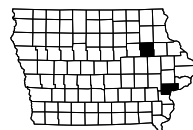


BUCHANAN COUNTY

PIPE CULVERTS
STPN-187-1(036)--2J-10

LETTING DATE
Dec 21 2027



| INDEX OF SHEETS | |
|------------------|--|
| No. | DESCRIPTION |
| A Sheets | Title Sheets |
| A.1 | Title Sheet |
| A.2 | Location Map Sheet |
| B Sheets | Typical Cross Sections and Details |
| B.1 | Typical Cross Sections and Details |
| D Sheets | Mainline Plan Sheets |
| * D.1 | Plan & Profile Legend & Symbol Information Sheet |
| * D.2 - 15 | ML 187 Buchanan County Plan Sheets |
| * D.16 - 18 | ML 187 Fayette County Plan Sheets |
| G Sheets | Survey Sheets |
| G.1 - 2 | Reference Ties and Bench Marks |
| G.3 | Horizontal Control Tab. |
| J Sheets | Traffic Control and Staging Sheets |
| * J.1 | Potential Detour Layout |
| V Sheets | Culvert Situation Plans |
| V.1 - 6 | Culvert Situation Plans |
| VW Sheets | Mainline Pipe Cross Sections |
| VW.1 - 9 | Mainline Pipe Cross Sections |
| | * Color Plan Sheets |



PLANS OF PROPOSED IMPROVEMENT ON THE
PRIMARY ROAD SYSTEM
BUCHANAN COUNTY
PIPE CULVERTS
 220th St to IA 3

SCALES: As Noted

Refer to the Proposal Form for list of applicable specifications.

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



DESIGN DATA URBAN

20 -- AADT _____ - V.P.D.
 20 -- AADT _____ - V.P.D.
 20 -- DHV _____ - V.P.H.
 TRUCKS _____ - %
 Total
 Design ESALs _____ -

PRELIMINARY PLANS

Subject to change by final design.

D5 PLAN - Date: 4-17-2026

REVISIONS

TOTAL

40

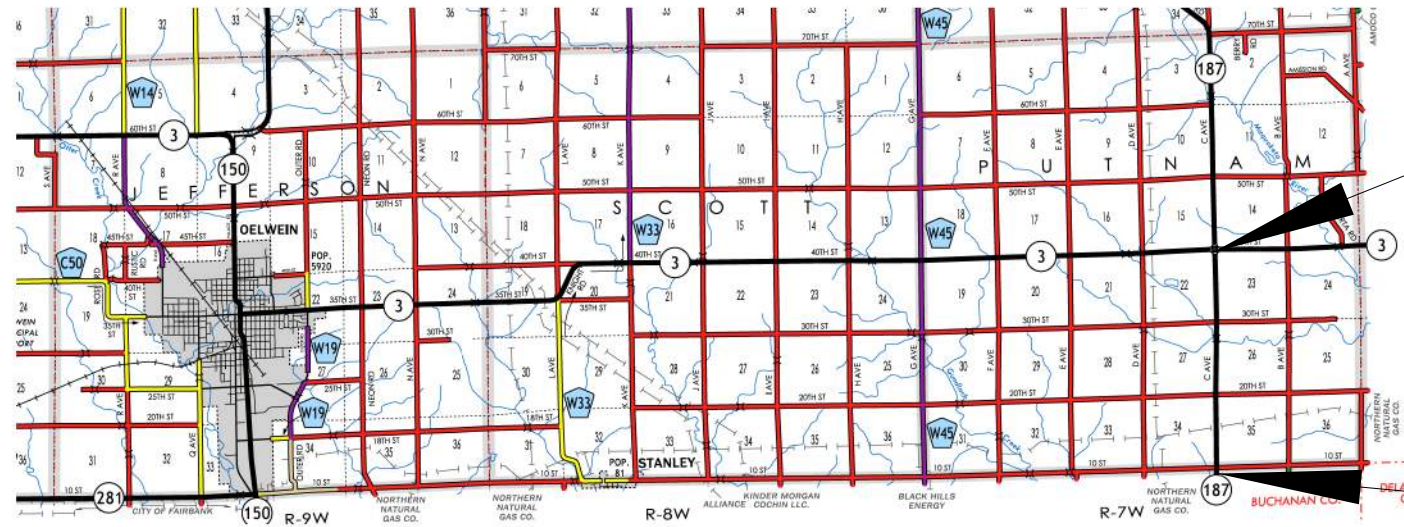
PROJECT IDENTIFICATION NUMBER

24-10-187-010

PROJECT NUMBER

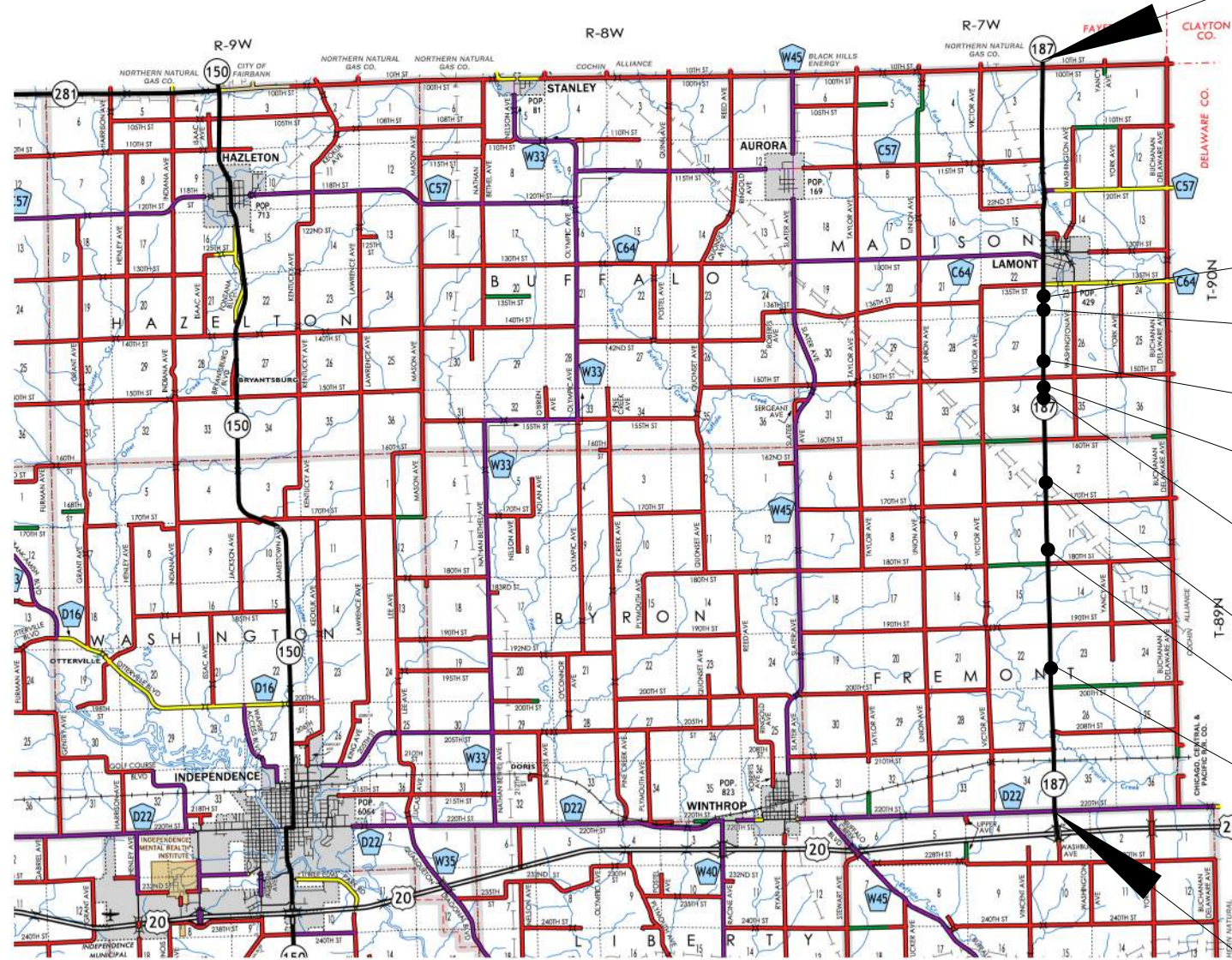
STPN-187-1(036)--2J-10

R.O.W. PROJECT NUMBER



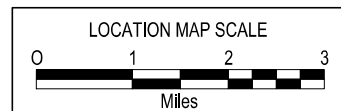
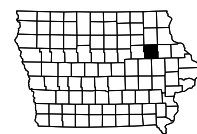
END CONSTRUCTION
MP 15.07

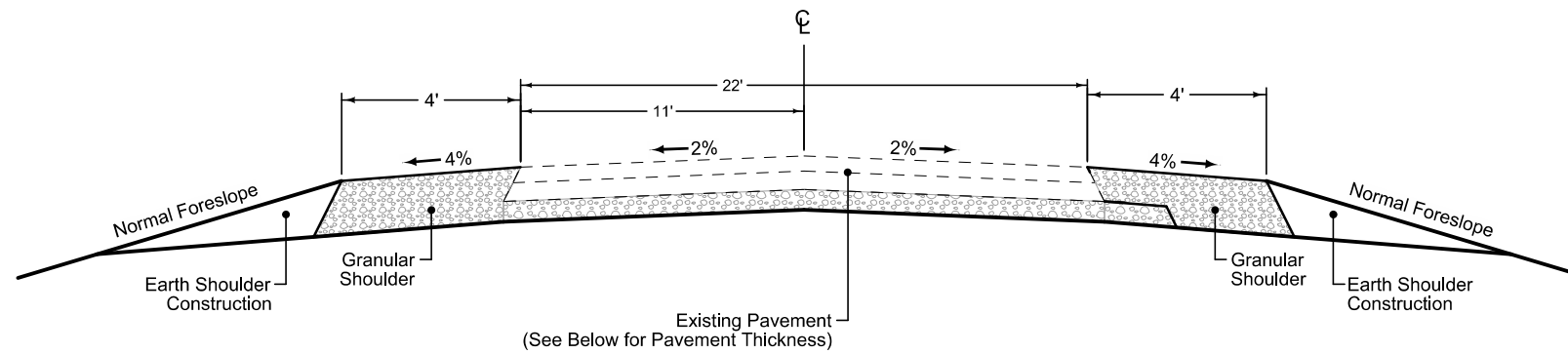
MP 12.05



- STA 444+84.00
12' x 6' RCB REPLACEMENT
- STA 431+16.79
66" RCB REPLACEMENT
- STA 389+96.01
102" x 62" RCP REPLACEMENT
- STA 369+55.00
6' x 3' RCB REPLACEMENT
- STA 348+85.03
24" RCP REPLACEMENT
- STA 280+06.59
60" RCP REPLACEMENT
- STA 230+58.28
24" RCP REPLACEMENT
- STA 127+72.00
14' x 4' RCB REPLACEMENT

BEGIN CONSTRUCTION
MP 0.47





Existing Pavement Section

For Reference Only

| 102-5 04-18-17 | | | | | | | | | | | | | | | | | | | | | | |
|-------------------|----------|--------|----------------|----------------------|--------------------|------|------|-----------------------|---------|----------|------|----------|---------|----------|---------|----------|------------------|-------------|---------|---------------|---|------------------|
| EXISTING PAVEMENT | | | | | | | | | | | | | | | | | | | | | | |
| No. | Location | | | | | Year | Type | Project Number | Surface | | Base | | Subbase | | Removal | | Coarse Aggregate | | | Reinforcement | Remarks | |
| | County | Route | Dir. of Travel | Begin Ref. Loc. Sign | End Ref. Loc. Sign | | | | Type | Depth IN | Type | Depth IN | Type | Depth IN | Type | Depth IN | Type | Depth IN | Source | Type | | Durability Class |
| 1 | Buchanan | IA 187 | Both | 0.00 | 9.63 | 2018 | | STPN-187-1(30)--2J-10 | BSC | | | | | | | | | | | | 1.5" SCR @ bridge approaches, culverts Cold-In-Place Recycling | |
| | | | | | | 1995 | | STPN-187-1(18)--2J-10 | HMA | 2.0 | HMA | 2.5 | | | | | Weston-Lamo | C. Lst. | | | | |
| | | | | | | 1988 | | MP-187-6(1)0--76-10 | BSC | | | | | | | | | | | | | |
| | | | | | | 1978 | | FN-187-1(6)--21-10 | HMA | 1.5 | HMA | 1.5 | | | | | | Weston-Lamo | C. Lst. | | | |
| | | | | | | 1956 | | P-744 | HMA | 2.0 | RSB | 6.0 | GSB | 12.0 | | | | | Walston | C. Lst. | | |
| 2 | Buchanan | IA 187 | Both | 9.63 | 10.26 | 1990 | | | PCC | 9.0 | | | | | | | | | | | | |
| 3 | Buchanan | IA 187 | Both | 10.26 | 12.05 | 2018 | | STPN-187-1(30)--2J-10 | BSC | | | | | | | | | | | | 1.5" SCR @ bridge approaches, culverts Cold-In-Place Recycling | |
| | | | | | | 1995 | | STPN-187-1(18)--2J-10 | HMA | 2.0 | HMA | 2.5 | | | | | Weston-Lamo | C. Lst. | | | | |
| | | | | | | 1988 | | MP-187-6(1)0--76-10 | BSC | | | | | | | | | | | | | |
| | | | | | | 1962 | | S-874(3) | BTB | 8.0 | GSB | 12.0 | SAS | 4.0 | | | | | | | | |
| 4 | Fayette | IA 187 | Both | 12.05 | 15.09 | 2018 | | STPN-187-1(30)--2J-10 | BSC | | | | | | | | | | | | 1.5" SCR @ Bridge approaches, only Cold-In-Place Recycling | |
| | | | | | | 1995 | | STPN-187-1(18)--2J-10 | HMA | 2.0 | HMA | 2.5 | | | | | Weston-Lamo | C. Lst. | | | | |
| | | | | | | 1988 | | MP-187-6(1)0--76-10 | BSC | | | | | | | | | | | | | |
| | | | | | | 1973 | | SN-874(4)--51-53 | HMA | 4.0 | | | | | | | | | | | | |
| | | | | | | 1961 | | S-874(2) | HMA | 0.5 | RSB | 6.0 | SAS | 4.0 | | | | | | | | |

SURVEY SYMBOLS

- Interstate Highway Symbol
- U.S. Highway Symbol
- Iowa Highway Symbol
- County Road Highway Symbol
- Evergreen Tree
- Deciduous Tree
- Fruit Tree
- Shrub (Bushes)
- Timber
- Hedge
- Stump
- Swamp
- Rock Outcrop
- Broken Concrete
- Revetment (Rip Rap)
- Cemetery
- Grave
- Cave
- Sink Hole
- Board Fence
- Chain Link or Security Fence
- Wire Fence
- Terrace
- Earth Dam or Dike (Existing)
- Tile Outlet
- Edge of Water
- Existing Drainage
- Right of Way Rail or Lot Corner
- Concrete Monument
- Well
- Windmill
- Beehive Intake
- Existing Intake
- Existing Utility Access (Manhole)
- Fire Hydrant
- Water Hydrant (Rural)
- Septic Tank
- Cistern
- L.P. Gas Tank (No Footing)
- Underground Storage Tank
- Latrine
- Satellite TV Dish
- Water Hook Up
- Radio Tower
- Tower Anchor
- Guardrail (Beam or Cable)
- Guard Post (one or two)
- Guard Post (over two)
- Filler Pipe
- Gas Valve
- Water Valve
- Speed Limit Sign
- Mile Marker Post
- Sign
- Traffic Signal Control Box
- Rail Road Signal Control Box
- Telephone Switch Box
- Electric Box

UTILITY LEGEND

- E1 EL1D, Electric Line East-Central Iowa REC - Quality D
- F0 F01D, Fiber Optic East Buchanan Telephone COOP - Quality D
- F02 F02D, Fiber Optic Iowa Communications Network - Quality D
- F03 F03D, Fiber Optic Windstream - Quality D
- G GL1D, Gas Line Pembina Cochin LLC - Quality D
- G2 GL2D, Gas Line Alliance Pipeline - Quality D
- PPA, Power Pole Co. 1
- W WL1D, Water Line Iowa REgional Utility Association - Quality D

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. | Transparency |
| Pink, Dark | (13) | | Temporary Pavement Shading |
| Yellow | (4) | | Proposed Pavement Shading |
| Orange | (6) | | Proposed Granular Shading |
| Orange | (70) | | Proposed Shoulder Granular Shading |
| Yellow | (68) | | Proposed Shoulder Paved Full Depth Shading |
| Yellow | (132) | | Proposed Shoulder Paved Partial Depth Shading |
| Brown, Light | (236) | | Grading Shading |
| Orange, Light | (134) | | Proposed Granular Entrance Shading |
| Yellow | (220) | | Proposed Paved Entrance Shading |
| Tan | (8) | | Proposed Sidewalk Shading |
| Blue, Light | (230) | | Proposed Sidewalk Landing Shading |
| Pink | (11) | | Proposed Sidewalk Ramp Shading |
| Red | (3) | | Proposed Structure Shading |
| Red | (3) | | Delineates Restricted Areas |

PROFILE VIEW COLOR LEGEND OF PLAN AND PROFILE SHEETS

| LINEWORK | | Design Color No. | |
|-------------|-------|------------------|---------------------------------|
| Green | (10) | | 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 |

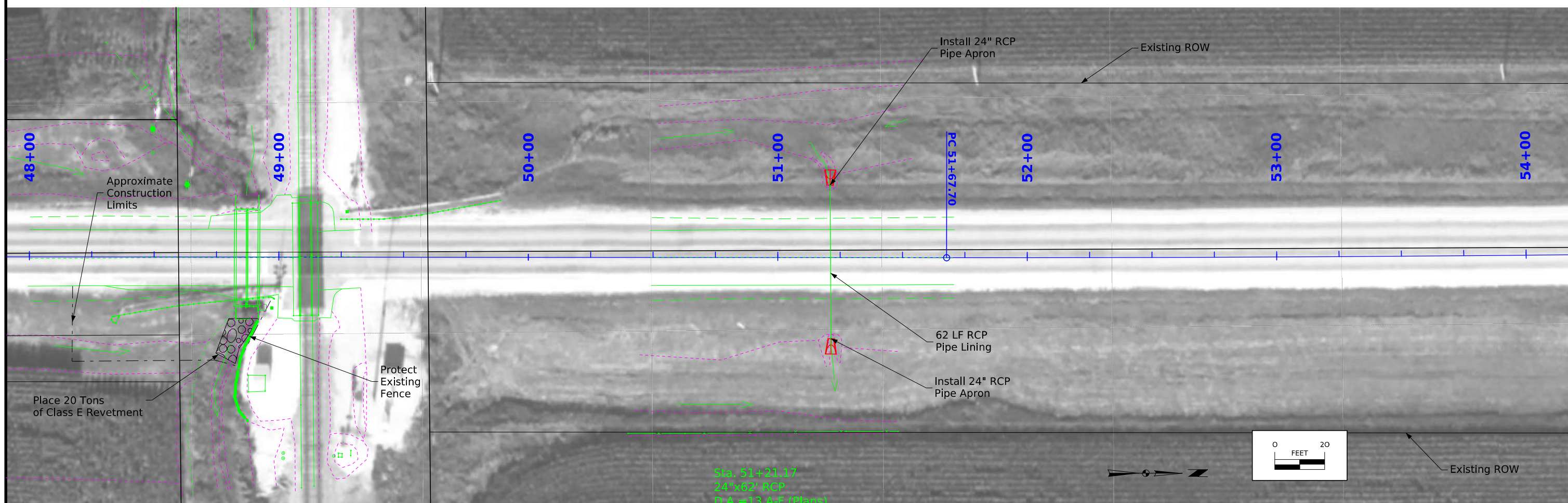
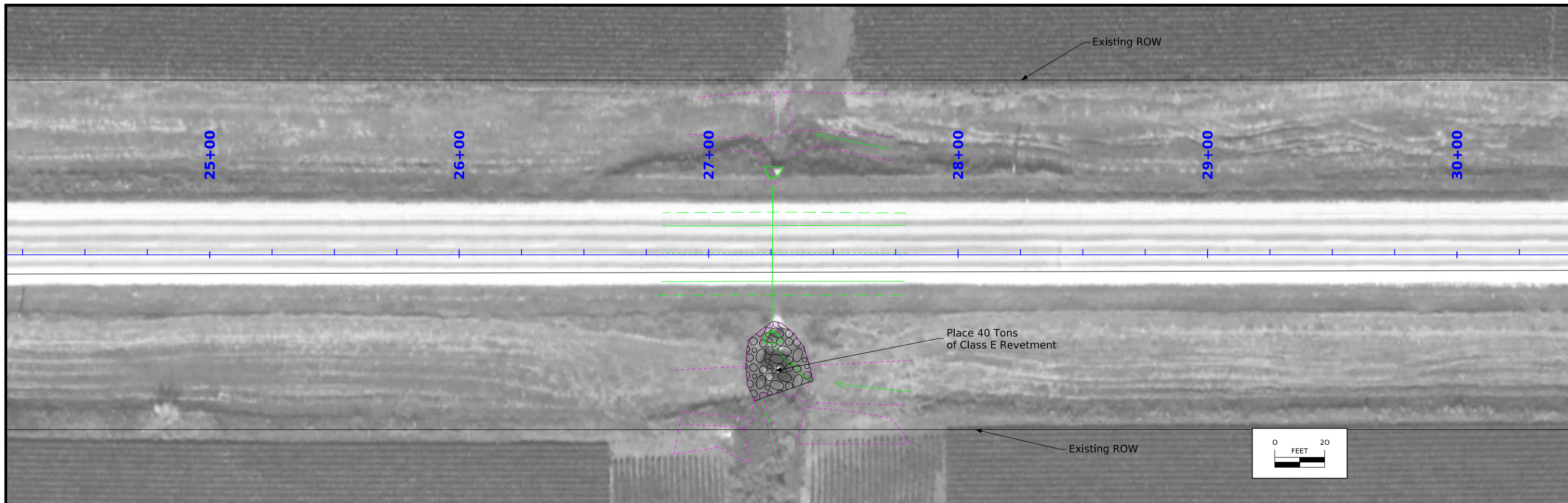
- Reference Point
- Station
- Survey Line
- Section Corner
- Ground Line Intercept
- Saw Cut
- Guardrail
- Trench Drain
- HighTension Cable Guardrail
- Sheet Pile
- Pavement Removal
- Clearing & Grubbing Area

RIGHT-OF-WAY LEGEND

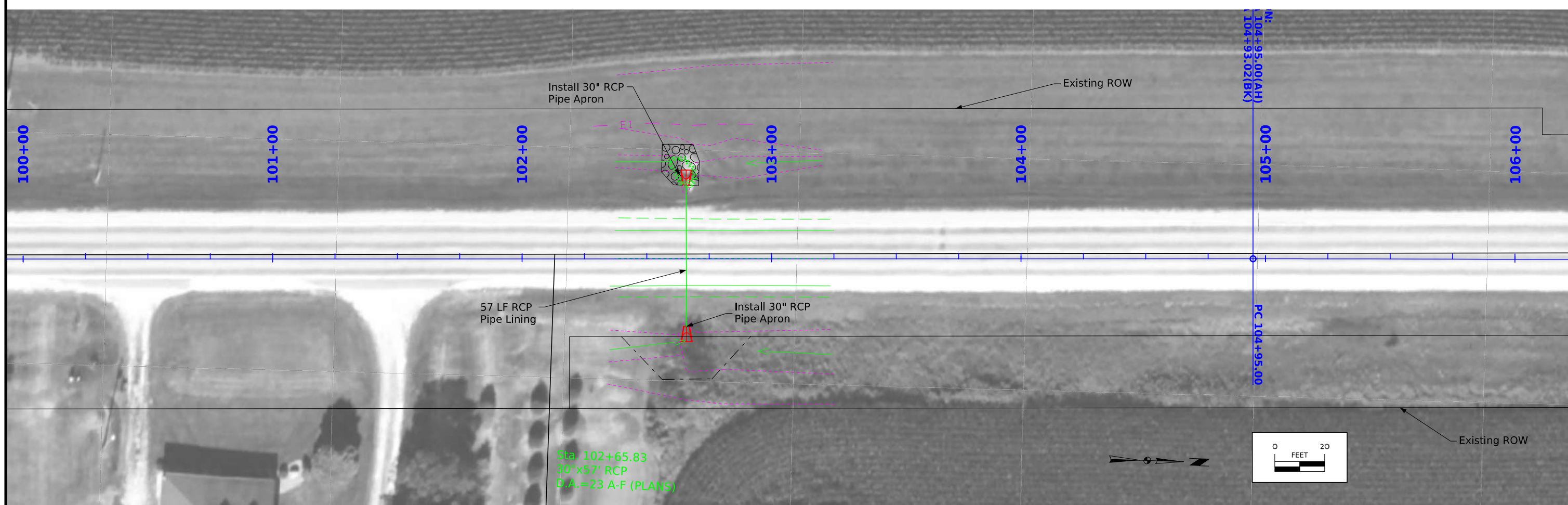
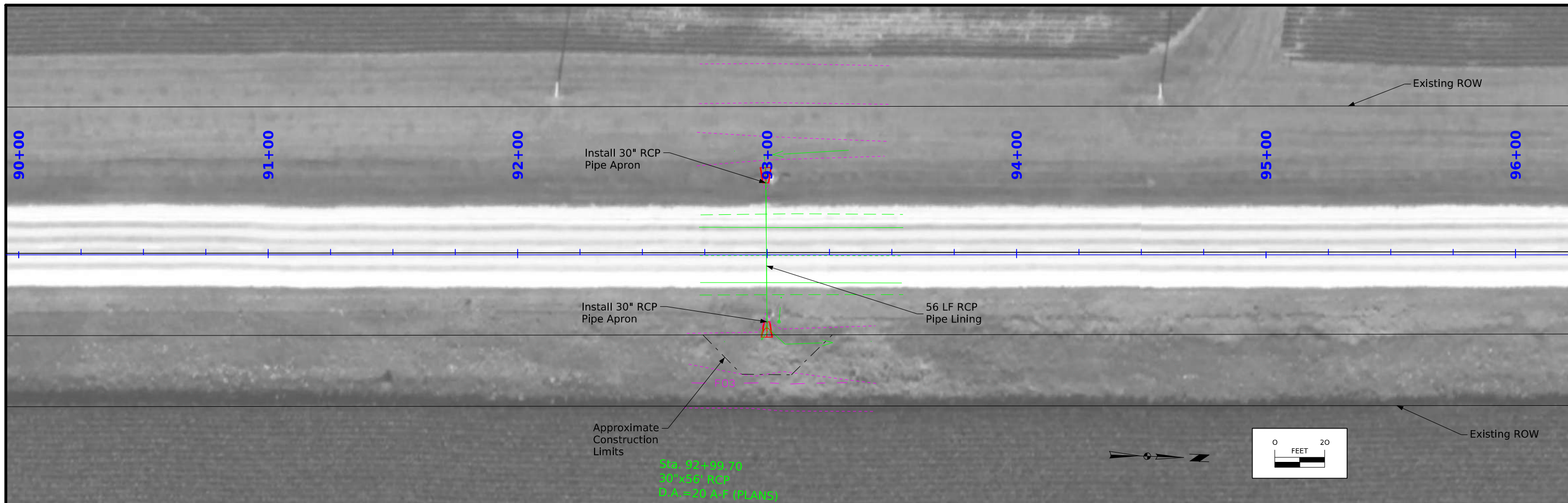
- Proposed Right-of-Way Symbol
- Proposed Right-of-Way Line
- Existing Right of Way
- Existing and Proposed Right-of-Way
- Easement and Existing Right-of-Way
- Easement (Temporary) Symbol
- Easement (Temporary) Line
- Easement
- C/A Access Control
- Property Line Symbol
- Property Line

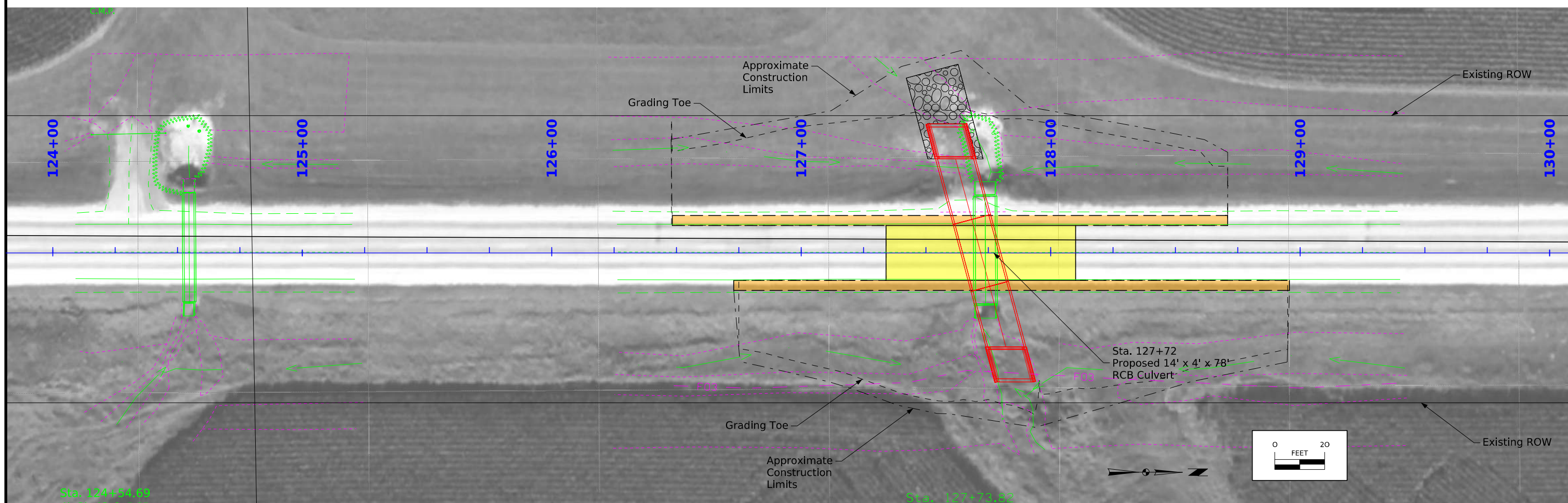
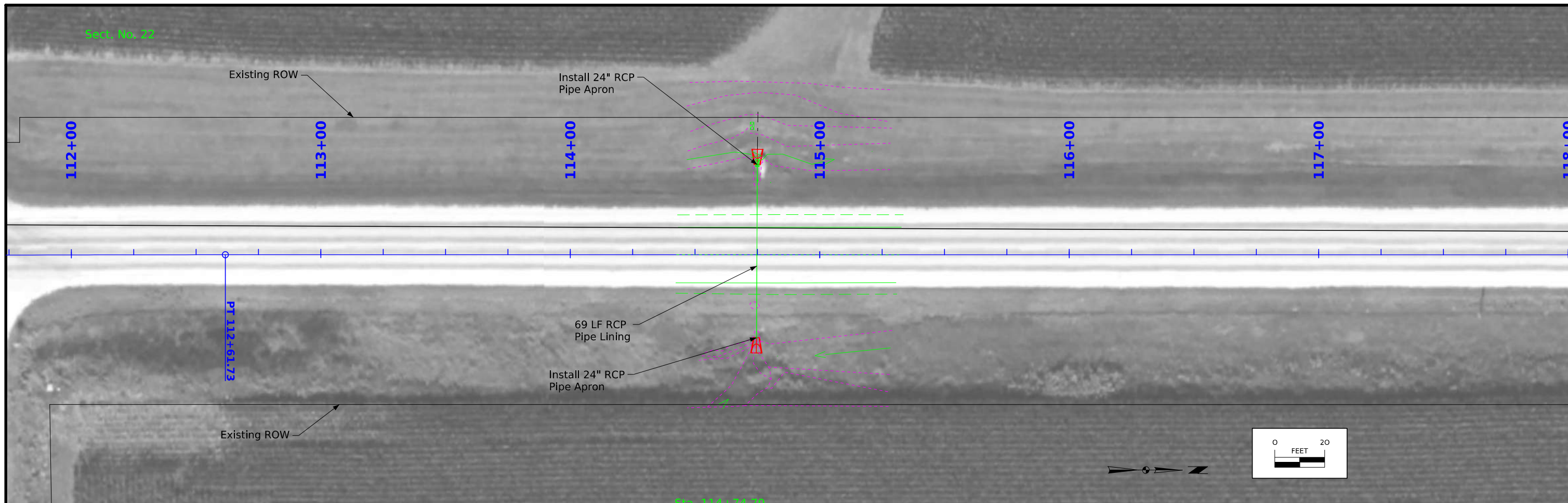
PLAN AND PROFILE LEGEND AND SYMBOL INFORMATION SHEET

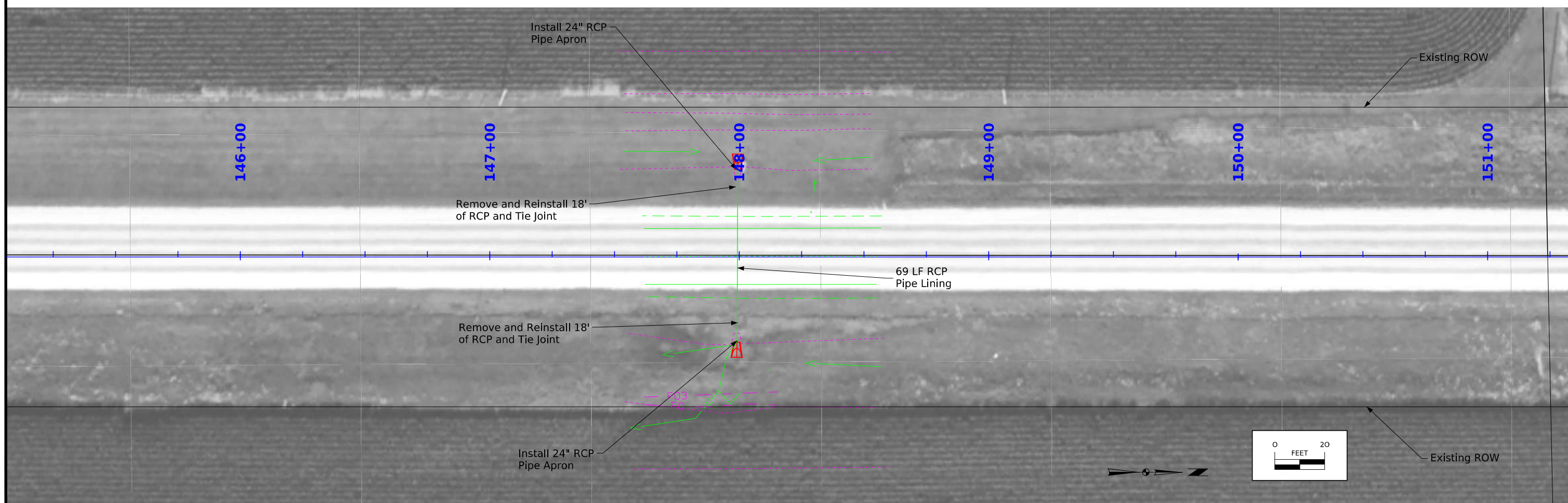
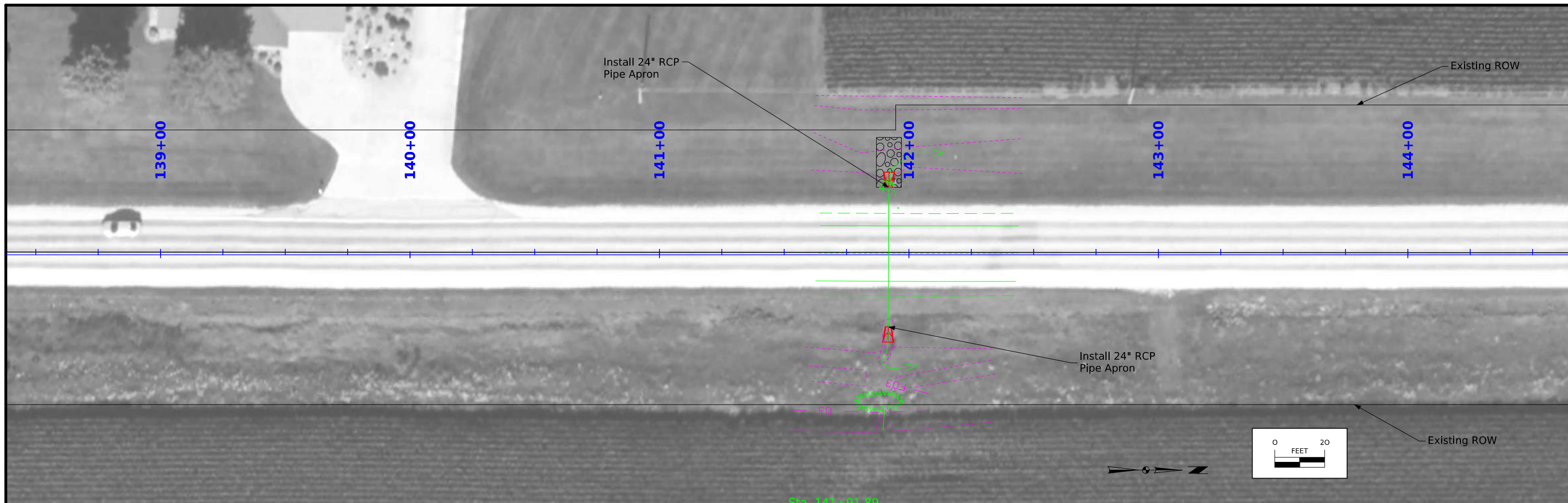
(COVERS SHEET SERIES D, E, F, & K)

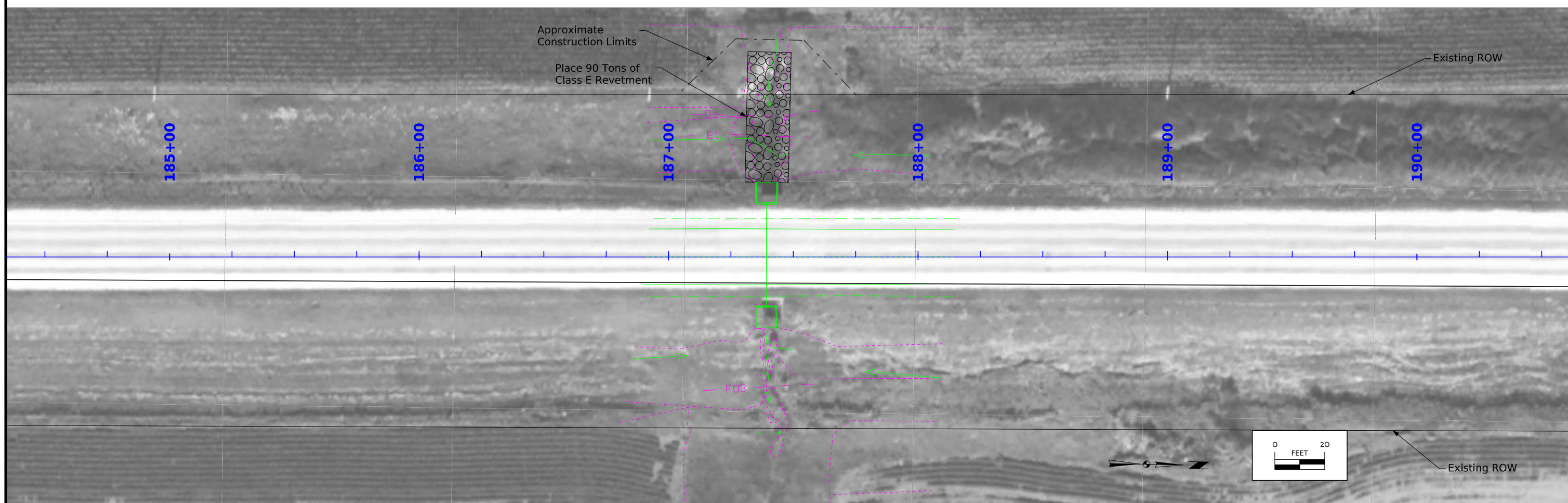
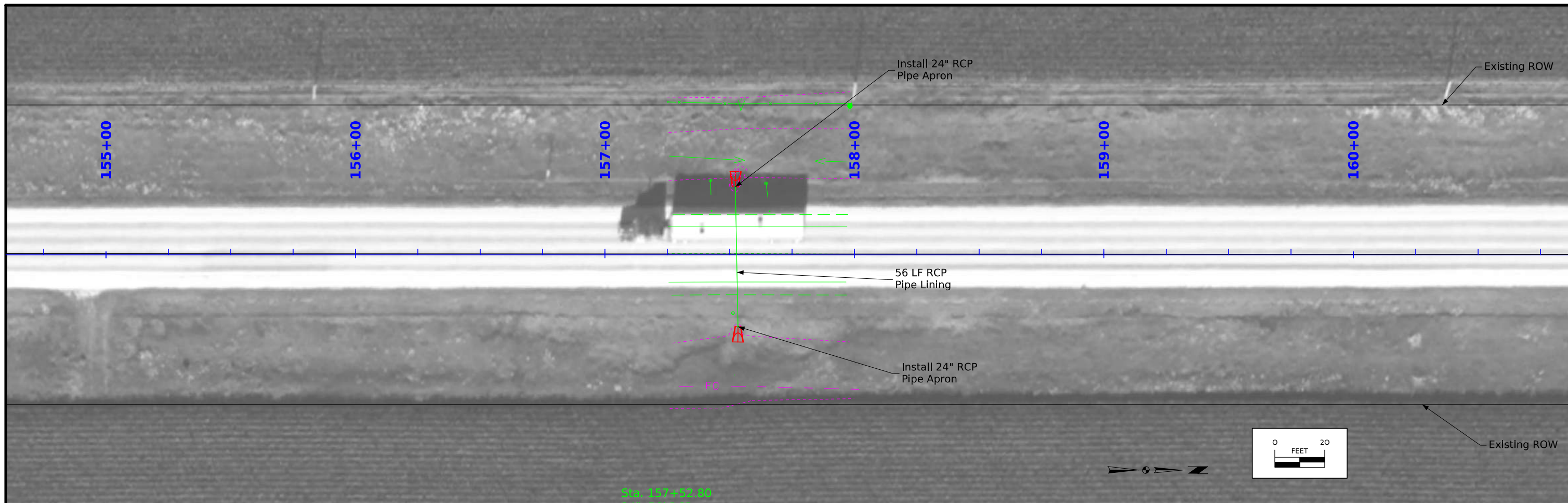


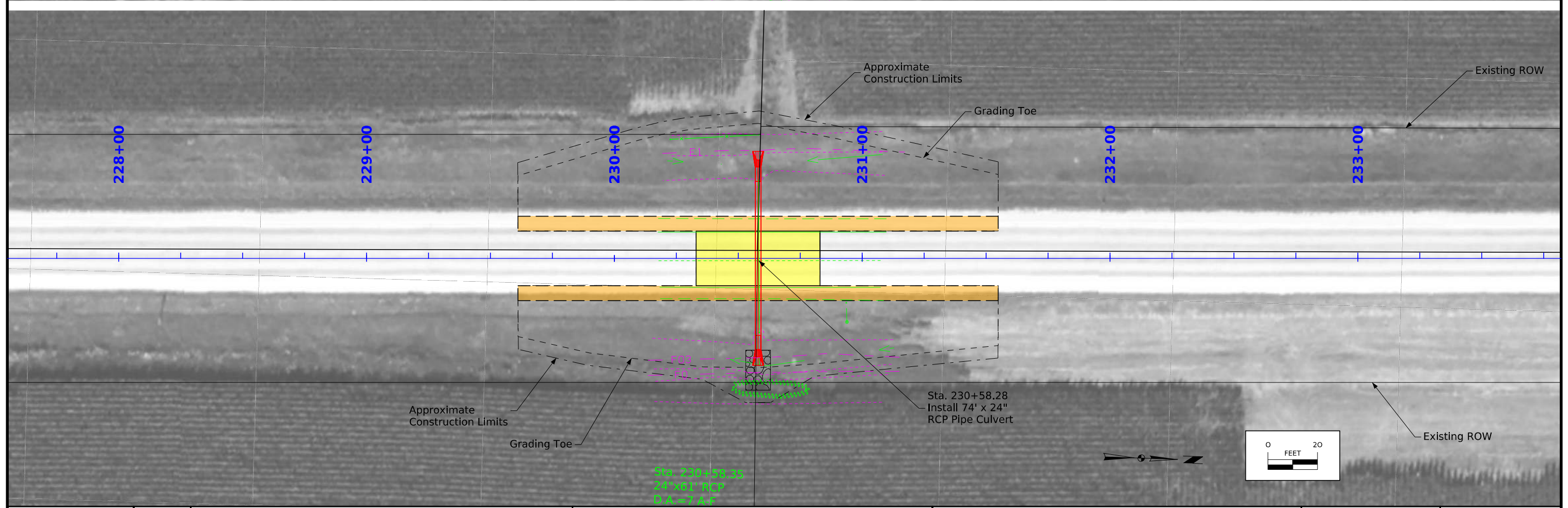
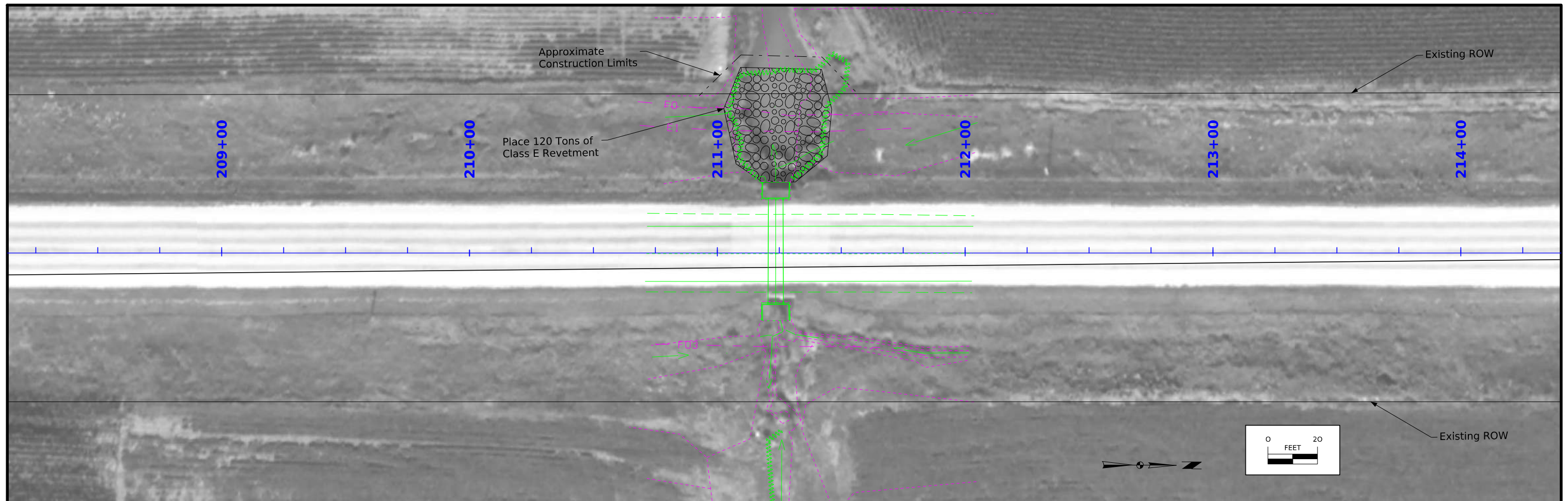
Sta. 51+21.17
 24" (62') RCP
 D/A = 13 A/F (Place)

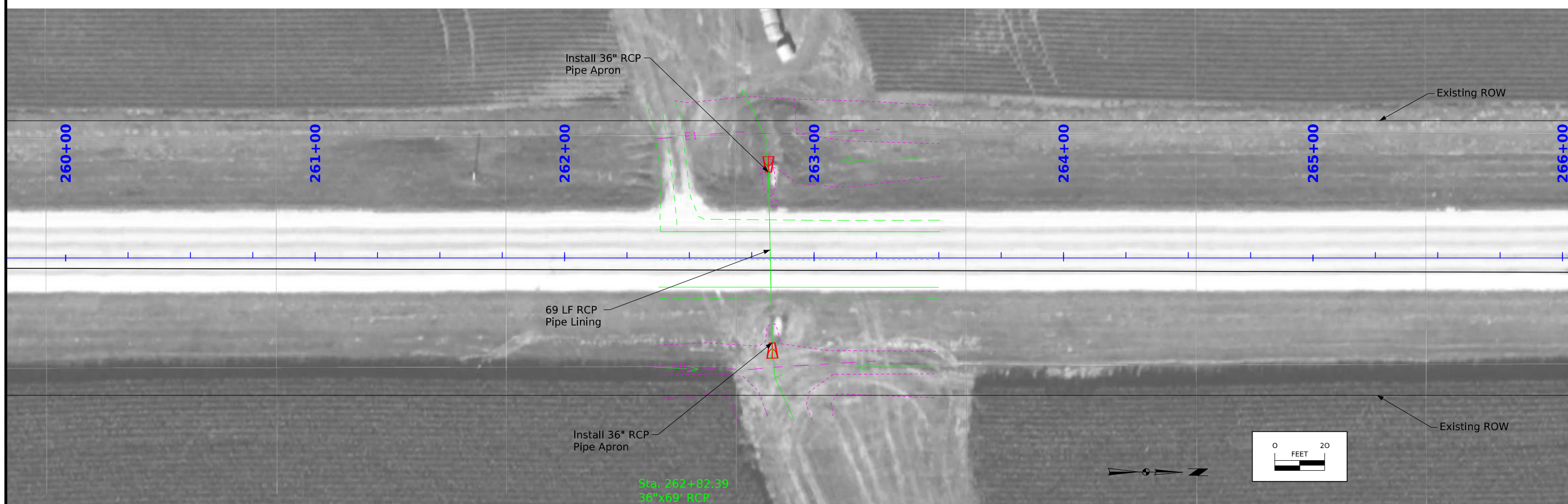
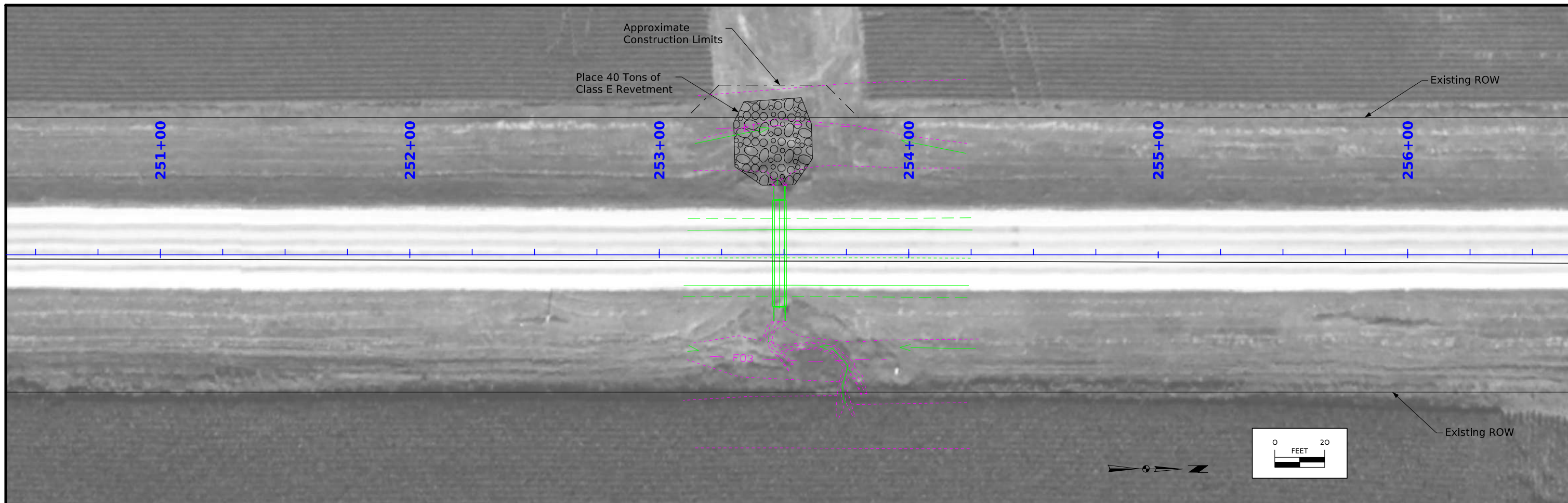


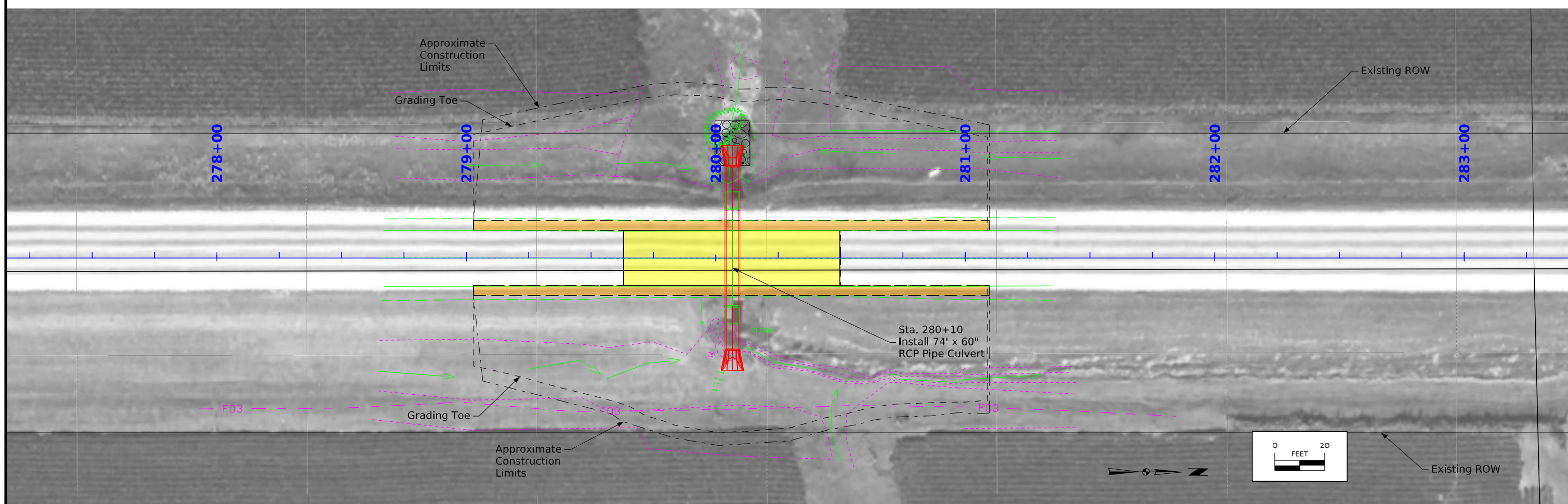
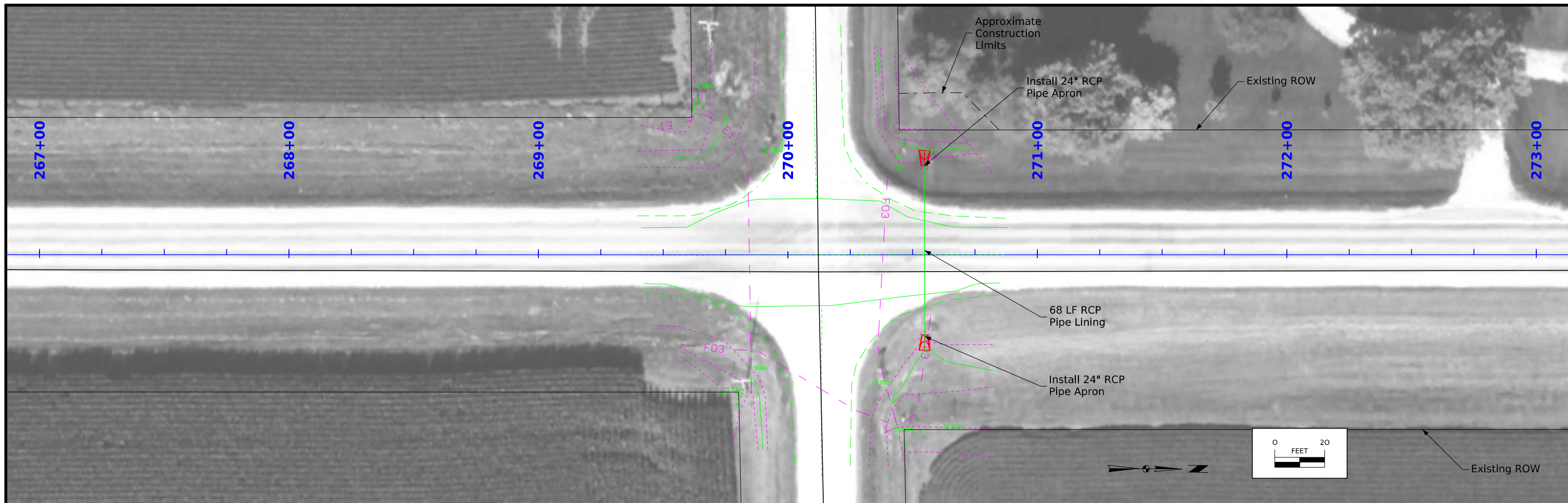


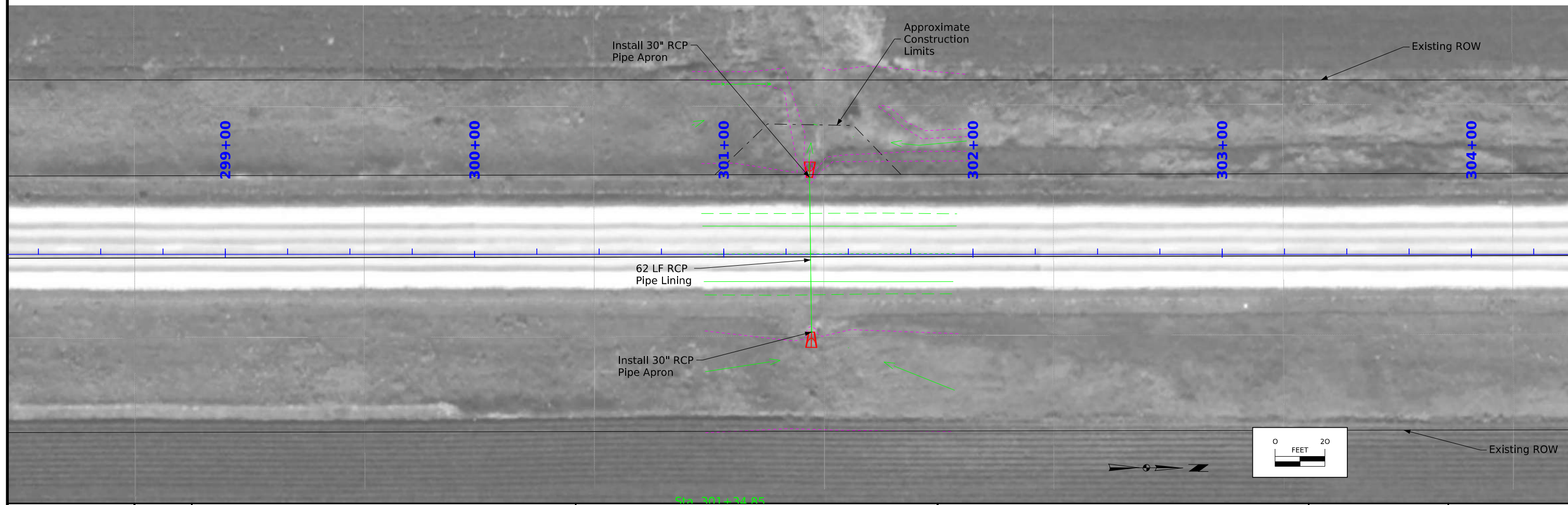
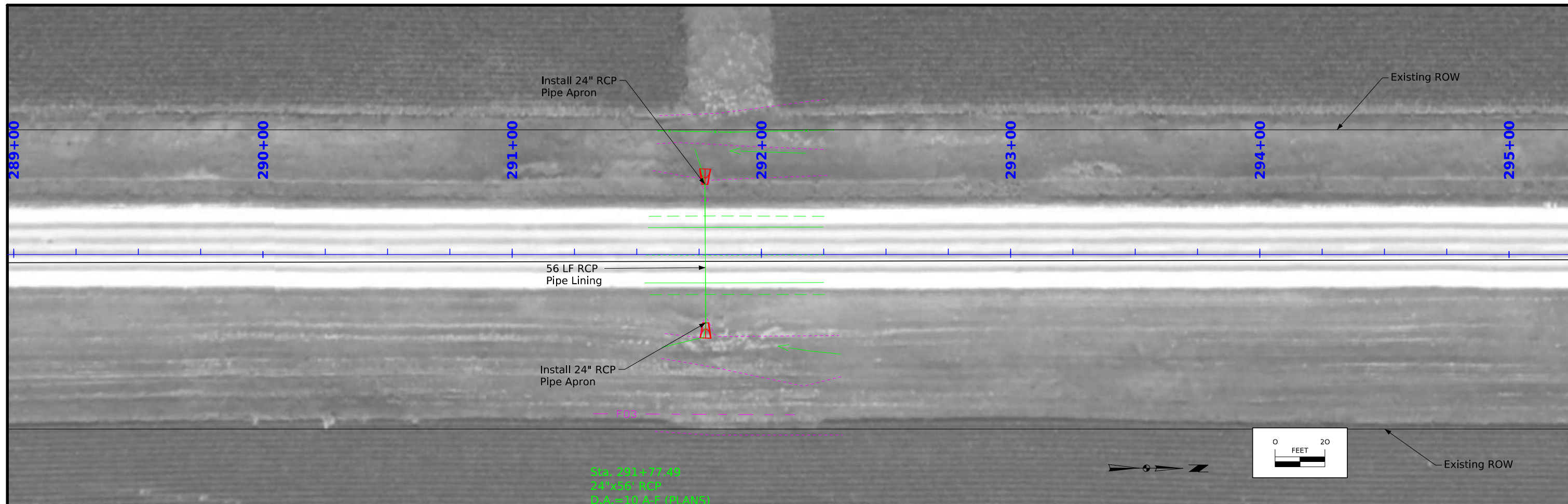


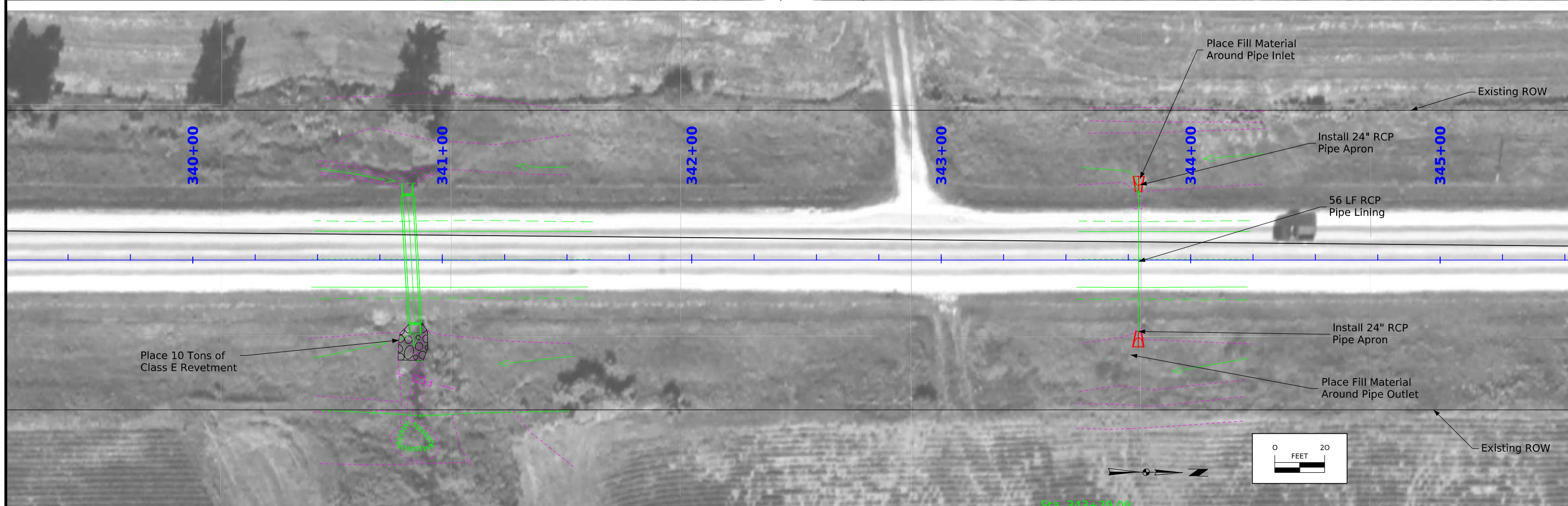
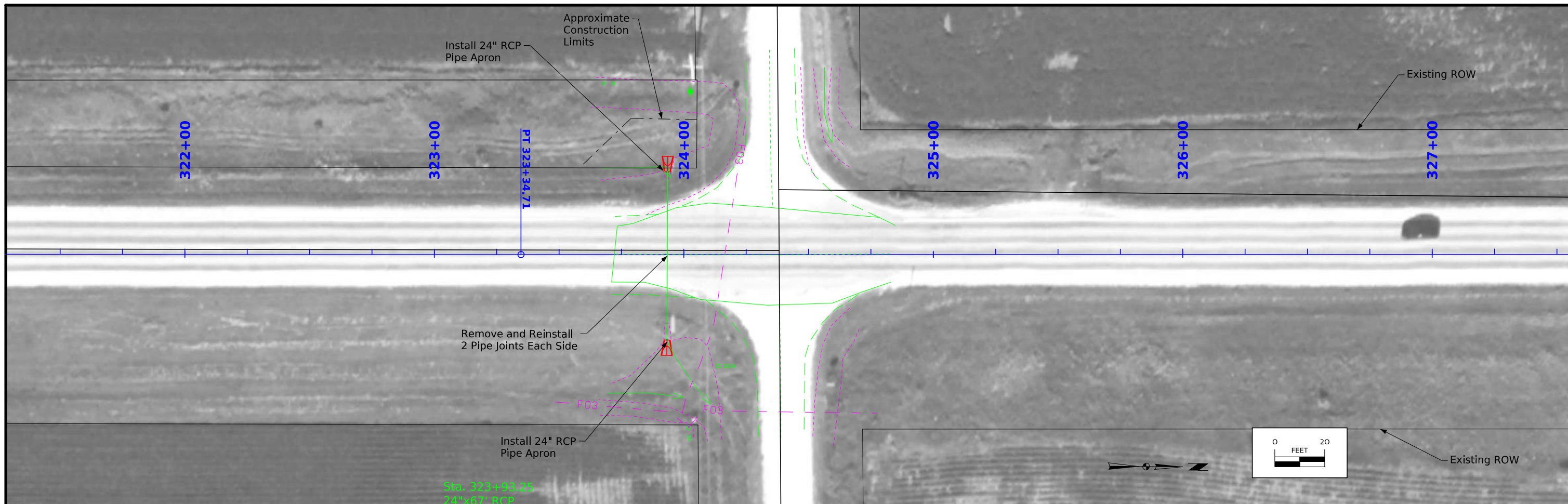


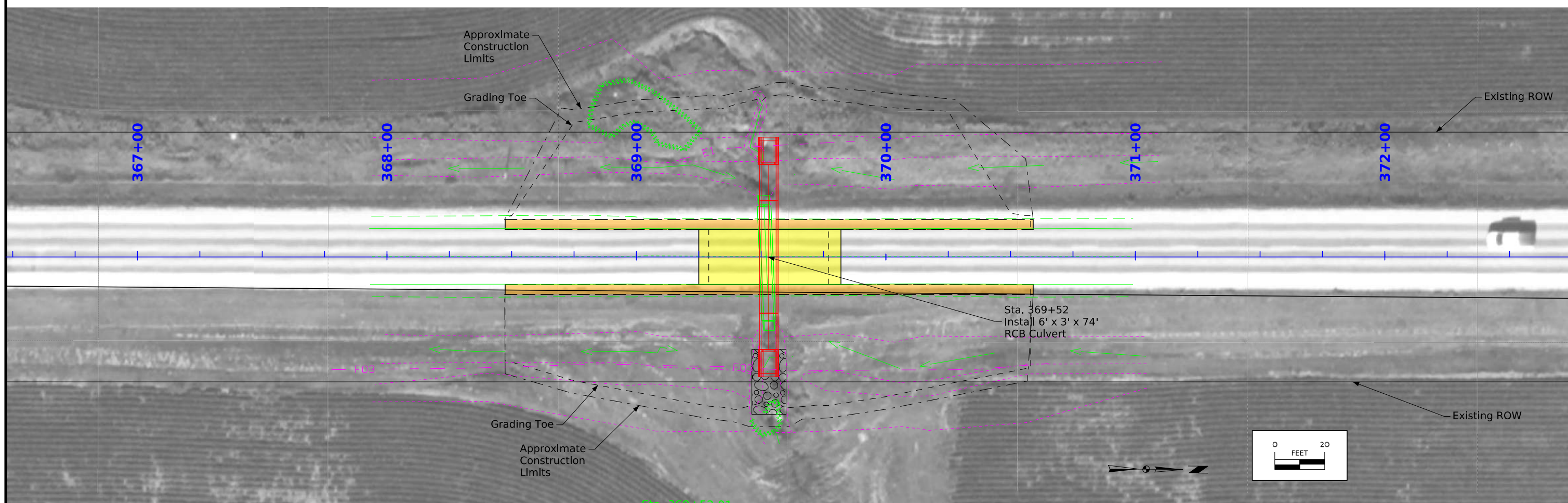
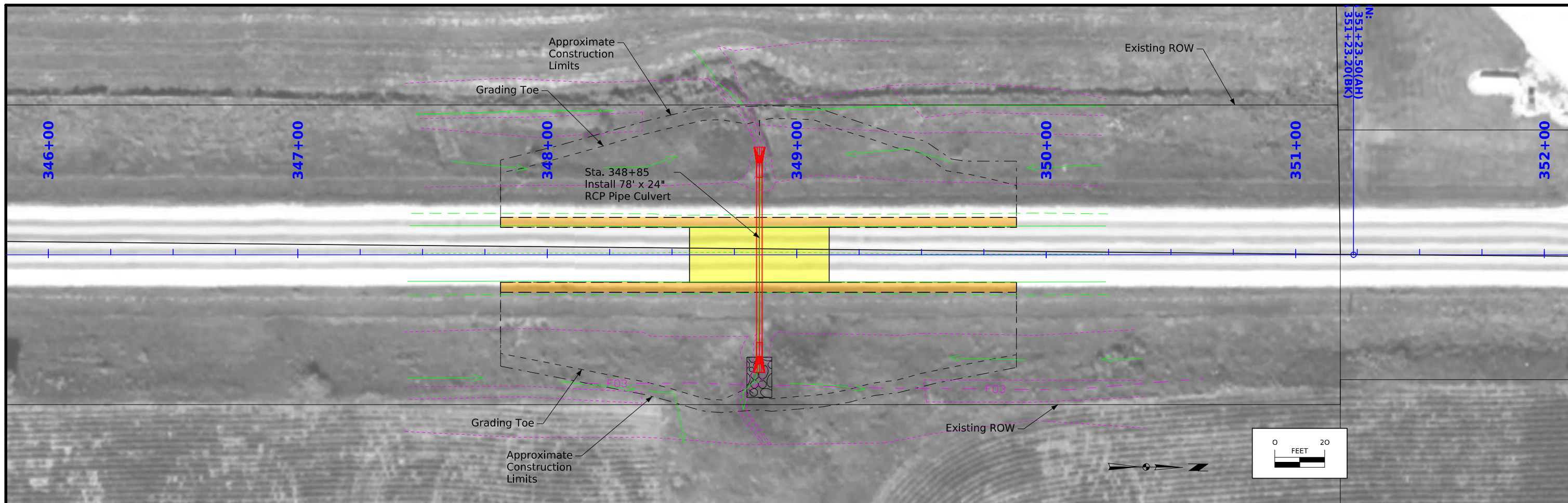


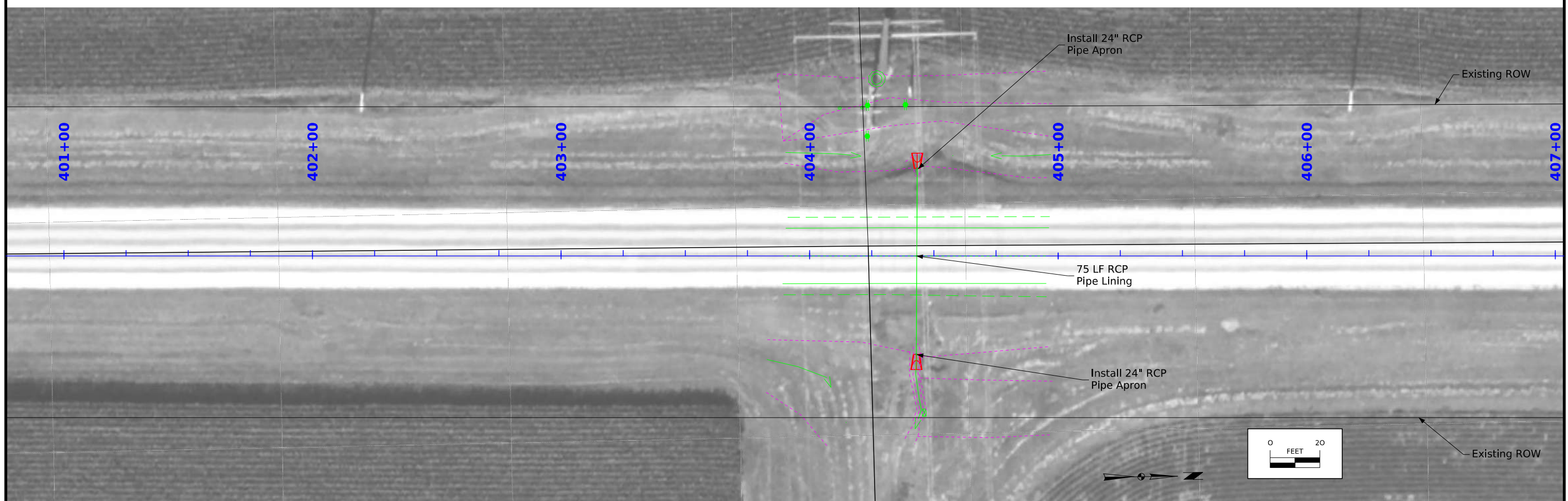
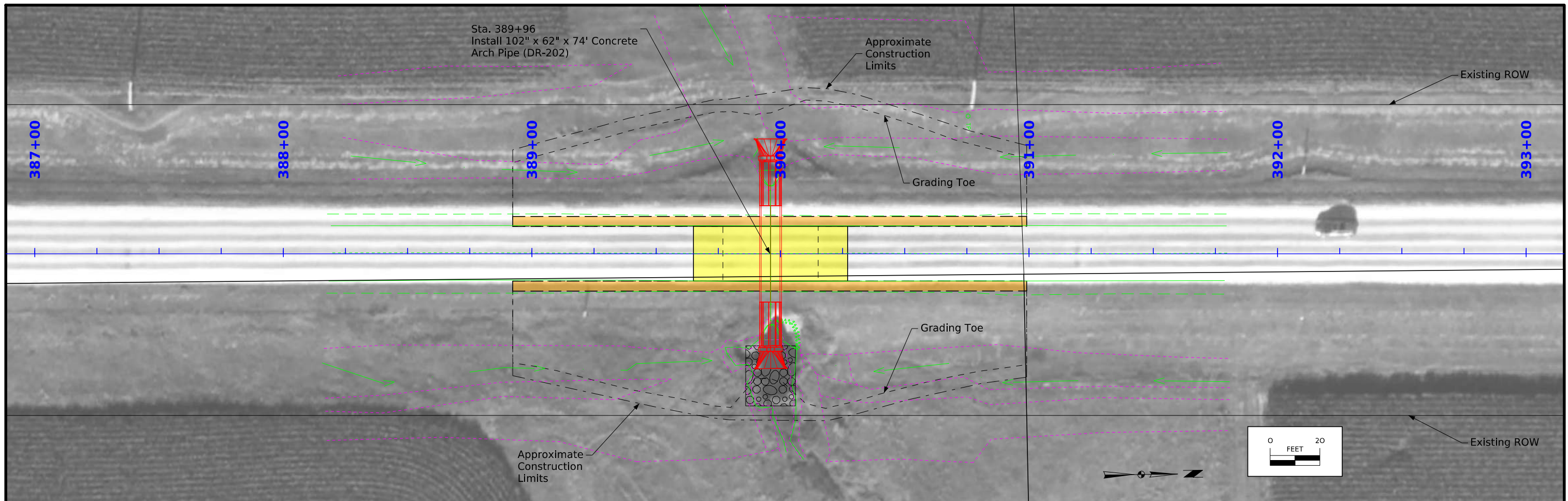


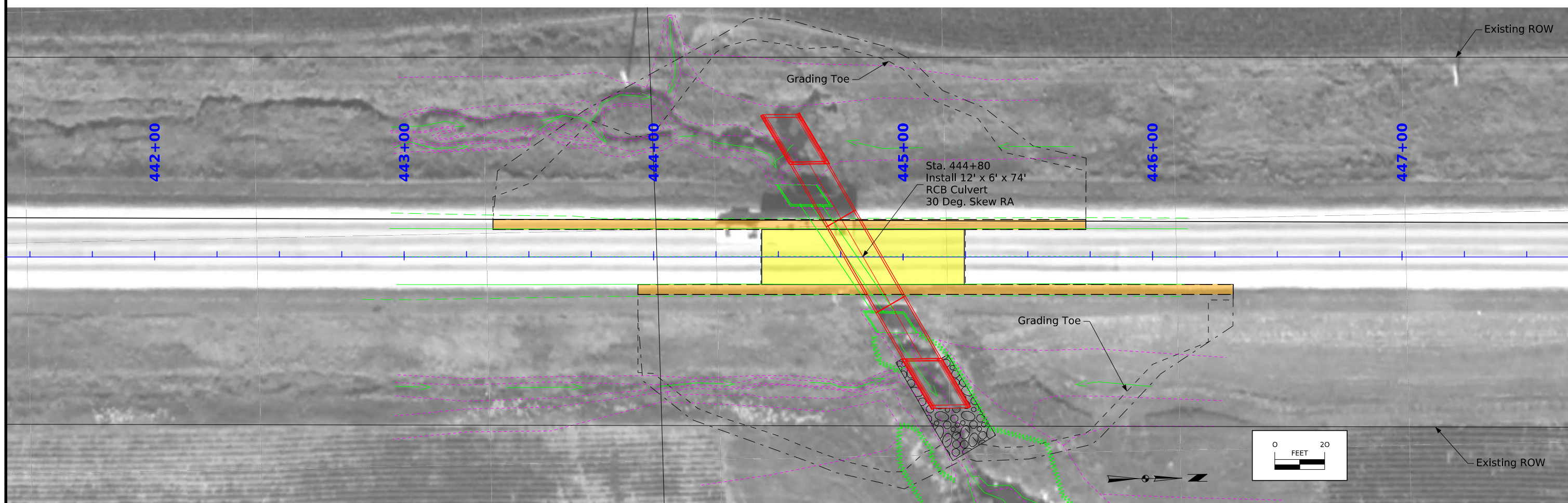
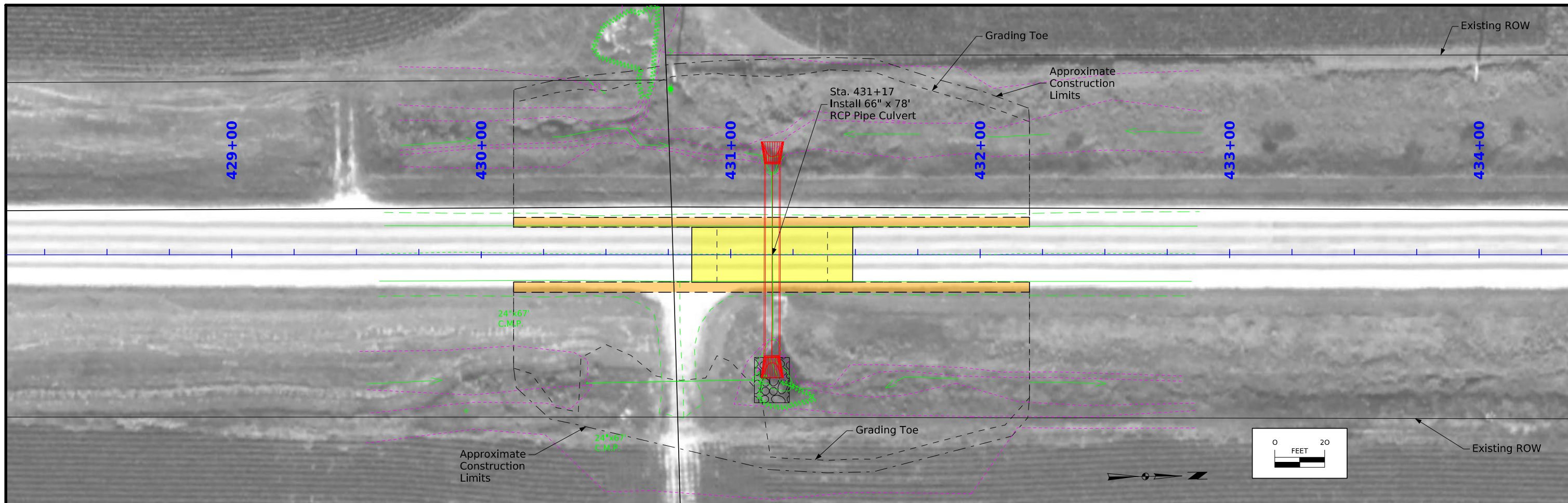


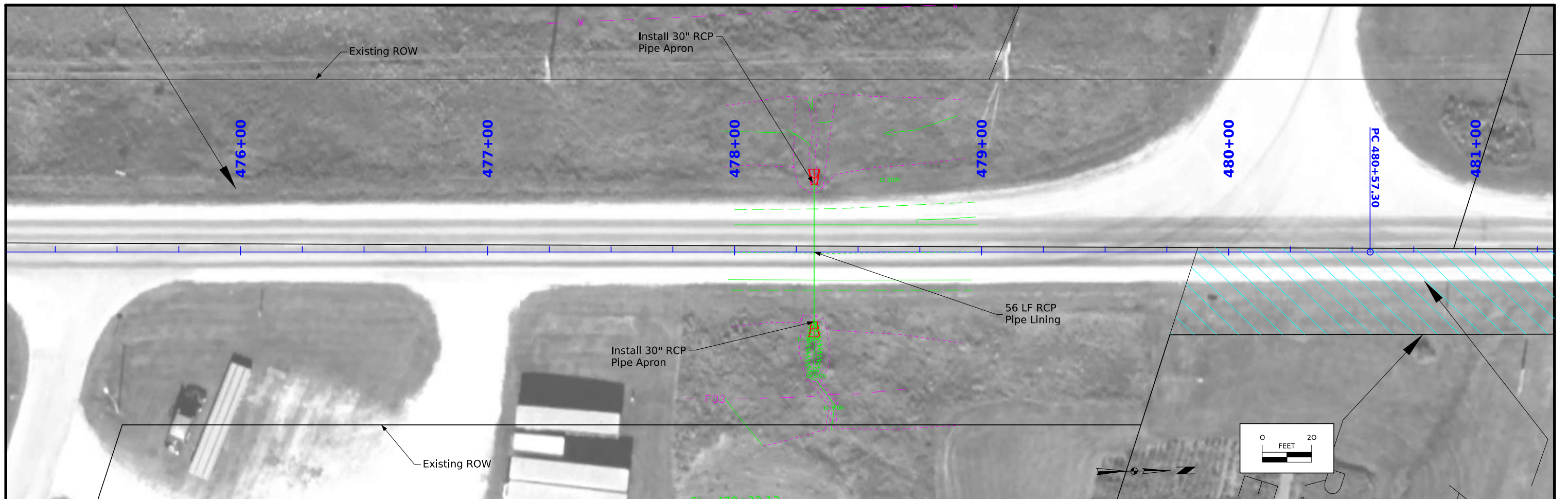


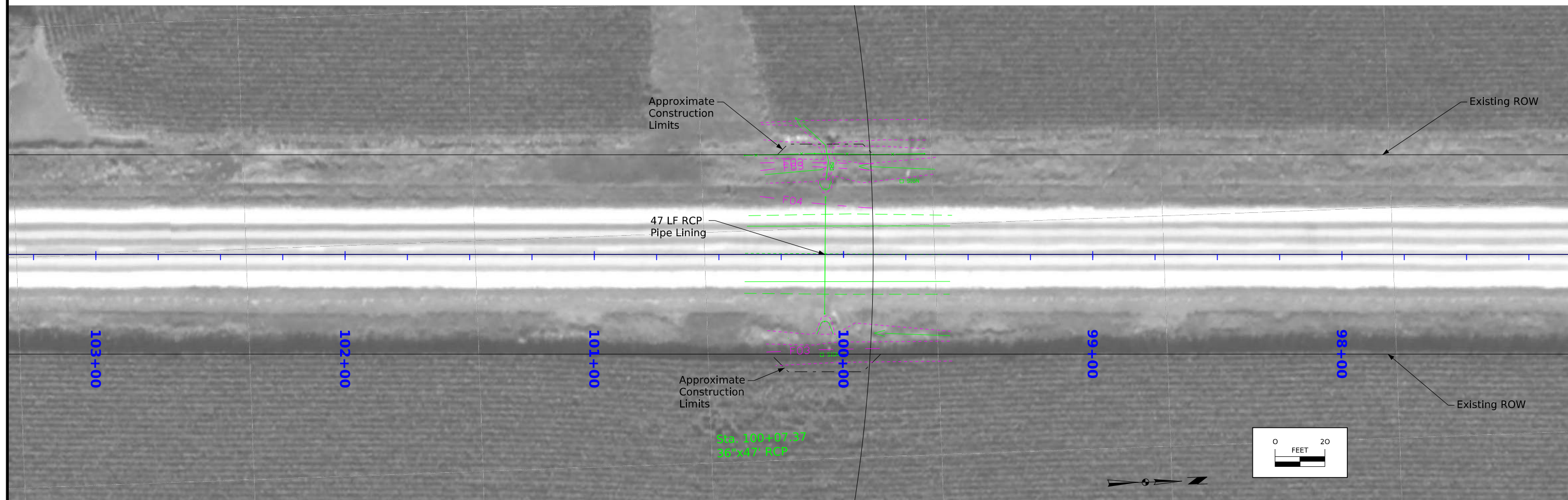
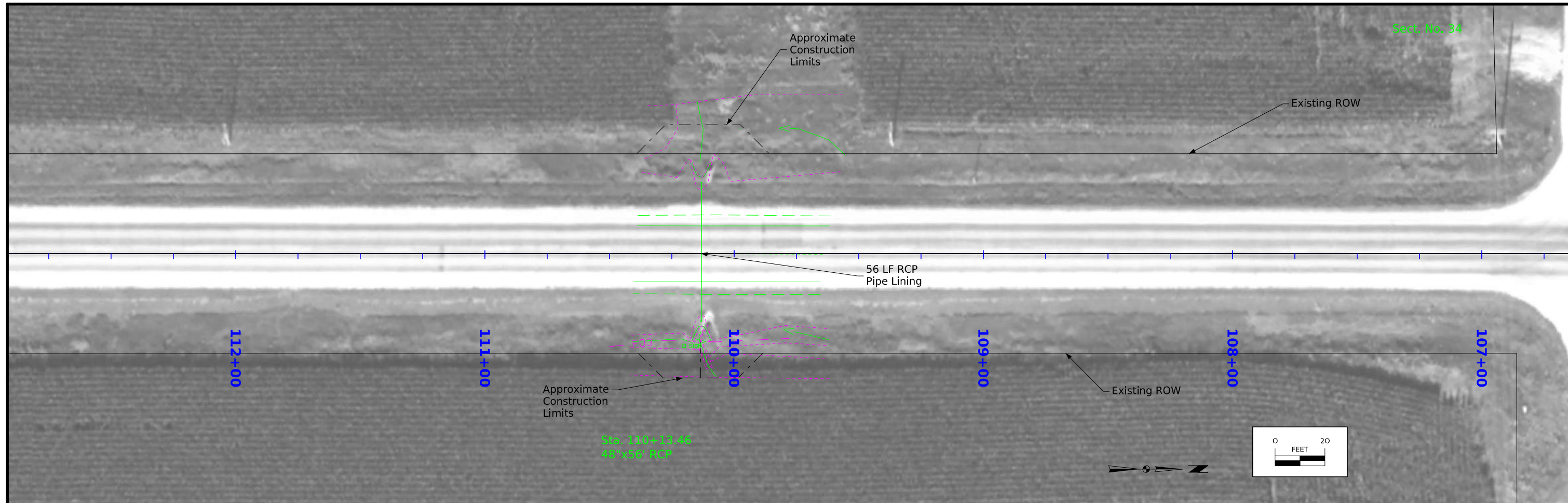


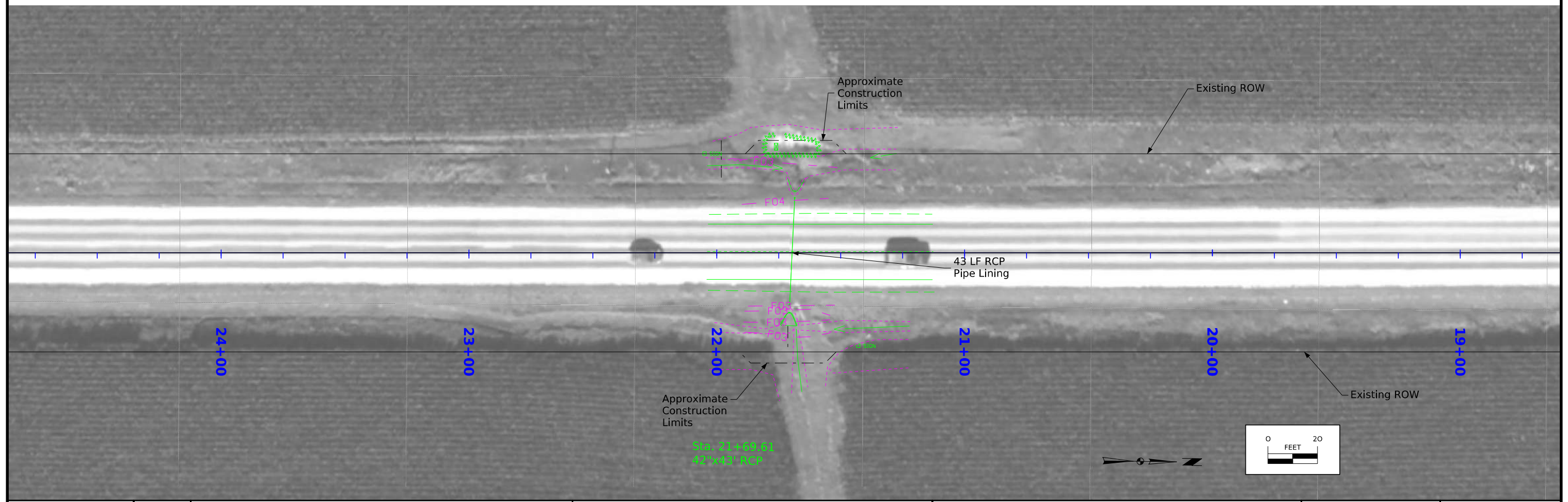
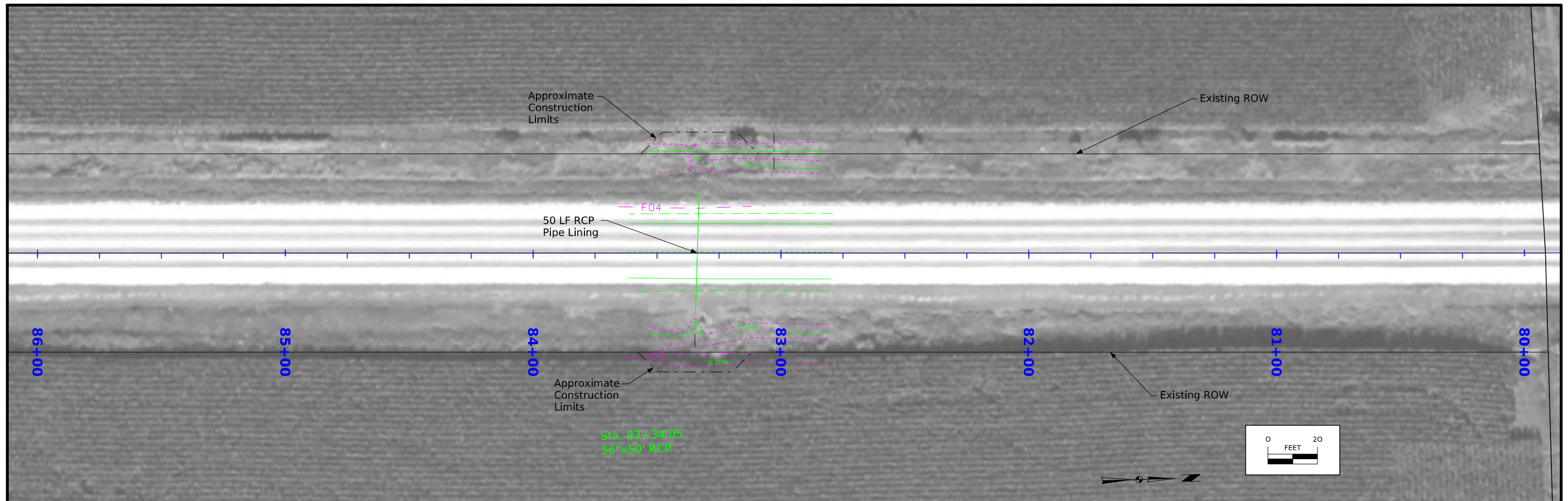


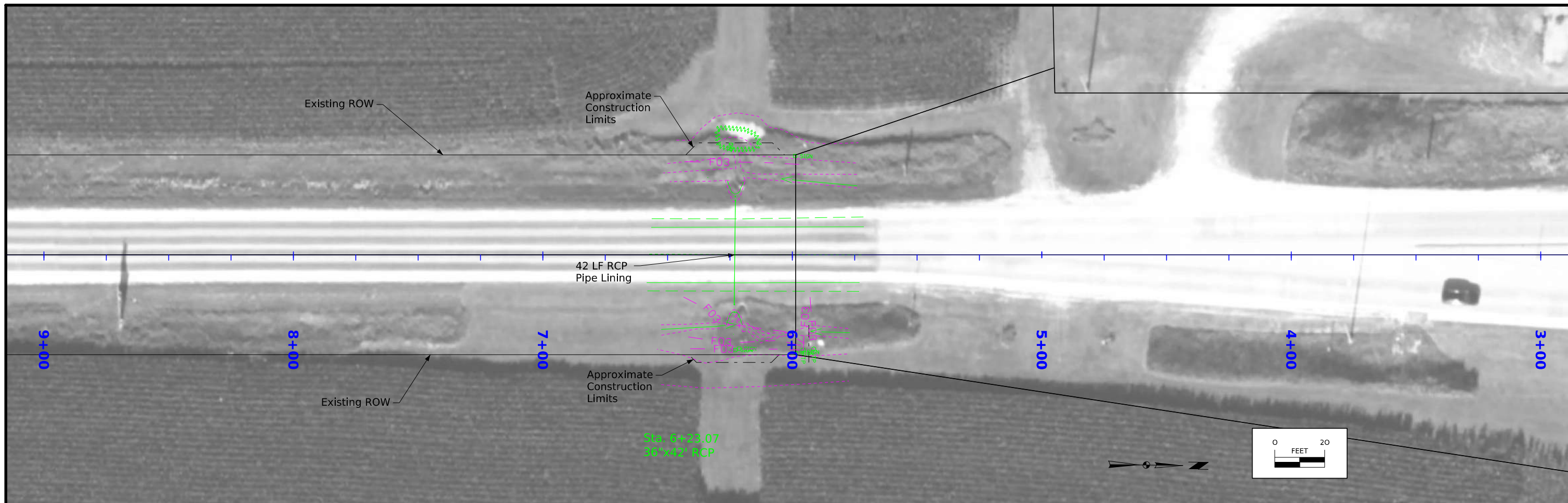












Survey Information

SURVEY INDEX

County: Buchanan
PIN: 24-10-187-010
Project Number: STPN-187-1(036)--2J-10
Location: 220th St to IA 3
Type of Work: Pipe/Culvert Repair
Project Directory: 1018701024

Survey Personnel

John Hahn– Survey Party Chief

Date(s) of Survey

Begin Date 09/23/2025
End Date 10/29/2025

General Information

This survey is for IA Hwy 187 pipe and culvert repair at various locations from 220th Street to IA Hwy 3. This survey request was for the IA Hwy 187 corridor only. This project is a Full Field DTM survey.

Utility Information

For logging data and other utility details see Utility Survey and Ownership Report in the Utility folder of the PrelimSurvey project directory.

Project Control

Coordinates were determined for primary project control points by conducting concurrent six-hour static observations. Post processing is constrained to nearby Iowa Real Time Network reference stations. For additional details of the control survey, contact the Preliminary Survey department.

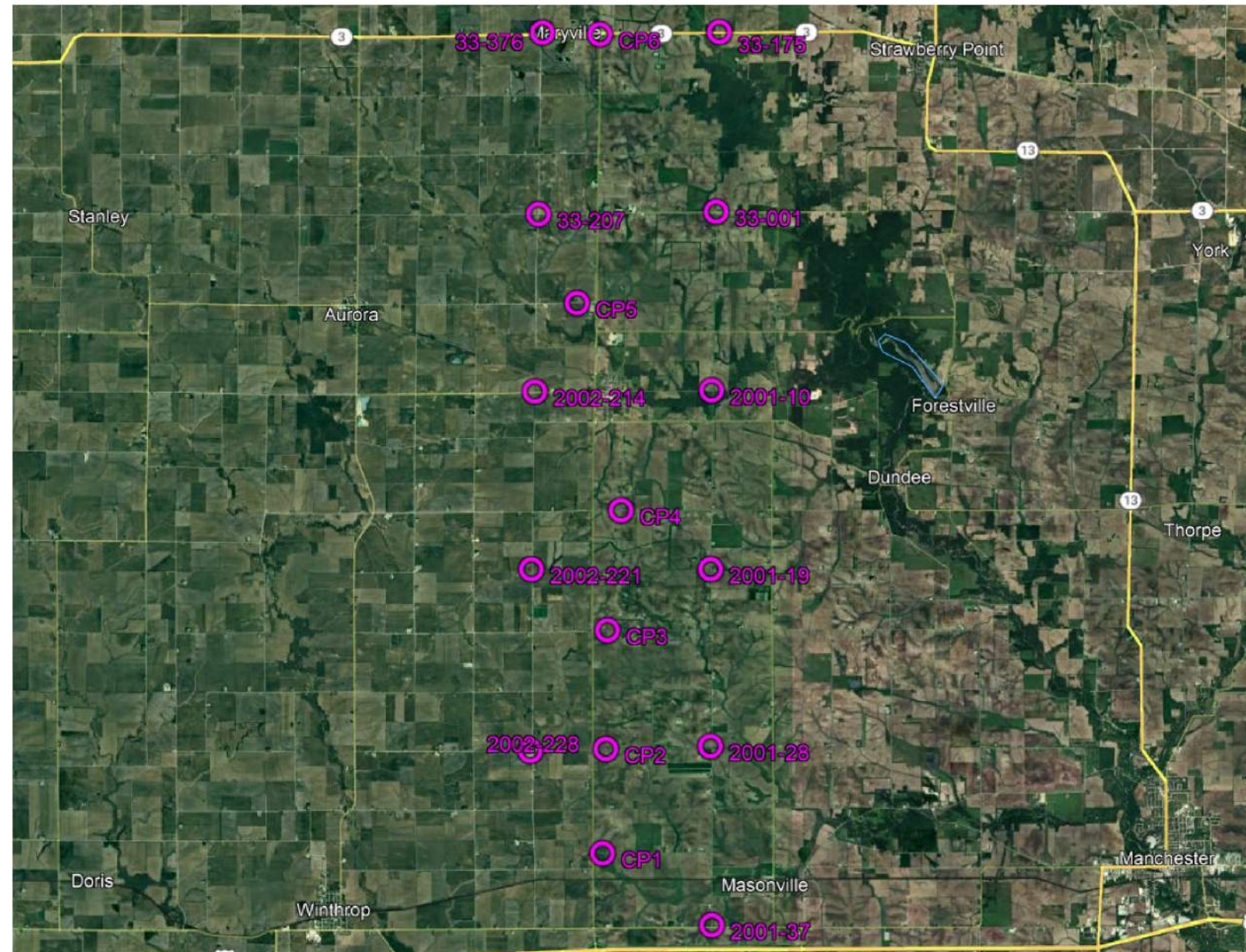
PROJECT DATUM: NAD83(2011) for EPOCH 2010.00 (IaRTN 2019 ADJUSTMENT)
COORDINATE SYSTEM: IOWA REGIONAL COORDINATE SYSTEM ZONE 5
(U.S. SURVEY FOOT)
VERTICAL DATUM: NAVD88
GEOID MODEL: 2018u3

Alignment Information

The alignment for this project was provided by District 6 ROW Survey.

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.



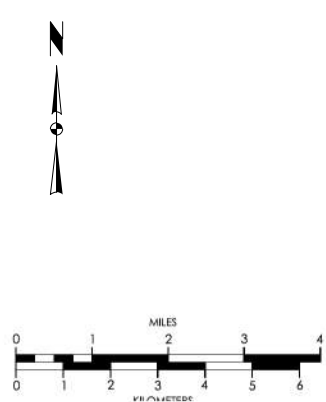
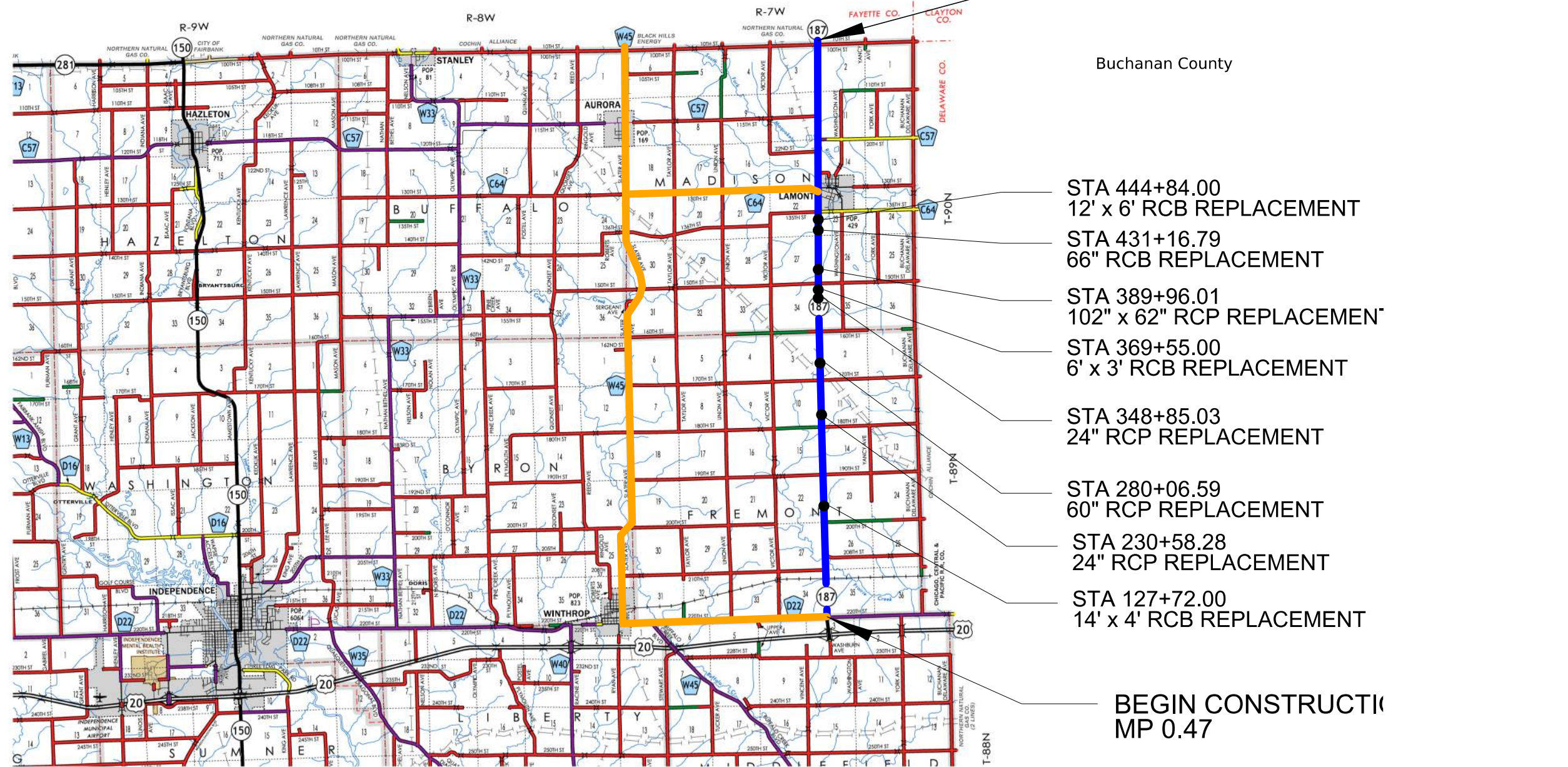
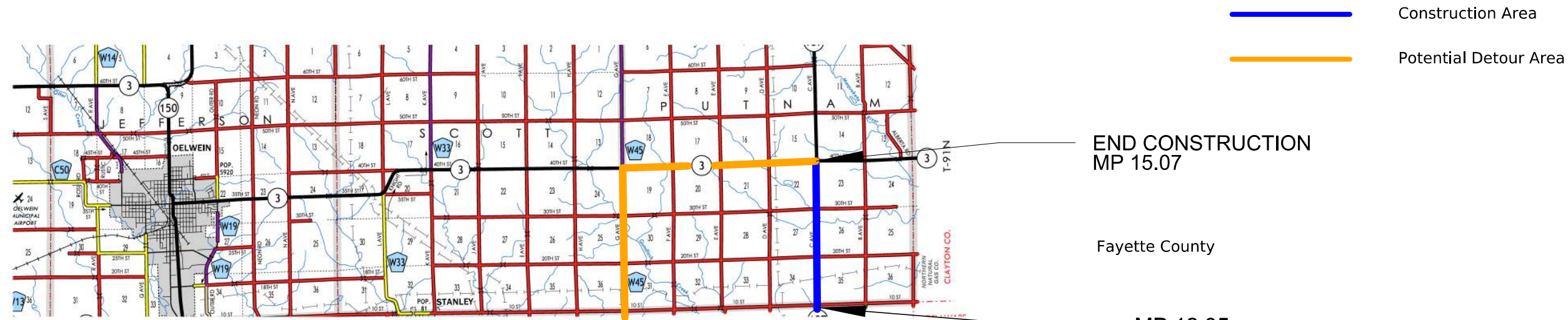
HORIZ. DATUM: NAD83(2011) for EPOCH 2010.00 (IaRTN 2019 Adjustment) - Iowa RCS Zone 5 (U.S. Survey Foot)

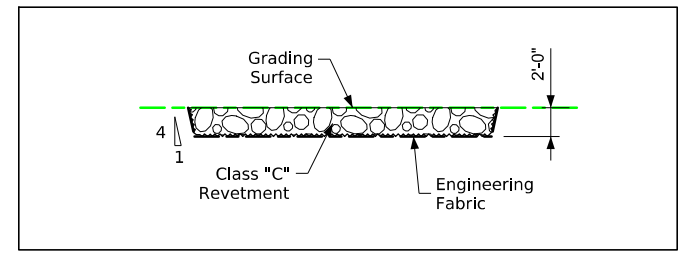
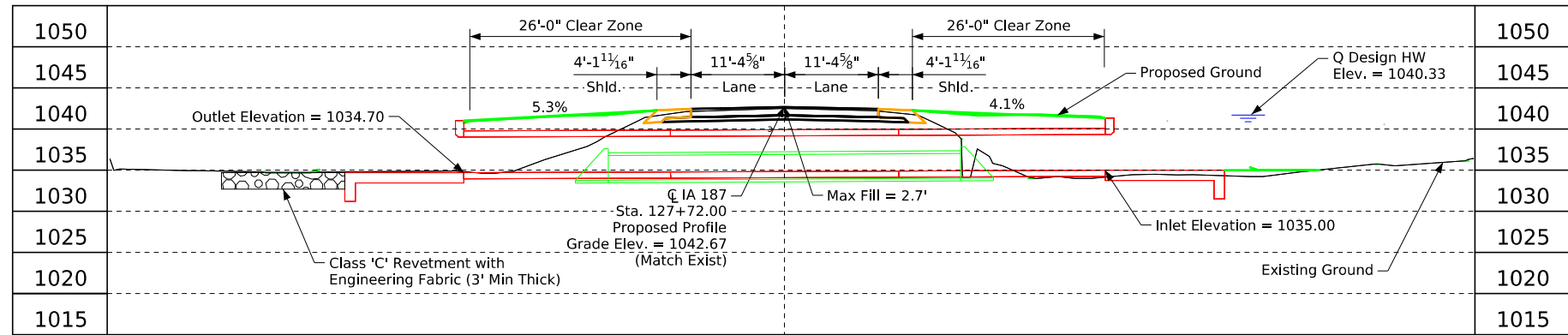
VERT. DATUM: NAVD88 - Geoid Model: 2018u3

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

HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING
HORIZ. DATUM: NAD83(2011) for EPOCH 2010.00 (IaRTN 2019 Adjustment)
Ia. Regional Coordinate System Zone 5 (U.S. Survey Foot)
VERT. DATUM: NAVD88
Geoid Model: 2018u3

| Point Name | Northing | Easting | Elevation | Code/Description |
|------------|------------|-------------|-----------|---|
| 2001-37 | 8834861.67 | 15673117.80 | 1019.62 | CP FND BUCHANAN CO GPS MON IN GOOD COND |
| CP1 | 8841224.56 | 15663226.83 | 1019.31 | CP SET FENO MON |
| CP3 | 8861106.90 | 15663514.65 | 1112.10 | CP SET FENO MON |
| CP2 | 8850492.58 | 15663460.98 | 1080.18 | CP SET FENO MON |
| 2001-28 | 8850836.55 | 15672950.59 | 1024.80 | CP FND BUCHANAN CO GPS MON IN GOOD COND |
| CP4 | 8871819.23 | 15664678.58 | 1096.06 | CP SET FENO MON |
| 2002-221 | 8866416.48 | 15656772.46 | 1100.23 | CP FND BUCHANAN CO GPS MON IN GOOD COND |
| 2001-19 | 8866642.97 | 15672722.70 | 1095.10 | CP FND BUCHANAN CO GPS MON IN GOOD COND |
| CP5 | 8890315.45 | 15660538.11 | 1053.06 | CP SET FENO MON |
| 33-207 | 8898142.32 | 15657120.42 | 1099.05 | CP FND FAYETTE CO GPS MON IN GOOD COND |
| 2001-10 | 8882603.95 | 15672824.95 | 1021.86 | CP FND BUCHANAN CO GPS MON IN GOOD COND |
| 33-001 | 8898433.81 | 15673032.46 | 1116.18 | CP FND FAYETTE CO GPS MON IN GOOD COND |
| 2002-214 | 8882342.51 | 15656868.59 | 1061.03 | CP FND BUCHANAN CO GPS MON IN GOOD COND |
| 33-376 | 8914359.54 | 15657227.60 | 1116.26 | CP FND FAYETTE CO GPS MON IN GOOD COND |
| CP6 | 8914205.23 | 15662734.71 | 1152.63 | CP SET FENO MON |
| 33-175 | 8914482.14 | 15673140.01 | 1086.05 | CP FND FAYETTE CO GPS MON IN GOOD COND |





Estimated Revetment Quantities Included With Road Plans

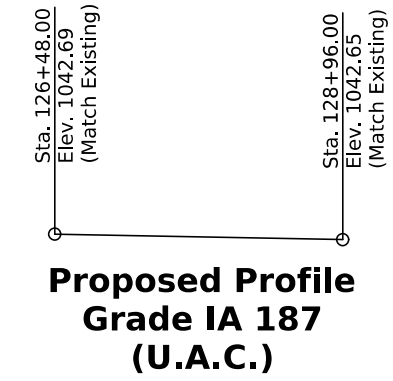
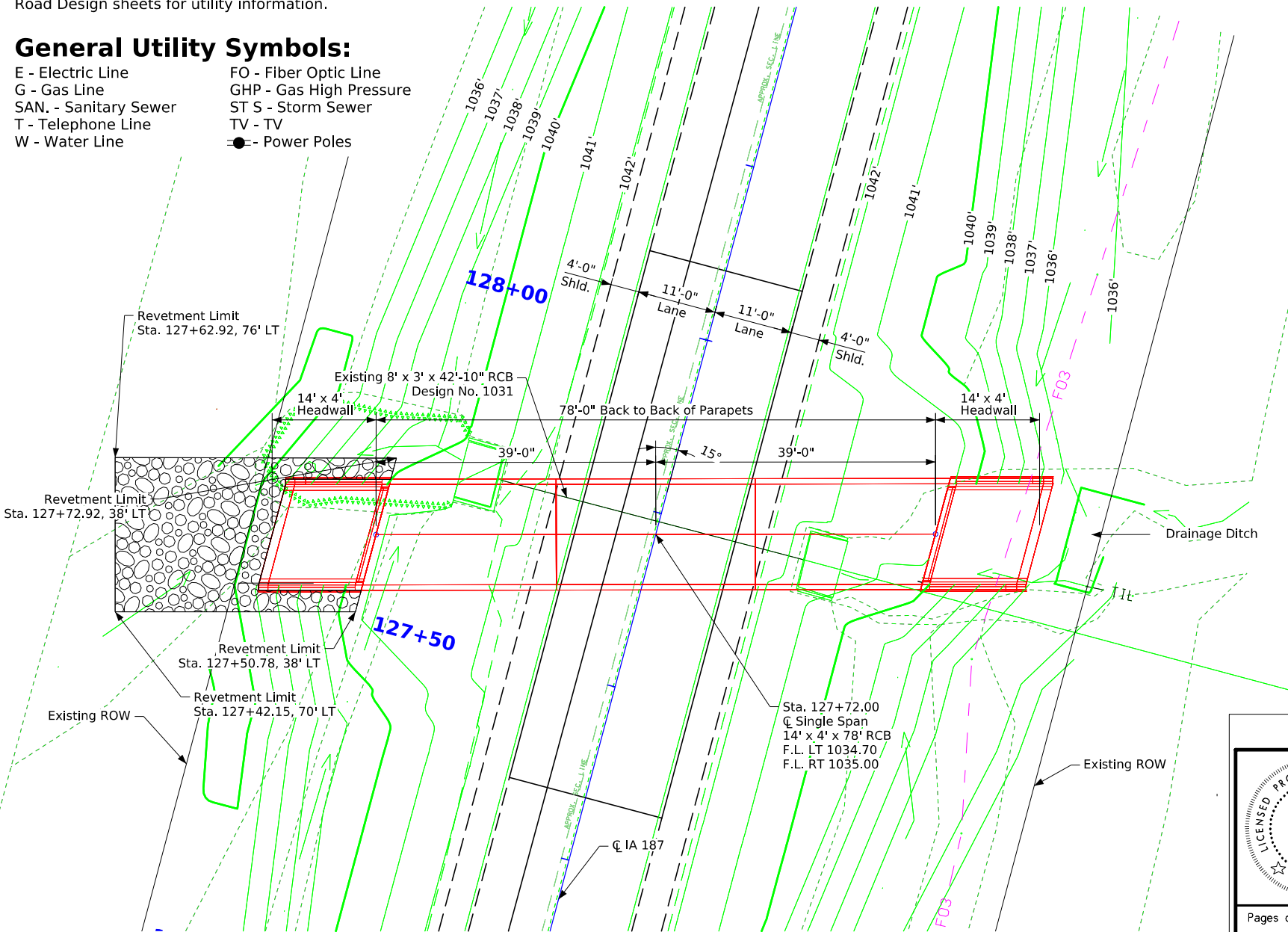
| Location | Revetment Class "C" (Ton) | Engineering Fabric (SY) | CL 10 Channel Excavation (CY) |
|----------|---------------------------|-------------------------|-------------------------------|
| Outlet | 98.8 | 114.3 | 61.8 |
| Totals | 98.8 | 114.3 | 61.8 |

Utilities Note:

Utilities shown on this sheet are for information only. See Road Design sheets for utility information.

General Utility Symbols:

- E - Electric Line
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- T - Telephone Line
- W - Water Line
- FO - Fiber Optic Line
- GHP - Gas High Pressure
- ST S - Storm Sewer
- TV - TV
- - Power Poles



Excavation quantity calculated from grading surface. Excavation quantity is for embedded revetment core out only, and does not include excavation to the grading surface. Excavation quantity to the grading surface is determined by Road Design and included in the Road Plans. Quantities shown for information only. See Road Sheets.

Hydraulic Data

RIDB: Not Applicable
 Drainage Area = 471.10 Acres
 Stream Slope = 67.4 Ft./Mi.
 $Q_{50} = 432.50$ cfs
 HW Elev. = 1040.33
 Exit Velocity = 10.92 fps

$Q_{100} = 555.35$ cfs
 HW Elev. = 1041.84
 Exit Velocity = 9.92 fps

Traffic Estimate

2024 AADT TRUCKS 2010 V.P.D. 15.6 %

Location

IA 187 Over Drainage Ditch
 T-89N R-7W
 Section 22 & 23
 Fremont Township
 Buchanan County
 Latitude 42.502514°
 Longitude -91.648154°

General Notes:

This design is for the replacement of the existing 8' x 3' x 42'-10" Reinforced Concrete Box Culvert, Design No. 1031.

Design Notes:

IA 187 will be closed to traffic during construction and an off-site detour will be utilized.

Revetment is proposed at the culvert outlet due to the outlet velocity exceeding policy limits.

Density used for Class C Revetment quantity calculations is 1.6 T/cy

Plan Notes:

Drainage through existing culvert must be maintained throughout construction.

Hydraulic Design

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Signature: *Daniel D. Kimball* Date: 3-23-26
 DANIEL D. KIMBALL
 Printed or Typed Name

My license renewal date is December 31, 2027

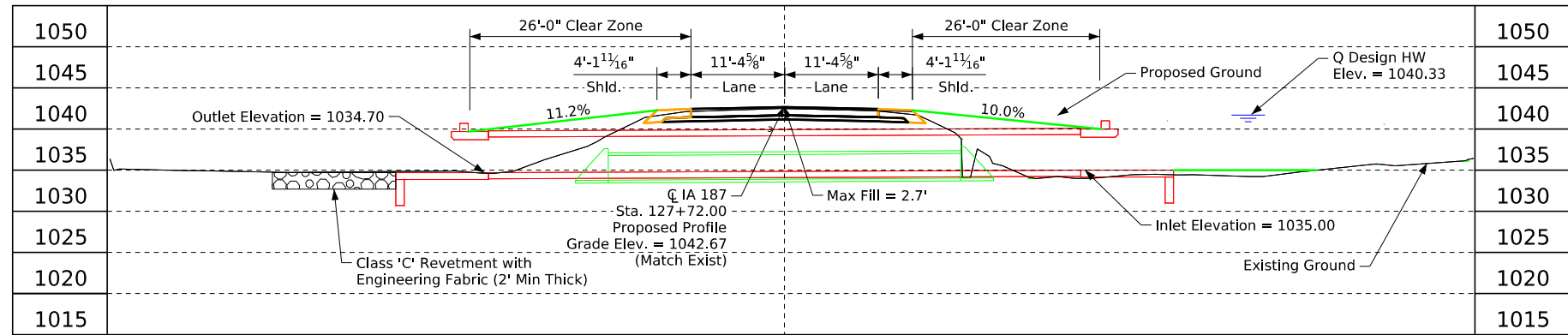
Pages or sheets covered by this seal: _____

Design For 15 Degree
14'-0" x 4'-0" x 78'-0"
Cast-In-Place RCB Culvert

Situation Plan - CIP
 STA. 127+72.00 (IA 187) Turn-In Date: Oct. 2027

Buchanan County
 IOWA DEPARTMENT OF TRANSPORTATION

Design No. Design Sheet No. 1 of 2 FHWA/Asset



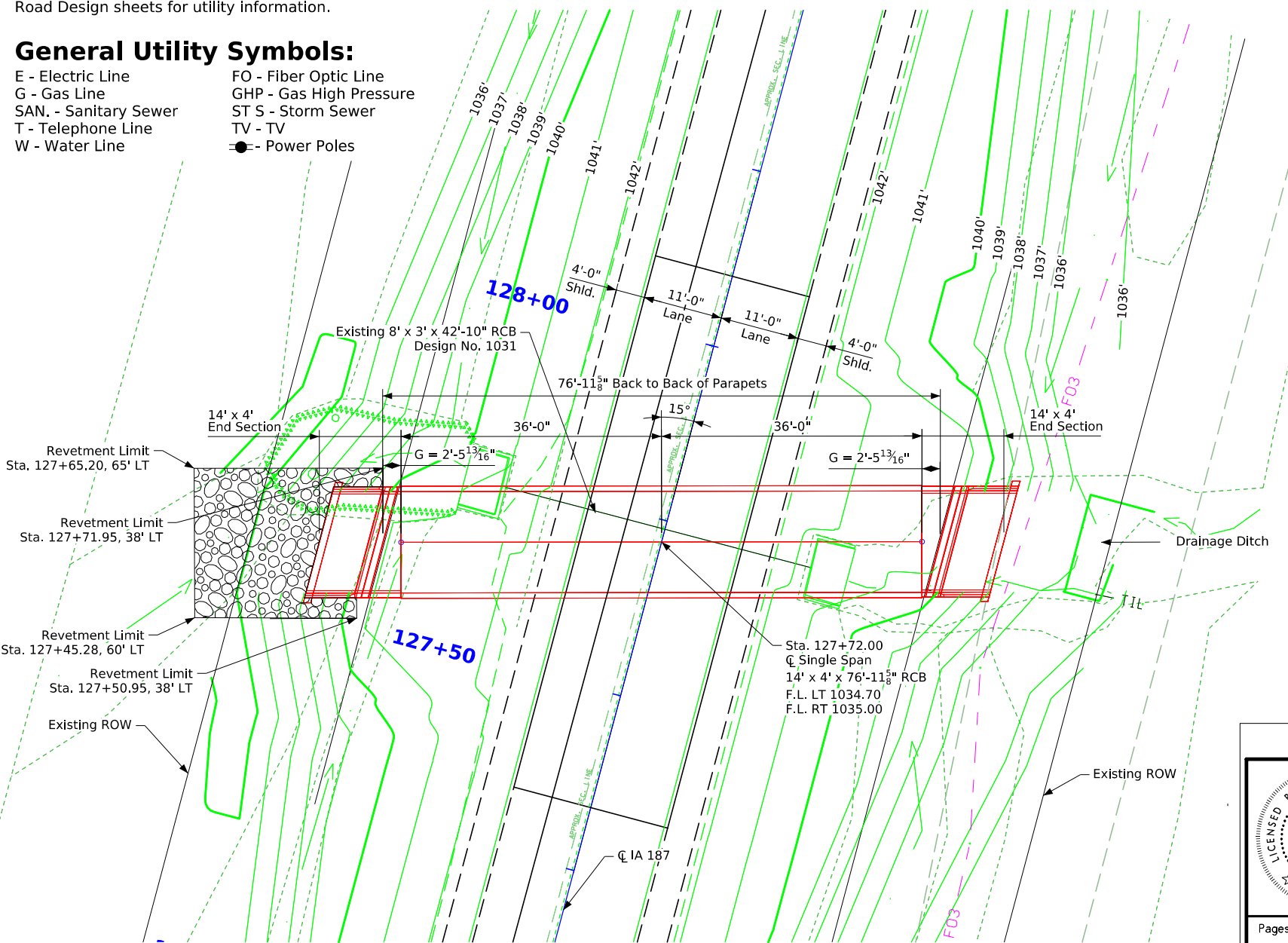
Longitudinal Section Along Centerline of Culvert

Utilities Note:

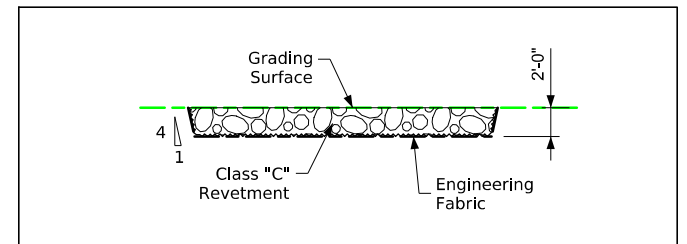
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General Utility Symbols:

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- GHP - Gas High Pressure
- ST S - Storm Sewer
- TV - TV
- - Power Poles



Situation Plan



Typical Channel Protection

Estimated Revetment Quantities Included With Road Plans

| Location | Revetment Class "C" (Ton) | Engineering Fabric (SY) | CL 10 Channel Excavation (CY) |
|----------|---------------------------|-------------------------|-------------------------------|
| Outlet | 69.9 | 83.8 | 43.7 |
| Totals | 69.9 | 83.8 | 43.7 |

Excavation quantity calculated from grading surface. Excavation quantity is for embedded revetment core out only, and does not include excavation to the grading surface. Excavation quantity to the grading surface is determined by Road Design and included in the Road Plans. Quantities shown for information only. See Road Sheets.

Hydraulic Data

RIDB: Not Applicable
 Drainage Area = 471.10 Acres
 Stream Slope = 67.4 Ft./Mi.
 $Q_{50} = 432.50$ cfs
 HW Elev. = 1040.33
 Exit Velocity = 10.92 fps

$Q_{100} = 555.35$ cfs
 HW Elev. = 1041.84
 Exit Velocity = 9.92 fps

General Notes:

This design is for the replacement of the existing 8' x 3' x 42'-10" Reinforced Concrete Box Culvert, Design No. 1031.

Design Notes:

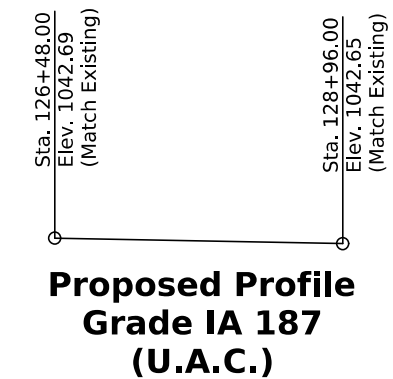
IA 187 will be closed to traffic during construction and an off-site detour will be utilized.

Revetment is proposed at the culvert outlet due to the outlet velocity exceeding policy limits.

Density used for Class C Revetment quantity calculations is 1.6 T/cy

Plan Notes:

Drainage through existing culvert must be maintained throughout construction.



Proposed Profile Grade IA 187 (U.A.C.)

Traffic Estimate

| | |
|-----------|-------------|
| 2024 AADT | 2010 V.P.D. |
| TRUCKS | 15.6 % |

Location

IA 187 Over Drainage Ditch
 T-89N R-7W
 Section 22 & 23
 Fremont Township
 Buchanan County
 Latitude 42.502514°
 Longitude -91.648154°



Hydraulic Design

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

Signature: *Daniel D. Kimball* Date: 3-23-26

Printed or Typed Name: DANIEL D. KIMBALL

My license renewal date is December 31, 2027

Pages or sheets covered by this seal: _____

Design For 15 Degree Skew RA
 14'-0" x 4'-0" x 76'-11 5/8"
 Precast RCB Culvert

Situation Plan - PC

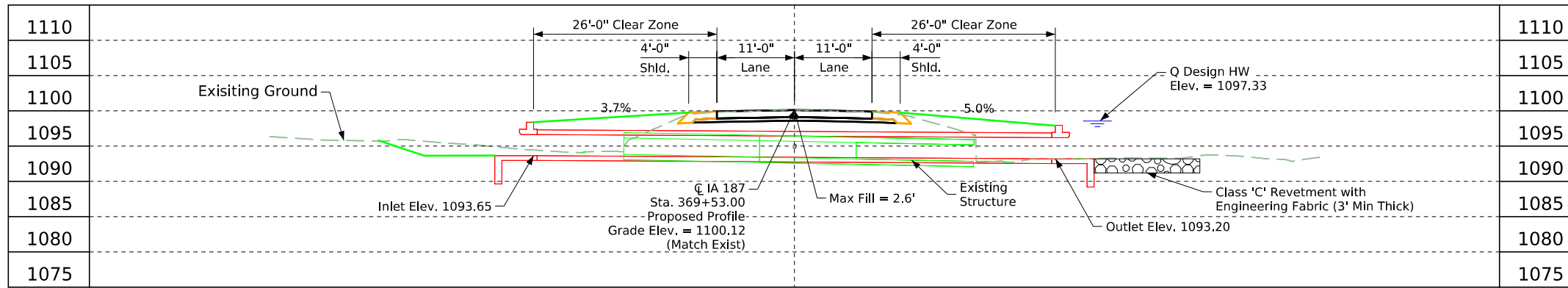
STA. 127+72.00 (IA 187) Turn-In Date: Oct. 2027

Buchanan County

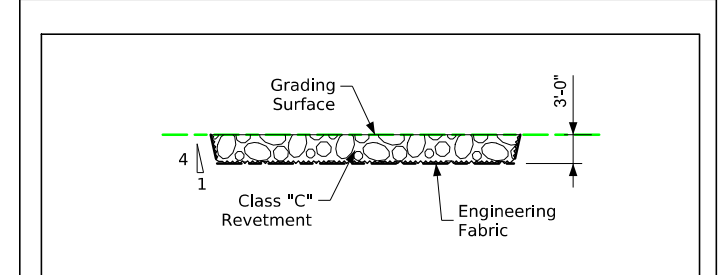
IOWA DEPARTMENT OF TRANSPORTATION

Design No. Design Sheet No. 2 of 2 FHWA/Asset

Control Point:
 Pnt. No.: CP4 N: 15664678.582 E:8871819.227 Elev:1096.058, CP SET FENO MON



Longitudinal Section Along C Culvert



Typical Channel Protection

Estimated Revetment Quantities Included With Road Plans

| Location | Revetment Class "C" (Ton) | Engineering Fabric (SY) | CL. 10 Channel Excavation (CY) |
|----------|---------------------------|-------------------------|--------------------------------|
| Outlet | 59.4 | 71.3 | 37.1 |
| Totals | 59.4 | 71.3 | 37.1 |

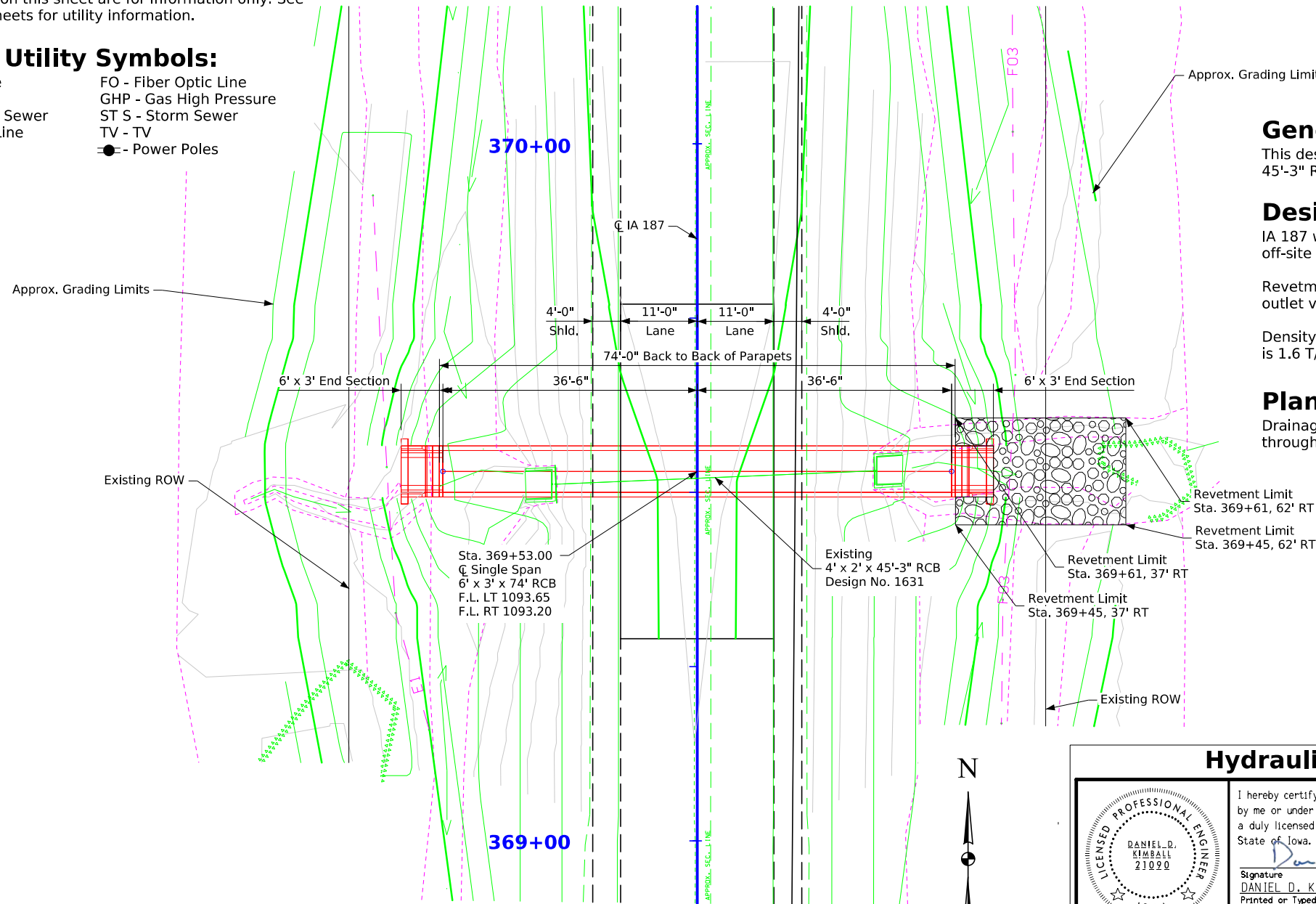
Excavation quantity calculated from grading surface. Excavation quantity is for embedded revetment core out only, and does not include excavation to the grading surface. Excavation quantity to the grading surface is determined by Road Design and included in the Road Plans. Quantities shown for information only. See Road Sheets.

Utilities Note:

Utilities shown on this sheet are for information only. See Road Design sheets for utility information.

General Utility Symbols:

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- T - Telephone Line
- W - Water Line
- FO - Fiber Optic Line
- GHP - Gas High Pressure
- ST S - Storm Sewer
- TV - TV
- - Power Poles



Situation Plan

General Notes:

This design is for the replacement of the existing 4' x 2' x 45'-3" Reinforced Concrete Box Culvert, Design No. 1631

Design Notes:

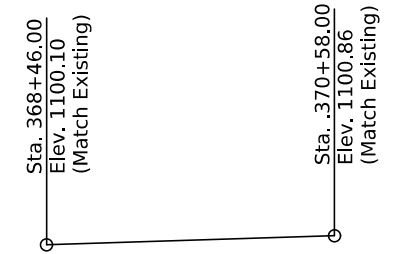
IA 187 will be closed to traffic during construction and an off-site detour will be utilized.

Revetment is proposed at the culvert outlet due to the outlet velocity exceeding policy limits.

Density used for Class C Revetment quantity calculations is 1.6 T/cy

Plan Notes:

Drainage through existing culvert must be maintained throughout construction.



Proposed Profile Grade IA 187 (U.A.C.)

Location

IA 187 Over Drainage Ditch
 T-90N R-7W
 Section 34 & 35
 Madison Township
 Buchanan County
 Latitude 42.568847°
 Longitude -91.648417°

Hydraulic Data

RIDB: Not Applicable
 Drainage Area = 78.28 Acres
 Stream Slope = 86.62 Ft./Mi.
 Q₅₀ = 108.47 cfs
 HW Elev. = 1097.33
 Exit Velocity = 9.55 fps
 Q₁₀₀ = 138.20 cfs
 HW Elev. = 1098.22
 Exit Velocity = 10.23 fps

Traffic Estimate

| | |
|-----------|-------------|
| 2024 AADT | 2010 V.P.D. |
| TRUCKS | 15.6 % |

Hydraulic Design

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly licensed Professional Engineer under the laws of the State of Iowa.

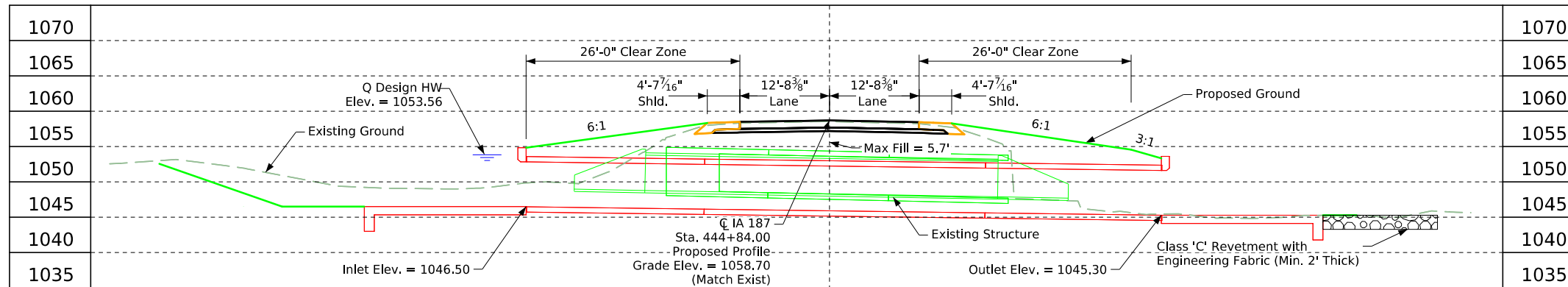
Signature: *Daniel D. Kimball* Date: 3-23-26
 DANIEL D. KIMBALL
 Printed or Typed Name
 My license renewal date is December 31, 2027

Pages or sheets covered by this seal: _____

Design For 0 Degree
6'-0" x 3'-0" x 74'-0"
Precast RCB Culvert

Situation Plan - PC
 STA. 369+55 (IA 187) Turn-In Date: Oct. 2027
Buchanan County
 IOWA DEPARTMENT OF TRANSPORTATION
 Design No. Design Sheet No. 2 of 2 FHWA/Asset

Control Point:
 Pnt. No.: CP4 N: 15664678.582 E:8871819.227 Elev:1096.058, CP SET FENO MON



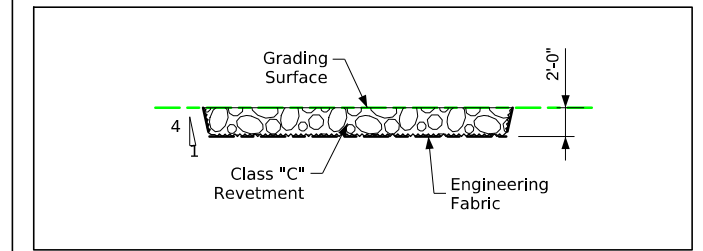
Utilities Note:

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General Utility Symbols:

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- T - Telephone Line
- W - Water Line
- FO - Fiber Optic Line
- GHP - Gas High Pressure
- ST S - Storm Sewer
- TV - TV
- Power Poles

Longitudinal Section Along Centerline of Culvert



Typical Channel Protection

Estimated Revetment Quantities Included With Road Plans

| Location | Revetment Class "C" (Ton) | Engineering Fabric (SY) | CL 10 Channel Excavation (CY) |
|----------|---------------------------|-------------------------|-------------------------------|
| Outlet | 90.0 | 117.0 | 56.2 |
| Totals | 90.0 | 117.0 | 56.2 |

Excavation quantity calculated from grading surface. Excavation quantity is for embedded revetment core out only, and does not include excavation to the grading surface. Excavation quantity to the grading surface is determined by Road Design and included in the Road Plans. Quantities shown for information only. See Road Sheets.

General Notes:

This design is for the replacement of the existing 6' x 5' x 50' Reinforced Concrete Box Culvert, Design No. 1831

Design Notes:

IA 187 will be closed to traffic during construction and off-site deour will be utilized

Revetment is proposed at the culvert outlet due to the outlet velocity exceeding policy limits.

Density used for Class C Revetment quantity calculations is 1.6 T/cy

Plan Notes:

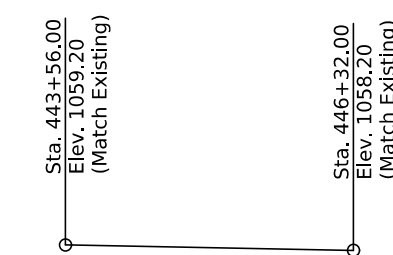
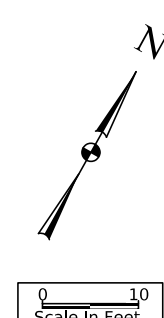
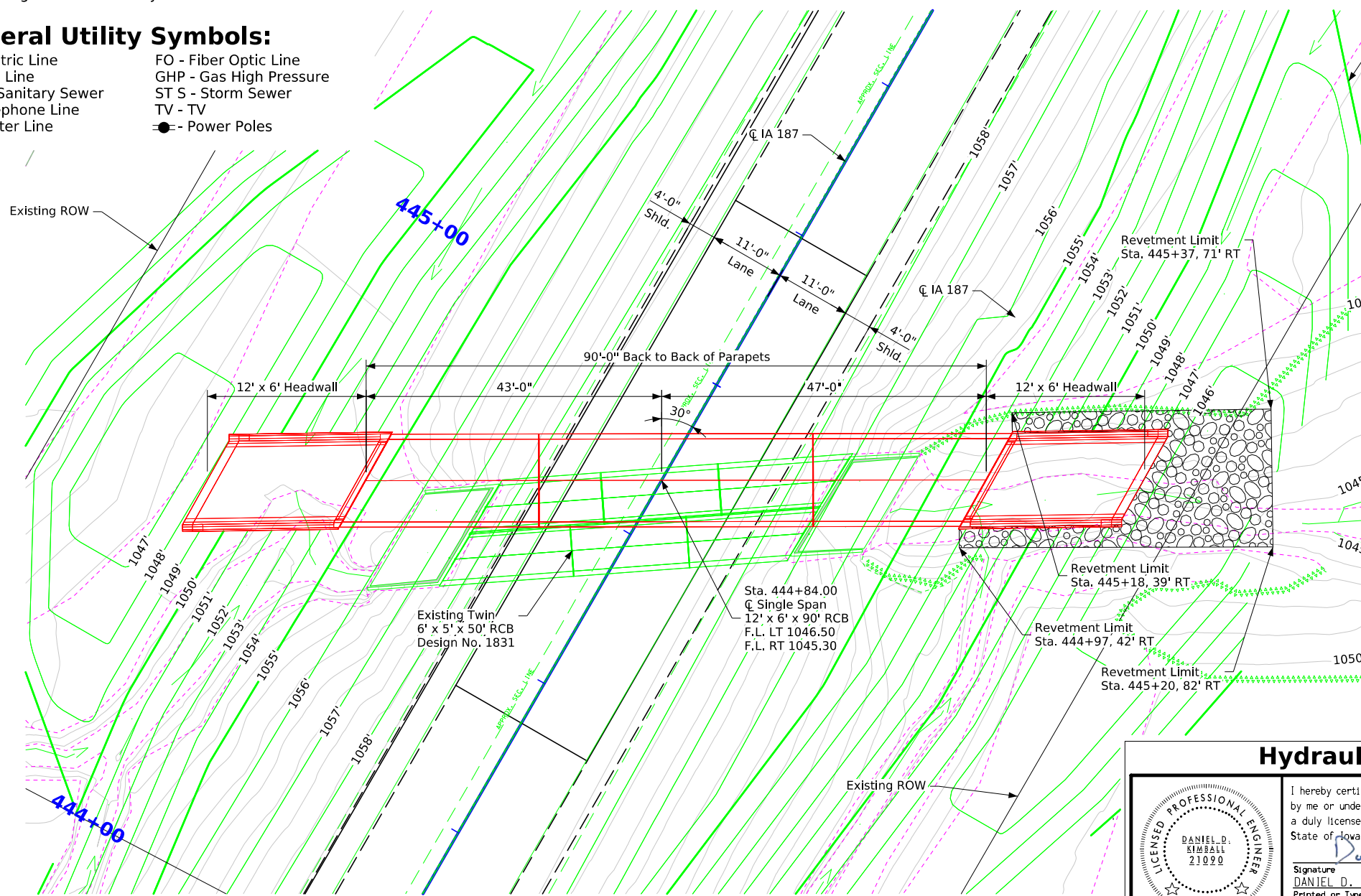
Drainage through existing culvert must be maintained throughout construction

Hydraulic Data

RIDB: Not Applicable
 Drainage Area = 940.39 Acres
 Stream Slope = 50.5 Ft./Mi.
 Q₅₀ = 576.09 cfs
 HW Elev. = 1053.56
 Exit Velocity = 15.76 fps
 Q₇₇ = 740.60 cfs
 HW Elev. = 1055.17
 Exit Velocity = 16.78 fps

Location

IA 187 Over Drainage Ditch
 T-90N R-7W
 Section 22 & 23
 Madison Township
 Buchanan County
 Latitude 42.589551°
 Longitude -91.647902°



Traffic Estimate

2024 AADT TRUCKS: 15.6 %
 2010 V.P.D.: 15.6 %

Situation Plan

Hydraulic Design

I hereby certify that this engineering document was prepared by me or under my direct personal supervision and that I am a duly Licensed Professional Engineer under the laws of the State of Iowa.

Signature: *Daniel D. Kimball* Date: 3-23-26
 DANIEL D. KIMBALL
 Printed or Typed Name

My license renewal date is December 31, 2027

Pages or sheets covered by this seal: _____

Design For 30 Degree RA
12'-0" x 6'-0" x 90'-0"
 Cast-In-Place RCB Culvert

Situation Plan - CIP

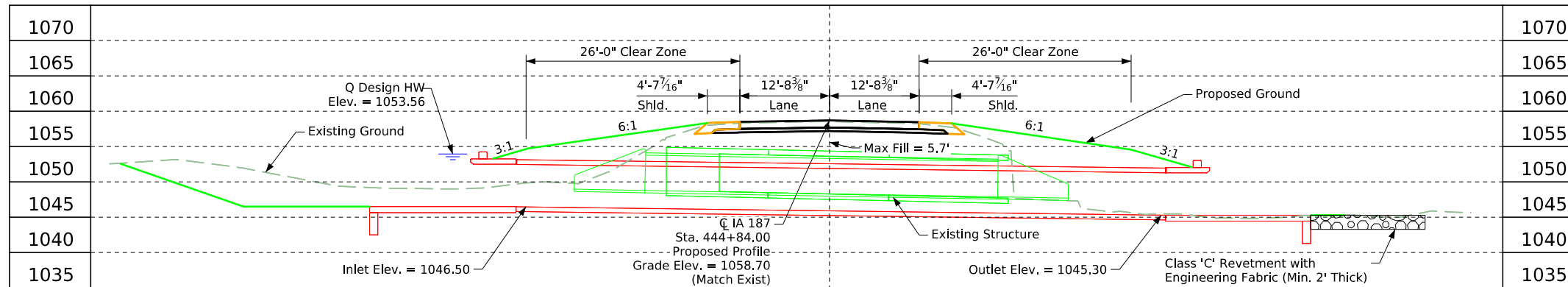
STA. 444+84.00 (IA 187) Turn-In Date: Oct. 2027

Buchanan County

IOWA DEPARTMENT OF TRANSPORTATION

Design No. Design Sheet No. 1 of 2 FHWA/Asset

Control Point:
 Pnt. No.: CP4 N: 15664678.582 E:8871819.227 Elev:1096.058, CP SET FENO MON

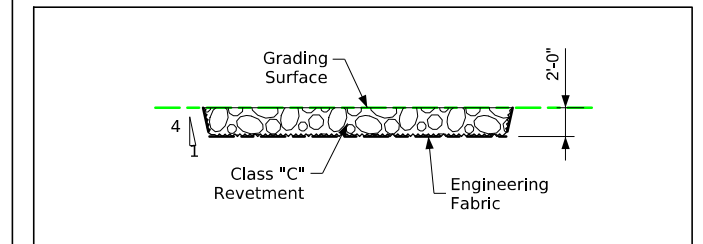
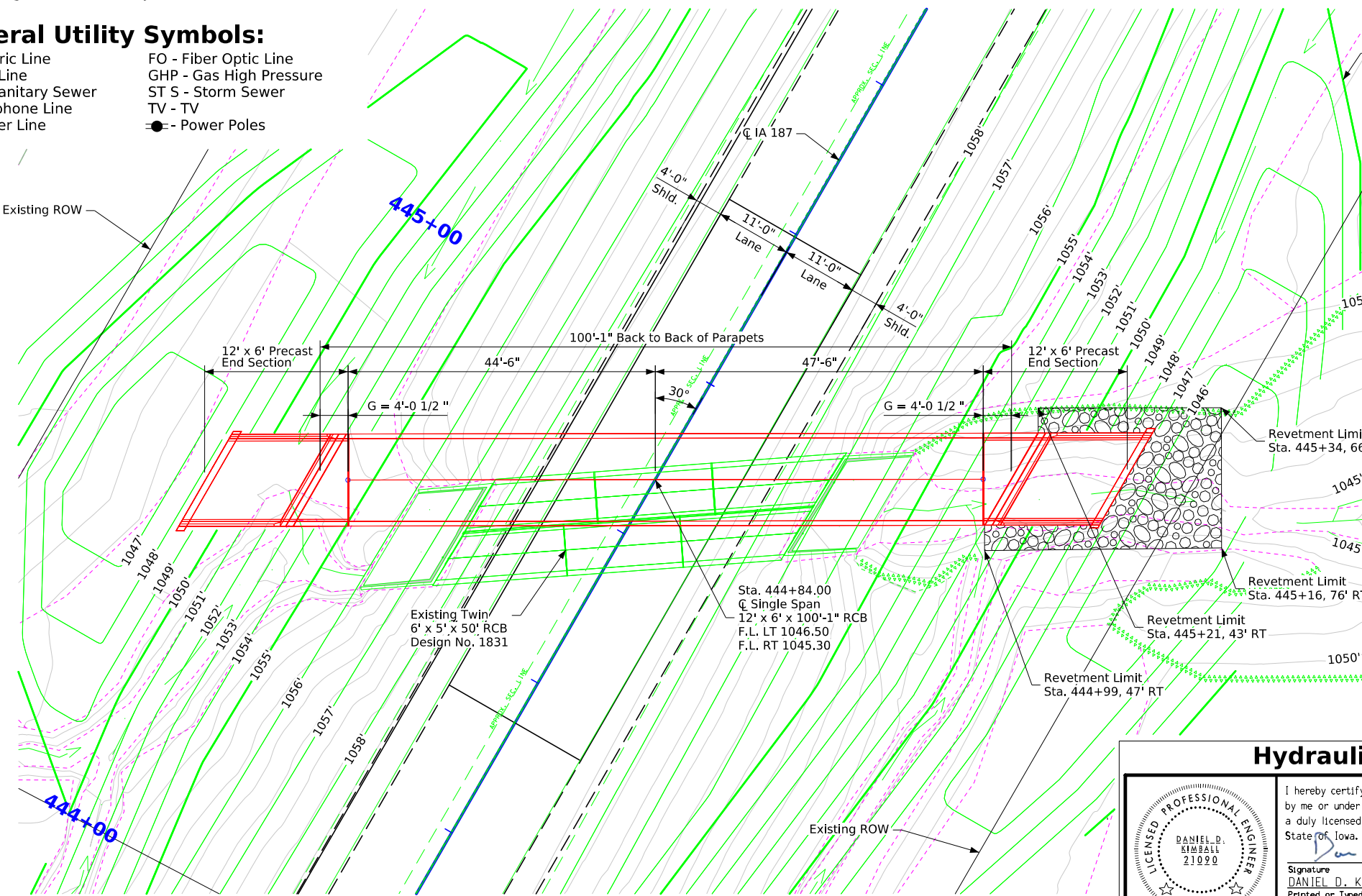


Utilities Note:

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General Utility Symbols:

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- G - Gas Line
- SAN. - Sanitary Sewer
- T - Telephone Line
- W - Water Line
- FO - Fiber Optic Line
- GHP - Gas High Pressure
- ST S - Storm Sewer
- TV - TV
- Power Poles



Typical Channel Protection

Estimated Revetment Quantities Included With Road Plans

| Location | Revetment Class "C" (Ton) | Engineering Fabric (SY) | CL 10 Channel Excavation (CY) |
|----------|---------------------------|-------------------------|-------------------------------|
| Outlet | 90.0 | 117.0 | 56.2 |
| Totals | 90.0 | 117.0 | 56.2 |

Excavation quantity calculated from grading surface. Excavation quantity is for embedded revetment core out only, and does not include excavation to the grading surface. Excavation quantity to the grading surface is determined by Road Design and included in the Road Plans. Quantities shown for information only. See Road Sheets.

General Notes:

This design is for the replacement of the existing 6' x 5' x 50' Reinforced Concrete Box Culvert, Design No. 1831

Design Notes:

IA 187 will be closed to traffic during construction and off-site deour will be utilized

Revetment is proposed at the culvert outlet due to the outlet velocity exceeding policy limits.

Density used for Class C Revetment quantity calculations is 1.6 T/cy

Plan Notes:

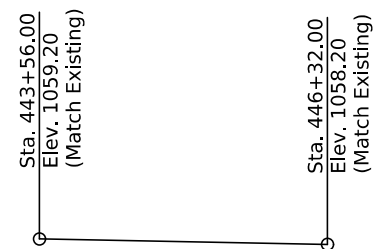
Drainage through existing culvert must be maintained throughout construction

Hydraulic Data

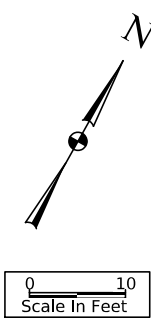
RIDB: Not Applicable
 Drainage Area = 940.39 Acres
 Stream Slope = 50.5 Ft./Mi.
 Q₅₀ = 576.09 cfs
 HW Elev. = 1053.56
 Exit Velocity = 15.76 fps
 Q₁₀₀ = 740.60 cfs
 HW Elev. = 1055.17
 Exit Velocity = 16.78 fps

Location

IA 187 Over Drainage Ditch
 T-90N R-7W
 Section 22 & 23
 Madison Township
 Buchanan County
 Latitude 42.589551°
 Longitude -91.647902°



Proposed Profile Grade IA 187 (U.A.C.)



Traffic Estimate

| | |
|-----------|-------------|
| 2024 AADT | 2010 V.P.D. |
| TRUCKS | 15.6 % |

Situation Plan

Hydraulic Design

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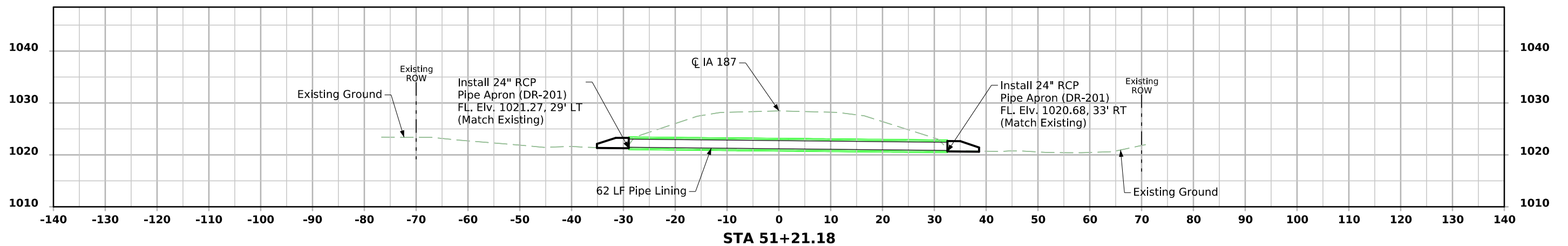
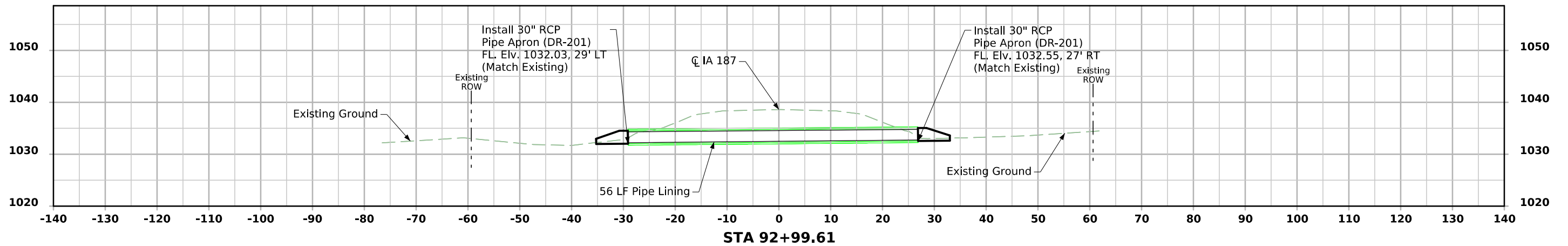
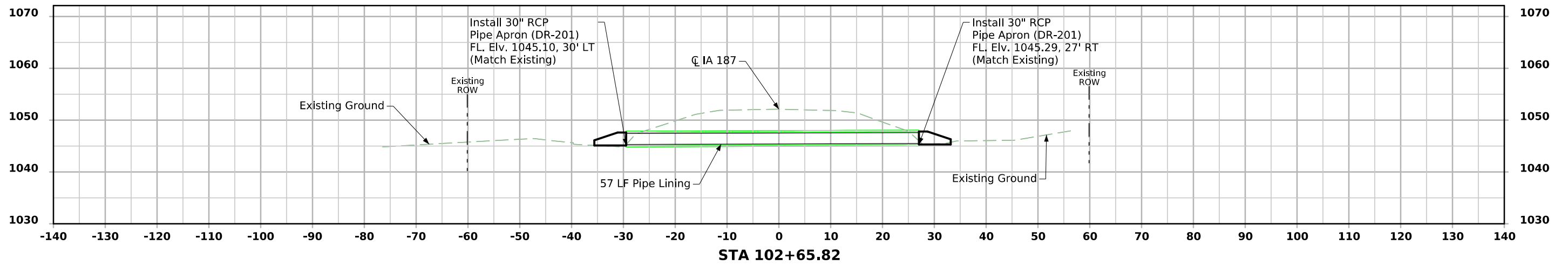
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Design For 30 Degree RA
 12'-0" x 6'-0" x 100'-1"
 Precast RCB Culvert

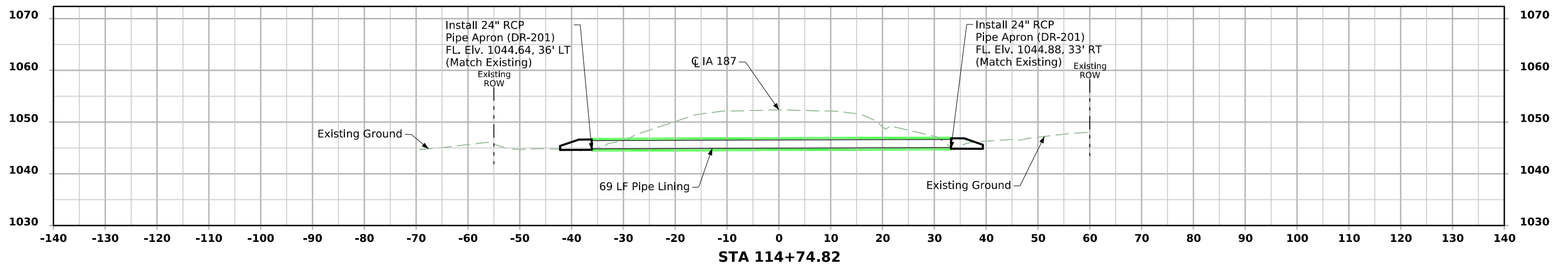
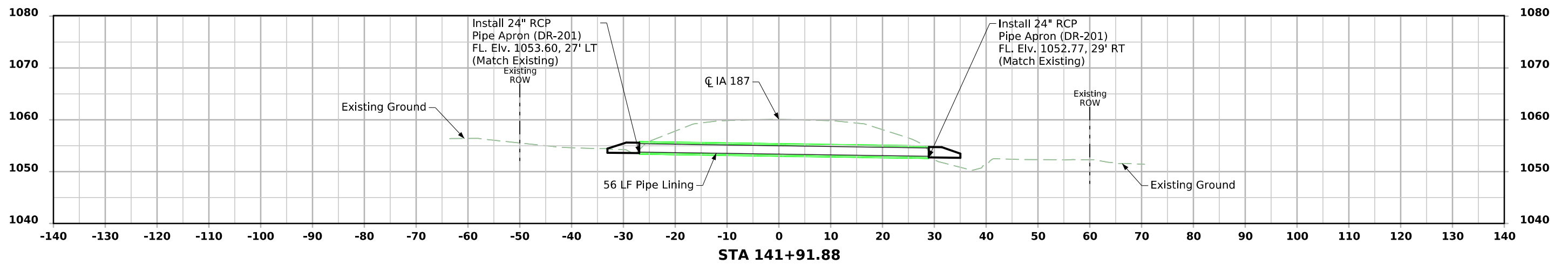
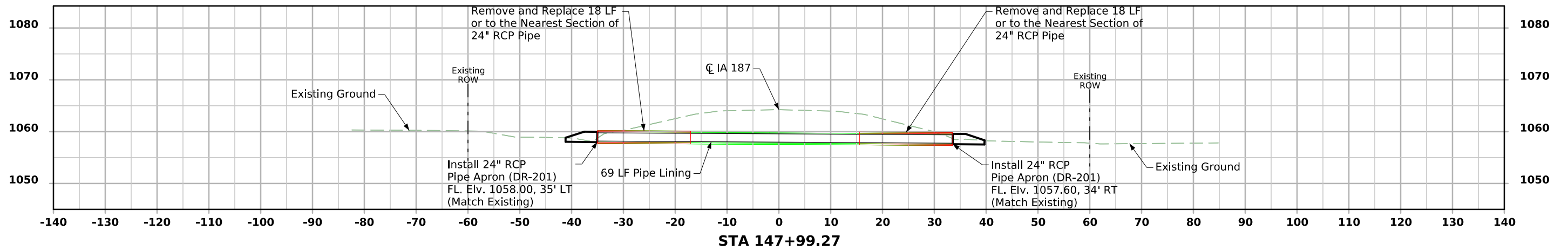
Situation Plan - PC

STA. 444+84 (IA 187) Turn-In Date: Oct. 2027
 Buchanan County
 IOWA DEPARTMENT OF TRANSPORTATION
 Design No. Design Sheet No. 2 of 2 FHWA/Asset

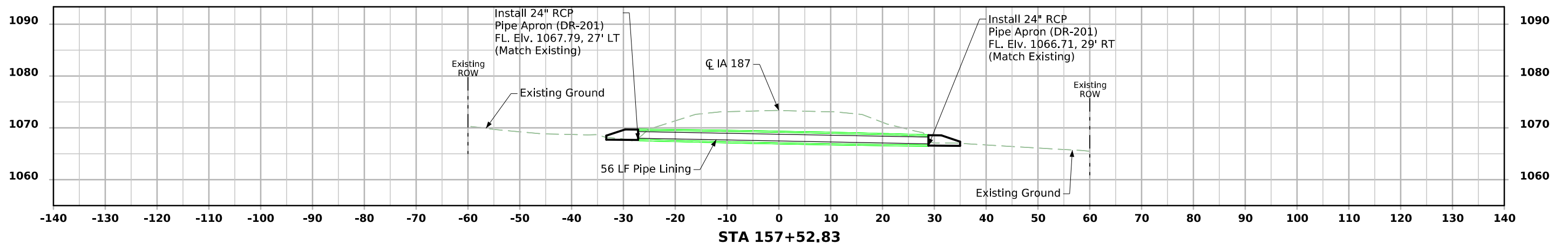
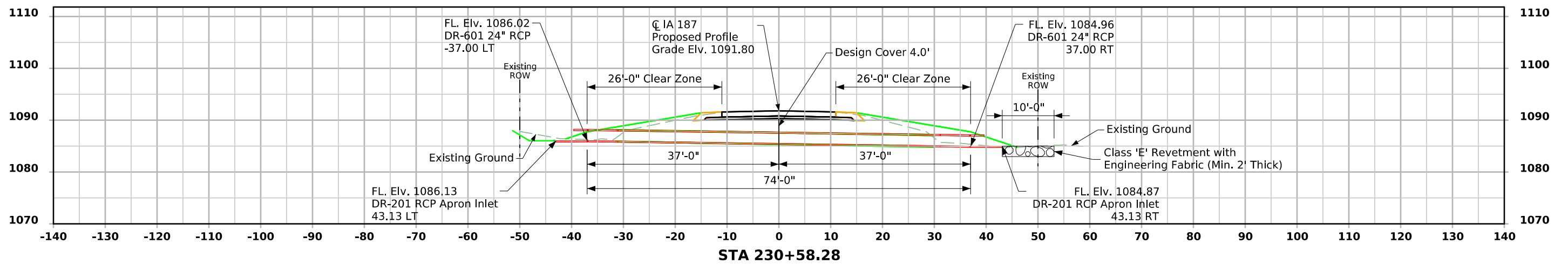
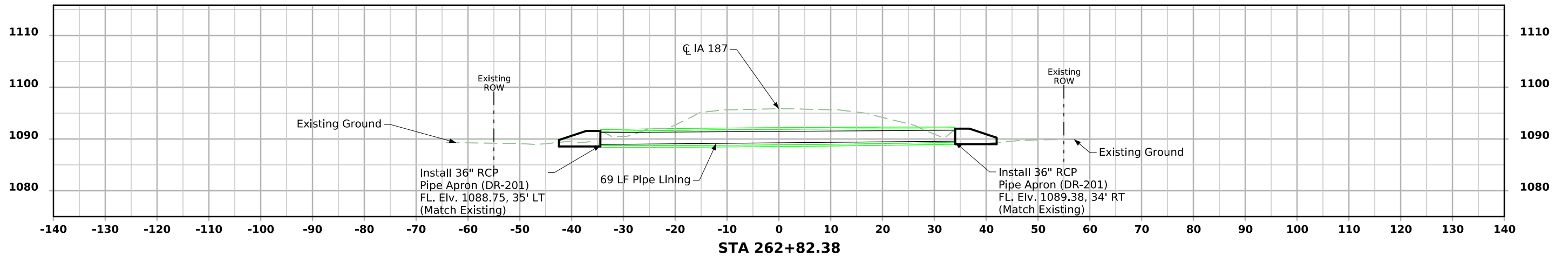
IA 187



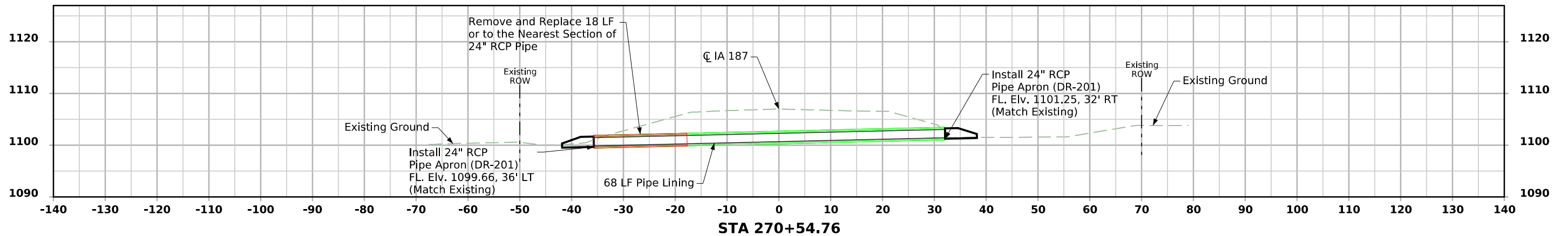
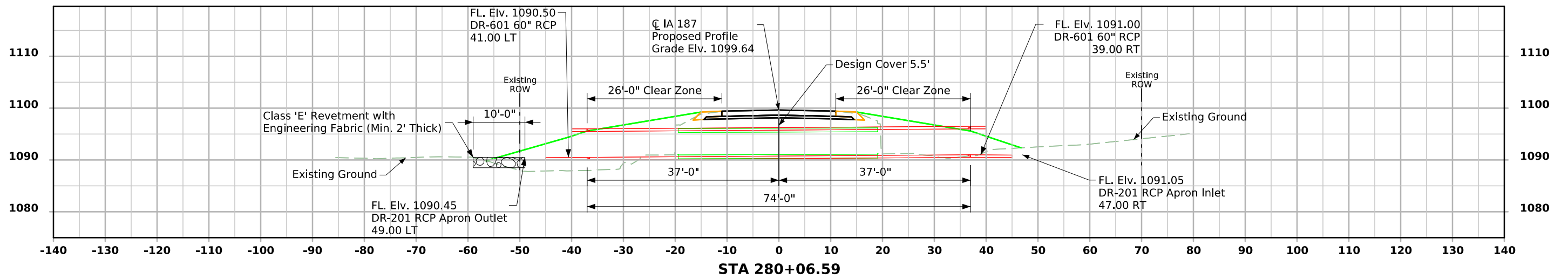
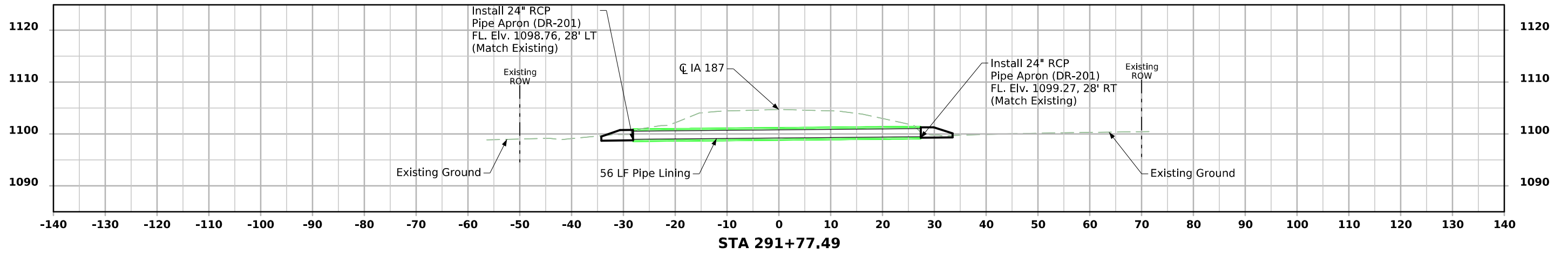
IA 187



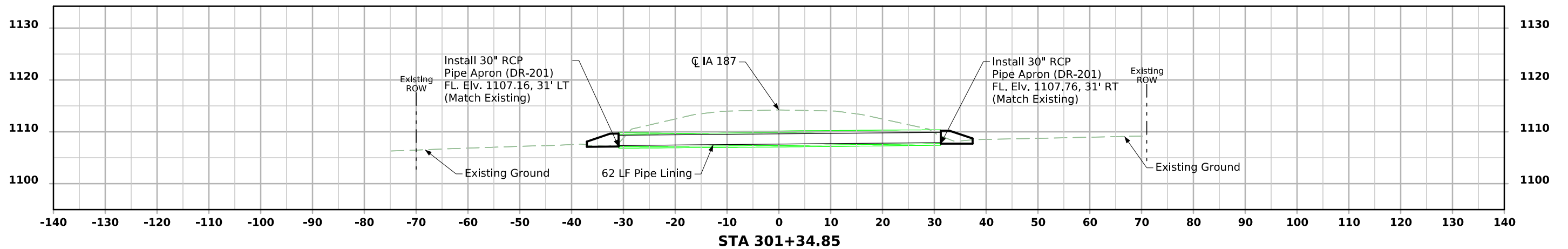
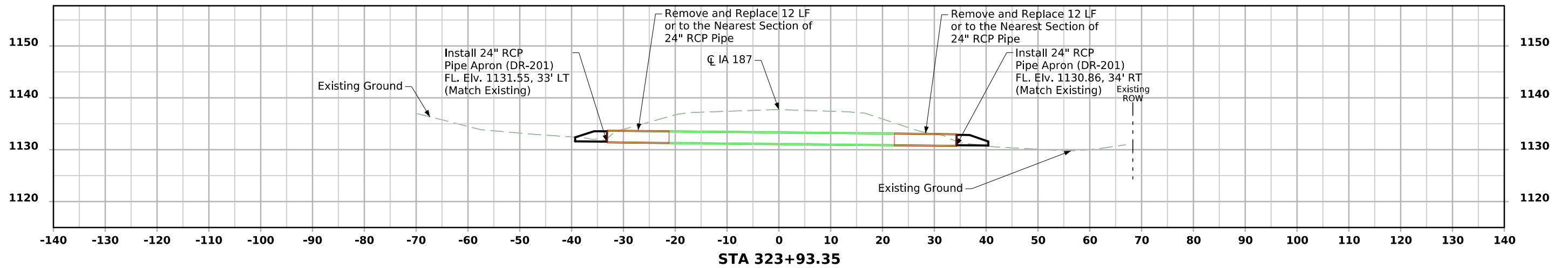
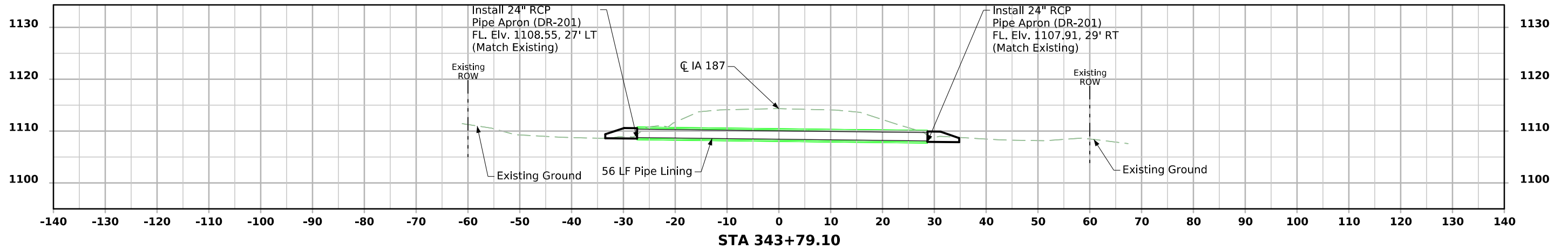
IA 187



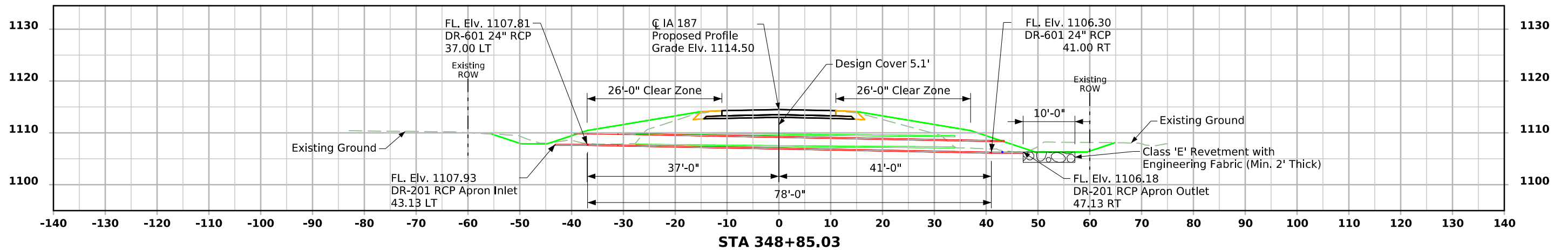
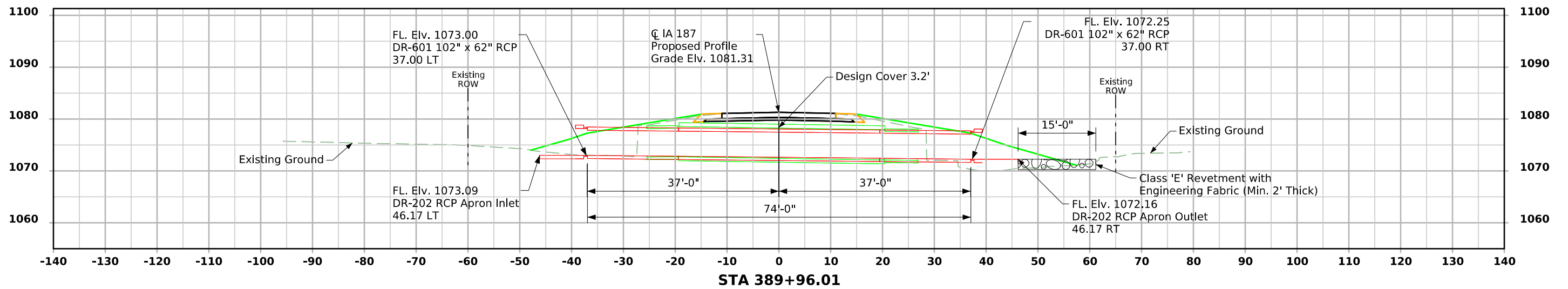
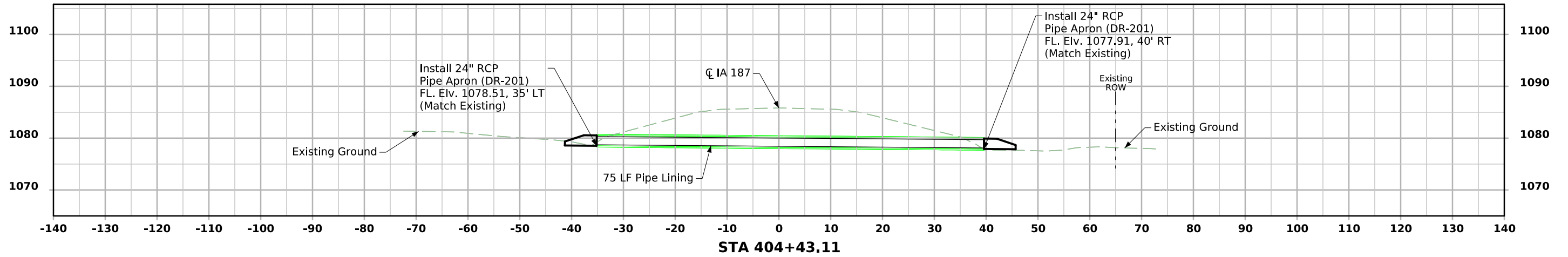
IA 187

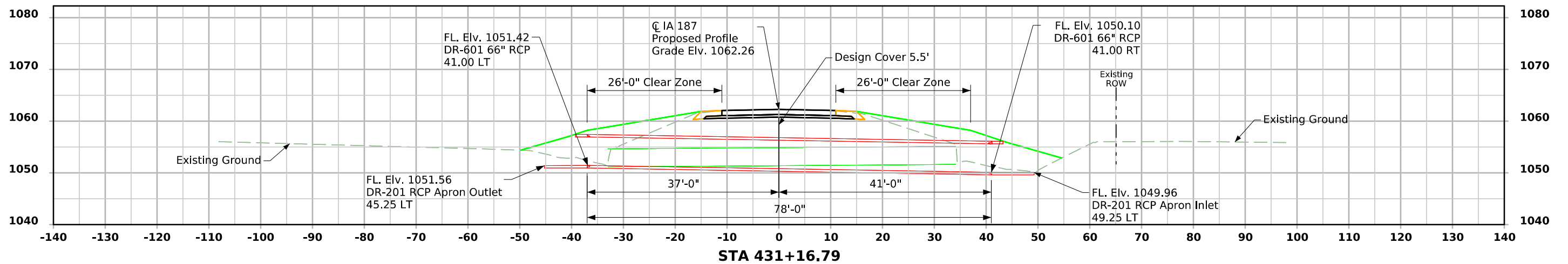
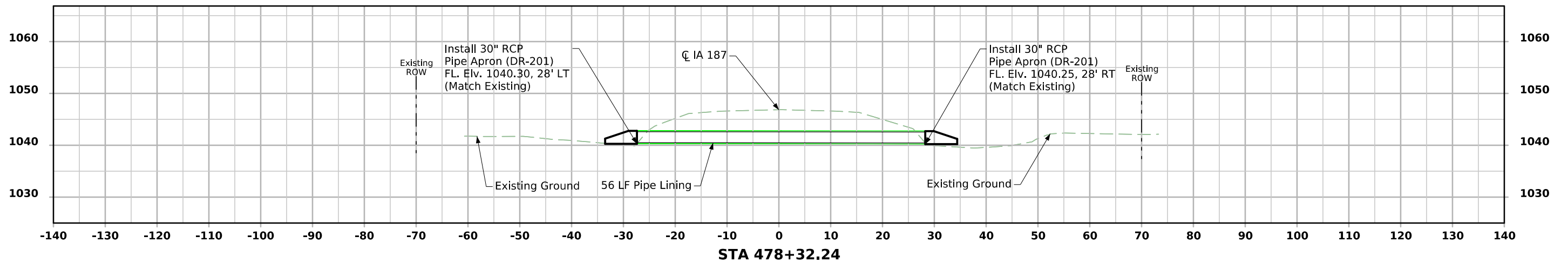


IA 187



IA 187





IA 187

