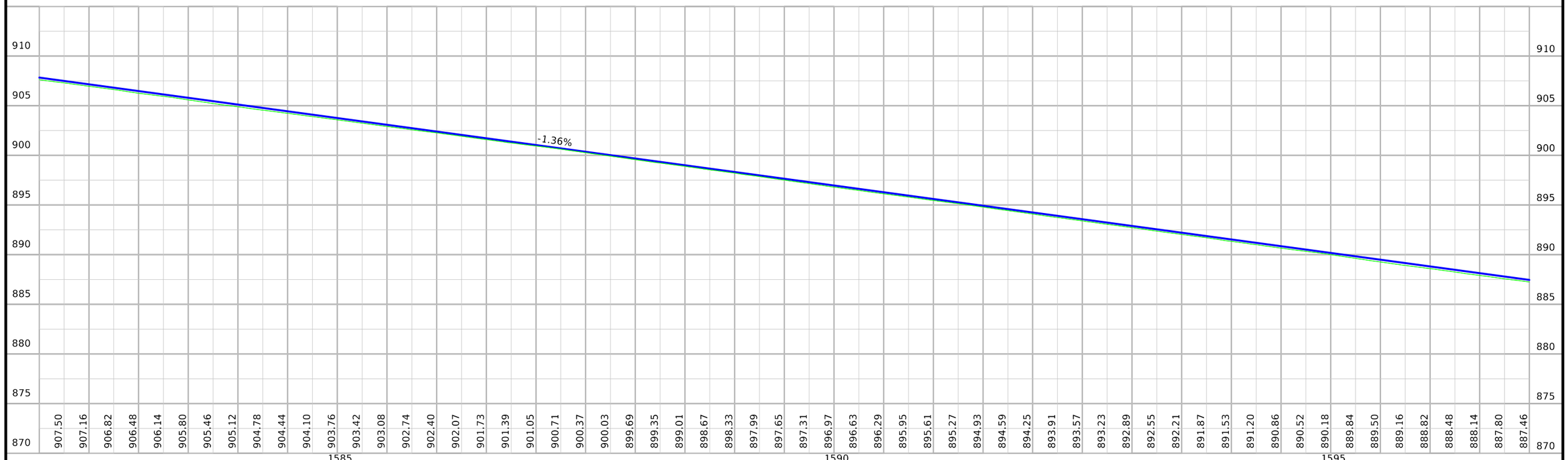

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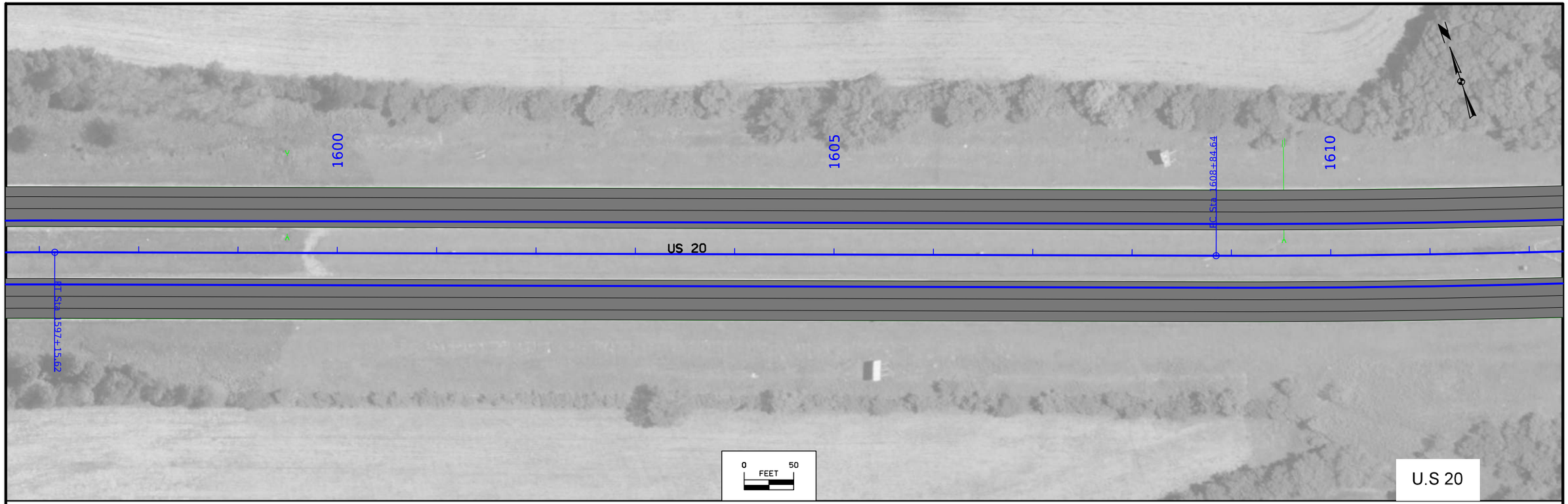

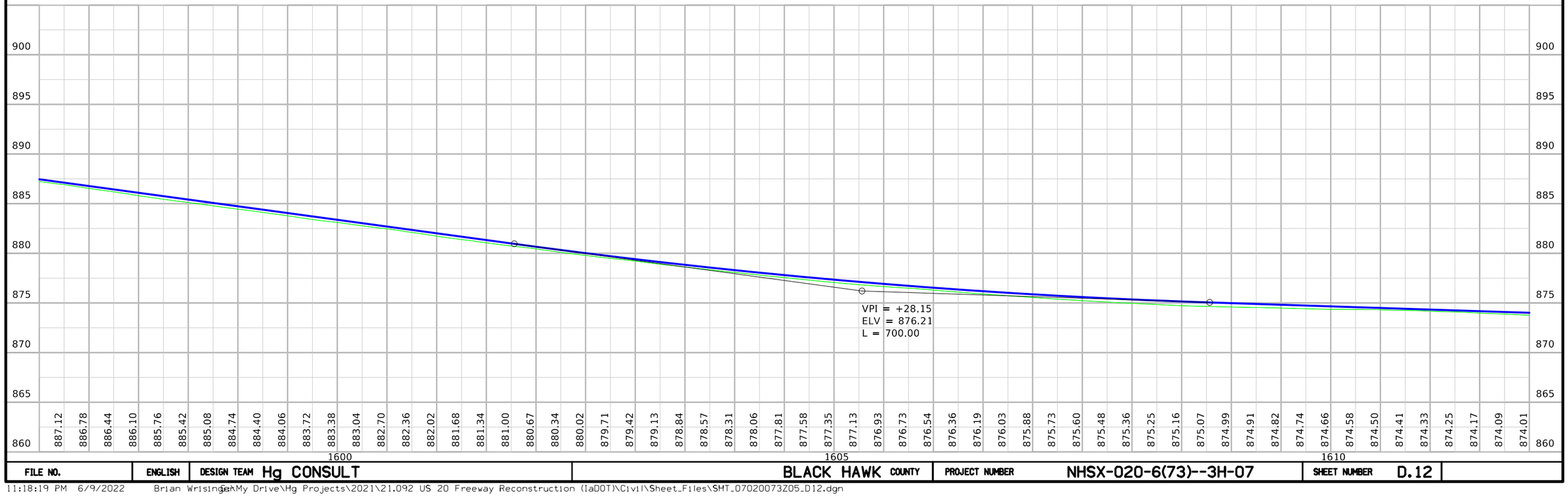

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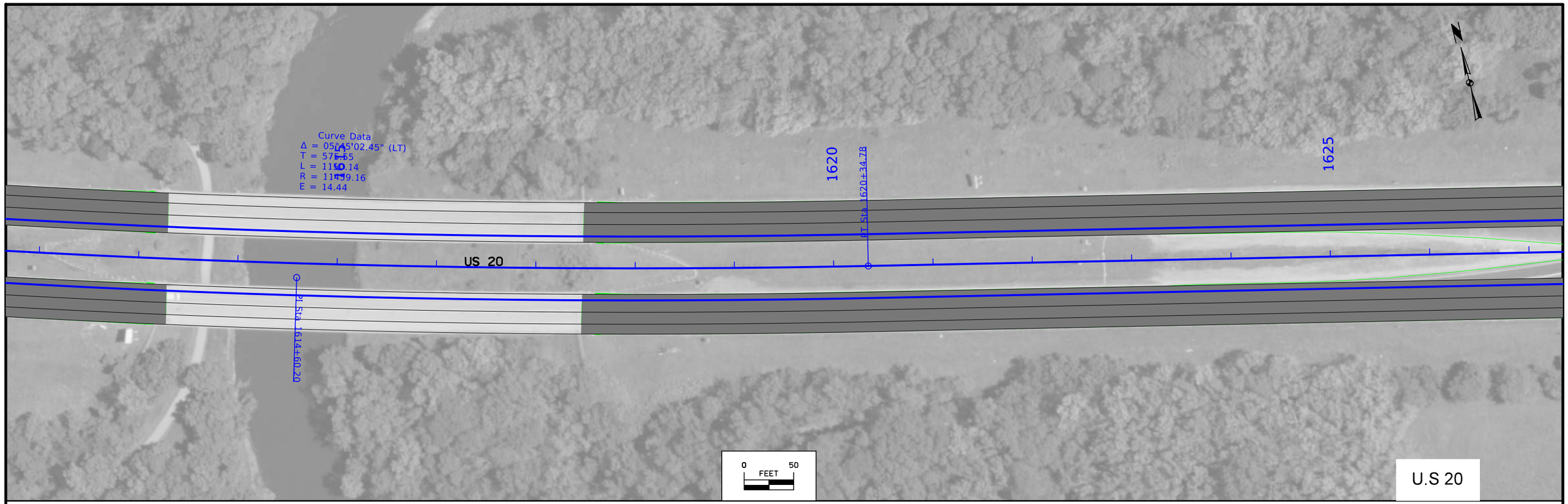

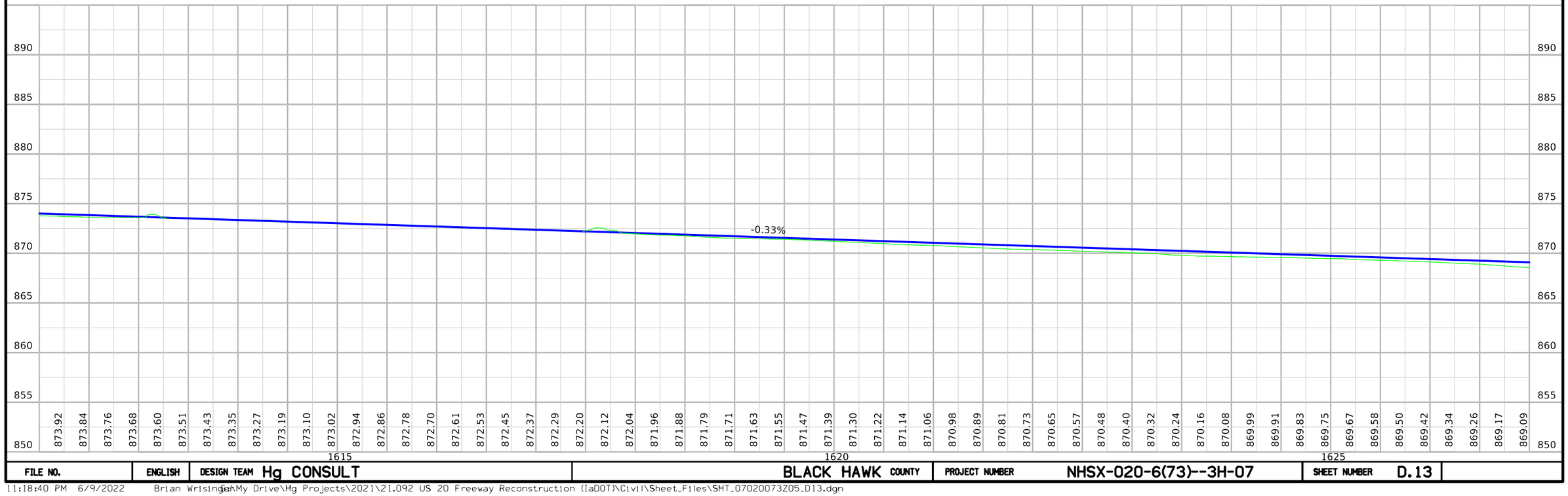

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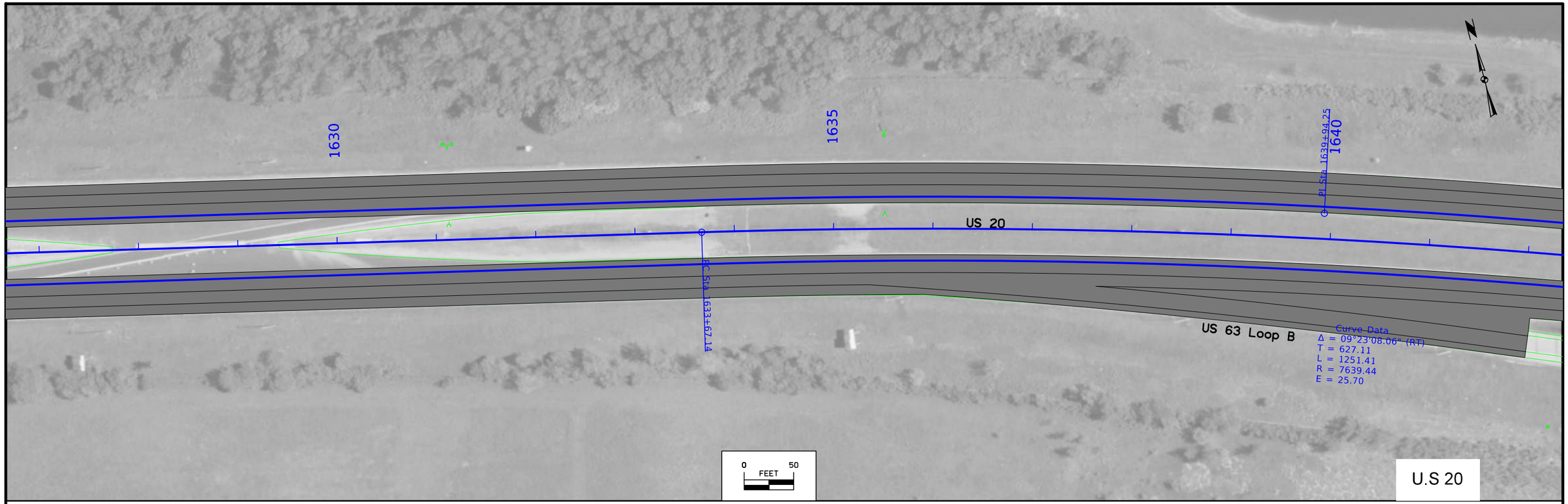

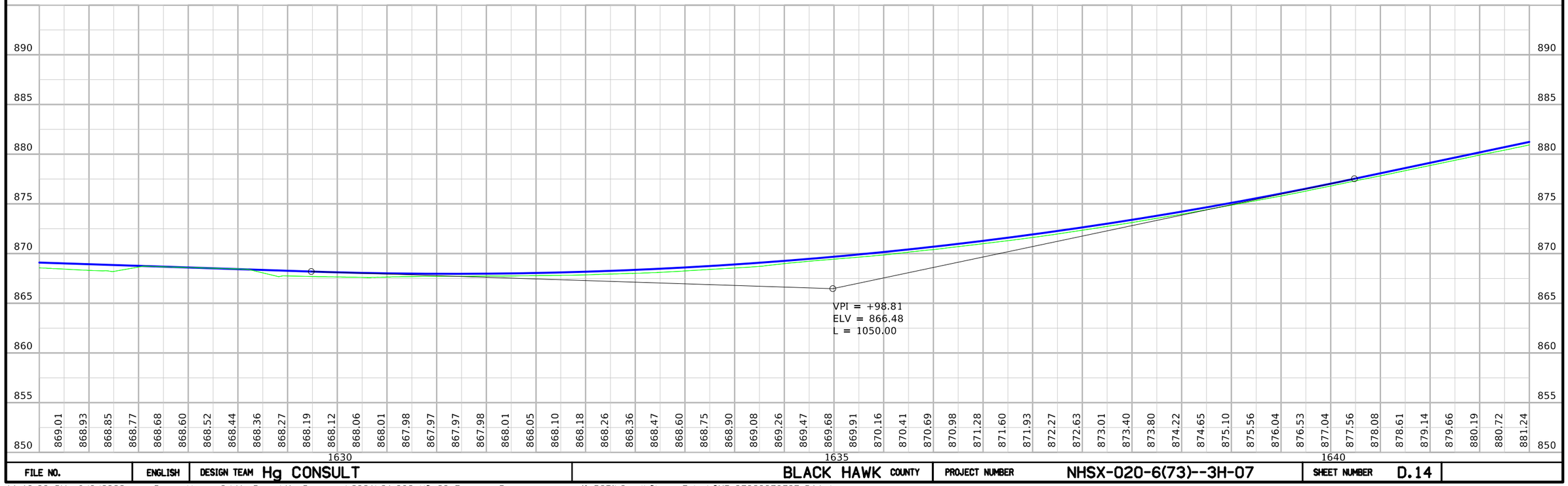

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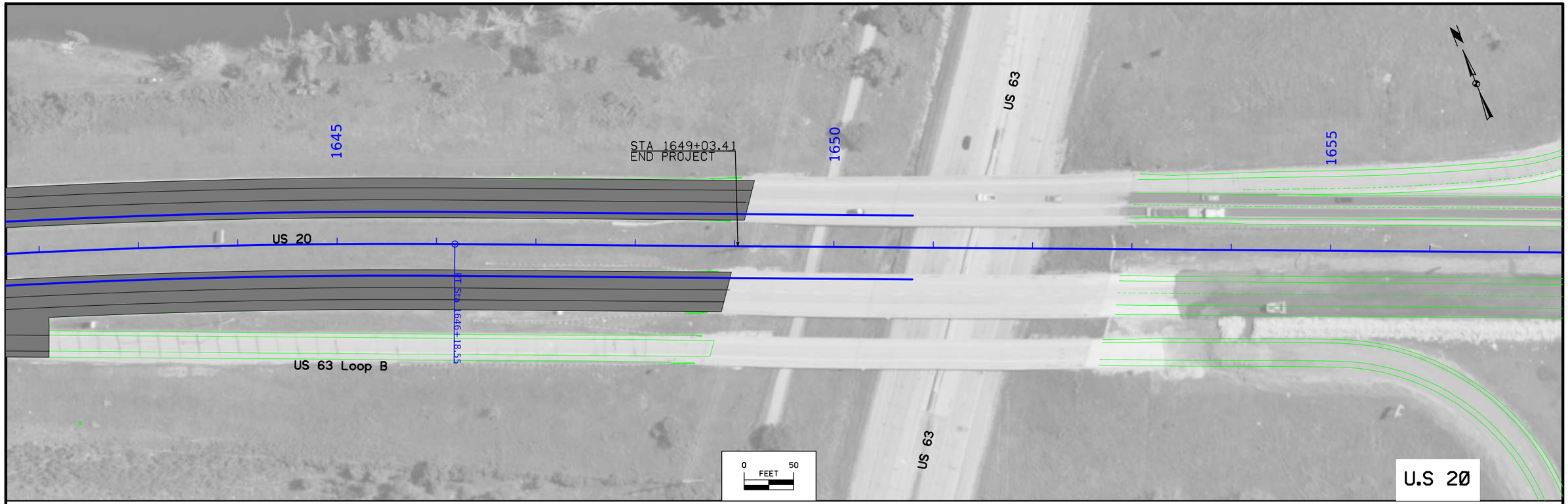

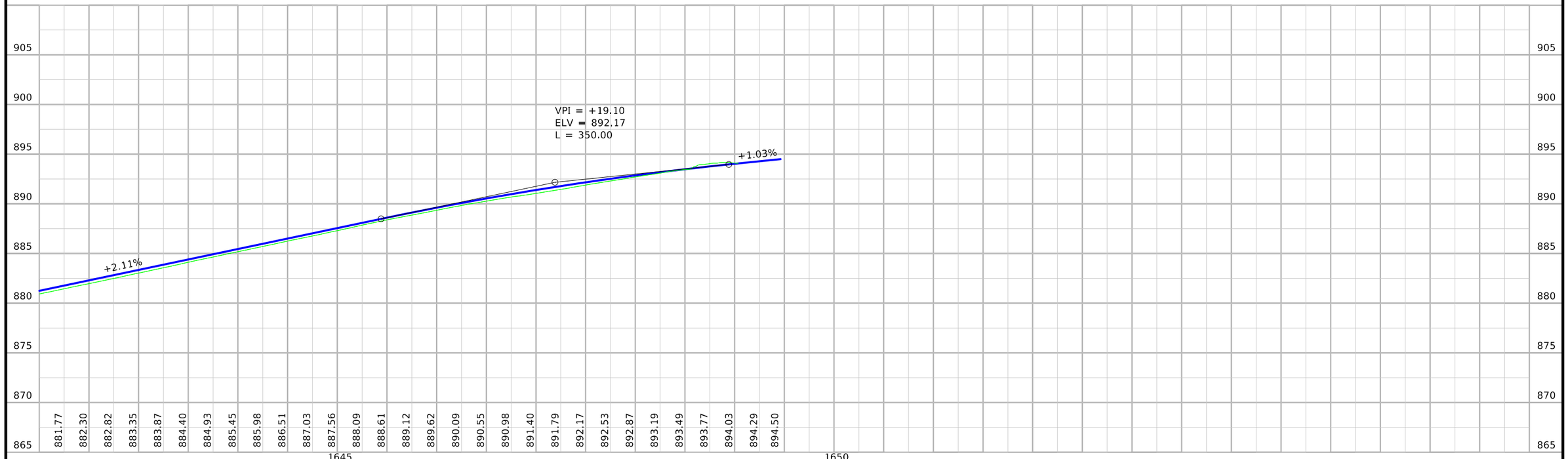

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER D.15

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Black Hawk County
NHXS-020-6(73)—3H-07
US20 Black Hawk County Survey
From IA58 to US63
PIN 16-07-020-030

Party Personnel

Jody Budde- PLS
Wes Shimp- PLS
Jon Miranda- Geospatial Lead Tech
Ben Sullivan- Geospatial Lead Tech
Matt Svec- Party Chief
Lee Budde- Party Chief
Aaron Paulsen- Party Chief
Katerina Wyatt- Assistant Survey Party Chief
Levi Suhr- Assistant Survey Party Chief
Jason Flaherty – Assistant Survey Party Chief

Date(s) of Survey

Begin Date	09/20/2021
End Date	01/31/2022

General Information

Measurement units for this survey are US survey feet. This survey is for the preliminary design for the section of approximately 4 miles of US Highway 20 beginning at the interchange with US Highway 63 and runs westerly to just past the interchange of Hudson Road in Cedar Falls, IA. Project datum and control information is provided by Design Survey Office. This project is a Partial DTM survey. Project horizontal datum is NAD83 (2011) epoch 2010.00, Iowa RCS Zone 5 (Waterloo). Foth established three new FENO monuments to supplement existing project control at a 0.5 mi to 1.0 mile distribution along the project corridor throughout the project lifecycle and for future corridor area work.

Vertical Control

Vertical datum for this survey is relative to NAVD88 (computed using Geoid18 for the 2021 new FENOs, FENO 1, FENO 2 and FENO 3. This survey consisted of observing three new FENO 1-meter rod monuments using minimum 2hr initial static observations along with data from three Iowa RTN CORS sites: Waterloo (IAWA), Grundy Center (IAGC) and Allison (IAAL).

The published Ellipsoidal heights for the three Iowa RTN stations were held for the vertical adjustment portion of this survey using as-published RTN positions by the Iowa DOT dated August 6, 2021.

Additionally, five local project area existing Iowa DOT FENOs with published NAVD88 elevations were observed and used that are located within the Hwy 20 project corridor area:

DOT FENO CP 2 has a published Elv of: 971.82 usft

DOT FENO CP 3 has a published Elv of: 961.62 usft

DOT FENO CP 5 has a published Elv of: 911.67 usft

DOT FENO CP 6 has a published Elv of: 878.17 usft

DOT FENO CP 7 has a published Elv of: 865.34 usft

The final vertical adjustment results show standard deviations were less than 0.028 ft. at 95% confidence level (2 sigma) for the new FENO monuments.

Horizontal Control

The project coordinate system for this survey is NAD83 (2011) Iowa RCS Zone 5 (Waterloo), US survey feet. This survey control is relative to IaRTN reference stations. IaRTN Reference Station coordinates are relative to the National Reference Station network datum: NAD83 (2011) for Epoch 2010.00. Coordinates were determined by observing each mark for 120 minutes minimum.

For the January 2022 control survey FOTH added FENO monuments FENO 1, FENO 2 and FENO 3 to supplement existing DOT control monuments. Existing FENO monuments CP2, CP3, CP5, CP6 and CP7 were recovered and re-observed as part of this survey. Additionally, existing passive marks Black Hawk County monument GPS-23, NGS CBN station “HUDSON” and NGS CBN station “L 11” were observed as part of this survey.

Three Iowa RTN CORS stations: Waterloo, Grundy Center and Allison stations were utilized for the horizontal adjustment portion of this survey. The published horizontal geodetic positions for the three Iowa RTN stations were held for the horizontal adjustment portion of this survey using as-published RTN positions by the Iowa DOT dated August 6, 2021. The published positions of the existing Iowa DOT FENOs, Black Hawk County GPS 23 and both NGS stations “HUDSON” and “L 11” were also confirmed and held fixed for the final horizontal constrained adjustment of the three new FENOs established by Foth.

The horizontal standard deviation of these adjusted observations was less than 0.02 ft. at 95% confidence level (2 sigma).

PROJECT CONTROL COORDINATE LISTING

Name	Northing	Easting	Elevation	Description
DOT CP1	8832416.72	15446592.15	945.96	FENO EXISTING DOT FENO
DOT CP2	8832396.82	15441880.95	971.82	FENO EXISTING DOT FENO
DOT CP3	8832642.14	15444284.28	961.62	FENO EXISTING DOT FENO
DOT CP4	8832372.31	15448509.77	921.76	FENO EXISTING DOT FENO
DOT CP5	8832298.45	15451094.97	911.67	FENO EXISTING DOT FENO
DOT CP6	8831762.42	15453412.12	878.17	FENO EXISTING DOT FENO
DOT CP7	8830890.1	15455864.39	865.34	FENO EXISTING DOT FENO
DOT CP8	8829713.16	15459250.02	897.09	FENO EXISTING DOT FENO
DOT CP9	8829287.01	15460739.16	902.94	FENO EXISTING DOT FENO
FENO1	8832611.47	15436580.12	947.08	FENO SET FENO TYPE MONUMENT FLUSH WITH THE GROUND. 168 FT FROM SIGN TO THE EAST. 5 FT FROM THE FENCE TO SOUTH AND 68 FT FROM FOG LINE TO THE NORTH.
FENO2	8832477.35	15447462.28	937.01	FENO SET FENO TYPE MONUMENT FLUSH WITH THE GROUND. 40 FT FROM US 20 EBL BRIDGE OVER HWY 58 TO THE SOUTH EAST. 27 FT FROM THE US 20 WBL BRIDGE OVER HW 58 TO THE NE. 28 FT FROM BEGGINING OF CURB ON US 20 WBL TO NORTH EAST.
FENO3	8832228.37	15452190.05	918.03	FENO SET FENO TYPE MONUMENT FLUSH WITH THE GROUND. 36 FT FROM HIGH POWER LINE POWER POLE TO THE NORTH EAST. 13 FT FROM THE FENCE BEND TO THE NORTH WEST. 122 FT FROM CULVERT APRON TO THE SOUTH EAST. 117 FT FROM EDGE OF US 20 WBL TO THE SOUTH.
BM L 11	8824622.59	15453931.98	871.52	BM CBN BM L 11 PID NK0036
HUDSON	8819713.1	15441754.96	956.59	BM CBN HUDSON PID NK0584
BHC GPS 22	8830289.78	15457869.92	893.23	CP CO GPS MON 22
BHC GPS 23	8834337.63	15454376.15	899.73	CP CO GPS MON 23

Alignment Information

The horizontal alignment for this survey is a retrace of As-built Plans No. F-520-6(10)—20-07, F-FG-520-6(8)—24-07, and IX-520-6(28)—3P-07. Survey stationing was equated to the plan POT at STA 156+55.3 at the end of DIV. 1 and the beginning of DIV. 2 and run back and ahead throughout the survey.

Mainline (US20) Survey stationing relates to as built plan stationing as follows:

POB POT Sta. 1441+22.23 As-built Plans Project No. F-520-6(10)—20-07
Survey POT Sta. 1441+22.55

Station Equation
As-built Plans POT Sta 1457+04.90 (Back) = POT Sta 156+55.30 (Ahead)
Survey POT Sta 1457+04.90 (Back) = POT Sta 156+55.30 (Ahead)
*As-built Plans Project No. F-520-6(10)—20-07

PI Sta. 261+04.3 As-built Plans Project No. F-FG-520-6(8)—24-07
Survey PI Sta. 261+03.88

PI Sta. 289+18.35 As-built Plans Project No. F-FG-520-6(8)—24-07
Survey PI Sta. 289+15.73

Station Equation
As-built Plans POT Sta 300+43.11 (Back) = POT Sta 300+40.71(Ahead)
Survey POT Sta 300+43.11 (Back) = POT Sta 300+40.71(Ahead)
*As-built Plans Project No. F-FG-520-6(8)—24-07

PI Sta. 314+08.35 As-built Plans Project No. F-FG-520-6(8)—24-07
Survey PI Sta. 314+07.71

PI Sta. 339+42.69 As-built Plans Project No. F-FG-520-6(8)—24-07
Survey PI Sta. 339+40.84

Station Equation
As-built Plans PT Sta 345+66.85 (Back) = PT Sta 347+26.99 (Ahead)
Survey PT Sta 345+66.55 (Back) = PT Sta 347+26.99 (Ahead)
*As-built Plans Project No. F-FG-520-6(8)—24-07

END POT Sta. 379+15.40 As-built Plans Project No. IX-520-6(28)—3P-07
Survey POT Sta. 379+15.05

Sideroad (Hudson Road) Survey stationing relates to as built plan stationing as follows:

POB POT Sta. 991+06.80 As-built Plans Project No. F-520-6(10)—20-07
Survey POT Sta. 991+06.80

POT Sta. 1018+18.96 As-built Plans Project No. F-520-6(10)—20-07
Survey POT Sta. 1018+18.96

END POT Sta. 1035+18.94 As-built Plans Project No. F-520-6(10)—20-07
Survey POT Sta. 1035+18.94

Sideroad (Hwy58) Survey stationing relates to as built plan stationing as follows:

POB POT Sta. 1225+00.00 As-built Plans Project No. F-FG-520-6(8)—24-07
Survey POT Sta. 1225+00.00

POT Sta. 1242+15.00 As-built Plans Project No. F-FG-520-6(8)—24-07
Survey POT Sta. 1242+15.00

END PC Sta. 1252+06.27 As-built Plans Project No. F-FG-520-6(8)—24-07
Survey POT Sta. 1252+18.72

Survey Information

Sideroad (Hwy63) Survey stationing relates to as built plan stationing as follows:

POB POT Sta. 828+50.00 As-built Plans Project No. IX-520-6(28)—3P-07
Survey POT Sta. 828+50.00

POT Sta. 845+11.45 As-built Plans Project No. IX-520-6(28)—3P-07
Survey POT Sta. 845+11.45

END POT Sta. 856+47.00 As-built Plans Project No. IX-520-6(28)—3P-07
Survey POT Sta. 856+47.00

CONTROL POINT VICINITY MAP

This map is a guide to the vicinity of the primary project control points. Primary control is for use with RTK base stations and for RTN validation. Future surveys will use primary project control to establish temporary control as needed for construction or other surveying applications.

HORIZ. DATUM: NAD83(2011) EPOCH 2010.00 - Ia. RCS Zone 05
VERT. DATUM: NAVD88 - Geoid Model G018

Coordinate listing from next sheet will be used with IaRTN for monument recovery. No other reference ties are given.

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER G.4

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HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING

HORIZ. DATUM: NAD83(2011) EPOCH 2010.00
Ia. Regional Coordinate System Zone 05

VERT. DATUM: NAVD88
Geoid Model G018
Project Control Marks are Bench Marks

Name	Northing	Easting	Elevation	Description
DOT CP1	8832416.72	15446592.15	945.96	FENO EXISTING DOT FENO
DOT CP2	8832396.82	15441880.95	971.82	FENO EXISTING DOT FENO
DOT CP3	8832642.14	15444284.28	961.62	FENO EXISTING DOT FENO
DOT CP4	8832372.31	15448509.77	921.76	FENO EXISTING DOT FENO
DOT CP5	8832298.45	15451094.97	911.67	FENO EXISTING DOT FENO
DOT CP6	8831762.42	15453412.12	878.17	FENO EXISTING DOT FENO
DOT CP7	8830890.1	15455864.39	865.34	FENO EXISTING DOT FENO
DOT CP8	8829713.16	15459250.02	897.09	FENO EXISTING DOT FENO
DOT CP9	8829287.01	15460739.16	902.94	FENO EXISTING DOT FENO
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FENO2	8832477.35	15447462.28	937.01	FENO SET FENO TYPE MONUMENT FLUSH WITH THE GROUND. 40 FT FROM US 20 EBL BRIDGE OVER HWY 58 TO THE SOUTH EAST. 27 FT FROM THE US 20 WBL BRIDGE OVER HW 58 TO THE NE. 28 FT FROM BEGGINING OF CURB ON US 20 WBL TO NORTH EAST.
FENO3	8832228.37	15452190.05	918.03	FENO SET FENO TYPE MONUMENT FLUSH WITH THE GROUND. 36 FT FROM HIGH POWER LINE POWER POLE TO THE NORTH EAST. 13 FT FROM THE FENCE BEND TO THE NORTH WEST. 122 FT FROM CULVERT APRON TO THE SOUTH EAST. 117 FT FROM EDGE OF US 20 WBL TO THE SOUTH.
BM L 11	8824622.59	15453931.98	871.52	BM CBN BM L 11 PID NK0036
HUDSON	8819713.1	15441754.96	956.59	BM CBN HUDSON PID NK0584
BHC GPS 22	8830289.78	15457869.92	893.23	CP CO GPS MON 22
BHC GPS 23	8834337.63	15454376.15	899.73	CP CO GPS MON 23

108-23A
08-01-08

TRAFFIC CONTROL PLAN

Normal traffic operations on US 20, IA 58/Hudson Rd., IA 58/Butterfield Rd. and US 63 shall be maintained at all times, except as follows:

On US 20:
- A single lane closure in each direction shall be in place while construction activities are present during the construction and removal of the median cross-overs. Drop-offs and traffic control devices must be removed at the cross-overs each night when construction activities end if no work is planned for the following day.
- Hauling of equipment and materials into or out of the lane closure area shall not occur between the time of 6 AM to 9 AM, and 3 PM to 7 PM during weekdays Monday thru Thursday, and from 6AM Friday to 9 PM Sunday.
- Traffic will be reduced to one lane in each direction and maintained as two-lane, two-way operations during Stages 2 and 3.

On IA 58/Hudson Rd. and IA 58/Butterfield Rd.:
- Utilize Single lane closures during ramp construction

Normal traffic operations on all interchange ramps and loops shall be maintained at all times, except as follows:

During Stage 2, the following ramps and loops shall be closed:
- US 20 EB exit ramp to IA 58 / Hudson Rd. (Ramp B)
- US 20 EB entrance ramp from NB IA 58 / Hudson Rd. (Ramp D)
- US 20 EB entrance loop from SB IA 58 / Hudson Rd. (Loop F)
- US 20 EB exit ramp to IA 58 / Butterfield Rd. (Ramp B)
- US 20 EB entrance ramp from NB IA 58 / Butterfield Rd. (Ramp D)
- US 20 EB exit loop to US 63 (Loop B)

During Stage 3, the following ramps and loops shall be closed:
- US 20 WB entrance loop from US 63 (Loop C)
- US 20 WB exit ramp to IA 58 / Butterfield Rd. (Ramp A)
- US 20 WB entrance ramp from IA 58 / Butterfield Rd. (Ramp C)
- US 20 WB exit ramp to IA 58 / Hudson Rd. (Ramp A)
- US 20 WB entrance ramp from NB IA 58 / Hudson Rd. (Ramp C)

TRAFFIC CONTROL CHANGES:
- Traffic control changes must be done during the following hours: Between 7 PM and 6 AM Monday night to Friday morning or between 9 PM Sunday night and 6 AM Monday morning
- The contractor shall notify the Engineer at least 10 days prior to making traffic control changes.
- The Iowa Department of Transportation reserves the right to modify the hours specified above as necessary to accommodate unexpected traffic conditions.

DETOURS:
- All signing for detours shall be provided, installed, maintained, and removed by the Contractor as detailed on the J-sheets.
- Signs will become property of Contractor.
- This is incidental to the Traffic Control bid item.

Stage 3 Work
- Contractor shall not begin work on Stage 3 after 8/15/2021 without approval from the project engineer.

108-26A
08-01-08

STAGING NOTES

Stage 1A:
Traffic:
On US 20, close inside (median) lane and shoulder at approximate MP 223.8
Construct:
Construct Median Crossover at approximate MP 223.8

Stage 1B:
Traffic:
On US 20, close inside (median) lane and shoulder at approximate MP 227.9
Construct:
Construct Median Crossover at approximate MP 227.9

Stage 2A:
Traffic:
On US 20 mainline, shift traffic into two-lane, two-way operation on existing WB pavement.
Close US 20 EB Ramps and Loops.
Close side road lanes adjacent to ramp construction per Traffic Control Plan
Construct:
Remove existing pavement and Pave US 20 EB lanes.
Remove existing pavement and Pave US 58/Hudson Rd. Ramp B, Ramp D and Loop F.
Remove existing pavement and Pave US 58/Butterfield Rd. Ramp B and Ramp D.
Remove existing pavement and Pave US 58/US 63 Loop B (to West End of Bridge).
Construct pavement notch and bridge approaches on west end of eastbound US 20 bridge over US 63 and US 20 off ramp over US 63.

Stage 3:
Traffic:
On US 20 mainline, shift traffic into two-lane, two-way operation on new EB pavement.
Close US 20 WB Ramps and Loops.
Close side road lanes adjacent to ramp construction per Traffic Control Plan
Construct:
Remove existing pavement and Pave US 20 WB lanes.
Remove existing pavement and Pave US 58/Hudson Rd. Ramp A and Ramp C.
Remove existing pavement and Pave US 58/Butterfield Rd. Ramp A and Ramp C.
Construct pavement notch and bridge approaches on west end of westbound US 20 bridge over US 63.

Stage 4:
Traffic:
On US 20, close inside (median) lane and shoulder at approximate MP 223.8 and 227.9.
Construct:
Remove Median crossovers at approximate MP 223.8 and MP 227.9.
New inside shoulders after removal of cross overs.

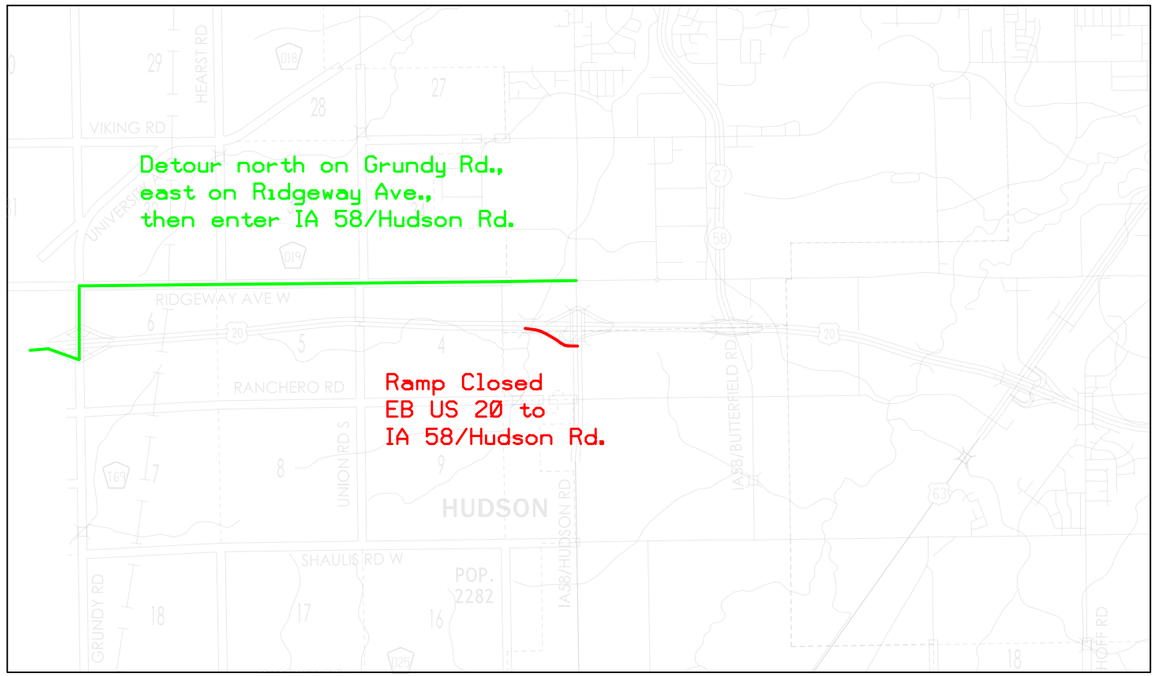
511 TRAVEL RESTRICTIONS

Route	Direction	County	Location Description	Feature Crossed	Object Type	Maint. Bridge No., Structure ID, or FHWA No.	Type of Restriction	Existing Measurement	Construction Measurement	Construction Measurement as Signed	Projected As Built Measurement	Remarks
U.S. 20		Black Hawk	On-Ramps and Off Ramps - US 20 - Stage 2 and 3									

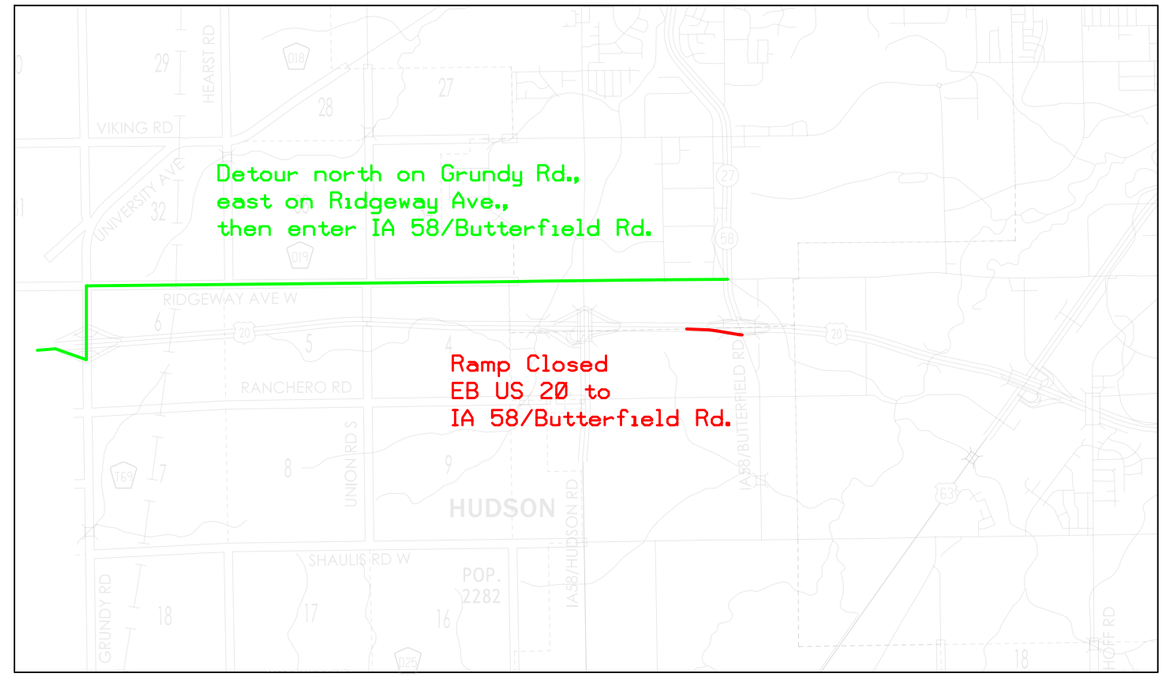
COORDINATED OPERATIONS

Other work in progress during the same period of time will include the construction of the projects listed. Coordinate operations with those of other contractors working within the same area.

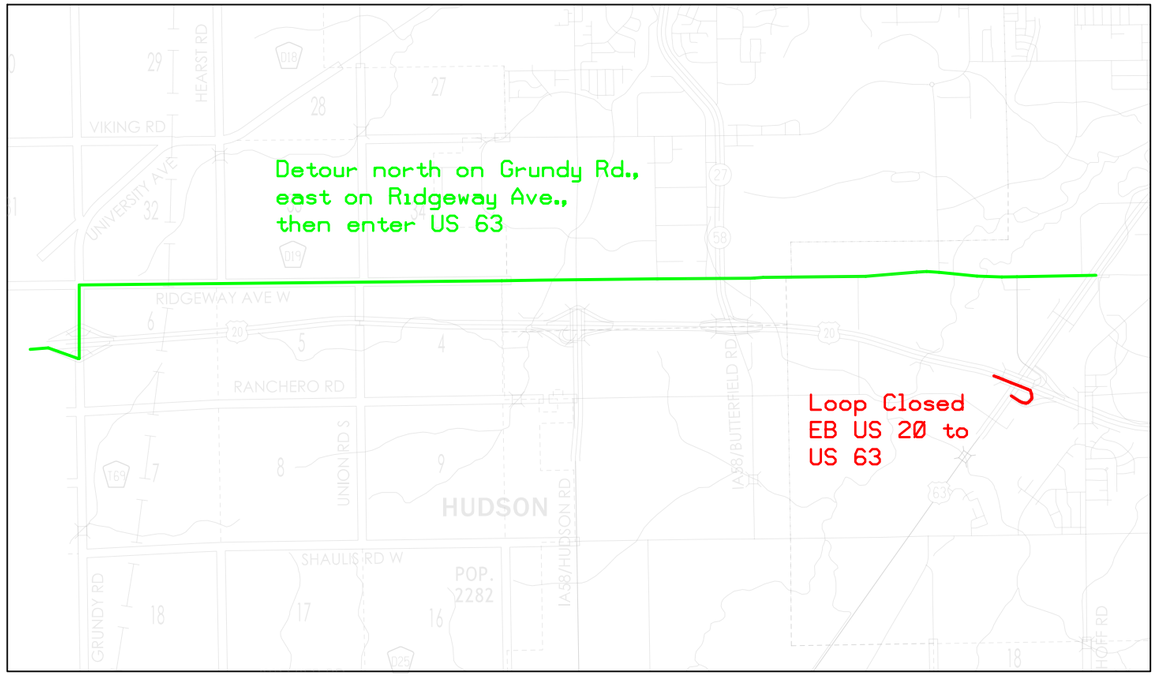
Project	Type of Work
None Provided	



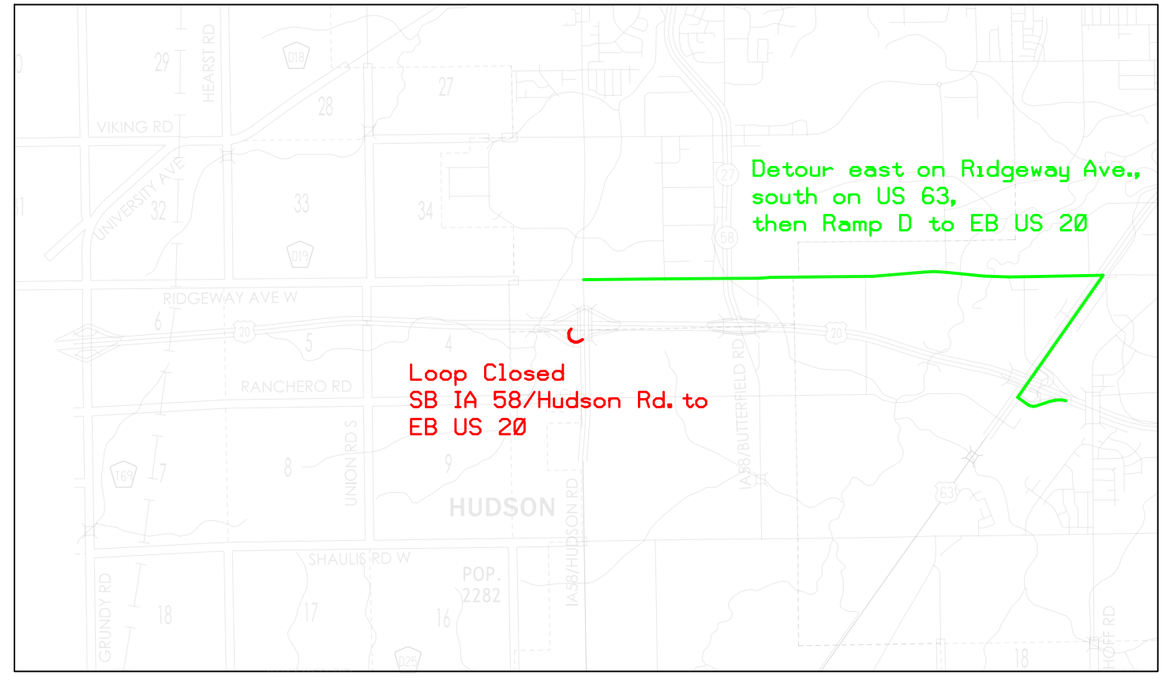
STAGE 2 - PROPOSED HUDSON RAMP B DETOUR



STAGE 2 - PROPOSED BUTTERFIELD RAMP B DETOUR



STAGE 2 - PROPOSED US 63 LOOP B DETOUR



STAGE 2 - PROPOSED HUDSON LOOP E DETOUR

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.3

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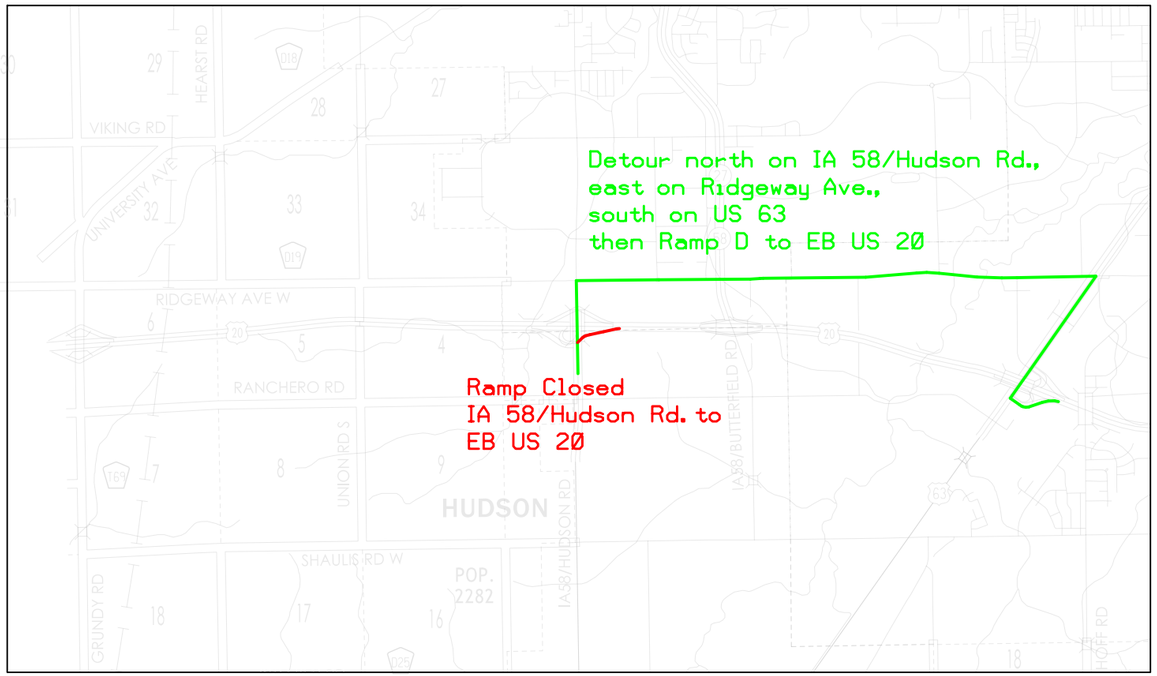
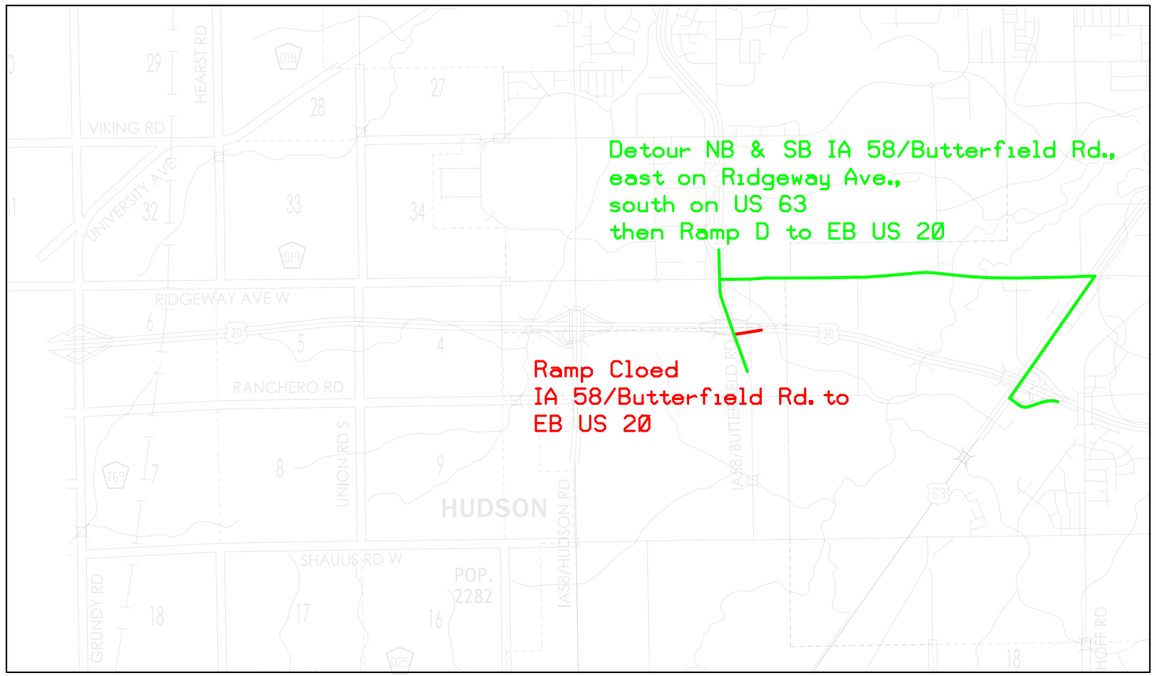
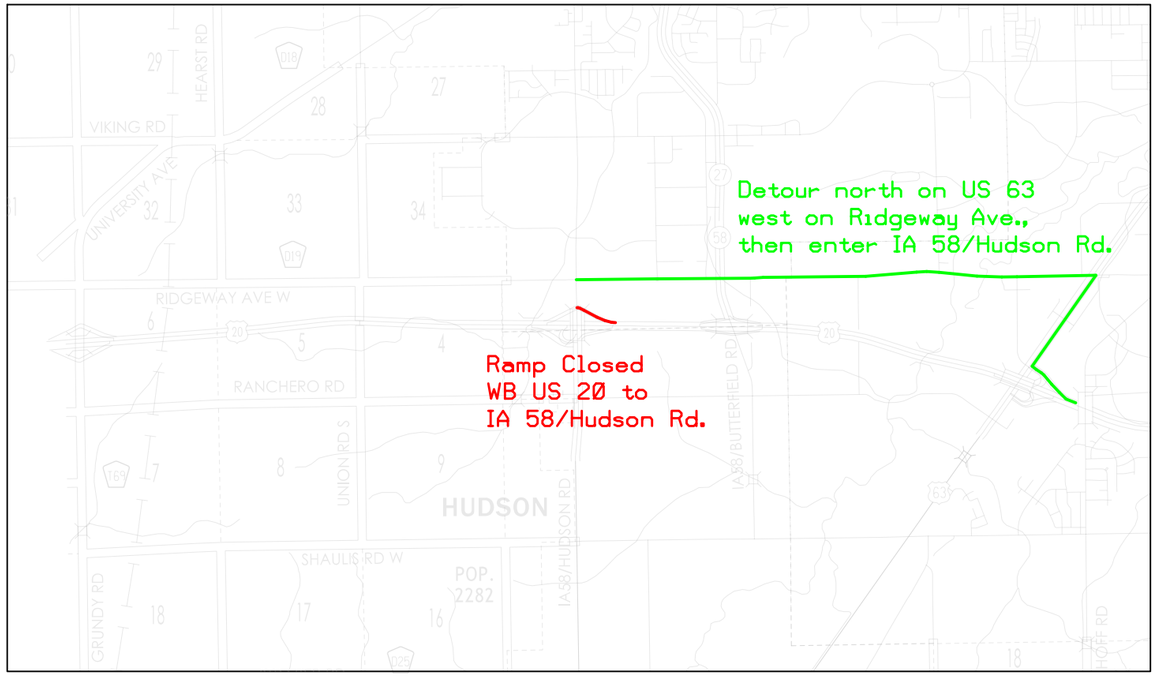


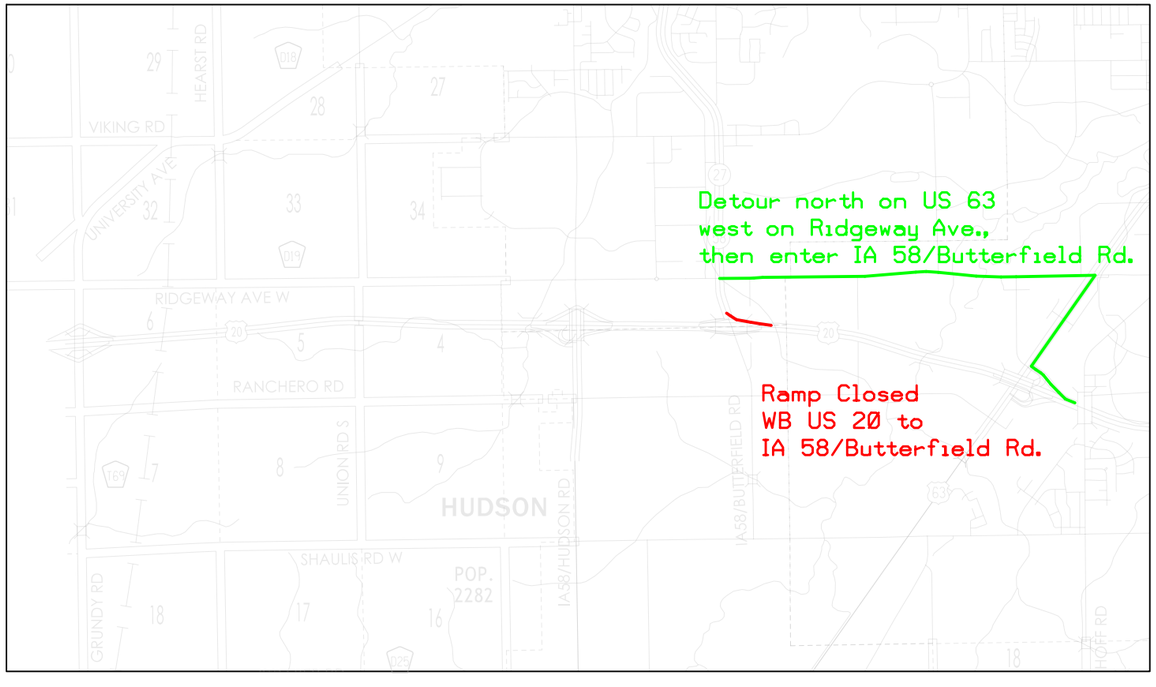
STAGE 2 - PROPOSED HUDSON RAMP D DETOUR



STAGE 2 - PROPOSED BUTTERFIELD RAMP D DETOUR



STAGE 3 - PROPOSED HUDSON RAMP A DETOUR



STAGE 3 - PROPOSED BUTTERFIELD RAMP A DETOUR

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.4

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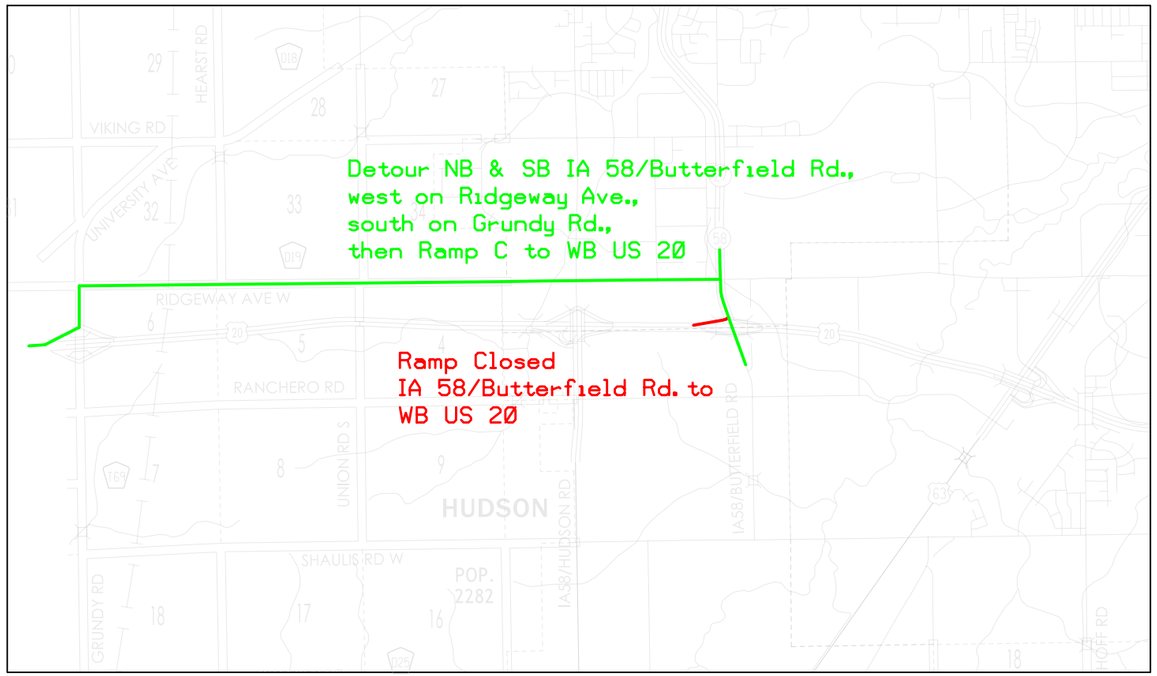
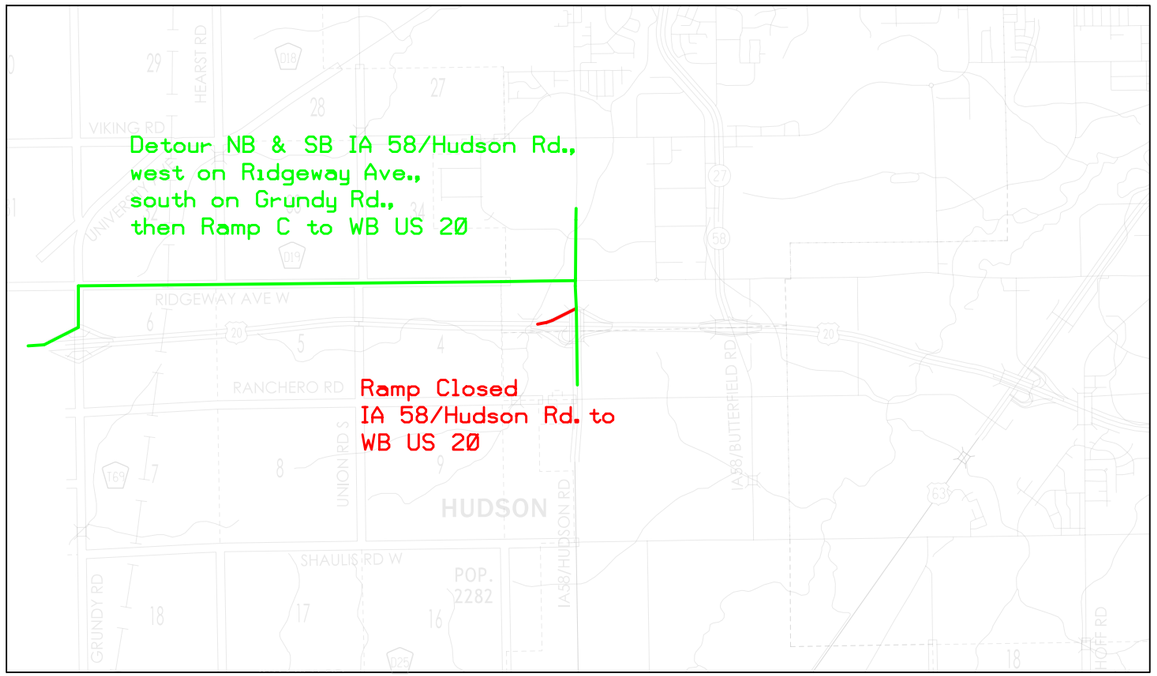
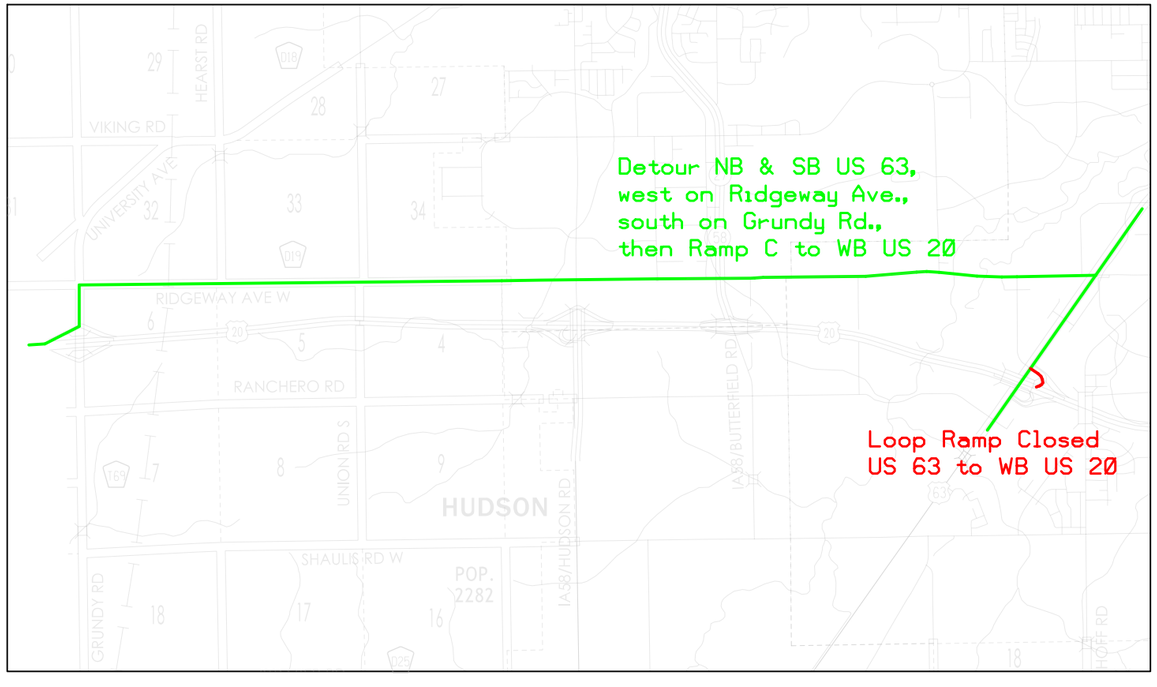


STAGE 3 - PROPOSED BUTTERFIELD RAMP C DETOUR



STAGE 3 - PROPOSED HUDSON RAMP C DETOUR



STAGE 3 - PROPOSED US 63 LOOP C DETOUR

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.5

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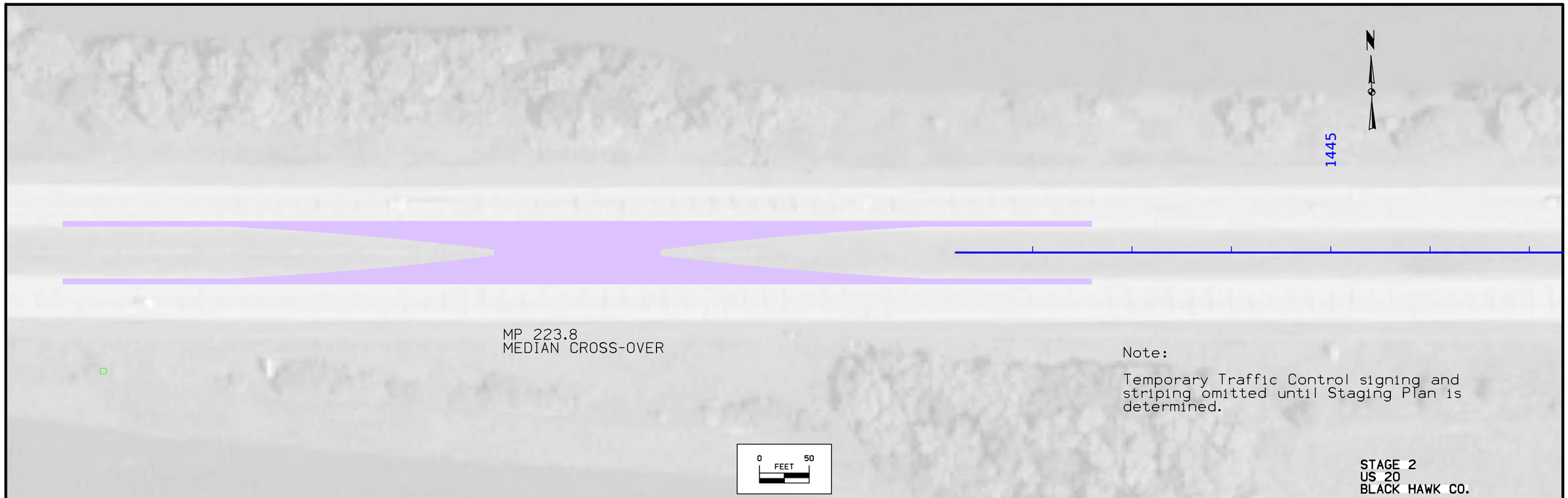
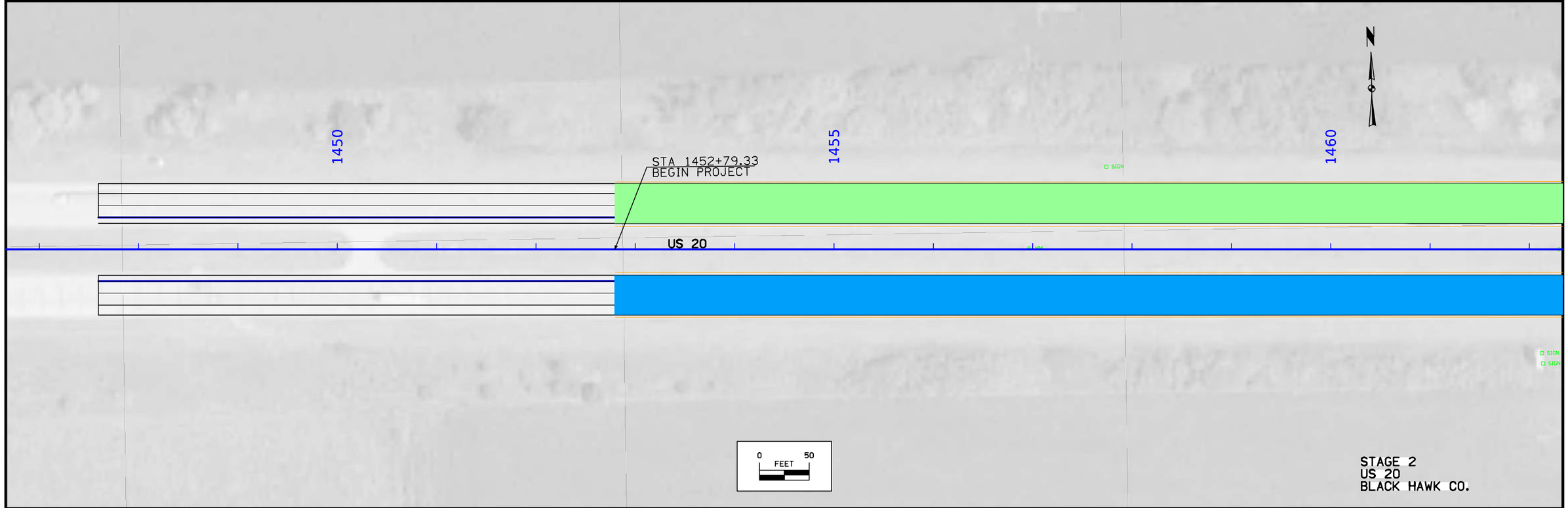


Note:

Temporary Traffic Control signing and striping omitted until Staging Plan is determined.

STAGE 2
US 20
BLACK HAWK CO.



STAGE 2
US 20
BLACK HAWK CO.

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.6

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FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.7

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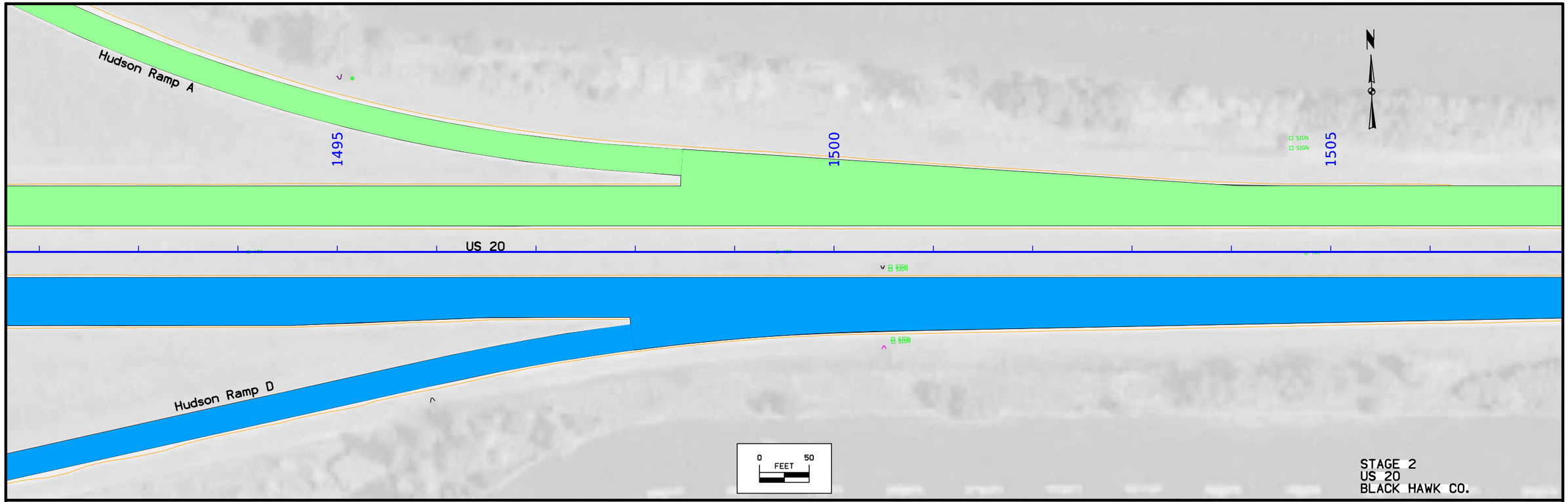

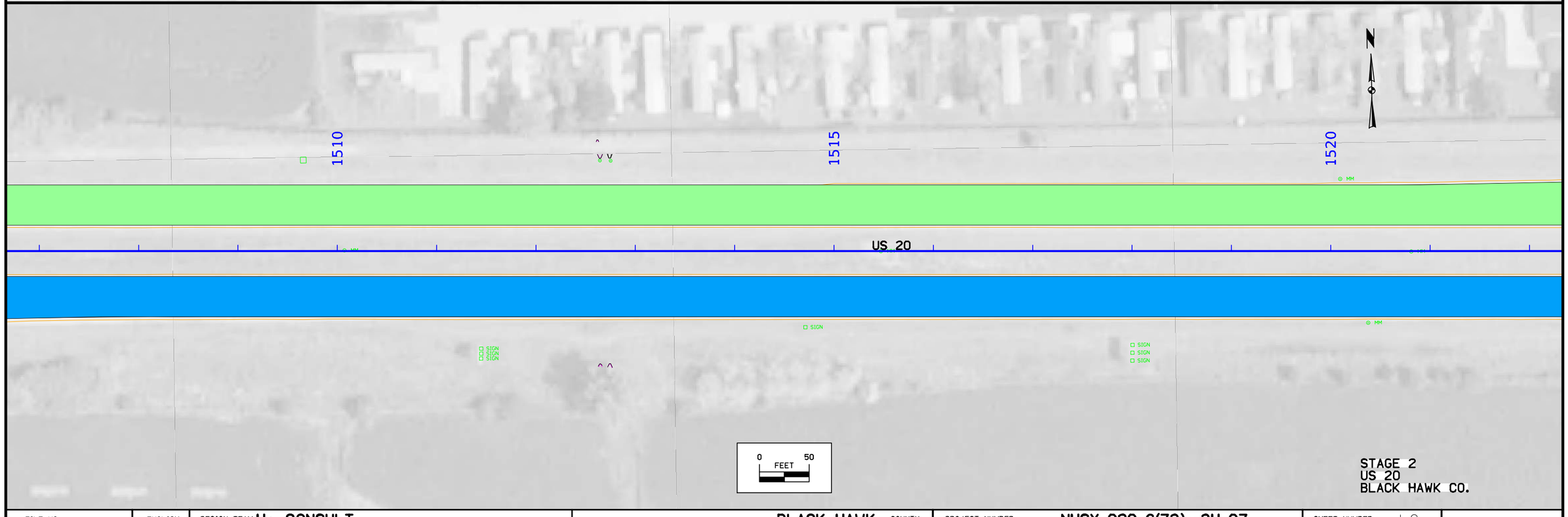

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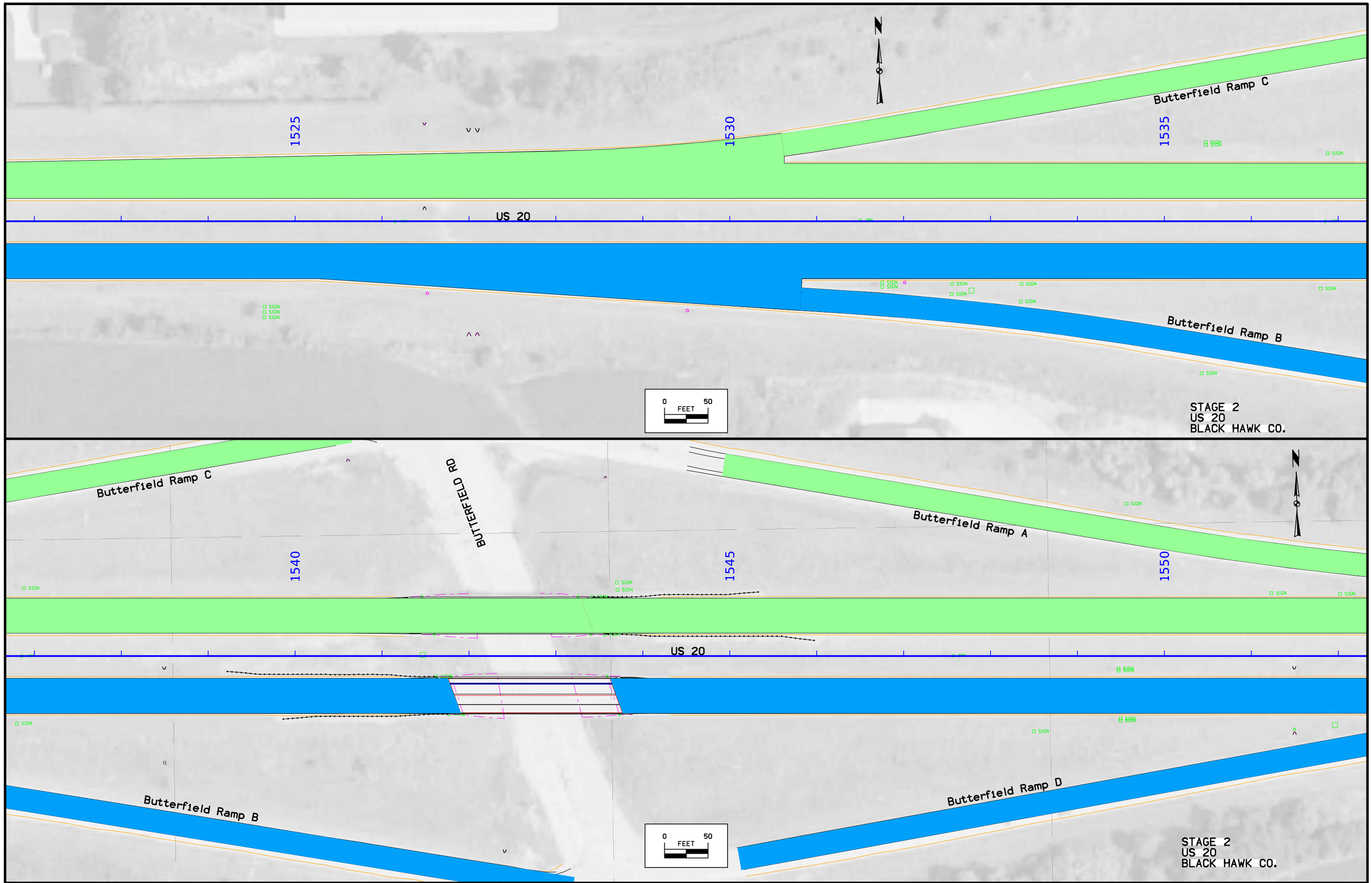

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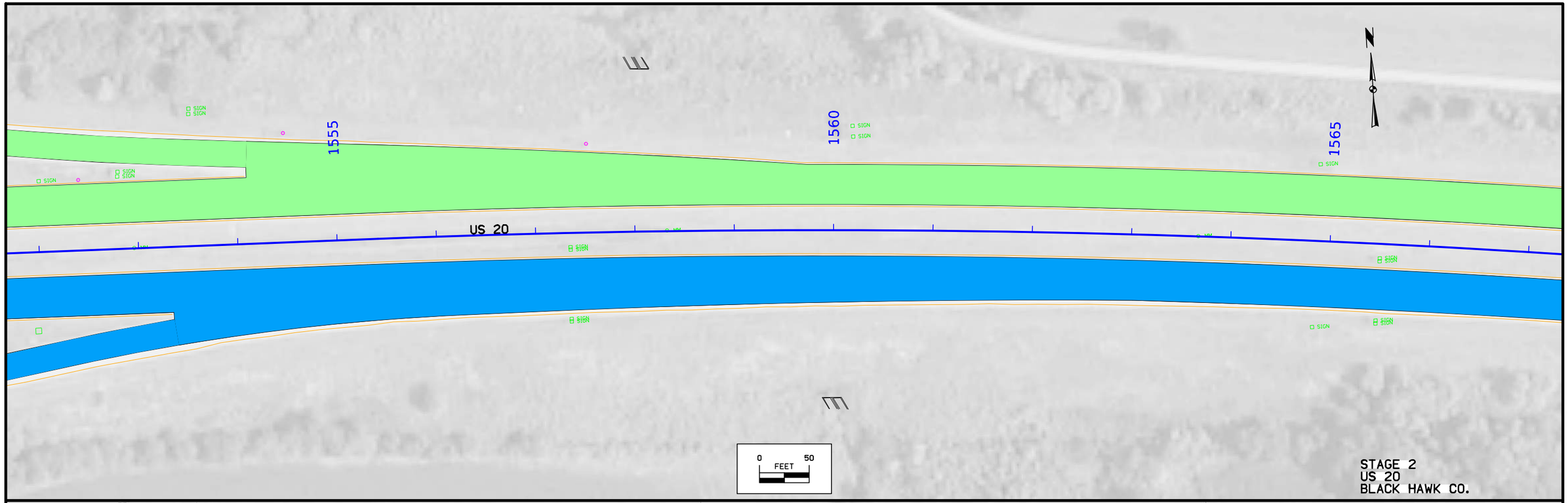

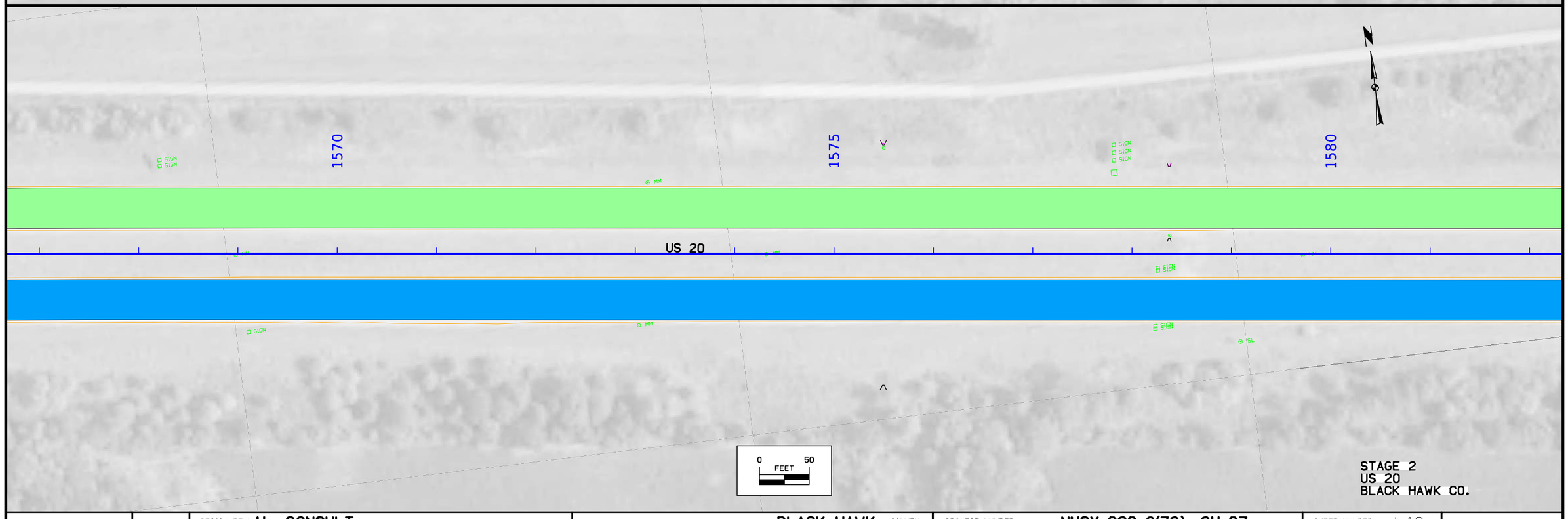

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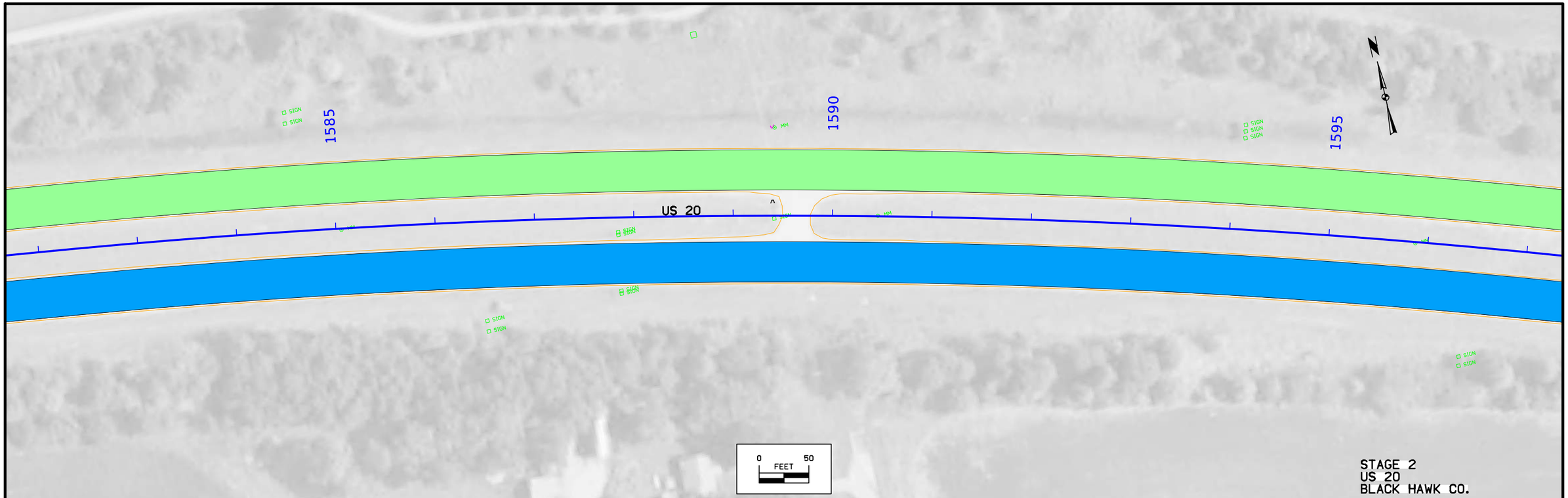
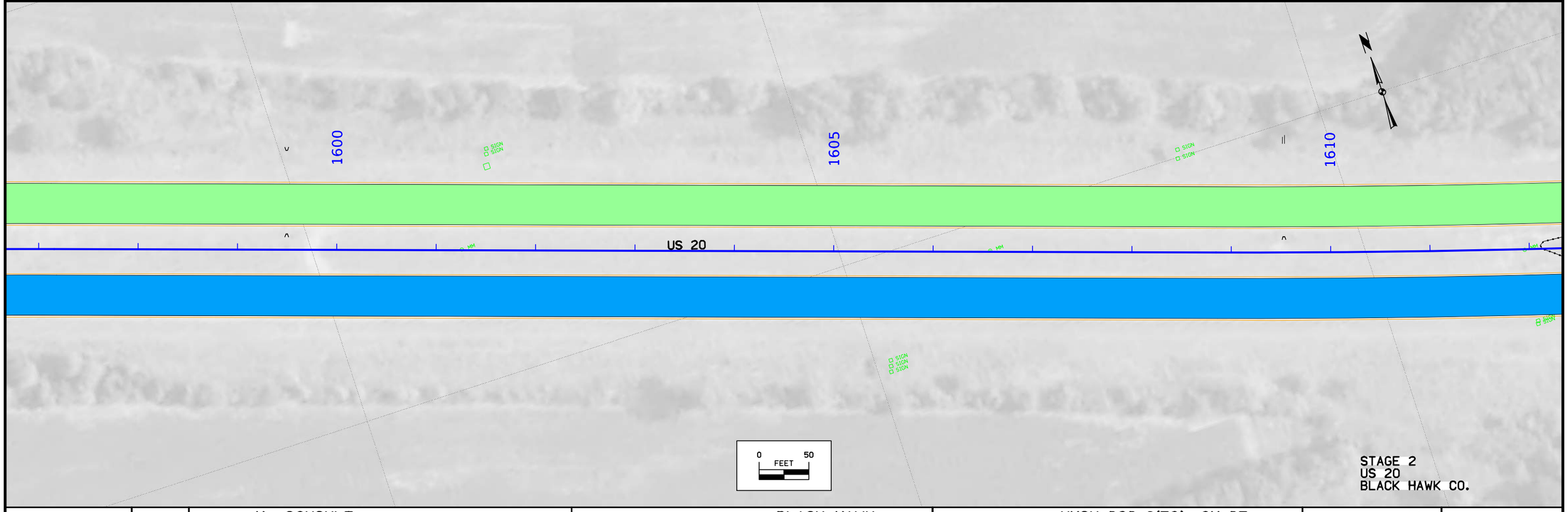


STAGE 2
US 20
BLACK HAWK CO.



STAGE 2
US 20
BLACK HAWK CO.

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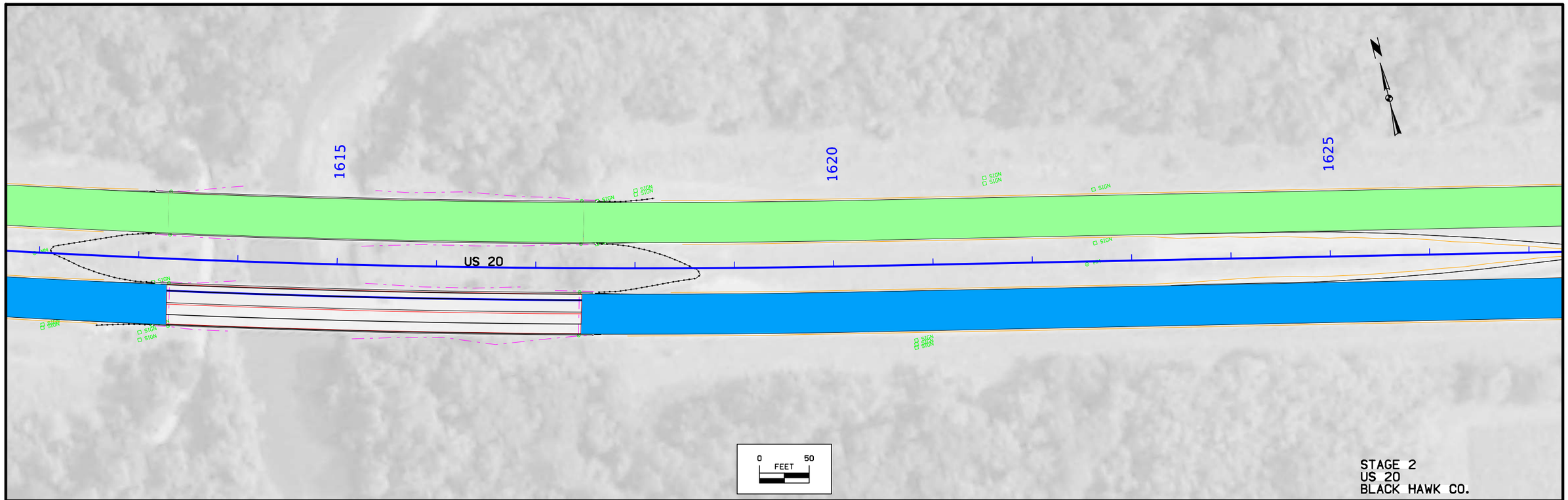
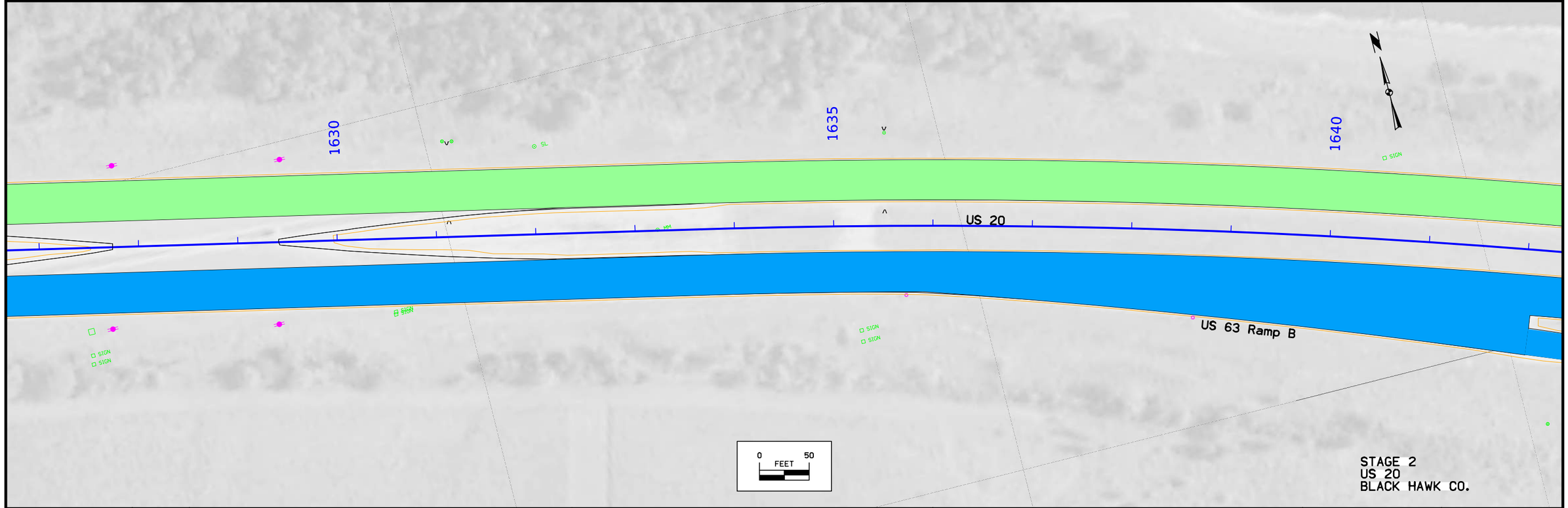


STAGE 2
US 20
BLACK HAWK CO.



STAGE 2
US 20
BLACK HAWK CO.

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.12

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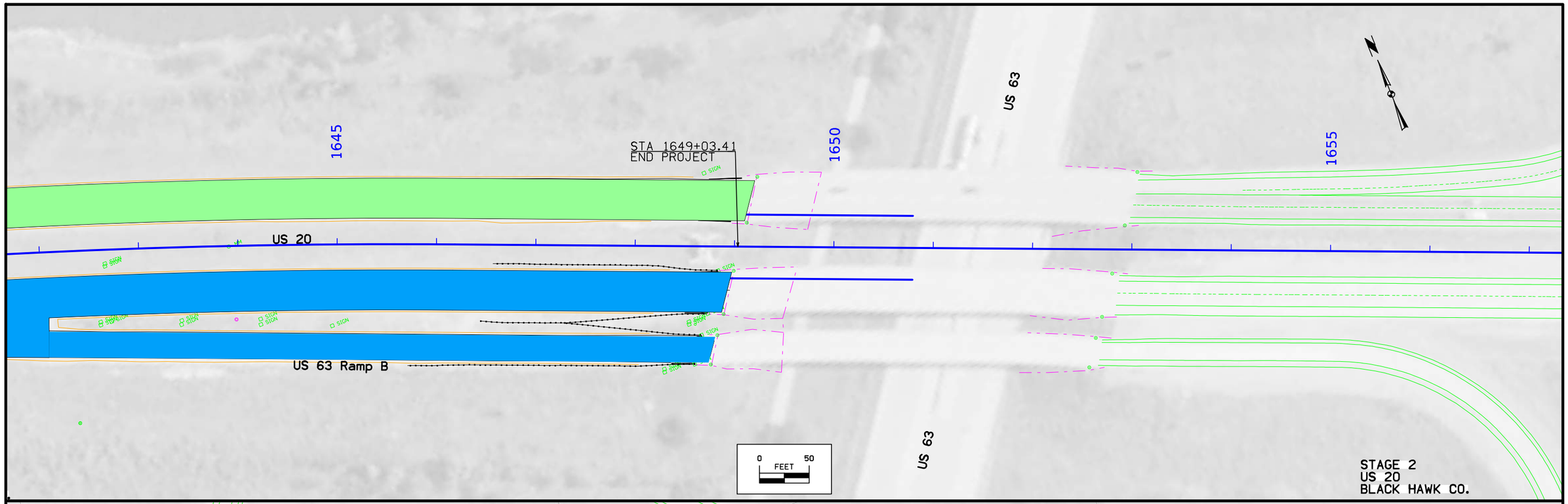

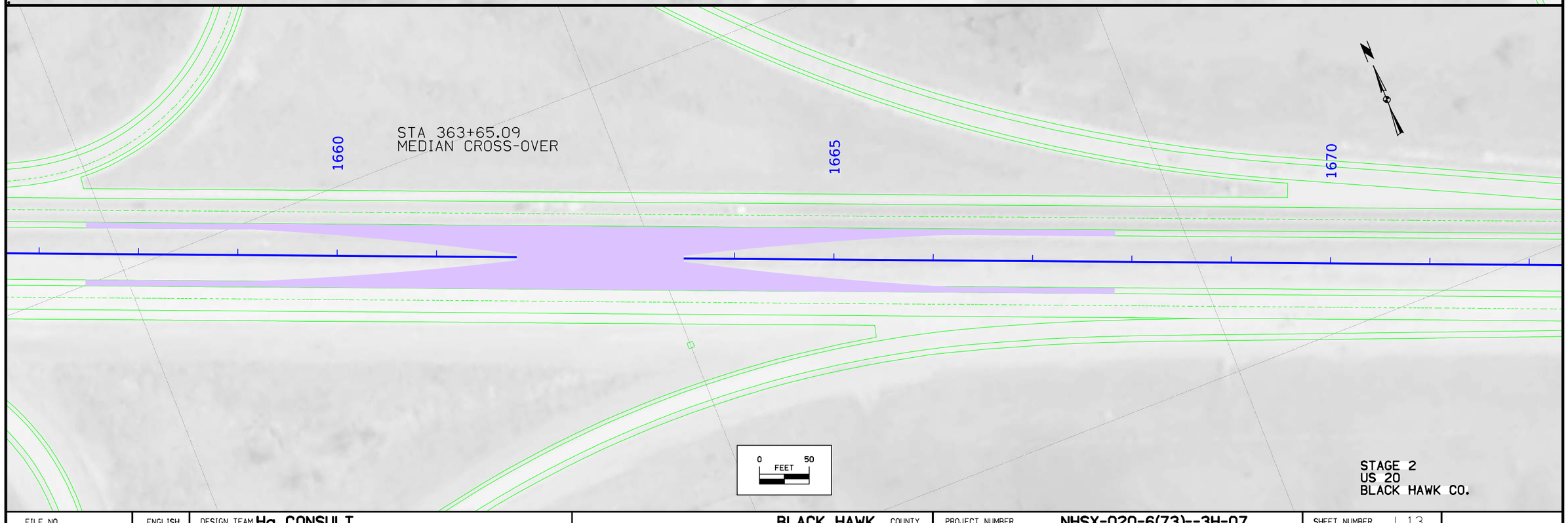

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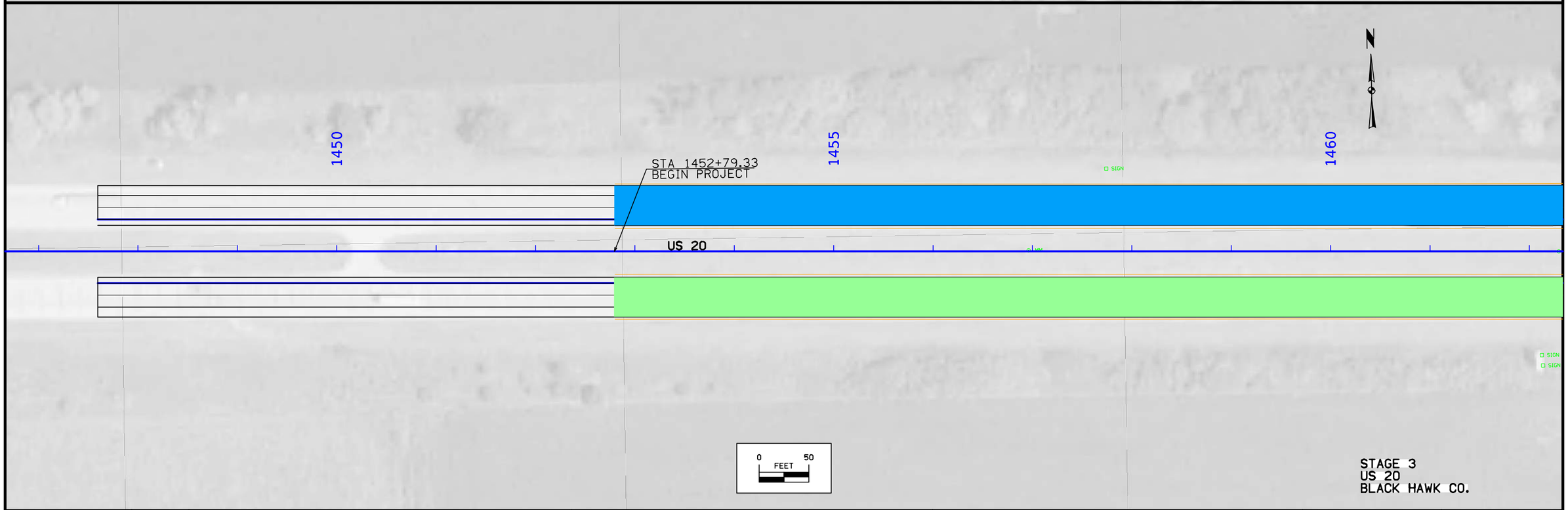
Note:

Temporary Traffic Control signing and striping omitted until Staging Plan is determined.

STAGE 3
US 20
BLACK HAWK CO.



STAGE 3
US 20
BLACK HAWK CO.

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.14

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1465
1470
1475
Hudson Ramp C
US 20
SIGN
MM
Hudson Ramp B
0 50
FEET
STAGE 3
US 20
BLACK HAWK CO.
Hudson Ramp C
1480
S HUDSON RD
1485
1490
US 20
Hudson Ramp E
S HUDSON RD
0 50
FEET
STAGE 3
US 20
BLACK HAWK CO.
Hudson Ramp D

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.15

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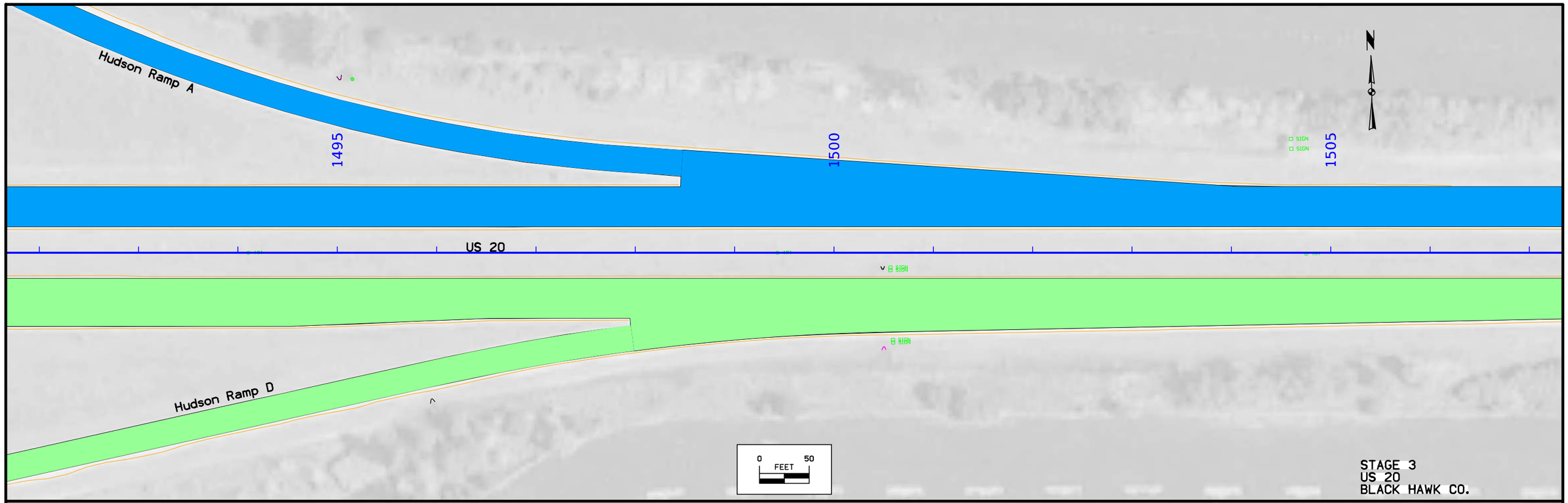
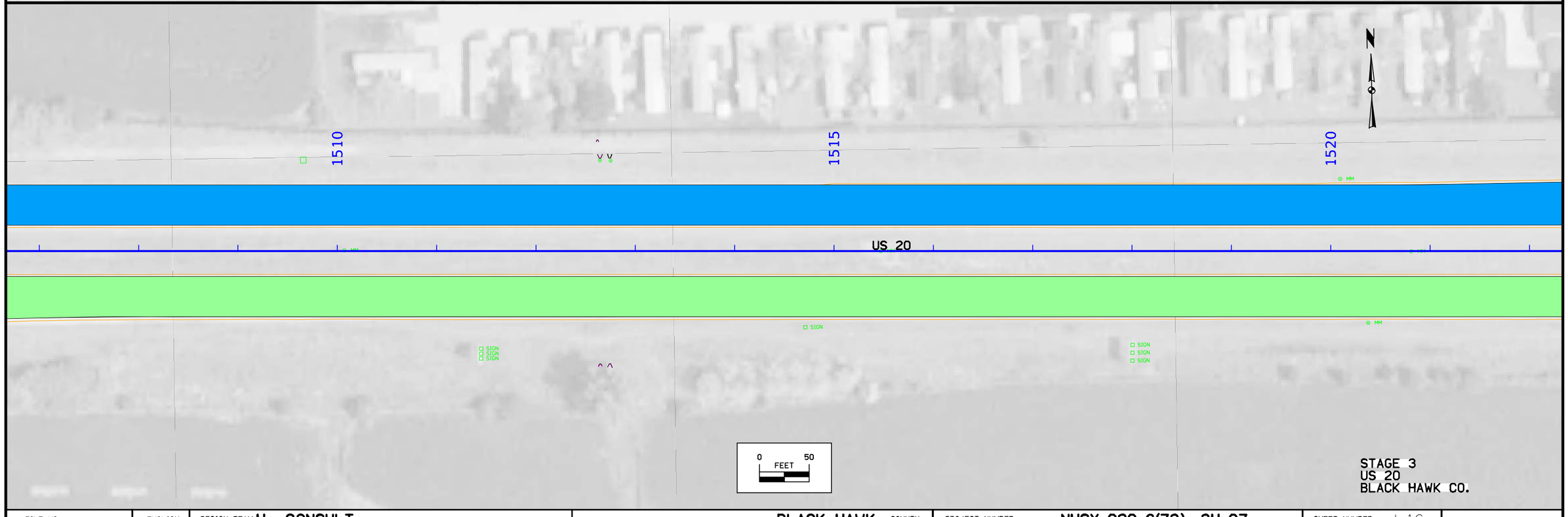


STAGE 3
US 20
BLACK HAWK CO.



STAGE 3
US 20
BLACK HAWK CO.

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FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.17

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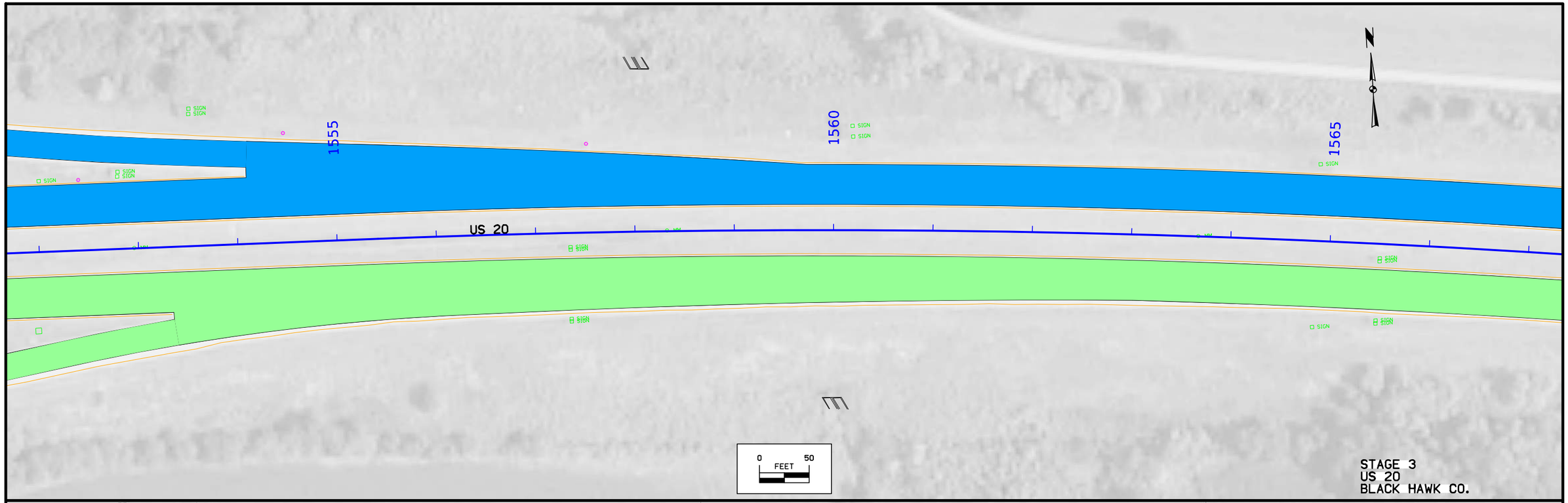
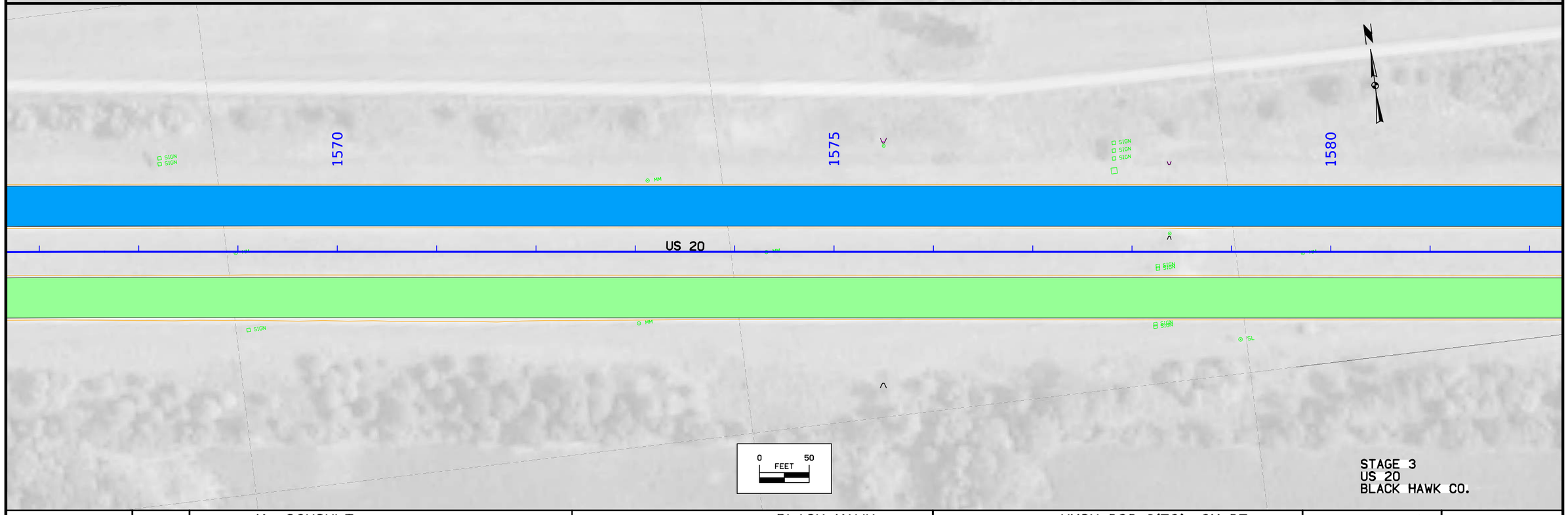


STAGE 3
US 20
BLACK HAWK CO.



STAGE 3
US 20
BLACK HAWK CO.

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.18

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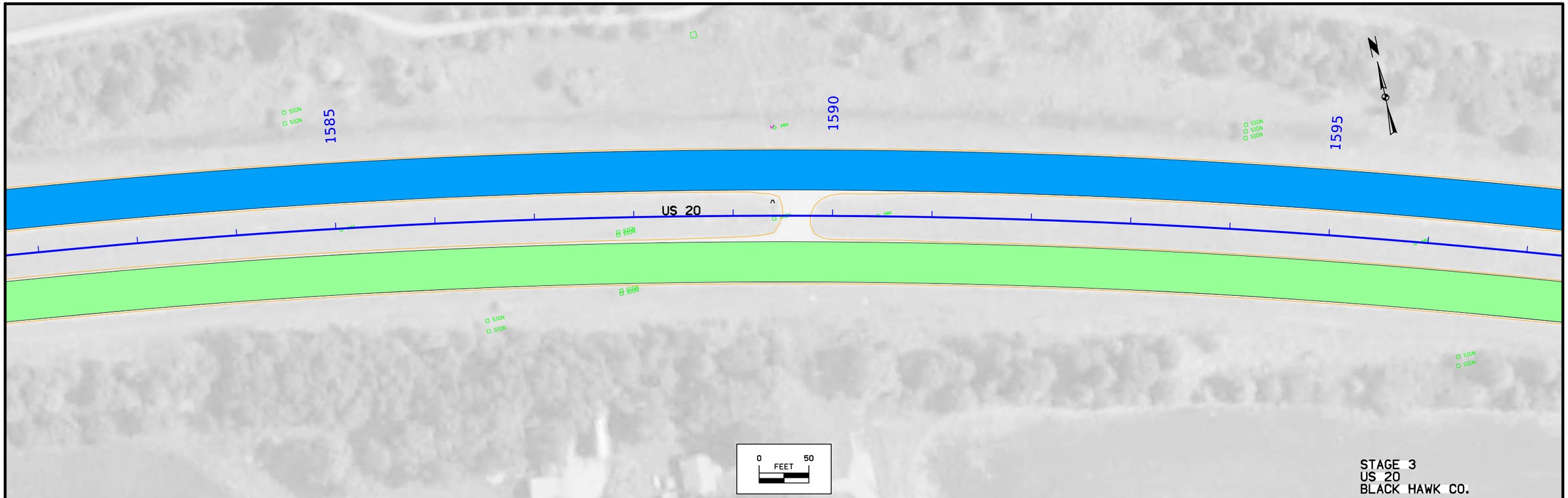
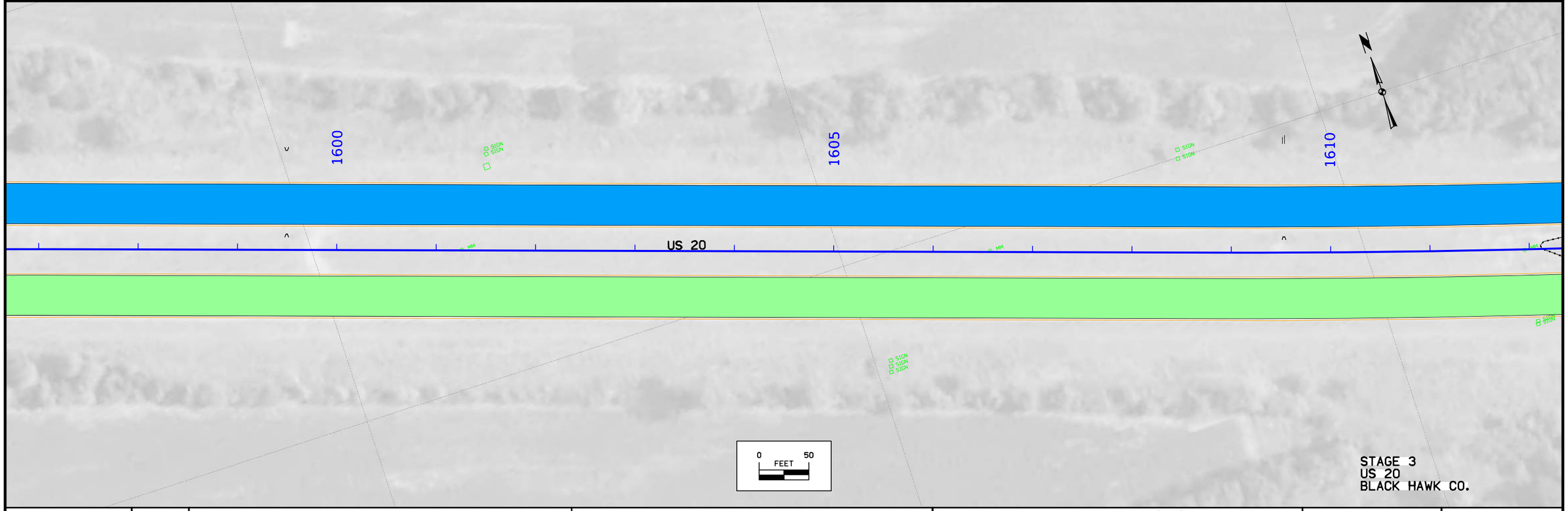


STAGE 3
US 20
BLACK HAWK CO.



STAGE 3
US 20
BLACK HAWK CO.

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER J.19

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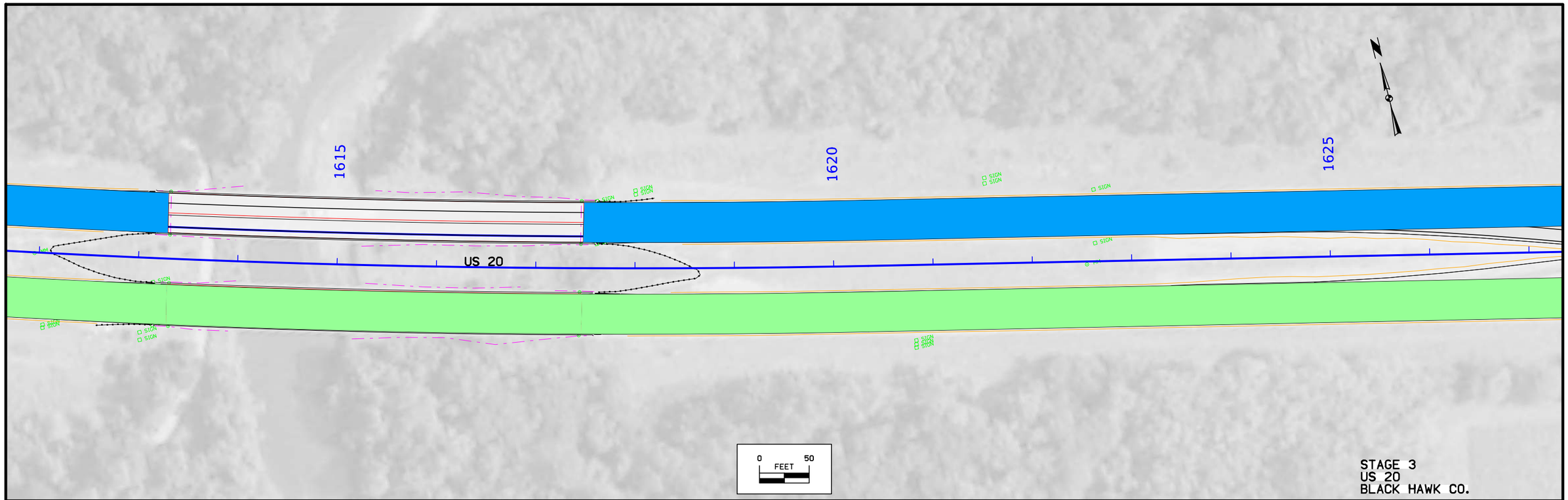

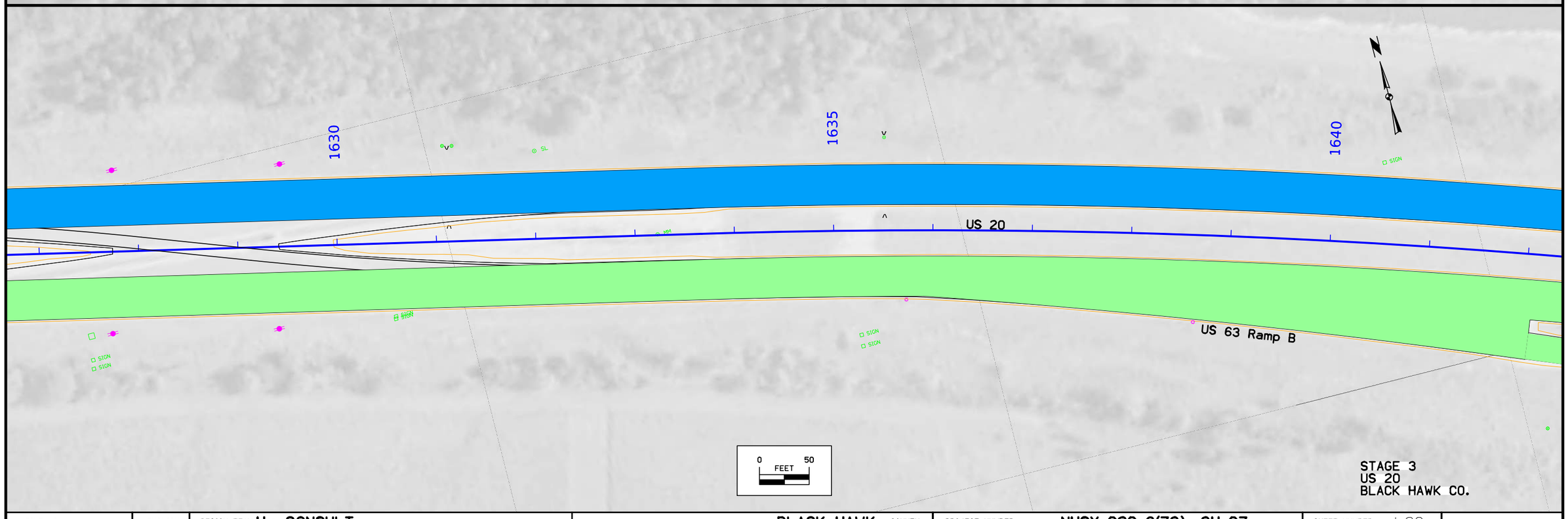

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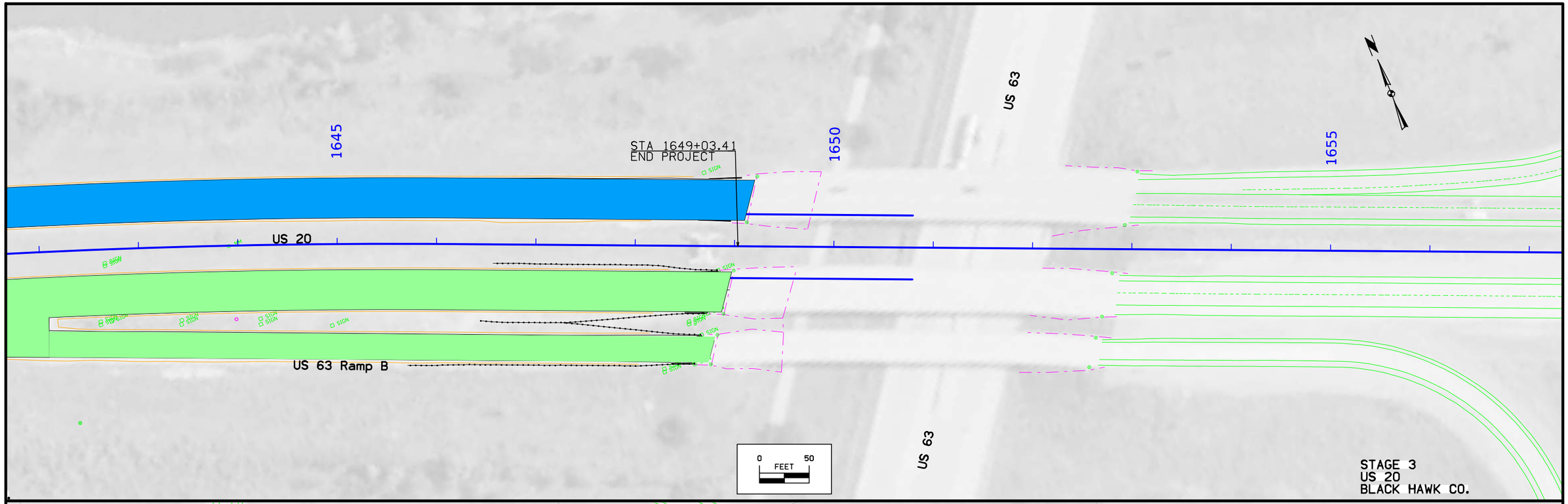

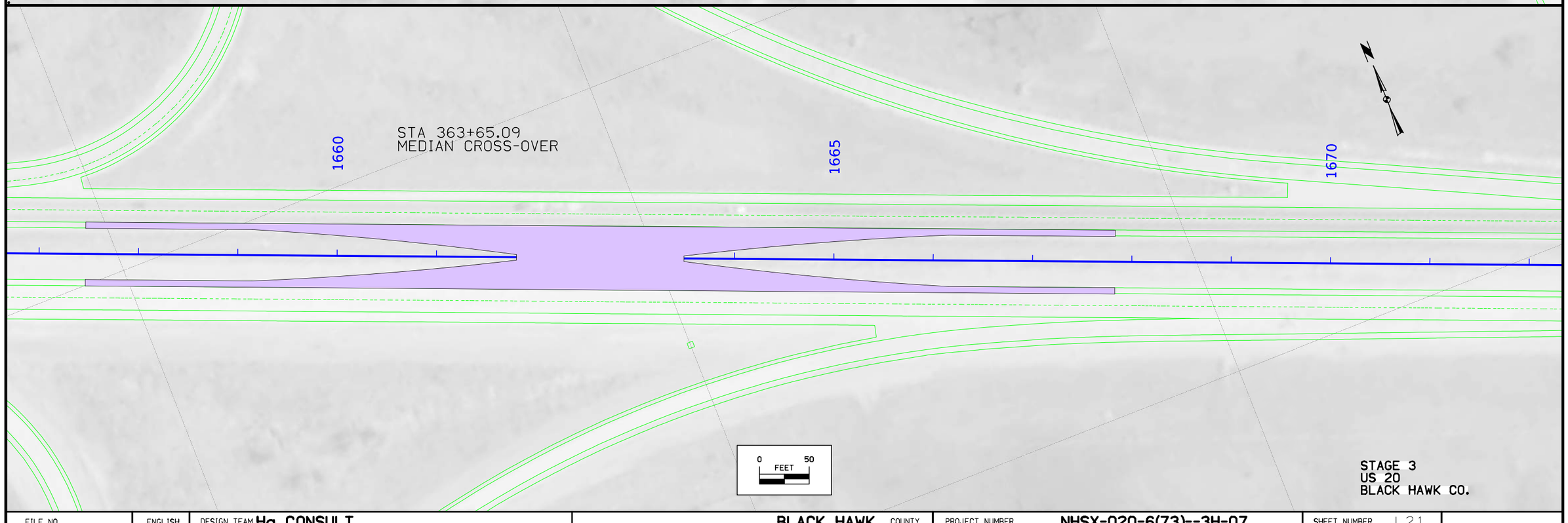

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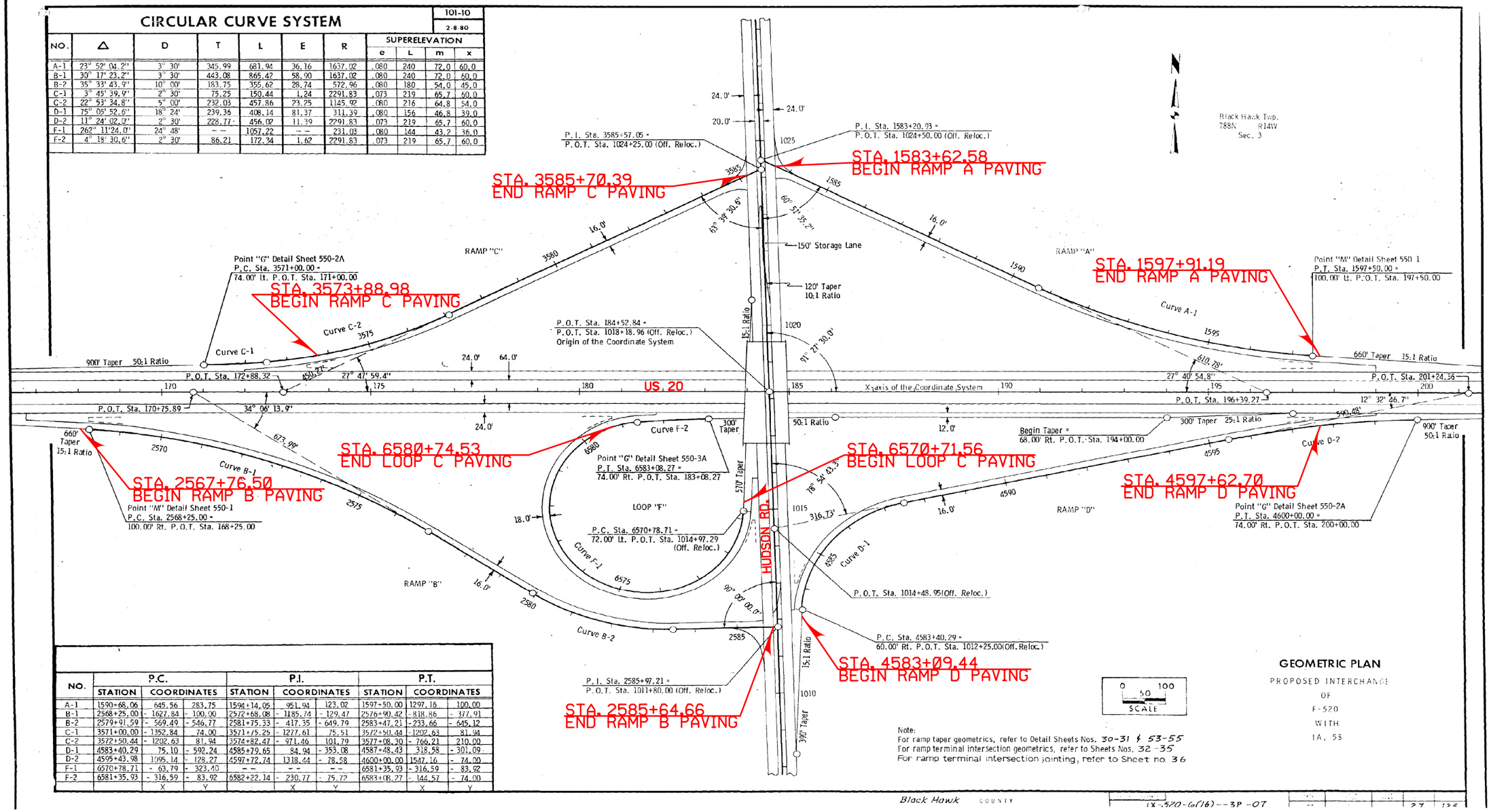
CIRCULAR CURVE SYSTEM

101-10
2-8-80

NO.	Δ	D	T	L	E	R	SUPERELEVATION e	L	m	x
A-1	23° 52' 04.2"	3° 30'	345.99	681.94	36.16	1637.02	.080	240	72.0	60.0
B-1	30° 17' 23.2"	3° 30'	443.08	865.42	58.90	1637.02	.080	240	72.0	60.0
B-2	35° 33' 43.9"	10° 00'	183.75	355.62	28.74	572.96	.080	180	54.0	45.0
C-1	3° 45' 39.9"	2° 30'	75.25	150.44	1.24	2291.83	.073	219	65.7	60.0
C-2	22° 53' 34.8"	5° 00'	232.03	457.86	23.25	1145.92	.080	216	64.8	54.0
D-1	75° 05' 52.6"	18° 24'	239.36	408.14	81.37	311.39	.080	156	46.8	39.0
D-2	11° 24' 02.0"	2° 30'	228.77	456.02	11.39	2291.83	.073	219	65.7	60.0
F-1	262° 11'24.0"	24° 48'	--	1057.22	--	231.03	.080	144	43.2	36.0
F-2	4° 18' 30.6"	2° 30'	86.21	172.34	1.62	2291.83	.073	219	65.7	60.0



NO.	P.C. STATION	P.C. COORDINATES		P.I. STATION	P.I. COORDINATES		P.T. STATION	P.T. COORDINATES	
A-1	1590+68.06	645.56	283.75	1594+14.05	951.94	123.02	1597+50.00	1297.16	100.00
B-1	2568+25.00	- 1627.84	- 100.00	2572+68.08	- 1185.74	- 129.47	2576+90.42	- 818.86	- 377.91
B-2	2579+91.59	- 569.49	- 546.77	2581+75.33	- 417.35	- 649.79	2583+47.21	- 233.66	- 645.12
C-1	3571+00.00	- 1352.84	74.00	3571+75.25	- 1277.61	75.51	3572+50.44	- 1202.63	81.94
C-2	3572+50.44	- 1202.63	81.94	3574+82.47	- 971.46	101.79	3577+08.30	- 766.21	210.00
D-1	4583+40.29	75.10	- 592.24	4585+79.65	84.94	- 353.08	4587+48.43	318.58	- 301.09
D-2	4595+43.98	1095.14	- 128.27	4597+72.74	1318.44	- 78.58	4600+00.00	1547.16	- 74.00
F-1	6570+78.71	- 63.79	- 323.40	--	--	--	6581+35.93	- 316.59	- 83.92
F-2	6581+35.93	- 316.59	- 83.92	6582+22.14	- 230.77	- 75.77	6583+08.27	- 144.57	- 74.00
		X	Y		X	Y		X	Y

Note:
For ramp taper geometrics, refer to Detail Sheets Nos. 30-31 & 53-55
For ramp terminal intersection geometrics, refer to Sheets Nos. 32 -35
For ramp terminal intersection jointing, refer to Sheet no. 36

GEOMETRIC PLAN

PROPOSED INTERCHANGE
OF
F-520
WITH
IA. 58

Black Hawk COUNTY

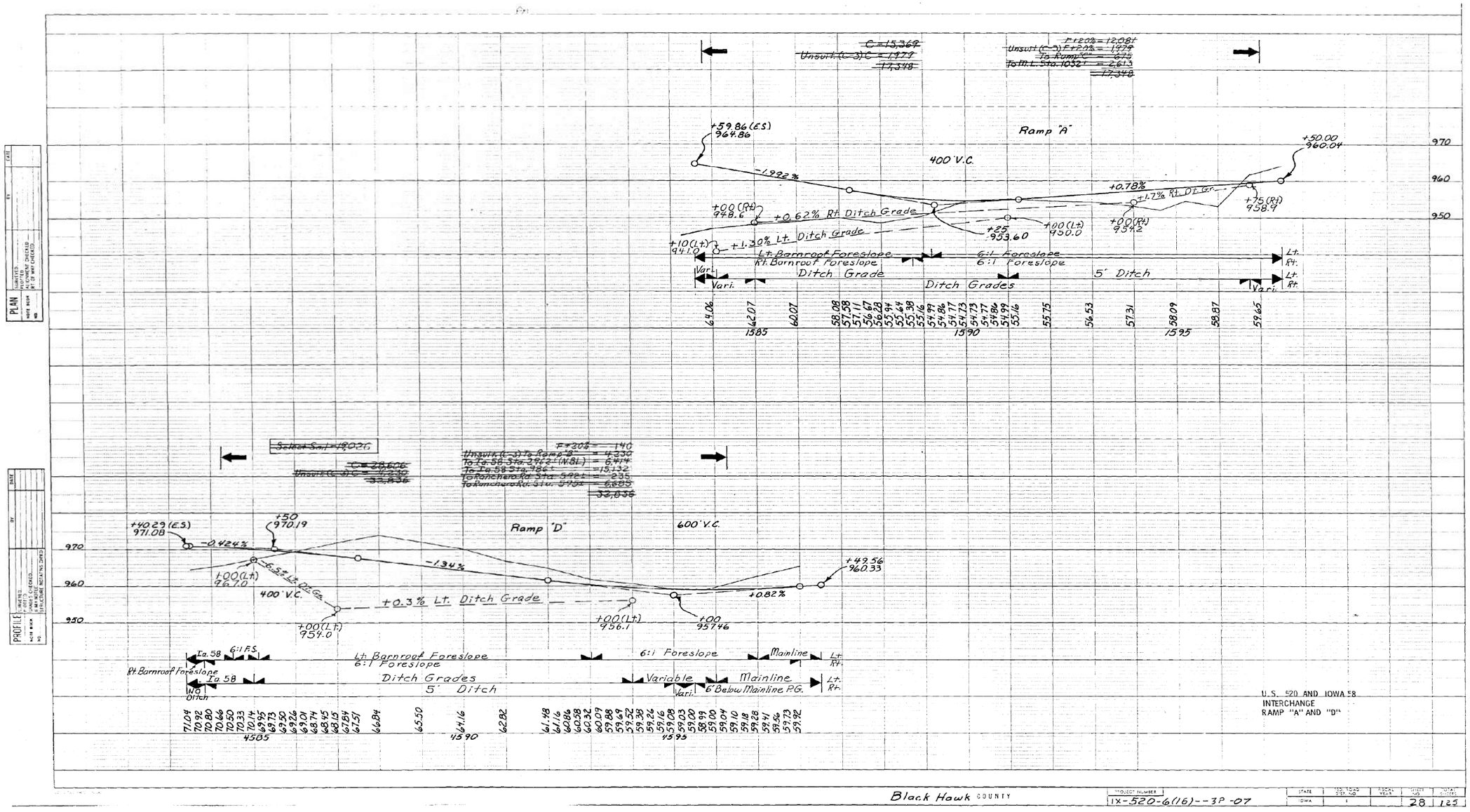
IX-520-6(16)--3P-07

As-built information for propsed construction.
Alignments, elevations, and tie-ins to be verified by contractor.

US 20 Interchange with Hudson Rd.
Geometric Plan

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER K.1

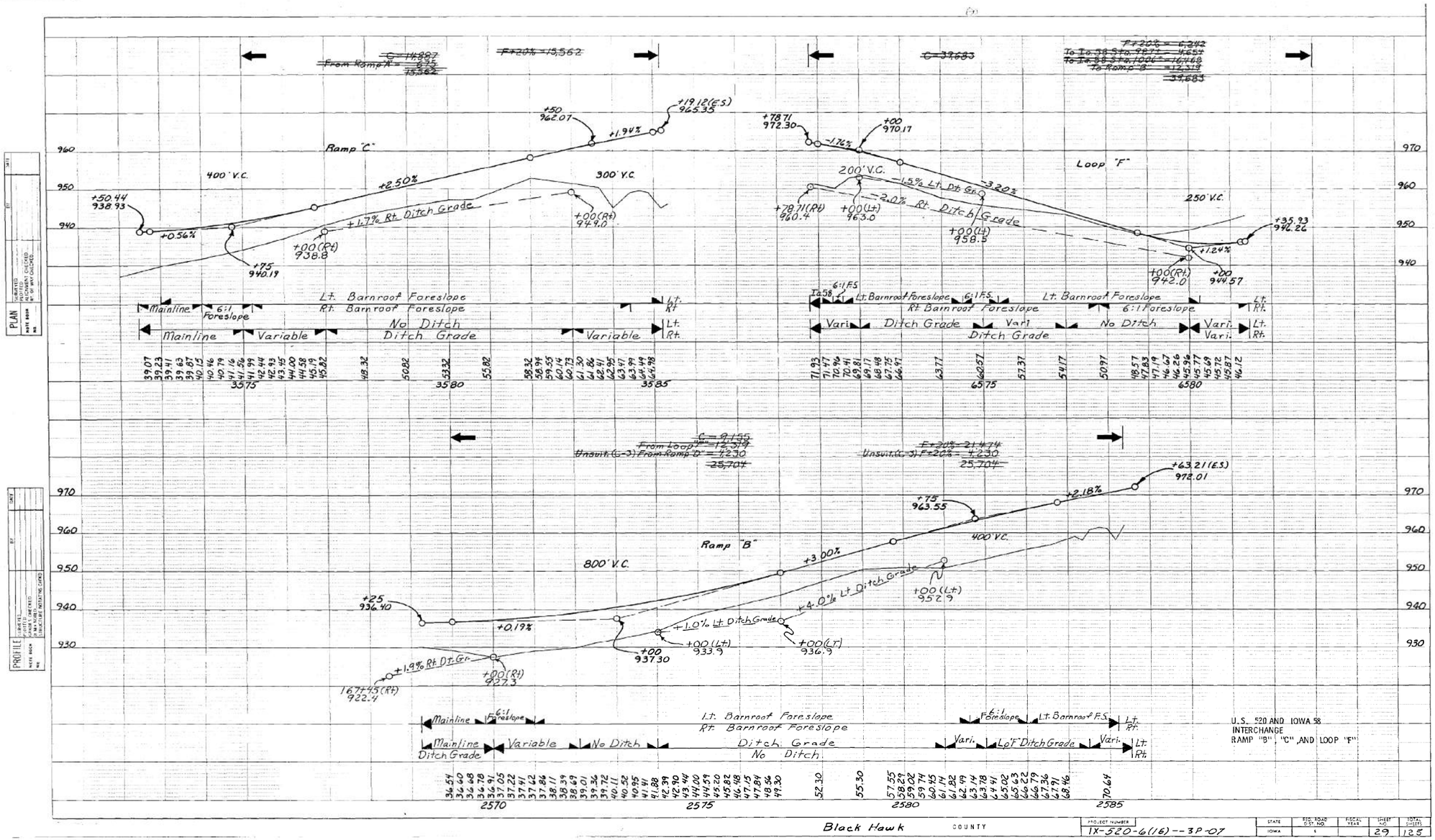
12:10:19 PM 6/9/2022 Brian Wrisinger\My Drive\Hg Projects\2021\21.092 US 20 Freeway Reconstruction (IaDOT)\Civil\Sheet_Files\SHT_07020073Z05_K01.dgn



As-built information for propsed construction.
Alignments, elevations, and tie-ins to be verified by contractor.

US 20 Interchange with Hudson Rd.
Ramps Profile

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER K.2



As-built information for propsed construction.
Alignments, elevations, and tie-ins to be verified by contractor.

US 20 Interchange with Hudson Rd.
Ramps and Loops Profile

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER K.3	

CIRCULAR CURVE SYSTEM

101-10
2-8-80

NO.	Δ	D	T	L	E	R	SUPERELEVATION e	L	m	x
A-1	59° 05' 13.6"	12° 30'	259.79	472.70	68.50	458.37	.080	168.0	50.4	42.0
A-2	5° 40' 00.1"	1° 30'	189.04	377.78	4.68	3819.72	.053	159.0	47.7	60.0
B-1	5° 20' 41.0"	1° 30'	178.29	356.32	4.16	3819.72	.053	159.0	47.7	60.0
C-1	8° 36' 10.9"	2° 30'	172.38	344.12	6.47	2291.83	.073	219.0	65.7	60.0
D-1	9° 28' 20.5"	2° 30'	189.86	378.89	7.85	2291.83	.073	219.0	65.7	60.0

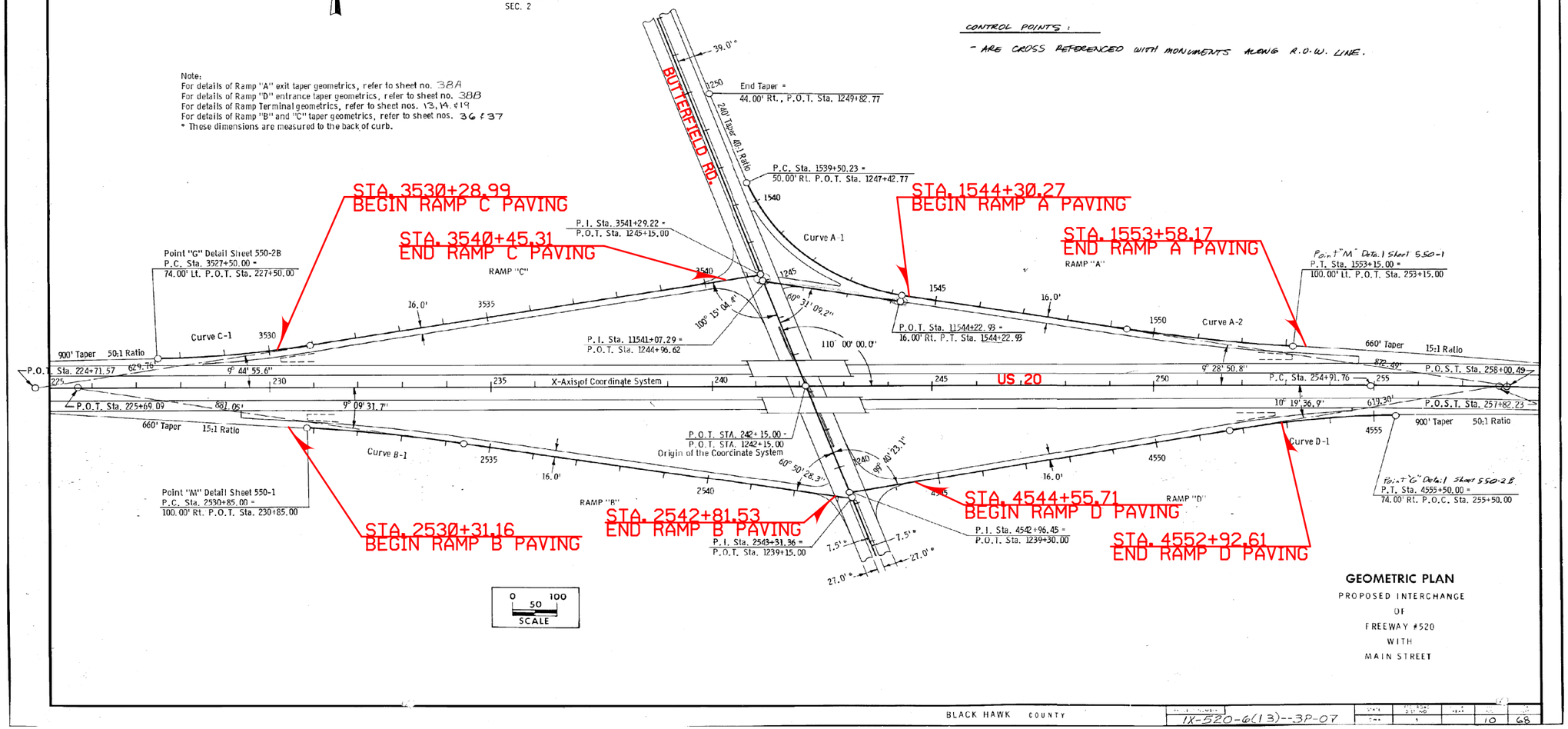
NO.	P.C. STATION	P.C. COORDINATES X	P.C. COORDINATES Y	P.I. STATION	P.I. COORDINATES X	P.I. COORDINATES Y	P.T. STATION	P.T. COORDINATES X	P.T. COORDINATES Y
A-1	1539+50.23	-133.52	513.05	1542+10.02	-38.60	271.22	1544+22.93	217.65	228.43
A-2	1540+37.22	724.91	143.71	1551+26.26	911.38	112.58	1553+15.00	1100.00	100.00
B-1	2530+85.00	-1130.00	-100.00	2532+63.29	-952.11	-111.86	2534+41.32	-776.09	-140.24
C-1	3527+50.00	-1465.00	74.00	3529+22.38	-1292.65	77.45	3530+94.12	-1122.76	106.64
D-1	4551+71.11	957.96	-111.02	4553+60.99	1144.77	-76.98	4555+50.00	1334.62	-74.15

N

BLACK HAWK
T88N R14W
SEC. 2

Note:
For details of Ramp "A" exit taper geometrics, refer to sheet no. 38A
For details of Ramp "D" entrance taper geometrics, refer to sheet no. 38B
For details of Ramp Terminal geometrics, refer to sheet nos. 13, 14, & 19
For details of Ramp "B" and "C" taper geometrics, refer to sheet nos. 36 & 37
* These dimensions are measured to the back of curb.

CONTROL POINTS :
- ARE CROSS REFERENCED WITH MONUMENTS ALONG R.O.W. LINE.



GEOMETRIC PLAN
PROPOSED INTERCHANGE
OF
FREEWAY #520
WITH
MAIN STREET

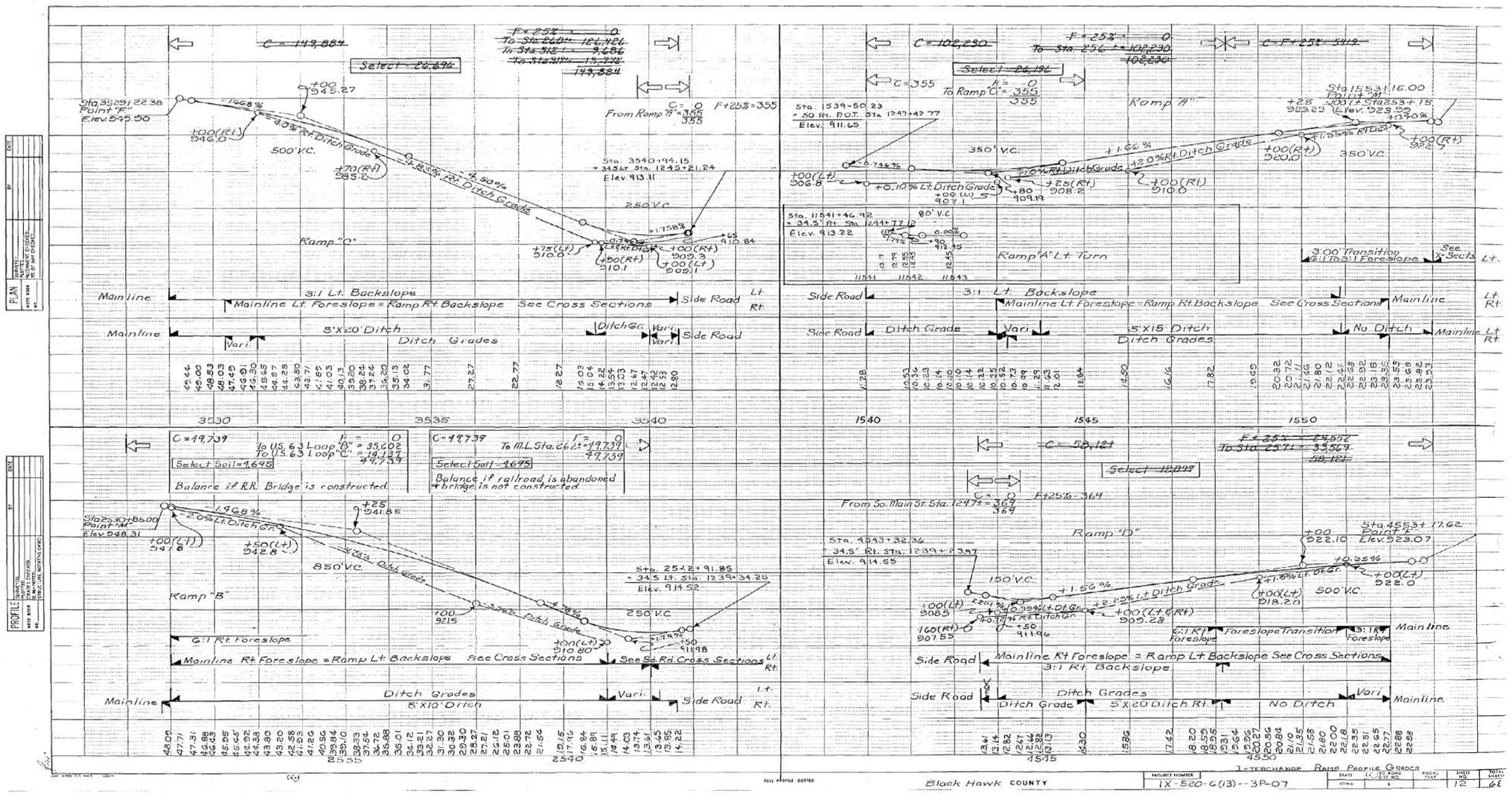
BLACK HAWK COUNTY
IX-520-6(13)--3P-07

As-built information for propsed construction.
Alignments, elevations, and tie-ins to be verified by contractor.

US 20 Interchange with Butterfield Rd.
Geometric Plan

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER K.4

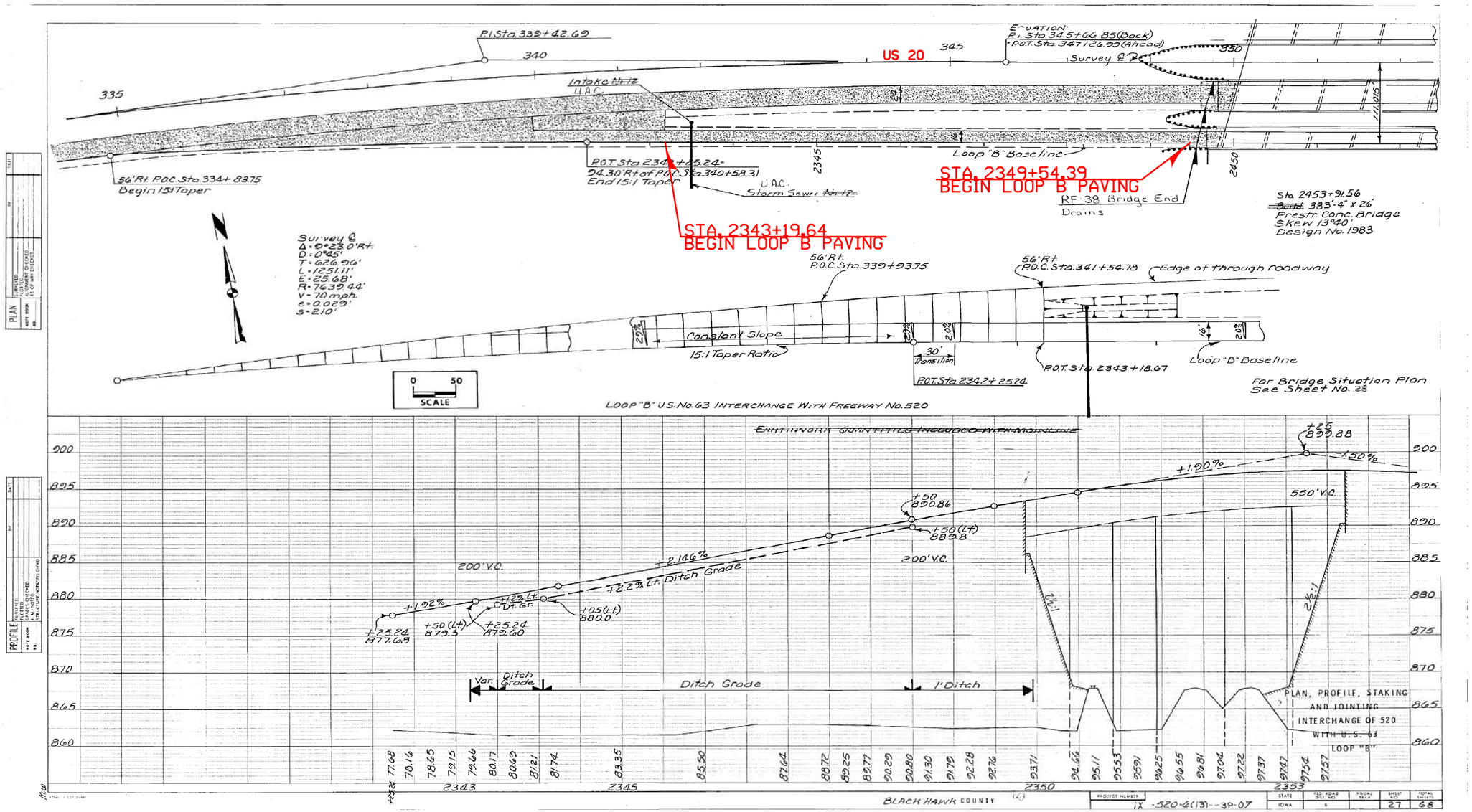
12:10:35 PM 6/9/2022 Brian Wrisinger\My Drive\Hg Projects\2021\21.092 US 20 Freeway Reconstruction (IaDOT)\Civil\Sheet_Files\SHT_07020073Z05_K01.dgn



US 20 Interchange with Butterfield Rd.
Ramps Profile

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER K.5

12:10:40 PM 6/9/2022 Brian Wrisinger J:\My Drive\Hg Projects\2021\21.092 US 20 Freeway Reconstruction (IaDOT)\Civil\Sheet_Files\SHT_07020073Z05_K01.dgn



US 20 Interchange with US 63 Geometric Plan and Loops Profile

FILE NO.	ENGLISH	DESIGN TEAM Hg CONSULT	BLACK HAWK COUNTY	PROJECT NUMBER NHSX-020-6(73)--3H-07	SHEET NUMBER K.6