

WINNEBAGO CO. RCB CULVERT REPLACEMENT - SINGLE BOX
BRFN-009-5(109)--38-95

LETTING DATE
09/03/2019



Highway Division

PLANS OF PROPOSED IMPROVEMENT ON THE

PRIMARY ROAD SYSTEM
WINNEBAGO COUNTY
RCB CULVERT REPLACEMENT - SINGLE BOX

Ditch 0.1 mi E of Co Rd R74



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

15-95-009-010

PROJECT NUMBER

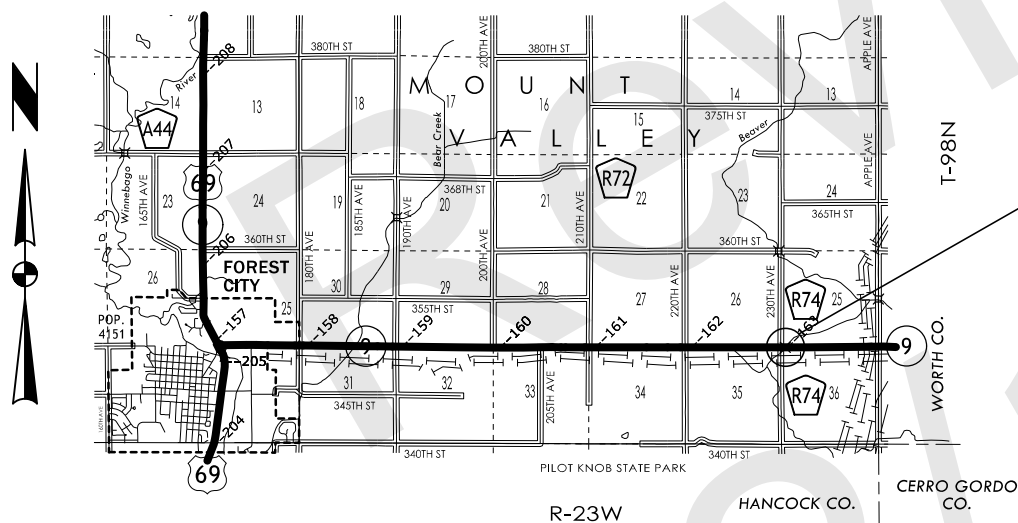
BRFN-009-5(109)--38-95

R.O.W. PROJECT NUMBER

STPN-009-5(110)--2J-95

INDEX OF SHEETS

No.	DESCRIPTION
A Sheets	Title Sheets
A.1	Title Sheet
A.1	Location Map Sheet
B Sheets	Typical Cross Sections and Details
B.1 - 4	Typical Cross Sections and Details
D Sheets	Mainline Plan and Profile Sheets
* D.1	Plan & Profile Legend & Symbol Information Sheet
* D.2	IA 9 Plan
* D.3	IA 9 Profile
G Sheets	Survey Sheets
G.1 - 3	Reference Ties and Bench Marks
J Sheets	Traffic Control and Staging Sheets
J.1	Traffic Control Plan
V Sheets	Bridge and Culvert Situation Plans
V.1	Bridge and Culvert Situation Plans
W Sheets	Mainline Cross Sections
W.1 - 5	Mainline Cross Sections * Color Plan Sheets



PROJECT LOCATION
Ref. Loc. - 162.9
Maint. No - 9562.9S009
FHWA No - 52500

DESIGN DATA RURAL

2020 AADT	3000	V.P.D.
2040 AADT	3700	V.P.D.
20-- DHV	--	V.P.H.
TRUCKS	15	%
Total Design ESALs	--	

LOCATION MAP SCALE



EVENT DATES:

D4 PLAN - Date: 07-23-2019

PRELIMINARY PLANS

Subject to change by final design.

D5 PLAN - Date: 04-16-2018

FILE NO.

ENGLISH

DESIGN TEAM **Flattery \ Carlson**

WINNEBAGO COUNTY

PROJECT NUMBER

BRFN-009-5(109)--38-95

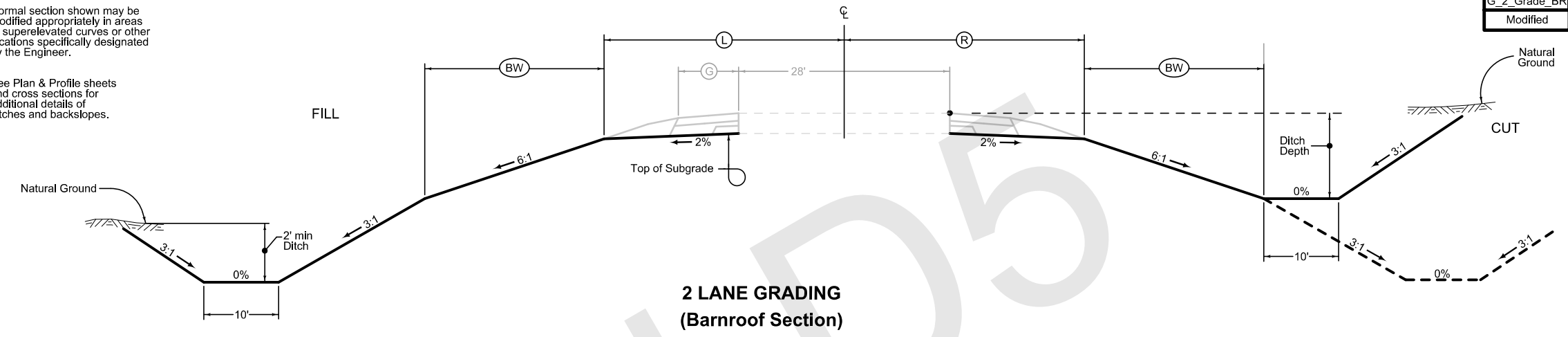
SHEET NUMBER

A.1

LOCATION		DIMENSIONS		
ROAD IDENTIFICATION	STATION TO STATION	L Feet	R Feet	BW Feet
IA 9	1598+32.54 1602+07.45	32	32	10

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.

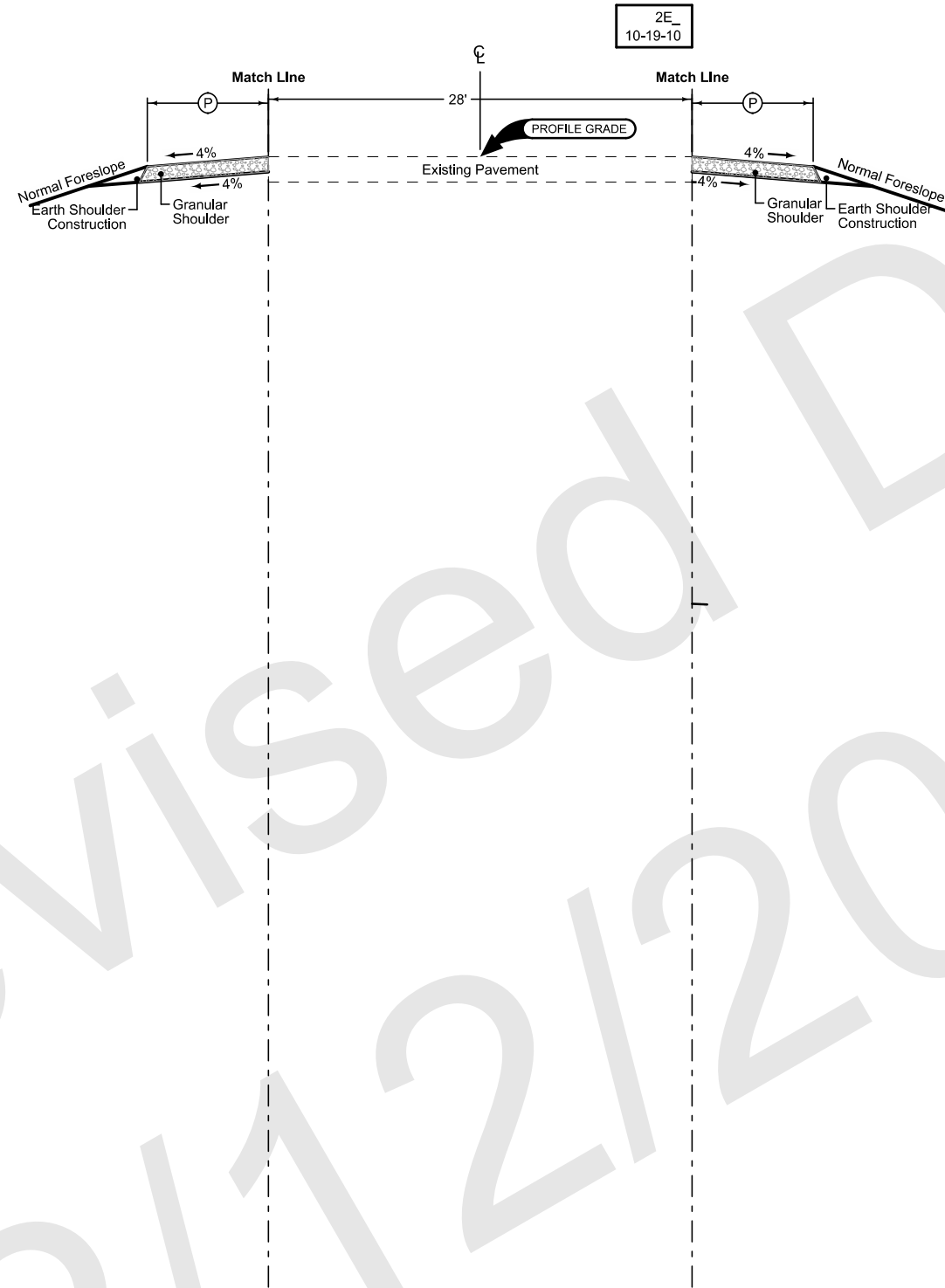


G_2_Grade_BR
Modified

Revised 02/12/2019

Granular Shoulder

2_G_SR_10-19-10		Ⓞ Feet
STATION TO STATION		
1598+45.00	1602+07.45	8



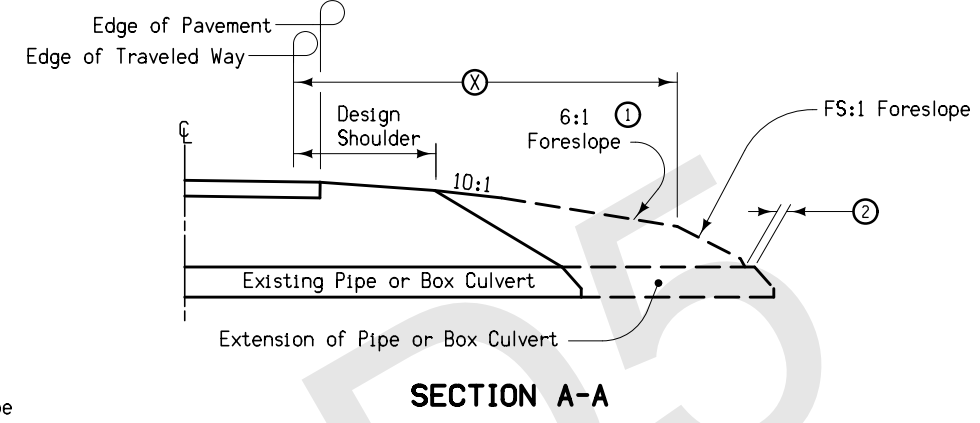
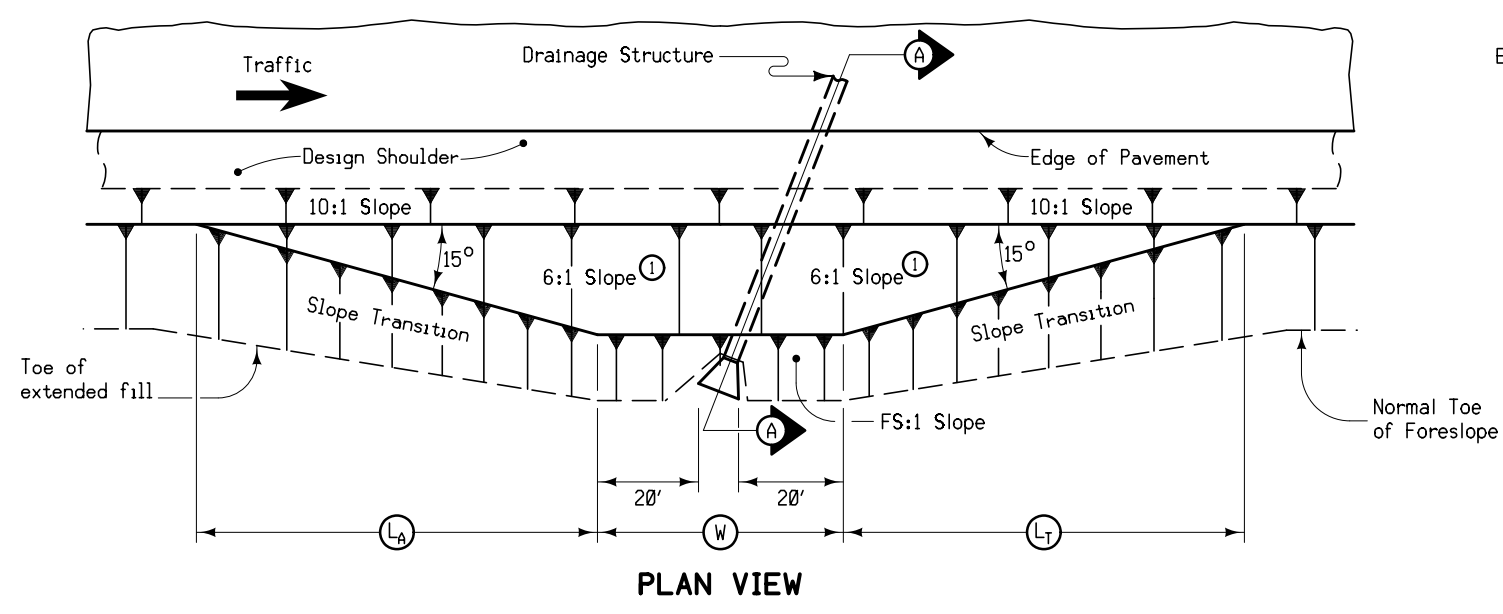
Granular Shoulder

2_G_SR_10-19-10		Ⓞ Feet
STATION TO STATION		
1598+32.54	1601+30.77	8

Revised 02/12/2019

See Tab 112-9 for shoulder quantities.

Iowa Highway 9



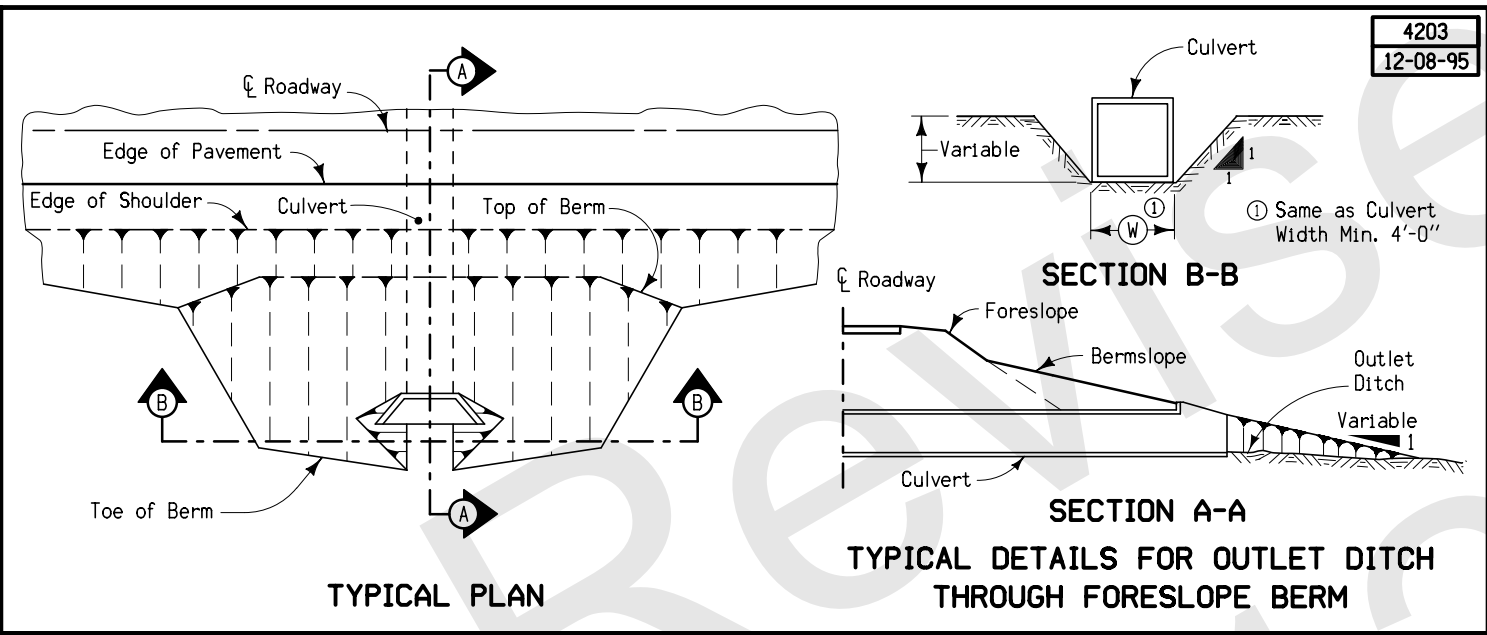
At locations where an extended or newly constructed drainage structure extends beyond the normal foreslope cover, flatten as indicated so as to cover the structure. Minimum earth cover is 6 inches.

- ① Slope may be flatter than 6:1.
- ② 6 inch minimum for pipe installations or to top of headwall on RCB.
- ③ At ϕ of road.
- Ⓜ = Pipe or RCB opening width plus 20 feet each side.

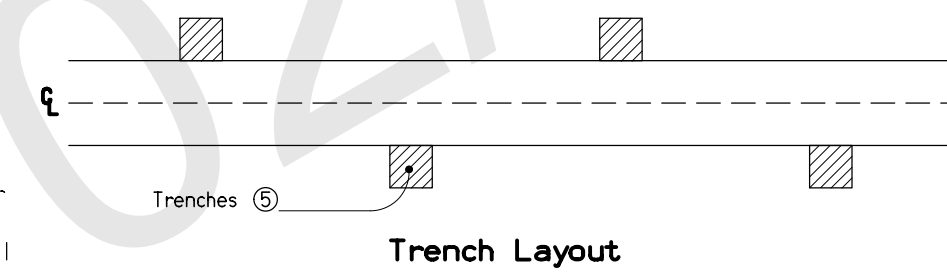
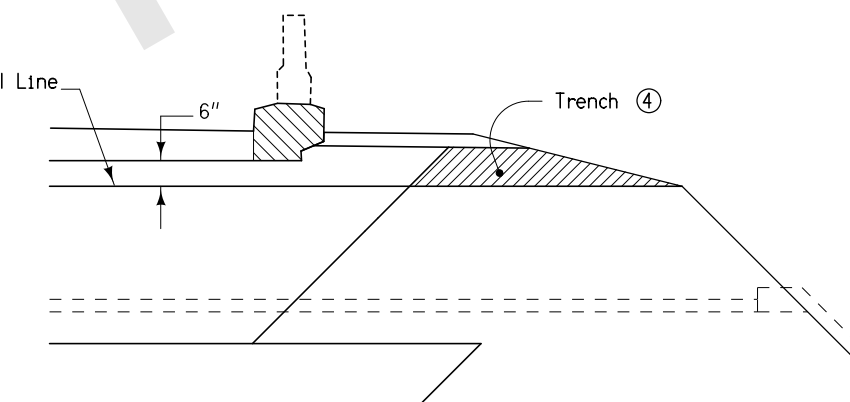
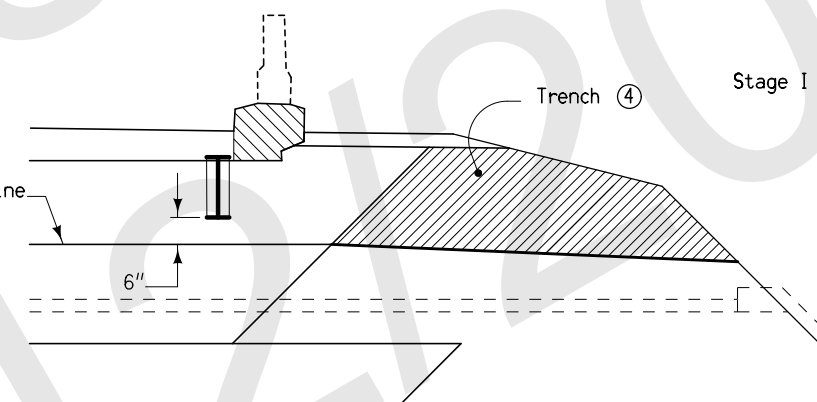
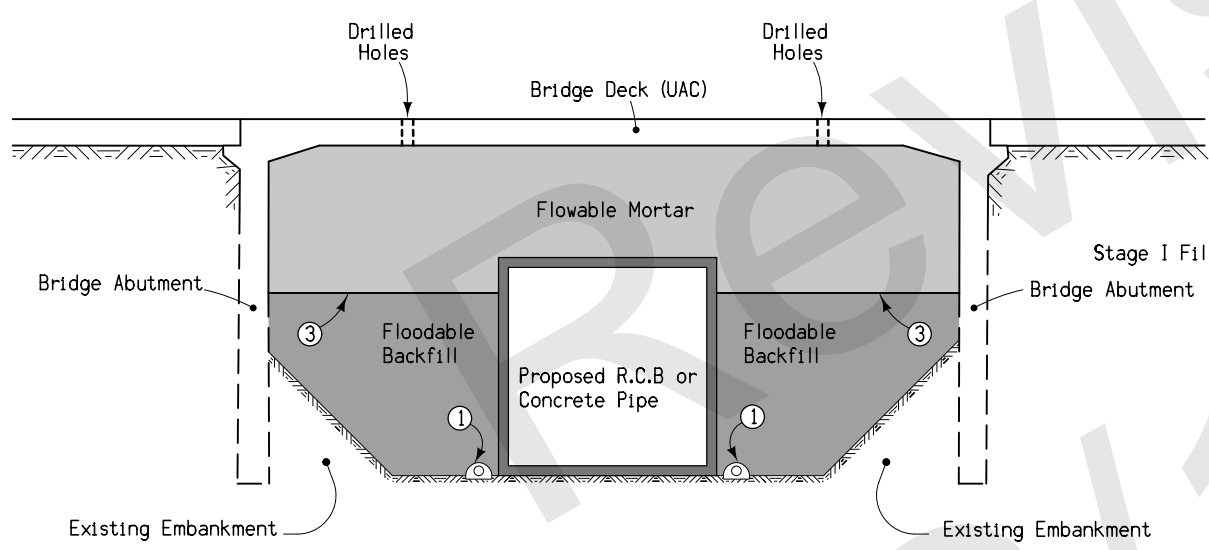
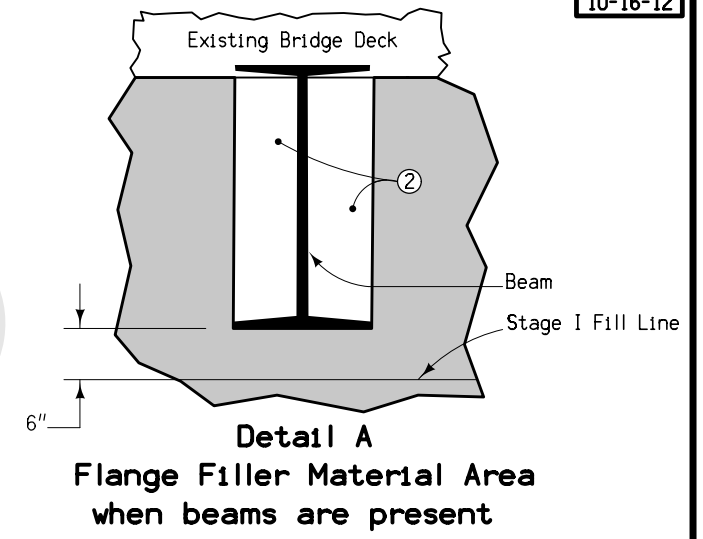
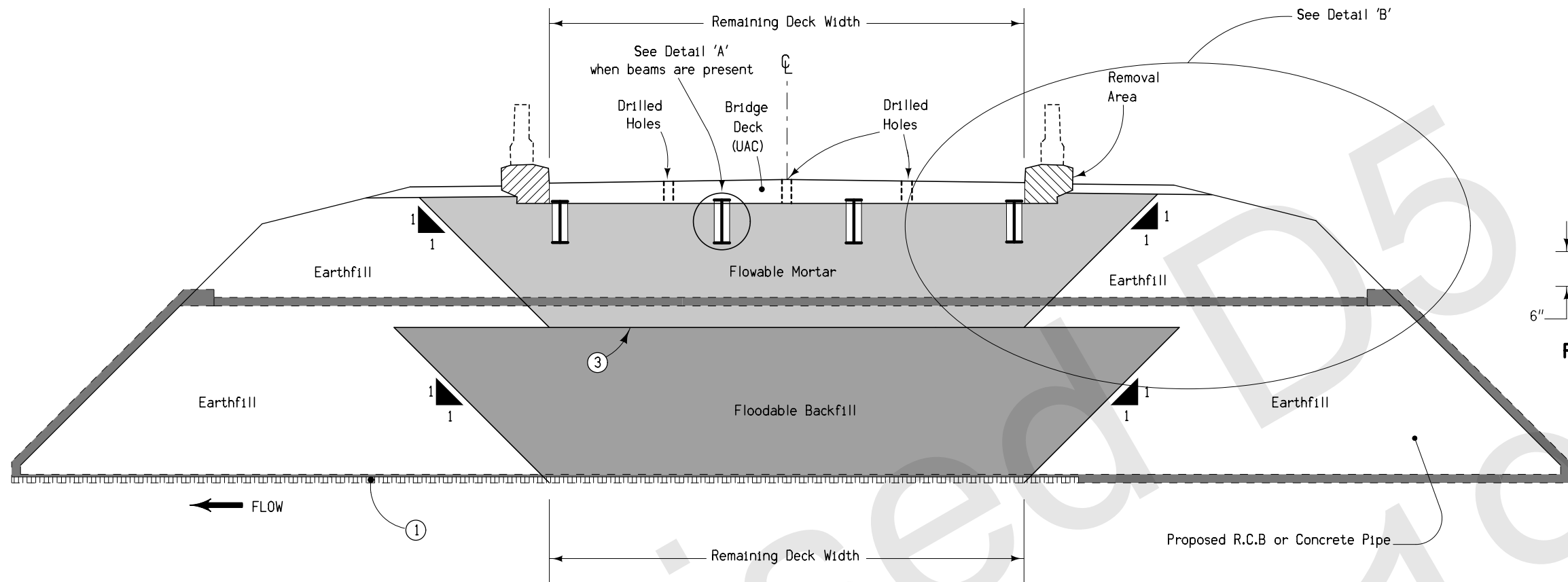
SECTION A-A

STRUCTURE LOCATION		Ⓜ	L _A	L _T	X	FS
STATION ③	SIDE	Feet	Feet	Feet	Feet	
1599+81.50	Lt.	58.09	127.95	148.49	53.53	3
1599+81.50	Rt.	58.09	80.70	80.70	35.63	3

BARNROOF FORESLOPE AT SKEWED DRAINAGE STRUCTURE



TYPICAL DETAILS FOR OUTLET DITCH THROUGH FORESLOPE BERM



Denotes pay limits for flowable mortar
Denotes pay limits for flooded backfill

- ① 4" Subdrain at flowline elevation of culvert with 4" cover of porous backfill.
- ② Place Flange Filler Material to fill pocket area between flanges to prevent flowable mortar from building up. Flange Filler Material is incidental to flowable mortar.
- ③ Fill void with the maximum amount of Floodable Backfill possible. Distance from Floodable Backfill to bridge beams (when present) or bridge deck shall not exceed 5'.
- ④ Cut trenches in the soil plug to provide drainage for the flowable mortar. Backfill the trenches with open graded crushed stone, gravel, or recycled PCC to allow water to drain. Backfill material is incidental to flowable mortar.
- ⑤ Place trenches at 20' spacing with a minimum of two trenches on each side of the roadway.

**FILL FOR CULVERT USED
IN BRIDGE REPLACEMENTS**

SURVEY SYMBOLS

- GP GP Guard Post (Less Than 4 Posts)
- MM MM Mile Marker Post
- OUT Tile Outlet
- ▲ PI Tangent Point
- POT Tangent Point
- SIGN SI Sign
- TPD Telephone Pedestal
- TW Top of Water
- TA Tower Anchor
- DU Centerline Draw or Stream (Up)
- D Centerline Draw or Stream (Down)
- - - ENU Edge Unpaved Entrance & Parking
- - - ENT Centerline BL of Entrance
- EW Edge of Water
- FW Wire Fence
- GDL Guard Rail Steel
- ROC Rock Outcropping
- - - SNP Unpaved Shoulder

UTILITY LEGEND

- ⬮ PPE Power Pole Heartland Power Cooperative
- Winnebago Cooperative Telecom Association - Quality D
- Northern Natural Gas - 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.	
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	

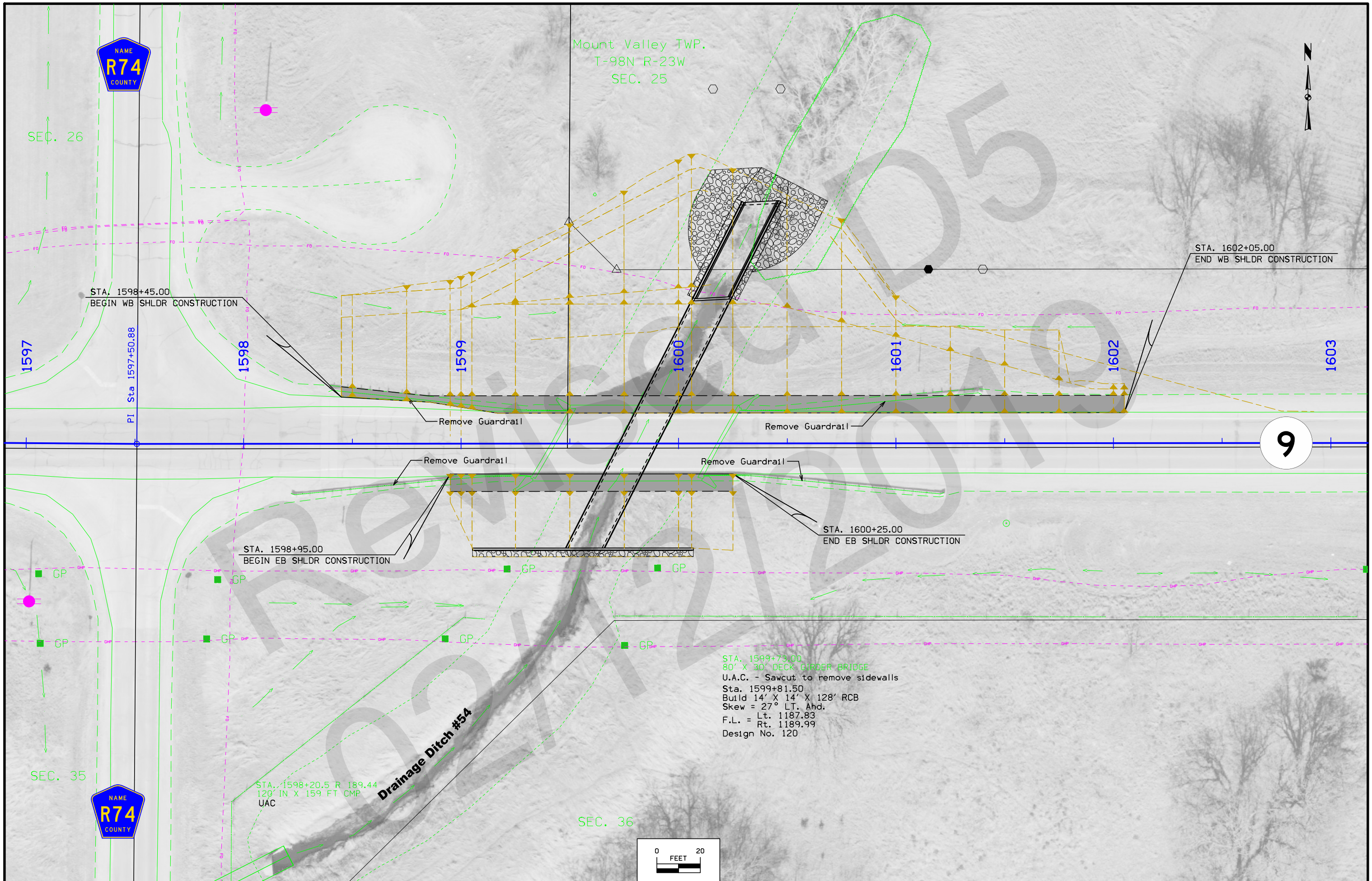
- Reference Point
- Station
- Survey Line
- Section Corner
- Ground Line Intercept
- Saw Cut
- Guardrail
- Trench Drain
- HighTension Cable Guardrail
- Sheet Pile
- Pavement Removal
- Clearing & Grubbing Area

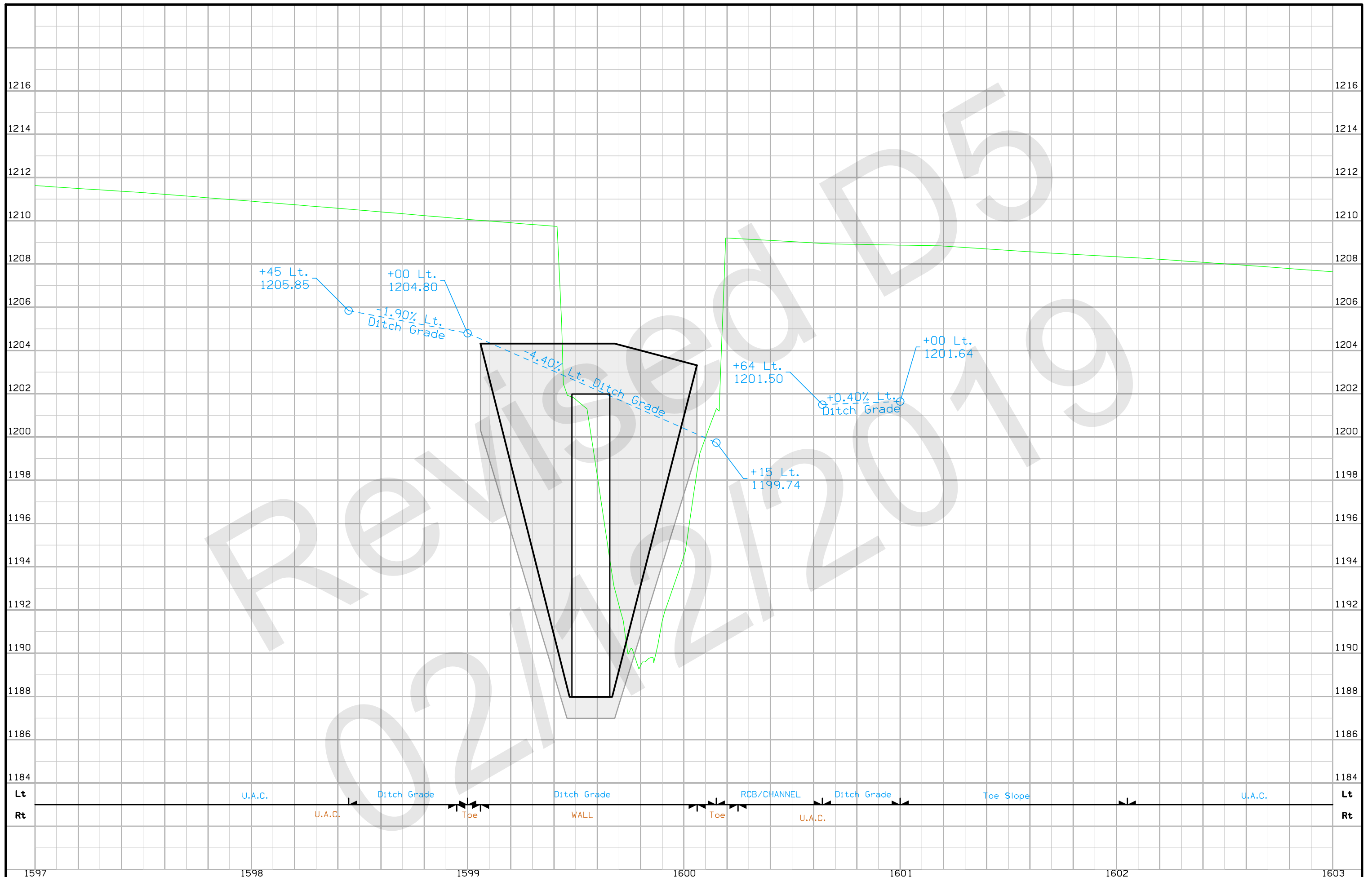
RIGHT-OF-WAY LEGEND

- 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)





Survey Information

Winnebago County
BRFN-009-5(109)--39-95
RCB Culvert Replacement - Single Box
PIN 15-95-009-010
Sap-0888

General Information

Measurement units for this survey are US survey feet. This survey is for proposed reinforced concrete box culvert on Iowa Hwy 9 located 0.04 miles East of County Rd R74. This project is a Partial DTM with Photo control.

Vertical Control

Vertical datum for this survey is NAVD88 (Computed using Geoid12B). GRS80 Ellipsoidal Height was computed at project Pt. 301 by doing 6 hour static observations. The project control is relative to nearby Iowa RTN Base Stations.

This survey observed a NGS Control Monument with published NAVD88 heights to compare to local ground control:

NGS 2nd. order class 0 mark designated Forest City has a published Elev. Of 1280.57
Survey Elev. = 1280.75

This survey also observed 2 Winnebago County Control Monuments with published NAVD88 height to compare to local ground control:

Winnebago County Control mark G101 published height = 1242.07(Geoid99)
Survey Elev.= 1242.45(Geoid12b)

Winnebago County Control mark G5 published height = 1262.88(Geoid99)
Survey Elev.= 1263.60(Geoid12b)

Horizontal Control

The project coordinate system for this survey is Iowa RCS Zone 2 (U.S. Survey Feet). This survey control is relative to IaRTN reference stations. IaRTN Reference Station coordinates are relative to the National Reference Station network datum: NAD83 (2011) for Epoch 2010.00. Coordinates were determined by conducting a six hour static observation. Additional control points were placed throughout the project using a GNSS Base-Rover setup relative to point 301.

Alignment Information

The horizontal alignment for this survey is a retrace of As-built Plans No. FN-9-5(11)—21-95. Survey stationing was equated to the plan PI at STA 1595+95.6 and run back and ahead without equation throughout the survey.

Survey stationing relates to as built plan stationing as follows:

Section Corner Sta. 1571+30.2 As-built Plans Project No. FN-9-5(11)—21-95
Survey POT Sta. 1571+30.48

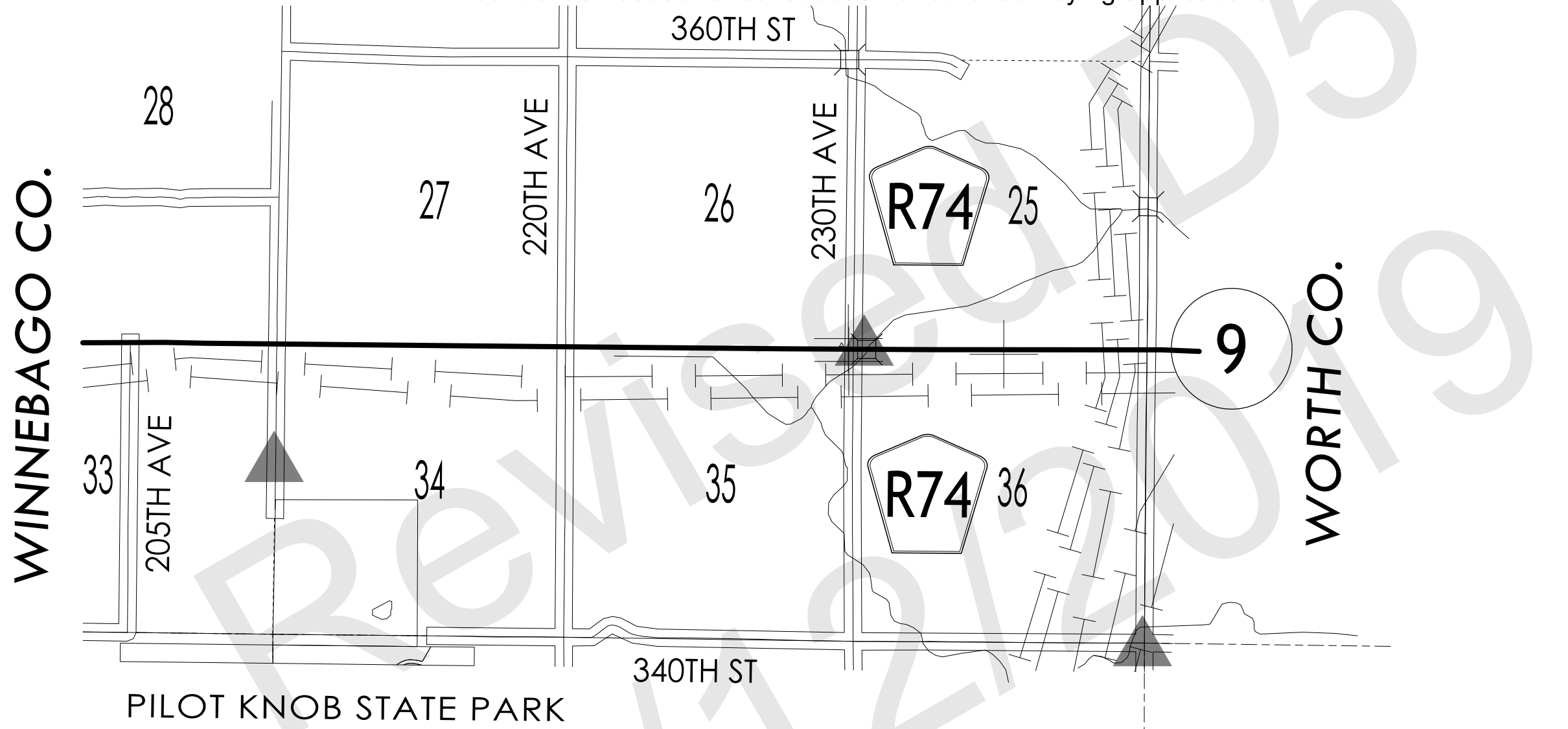
PI Sta 1595+95.6 Project No. FN-9-5(11)—21-95
Survey PI STA 1595+95.6

POT STA 1597+50.8 Project No. FN-9-5(11)—21-95
Survey PI STA 1597+50.88

Section Corner STA 1624+30.54 Project No. FN-9-5(11)—21-95
Survey POT STA 1624+28.24

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.



R-23W

HANCOCK CO.

CERRO GORDO CO.

HORIZ. DATUM: NAD83(2011) EPOCH 2013.00

VERT. DATUM: NAVD88

1a. Regional Coordinate System Zone 2

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

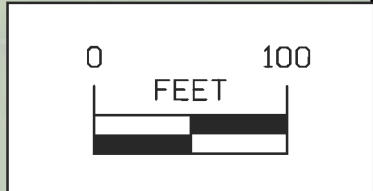
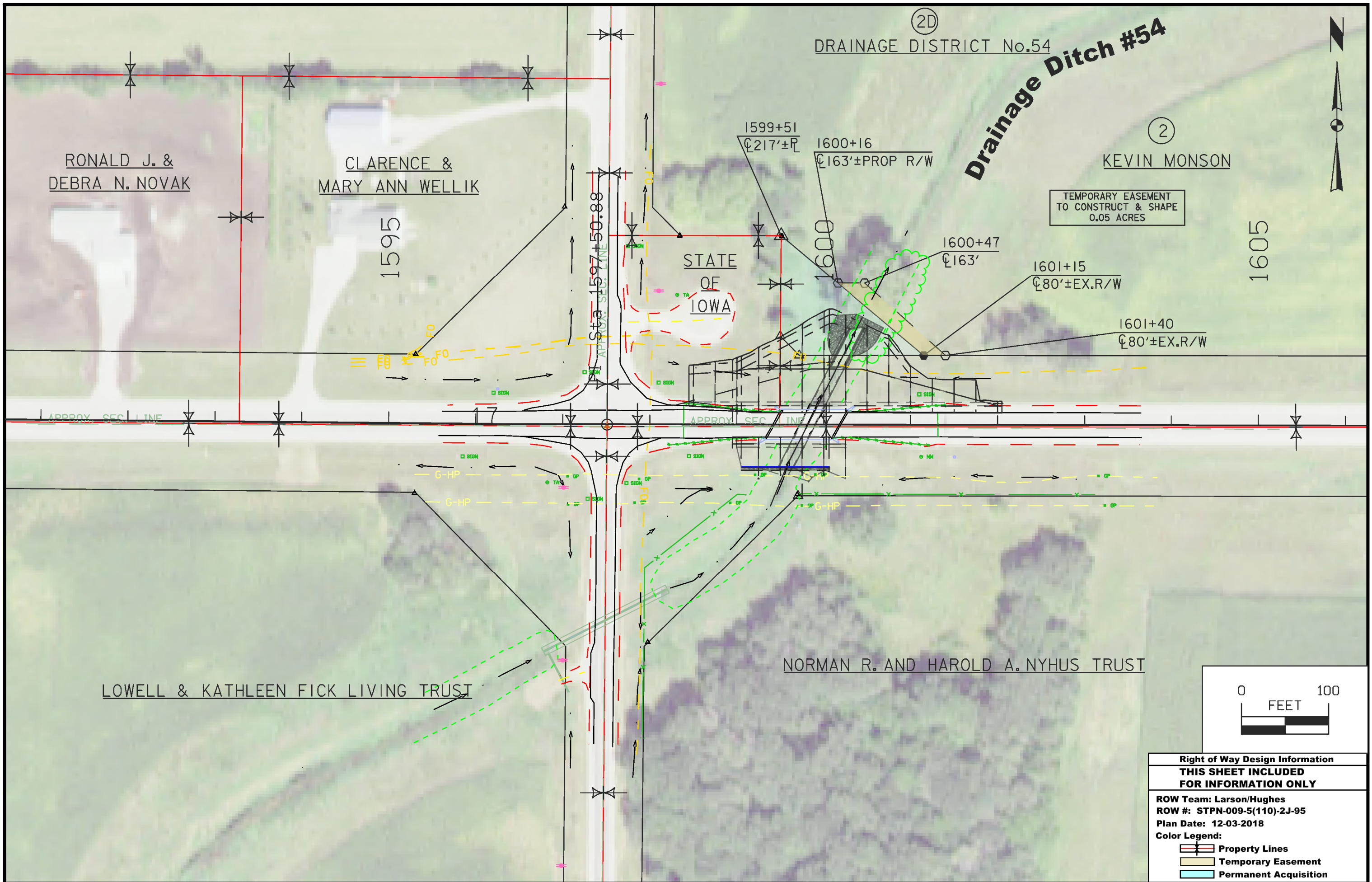
HORIZONTAL AND VERTICAL PROJECT CONTROL COORDINATE LISTING

HORIZ. DATUM: NAD83(2011) EPOCH 2013.00

VERT. DATUM: NAVD88

Ia. Regional Coordinate System Zone 2

Point Name	Northing	Easting	Elevation	Feature Definition
G5	9833149.454	12300779.405	1263.60	BM FOUND WINNEBAGO COUNTY GPS CNTRL MON G5 AN NGS STYLE ALUM MON WITH ACCESS COVER LOCATED IN THE SW QUAD OF 340TH ST AND APPLE AVE 35' WEST OF APPLE AVE AND 105' SOUTH OF 340TH ST
300	9838526.722	12298251.286	1196.33	REF FOUND CONC REF MON SET DIMPLE IN 1/2 INCH RBR MONUMENT IS SE'LY TIE TO N 1/4 CORNER SEC 36 T98N R23W 63' EAST OF FENCE SOUTH AND 2' NORTH OF EAST-WEST ROW FENCE
301	9838812.445	12295414.489	1206.34	REF FOUND CONC REF MON SET DIMPLE IN 1/2 INCH RBR MONUMENT IS NW'LY TIE TO NW CORNER SEC 36 T98N R23W 200' NORTH OF IOWA HWY 9 AND 95' WEST OF COUNTY ROUTE R74
G101	9836510.234	12284939.818	1242.45	BM FOUND WINNEBAGO COUNTY GPS CNTRL MON G101 AN NGS STYLE ALUM MON WITH ACCESS COVER LOCATED 0.4 MILES SOUTH OF IOWA HIGHWAY 9 AND 30' WEST OF 210TH AVE AND 8' SOUTH OF FIELD ENTRANCE
FOREST CITY	9836273.903	12263296.410	1280.75	BM FOUND USC&GS BM FOREST CITY 1934 NGS PID 000700 TOP OF SOUTHEAST CORNER OF CONCRETE FOOTING FOR A BRICK PIER FOR A CANON AT THE SOUTHEAST CORNER OF THE COURTHOUSE SQUARE
110	9838397.046	12295421.380	1201.01	REF FOUND CONC REF MON SET DIMPLE IN 1/2 INCH RBR MONUMENT IS SW'LY TIE TO NW CORNER SEC 36 T98N R23W 215' SOUTH OF HWY 215' SOUTH OF IOWA HWY 9 AND 85' WEST OF COUNTY ROUTE R74
111	9838690.238	12295290.848	1210.33	ROW FOUND RAIL PLACED CUT X ON BALL RAIL IS 80' NORTH OF IOWA HWY 9 AND 220' WEST OF COUNTY ROUTE R74
500	9838630.034	12295703.898	1209.85	BM FOUND CUT X NW COR NW WING FOOTING 80' X 30' DECK GIRDER BRIDGE ON IOWA HWY 9 OVER DRAINAGE DITCH #54



Right of Way Design Information	
THIS SHEET INCLUDED FOR INFORMATION ONLY	
ROW Team: Larson/Hughes	
ROW #: STPN-009-5(110)-2J-95	
Plan Date: 12-03-2018	
Color Legend:	
	Property Lines
	Temporary Easement
	Permanent Acquisition

108-23A
08-01-08

TRAFFIC CONTROL PLAN

Traffic will be maintained at all times. However, it will be necessary to reduce traffic down to one lane via the use of flaggers during the removal of the bridge rail, guardrail and placement of the flowable mortar.

111-01
04-17-12

COORDINATED OPERATIONS

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

Project	Type of Work
None Provided	

108-25
10-21-14

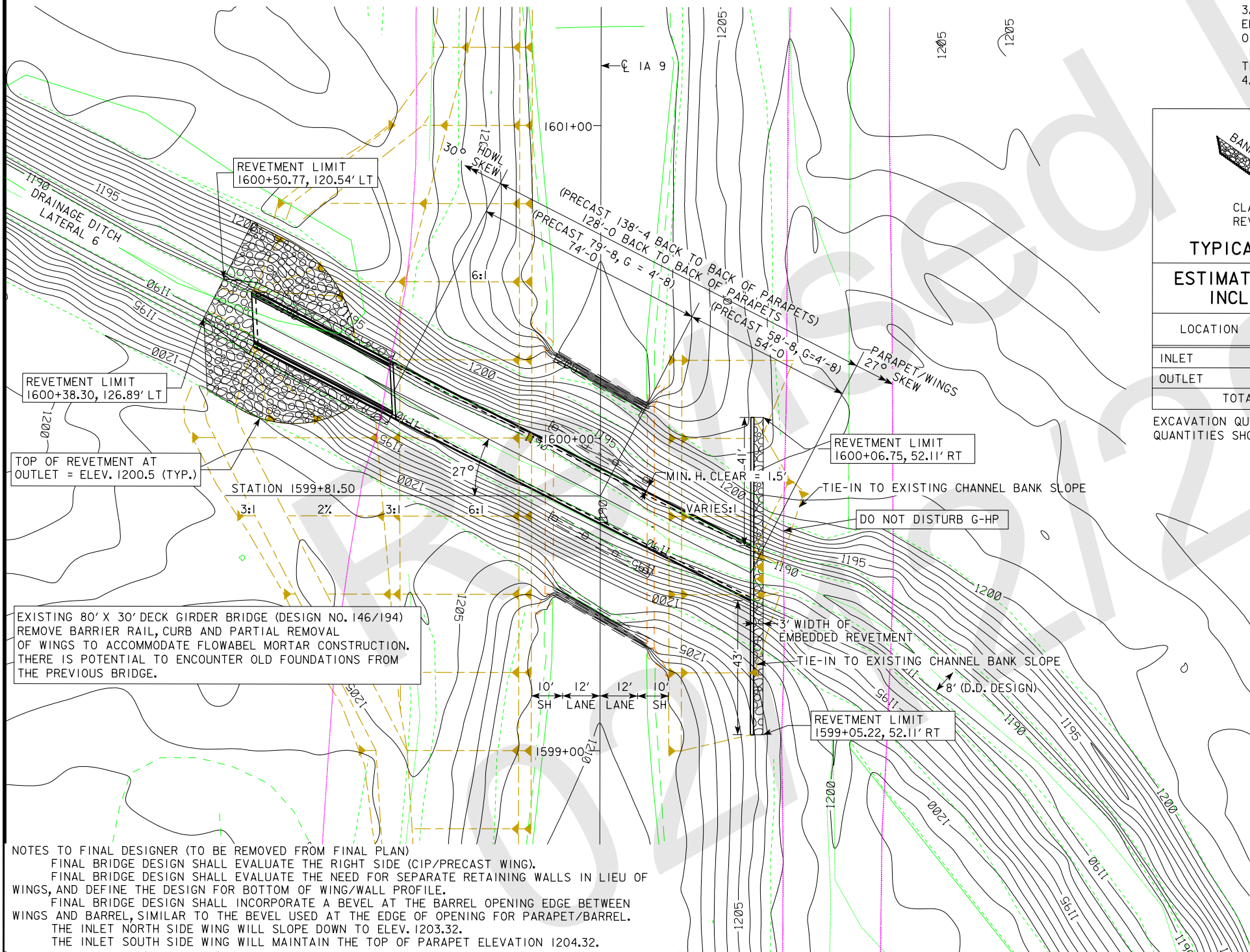
511 TRAVEL RESTRICTIONS

Route	Direction	County	Location Description	Feature Crossed	Object Type	Maint. Bridge No., Structure ID, or FHWA No.	Type of Restriction	Existing Measurement	Construction Measurement	Construction Measurement as Signed	Projected As Built Measurement	Remarks
			No Travel Restrictions Expected									

Revised 02/12/2019

1220				1220
1210		LOW STEEL ELEV. 1204.12	DESIGN FILL HEIGHT = 5.7'	1210
1200		MIN VERT. CLEAR = 0.88'	FALL PROTECTION (RAIL OR FENCE)	1200
1190	PLAN DITCH F.L.	TOP OF PPT ELEV. 1204.16	TOP OF PPT ELEV. 1204.32	1190
1180		F.L. ELEV. = 1187.83	DESIGN HW = 1200.0	1180
1170		F.L. ELEV. = 1187.99		1170

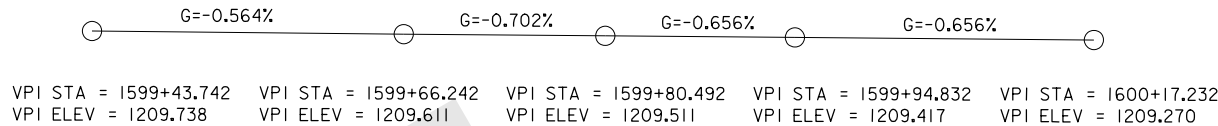
LONGITUDINAL SECTION ALONG ϕ CULVERT



SITUATION PLAN

NOTES TO FINAL DESIGNER (TO BE REMOVED FROM FINAL PLAN)
 FINAL BRIDGE DESIGN SHALL EVALUATE THE RIGHT SIDE (CIP/PRECAST WING).
 FINAL BRIDGE DESIGN SHALL EVALUATE THE NEED FOR SEPARATE RETAINING WALLS IN LIEU OF WINGS, AND DEFINE THE DESIGN FOR BOTTOM OF WING/WALL PROFILE.
 FINAL BRIDGE DESIGN SHALL INCORPORATE A BEVEL AT THE BARREL OPENING EDGE BETWEEN WINGS AND BARREL, SIMILAR TO THE BEVEL USED AT THE EDGE OF OPENING FOR PARAPET/BARREL.
 THE INLET NORTH SIDE WING WILL SLOPE DOWN TO ELEV. 1203.32.
 THE INLET SOUTH SIDE WING WILL MAINTAIN THE TOP OF PARAPET ELEVATION 1204.32.

BENCH MARK NO. 500 NORTHING 9838630.034, EASTING 12295703.898, ELEV. 1209.85, FOUND CUT X NW COR NW WING FOOTING 80' X 30' DECK GIRDER BRIDGE ON IOWA HWY 9 OVER DRAINAGE DITCH #54



PROPOSED PROFILE GRADE IA 9 (U.A.C.)

NOTES:

1. REPLACE EXISTING BRIDGE WITH 14' X 14' RCB USING THE FLOWABLE MORTAR METHOD.
2. THE RCB LENGTH WAS BASED ON A FUTURE PROPOSED ROADWAY SECTION WITH TURN LANES.
3. THE RCB FLOWLINES ARE SET TO AN ELEVATION 1 FOOT BELOW THE PLAN DITCH ELEVATION. THE PLAN DITCH ELEVATION AT THE IA 9 STRUCTURE IS 1188.92 WITH SLOPE OF 0.07%. BASE CHANNEL WIDTH IS 8 FEET WITH 2:1 SIDE SLOPES. (REF. "TRI-JOINT DRAINAGE DISTRICT 54-52-17 LATERAL 6 DITCH CLEAN OUT AND REPAIR PROJECT" DATED MARCH 21, 2017). THE PROJECT WAS COMPLETED IN SUMMER/FALL 2017 AND IS NOT REFLECTED IN SHOWN CONTOURS.
4. THE CONTRACTOR SHALL NOT DISTURB THE G-HP LINE DURING CONSTRUCTION.

UTILITIES LEGEND:
 FO - FIBER OPTIC
 G-HP - HIGH PRESSURE GAS
 REFER TO ROAD SHEETS FOR FINAL UTILITY INFORMATION.

HYDRAULIC DATA
 DRAINAGE AREA = 9.1 SQUARE MILES
 Q 100 = 950 CFS
 HW ELEV. = 1200.0
 STREAM SLOPE = 0.07% (3.7 FT/MI)

TRAFFIC ESTIMATE
 2020 AADT 3000 V.P.D.
 2040 AADT 3700 V.P.D.
 202L DHV - V.P.H.
 TRUCKS 15 %
 TOTAL DESIGN ESALS -

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.

NOV. 29, 2018
 Signature Patricia G. Schwarz Date
 Printed or Typed Name
 My license renewal date is December 31, 2018

Pages or sheets covered by this seal: 1 OF 1

EXCAVATION QUANTITY CALCULATED FROM GRADING SURFACE. QUANTITIES SHOWN FOR INFORMATION ONLY. SEE ROAD SHEETS.

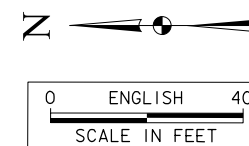
TYPICAL CHANNEL PROTECTION

ESTIMATED REVETMENT QUANTITIES INCLUDED WITH ROAD PLANS

LOCATION	REVETMENT CL. "E" (TON)	ENGINEERING FABRIC (SY)	EXCAVATION (CY)
INLET	39.5	87.3	24.7
OUTLET	234.9	295.6	146.8
TOTALS	274.4	382.9	171.5

LOCATION

IA 9 OVER DRAINAGE DITCH LATERAL 6
 T-98N R-23W
 SECTIONS 25 & 36
 MOUNT VALLEY TOWNSHIP
 WINNEBAGO COUNTY
 LATITUDE 43.270023°
 LONGITUDE -93.516864°



PRELIMINARY
 DESIGN FOR 27° SKEW (L.A.)
 14'-0 X 14'-0 X 128'-0 REINFORCED CONCRETE BOX CULVERT

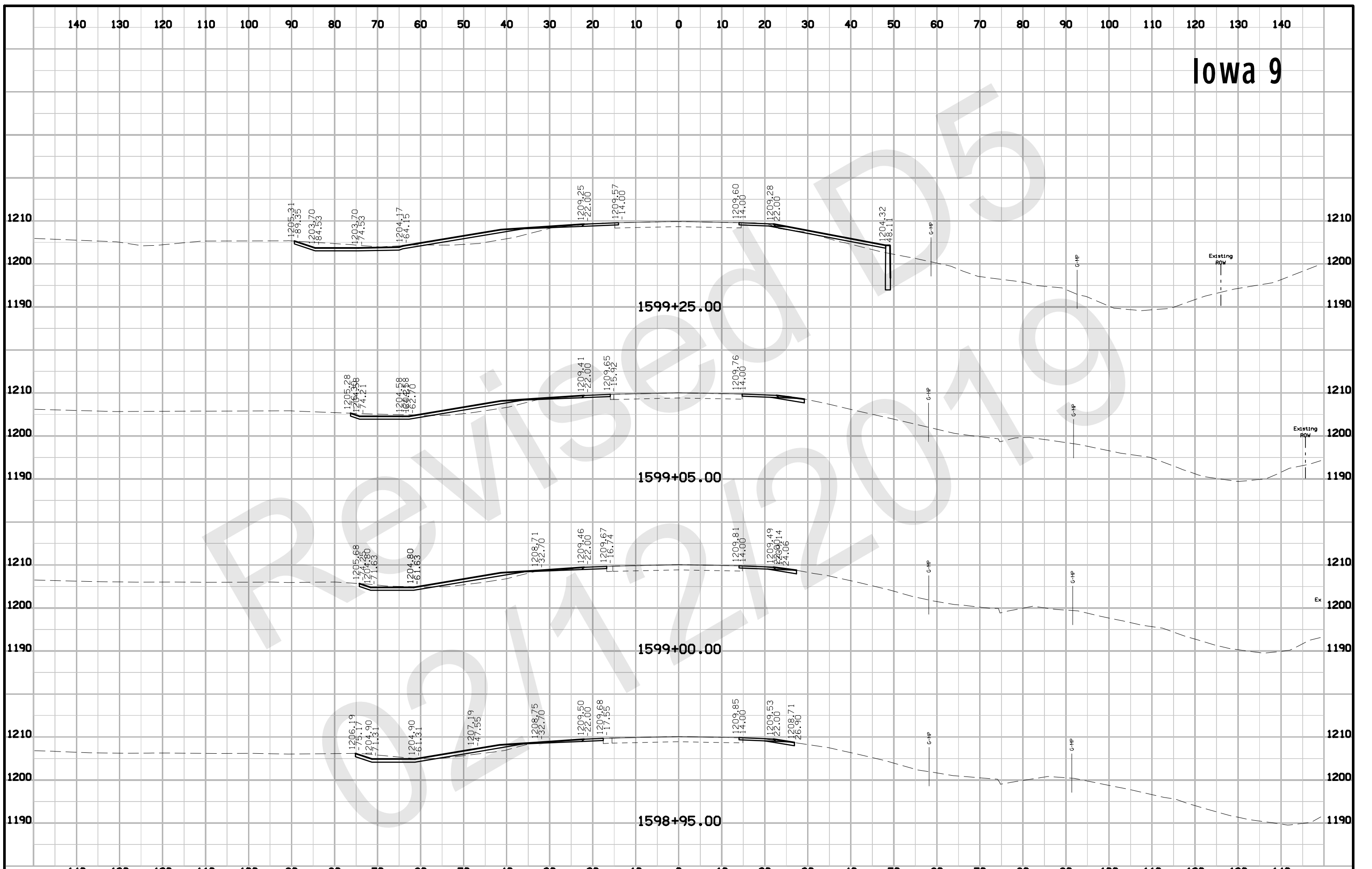
SITUATION PLAN

STATION 1599+81.50 IA 9 NOVEMBER 2018
 WINNEBAGO COUNTY
 IOWA DEPARTMENT OF TRANSPORTATION - HIGHWAY DIVISION
 DESIGN SHEET NO. 1 OF 1 FILE NO. 31579 DESIGN NO. 120

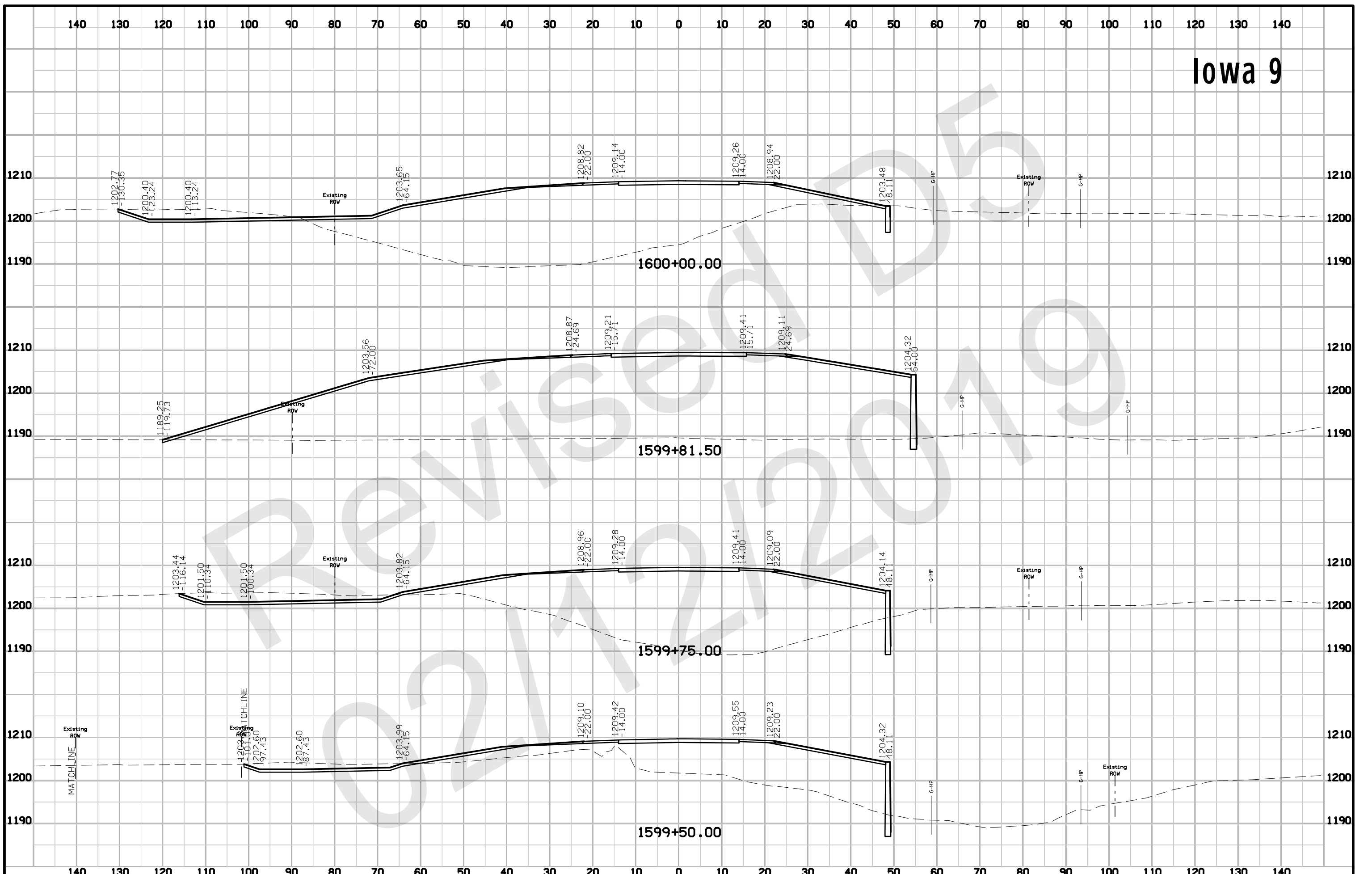
Iowa 9



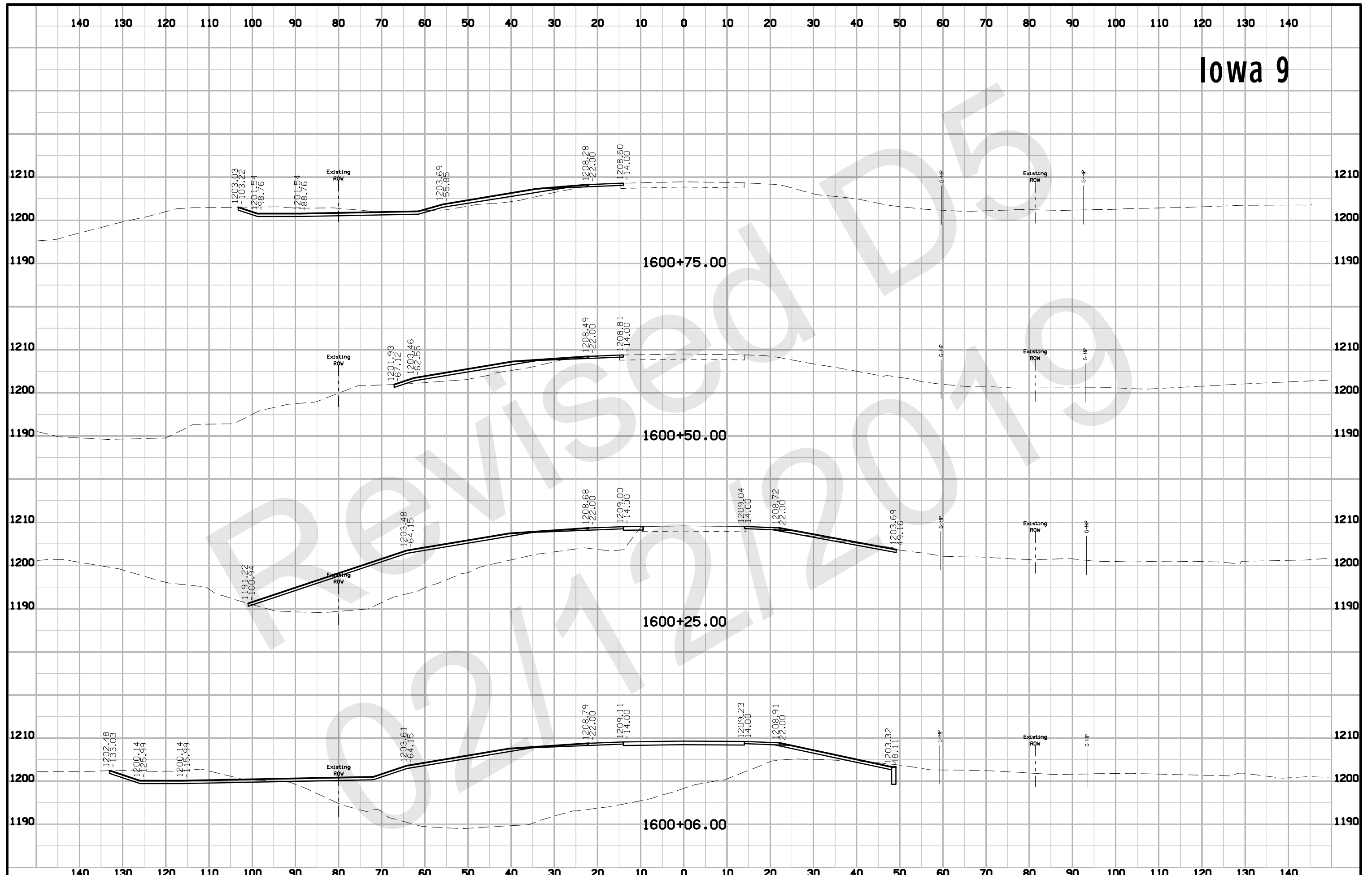
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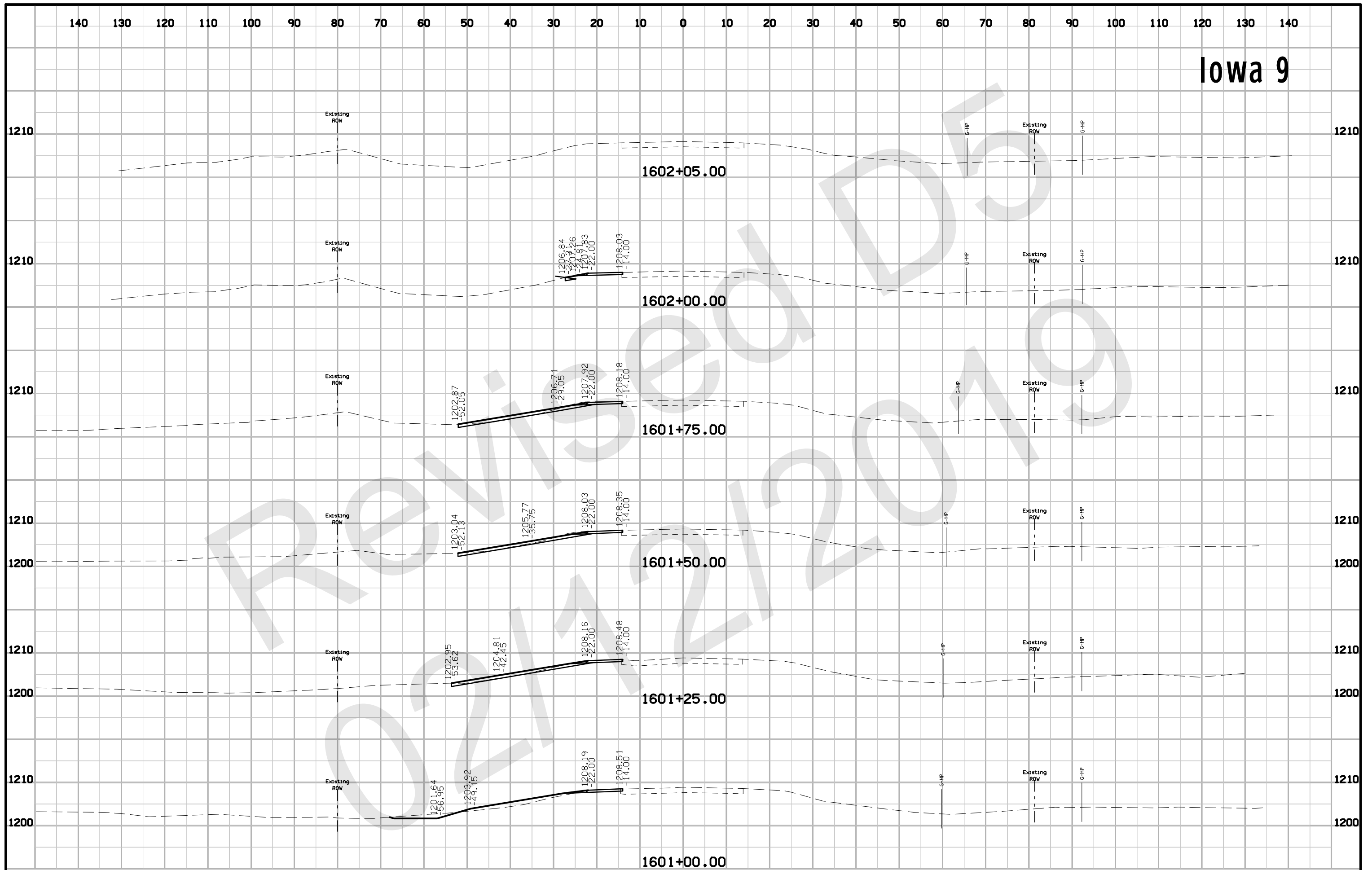
Iowa 9



Iowa 9



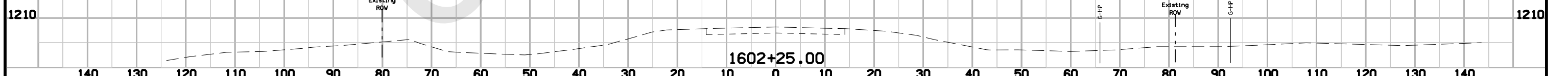
Iowa 9



140 130 120 110 100 90 80 70 60 50 40 30 20 10 0 10 20 30 40 50 60 70 80 90 100 110 120 130 140

Iowa 9

Revised 02/12/2019 D5



NO ACCESS RIGHTS ARE TO BE ACQUIRED ON THIS PROJECT.