

IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: District 6

DATE: February 1, 2018

ATTENTION: Jim Schnoebelen

REF. NO.: Benton County
NHSX-150-2(17)--3H-06
PIN:16-06-150-030

FROM: Kevin K. Patel

OFFICE: Design

SUBJECT: Project Concept - (Final)

PROJECT DATA:

ROUTE: IA 150, Curve west of Urbana at the intersection of 55th Street and 31st Avenue

LENGTH: 0.4 miles;

PLANNING CLASSIFICATION: Area Development;

MAINTENANCE SERVICE LEVEL: B;

TRAFFIC: 2018 --- 3,100 ADT with 8% trucks,
2038 --- 3,900 ADT with 8% trucks;

PRESENT PAVEMENT SURFACE: HMA;

PRESENT PAVEMENT WIDTH: 27 ft.

PRESENT SHOULDER WIDTH: 3 ft. shoulders

MP to MP	Dir.	Type	Avg. Str. No.	80% Str. No.	PCI	IRI	K Value
11.4 to 11.8	E/N and S/W	HMA	6.28	4.83	65	156	143

PAVEMENT HISTORY:

ORIGINAL PAVEMENT: 24ft. wide, -8 ¾" (8" Rolled Stone Base and ¾" Seal Coat)

YEAR CONSTRUCTED: 1949;

RESURFACED: 1967, 4 ½" Type B, ACC,

1979, 2", Type B ACC Base, 2 in. Type B ACC

1996, Milled 1 ½", 3 in. Type A ACC. Widened inside of curve 3'

EXISTING CONDITIONS AND CRASH HISTORY:

This section of IA 150 is within a 90-degree, 1,146 ft. radius, horizontal curve. The posted speed limit is 55 mph; however, it does have a posted 50 mph advisory speed limit. The horizontal curve is in the north-west quadrant of the intersection of 55th Street and 31st Avenue. 55th Street is the east- west leg of the intersection and 31st Avenue is the north-south leg of the intersection. These roadways are all paved with the exception of the south leg of 31st Avenue which is granular surfaced. The City of Urbana lies south east of the intersection.

During the five-year study period from January 1, 2011 through December 31, 2015, there were two crashes that resulted in 1 possible injury and 5 fatalities. The 5 fatalities were a result of a crash that occurred in April 2015 where a westbound vehicle on 55th Street failed to stop at the stop sign and hit a vehicle that was approaching on the eastbound to northbound IA 150 curve.

As a result of the fatalities, short term safety features were added including new signing and a painted island and tubular markers. The specific improvements also included the following:

1. The existing curve warning sign was replaced with a 36" fluorescent yellow curve/straight sign just west of the curve for eastbound traffic. The 50 mph advisory speed will remain on it. A flashing amber light was installed.
2. The current stop sign was replaced with a 36" stop sign for westbound traffic at the crash site. A red flashing light was also installed as well as a CROSS TRAFFIC DOES NOT STOP sign under the STOP sign.
3. The current STOP AHEAD sign was replaced with a 36" stop ahead symbol sign for WB traffic just east of the new STOP sign. Metal flags were placed on this sign.
4. A new stop bar and painted island along with tubular markers were added at the intersection to delineate the desire path of the west bound vehicle. The new path will allow the vehicle to intersect IA 150 closer to 90 degrees and thus reduce the distance (and potential area of conflict) that the vehicle will travel before reaching the west bound lanes of IA 150. The tubular markers were removed prior to the first snowfall and replaced in the spring during the first year of installation; however, it is the intent that this year they will be removed prior to winter and not replaced in the springtime.



Alternative 1
New pavement markings, stop sign and tubular markers
For Westbound Traffic on 55th Street

ALTERNATIVE 1

This alternative recommends continuing to use the short term safety features that were made in 2015. This includes the new signing that was previously installed; however, the tubular markers will not be a part of the long term solution and have been removed. Since the improvements have been made, no crashes have been reported at the intersection. No additional costs should be incurred with this alternative.

ALTERNATIVE 1A

This alternative is very similar to alternative 1; however, in lieu of the tubular markers, a 4" high, low rise island will be installed. A 4" high sloped faced curb will be used around the island. The low rise island will help delineate the path of the westbound vehicles similar to guidance that the tubular markers provided.

<u>ITEM</u>	<u>ESTIMATED COST</u>
New Pavement	\$14,200
Pavement Removal	1,400
Granular Subbase	1,700
Traffic Control	1,000
Mobilization	1,700
M & C	<u>6,000</u>
Total	\$26,000

ALTERNATIVE 2

This proposed alternative involves removing the existing IA 150 curve and updating the existing 55th Street and 31st Avenue intersection to accommodate the additional traffic. The removal of curve will warrant installation of turn lanes at the intersection for the following movements.

- Left Turn Lane- Eastbound to northbound traffic
- Right Turn Lane-Westbound to northbound
- Right Turn Lane-Southbound to westbound

The new pavement will be 28 ft. wide with 10 ft. effective shoulders (2 ft. of the roadway, 4 ft. additional paved and 4 ft. granular) with 6:1/3:1 foreslopes. This project will require approximately 2550 ft. of pavement to be removed and reconstructed on 55th Street and 1320 ft. on 31st Avenue. The left turn lanes will be 12 ft. wide along with a 4 ft. wide painted median. The right turn lanes will be 12 ft. wide with an adjacent 6 ft. wide shoulder. The new intersection will provide 55th Street (the east –west movement) as the thru route, with stop controls on 31st Avenue. Rumble strips will be placed on the north leg of 31st Avenue for southbound traffic.

Longitudinal subdrains will be installed along the new roadway. The existing drainage structures under 55th Street and 31st Avenue will be removed and replaced.

The existing pavement for the IA 150 curve will be removed allowing the old roadway embankment to be removed and obliterated. As a result of the curve being removed, there will be excess right of way that can be sold. However, additional right of way will need to be purchased to accommodate the construction of the turn lanes in the northeast quadrant.

New lighting will be installed at the intersection.

It appears that utilities will be impacted by this project.

During construction, traffic for IA 150 will be detoured as shown in alternative 2 of the DETOUR ANALYSIS section.

<u>ITEM</u>	<u>ESTIMATED COST</u>
New Pavement	\$811,200
Special Backfill	65,400
Modified Subbase	224,400
Class 10 Excavation	163,500
Paved Shoulders	72,700
Granular Shoulders	21,600
Longitudinal Subdrain and Outlets	45,300
Pavement Removal	88,900
Obliterate Old Roadbed	3,300
Lighting	40,000
Erosion Control	100,000
Traffic Control	74,800
Mobilization	74,800
ROW	24,000
M & C	<u>452,500</u>
Total	\$2,262,700

ALTERNATIVE 3

This proposed alternative involves construction of a roundabout at the existing 55th Street and 31st Avenue intersection and removing the existing IA 150 curve. The preliminary design for the roundabout alternative was performed by Kittelson and Associates, Inc. The roundabout will be designed with a 140 ft. inscribed circle diameter (ICD). The inside circulatory roadway will be 20 ft. wide with a 10 ft. wide truck apron.

The east, west, and north legs adjacent to roundabout will be reconstructed approximately 500 ft. to provide for a 300 ft. long splitter island and a 200 ft. long painted taper. There will be approximately 700 ft. of reconstruction beyond what is required for the roundabout on the west and north legs to remove the existing curve and the associated superelevation transition section. The existing speed limit will be reduced from 55 mph to 25 mph on these leg as vehicles approach the roundabout. The south leg adjacent to the roundabout will only be reconstructed approximately 180 ft. to provide for a 100 ft. long splitter island as it is a lower speed granular surfaced roadway.

The new pavement will be 12 ft. wide lanes with 10 ft. effective shoulders (6 ft. paved and 4 ft. granular) with 6:1/3:1 foreslopes.

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The roundabout shows pedestrian features that may not be needed upon implementation. However, it is recommended that these features be included so as to not preclude future service of pedestrians and bicyclists.

New lighting will be installed at the roundabout.

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New Pavement	\$555,200
Median Pavement	107,800
Special Backfill	86,300
Modified Subbase	175,700
Granular Backfill	14,100
Class 10 Excavation	91,400
Paved Shoulders	100,700
Granular Shoulders	21,400
Longitudinal Subdrain and Outlets	40,700
Pavement Removal	76,800
Obliterate Old Roadbed	3,300
Lighting	75,000
Erosion Control	100,000
Traffic Control	63,700
Mobilization	63,700
ROW	24,000
M & C	<u>400,000</u>
Total	\$1,999,600

DETOUR ANALYSIS

Alternative 1/1A

No/minor impacts to traffic during construction.

Alternative 2 and 3

During construction, IA 150 traffic will be detoured as follows: at the intersection of IA 150 and County Road V71, head north on County Road V71 for approximately 6.4 miles to County Road D 48. Then turn east on County Road D48 for 5.1 miles to the intersection with IA 150. There is approximately 0.5 miles out of distance travel for IA 150 traffic. The contractor will be required to maintain access to the properties on the south side of 55th Street during construction.

RECOMMENDATIONS

It is recommended to proceed with the roundabout alternative 3 as a result of the January 5th project review meeting.

ACCESS CONTROL

Access control will be acquired for the roundabout as shown in the attachment. The 28E agreement between the Iowa DOT and the local jurisdiction should contain a section for access control outlining that: Any future access point(s) that abuts the access limits or will influence traffic operations inside the access limits will require a permit (from the Iowa DOT) and may or may not be granted base on a change or revision to the access type, exact location and type of allowed movements.

SPECIAL CONSIDERATIONS:

A forth option was discussed which involved tying 55th Avenue into the existing IA 150 to create a "T" intersection. This option was dismissed from further consideration as it was thought that tying 55th Ave. into the high side of the superelevated curve, potential sight distance restrictions, along with the required left and right turn lanes may lead to operational problems.

The Office of Location and Environment office currently has this project under review. Field work analysis and recommendations will be issued after the final concept date.

FUNDS PROGRAMMED:

This project is not listed in the 2018-2022 Iowa Transportation Improvement program. A schedule of events will be developed following approval of the project concept.

KKP:

cc:

C. Purcell	M. J. Kennerly	K. D. Nicholson
D. L. Maifield	S. J. Megivern	N. L. McDonald
G. A. Novey	M. A. Swenson	R. A. Younie
D. R. Tebben	K. Brink	D. L. Newell
J. W. Laaser-Webb	W. A. Sorenson	D. E. Sprengeler
E. C. Wright	M. E. Ross	A. A. Welch
N. M. Miller	C. C. Poole	M. J. Sankey
B. E. Azeltine	B. D. Hofer	T. D. Crouch
S. J. Gent	S. Anderson	P. C. Keen
S. Godbold	J. Selmer	B. Smith
C. Brakke	T. Hanson	R.R. Walton
N. M. Abuissa	V. A. Brewer	C. L. Cutler
M. J. Donovan	S. W. Flockhart	K. A. Yanna
D. McDonald	F. Todey	M. Sloppy
M. K. Solberg	T. M. Storey	J. J. Tjaden
FHWA		

**Benton County
NHSX-150-2(17)--3H-06
IA 150 Curve West of Urbana
Alternative 1A - Low Rise Island**

Photo - July, 2013 (NAIP)

4" Low Rise Island



R1-1
48" x 48"

150

150

55th St.

LEGEND



PROPOSED LOW RISE PAVEMENT



0 FEET 100

31st Ave.



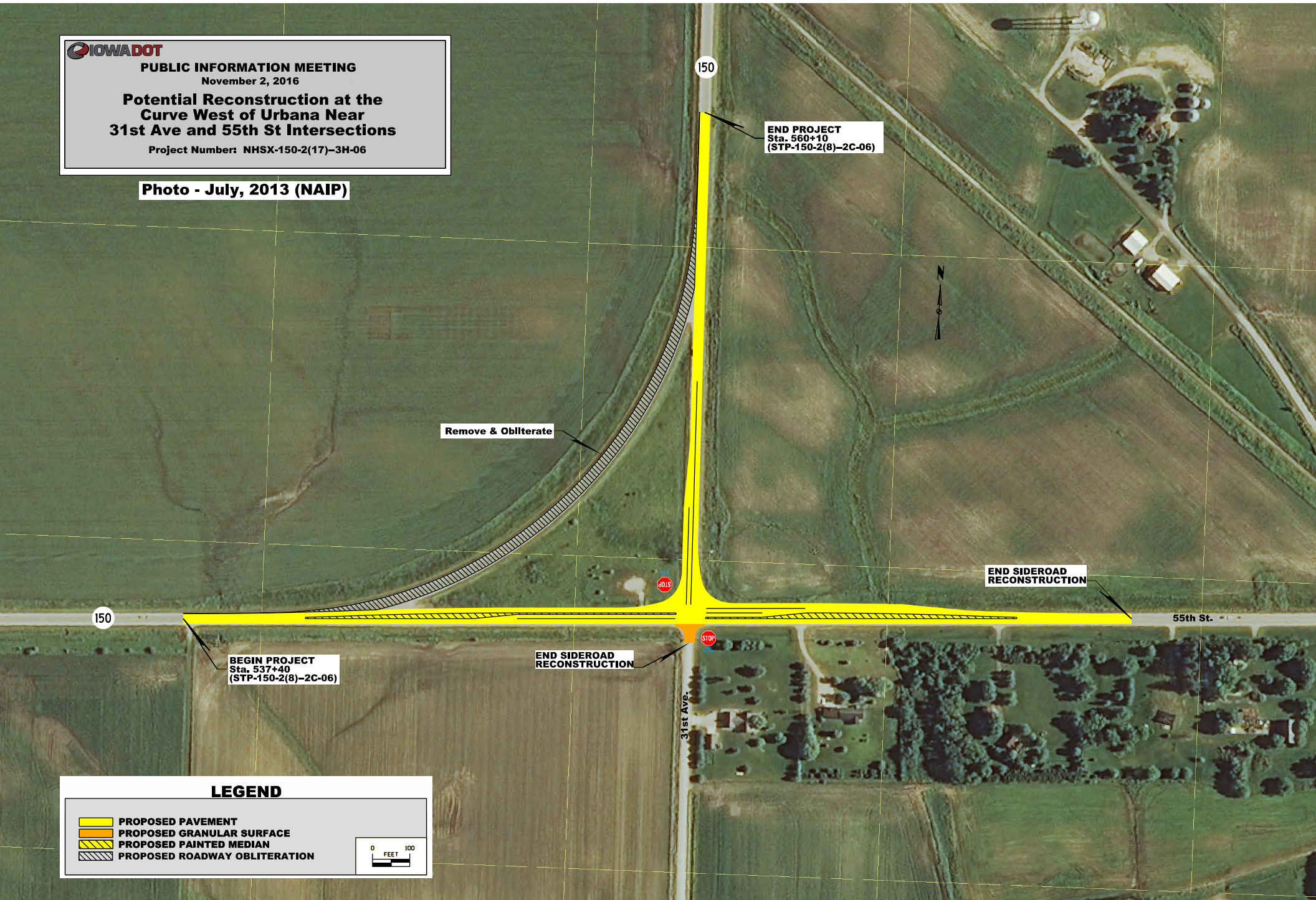


PUBLIC INFORMATION MEETING
November 2, 2016

**Potential Reconstruction at the
Curve West of Urbana Near
31st Ave and 55th St Intersections**

Project Number: NHSX-150-2(17)-3H-06

Photo - July, 2013 (NAIP)



Remove & Obliterate

150

END PROJECT
Sta. 560+10
(STP-150-2(8)-2C-06)

END SIDEROAD
RECONSTRUCTION

150

BEGIN PROJECT
Sta. 537+40
(STP-150-2(8)-2C-06)

END SIDEROAD
RECONSTRUCTION

55th St.

31st Ave.

LEGEND

- PROPOSED PAVEMENT
- PROPOSED GRANULAR SURFACE
- PROPOSED PAINTED MEDIAN
- PROPOSED ROADWAY OBLITERATION



Benton County
NHSX-150-2(17)--3H-06
IA 150 Curve West of Urbana
Alternative 3 - Roundabout

Photo - July, 2013 (NAIP)

150

END PROJECT
Sta. 560+10
(STP-150-2(8)--2C-06)

Remove & Obliterate

**END SIDEROAD
RECONSTRUCTION**

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Sta. 537+40
(STP-150-2(8)--2C-06)

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RECONSTRUCTION**

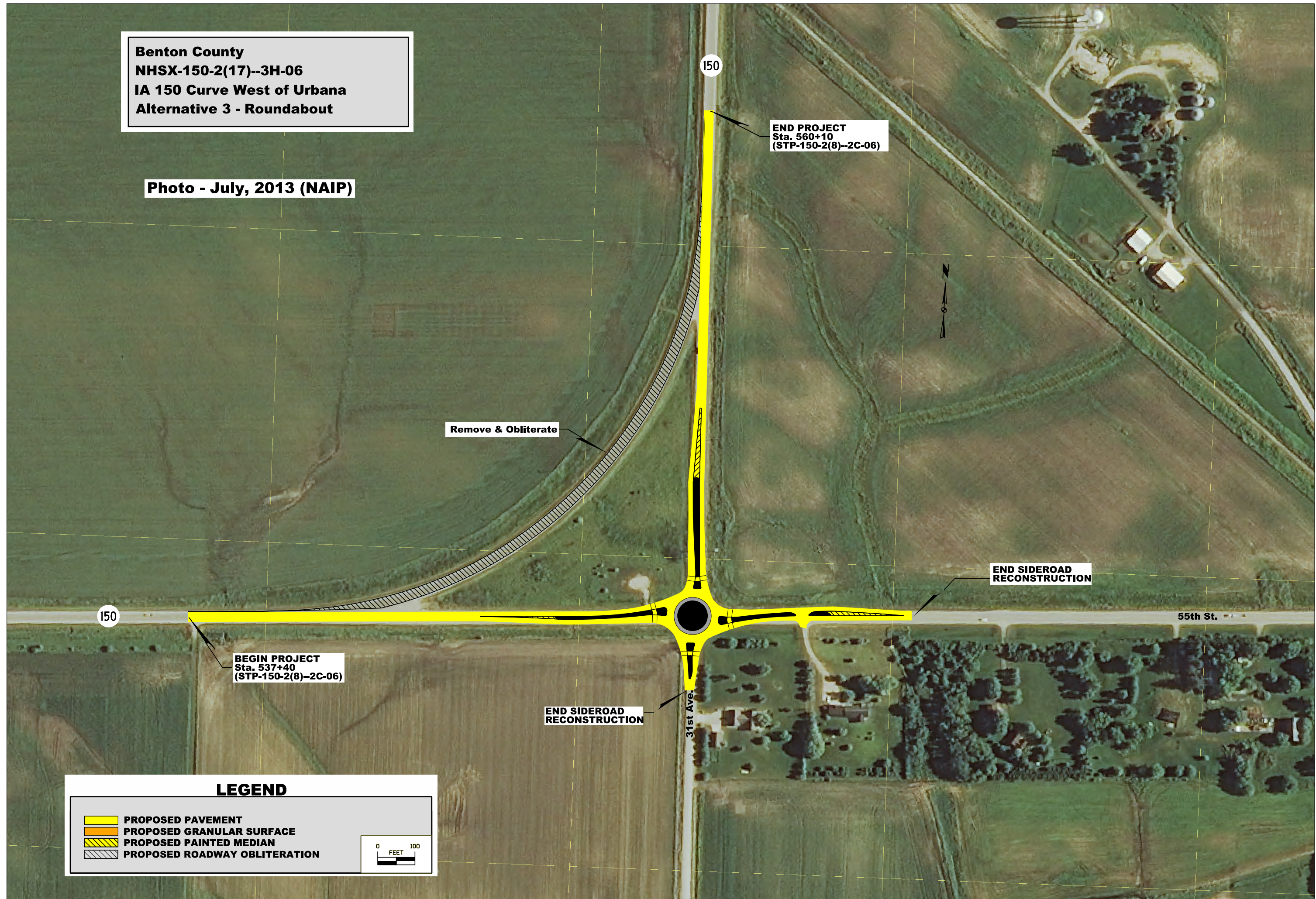
31st Ave.

55th St.

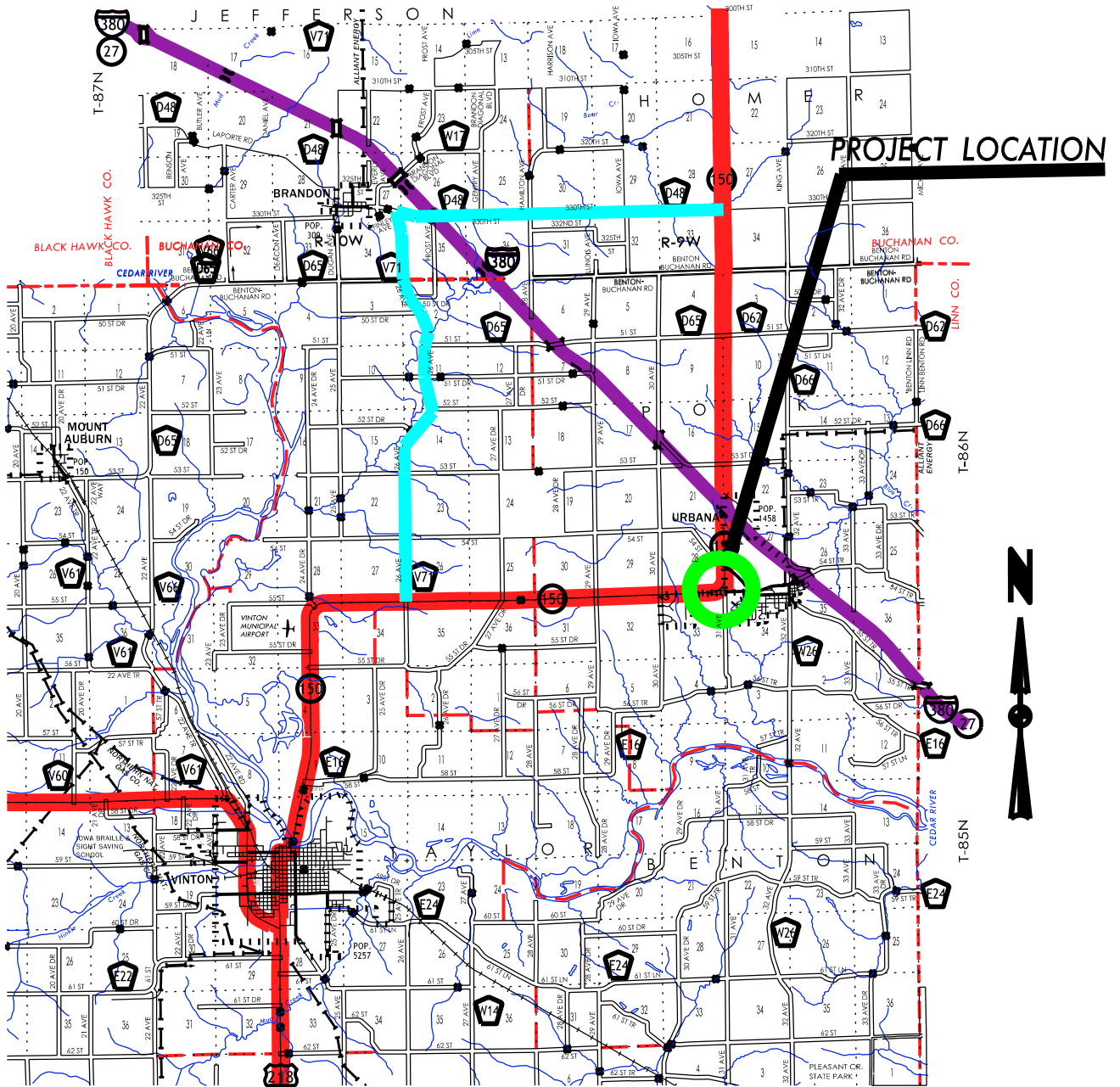
LEGEND

-  **PROPOSED PAVEMENT**
-  **PROPOSED GRANULAR SURFACE**
-  **PROPOSED PAINTED MEDIAN**
-  **PROPOSED ROADWAY OBLITERATION**

0 FEET 100



BENTON\BUCHANAN COUNTIES

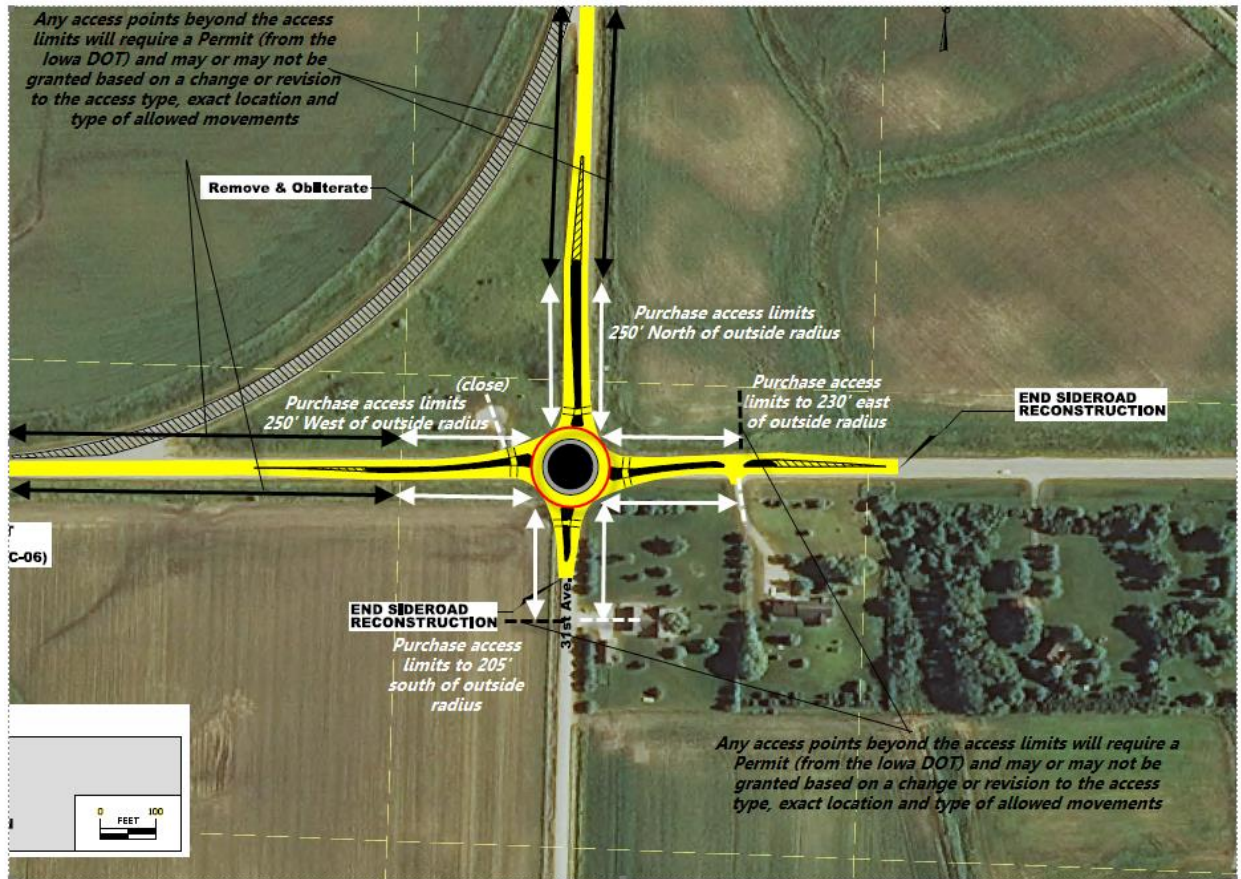


IA. 150 CURVE WEST
OF URBANA NEAR THE (IA 150)
31st. AVE. AND 55th ST. INTERSECTION
ROADWAY IMPROVEMENT
NHSX-150-2(17)-3H-06
PIN:16-06-150-030

Detour Route



Recommended Access Control Limits



The 28E agreement between the Iowa DOT and local jurisdiction, should contain a section for access control outlining that: *Any future access point(s) that abuts the access limits or will influence traffic operations inside the access limits will require a Permit (from the Iowa DOT) and may or may not be granted based on a change or revision to the access type, exact location and type of allowed movements.*

BENTON CO.

**PCC PAVEMENT - GRADE AND NEW
HSIPX-150-2(18)--3I-06**

LETTING DATE
12-21-2021



Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM

BENTON COUNTY

PCC PAVEMENT - GRADE AND NEW

IA 150, CURVE WEST OF URBANA
AT THE INTERSECTION OF 55TH STREET AND 31ST AVENUE

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

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



REVISIONS

TOTAL

PROJECT IDENTIFICATION NUMBER

16-06-150-030

PROJECT NUMBER

HSIPX-150-2(18)--3I-06

R.O.W. PROJECT NUMBER

INDEX OF SHEETS

No.	DESCRIPTION
A Sheets	Title Sheets
A.1	Title Sheet
A.2	Location Map Sheet
A.3 - 10	Concept Statement
A.11 - 16	Design Criteria
A.17	Design Notes
B Sheets	Typical Cross Sections and Details
B.1 - 3	Typical Cross Sections and Details
D Sheets	Mainline Plan and Profile Sheets
* D.1	Plan & Profile Legend & Symbol Information Sheet
* D.2 - 4	IA 150 EB/WB
* D.5 - 8	IA 150 NB/SB
E Sheets	Side Road Plan and Profile Sheets
* E.1 - 2	55TH STREET
* E.3 - 4	31ST AVENUE
G Sheets	Survey Sheets
G.1	Survey Information
G.2	Control Point Vicinity Map
G.3	Horizontal and Vertical Control Tab.
J Sheets	Traffic Control and Staging Sheets
J.1	Traffic Control Plan and Staging Notes
W Sheets	Mainline Cross Sections
W.1 - 7	IA 150 EB/WB Mainline Cross Sections
W.8 - 14	IA 150 NB/SB Mainline Cross Sections
X Sheets	Side Road Cross Sections
X.1 - 5	55TH Street EB/WB Side Road Cross Sections
X.6	31ST Avenue NB/SB Side Road Cross Sections
	* Color Plan Sheets

DESIGN DATA URBAN

2018	AADT	3100	V.P.D.
2038	AADT	3900	V.P.D.
20	DHV		V.P.H.
	TRUCKS	8	%
	Total		
	Design ESALs		

INDEX OF SEALS

SHEET NO.	NAME	TYPE
A.1	ANDREW S. FLOY	Primary Signature Block

PRELIMINARY PLANS

Subject to change by final design.

D2 PLAN - Date: May 29, 2019

FILE NO.

ENGLISH

DESIGN TEAM **FOTH**

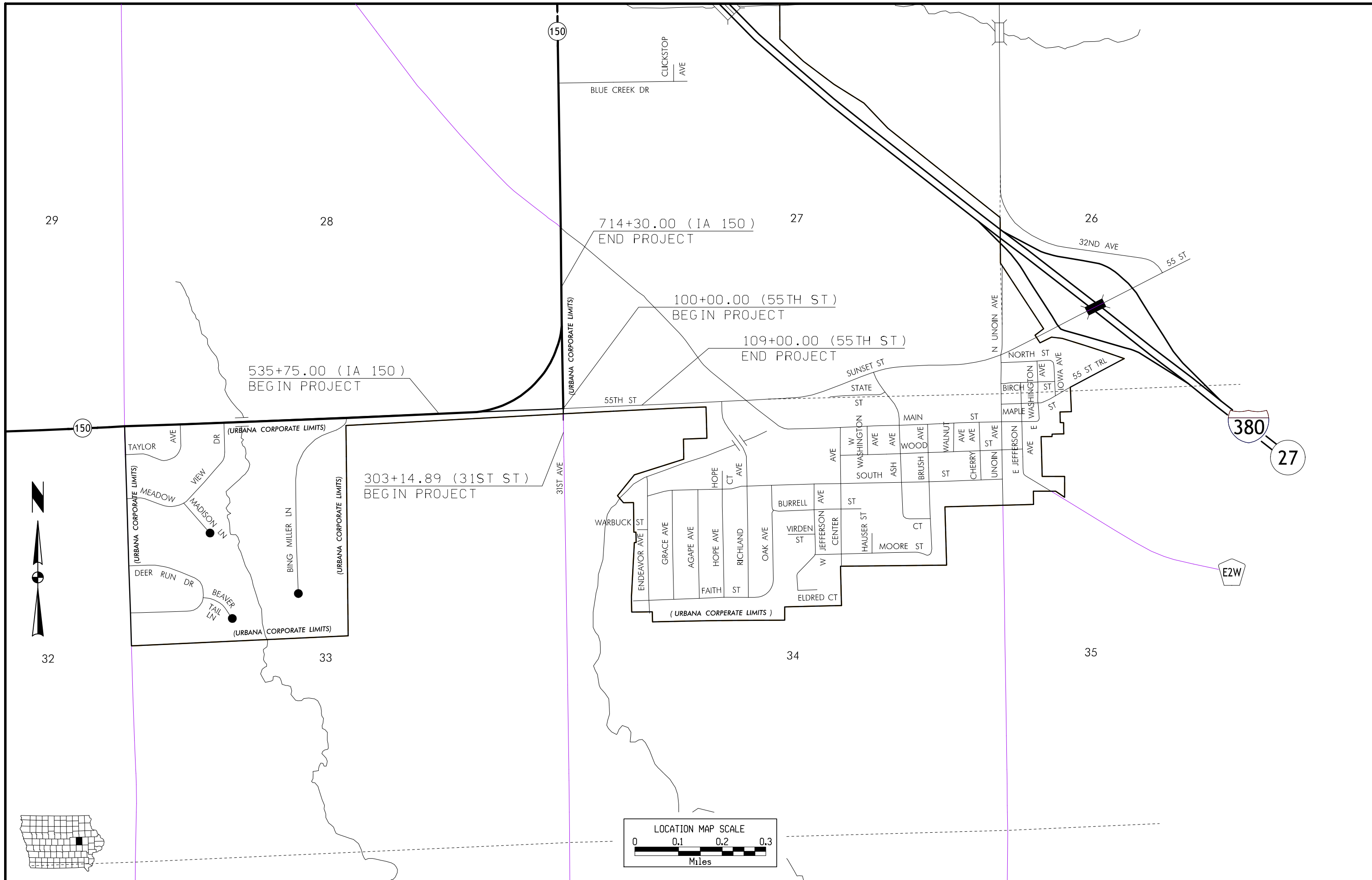
BENTON COUNTY

PROJECT NUMBER

HSIPX-150-2(18)--3I-06

SHEET NUMBER

A.1



IOWA DEPARTMENT OF TRANSPORTATION

TO OFFICE: District 6
ATTENTION: Jim Schnoebelen
FROM: Kevin K. Patel
OFFICE: Design
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Benton County
 NHSX-150-2(17)--3H-06
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 Page 2

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DETOUR ANALYSIS

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C. Purcell	M. J. Kennerly	K. D. Nicholson
D. L. Maifield	S. J. Megivern	N. L. McDonald
G. A. Novey	M. A. Swenson	R. A. Younie
D. R. Tebben	K. Brink	D. L. Newell
J. W. Laaser-Webb	W. A. Sorenson	D. E. Sprengeler
E. C. Wright	M. E. Ross	A. A. Welch
N. M. Miller	C. C. Poole	M. J. Sankey
B. E. Azeltine	B. D. Hofer	T. D. Crouch
S. J. Gent	S. Anderson	P. C. Keen
S. Godbold	J. Selmer	B. Smith
C. Brakke	T. Hanson	R.R. Walton
N. M. Abuissa	V. A. Brewer	C. L. Cutler
M. J. Donovan	S. W. Flockhart	K. A. Yanna
D. McDonald	F. Today	M. Sloppy
M. K. Solberg	T. M. Storey	J. J. Tjaden
FHWA		

**Benton County
NHSX-150-2(17)--3H-06
IA 150 Curve West of Urbana
Alternative 1A - Low Rise Island**

Photo - July, 2013 (NAIP)



4" Low Rise Island

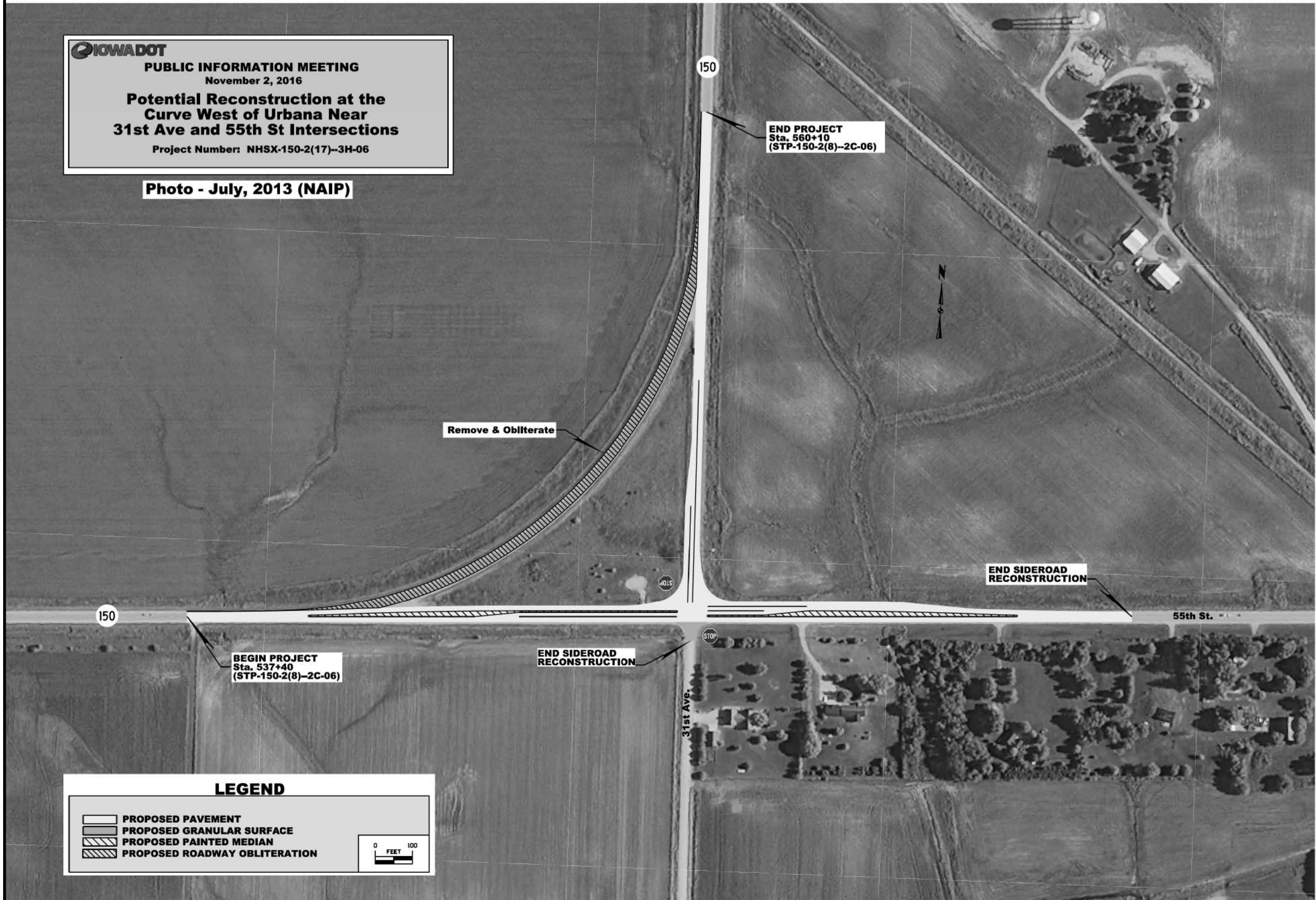
LEGEND

PROPOSED LOW RISE PAVEMENT



IOWADOT
PUBLIC INFORMATION MEETING
 November 2, 2016
Potential Reconstruction at the
Curve West of Urbana Near
31st Ave and 55th St Intersections
 Project Number: NHSX-150-2(17)--3H-06

Photo - July, 2013 (NAIP)



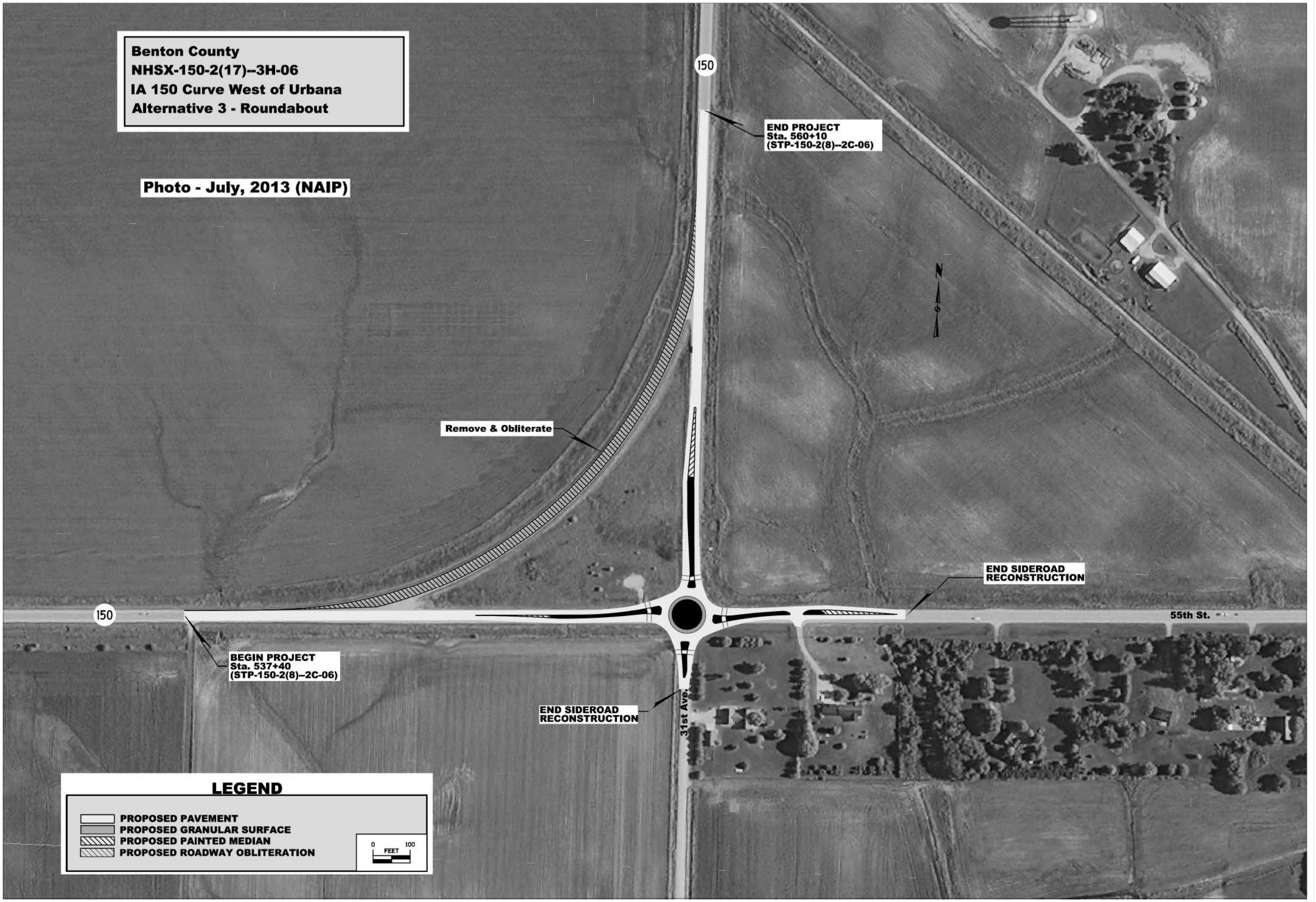
LEGEND

	PROPOSED PAVEMENT
	PROPOSED GRANULAR SURFACE
	PROPOSED PAINTED MEDIAN
	PROPOSED ROADWAY OBLITERATION

0 FEET 100

**Benton County
 NHSX-150-2(17)--3H-06
 IA 150 Curve West of Urbana
 Alternative 3 - Roundabout**

Photo - July, 2013 (NAIP)

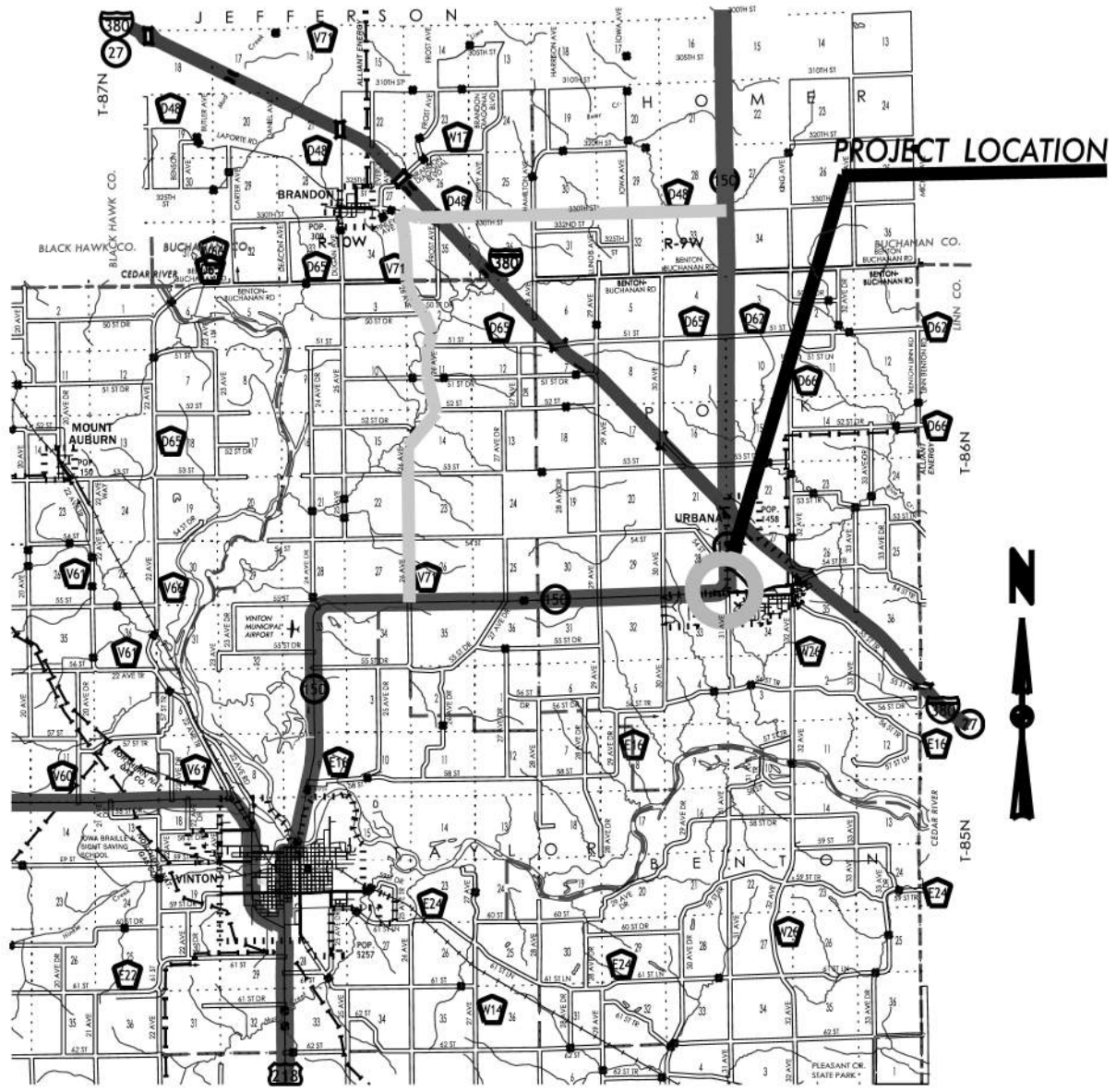


LEGEND

	PROPOSED PAVEMENT
	PROPOSED GRANULAR SURFACE
	PROPOSED PAINTED MEDIAN
	PROPOSED ROADWAY OBLITERATION

0 FEET 100

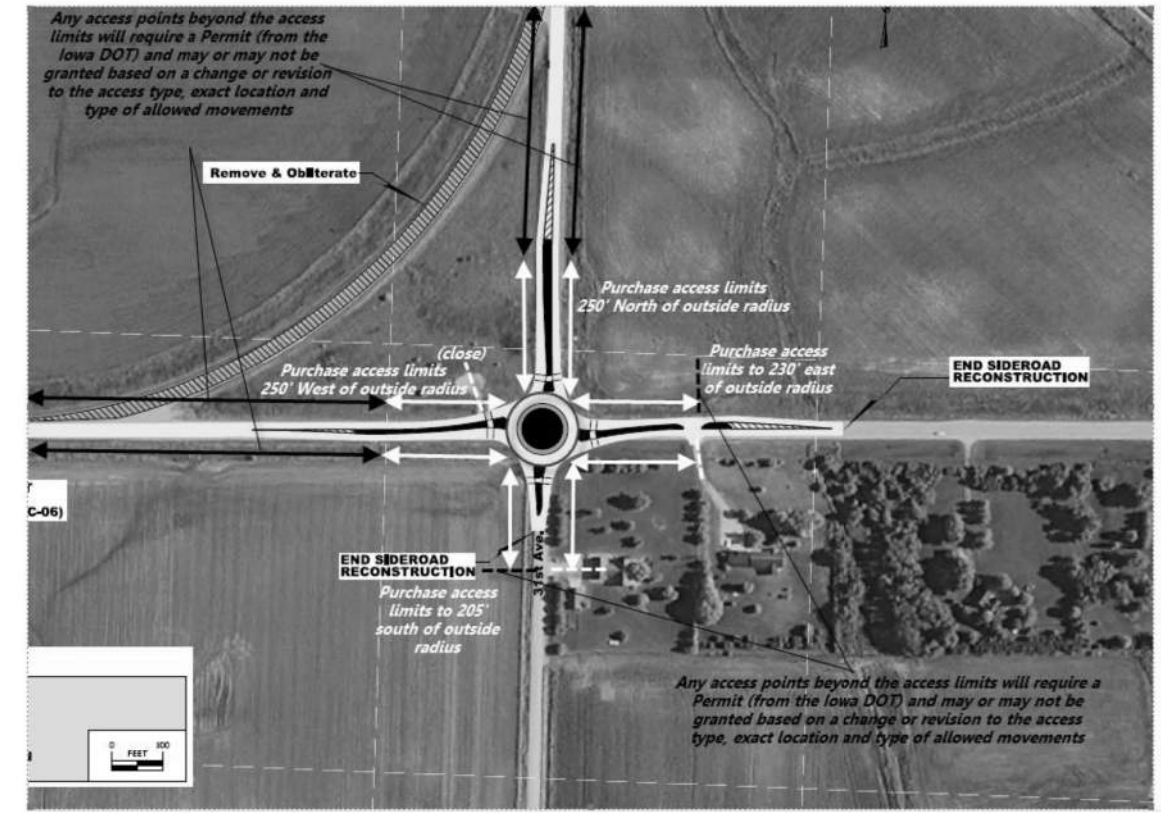
BENTON \ BUCHANAN COUNTIES



IA. 150 CURVE WEST
 OF URBANA NEAR THE (IA 150)
 31st. AVE. AND 55th ST. INTERSECTION
 ROADWAY IMPROVEMENT
 NHSX-150-2(17)-3H-06
 PIN:16-06-150-030

Detour Route

Recommended Access Control Limits



The 28E agreement between the Iowa DOT and local jurisdiction, should contain a section for access control outlining that: *Any future access point(s) that abuts the access limits or will influence traffic operations inside the access limits will require a Permit (from the Iowa DOT) and may or may not be granted based on a change or revision to the access type, exact location and type of allowed movements.*

IA 150 TWO LANE RURAL ROADWAY DESIGN CRITERIA

Roadway				
PIN Number	16-06-150-030	Submittal Date		
Project Number	NHSIPX-150-2(18)--3L-06	Approval Date		
District	District 6	Assistant District Engineer	Ken Yanna	
County	BENTON	or		
Route	IA 150	Office Director		
Location	Curve west of Urbana at the intersection of 55th Street and 31st Avenue			
Work Type	PCC Replace			
Segment Manager				
Designer	Foth			
Design Manual Section 1C-1 Last Updated: 05-26-17				
Rural Two-Lane Highways (Rural Arterials)				
	Design Element	Preferred	Acceptable	Project Values
	Design speed (mph)	60	50	60
	Maximum superelevation rate (Refer to Section 2A-2)	6%	8%	6%
	Design lane width (ft)	12	12	12
	Full depth paved width (ft)	14	12	12
	Right turn lane (ft)	12	10	N/A
	Climbing Lane (ft)	12	12	N/A
	Left turn lane (ft)	12	10	N/A
Pavement cross-slope (on tangent sections)	Through lanes	2%	1.5% minimum, 2% maximum	2%
	Auxiliary and turn lanes	3%	3% maximum	N/A
	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	-
	Design speed \geq 60 mph	4-inch sloped	6-inch sloped	N/A
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	10:1 for 4' then 6:1
	Beyond standard ditch depth and design clear zone	3.5:1	3:1	3:1
	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	3:1
Transverse Slopes	w/ drainage structures	8:1	6:1	8:1
	w/o drainage structures	10:1	6:1	10:1
Ditches (Refer to Section 3G-1)	Outside ditch (depth x width) (ft)	5 x 10	-	5 x 10
Bridge width Δ new*	Bridge length \geq 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 Δ existing*		design lane widths + no less than 2 ft left and right	design lane widths + 2 ft. offset left and right	N/A
Vertical clearance (ft) (above lanes, shoulders and 25 feet left and right of the center of railroad tracks)	Over primary	16.5	16	N/A
	Over non-primary	16.5 at interchange locations, 15 at all other locations	14	N/A
	Over railroad	23.3	23.3	N/A
	Sign trusses and pedestrian bridges	17.5	17	N/A
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 is required)

IA 150 TWO LANE RURAL SHOULDER DESIGN CRITERIA

Design year ADT = 3900						
Effective Shoulder Width and Type for Two-Lane Highways						
Preferred (values shown in feet)			Acceptable (values shown in feet)			Project Values
	Rural Roadways	Urban Roadways		Rural Roadways	Urban Roadways	
Turn lanes with shoulders	6	6	Turn lanes with shoulders	6	0	N/A
Turn lanes with curbs	6	See Section 3C-2	Turn lanes with curbs	6	0	N/A
	Effective Shoulder Width	Paved Width		Effective Shoulder Width	Paved Width	
Climbing Lanes	6	4	Climbing Lanes	4	0	N/A
Two-Lane Highways	Effective Shoulder Width	Paved Width	Two-Lane Highways	Effective Shoulder Width	Paved Width	
Routes where bicycles are to be accommodated	10	10	Design year ADT > 2000 vpd	8	2*	10' effective*
On roadways approaching urban areas (due to increased bike traffic)	10	10				
On all curves with a superelevation rate of 7.0% or greater	10	10				
On roadways with design year ADT > 5000	10	6	Design year ADT between 400 - 2000 vpd	6	2*	
On all other NHS	10	4				
On non-NHS routes with design year ADT > 3000	10	4	Design year ADT < 400 vpd	4	2*	
On non-NHS routes with design year ADT < 3000	8	2*				

*Requires safety edge-Refer to 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:

* 6' paved with 4' granular (per project concept)

IA 150 TWO LANE RURAL HIGH SPEED ROADWAY DESIGN CRITERIA

Roadway Design Speed (mph) = 60															
Design Criteria for High Speed Roadways															
Design Element	Preferred Criteria						Acceptable Criteria						Project Values		
	Design Speed, mph						Design Speed, mph								
	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	570		
Minimum horizontal curve radius (ft) (Refer to Sections 2A-2 and 2A-3)	Method 5 superelevation and side friction distribution	emax = 6%	833	1060	1330	1660	2040	2500	833	1060	1330	1660	2040	2500	1330
			emax = 8%	--	--	--	--	--	--	758	960	1200	1480	1810	2210
Minimum vertical curve length (ft) (Refer to Section 2B-1)	crest vertical curves		150	165	180	195	210	225	150	165	180	195	210	225	180
Minimum rate of vertical curvature (K) (Refer to Section 2B-1)	sag vertical curves	roadways without fixed-source lighting	84	114	151	193	247	312	84	114	151	193	247	312	151
		roadways with fixed-source lighting	96	115	136	157	181	206	96	115	136	157	181	206	136
Minimum gradient (%) (Refer to Section 2B-1)			0.5						0.3% with a curb, 0.0% without a curb						0.07
Maximum gradient (%) (Refer to Section 2B-1)	Urban roadways		4	3				7	6	6	--	--	--	3	
	Rural roadways							5	5	4	4	4	4	3	
	Interstates							5	5	4	4	4	4	-	
Clear zone	See "Preferred Clear Zone" table in Section 8A-2						See "Acceptable Clear Zone" table in Section 8A-2						30		

IA 150 TWO LANE URBAN ROADWAY DESIGN CRITERIA

Roadway				
PIN Number	16-06-150-030	Submittal Date		
Project Number	NHSIPX-150-2(18)--3L-06	Approval Date		
District	District 6	Assistant District Engineer	Ken Yanna	
County	BENTON	or		
Route	IA 150, 55th St, and 31st St	Office Director		
Location	Curve west of Urbana at the intersection of 55th Street and 31st Avenue			
Work Type	PCC Replace			
Segment Manager				
Designer	Foth			
Design Manual Section 1C-1 Last Updated: 05-26-17	Urban Two-Lane Roadways (Urban Arterials)			
	Design Element	Preferred	Acceptable Criteria	Project Values
	Design speed (mph)	The anticipated posted speed limit	30	30
	Maximum superelevation rate (Refer to Section 2A-2)	4%	6%	6%
	Design lane width (ft)	12	11	12
	Full depth paved width (ft)	Design lane width + curb and gutter unit or 14 feet for roadways with shoulders	Match design lane width	14.5'
	Right turn lane (ft)	12	10	N/A
	Left turn lane (ft)	With raised or painted median	12 ft + median	N/A
		With depressed median	12	N/A
	Two-way left turn lane	14	11	N/A
	Parking lane width (ft)	10	7	N/A
	Pavement cross-slope (on tangent sections)	Through lanes	1.5% minimum, 2% maximum	2%
		Auxiliary and turn lanes	3% maximum	N/A
		Crown break at centerline	4% maximum	4%
	Shoulder cross-slope (on tangent sections)	Shoulders	4%	Shoulder cross-slope cannot be less than the adjacent lane, 6% max for paved or granular shoulders, 8% max for earth shoulders
		Curb and gutter units	Match pavement cross-slope	6% maximum
		Parking lanes	1% greater than pavement cross-slope	6% maximum
	Curb type (See Section 3C-2)	Design speed \geq 45 mph	6-inch standard	any shape
	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
		Beyond standard ditch depth and design clear zone	3.5:1	3:1
		Curbed roadways	2%	not steeper than 3:1
	Backslope (For cut areas greater than 25 feet, contact the Soils Design Section for assistance with backslope benches.)		3:1	2.5:1
	Traverse Slopes	w/ drainage structures	8:1	6:1
		w/o drainage structures	10:1	6:1
	Ditches (See Section 3G-1)	Outside ditch (depth x width) (ft)	5 x 10	-
	Bridge width ϕ new*	Bridge length \leq 200 ft	design lane widths + effective shoulder widths or design lane width + 3 ft each side in curb and gutter section	design lane widths + effective shoulder widths or curb-to-curb width in curb and gutter section**
		Bridge length > 200 ft	design lane widths + effective shoulder widths or design lane width + 3 ft each side in curb and gutter section	design lane widths + 4 ft offset each side for roadways with shoulders or curb-to-curb width in curb and gutter section**
	Bridge width ϕ existing*		design lane widths + no less than 2 ft left and right	design lane widths + 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
		Over non-primary	16.5 at interchange locations, 15 at all other locations	14
		Over railroad	23.3	23.3
		Sign trusses and pedestrian bridges	17.5	17
	Structural Capacity	Contact Office of Bridges and Structures	Contact Office of Bridges and Structures	N/A
	Level of Service	C	D	C
	*FHWA notification via email is required if acceptable criteria is not met on the NHS system (No formal design exception is required)			
	** If travel lanes are less than 12 ft wide contact the Methods Section for assistance.			

IA 150 TWO LANE URBAN SHOULDER DESIGN CRITERIA

Design year ADT =		3900				
Design Manual Section 1C-1 Last Updated: 05-26-17		Effective Shoulder Width and Type for Two-Lane Highways				
Preferred (values shown in feet)			Acceptable (values shown in feet)			Project Values
	Rural Roadways	Urban Roadways		Rural Roadways	Urban Roadways	
Turn lanes with shoulders	6	6	Turn lanes with shoulders	6	0	N/A
Turn lanes with curbs	6	See Section 3C-2	Turn lanes with curbs	6	0	2.5' curb offset
	Effective Shoulder Width	Paved Width		Effective Shoulder Width	Paved Width	
Climbing Lanes	6	4	Climbing Lanes	4	0	N/A
Two-Lane Highways	Effective Shoulder Width	Paved Width	Two-Lane Highways	Effective Shoulder Width	Paved Width	
Routes where bicycles are to be accommodated	10	10	Design year ADT > 2000 vpd	8	2'	10' effective*
On roadways approaching urban areas (due to increased bike traffic)	10	10				
On all curves with a superelevation rate of 7.0% or greater	10	10				
On roadways with design year ADT > 5000	10	6	Design year ADT between 400 - 2000 vpd	6	2'	
On all other NHS	10	4				
On non-NHS routes with design year ADT > 3000	10	4	Design year ADT < 400 vpd	4	2'	
On non-NHS routes with design year ADT < 3000	8	2*				
*Requires safety edge-Refer to 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:						
* 6' paved with 4' granular when no curb is present (per project concept)						

IA 150 TWO LANE URBAN LOW SPEED ROADWAY DESIGN CRITERIA

Roadway Design Speed (mph) =		30															
Design Manual Section 1C-1 Last Updated: 05-26-17		Design Criteria for Low Speed Roadways															
Design Element	Preferred Criteria					Acceptable Criteria					Project Values						
	Design Speed, mph					Design Speed, mph											
		25	30	35	40	45	25	30	35	40	45						
Stopping sight distance (ft) (Refer to Section 6D-1)		155	200	250	305	360	155	200	250	305	360	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	emax = 6%					144	231	340	485	643	144	231	340	485	643	231
		emax = 8%					-	-	-	-	-	134	214	314	444	587	-
Minimum vertical curve length (ft) (Refer to Section 2B-1)		75	90	105	120	135	75	90	105	120	135	90					
Minimum rate of vertical curvature (K) (Refer to Section 2B-1)	crest vertical curves		12	19	29	44	61	12	19	29	44	61	19				
	sag vertical curves	roadways without fixed-source lighting	26	37	49	64	79	26	37	49	64	79	37				
		roadways with fixed-source lighting	26	37	49	64	79	14	20	27	35	44	37				
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		5					--	9	8	8	7	5				
	Rural roadways		5					--	--	--	6	6	-				
Clear zone	See "Preferred Clear Zone" table in Section 8A-2					See "Acceptable Clear Zone" table in Section 8A-2					10						

55TH ST TWO LANE RURAL ROADWAY DESIGN CRITERIA

Roadway			
PIN Number	16-06-150-030	Submittal Date	
Project Number	NHSIPX-150-2(18)--3L-06	Approval Date	
District	District 6	Assistant District Engineer	Ken Yanna
County	BENTON	or	
Route	55th Street	Office Director	
Location	Curve west of Urbana at the intersection of 55th Street and 31st Avenue		
Work Type	PCC Replace		
Segment Manager			
Designer	Foth		
Design Manual Section 1C-1 Last Updated: 05-26-17		Rural Two-Lane Highways (Rural Arterials)	
	Design Element	Preferred	Acceptable
			Project Values
	Design speed (mph)	60	50
	Maximum superelevation rate (Refer to Section 2A-2)	6%	8%
	Design lane width (ft)	12	12
	Full depth paved width (ft)	14	12
	Right turn lane (ft)	12	10
	Climbing Lane (ft)	12	12
	Left turn lane (ft)	12	10
Pavement cross-slope (on tangent sections)	Through lanes	2%	1.5% minimum, 2% maximum
	Auxiliary and turn lanes	3%	3% maximum
	Crown break at centerline	4%	4% maximum
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	
Curb type (Refer to Section 3C-2)	Design speed = 50 or 55 mph	6-inch sloped	6-inch standard
	Design speed \geq 60 mph	4-inch sloped	6-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
	Beyond standard ditch depth and design clear zone	3.5:1	3:1
	Curbed roadways	2%	not steeper than 3:1
Backslope (For cut areas greater than 25 feet, contact the Soils Design Section for assistance with backslope benches.)		3:1	2.5:1
Transverse Slopes	w/ drainage structures	8:1	6:1
	w/o drainage structures	10:1	6:1
Ditches (Refer to Section 3G-1)	Outside ditch (depth x width) (ft)	5 x 10	-
Bridge width Δ new*	Bridge length \geq 200 ft	design lane widths + effective shoulder widths	design lane widths + effective shoulder widths
	Bridge length > 200 ft	design lane widths + effective shoulder widths	design lane width + 4' right and left of the design lane widths
Bridge width Δ existing*		design lane widths + no less than 2 ft left and right	design lane widths + 2 ft. offset 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
	Over non-primary	16.5 at interchange locations, 15 at all other locations	14
	Over railroad	23.3	23.3
	Sign trusses and pedestrian bridges	17.5	17
Structural Capacity	Contact Office of Bridges and Structures	Contact Office of Bridges and Structures	
Level of Service		B	B

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

55TH ST TWO LANE RURAL SHOULDER DESIGN CRITERIA

Design year ADT = 3900 (IA 150)						
Design Manual Section 1C-1 Last Updated: 05-26-17						
Effective Shoulder Width and Type for Two-Lane Highways						
	Preferred (values shown in feet)		Acceptable (values shown in feet)			Project Values
	Rural Roadways	Urban Roadways	Rural Roadways	Urban Roadways		
Turn lanes with shoulders	6	6	Turn lanes with shoulders	6	0	N/A
Turn lanes with curbs	6	See Section 3C-2	Turn lanes with curbs	6	0	N/A
	Effective Shoulder Width	Paved Width		Effective Shoulder Width	Paved Width	
Climbing Lanes	6	4	Climbing Lanes	4	0	N/A
Two-Lane Highways	Effective Shoulder Width	Paved Width	Two-Lane Highways	Effective Shoulder Width	Paved Width	
Routes where bicycles are to be accommodated	10	10	Design year ADT > 2000 vpd	8	2'	10' effective*
On roadways approaching urban areas (due to increased bike traffic)	10	10				
On all curves with a superelevation rate of 7.0% or greater	10	10				
On roadways with design year ADT > 5000	10	6	Design year ADT between 400 - 2000 vpd	6	2'	
On all other NHS	10	4				
On non-NHS routes with design year ADT > 3000	10	4	Design year ADT < 400 vpd	4	2'	
On non-NHS routes with design year ADT < 3000	8	2*				

*Requires safety edge-Refer to 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:
* 6' paved with 4' granular (per project concept)

55TH ST TWO LANE RURAL HIGH SPEED ROADWAY DESIGN CRITERIA

Roadway Design Speed (mph) = 50															
Design Manual Section 1C-1 Last Updated: 05-26-17															
Design Criteria for High Speed Roadways															
Design Element	Preferred Criteria						Acceptable Criteria						Project Values		
	Design Speed, mph						Design Speed, mph								
	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	425		
Minimum horizontal curve radius (ft) (Refer to Sections 2A-2 and 2A-3)	Method 5 superelevation and side friction distribution	emax = 6%	833	1060	1330	1660	2040	2500	833	1060	1330	1660	2040	2500	833
		emax = 8%	--	--	--	--	--	--	758	960	1200	1480	1810	2210	-
Minimum vertical curve length (ft) (Refer to Section 2B-1)	crest vertical curves	150	165	180	195	210	225	150	165	180	195	210	225	150	
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	84	
	sag vertical curves	roadways without fixed-source lighting	96	115	136	157	181	206	96	115	136	157	181	206	96
	roadways with fixed-source lighting	96	115	136	157	181	206	54	66	78	91	106	121	96	
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	4		3				5	5	4	4	4	4	4	
	Interstates	4		3				5	5	4	4	4	4	-	
Clear zone	See "Preferred Clear Zone" table in Section 8A-2						See "Acceptable Clear Zone" table in Section 8A-2						18		

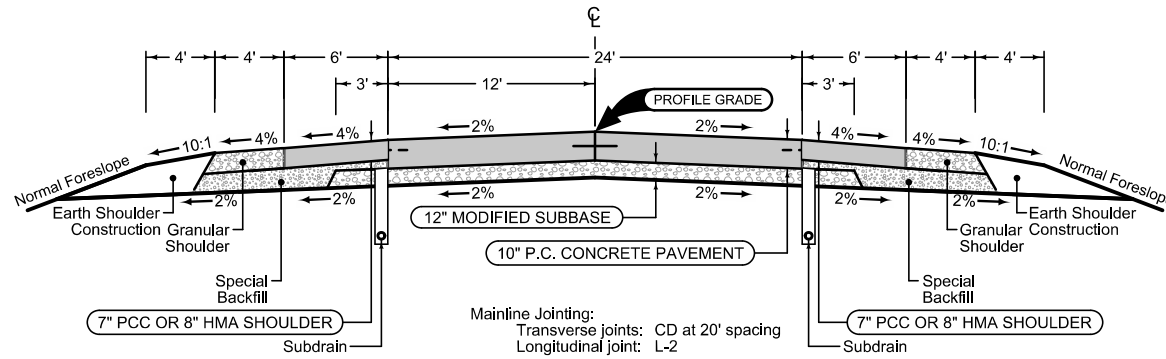
Design Notes:

Field Exam Notes:

Combination Shoulder

PCC Shoulder Jointing:
Longitudinal joint: BT-1 or BT-5
Transverse joints: C at 20' spacing
HMA Shoulder Jointing:
Longitudinal joint: B

2_C_10-15-13			
STATION TO STATION	(P) Feet	(G) Feet	



Mainline Jointing:
Transverse joints: CD at 20' spacing
Longitudinal joint: L-2

2P_10-19-10			
STATION TO STATION			

Combination Shoulder

PCC Shoulder Jointing:
Longitudinal joint: BT-1 or BT-5
Transverse joints: C at 20' spacing
HMA Shoulder Jointing:
Longitudinal joint: B

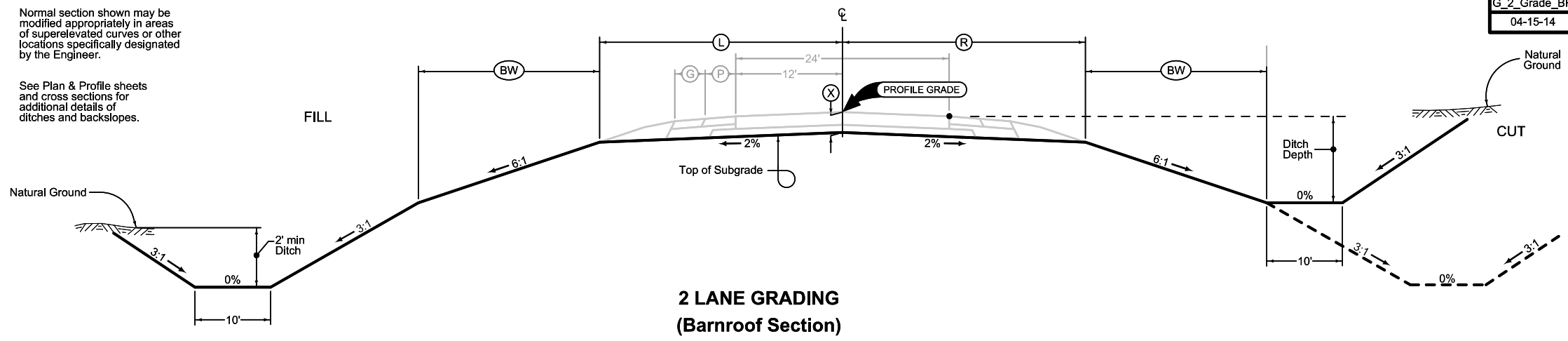
2_C_10-15-13			
STATION TO STATION	(P) Feet	(G) Feet	

**IA 150
55TH STREET**

LOCATION		DIMENSIONS			
ROAD IDENTIFICATION	STATION TO STATION	(L) Feet	(R) Feet	(X) Inches	(BW) Feet

Normal section shown may be modified appropriately in areas of super-elevated curves or other locations specifically designated by the Engineer.

See Plan & Profile sheets and cross sections for additional details of ditches and backslopes.



**2 LANE GRADING
(Barnroof Section)**

G_2_Grade_BR	
04-15-14	

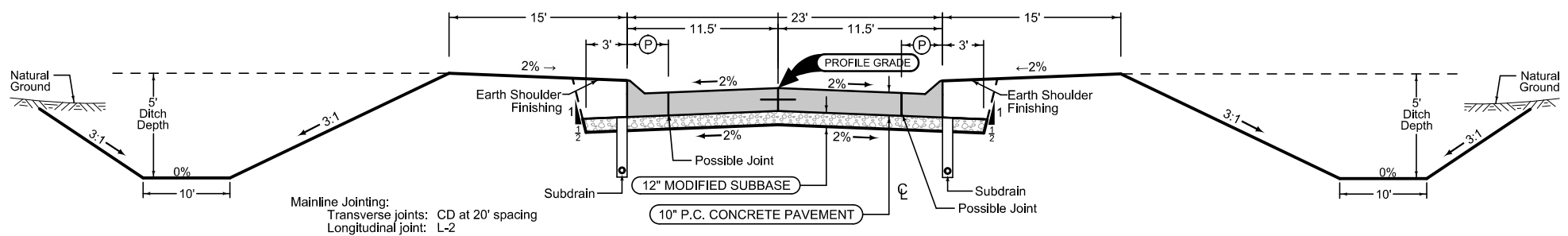
**IA 150
55TH STREET**

Curbed Shoulder

Shoulder Jointing:
Longitudinal joint not required when distance from back of curb to nearest joint is less than 15':

Single pour: L-2
Staged: KT-2
Transverse: C at 20' spacing

2_Curb_10-17-17		
STATION TO STATION	(P) Feet	Curb Type See PV-102
		6" Sloped
		6" Sloped



Mainline Jointing:
Transverse joints: CD at 20' spacing
Longitudinal joint: L-2

2P_10-19-10			
STATION TO STATION			

Curbed Shoulder

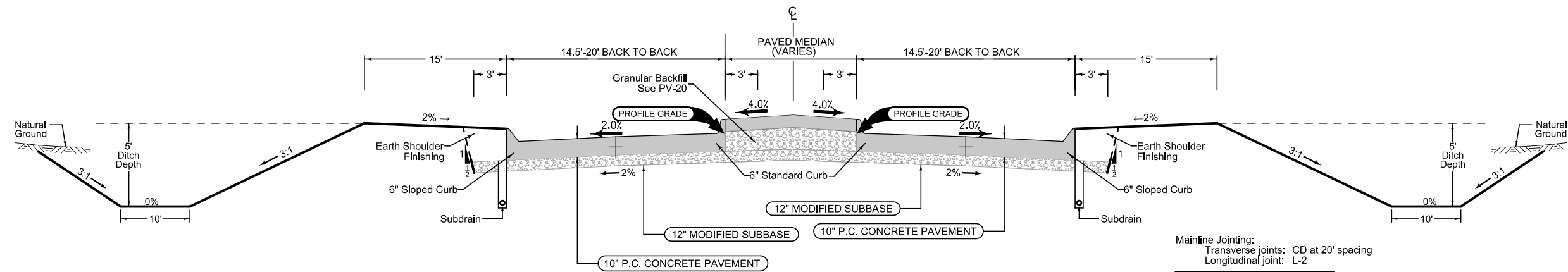
Shoulder Jointing:
Longitudinal joint not required when distance from back of curb to nearest joint is less than 15':

Single pour: L-2
Staged: KT-2
Transverse: C at 20' spacing

2_Curb_10-17-17		
STATION TO STATION	(P) Feet	Curb Type See PV-102
		6" Sloped
		6" Sloped

31ST AVENUE

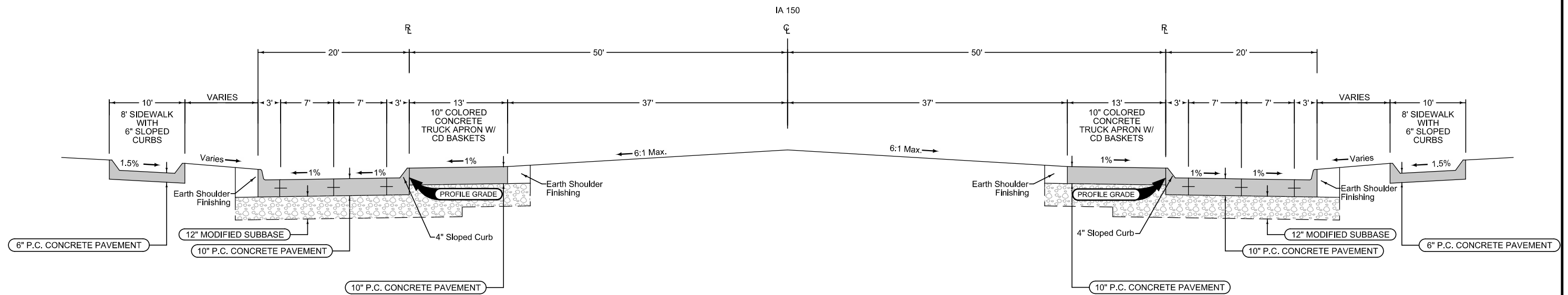
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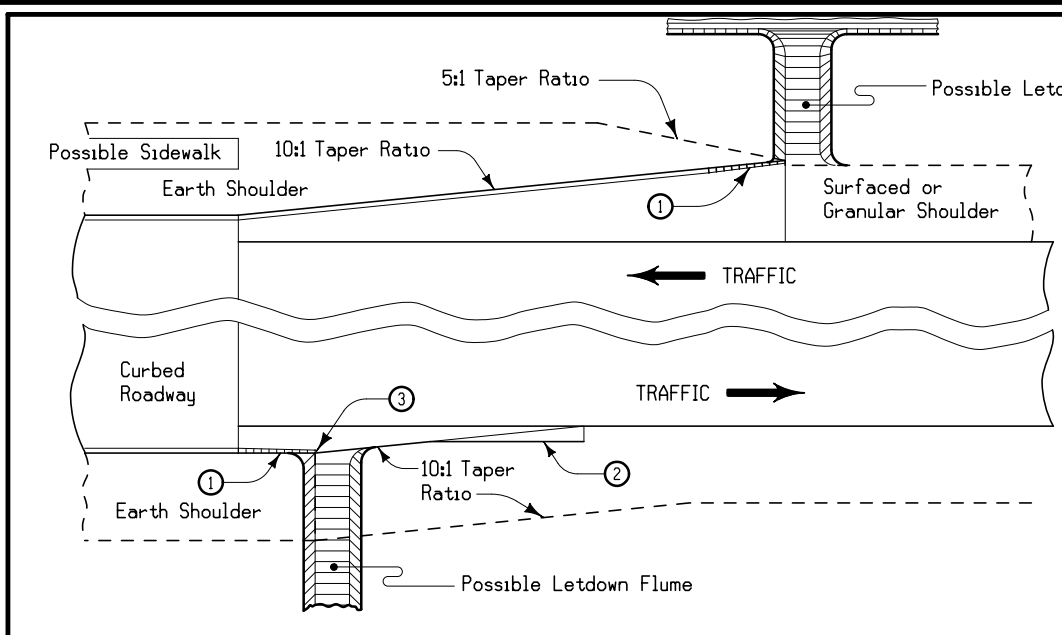
Mainline Jointing:
 Transverse joints: CD at 20' spacing
 Longitudinal joint: L-2

2P_	
10-19-10	
STATION TO STATION	

**IA 150
 55TH STREET
 31ST AVENUE**



IA 150 ROUNDABOUT



- ① Runout curb according to PV-102
- ② End of Taper Details see Typical Detail 7101
- ③ End earth shoulder at the end of the curb transition when no flume is needed.

**TRANSITION
BETWEEN CURBED AND
NON-CURBED ROADWAYS**

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

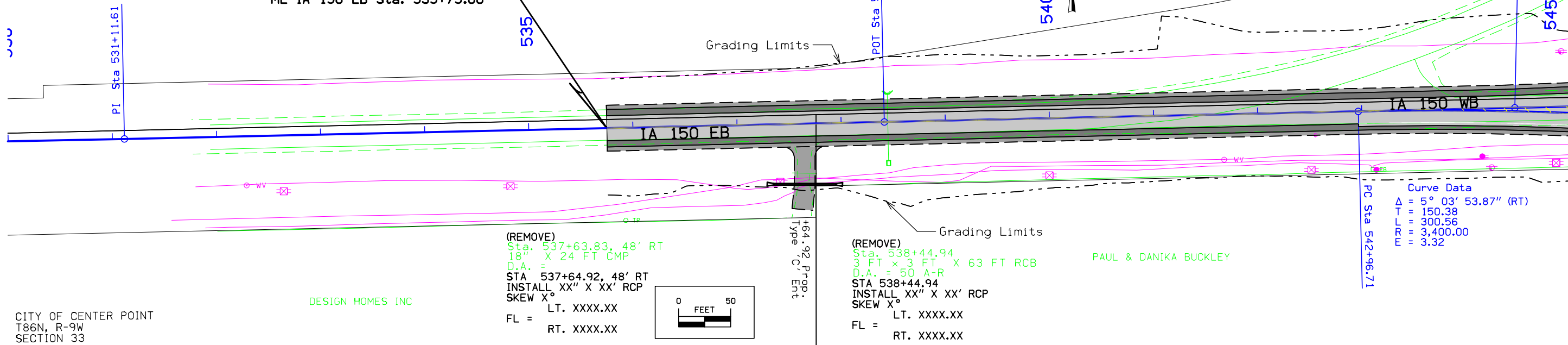
RIGHT-OF-WAY LEGEND	
	Proposed Right-of-Way
	Existing Right of Way
	Existing and Proposed Right-of-Way
	Easement and Existing Right-of-Way
	Easement (Temporary)
	Easement
	Access Control
	Property Line

**PLAN AND PROFILE
LEGEND AND SYMBOL
INFORMATION SHEET**

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

TERNUS FAMILY FARMS LLC

Begin Construction
ML IA 150 EB Sta. 535+75.00



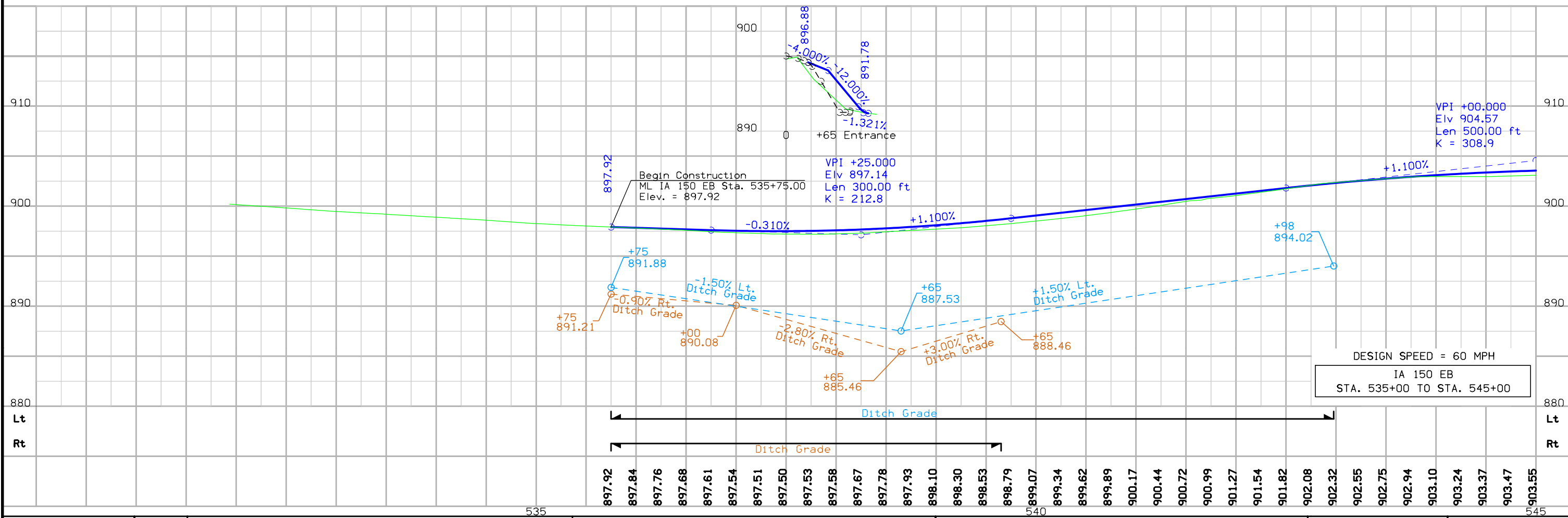
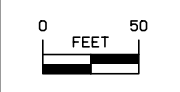
Curve Data
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 $L = 300.56$
 $R = 3,400.00$
 $E = 3.32$

(REMOVE)
 Sta. 537+63.83, 48' RT
 18" X 24 FT CMP
 D.A. =
 STA 537+64.92, 48' RT
 INSTALL XX" X XX' RCP
 SKEW X°
 LT. XXXX.XX
 FL = RT. XXXX.XX

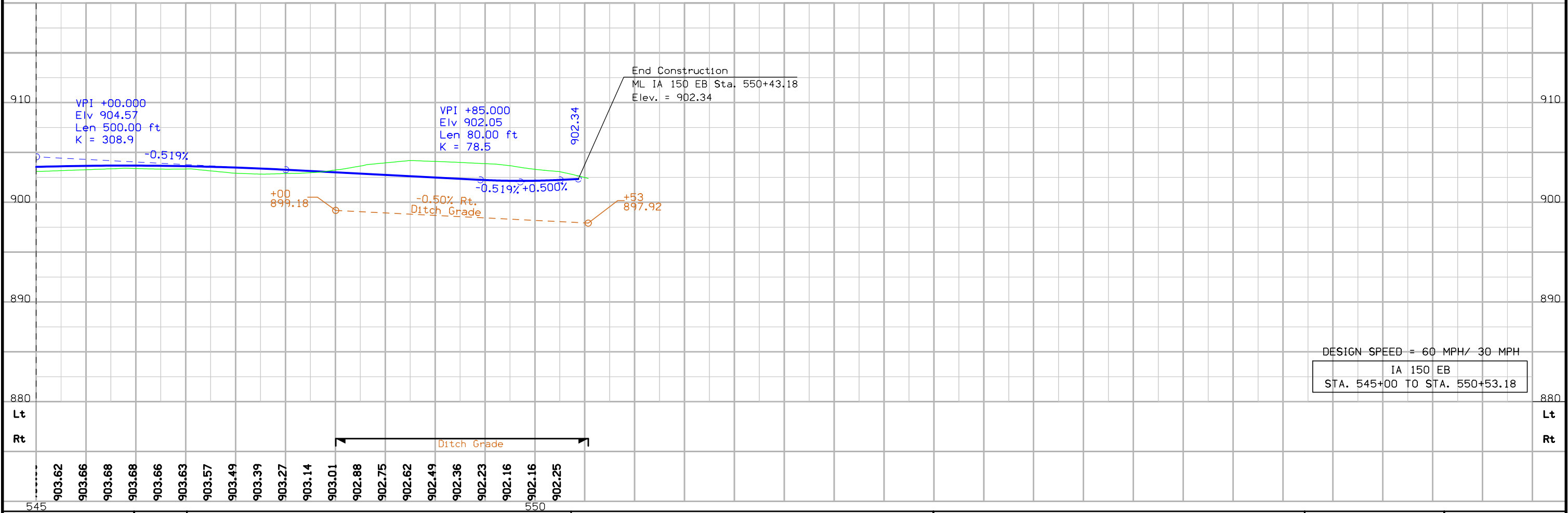
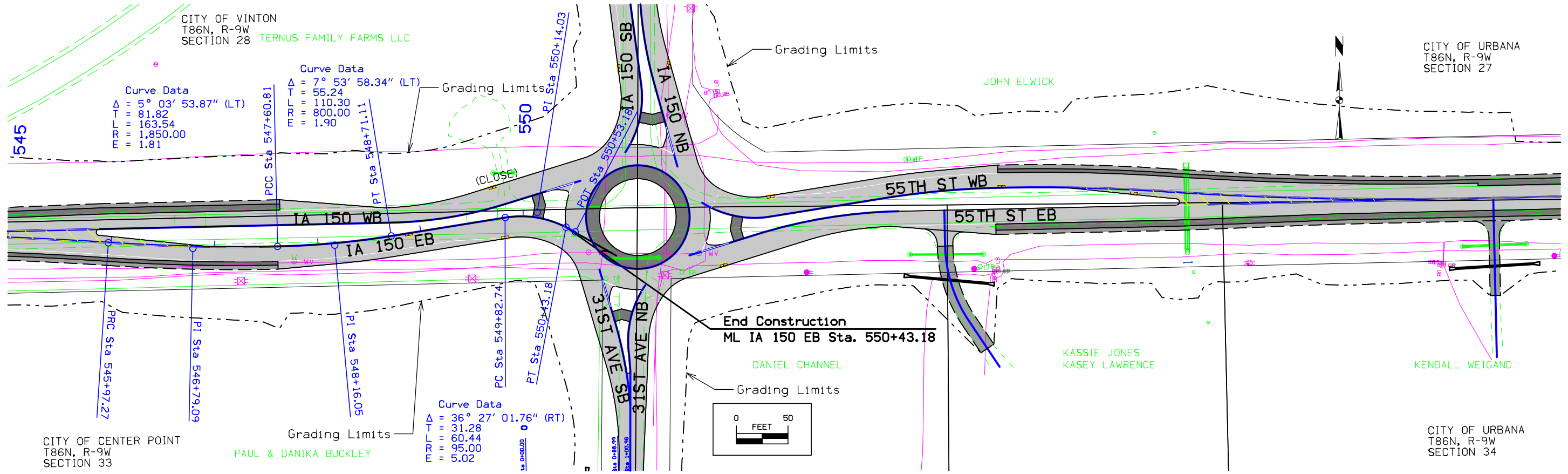
(REMOVE)
 Sta. 538+44.94
 3 FT X 3 FT X 63 FT RCB
 D.A. = 50 A-R
 STA 538+44.94
 INSTALL XX" X XX' RCP
 SKEW X°
 LT. XXXX.XX
 FL = RT. XXXX.XX

PAUL & DANIKA BUCKLEY

DESIGN HOMES INC



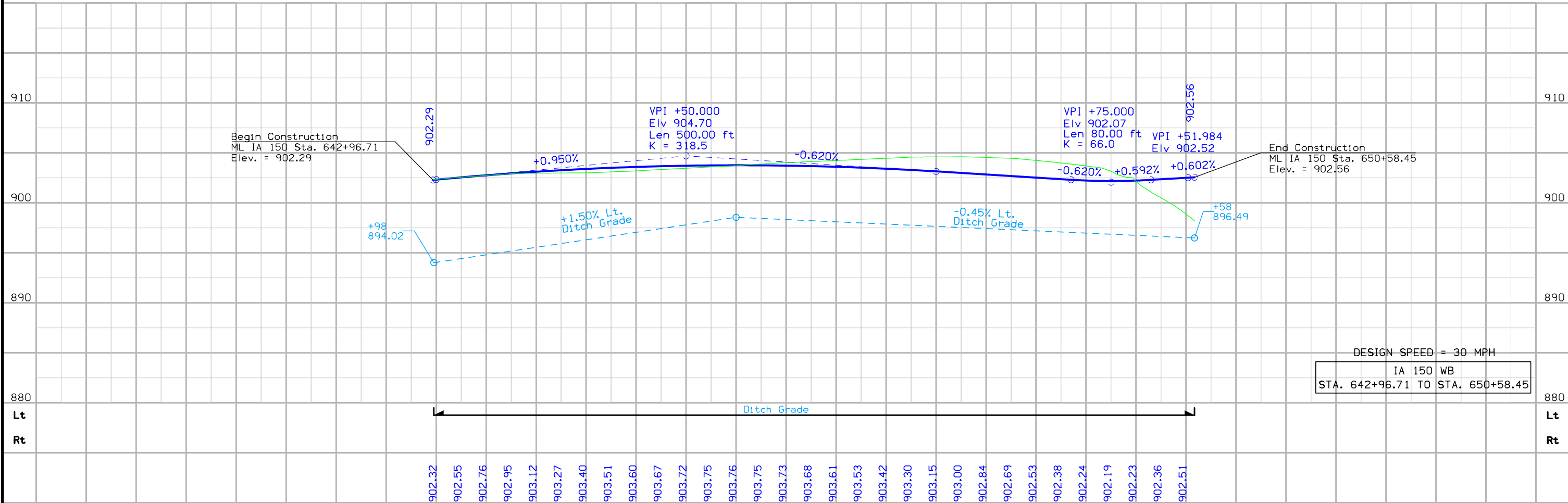
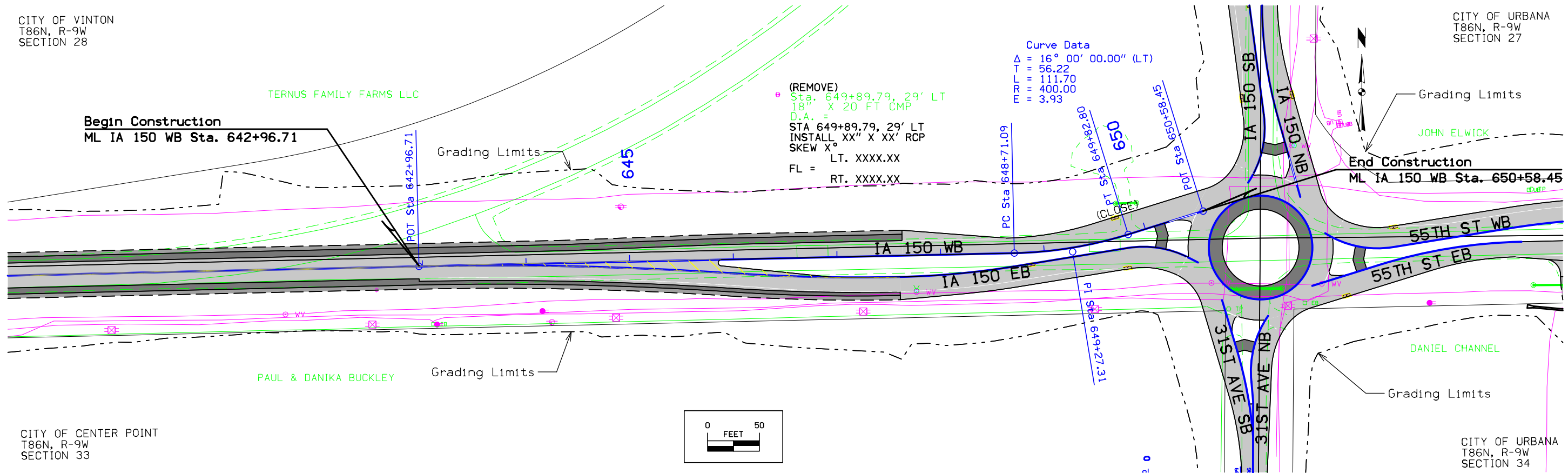
DESIGN SPEED = 60 MPH
 IA 150 EB
 STA. 535+00 TO STA. 545+00



DESIGN SPEED = 60 MPH/ 30 MPH
 IA 150 EB
 STA. 545+00 TO STA. 550+53.18

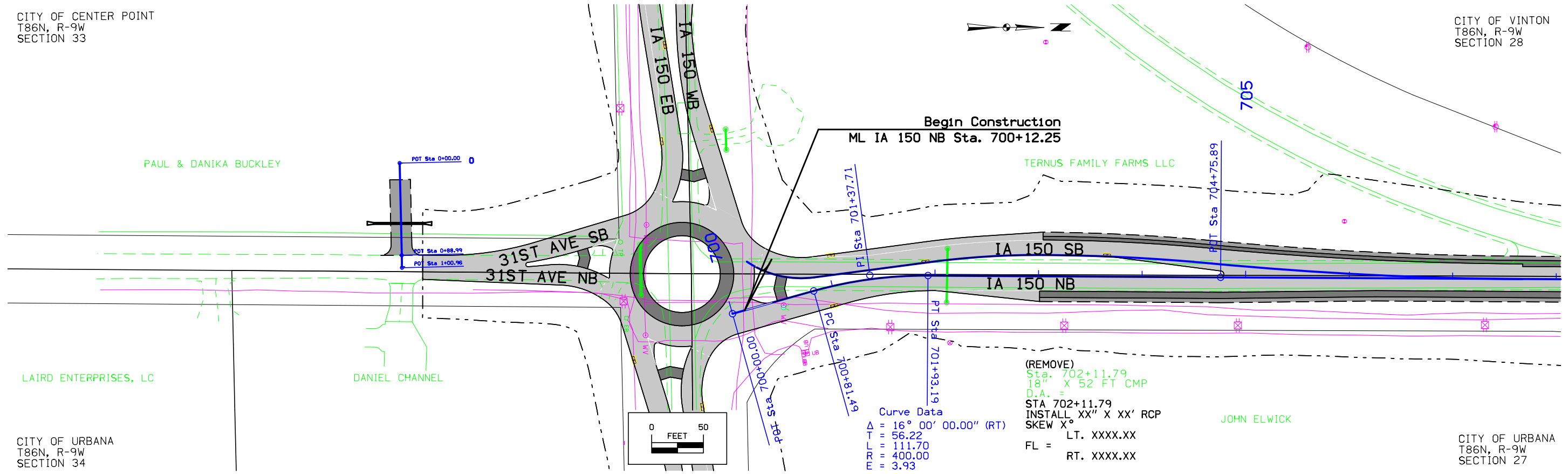
CITY OF VINTON
T86N, R-9W
SECTION 28

CITY OF URBANA
T86N, R-9W
SECTION 27



CITY OF CENTER POINT
T86N, R-9W
SECTION 33

CITY OF VINTON
T86N, R-9W
SECTION 28



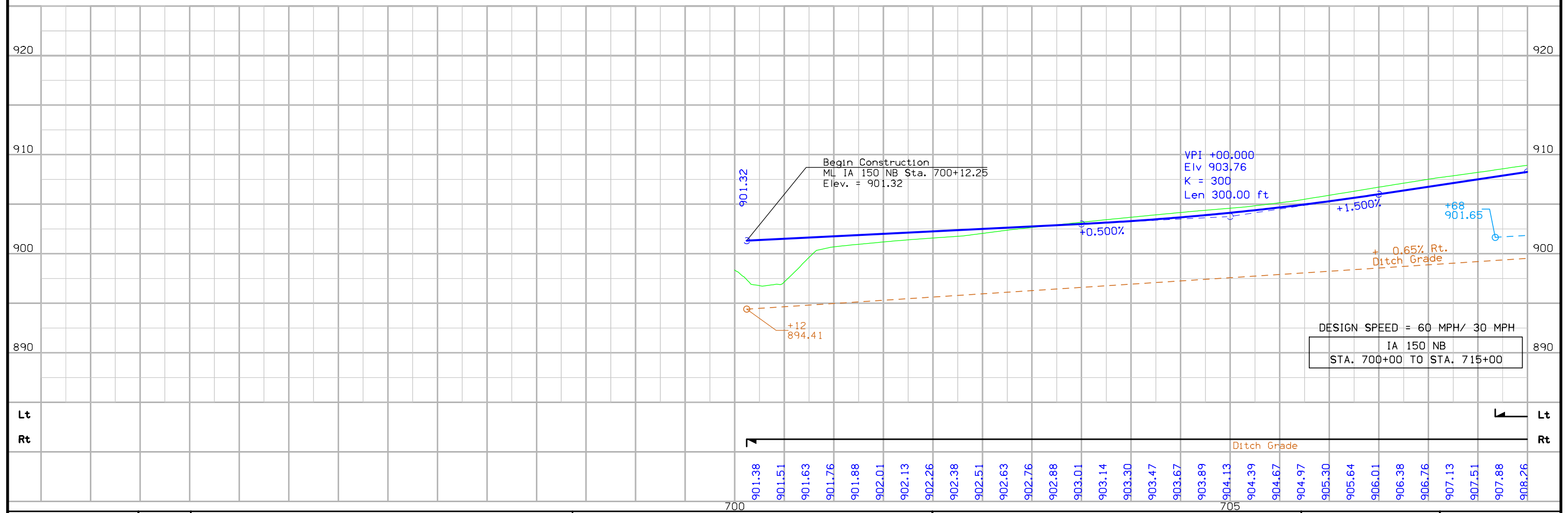
CITY OF URBANA
T86N, R-9W
SECTION 34

CITY OF URBANA
T86N, R-9W
SECTION 27

Begin Construction
ML IA 150 NB Sta. 700+12.25

Curve Data
 $\Delta = 16^\circ 00' 00.00''$ (RT)
 $T = 56.22$
 $R = 111.70$
 $E = 400.00$
 $F = 3.93$

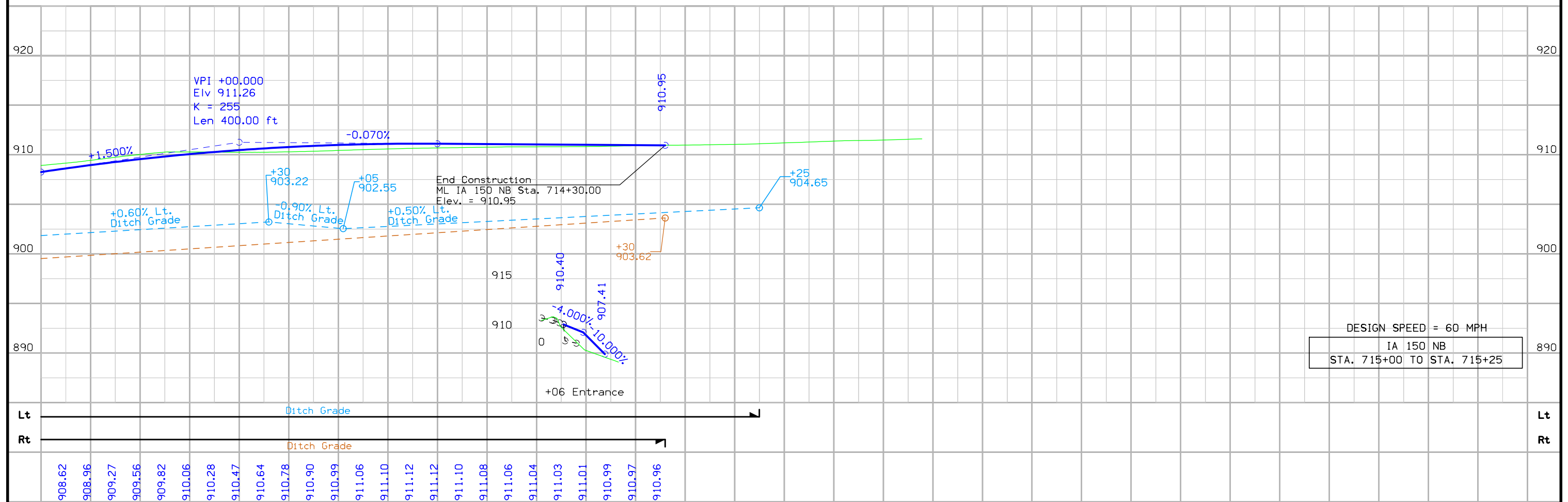
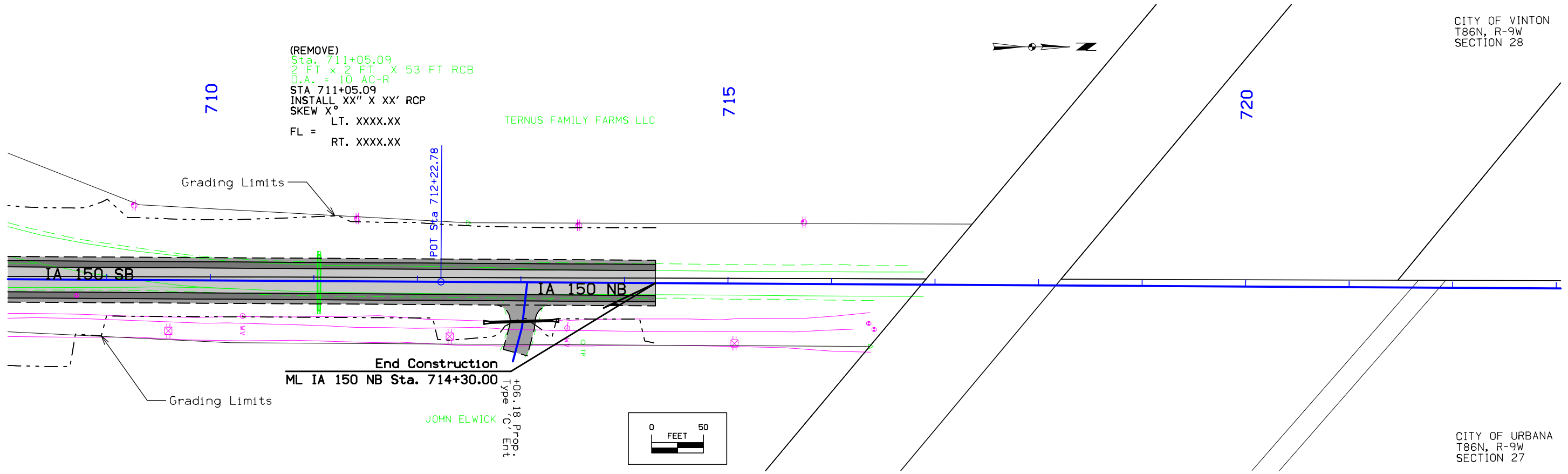
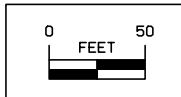
(REMOVE)
 Sta. 702+11.79
 $18'' \times 52$ FT CMP
 D.A. =
 STA 702+11.79
 INSTALL XX" X XX' RCP
 SKEW X°
 FL = LT. XXXX.XX
 RT. XXXX.XX



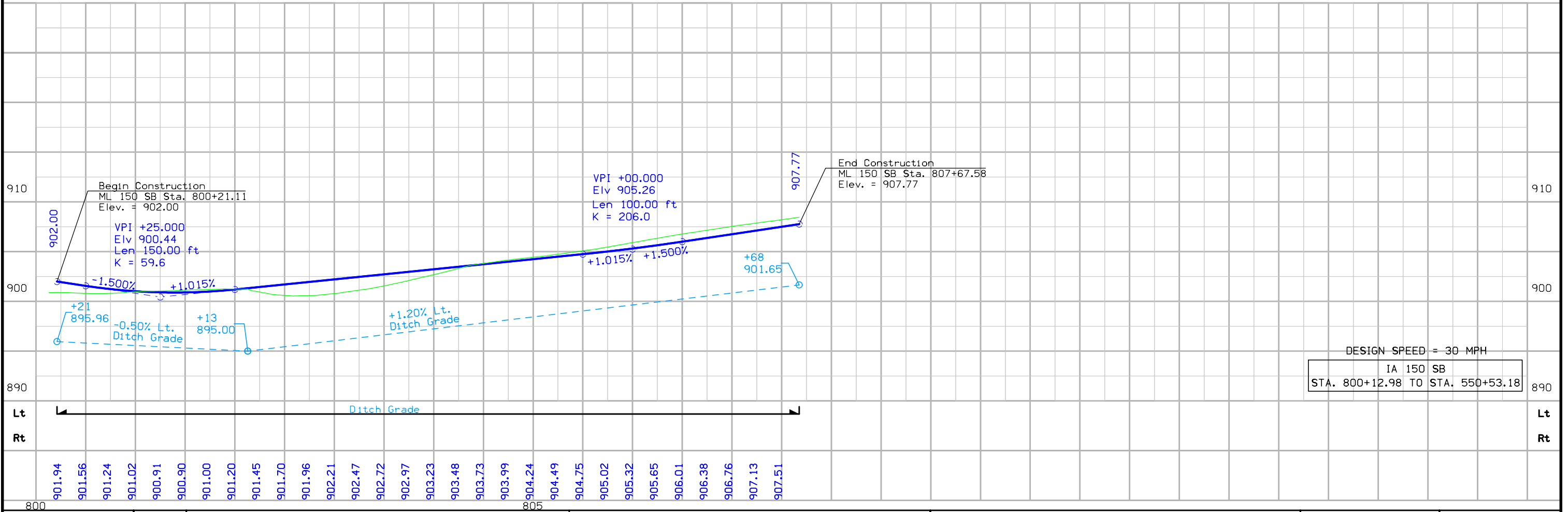
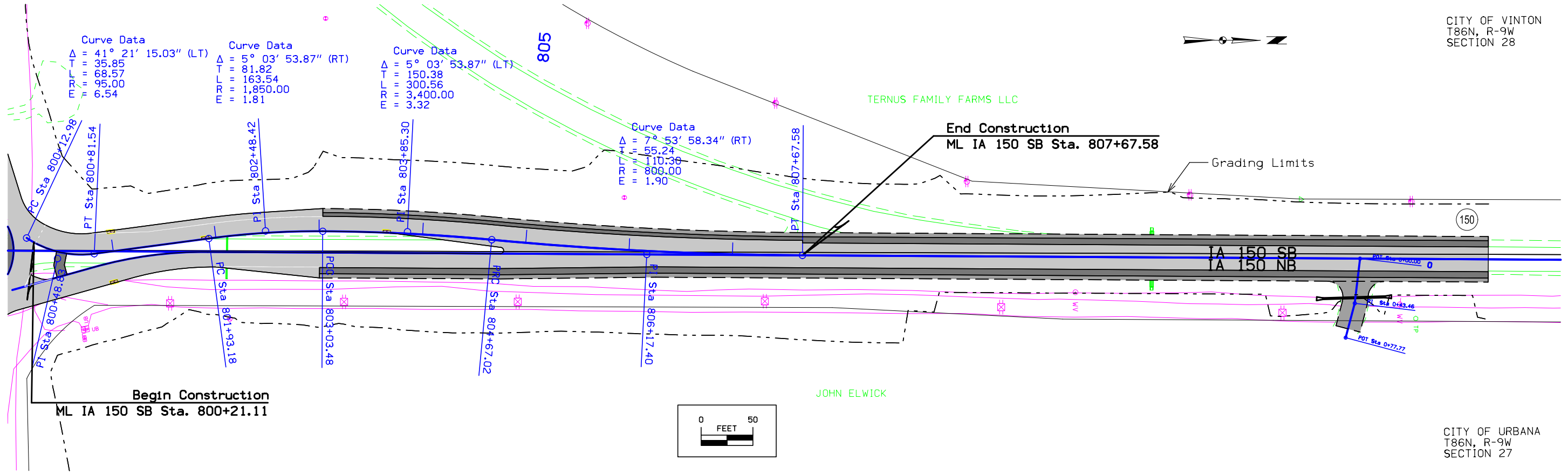
(REMOVE)
Sta. 711+05.09
2 FT x 2 FT x 53 FT RCB
D.A. = 10 AC-R
STA 711+05.09
INSTALL XX" X XX' RCP
SKEW X°
LT. XXXX.XX
FL = RT. XXXX.XX

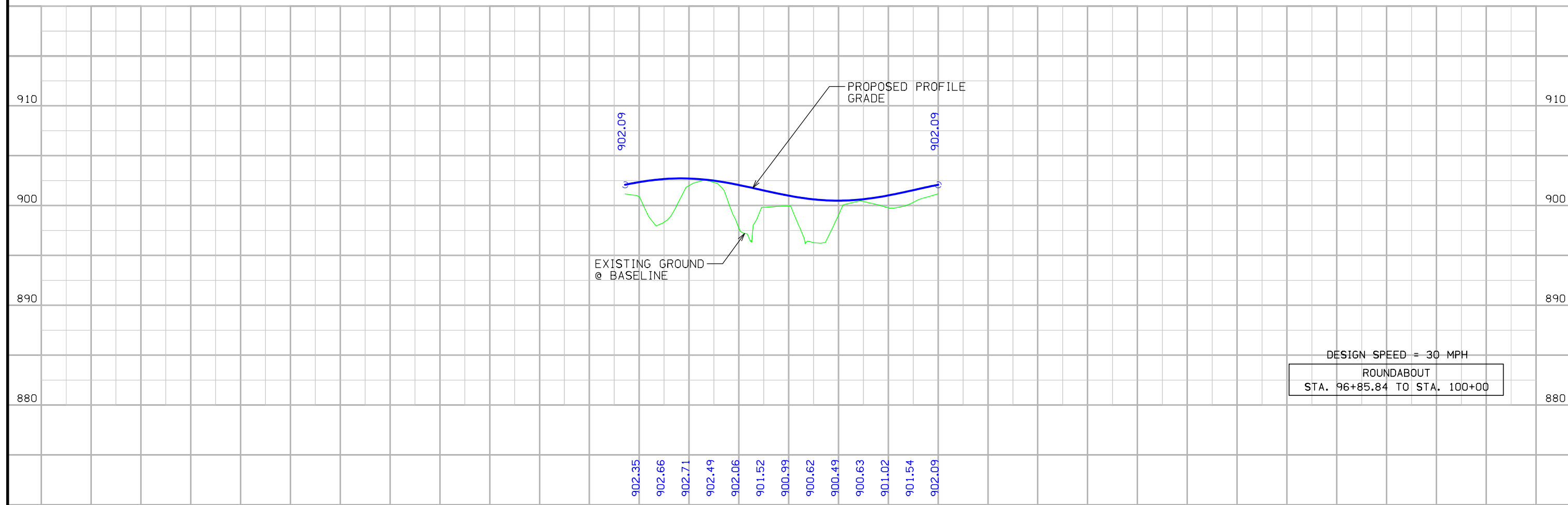
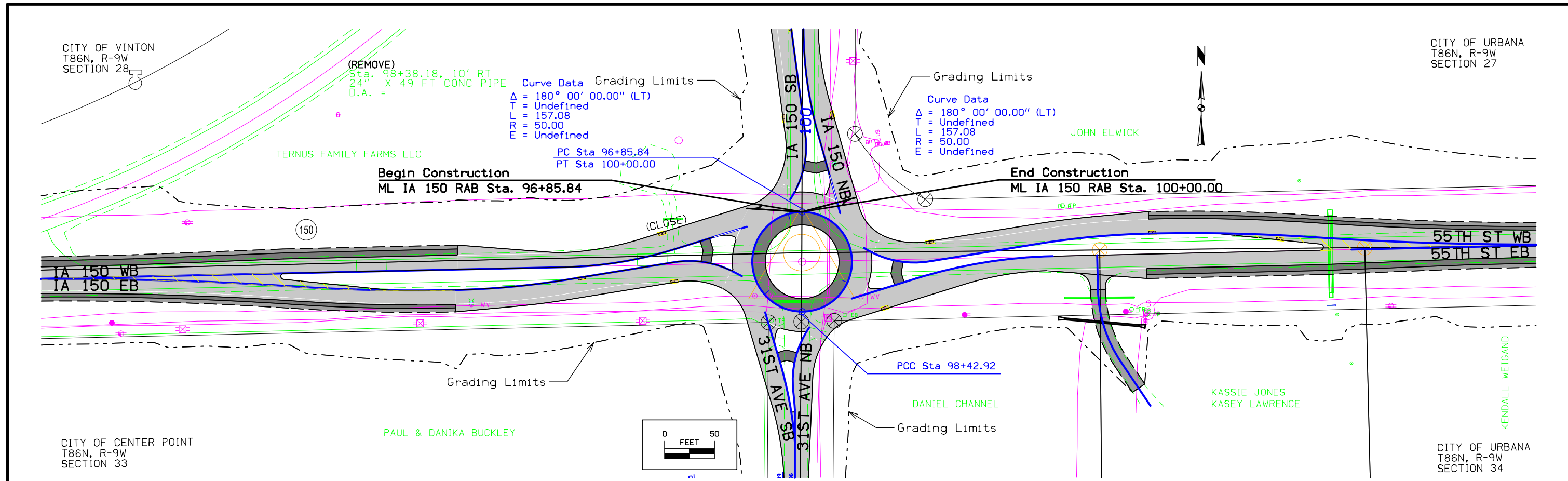
TERNUS FAMILY FARMS LLC

JOHN ELWICK
Type: C, e
Prop: 06.18
Ent: 18



FILE NO.	ENGLISH	DESIGN TEAM	FOTH	BENTON COUNTY	PROJECT NUMBER	HSIPX-150-2(18)--3I-06	SHEET NUMBER	D.6
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CITY OF VINTON
T86N, R-9W
SECTION 28

CITY OF URBANA
T86N, R-9W
SECTION 27

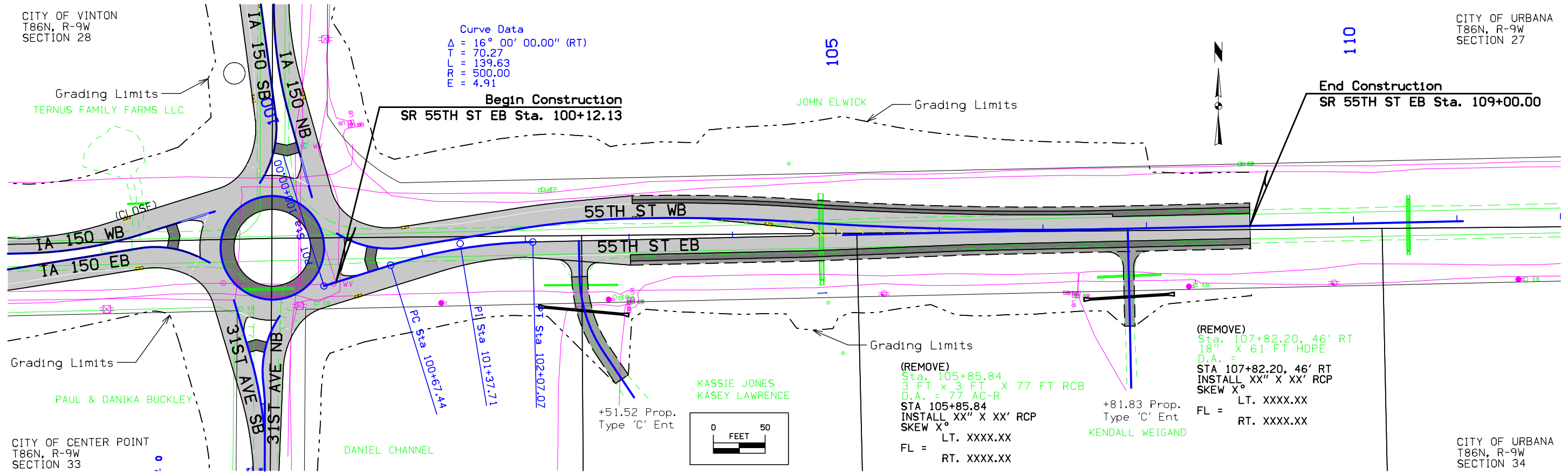
Curve Data
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 $L = 139.63$
 $R = 500.00$
 $E = 4.91$

105

110

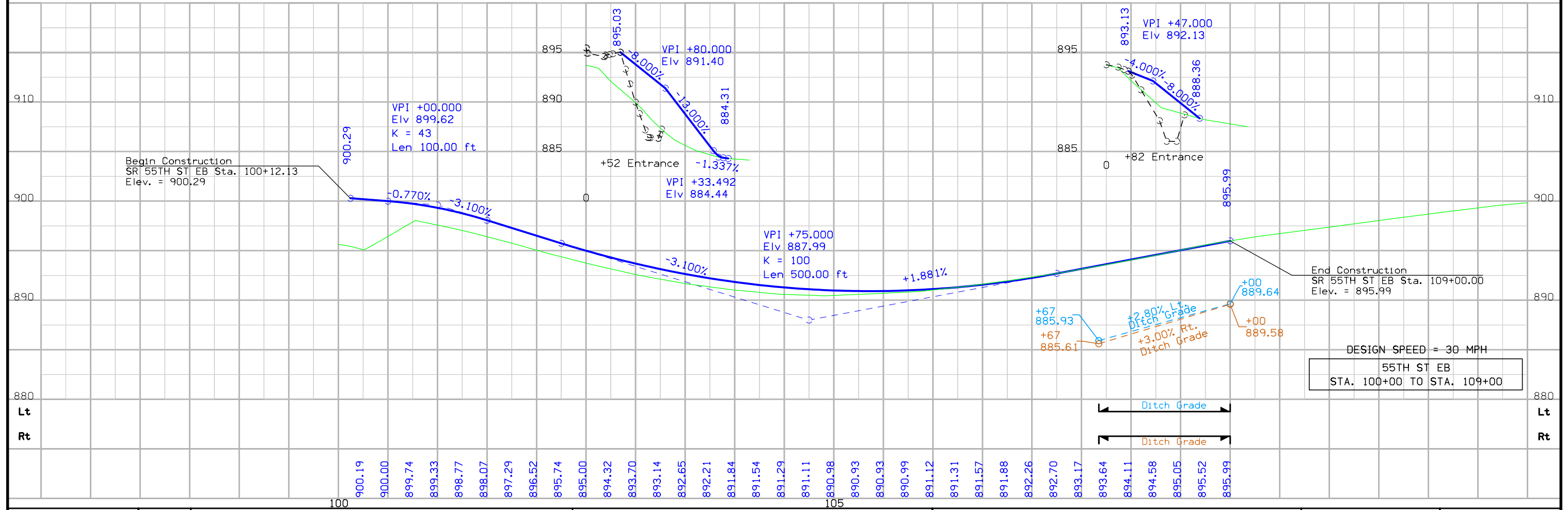
Begin Construction
SR 55TH ST EB Sta. 100+12.13

End Construction
SR 55TH ST EB Sta. 109+00.00



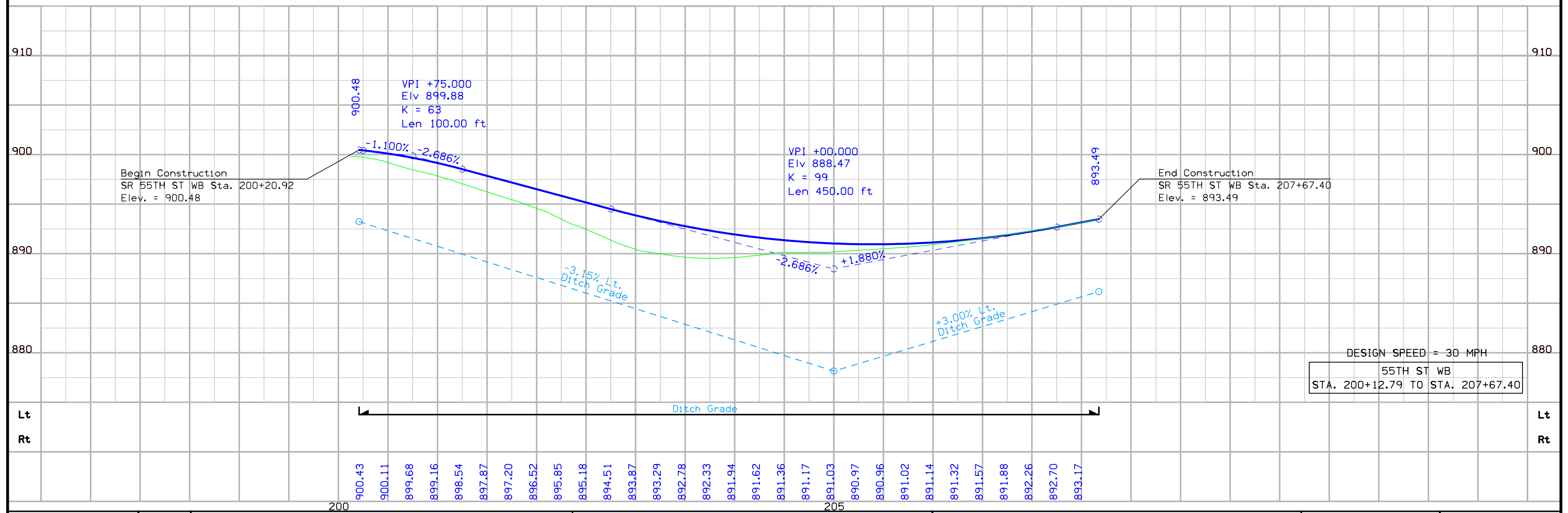
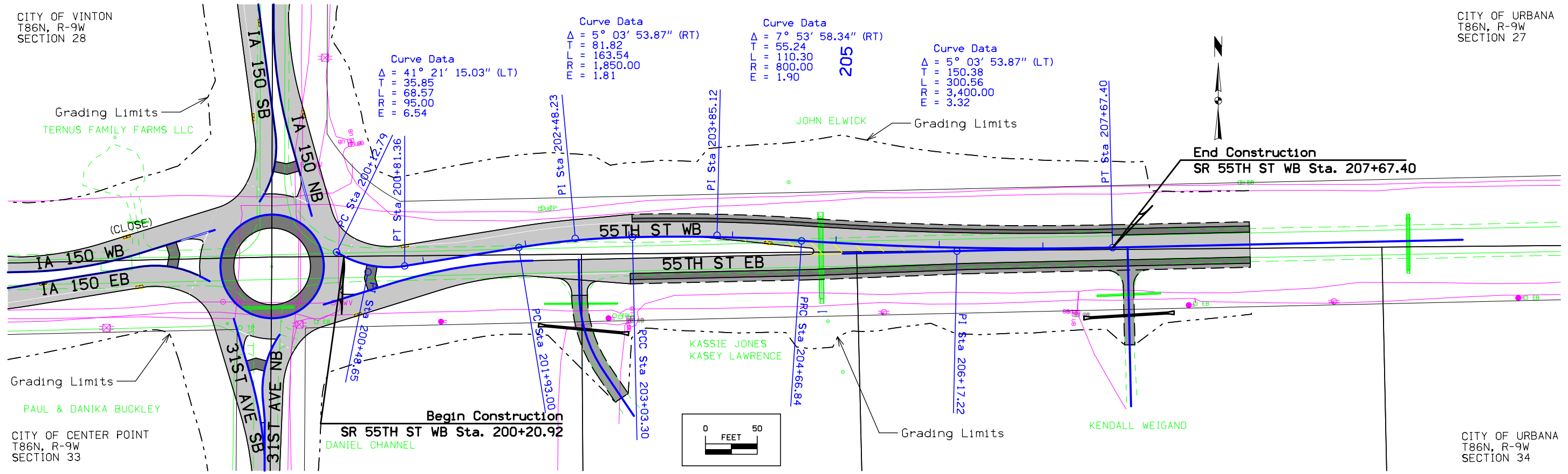
CITY OF CENTER POINT
T86N, R-9W
SECTION 33

CITY OF URBANA
T86N, R-9W
SECTION 34



CITY OF VINTON
T86N, R-9W
SECTION 28

CITY OF URBANA
T86N, R-9W
SECTION 27

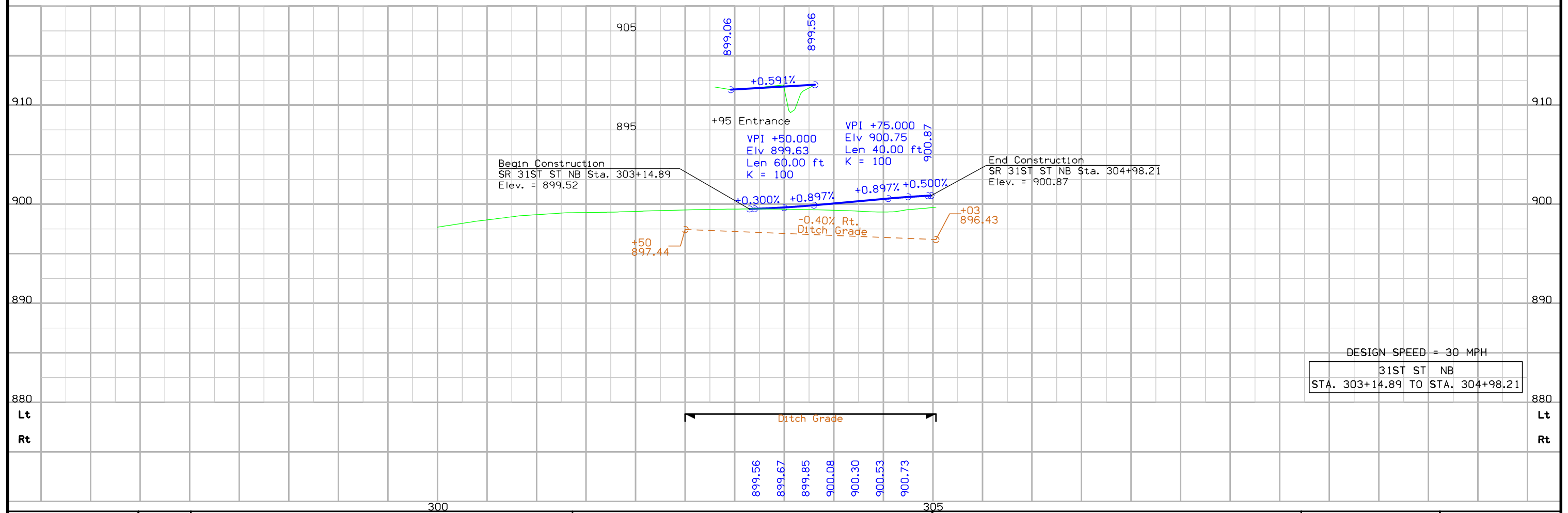
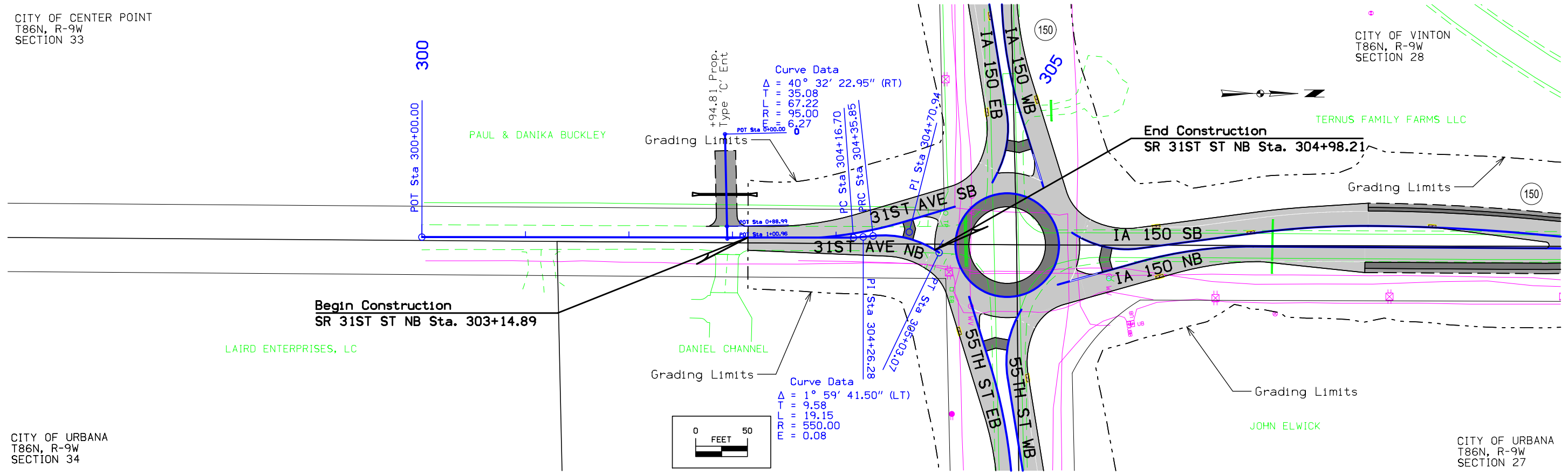


CITY OF CENTER POINT
T86N, R-9W
SECTION 33

CITY OF VINTON
T86N, R-9W
SECTION 28

CITY OF URBANA
T86N, R-9W
SECTION 34

CITY OF URBANA
T86N, R-9W
SECTION 27

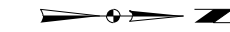


CITY OF CENTER POINT
T86N, R-9W
SECTION 33

CITY OF VINTON
T86N, R-9W
SECTION 28

Curve Data
 $\Delta = 11^\circ 56' 01.32''$ (LT)
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 $L = 83.31$
 $R = 400.00$
 $E = 2.18$

PAUL & DANIKA BUCKLEY

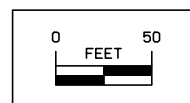


Begin Construction
SR 31ST ST SB Sta. 403+84.10

End Construction
SR 31ST ST SB Sta. 405+07.38

TERNUS FAMILY FARMS LLC

LAIRD ENTERPRISES, LC

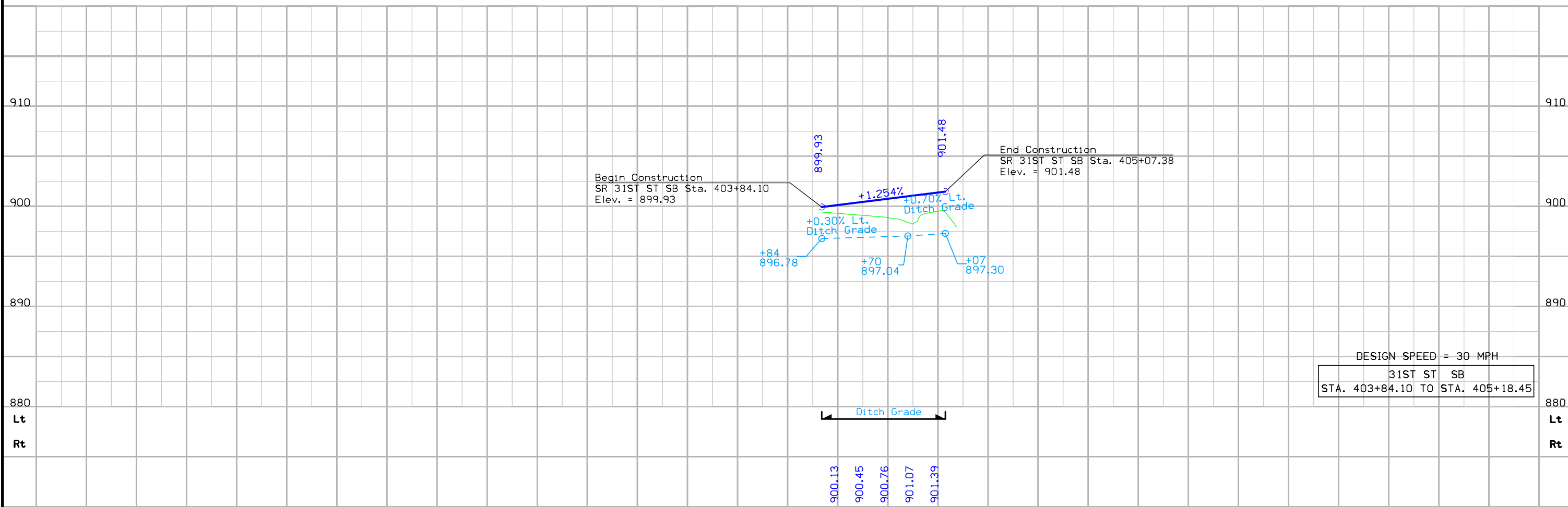


DANIEL CHANNEL

JOHN ELWICK

CITY OF URBANA
T86N, R-9W
SECTION 34

CITY OF URBANA
T86N, R-9W
SECTION 27



Survey Information

Benton County
HSIPX-150-2(18)3L-06
Curve W of Urbana near 31st Ave and 55th St Intersections
Preliminary Engineering
PIN 16-06-150-030
Sap-0937

Party Personnel

Jason Page- Survey Party Chief
John Hahn- Assistant Survey Party Chief

Date(s) of Survey

Begin Date 08/27/2018
End Date 10/23/2018

General Information

Measurement units for this survey are US survey feet. This survey is for proposed intersection reconstruction for Hwy 150 and Hwy 363 at the intersection of 31st Ave. Project datum and control information is provided by Design Survey Office. This project is a Full DTM.

Vertical Control

Vertical datum for this survey is NAVD88 (Computed using Geoid12b). GRS80 Ellipsoidal Height was computed at project Pts. 21DDB1966, 2003-077, 2003-078, CP1, CP2, & CP3 by conducting two concurrent 6-hour static observations. Additional benchmarks were placed throughout the project using a GNSS Base-Rover setup relative to Pt. CP2 and Pts. CP1 & CP3. Two observations with a minimum of 4-hours between were collected and used in a weighted average.

This survey observed 1 USGS Control Monument with published NAVD88 height to compare to local ground control:

USGS 3rd. order vertical control mark designated "21 DDB 1966" has a published Elev. Of 901.28
Survey Elev. = 901.22

This survey observed 2 local area county Control Monuments with published NAVD88 heights to compare to local ground control:

Benton County Control mark 2003-077 has a published Elev. of 872.20
Survey Elev. = 872.09

Benton County Control mark 2003-078 has a published Elev. of 925.41
Survey Elev. = 925.30

This survey observed 4 As-Built plan bench marks to compare to local ground control:

BM 50 Project F-263(4) Paving Plan Elev. 897.47
BM 500 this Survey Elev. = 892.12

BM 50A Project F-263(4) Paving Plan Elev. 895.11
BM 500A this Survey Elev. = 889.72

BM 152A Project F-901(1) Paving Plan Elev. 889.14
BM 501 this Survey Elev. = 883.70

BM 152B Project F-901(1) Paving Plan Elev. 900.82
BM 502 this Survey Elev. = 895.47

The average vertical difference between these four marks is -5.38' to be applied to as-built plan elevations.

This survey established an additional local bench mark:

BM 503 Survey Elev. = 906.39

Horizontal Control

The project coordinate system for this survey is Iowa RCS Zone 10 (U.S. Survey Feet). This survey control is relative to laRTN reference stations. laRTN Reference Station coordinates are relative to the National Reference Station network datum: NAD83 (2011) for Epoch 2010.00. Coordinates were determined by conducting 2 concurrent 6-hour static observations. Additional control points were placed throughout the project using a GNSS Base-Rover setup relative to Pt. CP2 and Pts. CP1 & CP3. Two observations with a minimum of 4-hours between were collected and used in a weighted average.

Alignment Information

The horizontal alignment information for this project was provided by the IDOT District 6 Land Survey Department.

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

VERT. DATUM: NAVD88

1a. Regional Coordinate System Zone 10

Coordinate listing from next sheet will be used with 1aRTN for monument recovery. No other reference ties are given.

HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING

HORIZ. DATUM: NAD83(2011) EPOCH 2010.00

VERT. DATUM: NAVD88

Ia. Regional Coordinate System Zone 10

Point Name	Northing	Easting	Elevation	Feature Code-Monument Description
21DDB1966	8153351.29	20420987.81	901.22	BM FD USGS 3RD ORDER BM TABLET STAMPED 21 DDB 1966 TOP CON MON AS DESCRIBED
2003-077	8137169.21	20439160.14	872.09	BM FD BENTON CO GPS CNTRL PT DESIGNATED 2003-077 AS DESCRIBED
2003-078	8153559.41	20438783.99	925.30	BM FD BENTON CO GPS CNTRL PT DESIGNATED 2003-078 AS DESCRIBED
CP1	8143047.54	20437138.24	898.05	FENO SET FENO MON STAMPED CP1 500' EAST OF BING MILLER LN...45' NORTH OF CENTER STATE HWY 150...7.6' NE OF T POST ROW CORNER...9.0' SE OF T POST ROW CORNER
CP2	8143112.20	20440769.82	899.30	FENO SET FENO MON STAMPED CP2 400' WEST OF RICHLAND AVE...35' NORTH OF CENTER STATE HWY 363...WEST SIDE OF GRASS FIELD ENT NEAR TOP OF FORESLOPE
CP3	8144836.49	20439224.45	909.94	FENO SET FENO MON STAMPED CP3 400' SOUTH OF INTSEC STATE HWY 150 & 54TH ST...30' WSW OF INTSEC HWY 150 & CEDAR VALLEY NAT TRAIL...SOUTH SIDE GRASS FIELD ENT NEAR TOP OF FORESLOPE
500A	8142983.66	20437980.98	889.72	BM FD IHC BRASS PLUG OULET HDWLL 3'X3' RCB DSGN NO 1947
500	8143047.28	20437979.53	892.12	BM FD CUT X INLET HDWLL 3'X3' RCB DSGN NO 1947
501	8143094.86	20439773.39	883.70	BM FD IHC BRASS PLUG INLET HDWLL 4'X4' & 3'X3' RCB DSGN NO 2447
502	8143096.20	20440340.95	895.47	BM FD IHC BRASS PLUG INLET HDWLL 2'X2' RCB DSGN NO 2547
503	8144198.73	20439225.01	906.39	BM FD IHC BRASS PLUG INLET HDWLL 2'X2' RCB DSGN NO 2047

TRAFFIC CONTROL PLAN

IA 150 will be closed to thru traffic for the duration of the project. Traffic will be detoured via north on County Road V71 for approximately 6.4 miles, then east on County Road D48 for 5.1 miles to the intersection with IA 150. Out of distance travel for IA 150 traffic is approximately 0.5 miles. 55th Street and 31st Avenue will closed to all traffic for the duration of the project.

Construction shall be staged to minimize local traffic disruption. Construction of the roundabout and approaches shall occur first in the project to allow use of the IA 150 curve for local traffic. The IA 150 curve will then be closed to all traffic while the connections to IA 150 are constructed.

Contractor to maintain access to residences located on south side of 55th Street at all times for the duration of the project.

The DOT will install and maintain all detour signage. Contractor shall install and maintain all road closures. Road closures shall be in accordance with Standard Road Plan TC-252.

STAGING NOTES

It is not the intent to confine the Contractor's activities to the areas of suggested stages alone. It is understood that some of the various steps may occur simultaneously. The Contractor may conduct several operations concurrently, provided that traffic is maintained and that these operations do not conflict with the staging indicated herein.

It is recognized that as the various activities related to the construction progress, certain situations may arise which will preclude adhering to the original construction sequence or which would readily lend themselves to more efficient staging operations. Should the Contractor desire to deviate from the original plan, a written alternative plan shall be submitted to the Project Engineer, for approval a minimum of one (1) week prior to the proposed changes.

Coordinate with all public and private projects in the area at all times.

STAGE 0

Set up detour and close IA 150 to thru traffic. Close 55th Street and 31st Avenue to all traffic. Allow local traffic to utilize IA 150 curve.

STAGE 1

Construct roundabout and approaches.

STAGE 2

Close IA 150 curve to all traffic. Construct connections to IA 150.

STAGE 3

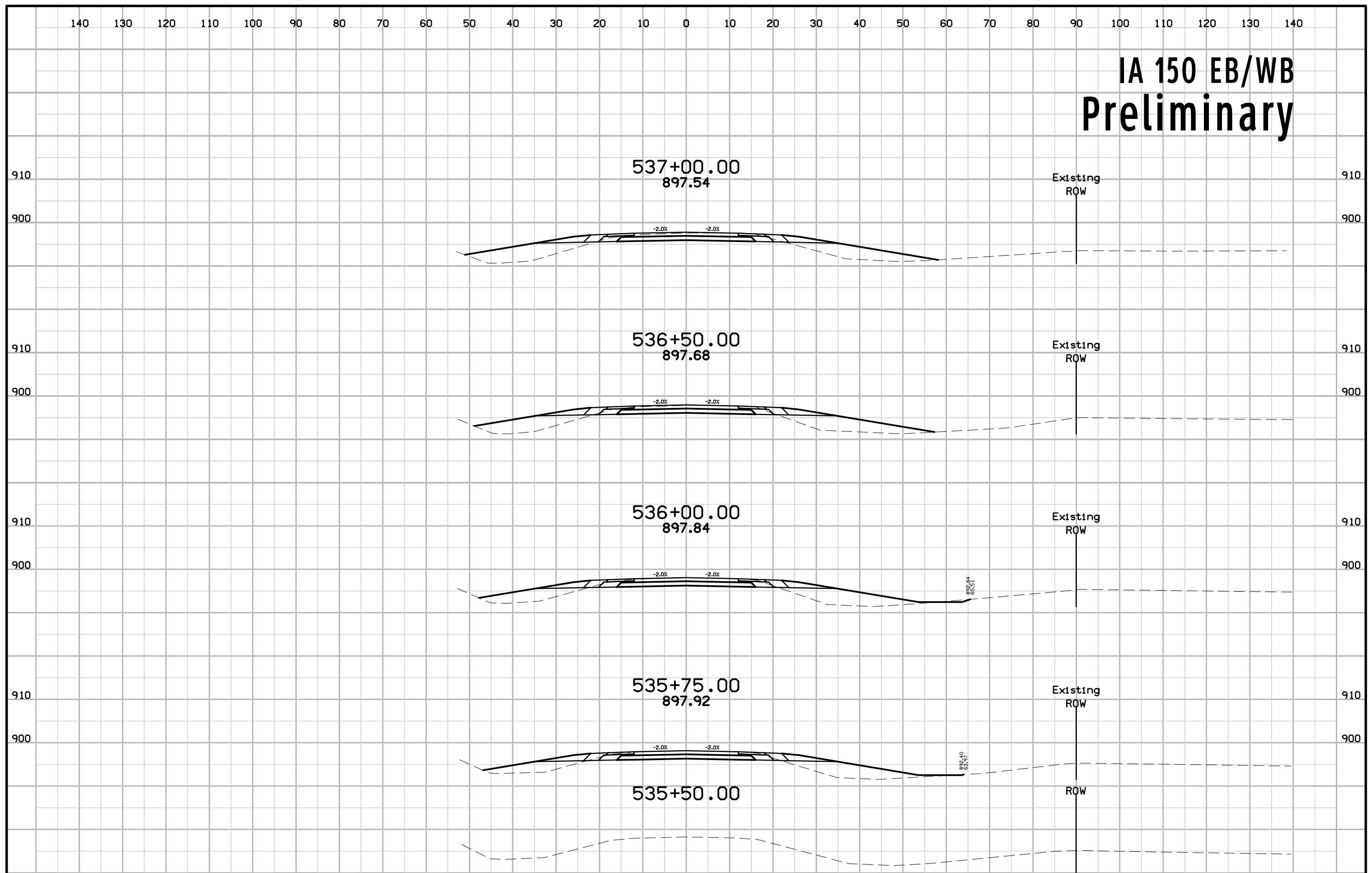
Reopen IA 150, 55th Street, and 31st Avenue to all traffic.

COORDINATED OPERATIONS

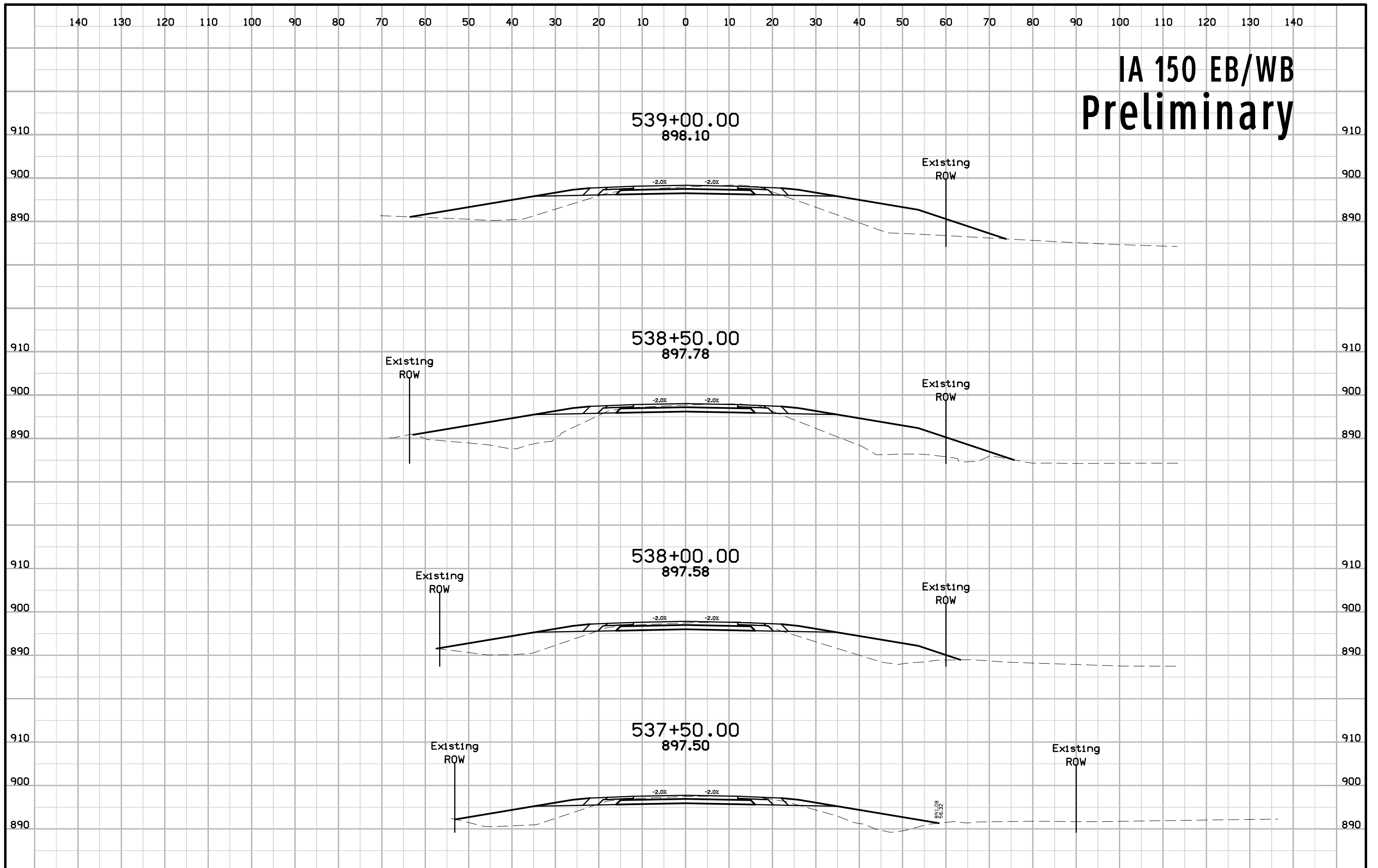
Other work in progress during the same period of time will include the construction of the projects listed. Coordinate operations with those of other contractors working within the same area.

Project	Type of Work

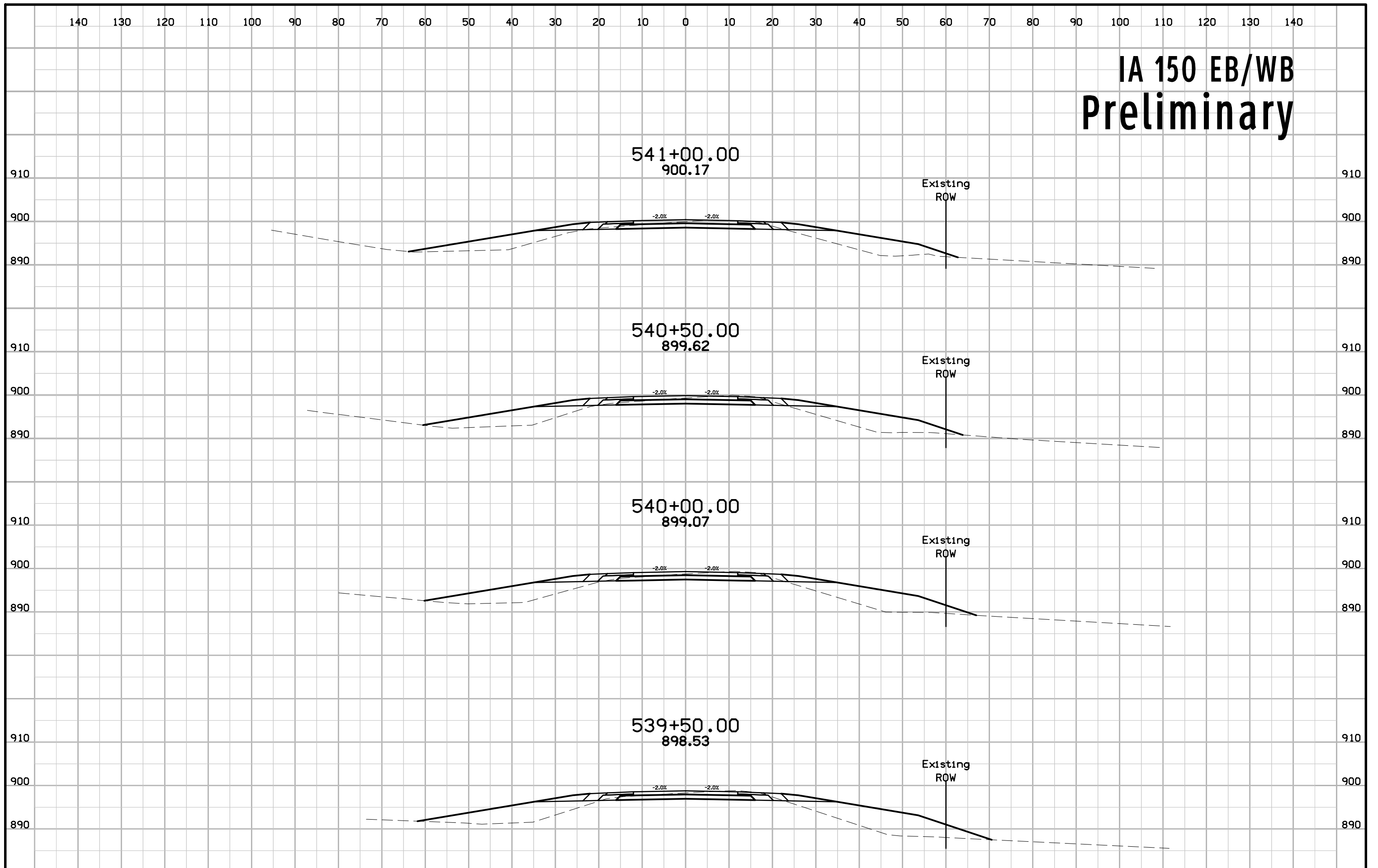
IA 150 EB/WB Preliminary



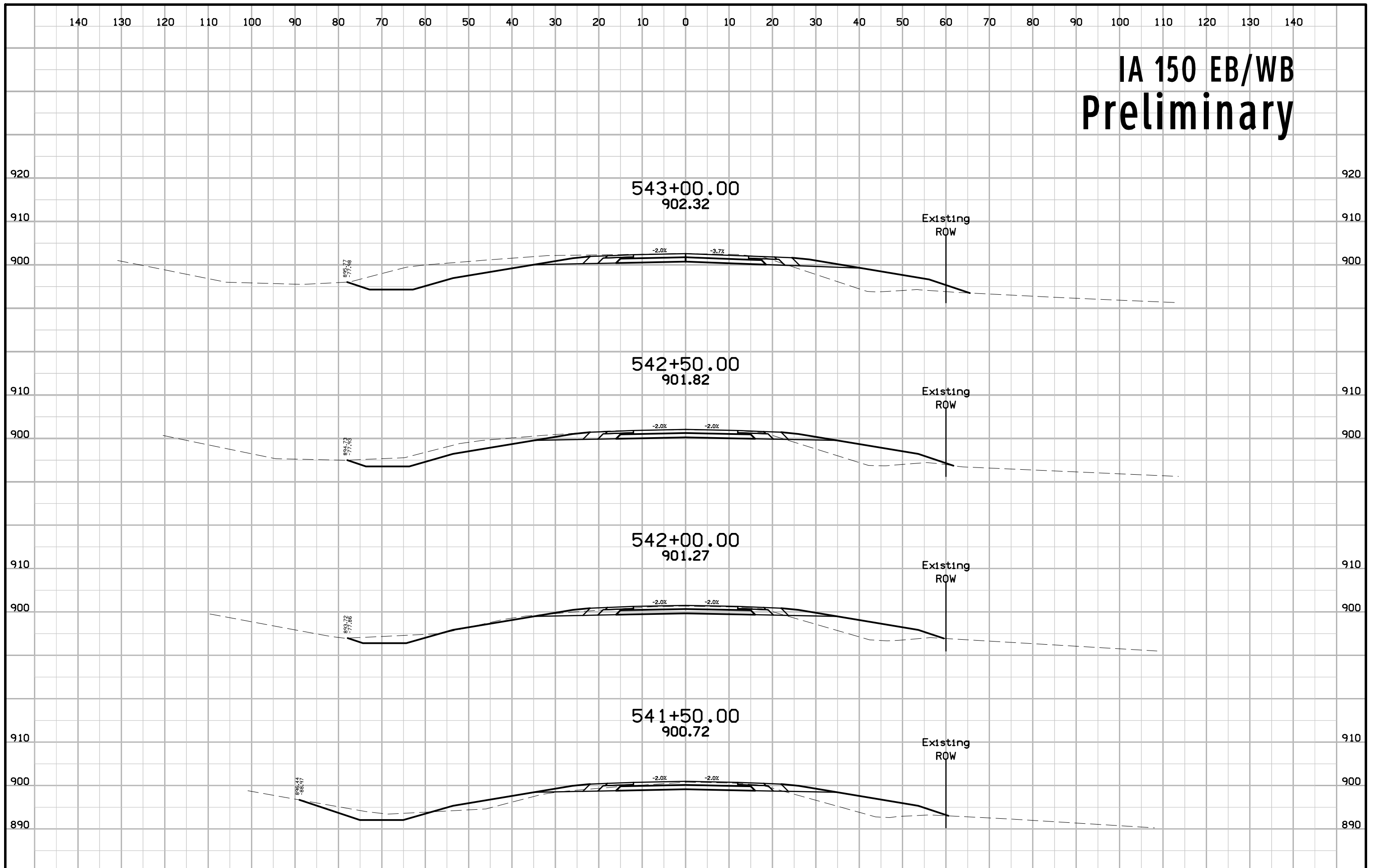
IA 150 EB/WB Preliminary



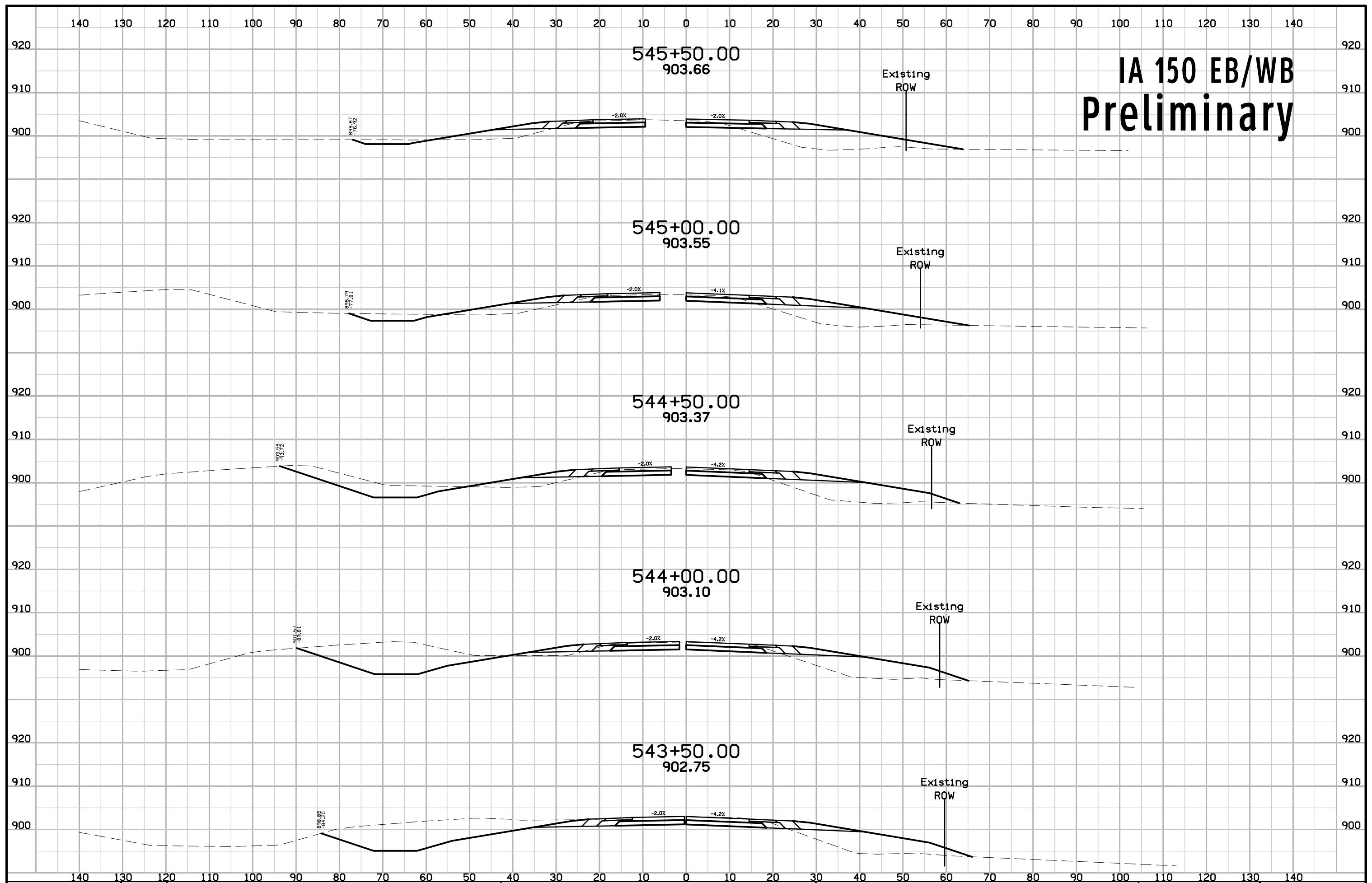
IA 150 EB/WB Preliminary



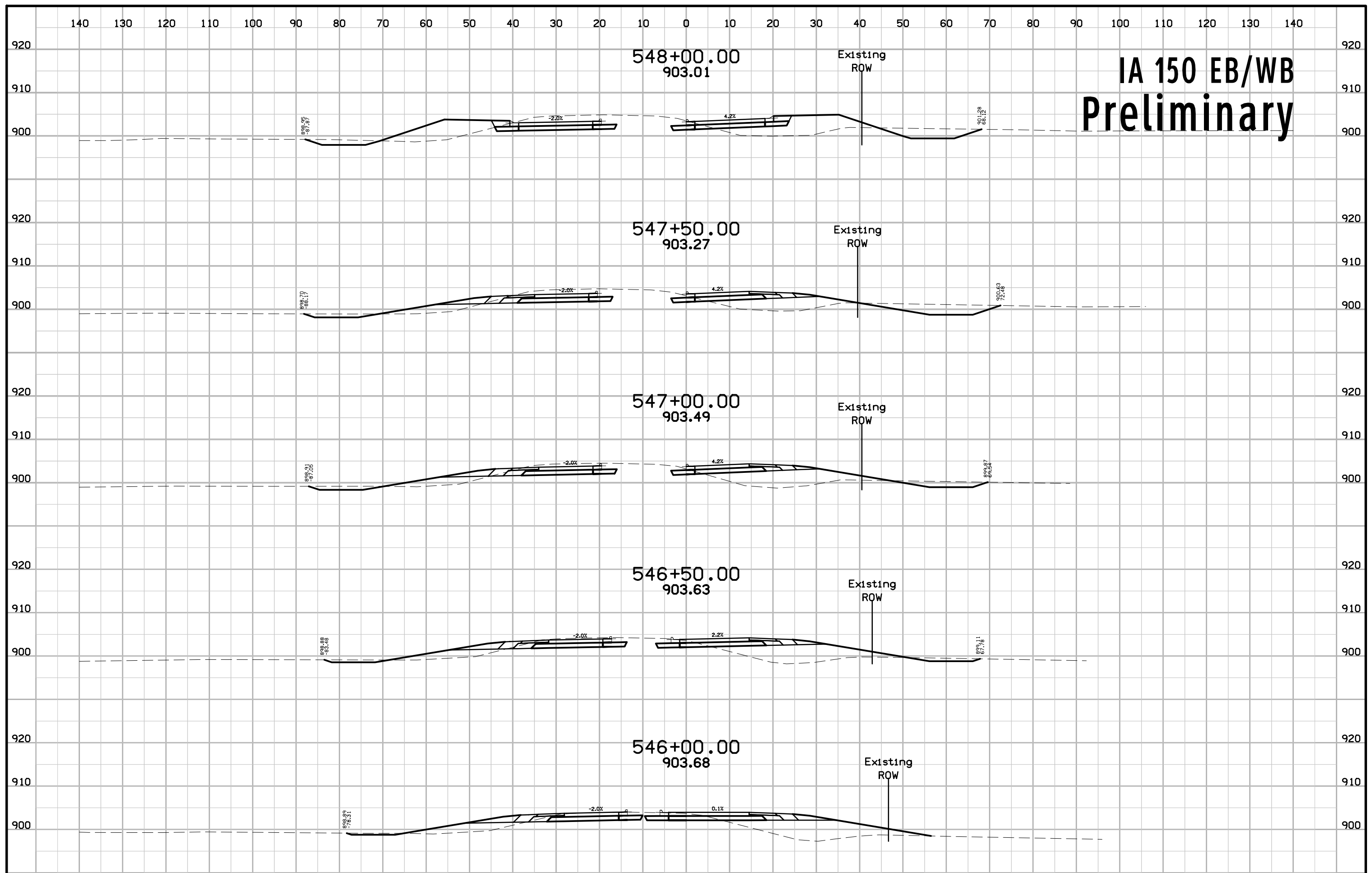
IA 150 EB/WB Preliminary



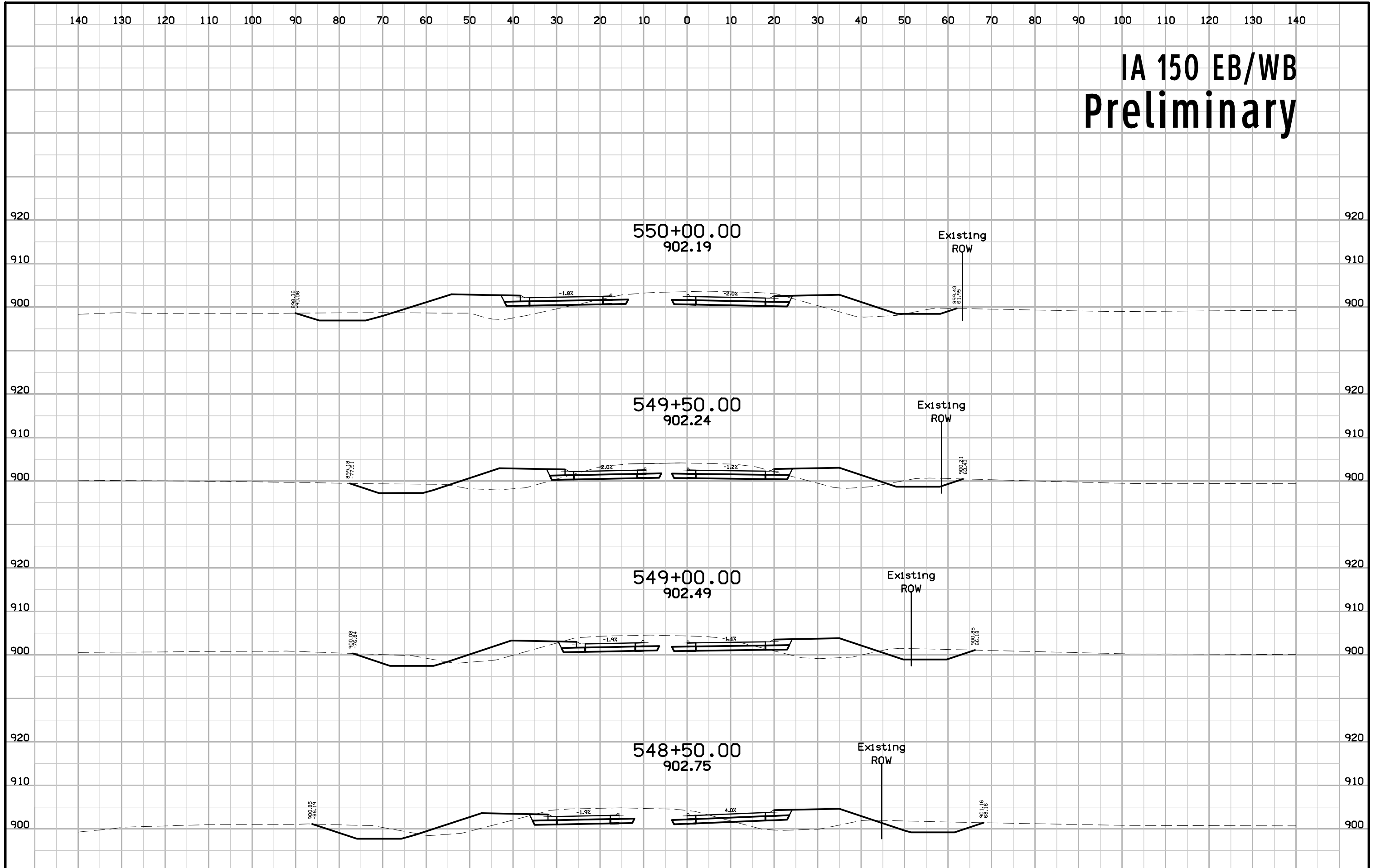
IA 150 EB/WB Preliminary



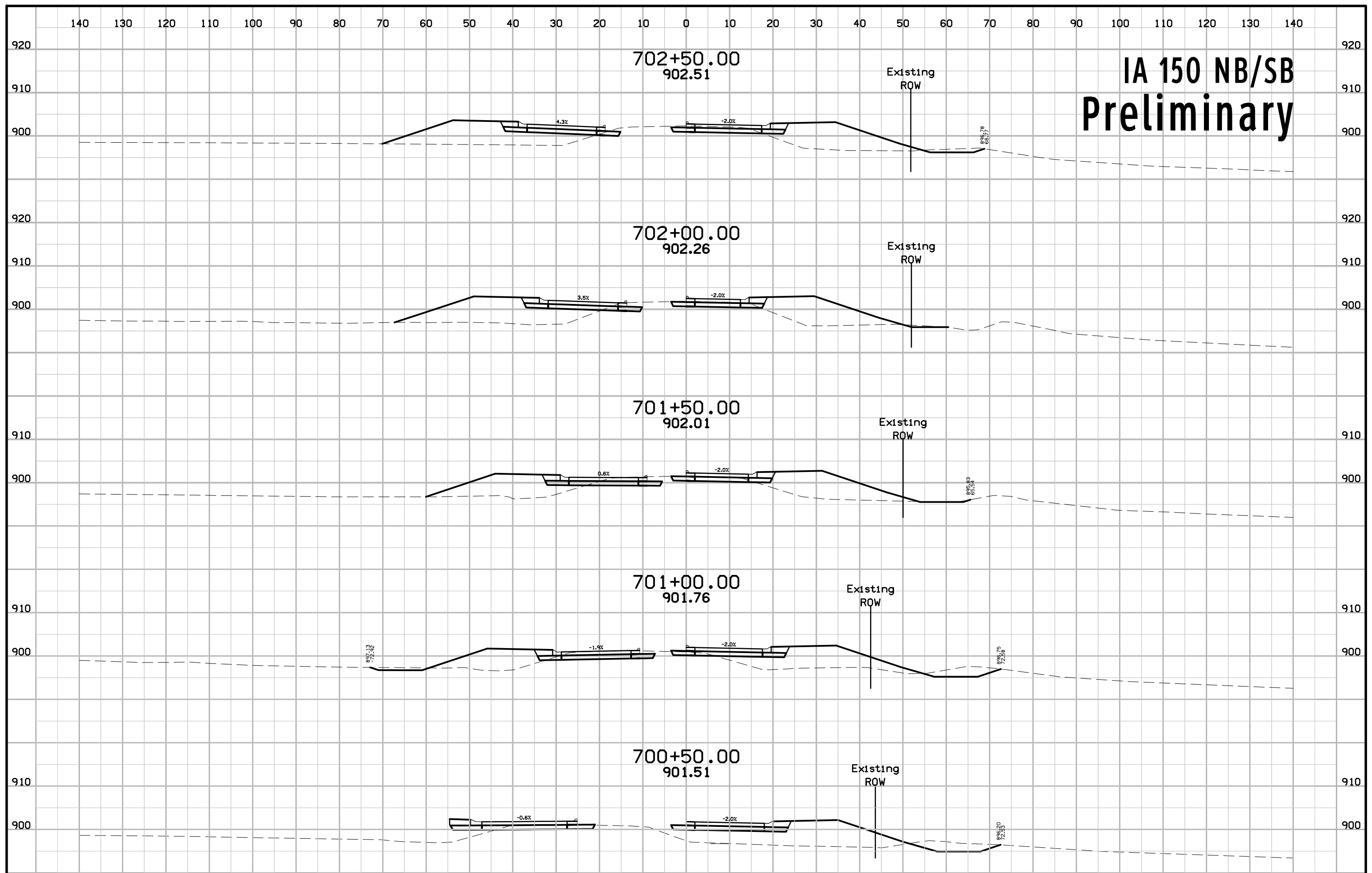
IA 150 EB/WB Preliminary



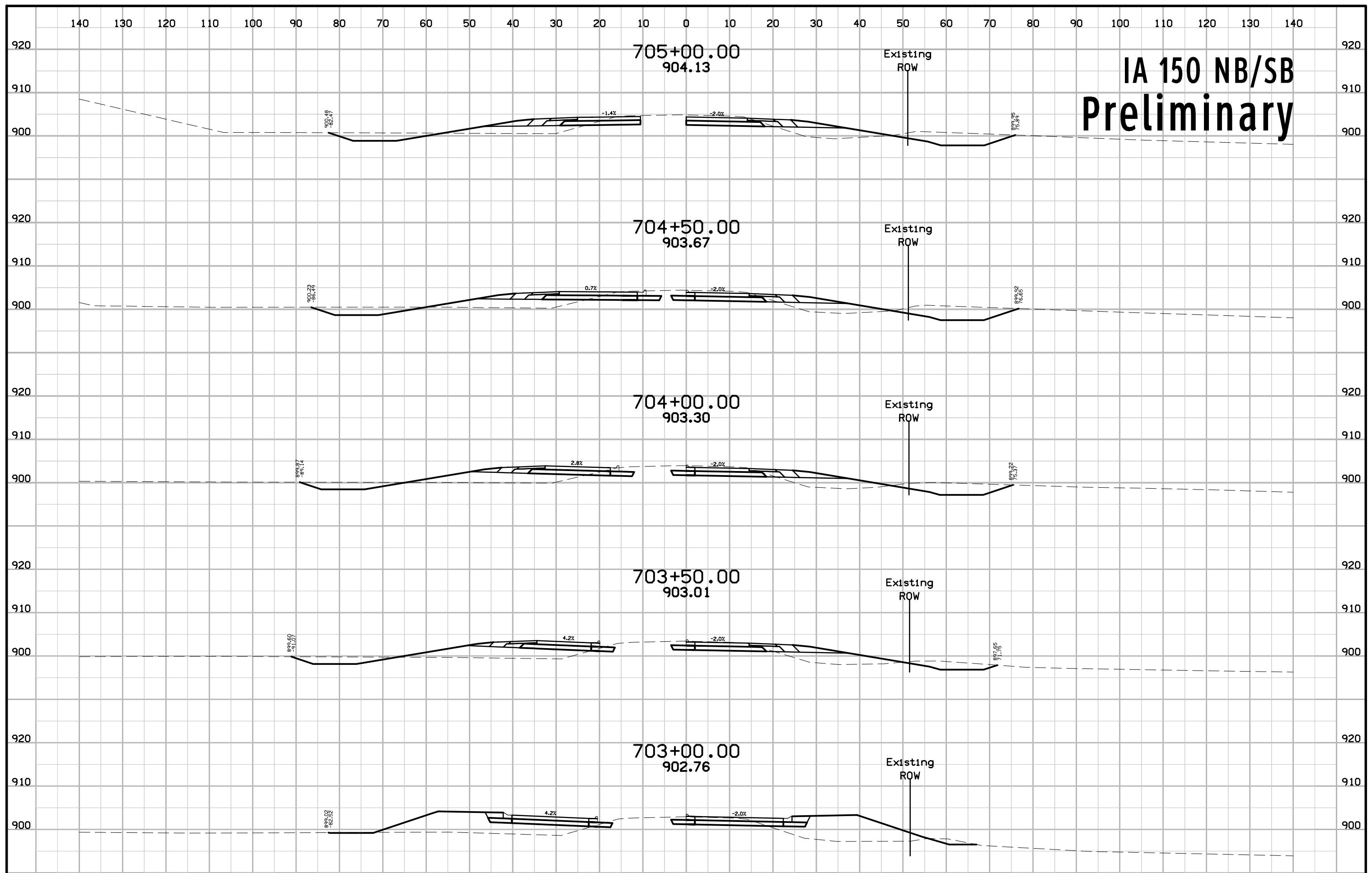
IA 150 EB/WB Preliminary



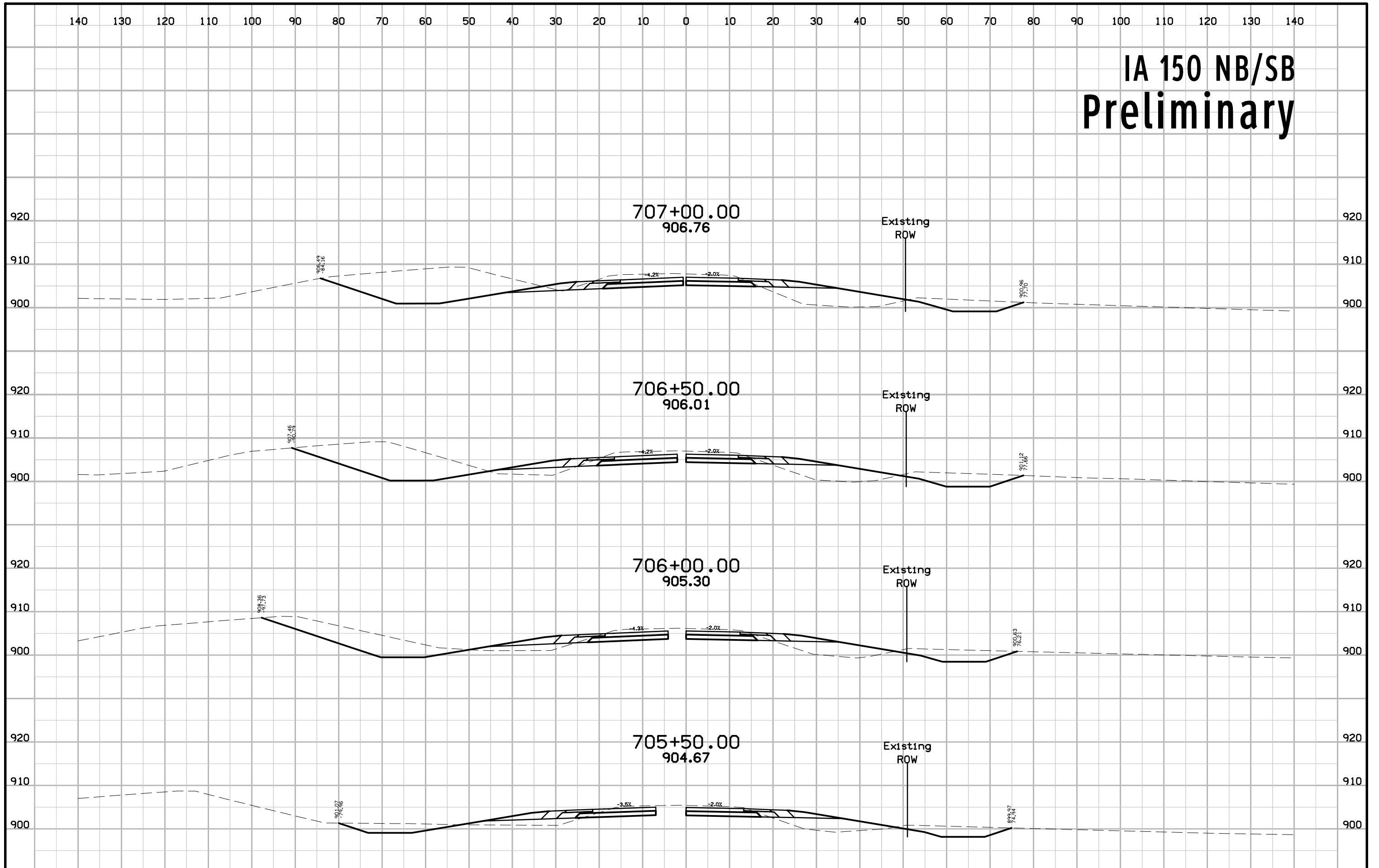
IA 150 NB/SB Preliminary



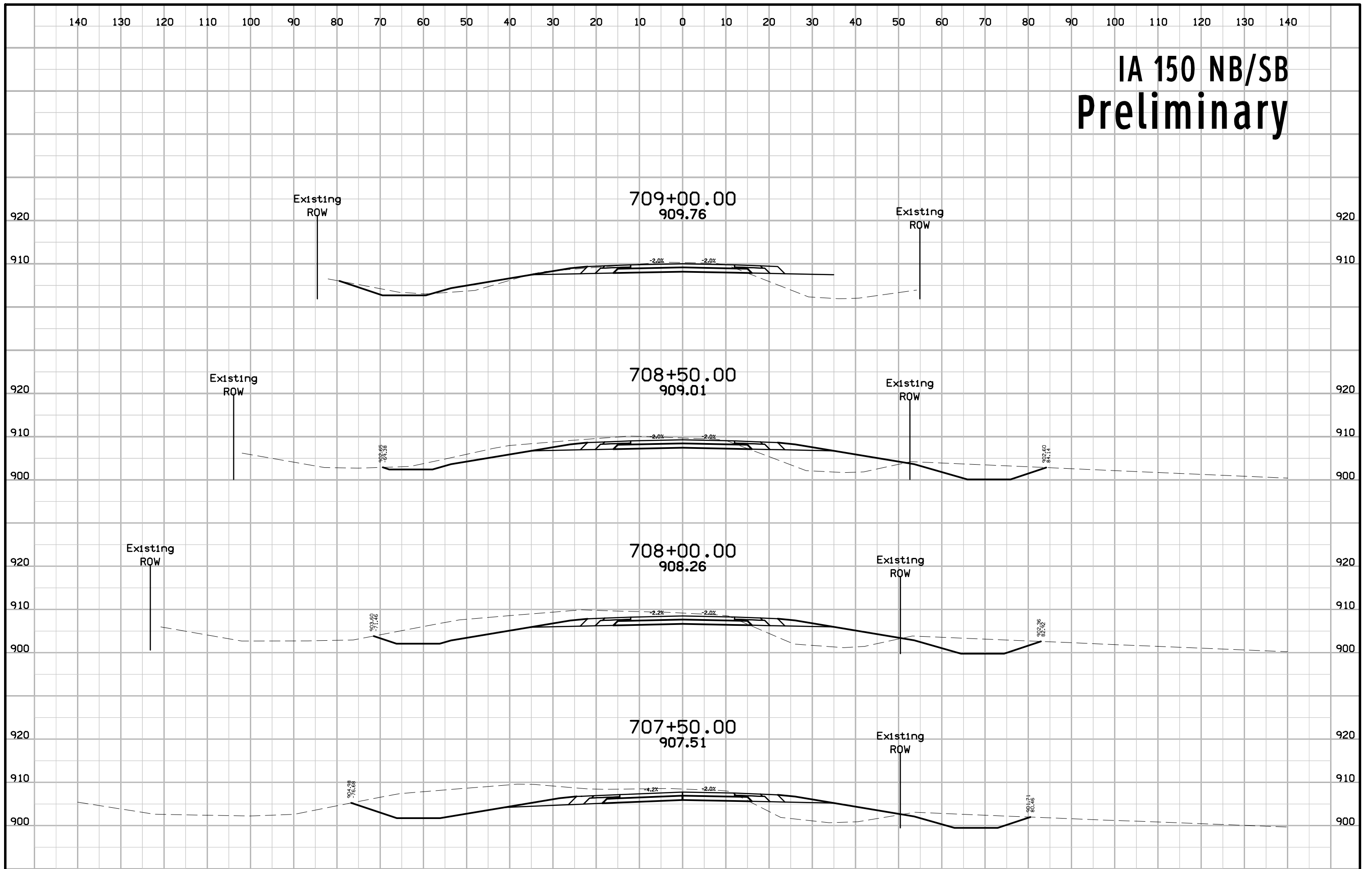
IA 150 NB/SB Preliminary



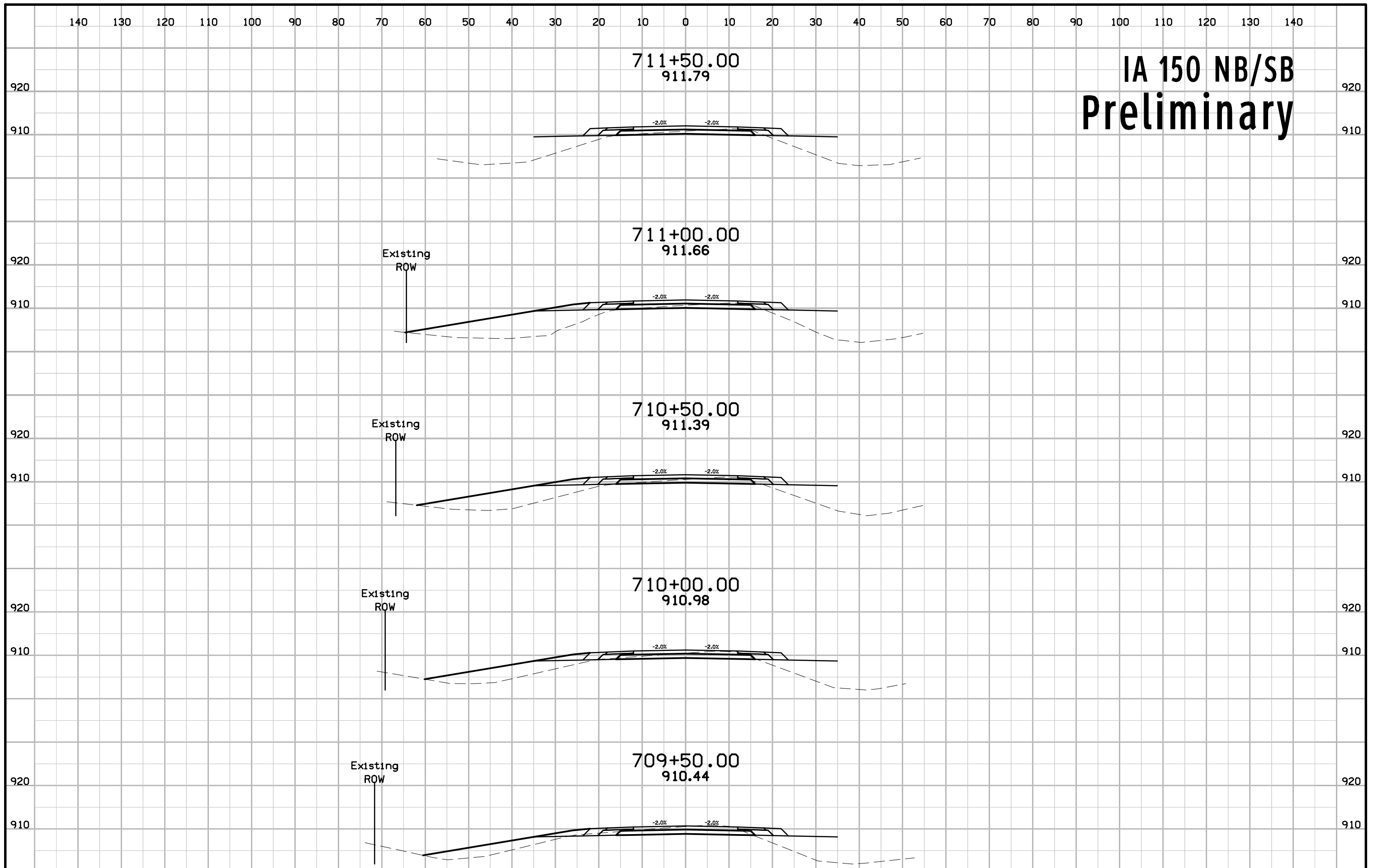
IA 150 NB/SB Preliminary



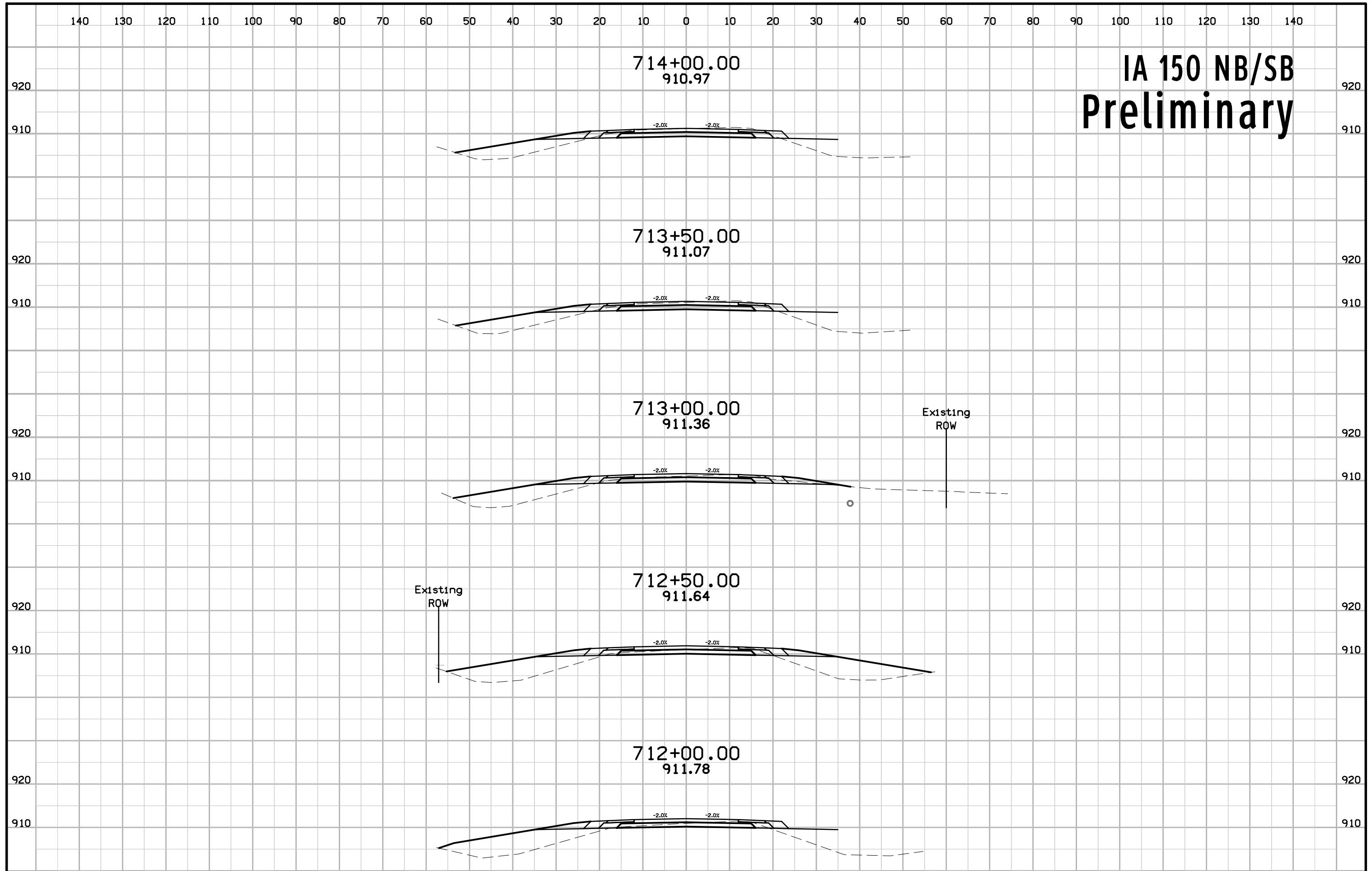
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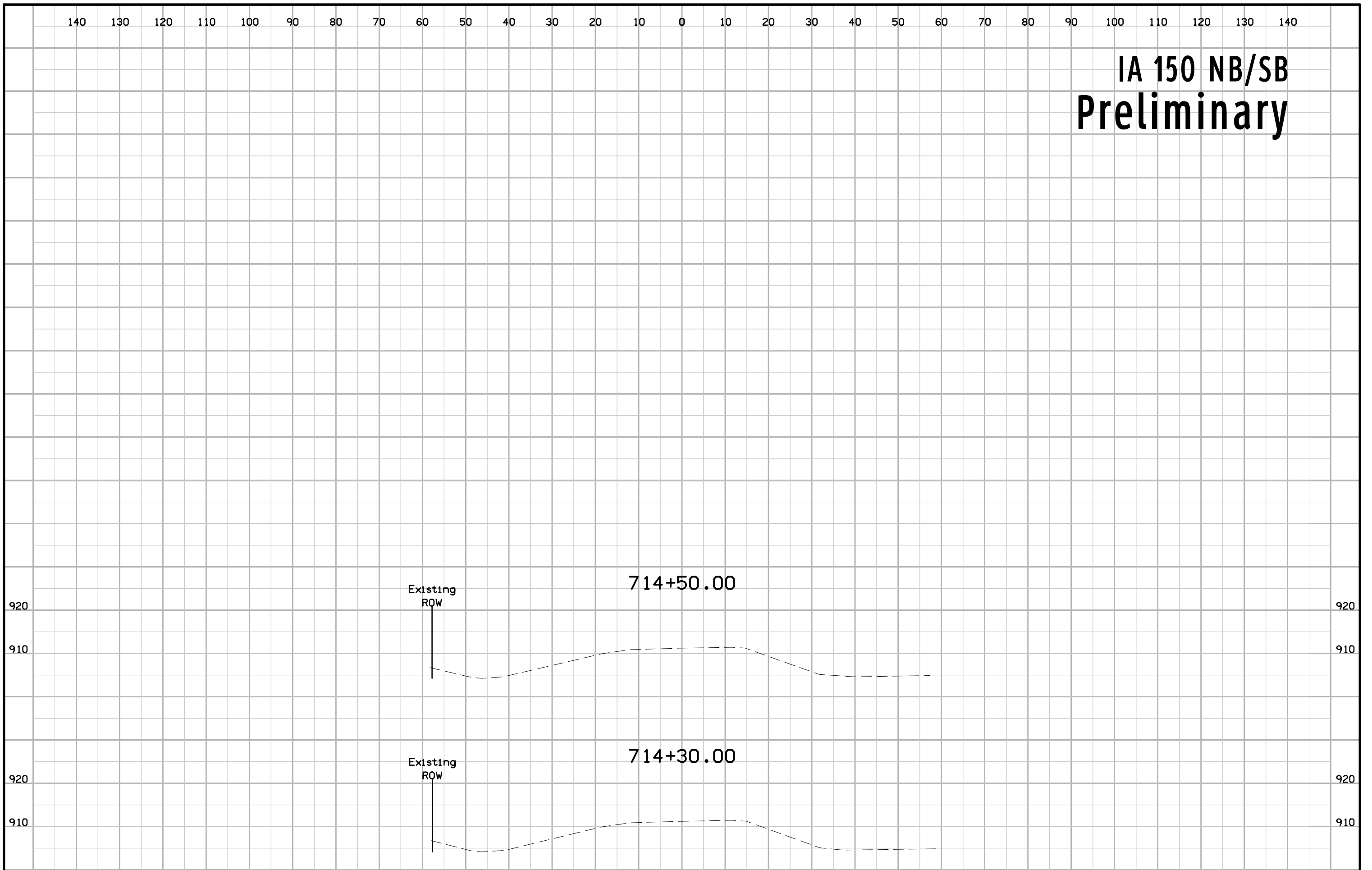
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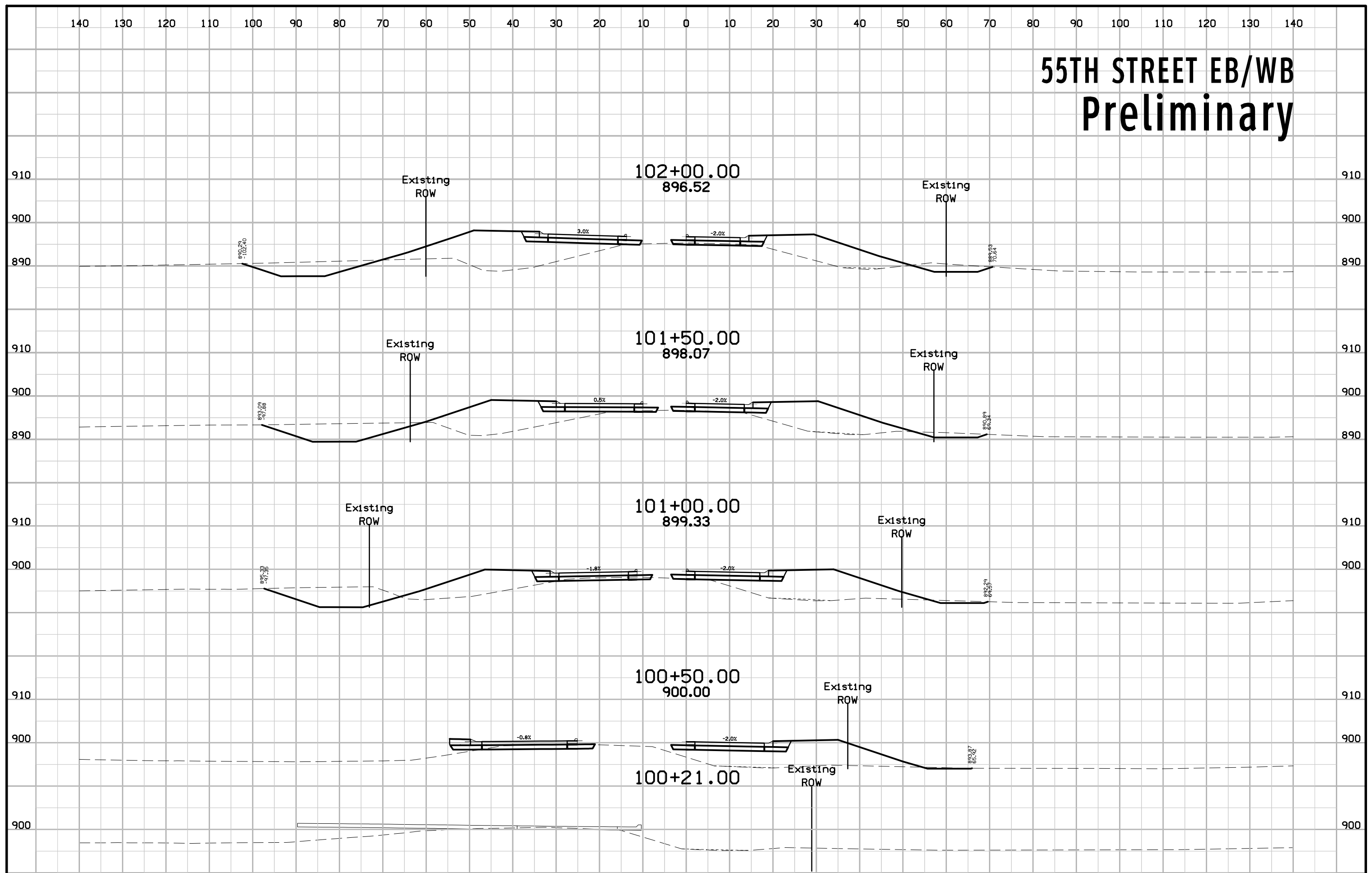
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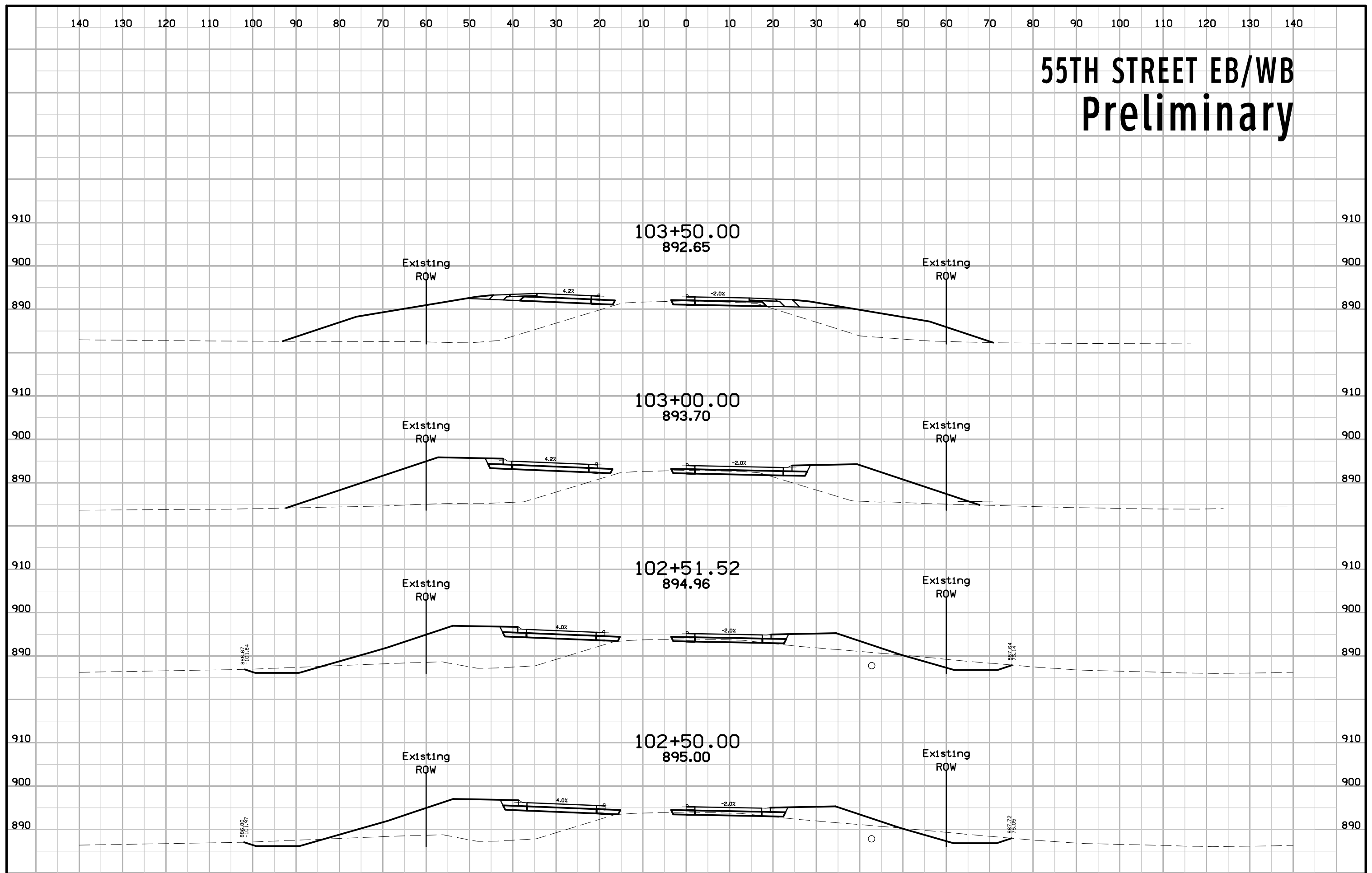
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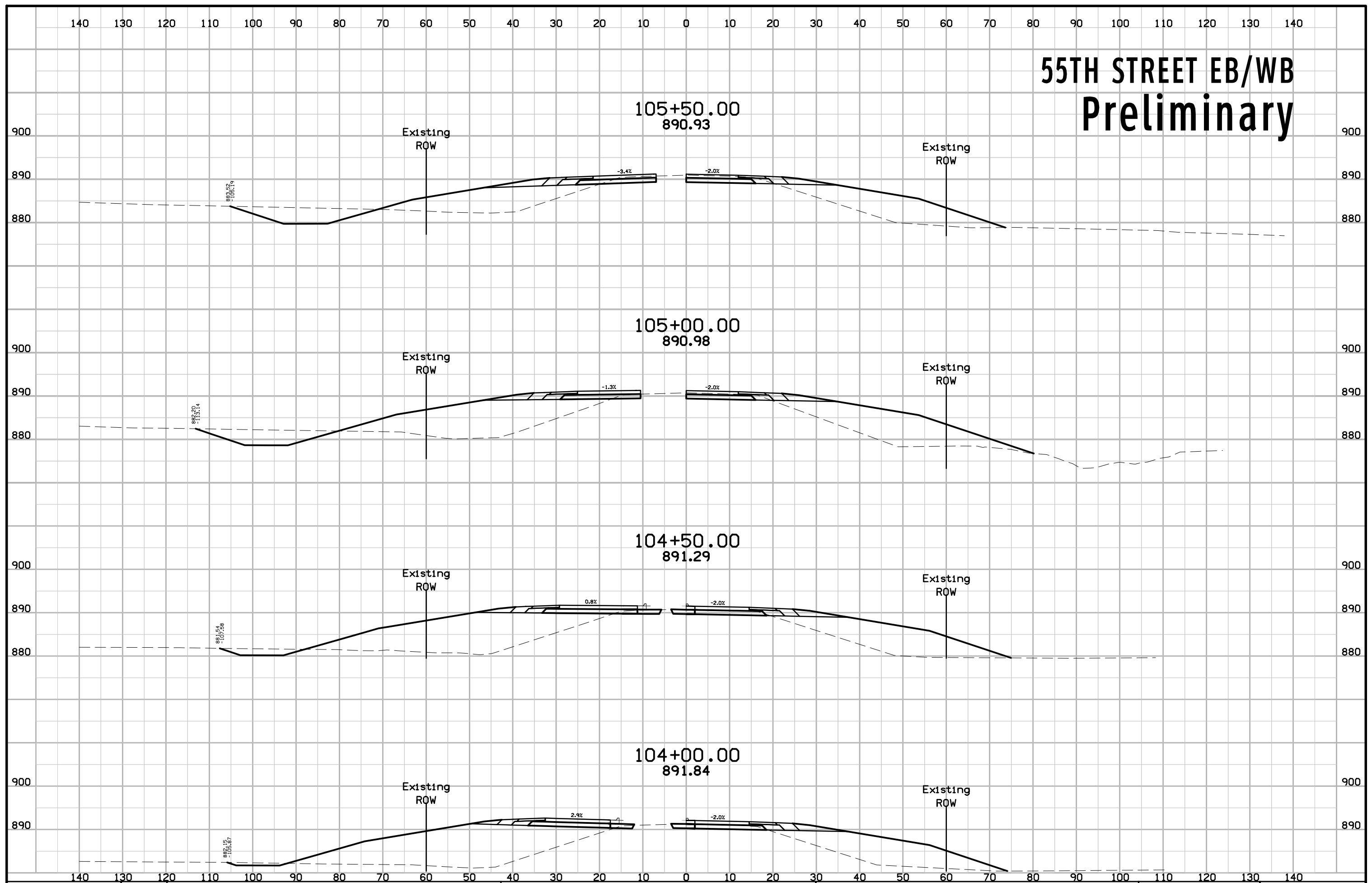
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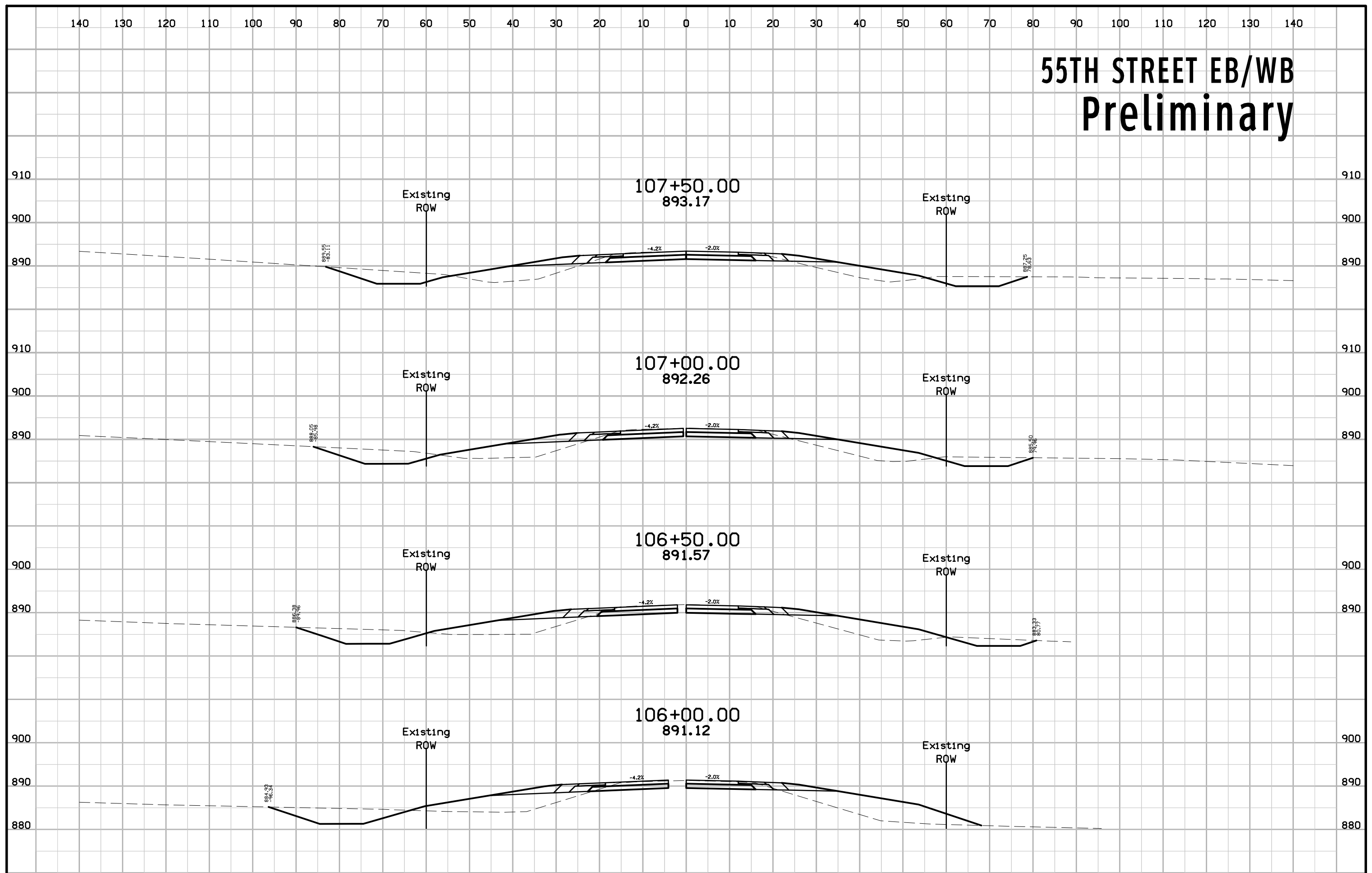
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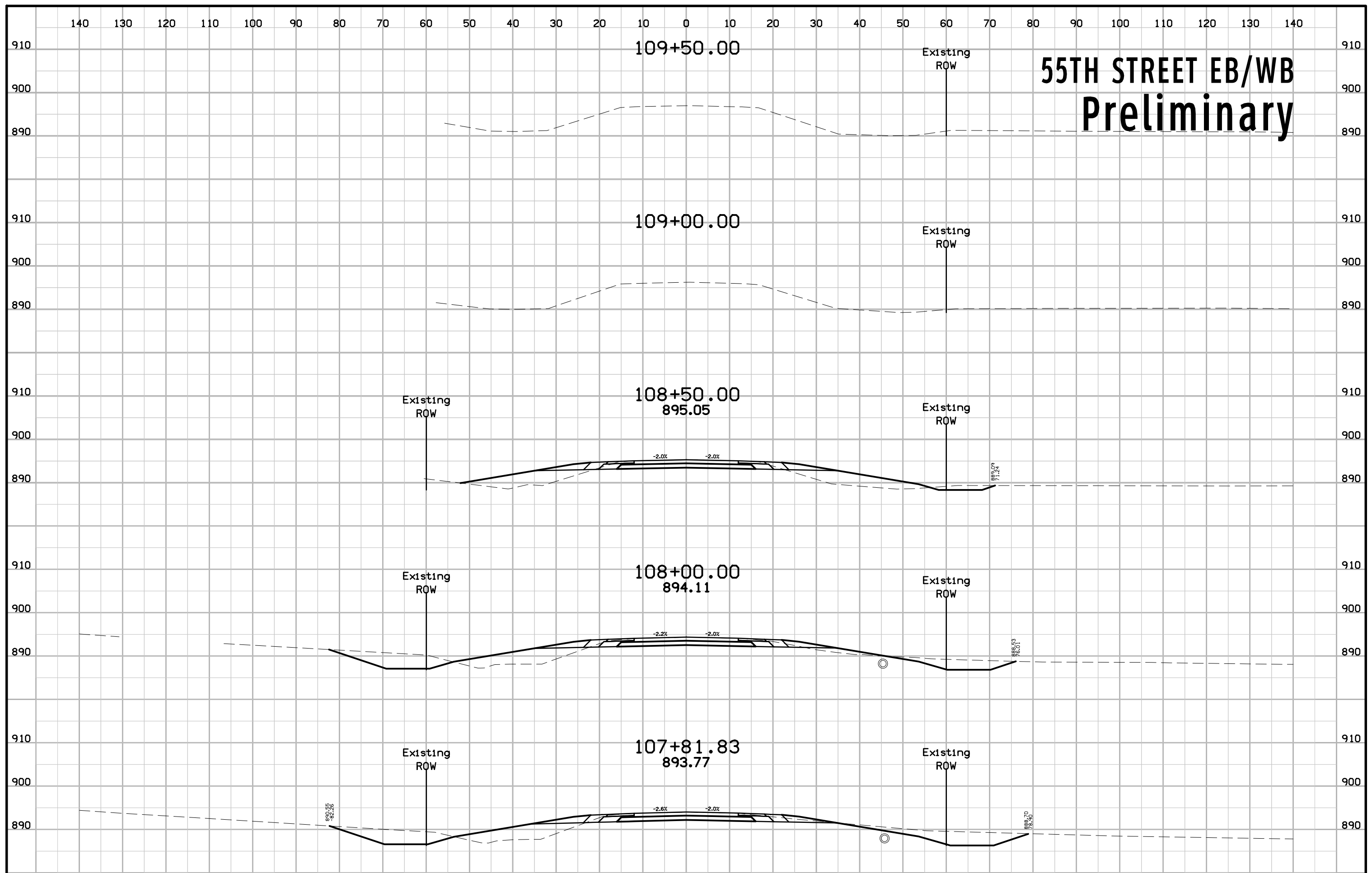
55TH STREET EB/WB Preliminary



55TH STREET EB/WB Preliminary



55TH STREET EB/WB Preliminary



31ST AVENUE NB/SB Preliminary

