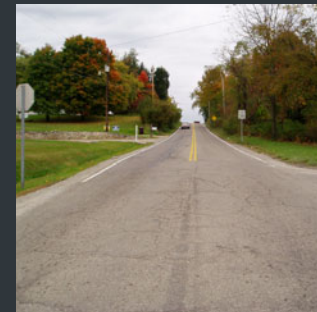
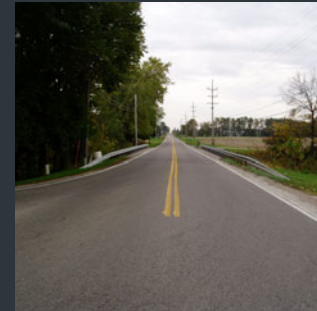


Widening Analysis

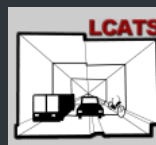
LIC - Thornwood Drive
PID 78116
Licking County, Ohio



Submitted to:
ODOT - District 5
9600 Jacksontown Road
Jacksontown, Ohio 43030

Submitted by:
HNTB Ohio, Inc.
330 West Spring St.
Suite 310
Columbus, Ohio 43215

October, 2008



Executive Summary

The Ohio Department of Transportation in cooperation with the City of Heath, the City of Newark, Licking County, and LCATS has contracted with HNTB to prepare Stage 1 engineering plans and environmental studies for the Thornwood Drive project area. The project involves the widening and re-alignment of Thornwood Drive to provide standard lane widths, graded shoulders, upgraded horizontal and vertical alignments, and clear zone grading where possible. In addition, left turn lanes will be provided on Thornwood Drive at relocated River Road, West Main Street and James Road; the following intersecting roads will be widened to accommodate left turn lanes: West Main Street, James Road, and Lees Road.

In June 2008, HNTB was asked to investigate possible widening options throughout the Thornwood Drive project limits and determine the impacts to the existing water mains. This document contains the estimated right of way and water line relocation costs associated with the various widening options. Although not specifically itemized for this analysis, the additional roadway costs (pavement, excavation, guardrail, etc.) are expected to be similar between the symmetrical and unsymmetrical options.

The analysis divides the project into two distinct design areas based upon design speed. The 55 mph design area, located in the City of Heath and Union Township, includes a comparison of unsymmetrical and symmetrical widening options (shown as Typical Sections A and B respectively). The 35 mph design area, which includes the Cities of Heath and Newark, compares a fully curbed typical with a partially curbed typical (shown as Typical Sections C and D respectively), both use symmetrical widening. The analysis of the symmetrical/unsymmetrical options was suspended from the Ramp Creek Bridge (Sta. 129+00) through the northern project limits at relocated River Road. Symmetrical widening was used throughout the area north of Ramp Creek to reduce/eliminate significant impacts at the following locations:

- Sta. 129+00 - Ramp Creek Bridge
- Sta. 140+00 to 165+00 - No waterline to relocate
- Sta. 165+00 to 175+00 - Residential Impacts, Potentially multiple housing takes
- Sta. 182+00 to 190+00 - Residential Impacts/Intersection Relocation, at least one housing take and relocation of the West Main/James Intersection

Right of way costs were estimated for each option using both a consistent permanent right of way width (100' of permanent right of way in the 55 mph zone; the existing right of way in the 35 mph zone) with temporary right of way, and a varied right of way width set to enclose the grading limits.

Based upon this analysis, HNTB recommends Typical Section A and Typical Section D be advanced for further development. Typical Section A, in addition to being the lower cost option within the 55 mph zone, should also create a simple maintenance of traffic scheme with minimal disruption of traffic. Typical Section D, while showing slightly higher costs for the items estimated for this analysis, will provide additional space for the occasional pedestrian, bicyclist, or disabled vehicle and will eliminate the need for a closed drainage system for most of the east side of the road.

Table of Contents

- **Executive Summary/Table of Contents**
- **Estimated Right of Way and Waterline Relocation Costs**
- **Roadway Design Criteria**
- **55 MPH Design Speed Area**
 - **Typical Sections (A and B)**
 - **Plans**
 - **Critical Sections**
- **35 MPH Design Speed Area**
 - **Typical Sections (C and D)**
 - **Plans**
 - **Critical Sections**

**LIC-Thornwood Drive
PID 78116
Estimated Right of Way and Waterline Relocation Costs**

55 MPH Design Speed Area														
HEATH	TYPICAL SECTION A - Unsymmetrical						TYPICAL SECTION B - Symmetrical							
	100' Perm. R/W with Temp. R/W					Varied R/W out to Grading Limits		100' Perm. R/W with Temp. R/W					Varied R/W out to Grading Limits	
	Perm.		Temp.		Total Cost	Area	Total Cost	Perm.		Temp.		Total Cost	Area	Total Cost
	Area	Cost	Area	Cost				Area	Cost	Area	Cost			
R/W	6.22	\$155,500	6.34	\$50,720	\$206,220	12.55	\$313,750	8.21	\$205,250	6.63	\$53,040	\$258,290	14.85	\$371,250
Waterline Relocation (City of Heath)														
Watermain @ \$125/ft	See Note 6					\$0	\$0	14250 Feet of Water main					\$1,781,250	\$1,781,250
Hydrant Replacement @ \$4400/Ea (Assumed every 1000Ft)						\$0	\$0	15 Hydrants					\$66,000	\$66,000
Service Connections @ \$2500/Ea (Per # of Parcels)						\$0	\$0	37 Parcels					\$92,500	\$92,500
Total Waterline Relocation Cost						\$0	\$0						\$1,939,750	\$1,939,750
Sub-Total						\$206,220	\$313,750						\$2,198,040	\$2,311,000
UNION TWP.	100' Perm. R/W with Temp. R/W					Varied R/W out to Grading Limits		100' Perm. R/W with Temp. R/W					Varied R/W out to Grading Limits	
	Perm.		Temp.		Total Cost	Area	Total Cost	Perm.		Temp.		Total Cost	Area	Total Cost
	Area	Cost	Area	Cost				Area	Cost	Area	Cost			
	R/W	7.42	\$185,500	5.78	\$46,240	\$231,740	13.19	\$329,750	5.29	\$132,250	5.43	\$43,440	\$175,690	10.72
Sub-Total						\$231,740	\$329,750						\$175,690	\$268,000
TOTAL COST 55 MPH Design Speed Area					\$437,960	\$643,500						\$2,373,730	\$2,579,000	

35 MPH Design Speed Area														
NEWARK	TYPICAL SECTION C - 2' shoulders Lt & Rt						TYPICAL SECTION D - 2' Lt shoulder, 6' Rt shoulder							
	Ex. R/W with Temp. R/W					Varied R/W out to Grading Limits		Ex. R/W with Temp. R/W					Varied R/W out to Grading Limits	
	Perm.		Temp.		Total Cost	Area	Total Cost	Perm.		Temp.		Total Cost	Area	Total Cost
	Area	Cost	Area	Cost				Area	Cost	Area	Cost			
R/W	3.32	\$83,000	5.05	\$40,400	\$123,400	8.37	\$209,250	3.32	\$83,000	5.41	\$43,280	\$126,280	8.73	\$218,250
Waterline Relocation (Required By Profile Changes)														
Watermain @ \$125/ft	1500 Feet of Water main					\$187,500	\$187,500	1500 Feet of Water main					\$187,500	\$187,500
Hydrant Replacement @ \$4400/Ea (Assumed every 1000Ft)	2 Hydrants					\$8,800	\$8,800	2 Hydrants					\$8,800	\$8,800
Service Connections @ \$2500/Ea (Per # of Parcels)	19 Parcels					\$47,500	\$47,500	19 Parcels					\$47,500	\$47,500
Total Waterline Relocation Cost (See Note 5)						\$243,800	\$243,800						\$243,800	\$243,800
TOTAL COST 35 MPH Design Speed Area						\$367,200	\$453,050						\$370,080	\$462,050

Notes:

1. Estimate does not include R/W acquisition costs
2. Estimate does not include Utility Relocation costs (Except Waterline stated above)
3. Permanent R/W unit cost = \$25,000/ac
4. Temp R/W unit cost = \$8000/ac
5. \$340,000 of additional waterline relocation costs are required to relocate the remaining 2400 feet of waterline outside the limits of the proposed pavement/shoulders within the city of Newark.
6. Typical Section A - Unsymmetrical cost estimate assumes the existing hydrants may remain within the clear zone and won't require relocation.

Note: The costs shown in this estimate represent an estimate of probable construction costs prepared in good faith and with reasonable care. HNTB has no control over the costs of construction labor, materials, or equipment, nor over competitive bidding or negotiating methods and does not make any commitment or assume any duty to assure that bids or negotiated prices will not vary from this estimate.

LIC - THORNWOOD DRIVE PID 78116 ROADWAY CRITERIA

	ODOT L&D Vol 1 Figure		Thornwood Drive (C-134)				Relocated River Road	
	Number	Date	Existing Condition	Standard Design		Existing Condition	Standard Design	
				South of Railroad (Design Speed = 55 mph)	North of Railroad (Design Speed = 35 mph)	Local		
Functional (Design) Classification				Collector				
# of Lanes	-	-	2	2	2	2	2	
Design Vehicle				SU				
TRAFFIC DATA								
Avg. Daily Traffic (Opening Day 2010)					7,180		970	
Avg. Daily Traffic (Design Year 2030)					12,360		1,430	
Design Hourly Volume					1,240			
Percentage B & C Trucks (T ₂₄)					0.04			
Percentage B & C Trucks (T _a)					0.02			
Directional Distribution Factor (D)					0.55			
Terrain	-	-		Level (South of Railroad Tracks)		Rolling (North of Railroad Tracks)		
Locale	-	-		Urban (uncurbed)		Urban (uncurbed)	Urban (curbed)	
Design Speed	104	April, 1999		55 mph		35 mph	35 mph	
Posted/Legal Speed				50 mph		35 mph	35 mph	
CROSS SECTIONS								
Lane Width	301-4	Jul-08	10 - 11 ft	12		12	12	
Curve Widening	301-5b	October, 2004		Fig. 301-5b		Fig. 301-5b	Fig. 301-5b	
Normal Pavement Cross Slope	-	-		0.016		0.016	0.016	
SHOULDERS *								
Type	301-3, 301-4	Oct.2004, Jul.2008	Aggregate - turf				Turf	
Treated shoulder width	301-3 ⁽²⁾ , 301-4,302-3E ⁽¹⁾	Oct.04,Jul.06,Nov.02	Varies	6 ft		6 ft	2 ft	
Graded Shoulder Width								
WITH Barrier or Foreslope STEEPER than 6:1	301-3, 301-4	Oct. 2004, Jul. 2008	Varies	10 ft		10 ft	N/A	
WITHOUT Barrier or Foreslope FLATTER than 6:1	301-3, 301-4	Oct. 2004, Jul. 2008	Varies	8 ft		8 ft	N/A	
Guardrail Offset	301-3, 301-4	Oct. 2004, Jul. 2008	Varies	8 ft		8 ft	(305.3.3) July 2006	
Rounding	301-3	Oct. 2004, Jul. 2008	None	8 ft		4 ft	N/A	
GRADING AND SIDESLOPES								
Type of Grading	307-3, 307-4, 307-6	Nov. 2002, Jan. 2007		Fig. 307-3		Fig. 307-3	Fig. 307-6	
Clear Zone	600-1	April, 1999		29		17	N/A	
HORIZONTAL ALIGNMENT								
Max. Centerline Deflection w/o curve	202-1	January, 2006		1° 00'		2° 45'	2° 45'	
Maximum Degree of Curve	202-2	January, 2006		5° 30'		15°30'	15°30'	
Maximum Degree of Curve w/o Superelevation	202-3	January, 2006		0° 39'		11°28'	11°28'	
Taper Rates	-	-		L = WS		L=WS ² /60	L=WS ² /60	
VERTICAL ALIGNMENT								
Maximum change in vertical alignment w/o vertical curve	203-2	January, 2006		0.40%		0.95%	0.95%	
Maximum Grades	203-1	January, 2006		5%***		10%***	10%***	
Minimum Grades	-	-		0.00%		0.00%	0.50%	
Crest Vertical Curves								
Design K	203-3	January, 2006		114		29	29	
Sag Vertical Curves								
Design K	203-6	January, 2006		115		49	49	
Stopping Sight Distance	201-1	January, 2006		495 ft		250 ft	250 ft	
Minimum Passing Sight Distance	201-3	January, 2006		1985 ft		1280 ft	1280 ft	
Intersection Sight Distance	201-5	January, 2006		Fig. 201-5		Fig. 201-5	Fig. 201-5	
Decision Sight Distance	201-6	January, 2006		1030 ft		590 ft	590 ft	

Notes

* Use rural criteria for uncurbed shoulders.

** See section 305.3.2, curb normally not used for 55 mph

*** Section 203.2.3 & Fig. 203-1E

¹ Fig. 302-1 may apply if bridge will be reconstructed.

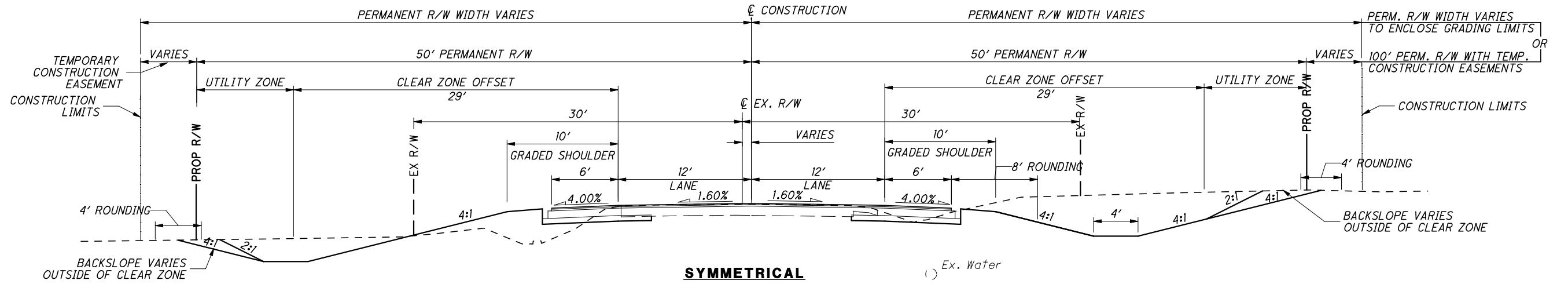
For existing bridge over Ramp Creek Fig. 302-3E, Foot Note (C) applies

² Foot note (I) applies

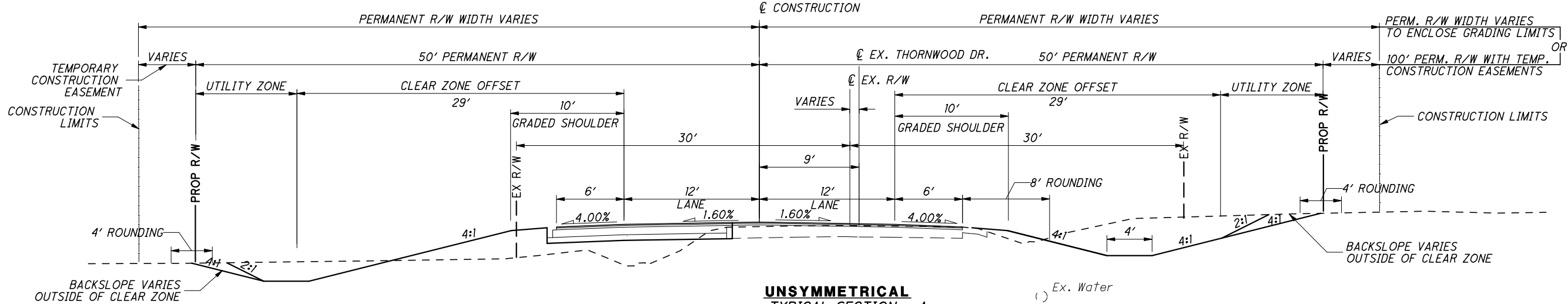
³ Posted speed south of the railroad tracks varies between 45-50 mph. Therefore, 55 mph design speed was used south of the railroad tracks

**LJC – Thornwood Drive
55 MPH Design Speed Area**

j:\JOBS\40927\Techprod\LIC\78116\roadway\sheets\GY_RW001.dgn 20-OCT-2008 4:30PM rsmalley



SYMMETRICAL
TYPICAL SECTION - B
STA. 129+00 TO STA. 166+00 - UNSYMMETRICAL OPTION
STA. 7+50 TO STA. 166+00 - SYMMETRICAL OPTION



UNSYMMETRICAL
TYPICAL SECTION - A
STA. 7+50 TO STA. 129+00 - UNSYMMETRICAL OPTION

THE 100' PERMANENT PROPOSED RIGHT OF WAY LIMITS ARE SHOWN ON THE CROSS SECTIONS.
THE LIMITS OF THE VARIABLE PERMANENT RIGHT OF WAY OPTION ARE SHOWN ON THE PLAN VIEWS.

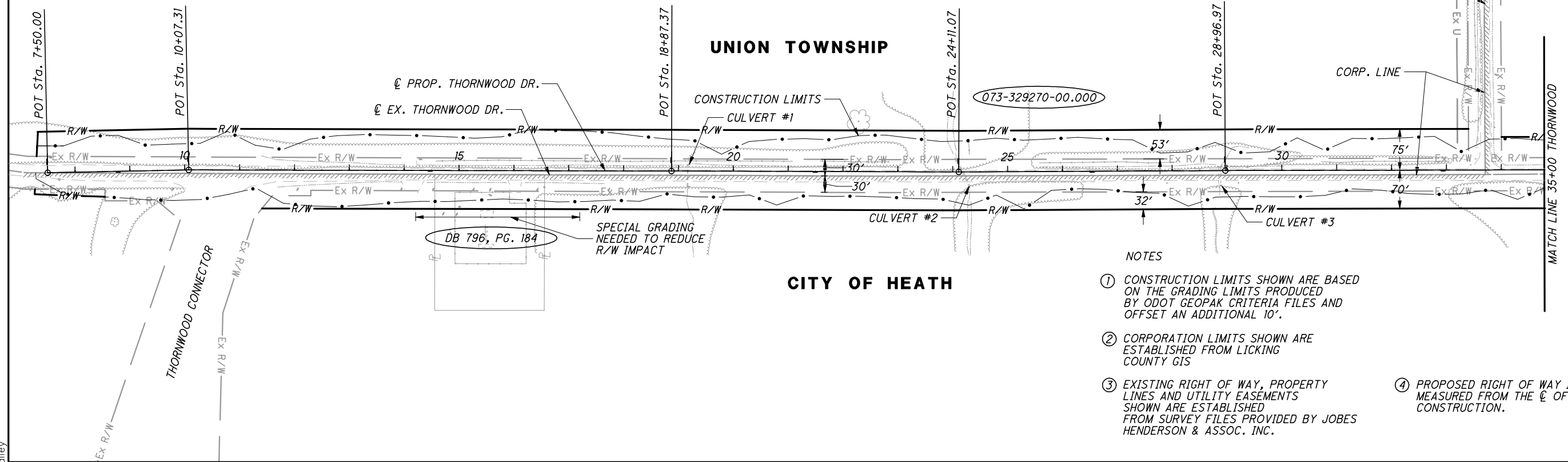
CALCULATED
CHECKED

TYPICAL SECTION - 55 MPH DESIGN SPEED AREA

LIC-THORNWOOD

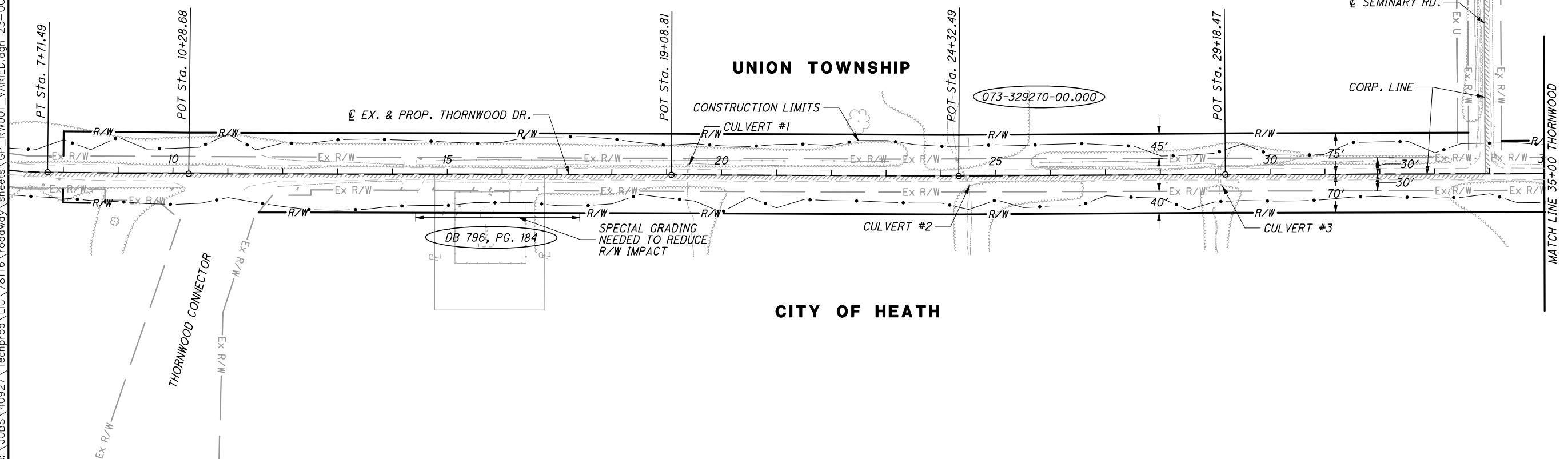


UNSYMMETRICAL WIDENING



- NOTES**
- ① CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
 - ② CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
 - ③ EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
 - ④ PROPOSED RIGHT OF WAY IS MEASURED FROM THE ϵ OF CONSTRUCTION.

SYMMETRICAL WIDENING



j:\JOBS\40927\Techprod\LIC\78116\roadway\sheets\GP_RW001_VARIED.dgn 23-OCT-2008 3:44PM rsmalley



CALCULATED

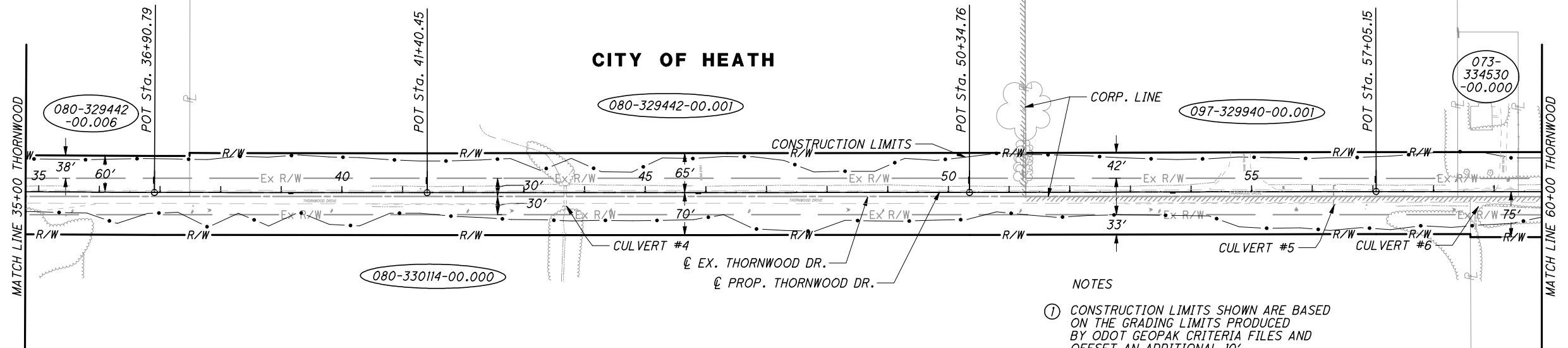
CHECKED

**55 MPH DESIGN SPEED AREA
R/W IMPACT ANALYSIS**

LIC-THORNWOOD



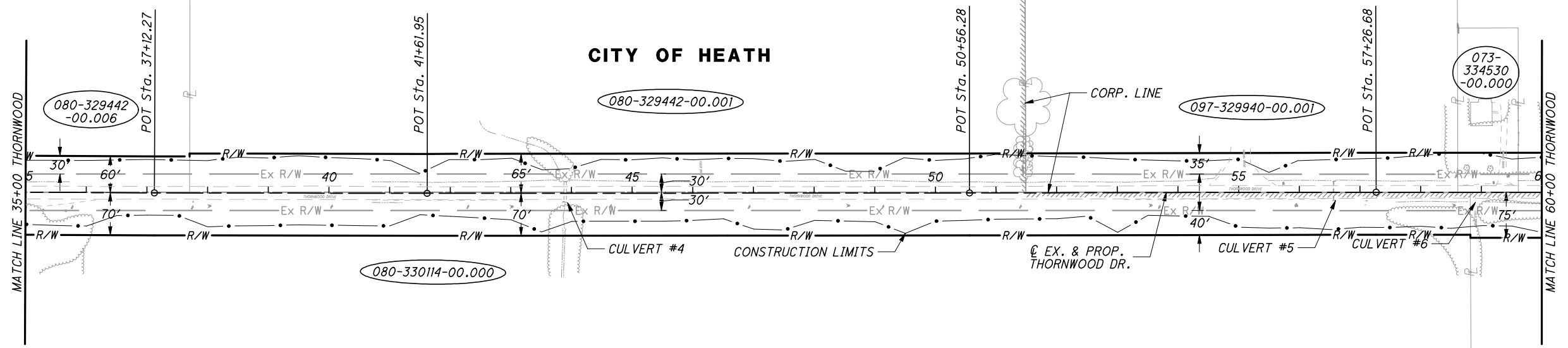
UNSYMMETRICAL WIDENING



NOTES

- ① CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
- ② CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
- ③ EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
- ④ PROPOSED RIGHT OF WAY IS MEASURED FROM THE ϕ OF CONSTRUCTION.

SYMMETRICAL WIDENING

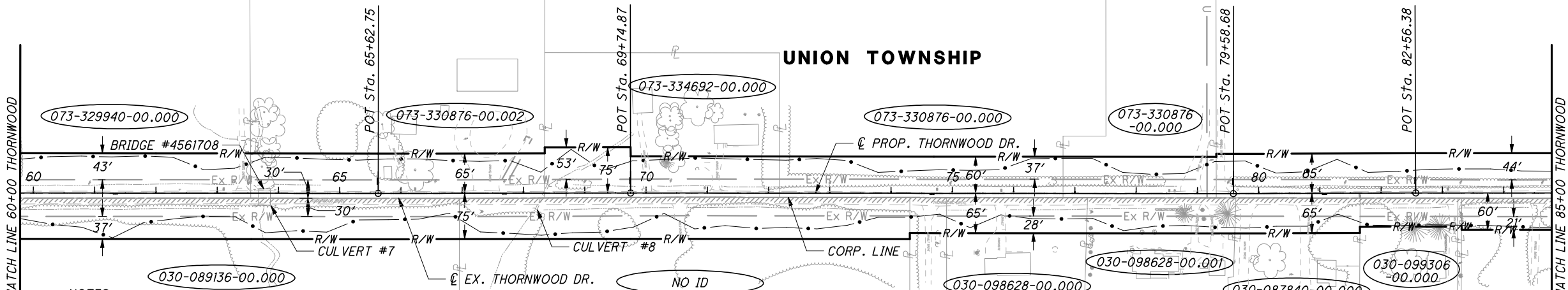


CALCULATED
CHECKED

**55 MPH DESIGN SPEED AREA
R/W IMPACT ANALYSIS**

LIC-THORNWOOD

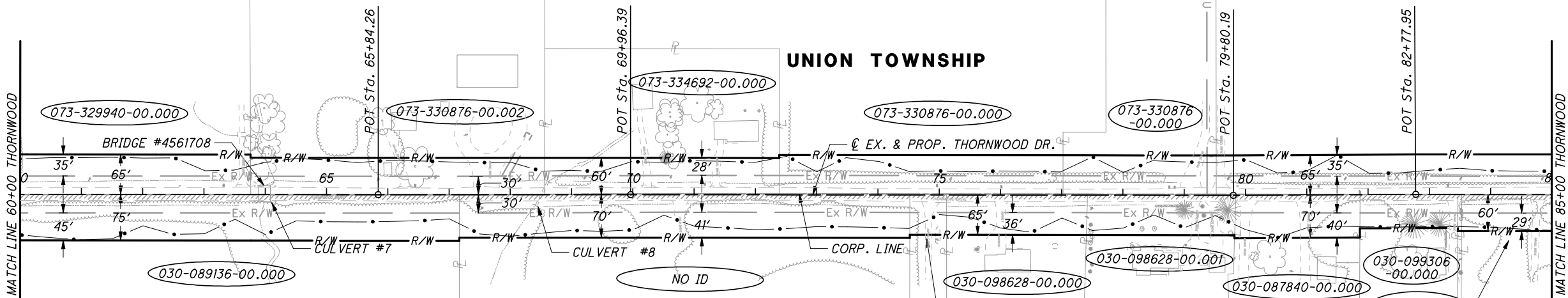
UNSYMMERICAL WIDENING



NOTES

- ① CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
- ② CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
- ③ EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
- ④ PROPOSED RIGHT OF WAY IS MEASURED FROM THE \bar{C} OF CONSTRUCTION.

SYMMERICAL WIDENING



CITY OF HEATH

UNION TOWNSHIP



CALCULATED
CHECKED

**55 MPH DESIGN SPEED AREA
R/W IMPACT ANALYSIS**

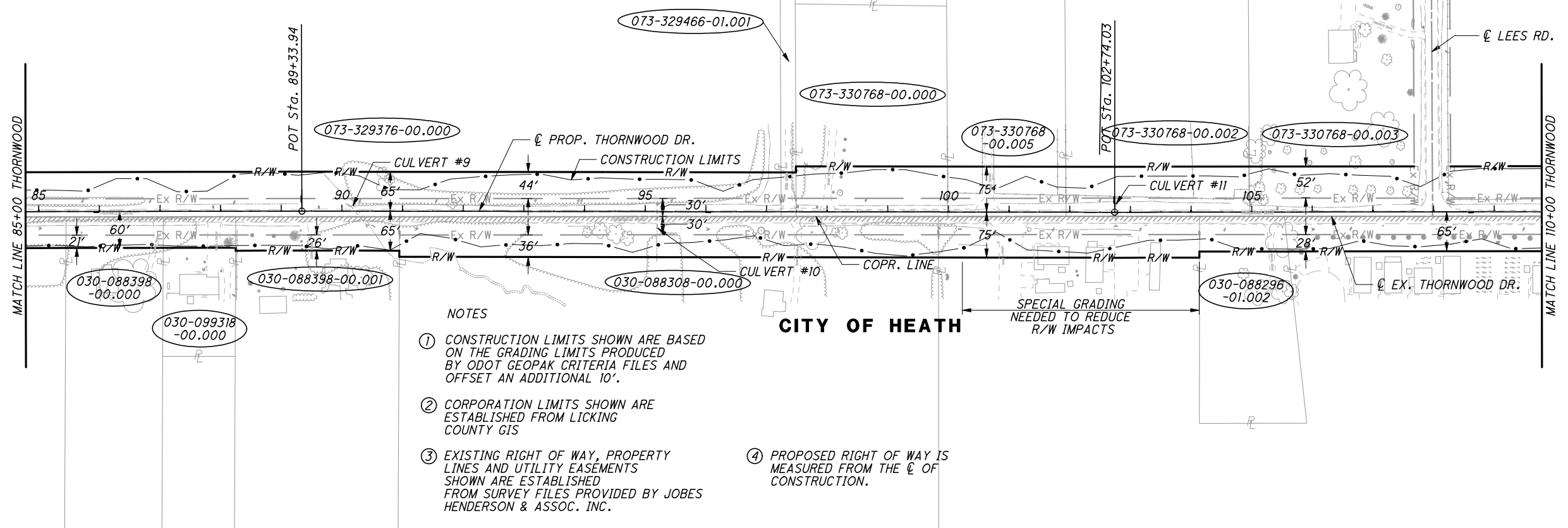
LIC-THORNWOOD



J:\JOBS\40927\Techprod\LIC\78116\roadway\sheets\GP_RW003_VARIED.dgn 23-OCT-2008 3:44PM rsmalley

UNSYMMETRICAL WIDENING

UNION TOWNSHIP

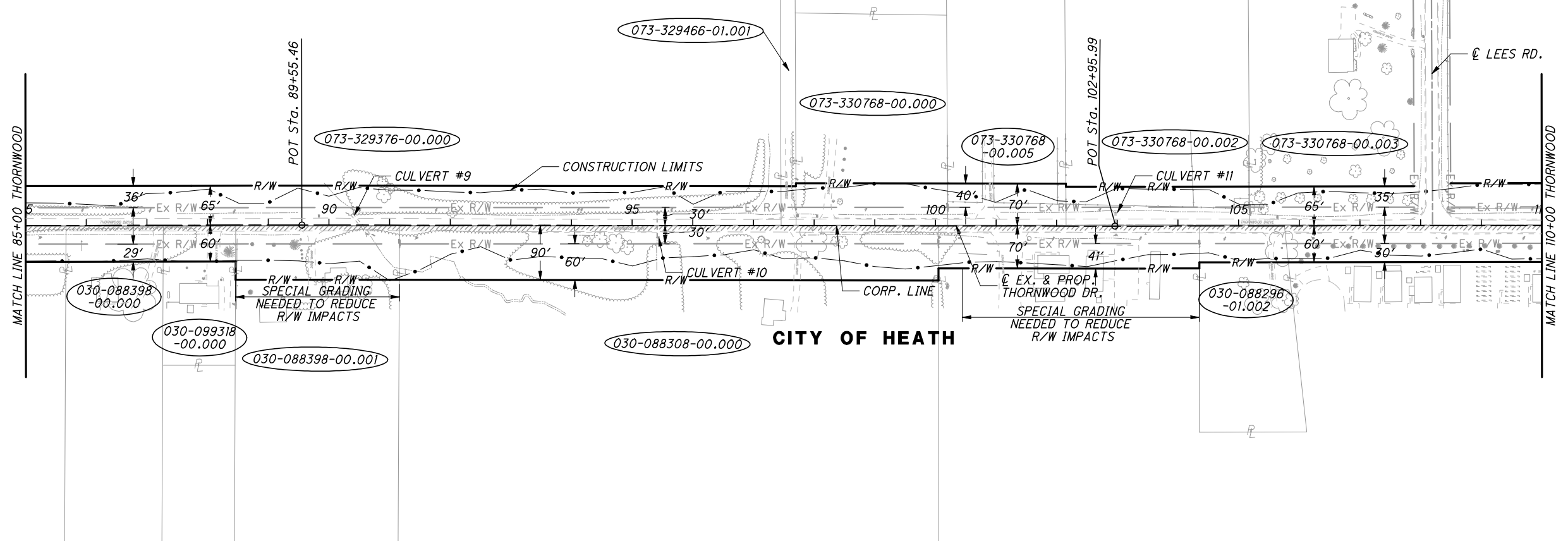


NOTES

- ① CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
- ② CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
- ③ EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
- ④ PROPOSED RIGHT OF WAY IS MEASURED FROM THE \bar{C} OF CONSTRUCTION.

SYMMETRICAL WIDENING

UNION TOWNSHIP



CALCULATED
CHECKED

**55 MPH DESIGN SPEED AREA
R/W IMPACT ANALYSIS**

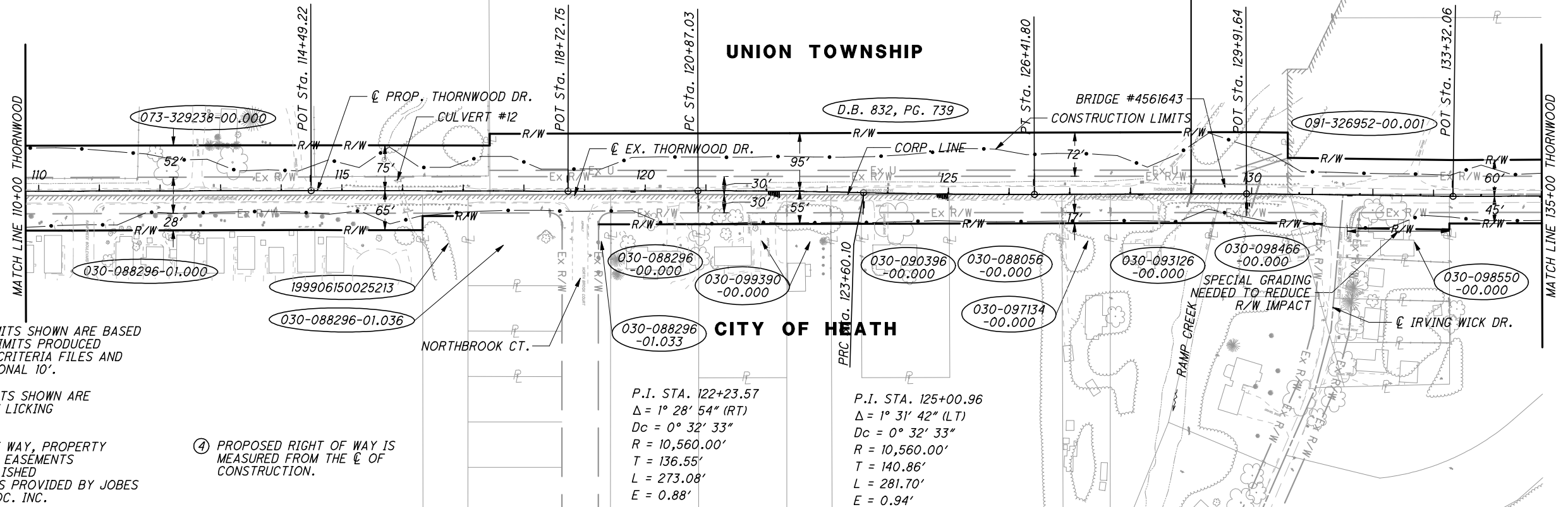
LIC-THORNWOOD



UNSYMMETRICAL WIDENING

END UNSYMMETRICAL WIDENING MEET EXISTING PAVEMENT ϵ

TYPICAL SECTION A TYPICAL SECTION B



NOTES

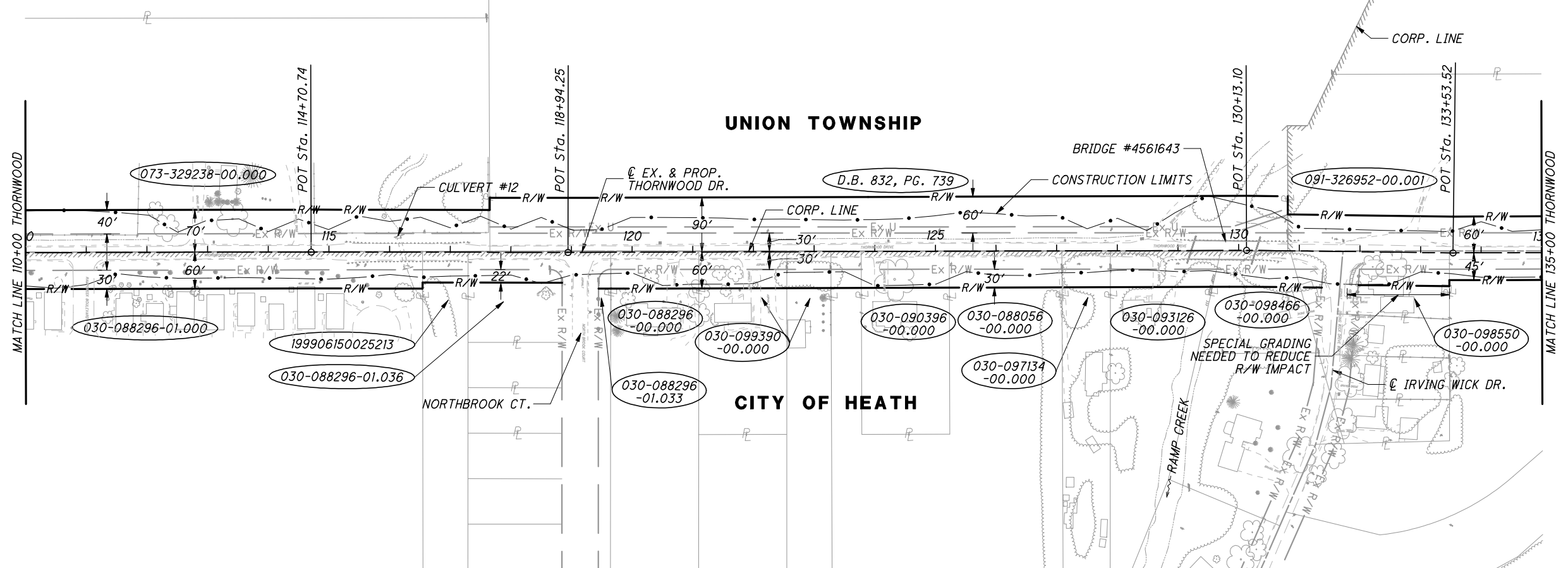
- ① CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
- ② CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
- ③ EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.

- ④ PROPOSED RIGHT OF WAY IS MEASURED FROM THE ϵ OF CONSTRUCTION.

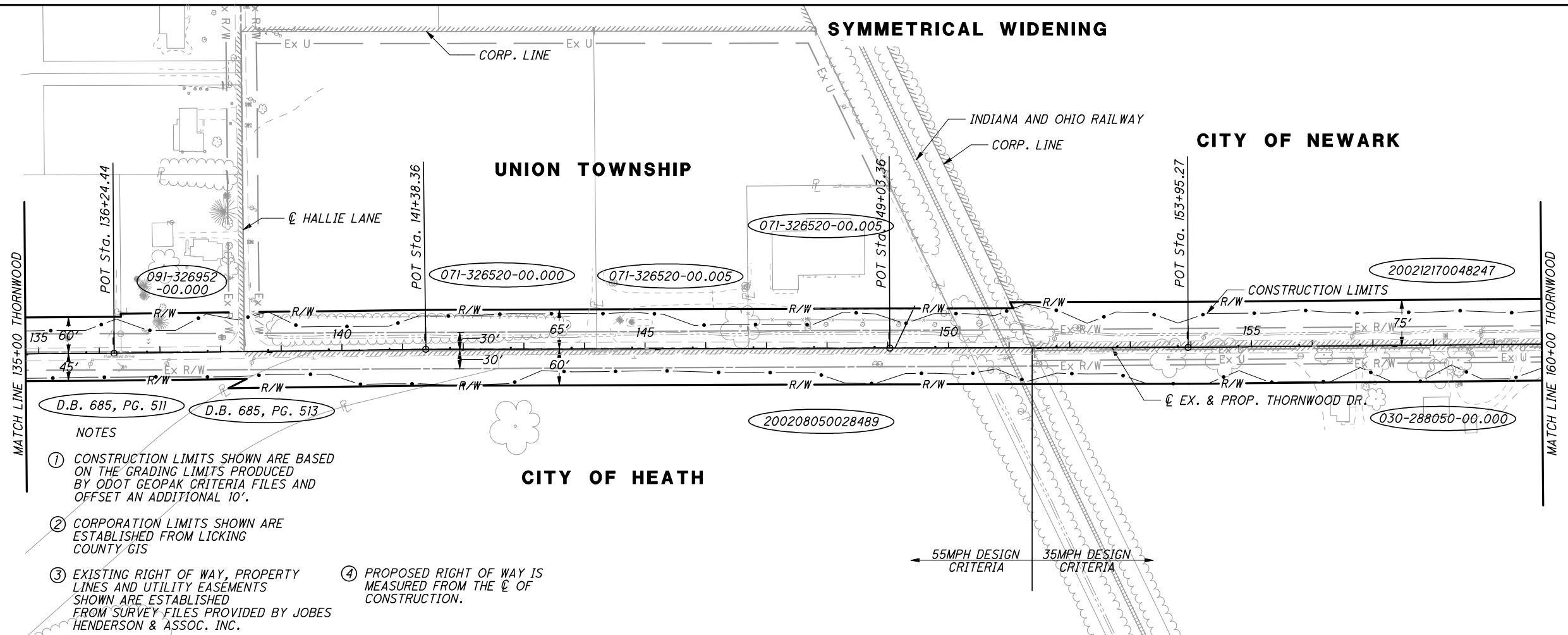
P.I. STA. 122+23.57
 $\Delta = 1^\circ 28' 54''$ (RT)
 $Dc = 0^\circ 32' 33''$
 $R = 10,560.00'$
 $T = 136.55'$
 $L = 273.08'$
 $E = 0.88'$

P.I. STA. 125+00.96
 $\Delta = 1^\circ 31' 42''$ (LT)
 $Dc = 0^\circ 32' 33''$
 $R = 10,560.00'$
 $T = 140.86'$
 $L = 281.70'$
 $E = 0.94'$

SYMMETRICAL WIDENING



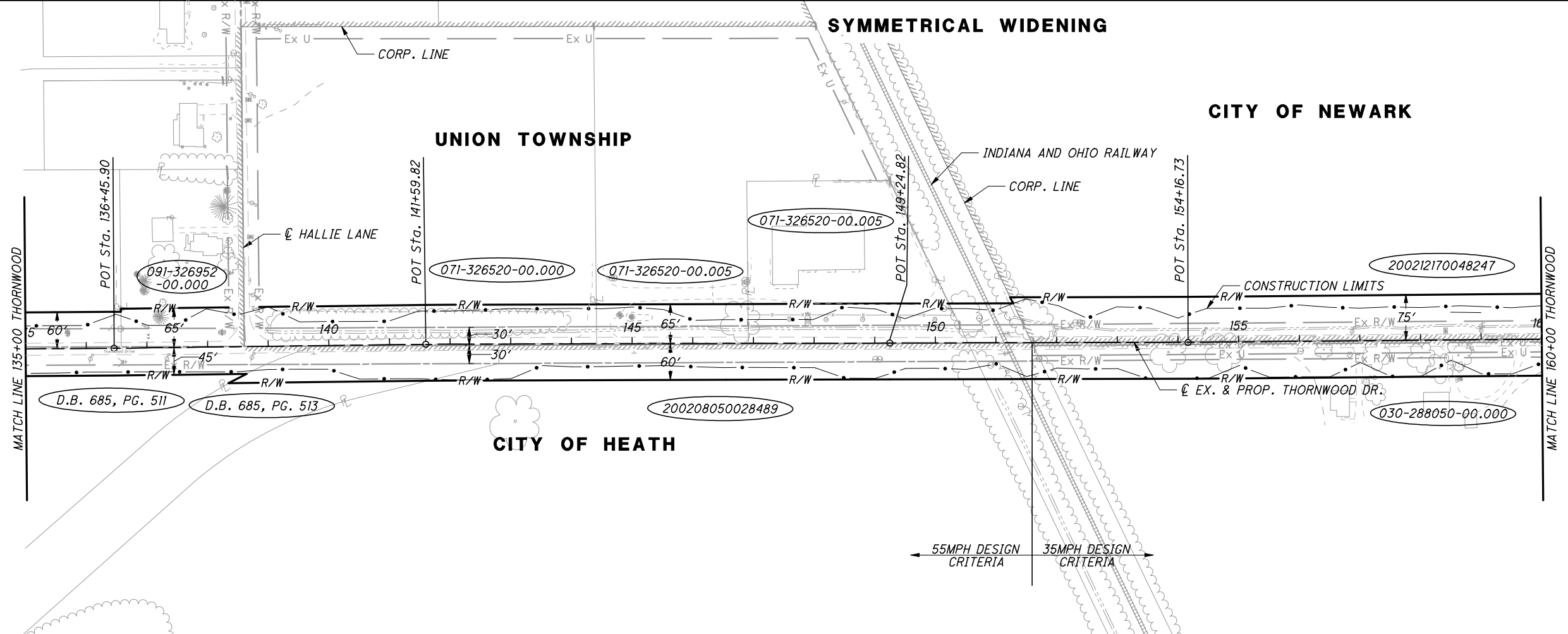
j:\JOBS\40927\Techprod\LIC\78116\roadway\sheets\GP_RW006_VARIED.dgn 23-OCT-2008 3:44PM rsmalley



D.B. 685, PG. 511 D.B. 685, PG. 513

NOTES

- ① CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
- ② CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
- ③ EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
- ④ PROPOSED RIGHT OF WAY IS MEASURED FROM THE ϕ OF CONSTRUCTION.



D.B. 685, PG. 511 D.B. 685, PG. 513

CALCULATED

CHECKED

55 MPH DESIGN SPEED AREA

R/W IMPACT ANALYSIS

LIC-THORWOOD

\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:56PM rsmalley

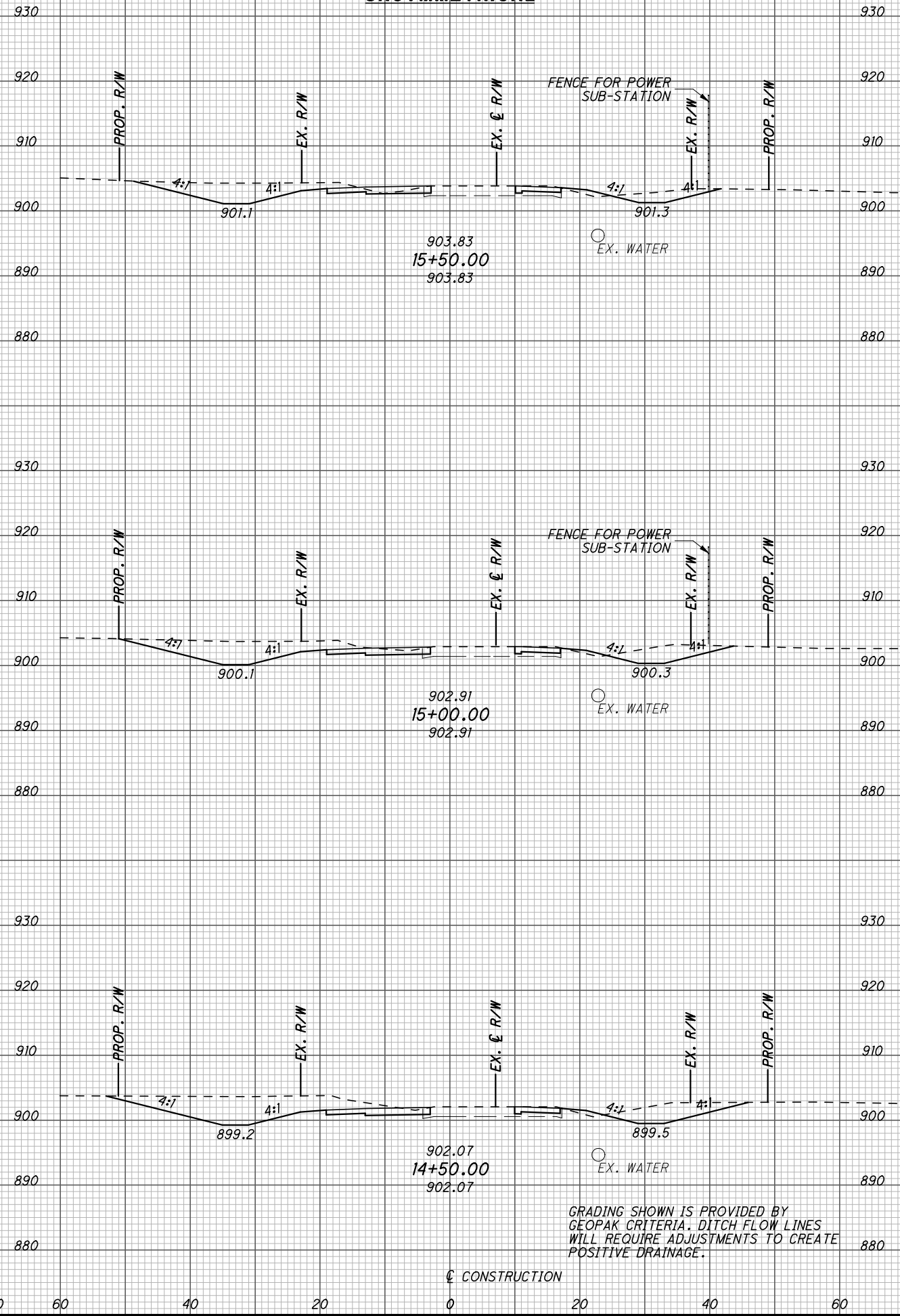
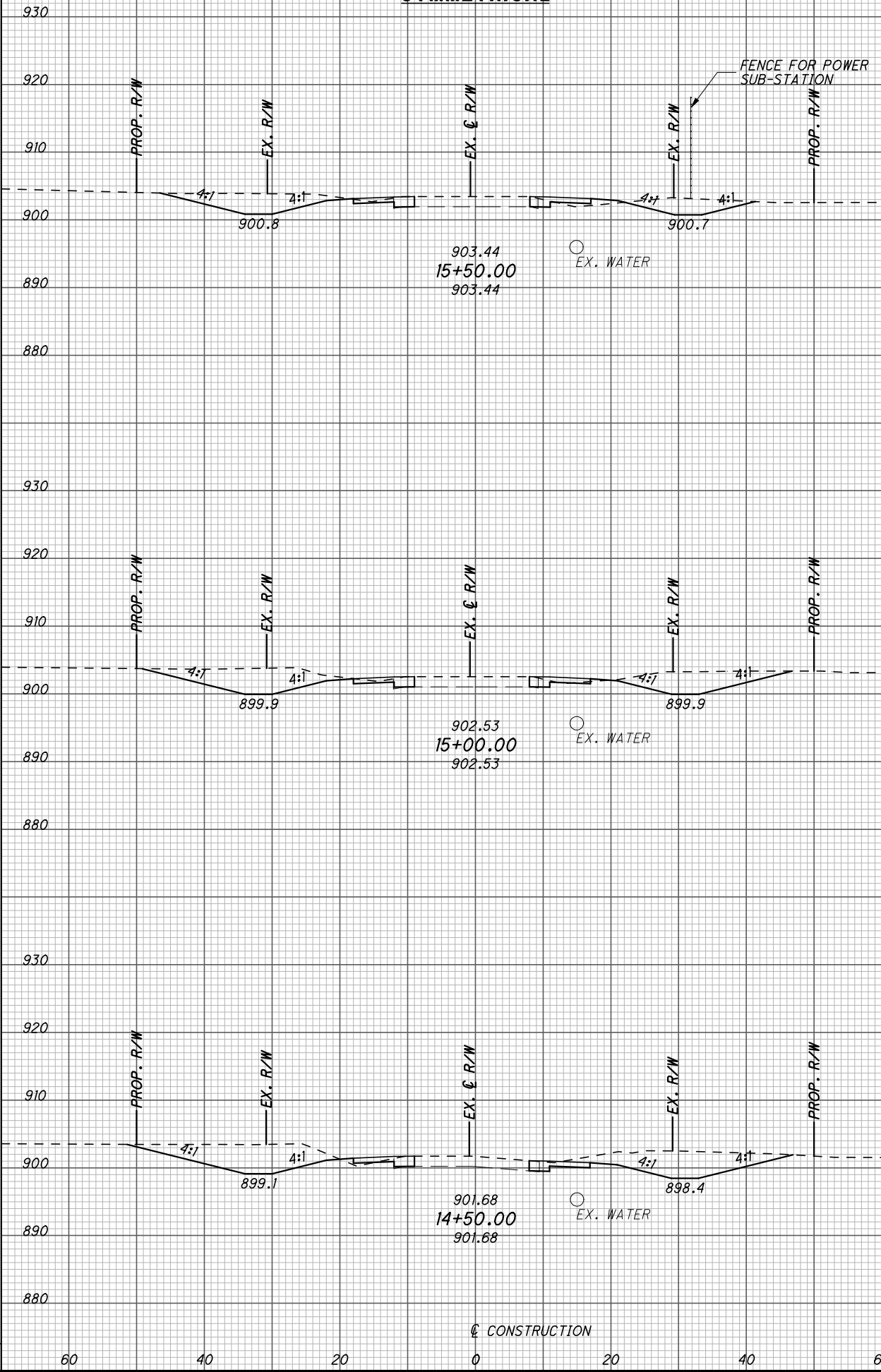
SEEDING
END WIDTH SQ. YDS.

END AREA VOLUME
CUT FILL CUT FILL

CALCULATED
CHECKED

SYMMETRICAL

UNSYMMETRICAL



GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

± CONSTRUCTION

± CONSTRUCTION

**CROSS SECTIONS
STA. 14+50.00 TO STA. 15+50.00**

LIC-THORNWOOD



\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:56PM rsmalley

SEEDING
END WIDTH SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

SYMMETRICAL

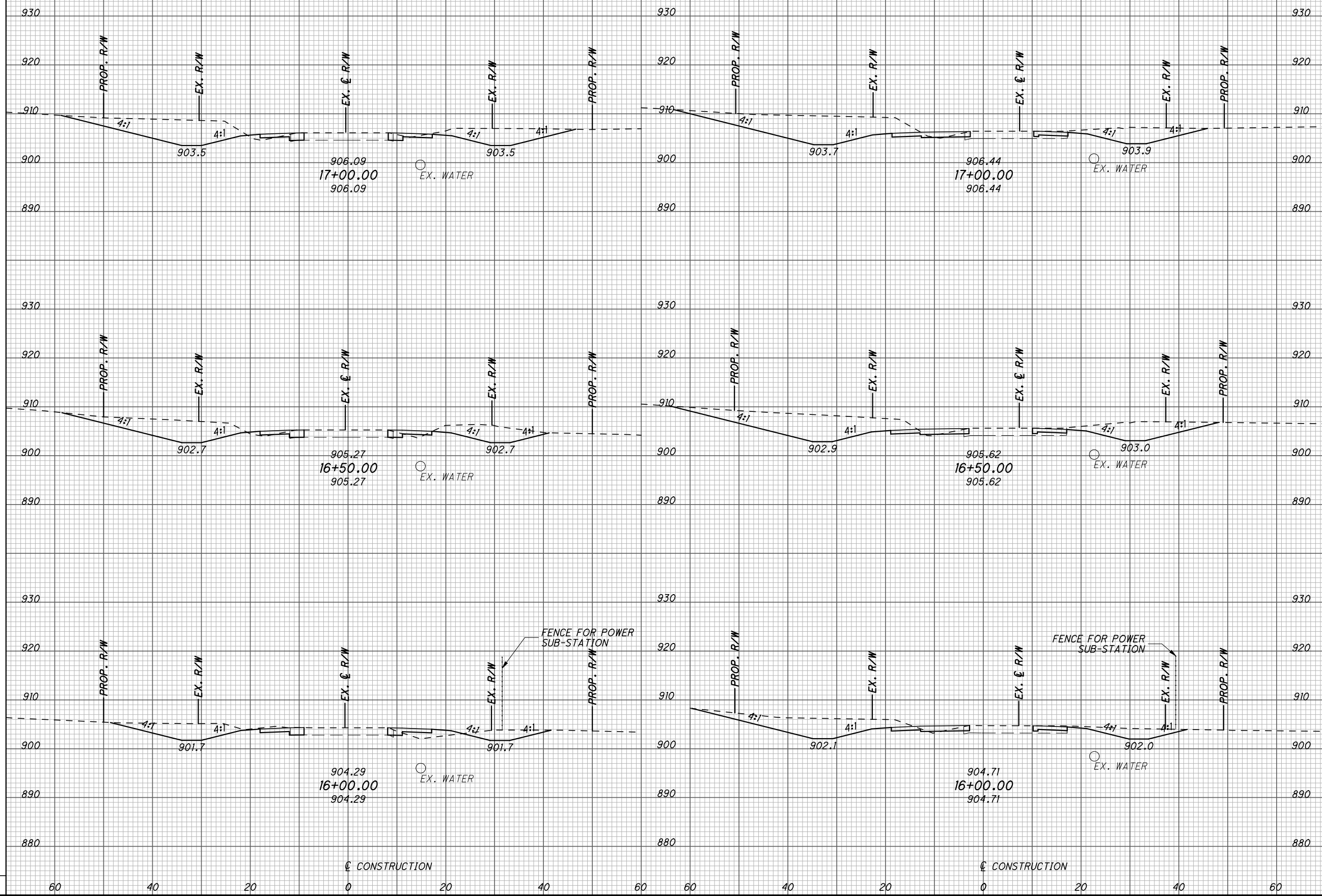
UNSYMMETRICAL

END AREA VOLUME
CUT FILL CUT FILL

CALCULATED
CHECKED

CROSS SECTIONS
STA. 16+00.00 TO STA. 17+00.00

LIC-THORNWOOD



\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:56PM rsmalley

SEEDING	
END WIDTH	SQ. YDS.

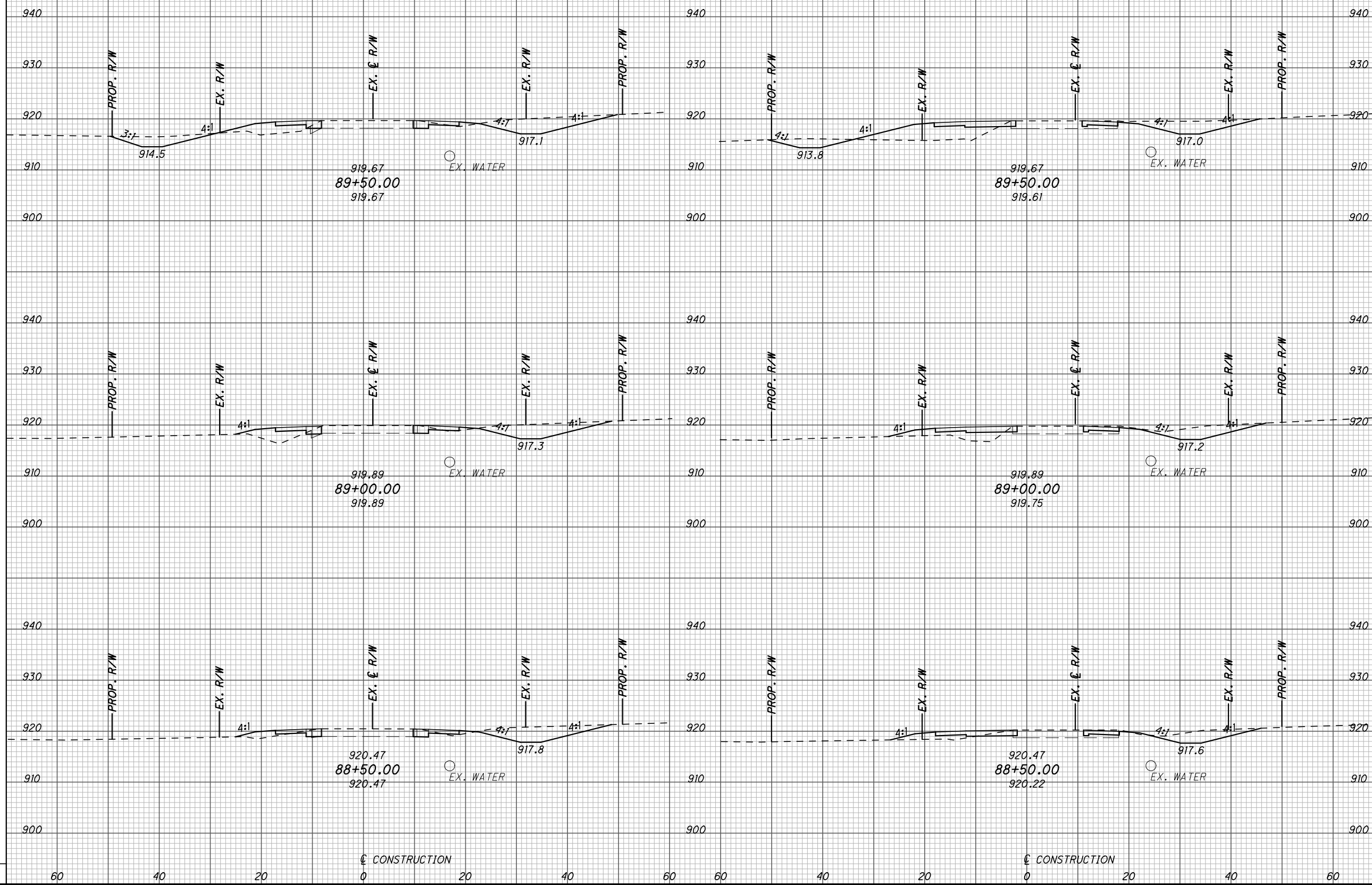
END AREA		VOLUME	
CUT	FILL	CUT	FILL

CALCULATED	CHECKED
------------	---------

SYMMETRICAL

UNSYMMETRICAL

GRADING SHOWN IS PROVIDED BY
GEOPAK CRITERIA. DITCH FLOW LINES
WILL REQUIRE ADJUSTMENTS TO CREATE
POSITIVE DRAINAGE.



**CROSS SECTIONS
STA. 88+50.00 TO STA. 89+50.00**

LIC-THORWOOD

\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:56PM rsmalley

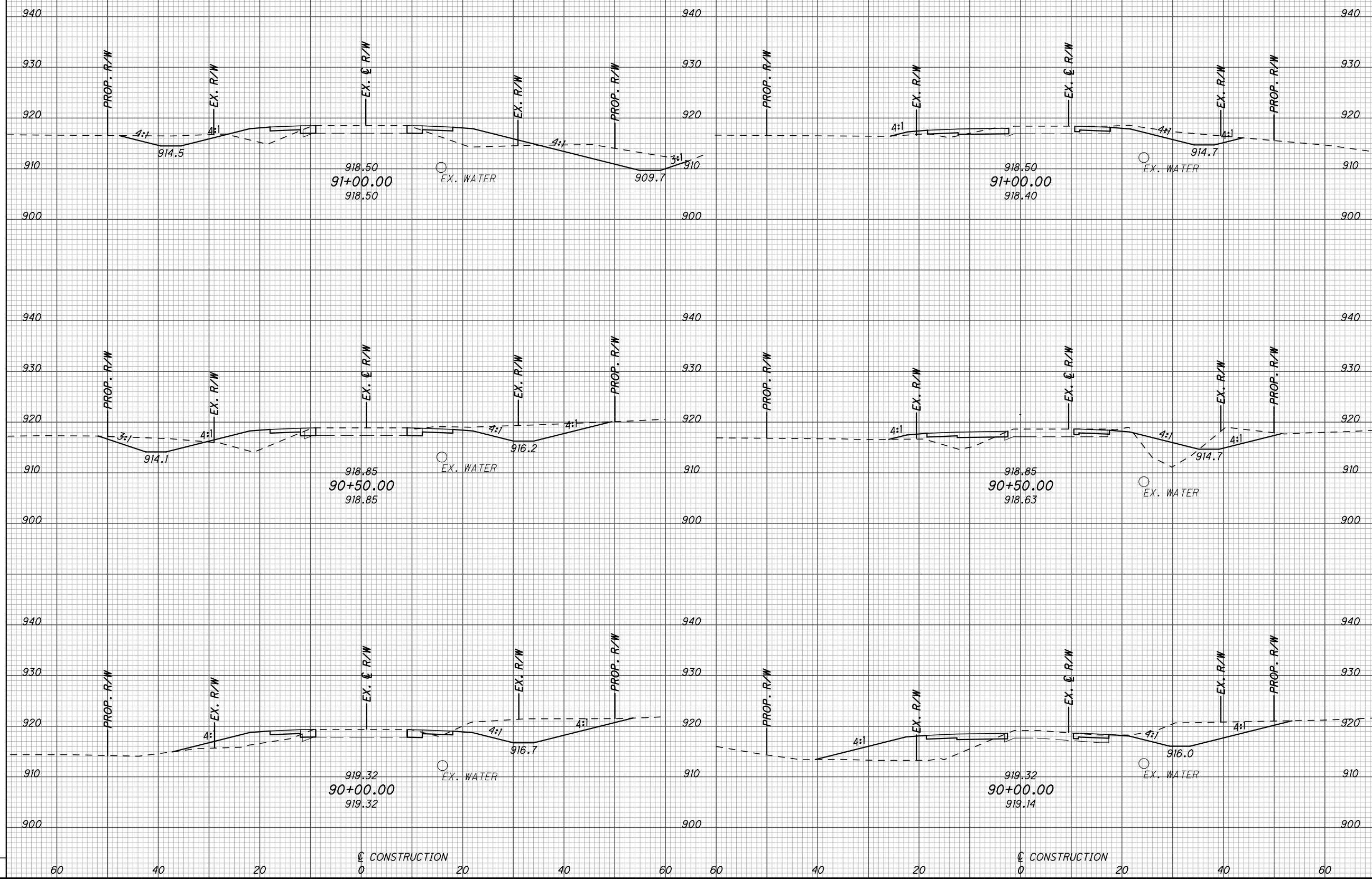
SEEDING
END WIDTH SQ. YDS.

END AREA VOLUME
CUT FILL CUT FILL
CALCULATED CHECKED

SYMMETRICAL

UNSYMMETRICAL

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.



CROSS SECTIONS
STA. 90+00.00 TO STA. 91+00.00

LIC-THORWOOD



\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:56PM rsmalley

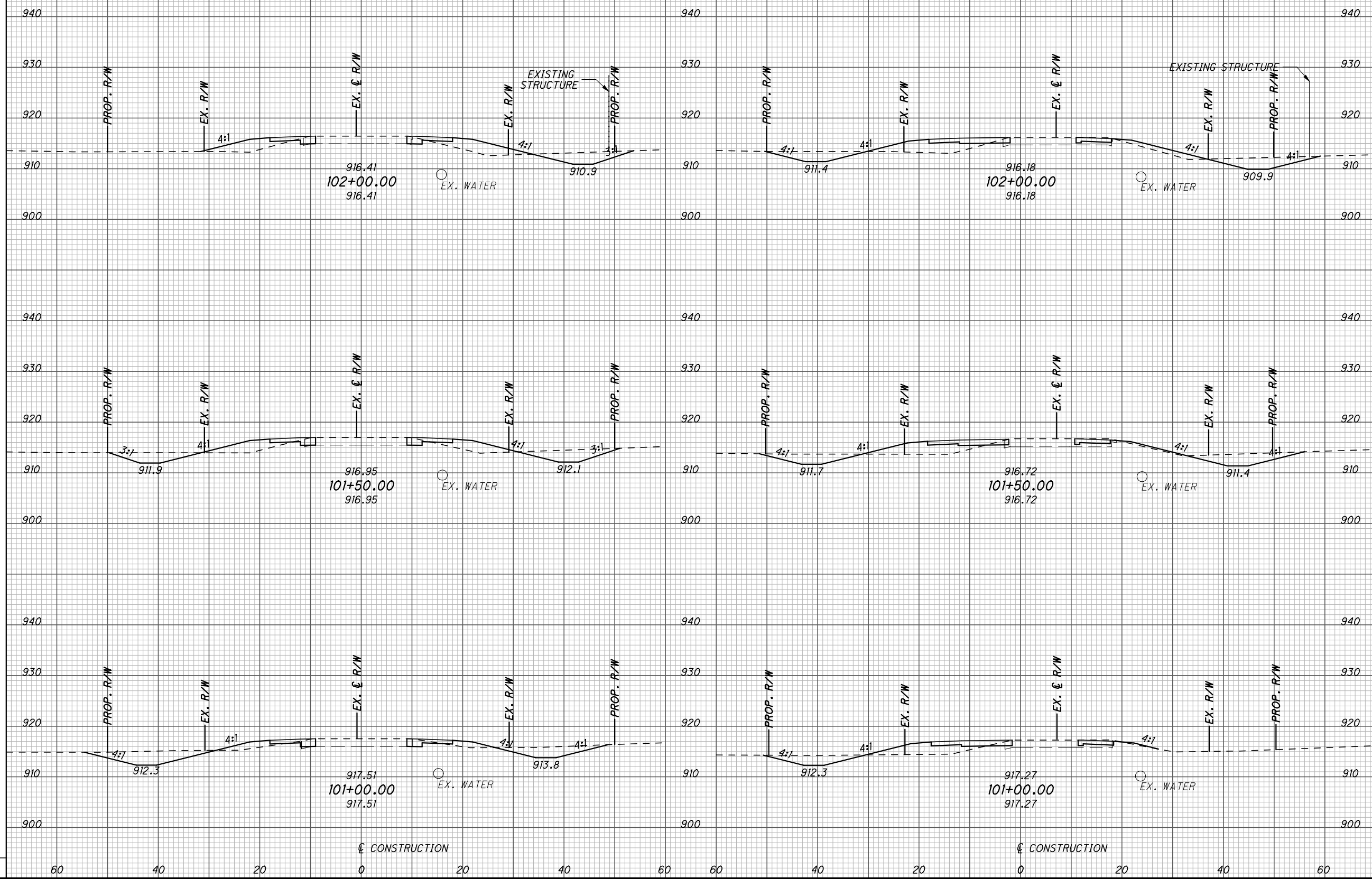
SEEDING
END WIDTH SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

SYMMETRICAL

UNSYMMETRICAL

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		



**CROSS SECTIONS
STA. 101+00.00 TO STA. 102+00.00**

LIC-THORWOOD



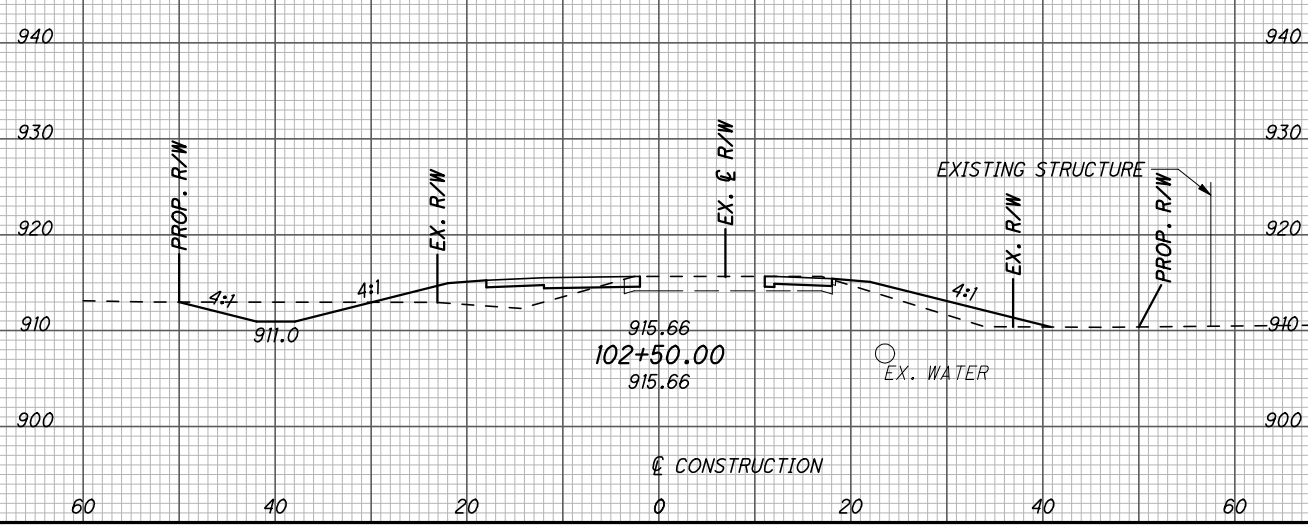
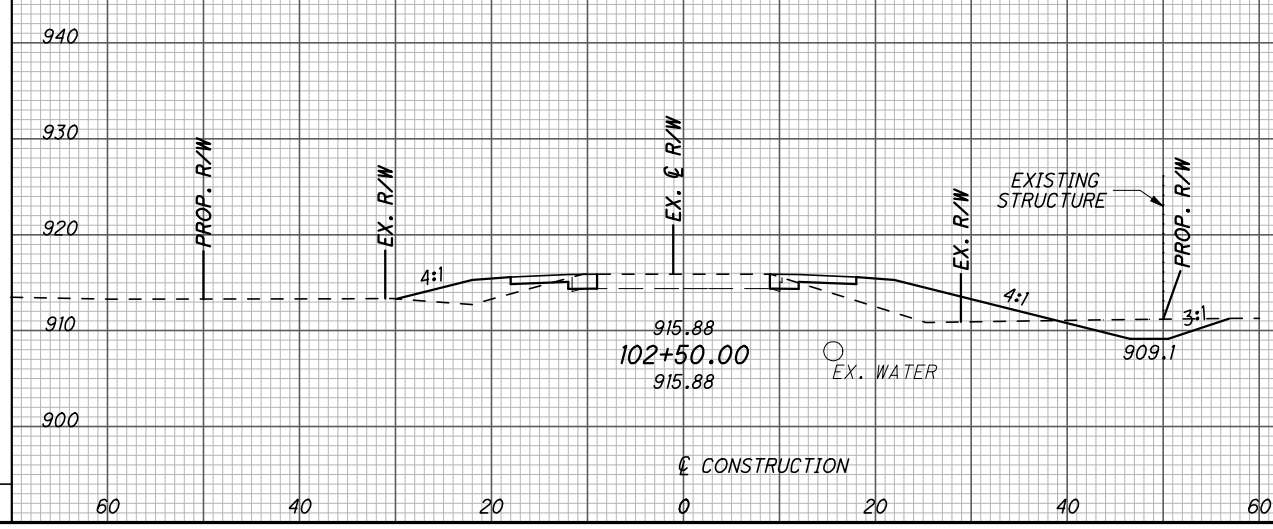
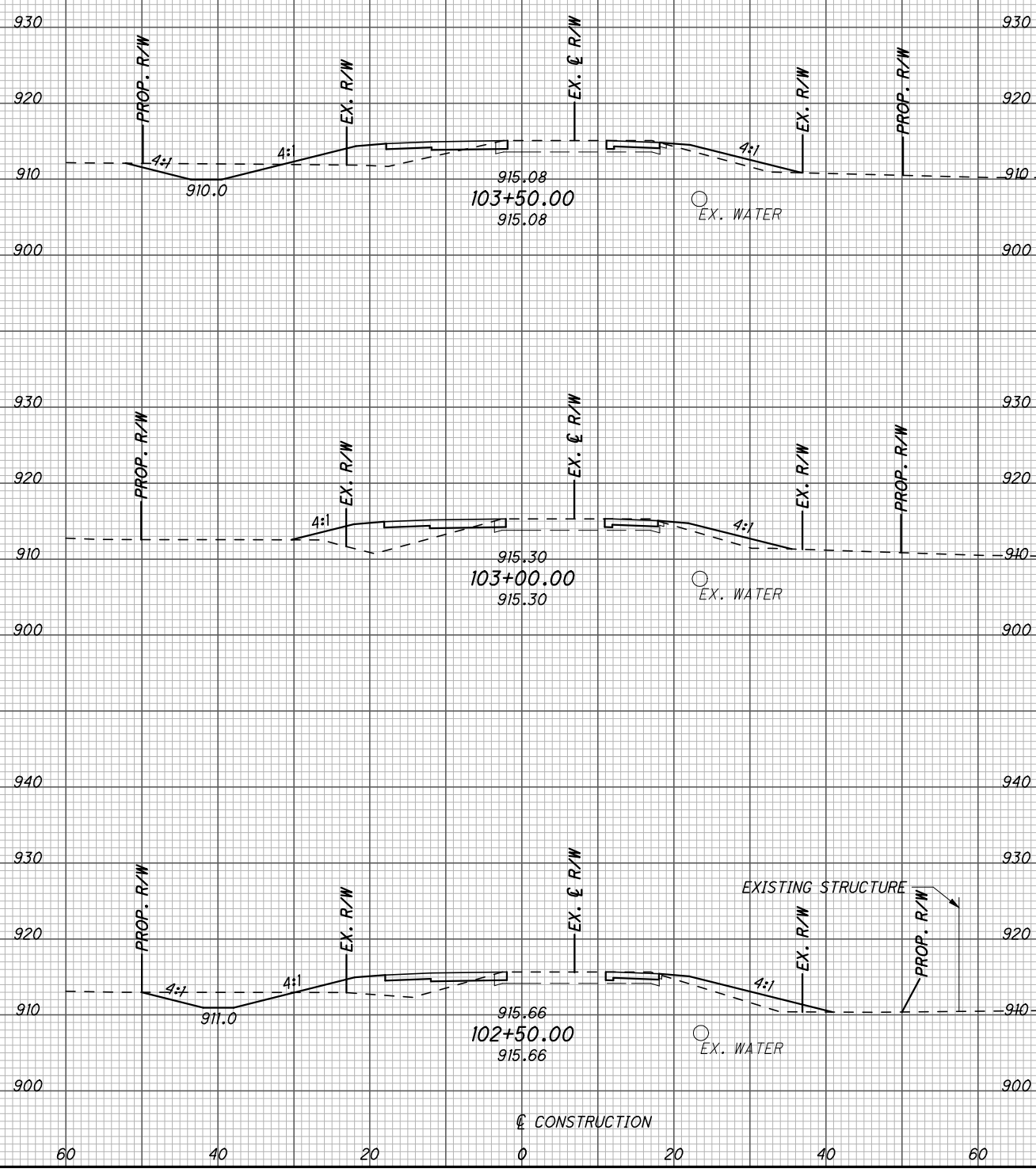
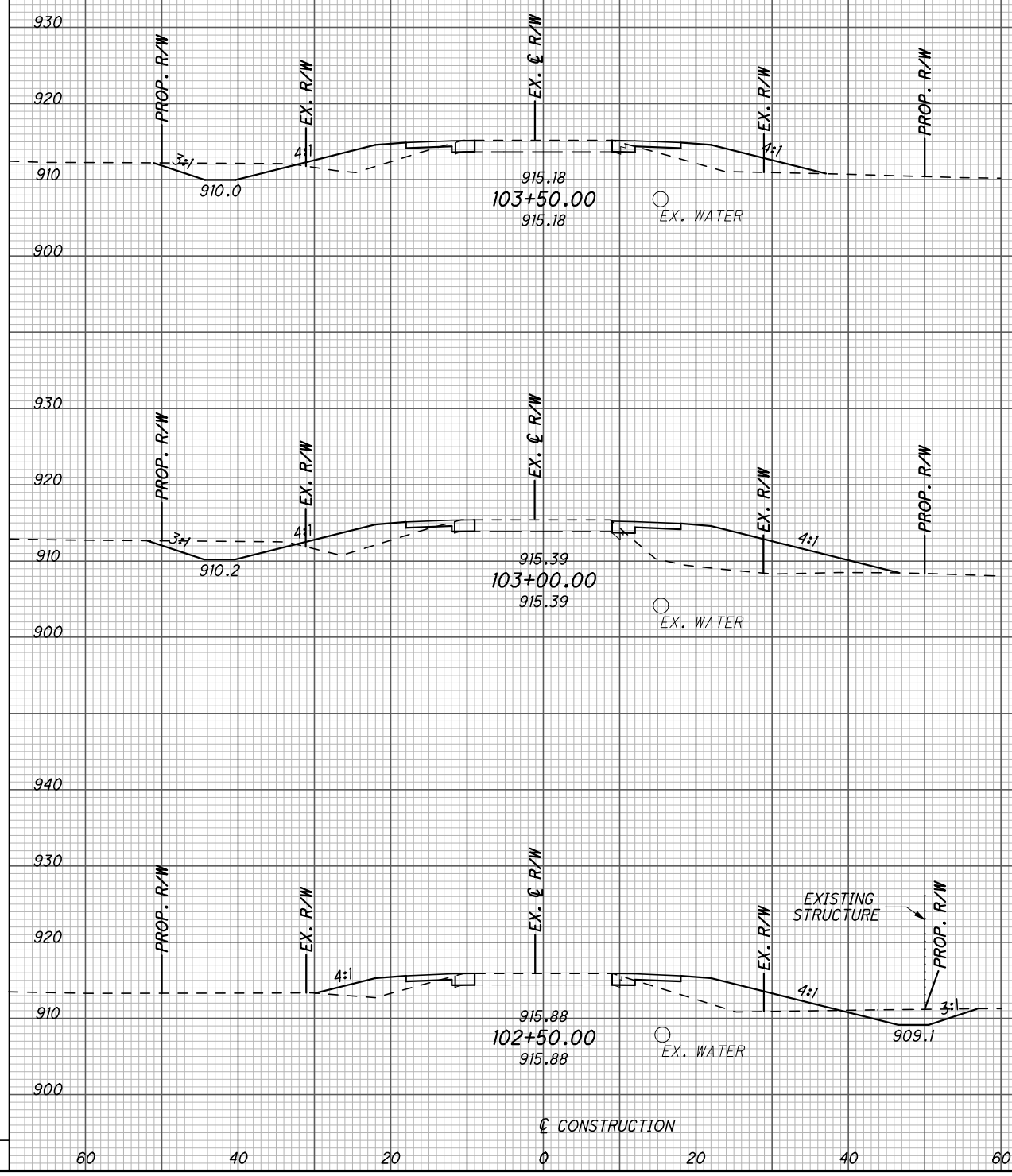
\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:56PM rsmalley

SEEDING	
END WIDTH	SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

SYMMETRICAL

UNSYMMETRICAL



END AREA	VOLUME	CALCULATED	CHECKED				
				CUT	FILL	CUT	FILL

**CROSS SECTIONS
STA. 102+50.00 TO STA. 103+50.00**

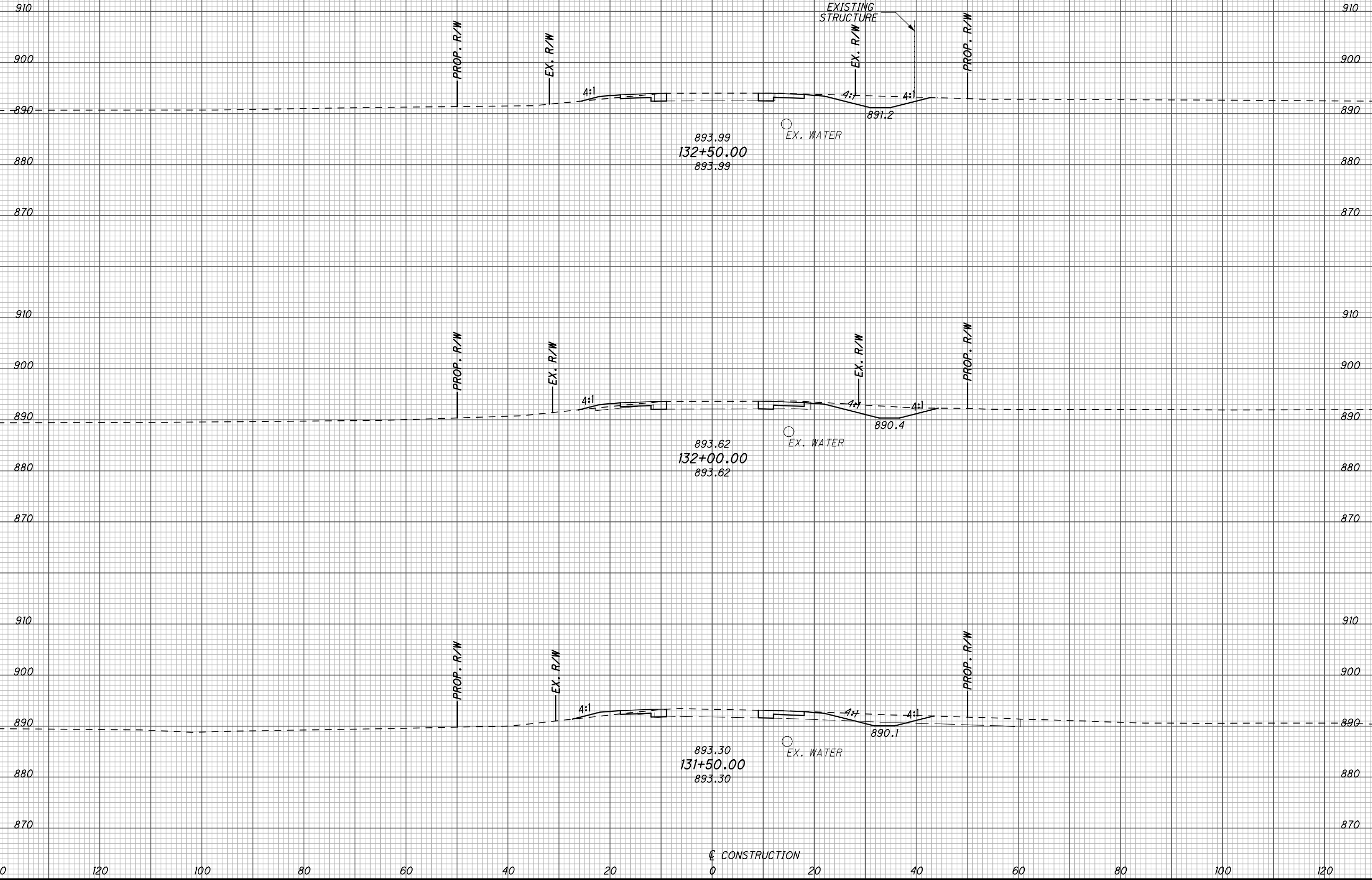
LIC-THORWOOD

\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:57PM rsmalley

SEEDING	
END WIDTH	SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		



CROSS SECTIONS
STA. 131+50.00 TO STA. 132+50.00

LIC-THORNWOOD



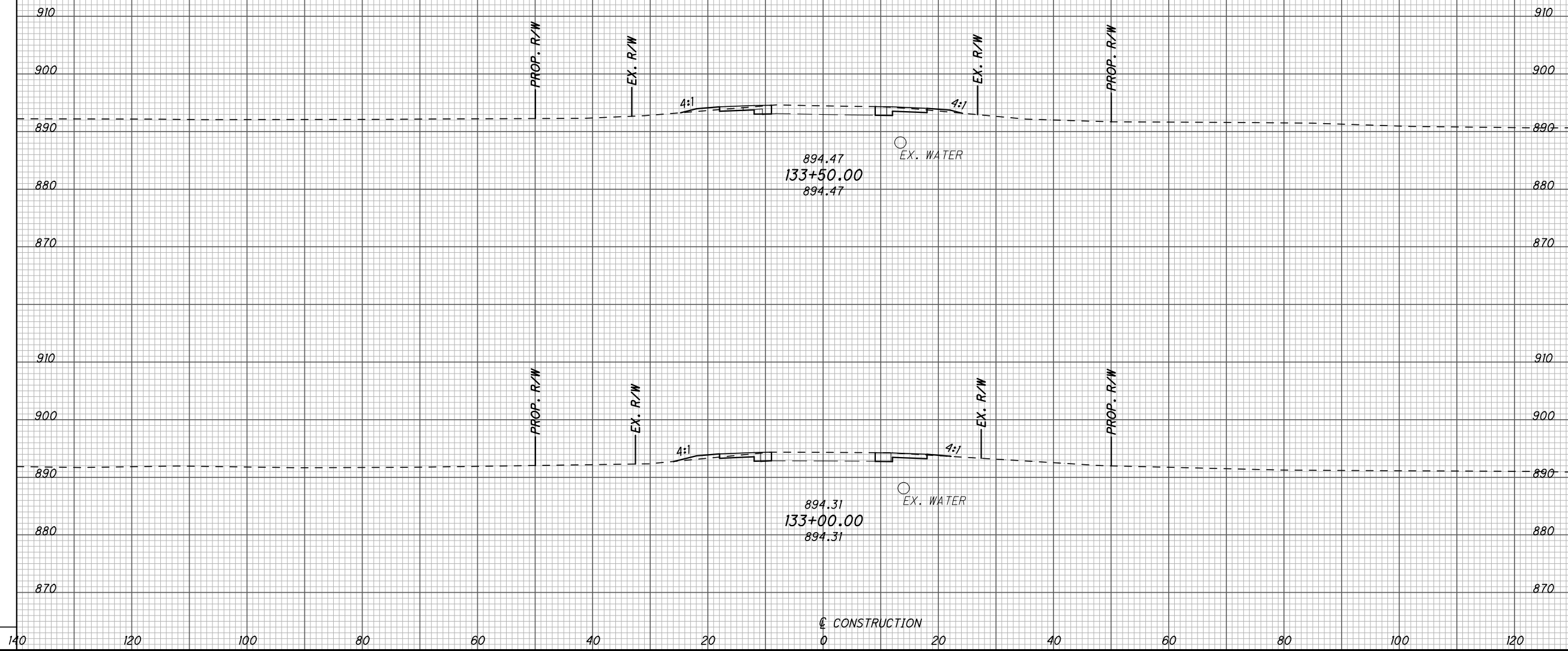
CONSTRUCTION

\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:57PM rsmalley

SEEDING	
END WIDTH	SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		

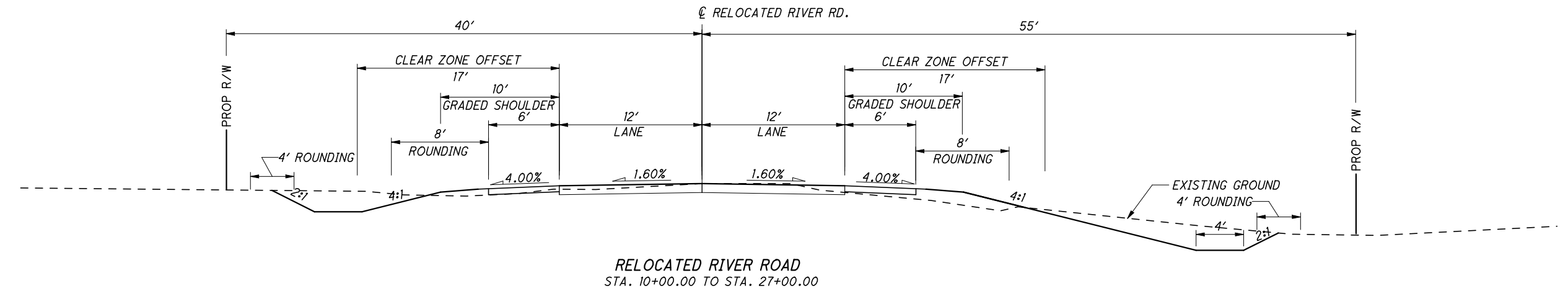
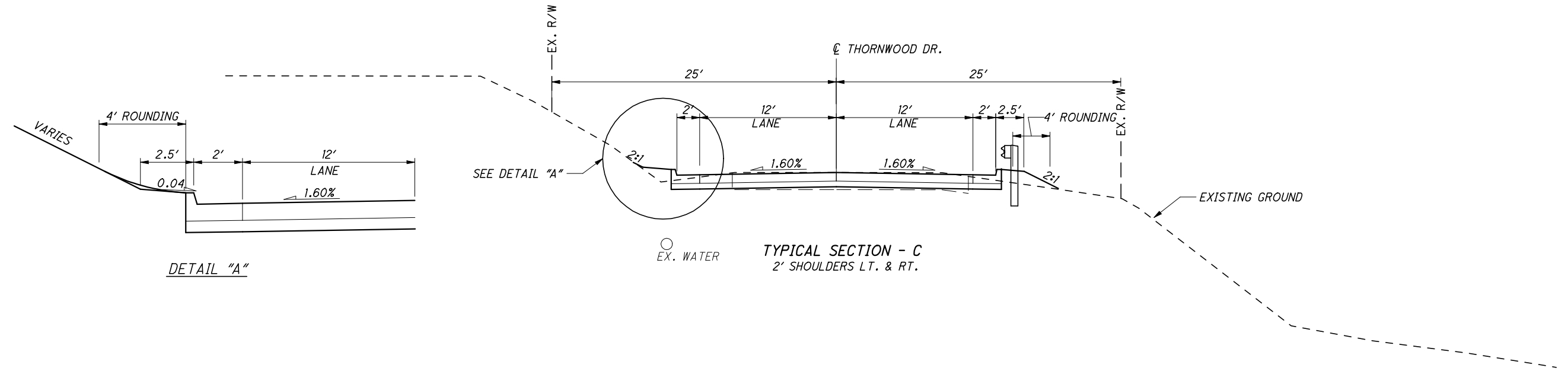
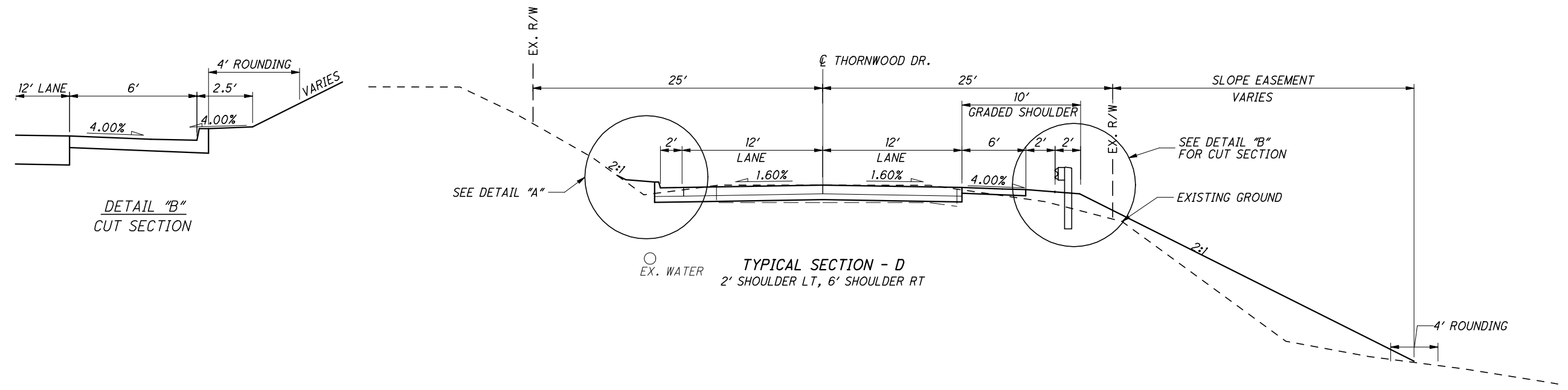


CROSS SECTIONS
STA. 133+00.00 TO STA. 133+50.00

LIC-THORWOOD



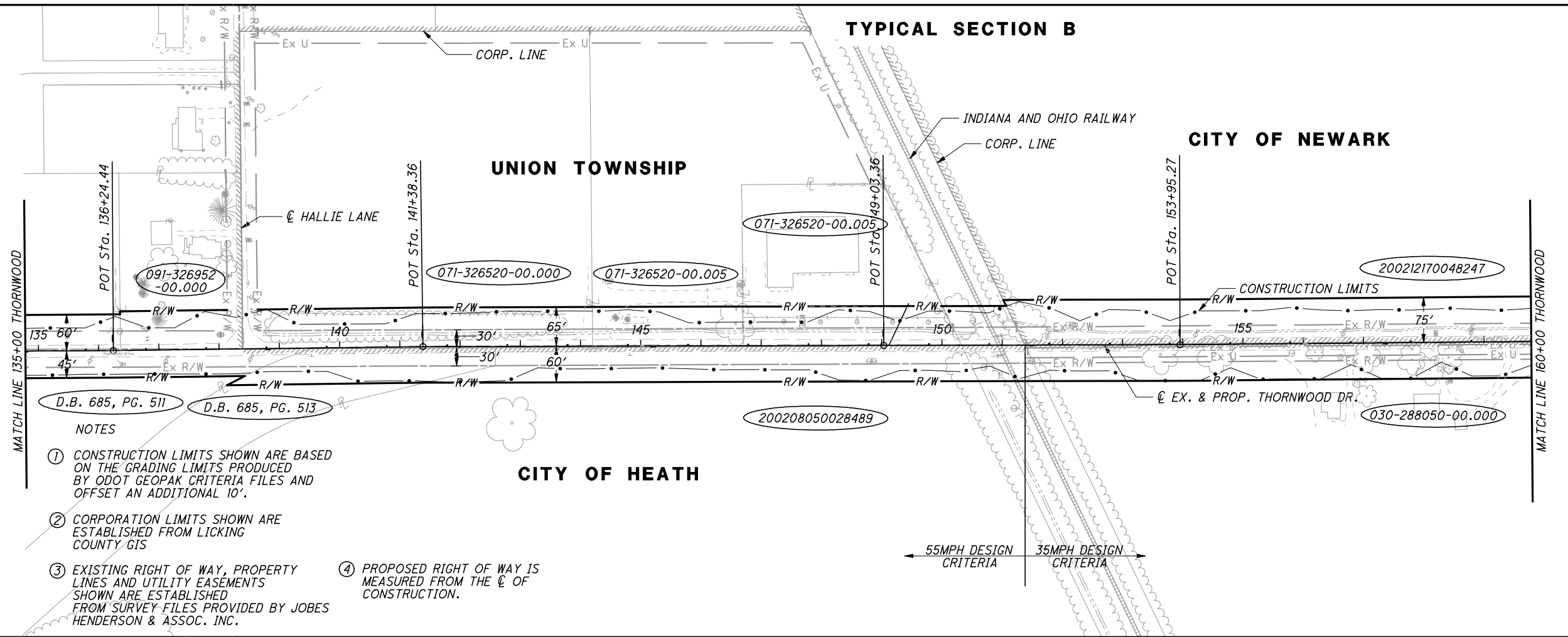
**LIC – Thornwood Drive
35 MPH Design Speed Area**



j:\JOBS\40927\Techprod\LIC\78116\roadway\sheets\GY_RW002.dgn 21-OCT-2008 12:20PM rsmalley

\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheet\GP_RW006_VARIED_1.dgn 23-OCT-2008 3:45PM rsmalley

TYPICAL SECTION B



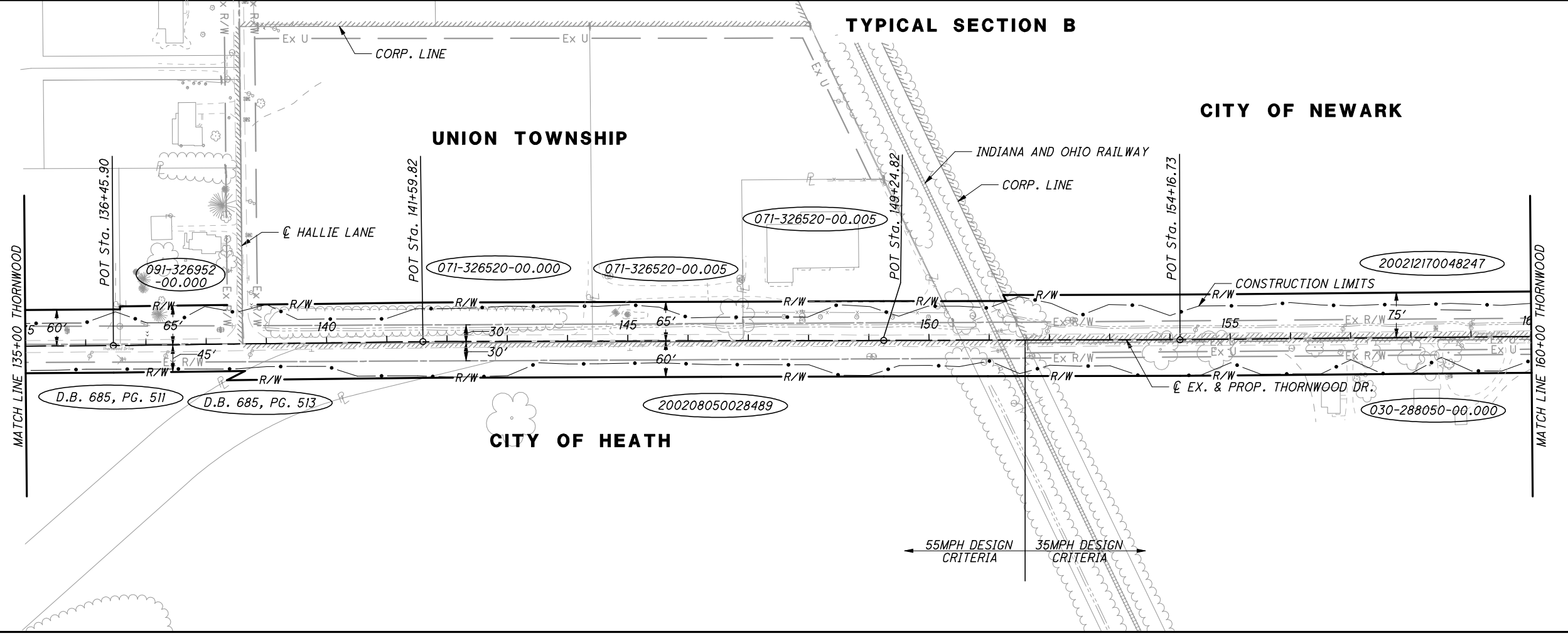
D.B. 685, PG. 511 D.B. 685, PG. 513

NOTES

- ① CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
- ② CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
- ③ EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
- ④ PROPOSED RIGHT OF WAY IS MEASURED FROM THE ϕ OF CONSTRUCTION.

← 55MPH DESIGN CRITERIA 35MPH DESIGN CRITERIA →

TYPICAL SECTION B



D.B. 685, PG. 511 D.B. 685, PG. 513

← 55MPH DESIGN CRITERIA 35MPH DESIGN CRITERIA →



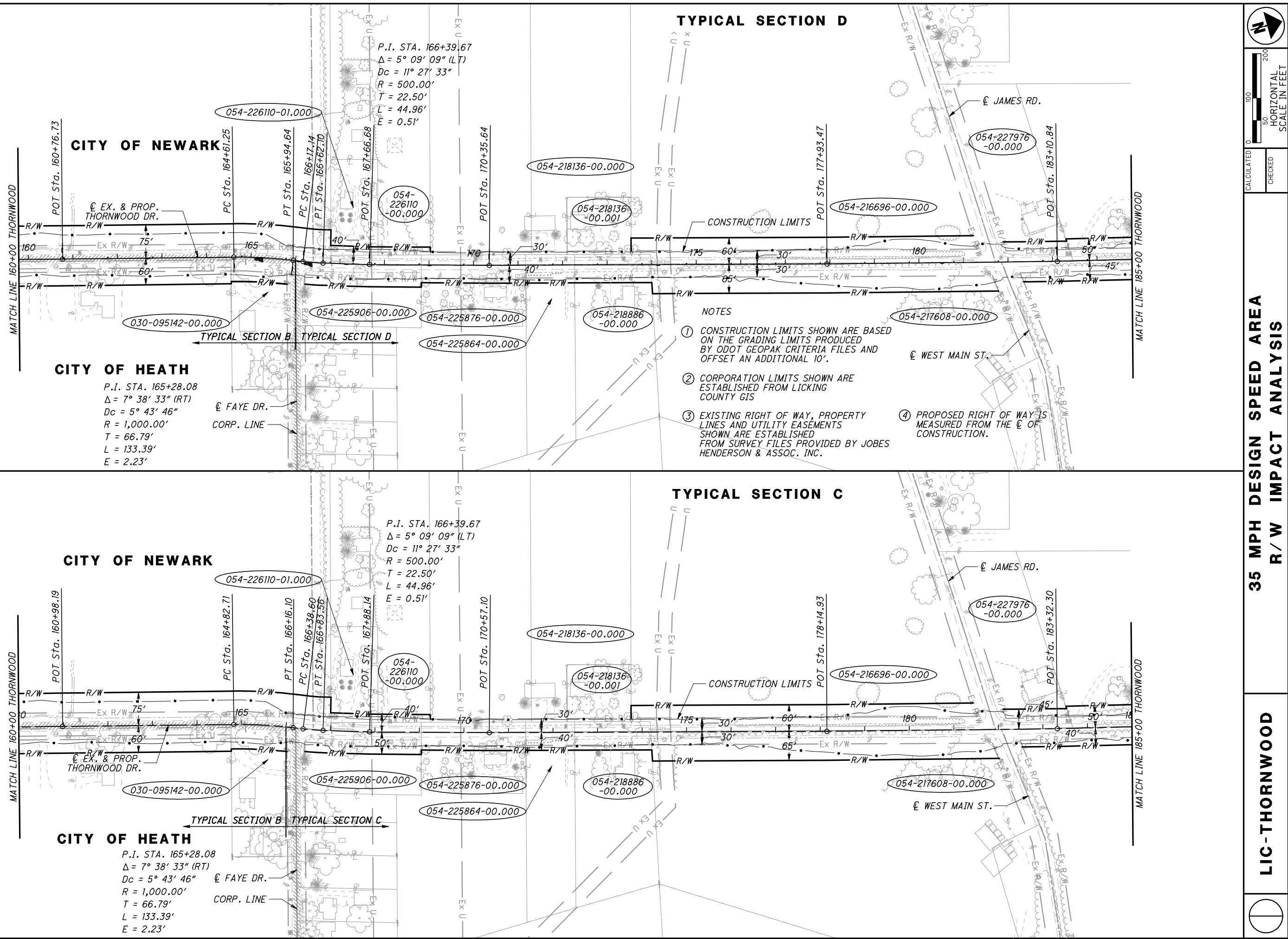
CALCULATED
CHECKED

35 MPH DESIGN SPEED AREA R/W IMPACT ANALYSIS

LIC-THORNWOOD



\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\GP_RW007_VARIED.dgn 23-OCT-2008 3:45PM rsmalley



CITY OF NEWARK

CITY OF HEATH

P.I. STA. 166+39.67
 $\Delta = 5^\circ 09' 09''$ (LT)
 $Dc = 11^\circ 27' 33''$
 $R = 500.00'$
 $T = 22.50'$
 $L = 44.96'$
 $E = 0.51'$

P.I. STA. 165+28.08
 $\Delta = 7^\circ 38' 33''$ (RT)
 $Dc = 5^\circ 43' 46''$
 $R = 1,000.00'$
 $T = 66.79'$
 $L = 133.39'$
 $E = 2.23'$

TYPICAL SECTION D

TYPICAL SECTION C

NOTES

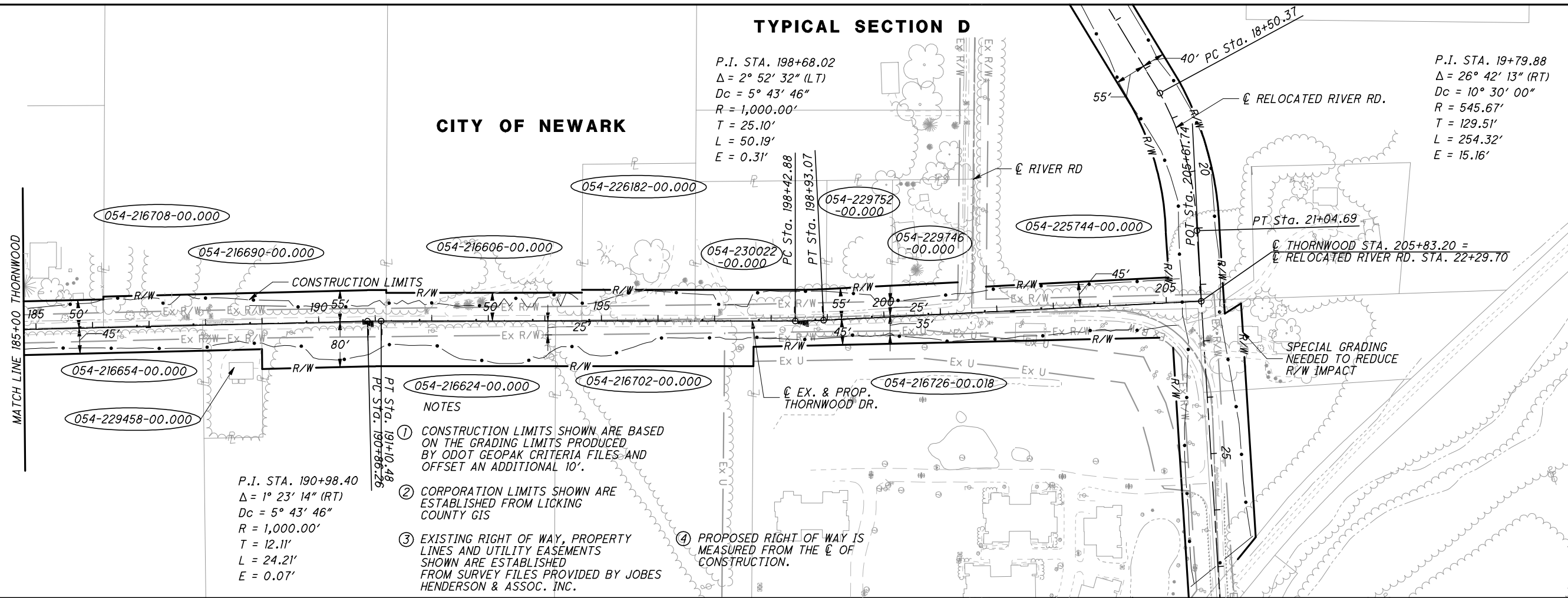
- ① CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
- ② CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
- ③ EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
- ④ PROPOSED RIGHT OF WAY IS MEASURED FROM THE \bar{C} OF CONSTRUCTION.



**35 MPH DESIGN SPEED AREA
R/W IMPACT ANALYSIS**

LIC-THORNWOOD

J:\JOBS\40927\Techprod\LIC\78116\roadway\sheets\GP_RW008_VARIED.dgn 23-OCT-2008 4:08PM rsmalley

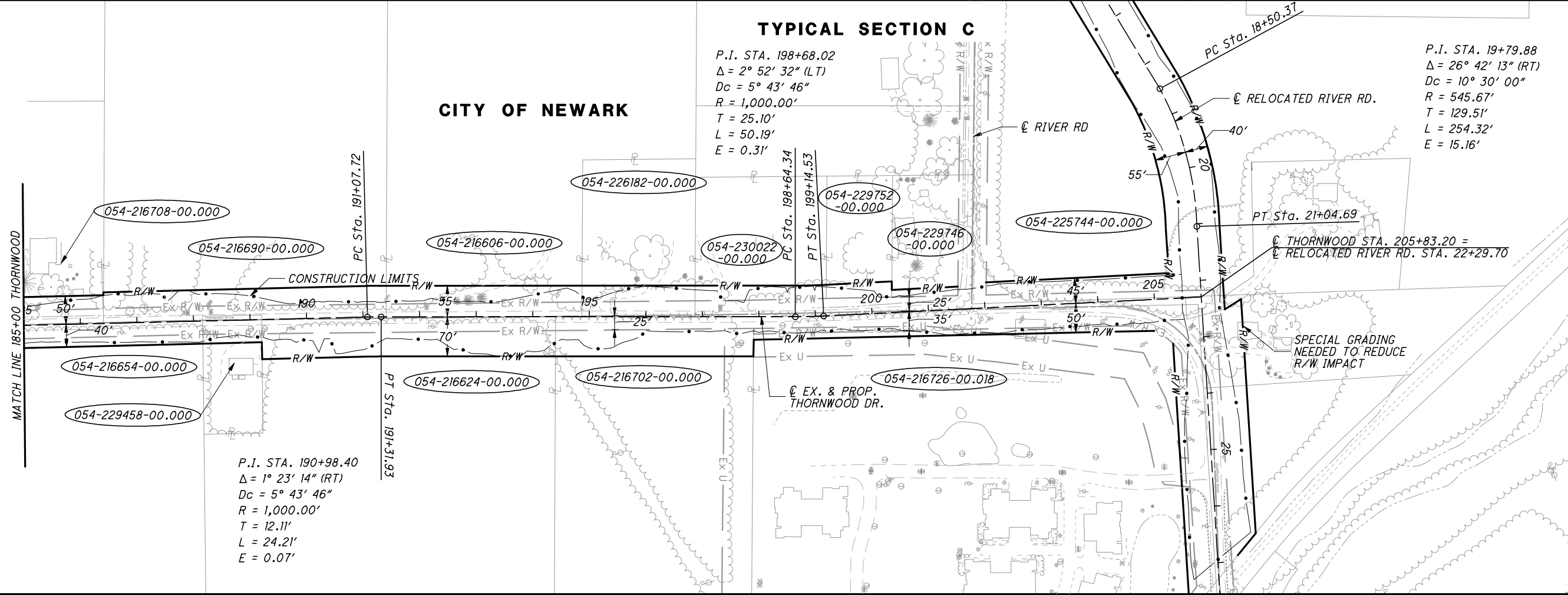


TYPICAL SECTION D

P.I. STA. 198+68.02
 $\Delta = 2^\circ 52' 32''$ (LT)
 $D_c = 5^\circ 43' 46''$
 $R = 1,000.00'$
 $T = 25.10'$
 $L = 50.19'$
 $E = 0.31'$

P.I. STA. 19+79.88
 $\Delta = 26^\circ 42' 13''$ (RT)
 $D_c = 10^\circ 30' 00''$
 $R = 545.67'$
 $T = 129.51'$
 $L = 254.32'$
 $E = 15.16'$

- NOTES**
- CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
 - CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
 - EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
 - PROPOSED RIGHT OF WAY IS MEASURED FROM THE ϵ OF CONSTRUCTION.



TYPICAL SECTION C

P.I. STA. 198+68.02
 $\Delta = 2^\circ 52' 32''$ (LT)
 $D_c = 5^\circ 43' 46''$
 $R = 1,000.00'$
 $T = 25.10'$
 $L = 50.19'$
 $E = 0.31'$

P.I. STA. 19+79.88
 $\Delta = 26^\circ 42' 13''$ (RT)
 $D_c = 10^\circ 30' 00''$
 $R = 545.67'$
 $T = 129.51'$
 $L = 254.32'$
 $E = 15.16'$

- NOTES**
- CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
 - CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
 - EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
 - PROPOSED RIGHT OF WAY IS MEASURED FROM THE ϵ OF CONSTRUCTION.



CALCULATED
CHECKED

**35 MPH DESIGN SPEED AREA
R/W IMPACT ANALYSIS**

LIC-THORNWOOD

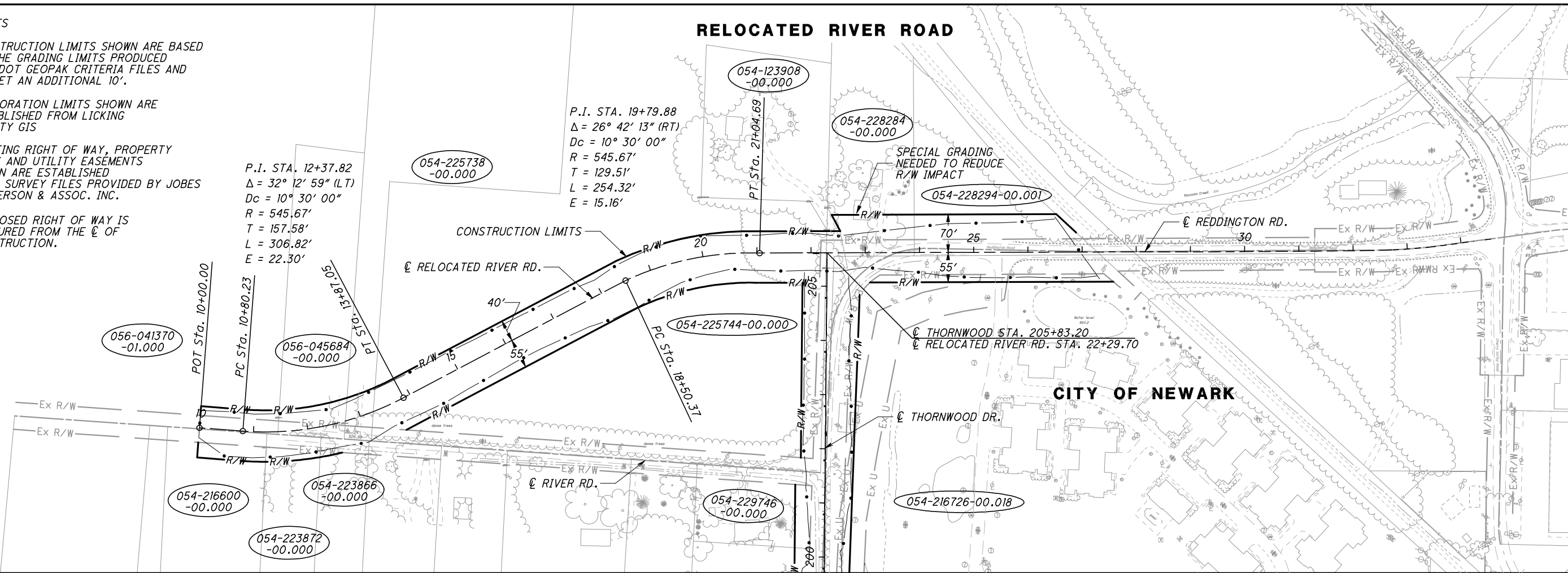
NOTES

- ① CONSTRUCTION LIMITS SHOWN ARE BASED ON THE GRADING LIMITS PRODUCED BY ODOT GEOPAK CRITERIA FILES AND OFFSET AN ADDITIONAL 10'.
- ② CORPORATION LIMITS SHOWN ARE ESTABLISHED FROM LICKING COUNTY GIS
- ③ EXISTING RIGHT OF WAY, PROPERTY LINES AND UTILITY EASEMENTS SHOWN ARE ESTABLISHED FROM SURVEY FILES PROVIDED BY JOBES HENDERSON & ASSOC. INC.
- ④ PROPOSED RIGHT OF WAY IS MEASURED FROM THE C OF CONSTRUCTION.

P.I. STA. 12+37.82
 $\Delta = 32^\circ 12' 59" \text{ (LT)}$
 $Dc = 10^\circ 30' 00"$
 $R = 545.67'$
 $T = 157.58'$
 $L = 306.82'$
 $E = 22.30'$

P.I. STA. 19+79.88
 $\Delta = 26^\circ 42' 13" \text{ (RT)}$
 $Dc = 10^\circ 30' 00"$
 $R = 545.67'$
 $T = 129.51'$
 $L = 254.32'$
 $E = 15.16'$

RELOCATED RIVER ROAD



CALCULATED
 CHECKED

0 50 100 200
 HORIZONTAL SCALE IN FEET

RELOCATED RIVER RD.
 R/W IMPACT ANALYSIS

LIC-THORNWOOD

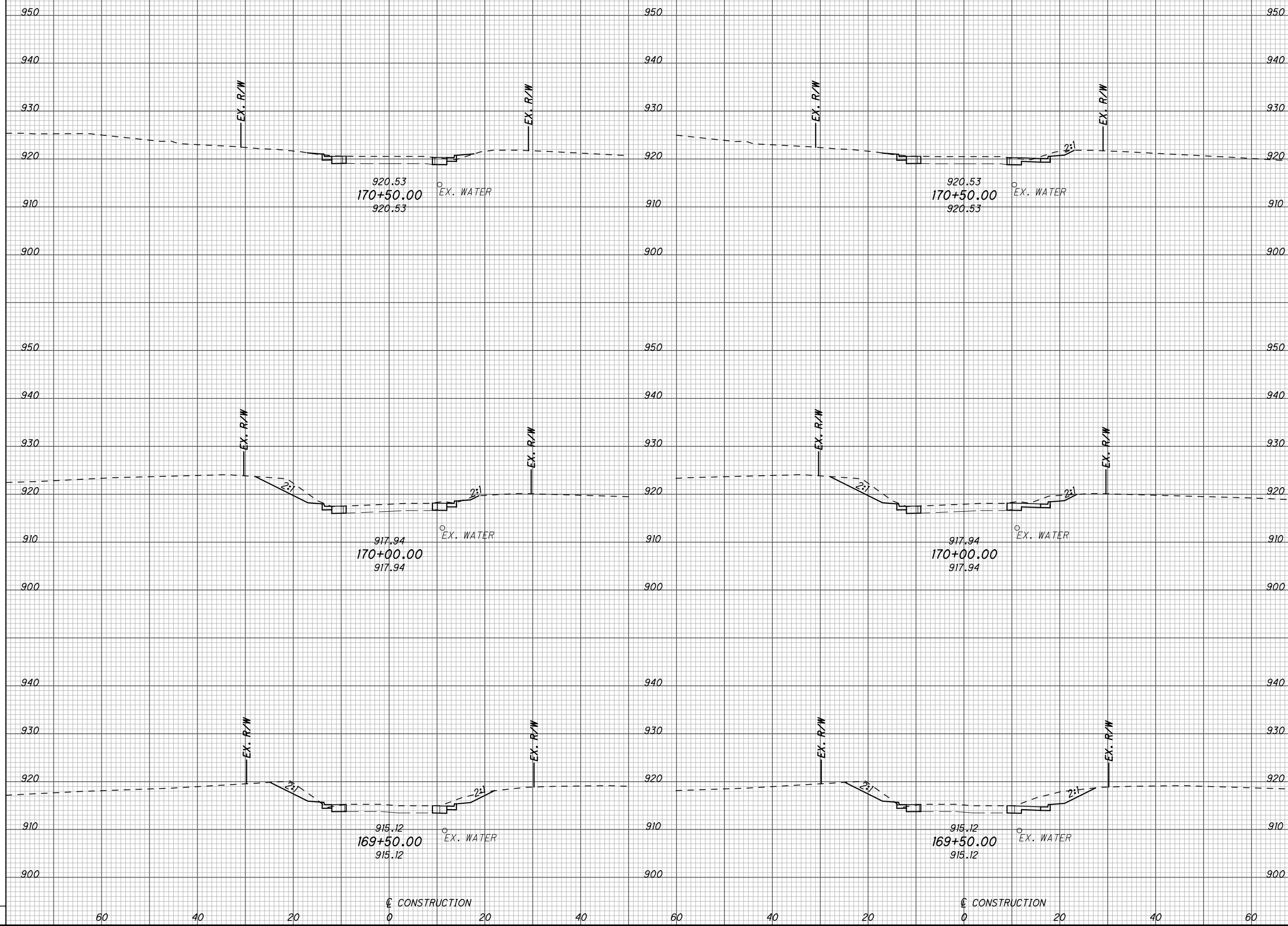
\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:58PM rsmalley

SEEDING	
END WIDTH	SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

TYPICAL SECTION C

TYPICAL SECTION D



END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		

**CROSS SECTIONS
STA. 169+50.00 TO STA. 170+50.00**

LIC-THORWOOD

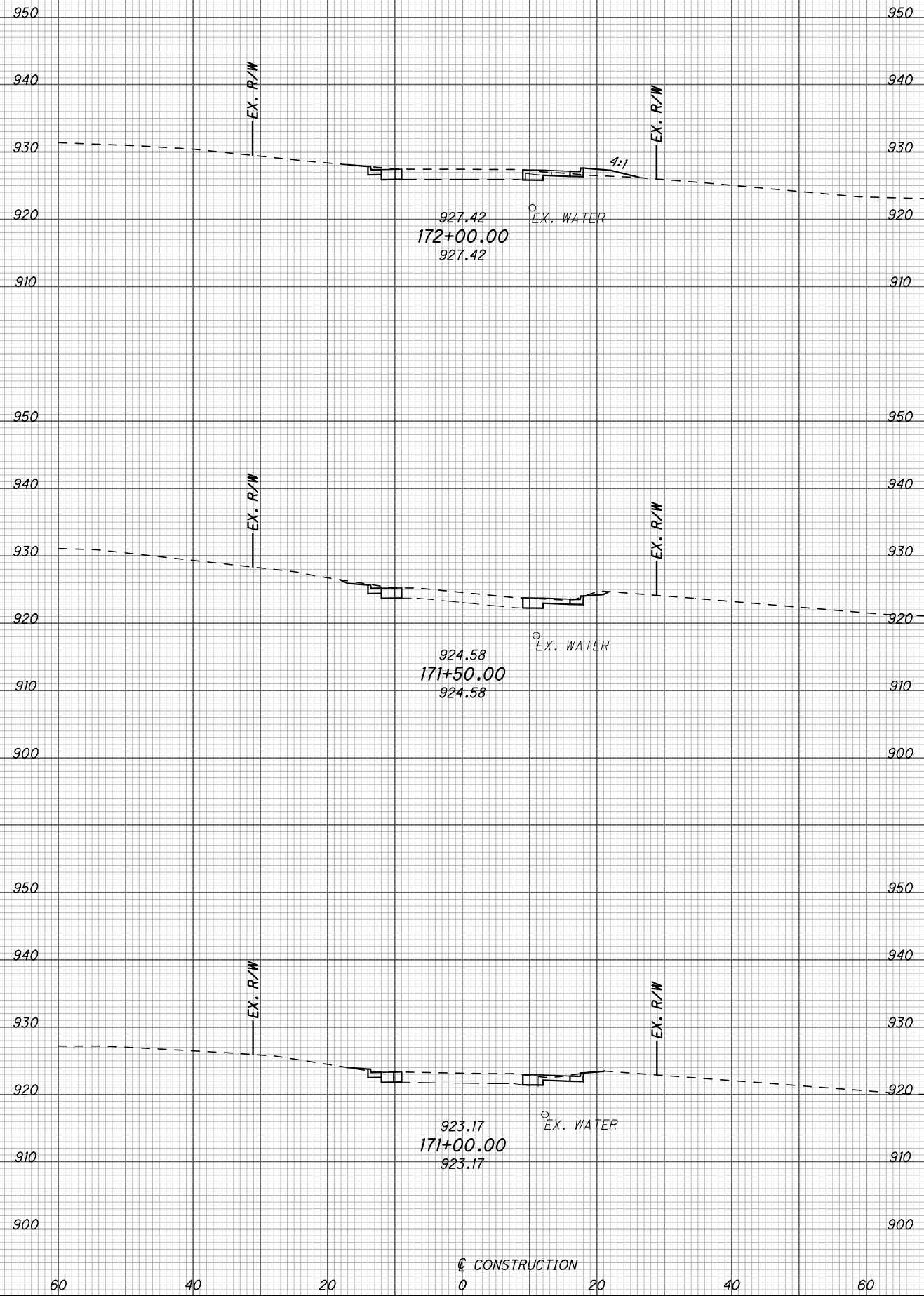
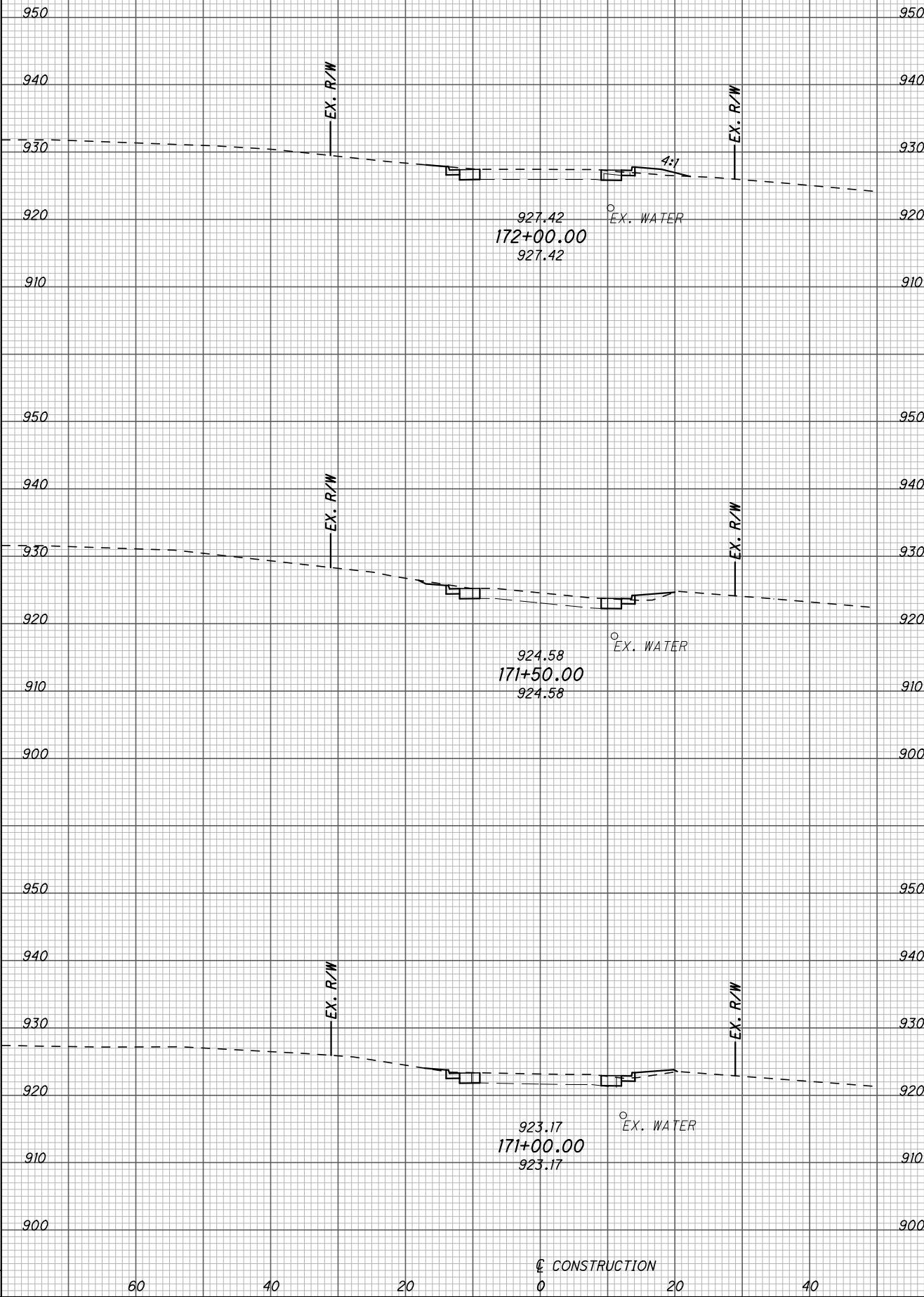
\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:58PM rsmalley

SEEDING	
END WIDTH	SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

TYPICAL SECTION C

TYPICAL SECTION D



END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		

**CROSS SECTIONS
STA. 171+00.00 TO STA. 172+00.00**

LIC-THORWOOD

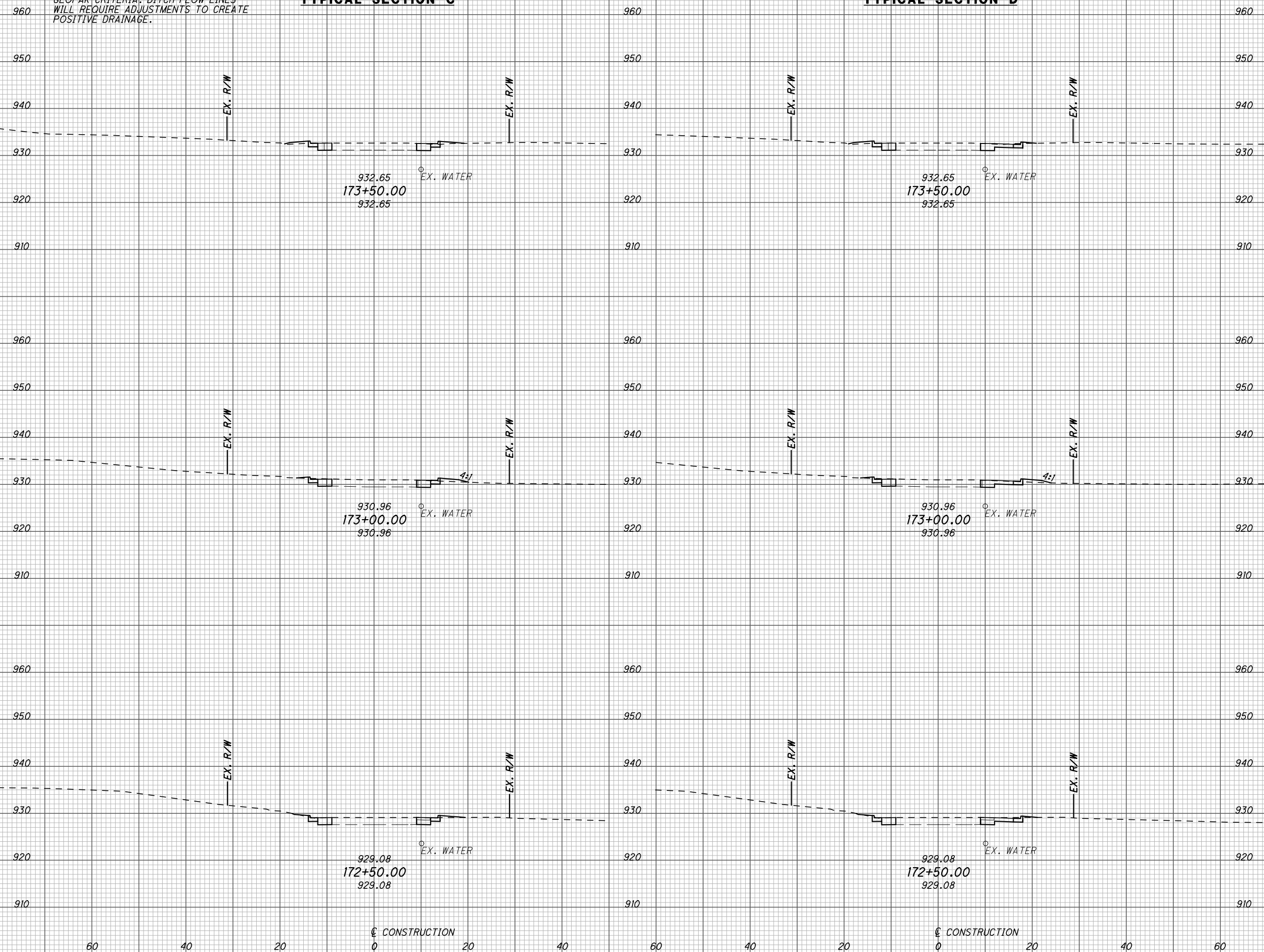
\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:58PM rsmalley

SEEDING	
END WIDTH	SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

TYPICAL SECTION C

TYPICAL SECTION D



END AREA	VOLUME				
		CUT	FILL	CUT	FILL

CALCULATED
 CHECKED
CROSS SECTIONS
STA. 172+50.00 TO STA. 173+50.00
LIC-THORWOOD

\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:58PM rsmalley

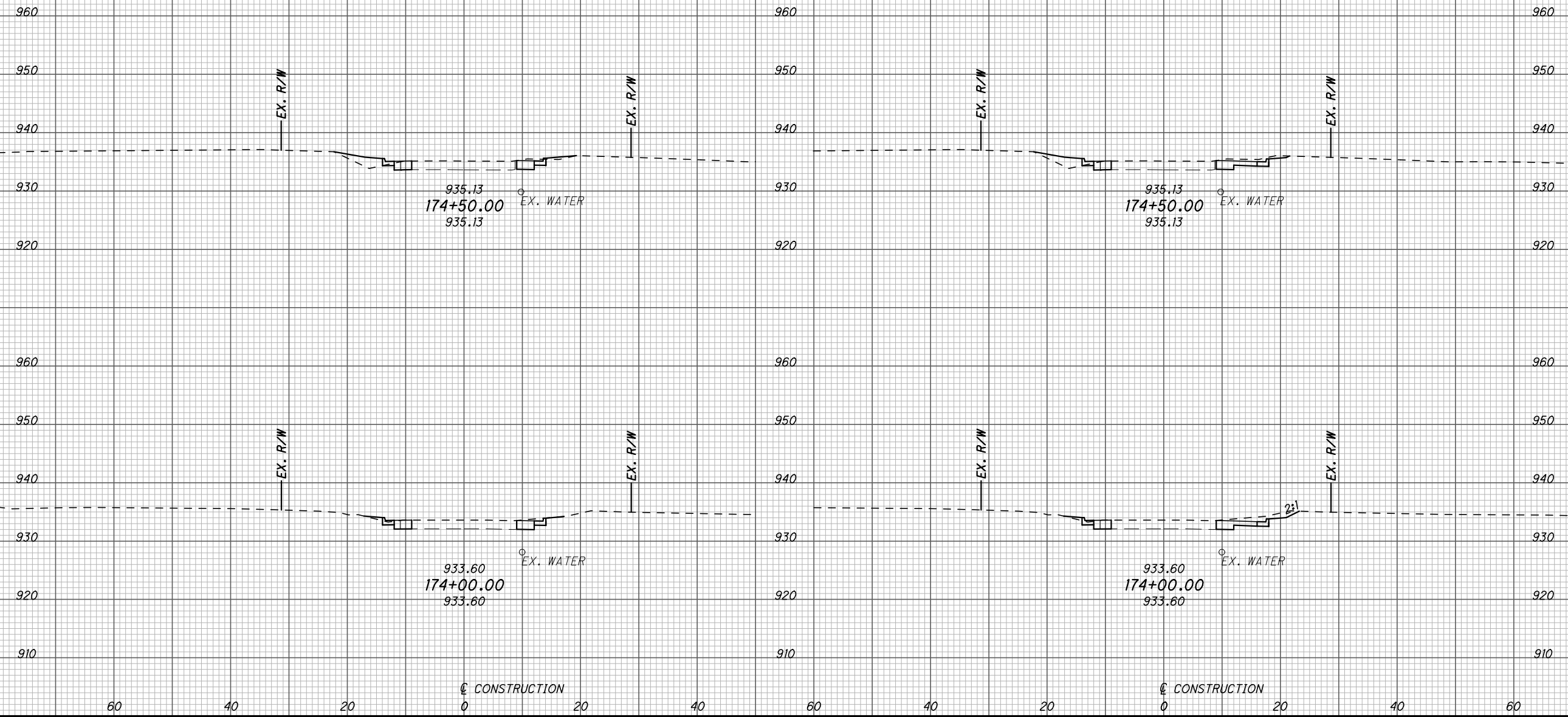
SEEDING
END WIDTH SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

TYPICAL SECTION C

TYPICAL SECTION D

END AREA		VOLUME		CALCULATED	CHECKED
CUT	FILL	CUT	FILL		



CROSS SECTIONS
STA. 174+00.00 TO STA. 174+50.00

LIC-THORWOOD



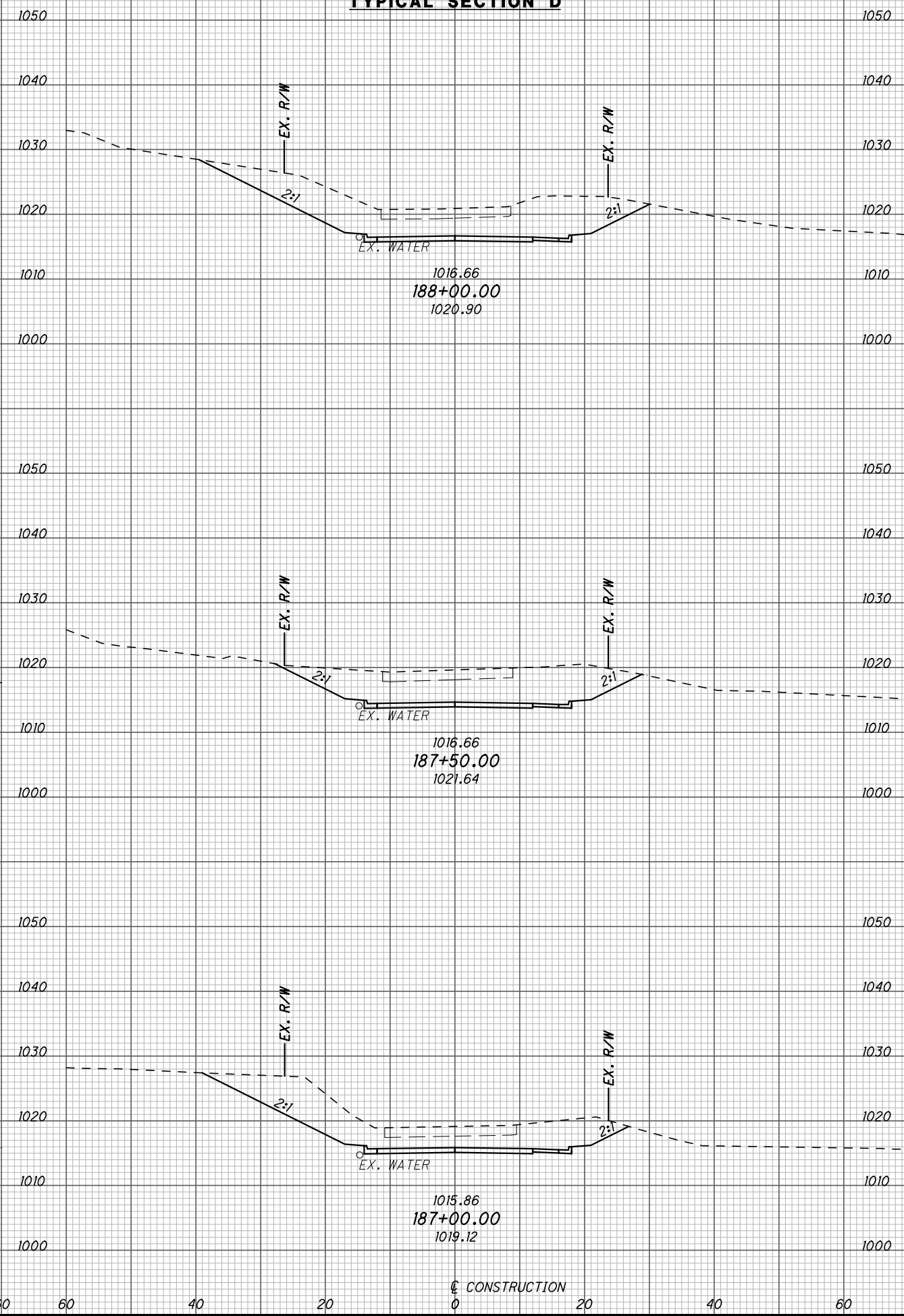
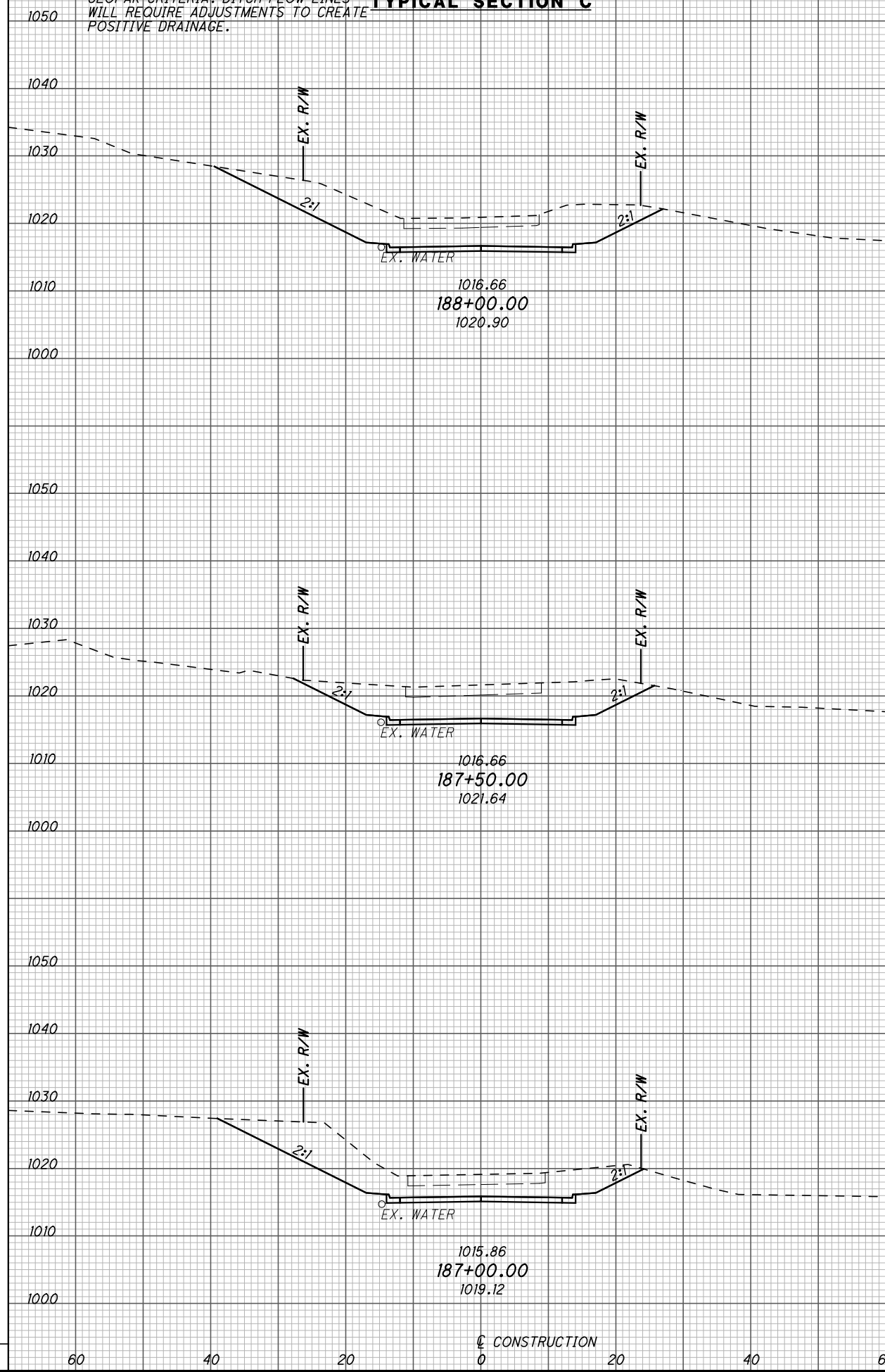
\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:58PM rsmalley

SEEDING	
END WIDTH	SQ. YDS.

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.

TYPICAL SECTION C

TYPICAL SECTION D



END AREA	VOLUME	CALCULATED	CHECKED

**CROSS SECTIONS
 STA. 187+00.00 TO STA. 188+00.00**

LIC-THORWOOD

\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_SYM.dgn 22-OCT-2008 12:59PM rsmalley

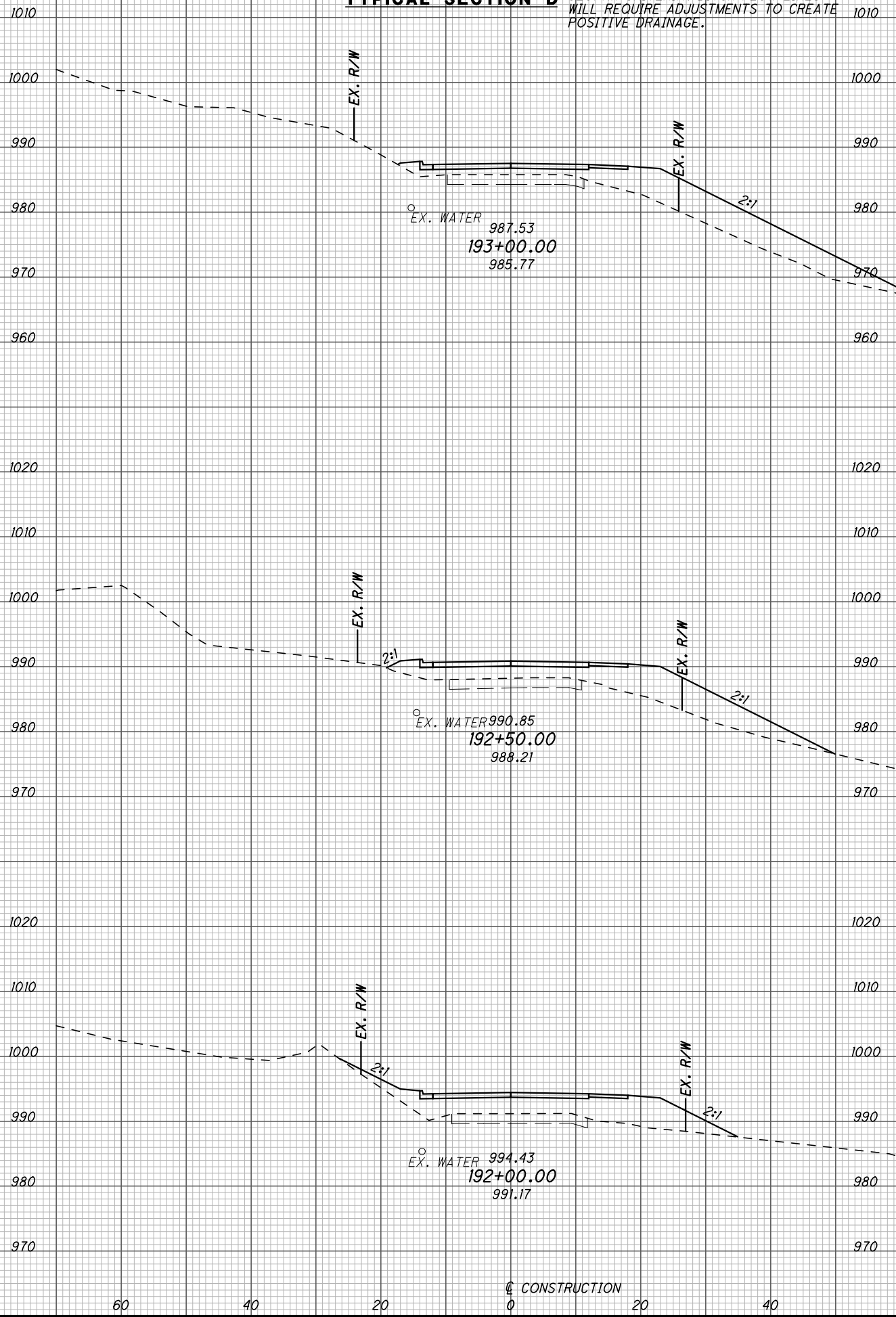
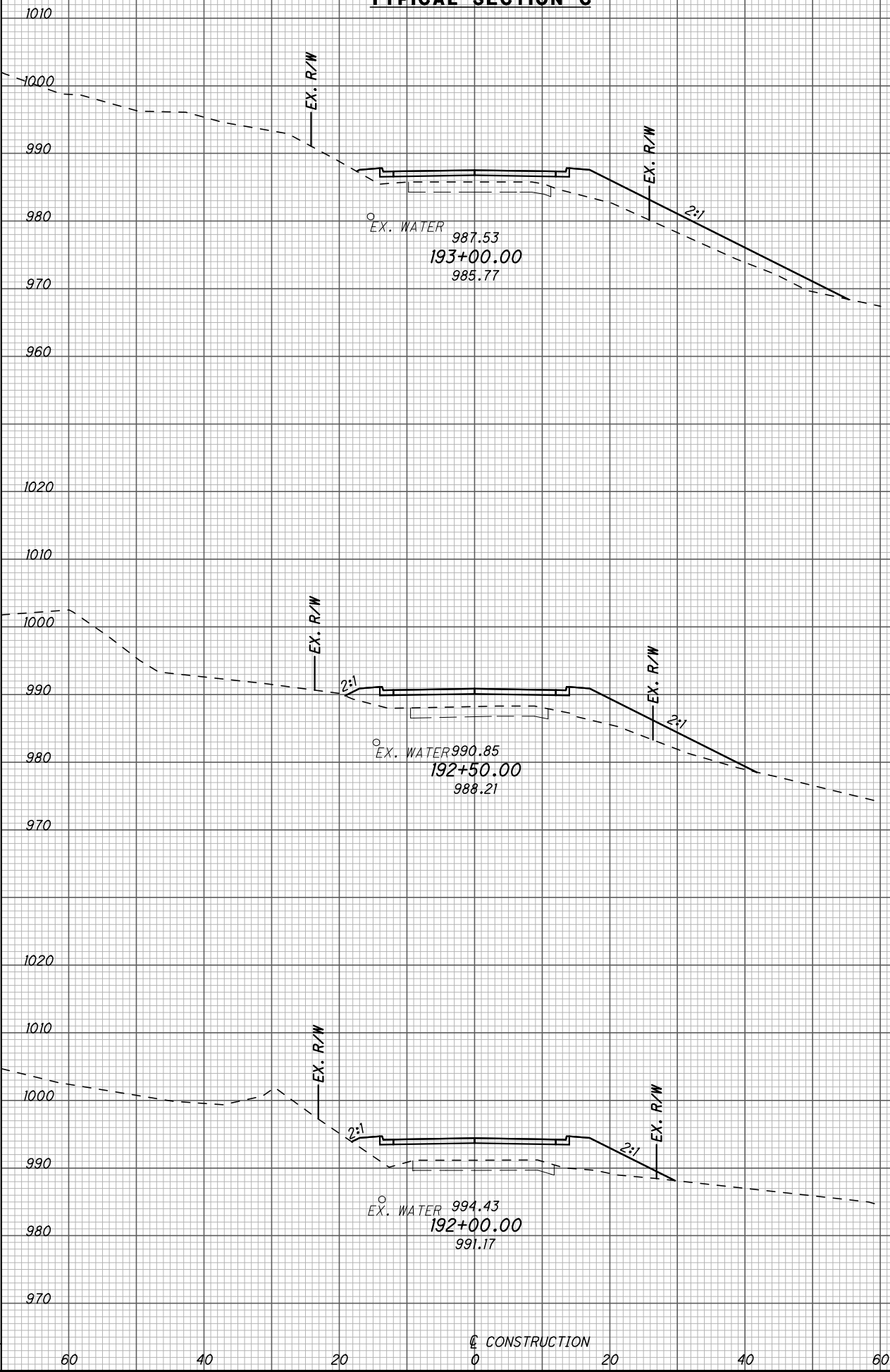
SEEDING
END WIDTH SQ. YDS.

END AREA VOLUME
CUT FILL CUT FILL
CALCULATED CHECKED

TYPICAL SECTION C

TYPICAL SECTION D

GRADING SHOWN IS PROVIDED BY GEOPAK CRITERIA. DITCH FLOW LINES WILL REQUIRE ADJUSTMENTS TO CREATE POSITIVE DRAINAGE.



CONSTRUCTION

CONSTRUCTION

CROSS SECTIONS
STA. 192+00.00 TO STA. 193+00.00

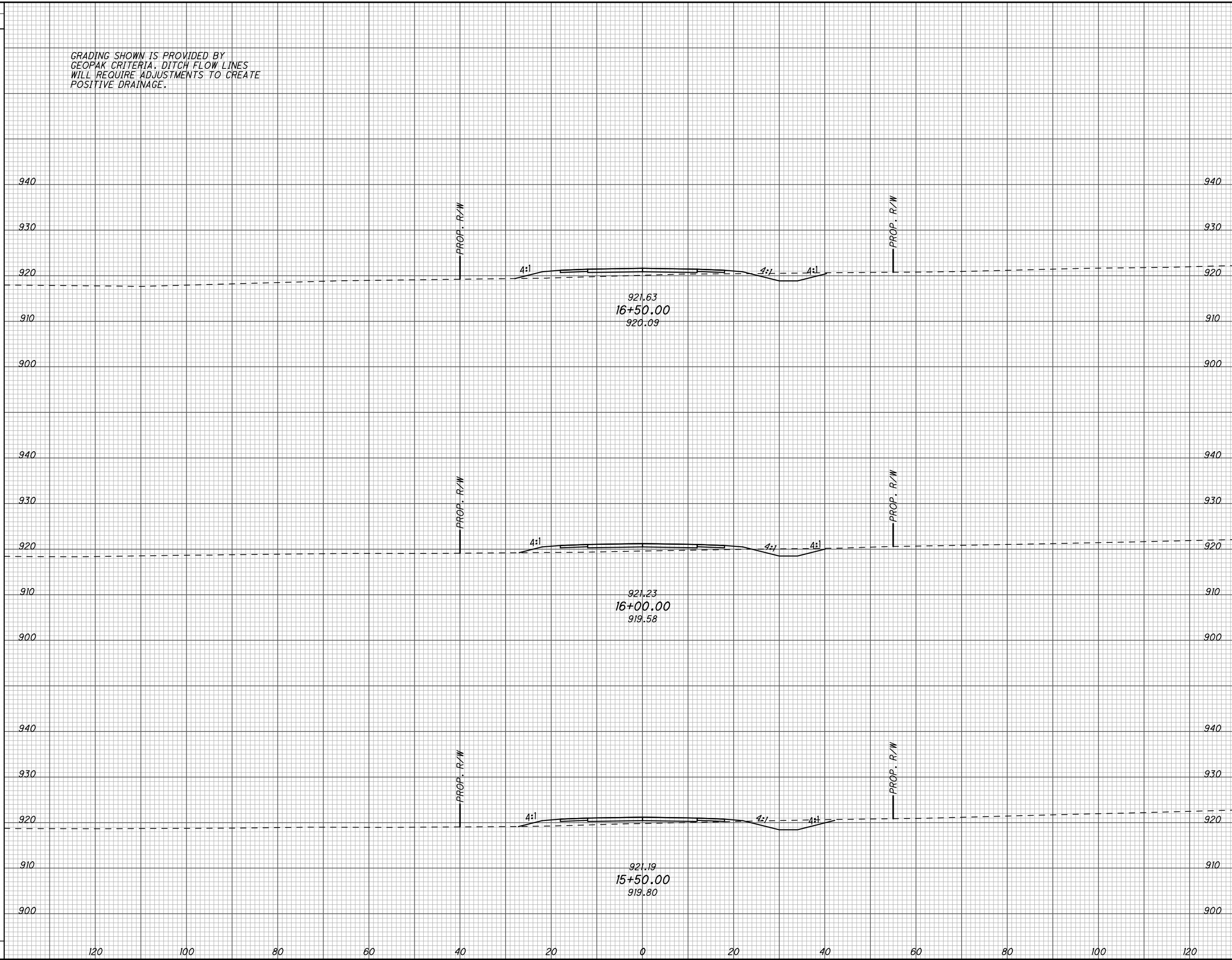
LIC-THORWOOD



\\clew00\pmwork\JOBS\40927\Techprod\LIC\78116\roadway\sheets\XS001_RIVER.dgn 22-OCT-2008 11:50AM rsmalley

SEEDING	
END WIDTH	SQ. YDS.

GRADING SHOWN IS PROVIDED BY
GEOPAK CRITERIA. DITCH FLOW LINES
WILL REQUIRE ADJUSTMENTS TO CREATE
POSITIVE DRAINAGE.



END AREA		VOLUME	
CUT	FILL	CUT	FILL

CALCULATED	CHECKED

**CROSS SECTIONS - RIVER RD.
STA. 15+50.00 TO STA. 16+50.00**

LIC-THORWOOD

