

# **Enhance Energy Inc. and North West Redwater Partnership**

Knowledge Sharing Report

Appendices i–viii

Calendar Year 2014

Submitted on March 31, 2015

# Table of Contents

## APPENDICES i–viii

APPENDIX I	Agrium CRF Block Flow Diagram . . . . .	3
APPENDIX II	Agrium CRF Heat & Mass Balance . . . . .	5
APPENDIX III	Agrium CRF Measurement Point Block Diagram . . . . .	9
APPENDIX IV	Agrium CRF Energy Boundary Block Diagram . . . . .	11
APPENDIX V	Agrium CRF Produced Water Analysis Report . . . . .	13
APPENDIX VI	Agrium CRF Plot Plan . . . . .	16
APPENDIX VII	AER ACTL Base Maps . . . . .	18
APPENDIX VIII	ACTL Block Valve Schematic . . . . .	47

# Enhance Energy Inc. and North West Redwater Partnership

## APPENDIX i Agrium CRF Block Flow Diagram

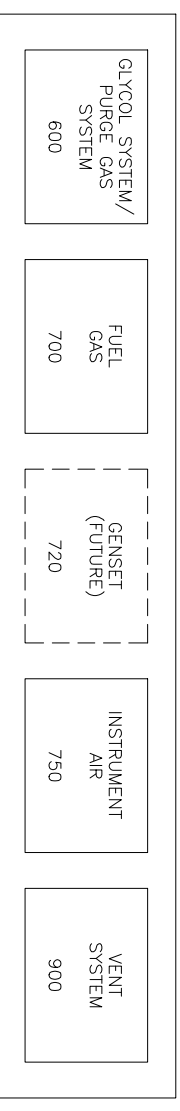
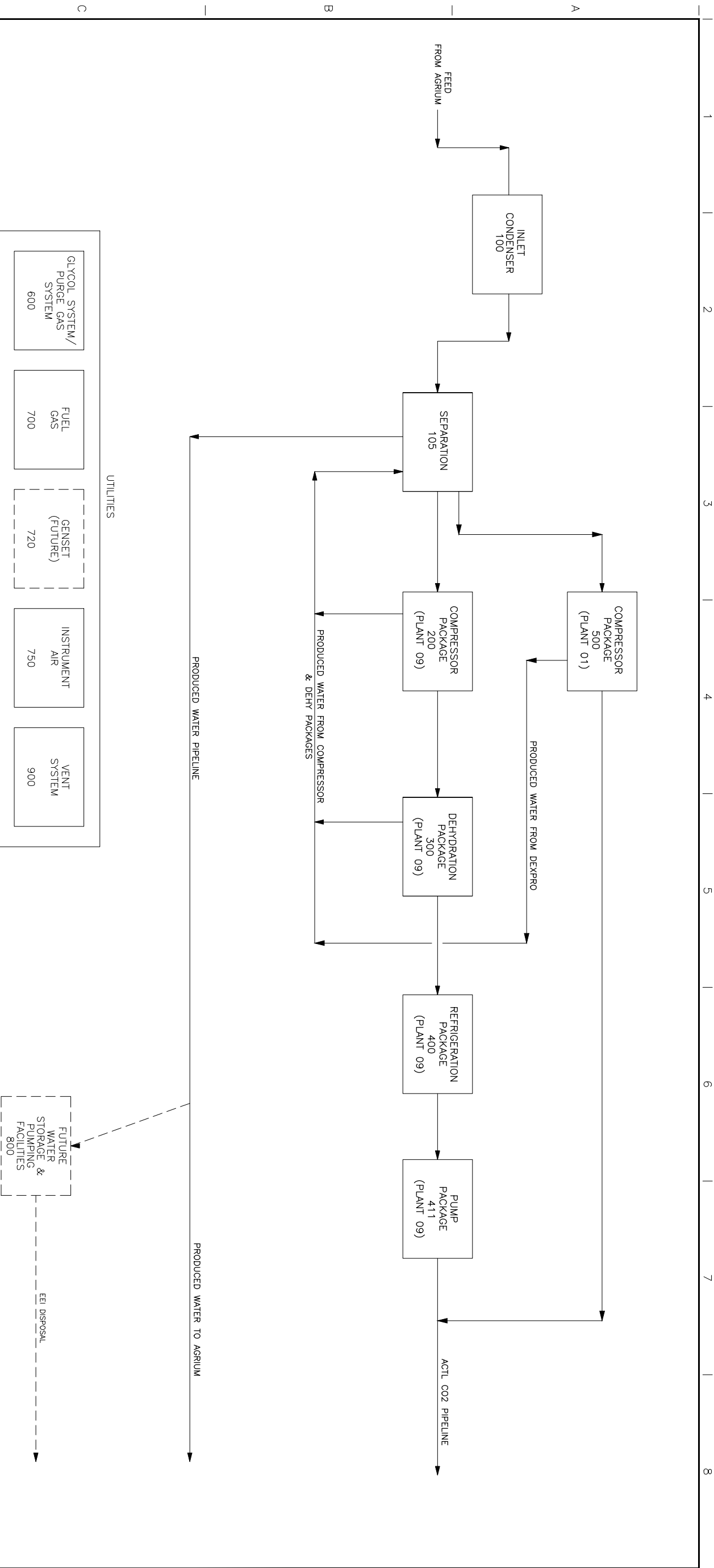


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REFERENCE DRAWINGS				PROJECT DESCRIPTION				ISSUE STAGE				ENGINEER'S STAMP			
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						A	14-06-18	CL	SW	TB	A	UNIT 09 AGRUM CO2	RECOVERY FACILITY	12-100-P-F-0050	
						B	14-07-24	KH	SW			BLOCK FLOW DIAGRAM			
												STURGEON COUNTY			



S.A.W. ENGINEERING LTD.

ENHANCE ENERGY INC.

ENGINEER'S STAMP  
 PERMIT No. P10437  
 AREA  
 STURGEON COUNTY

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## APPENDIX ii Agrium CRF Heat & Mass Balance



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## APPENDIX iii Agrium CRF Measurement Point Block Diagram



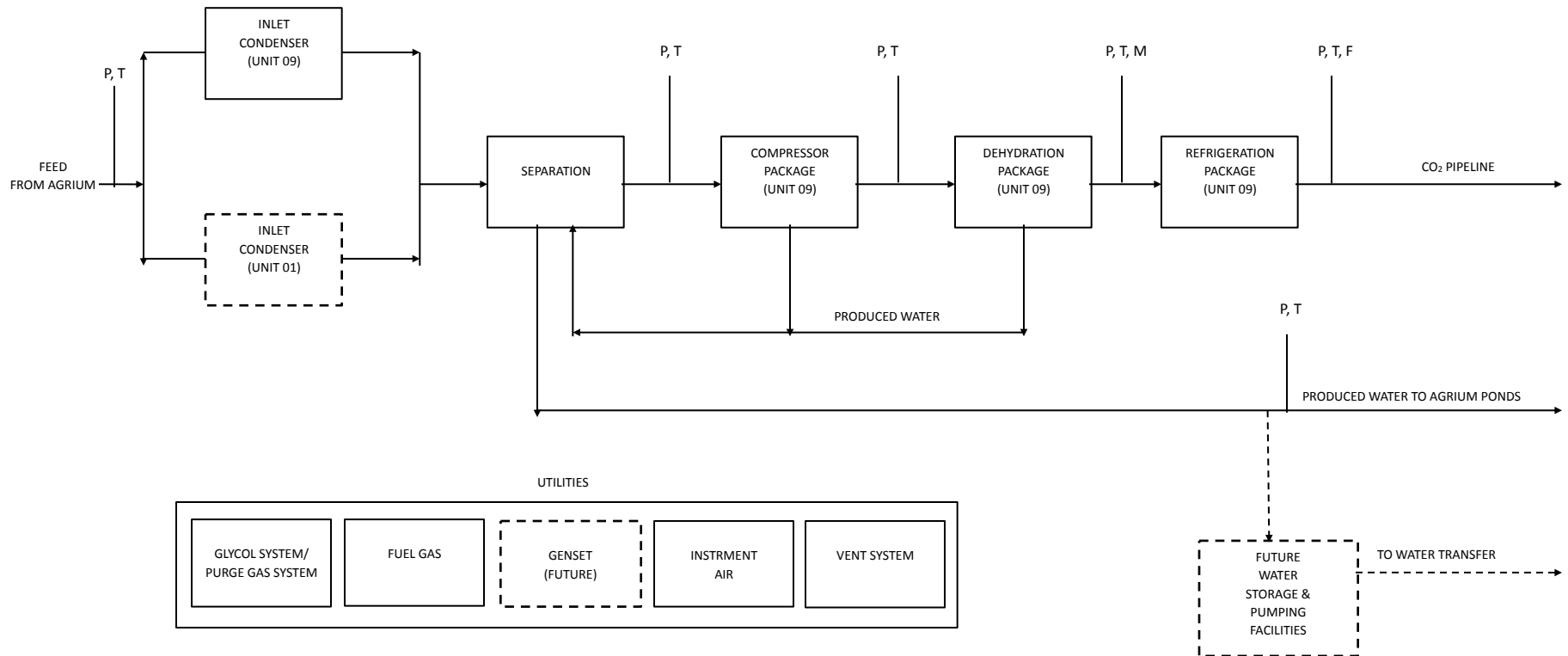
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## Enhance Energy, Inc – Agrium CO<sub>2</sub> Recovery Facility Process Measurement Point Diagram



P- Pressure  
 T- Temperature  
 F- Flow  
 M- Moisture

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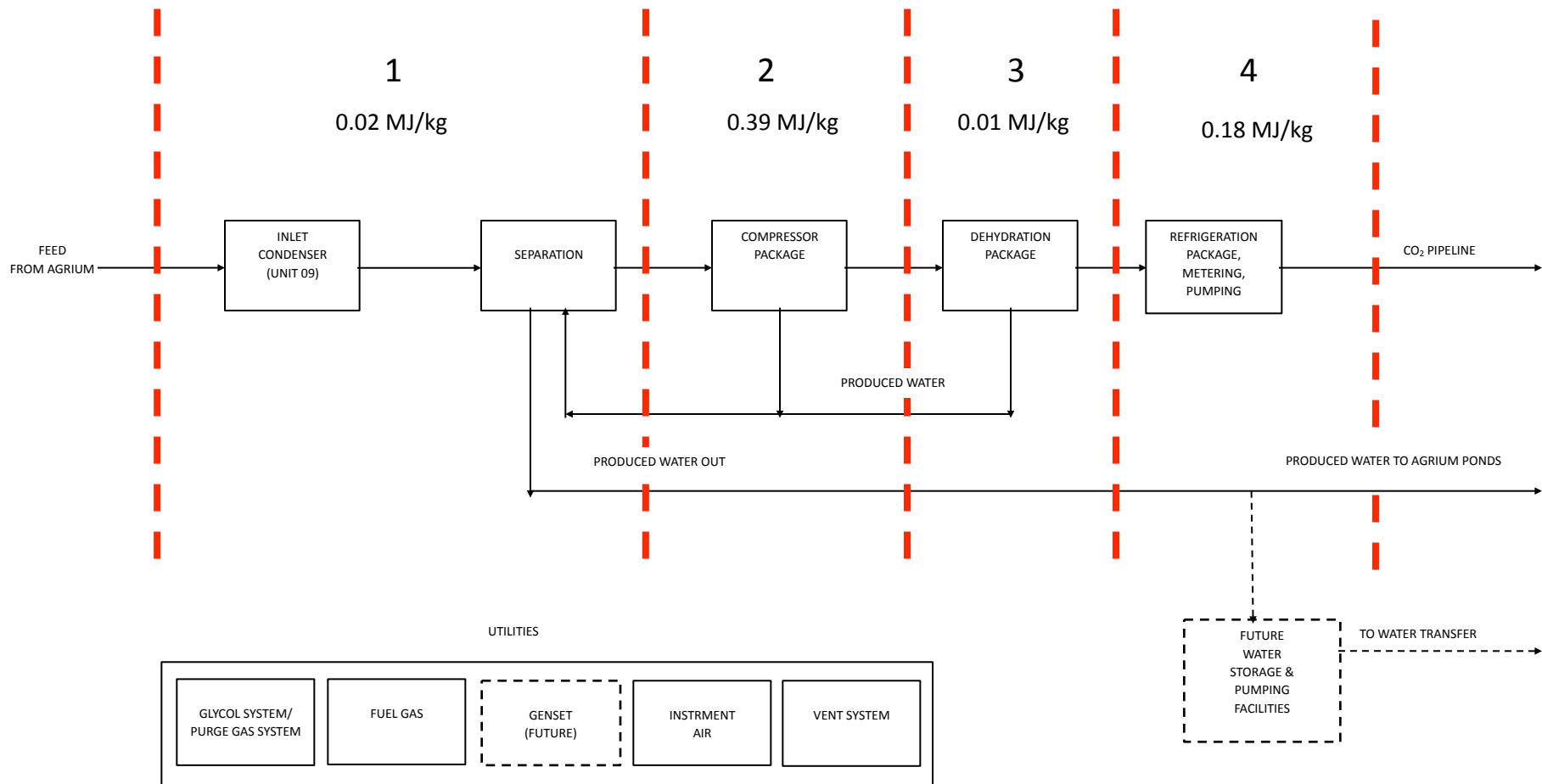
## APPENDIX iv Agrium CRF Energy Boundary Block Diagram



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## Enhance Energy, Inc – Agrium CO<sub>2</sub> Recovery Facility Energy Boundary Diagram



- 1 – Inlet / Separation
- 2- Compression
- 3- Dehydration
- 4- Refrigeration/Metering/Pumping

Note – each area shares an appropriate portion of the utility systems

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**APPENDIX v**  
Agrium CRF Produced  
Water Analysis Report



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**Nalco Analytical Resources**  
 1601 West Diehl Road, Naperville, Illinois 60563-1198  
 Phone: (630) 305-2316, Fax: (630) 305-2946, Analytical.Lab.Naperville@Nalco.com



**Agrium Redwater**  
 Redwater AB Canada  
 Sample Marked: T-903 Overhead Condensate  
 SAP SoldTo Number: 0001000024

Sample Number: NW0702633  
 Date Sampled: 16-Jan-2007  
 Date Received: 15-Feb-2007  
 Date Completed: 07-Mar-2007

### Water Analysis Report

Cations/Metals	Filtered	Total
Aluminum (Al)	<1.0	<1.0 mg/L
Barium (Ba)	<4.1	<3.9 mg/L
Boron (B)	<1.0	<1.0 mg/L
Cadmium (Cd)	<0.41	<0.39 mg/L
Calcium (Ca)	<1.0	<1.0 mg/L
Chromium (Cr)	<0.10	<0.10 mg/L
Copper (Cu)	<0.10	<0.10 mg/L
Iron (Fe)	<0.10	<0.10 mg/L
Lead (Pb)	<2.0	<1.9 mg/L
Lithium (Li)	<0.10	<0.10 mg/L
Magnesium (Mg)	<4.1	<3.9 mg/L
Manganese (Mn)	<0.10	<0.10 mg/L
Molybdenum (Mo)	<1.0	<1.0 mg/L
Nickel (Ni)	<1.0	<1.0 mg/L
Phosphorus (P)	<10.1	<9.7 mg/L
Phosphorus (PO4)	<31.0	<29.7 mg/L
Potassium (K)	<7.1	6.9 mg/L
Silica (SiO2)	<10.8	<10.4 mg/L
Sodium (Na)	<2.0	<1.9 mg/L
Strontium (Sr)	<0.10	<0.10 mg/L
Vanadium (V)	<5.07	<4.85 mg/L
Zinc (Zn)	<0.10	<0.10 mg/L
Calcium (CaCO3)	<2.5	<2.4 mg/L
Magnesium (CaCO3)	<16.7	<16.0 mg/L
Sodium (CaCO3)	<4.4	<4.2 mg/L
Calculated Hardness (CaCO3)	NR*	NR*

#### Anions

Bromide (Br)	<10.0 mg/L
Chloride (Cl)	11 mg/L
Nitrate (NO3)	<10.0 mg/L
Nitrite (NO2)	<10.0 mg/L
Sulfate (SO4)	<10.0 mg/L
Chloride (CaCO3)	15 mg/L
Nitrate (CaCO3)	<8.1 mg/L
Sulfate (CaCO3)	<10.0 mg/L

Authorized by : David R. Szymborski





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**SAP SoldTo Number:** 0001000024

**Sample Number:** NW0702633  
**Date Sampled:** 16-Jan-2007  
**Date Received:** 15-Feb-2007  
**Date Completed:** 07-Mar-2007

### Water Analysis Report

#### ALK - Alkalinity

Bicarbonate (CaCO <sub>3</sub> )	7100 mg/L
Carbonate (CaCO <sub>3</sub> )	110 mg/L
Methyl Orange (CaCO <sub>3</sub> )	7200 mg/L
Phenolphthalein (CaCO <sub>3</sub> )	53 mg/L

#### Others

pH	8.5 pH Units
Conductivity	13000 $\mu$ S/cm
Organic Carbon (C) - Total	1100 mg/L
MS Number	MS0048

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## APPENDIX vi Agrium CRF Plot Plan



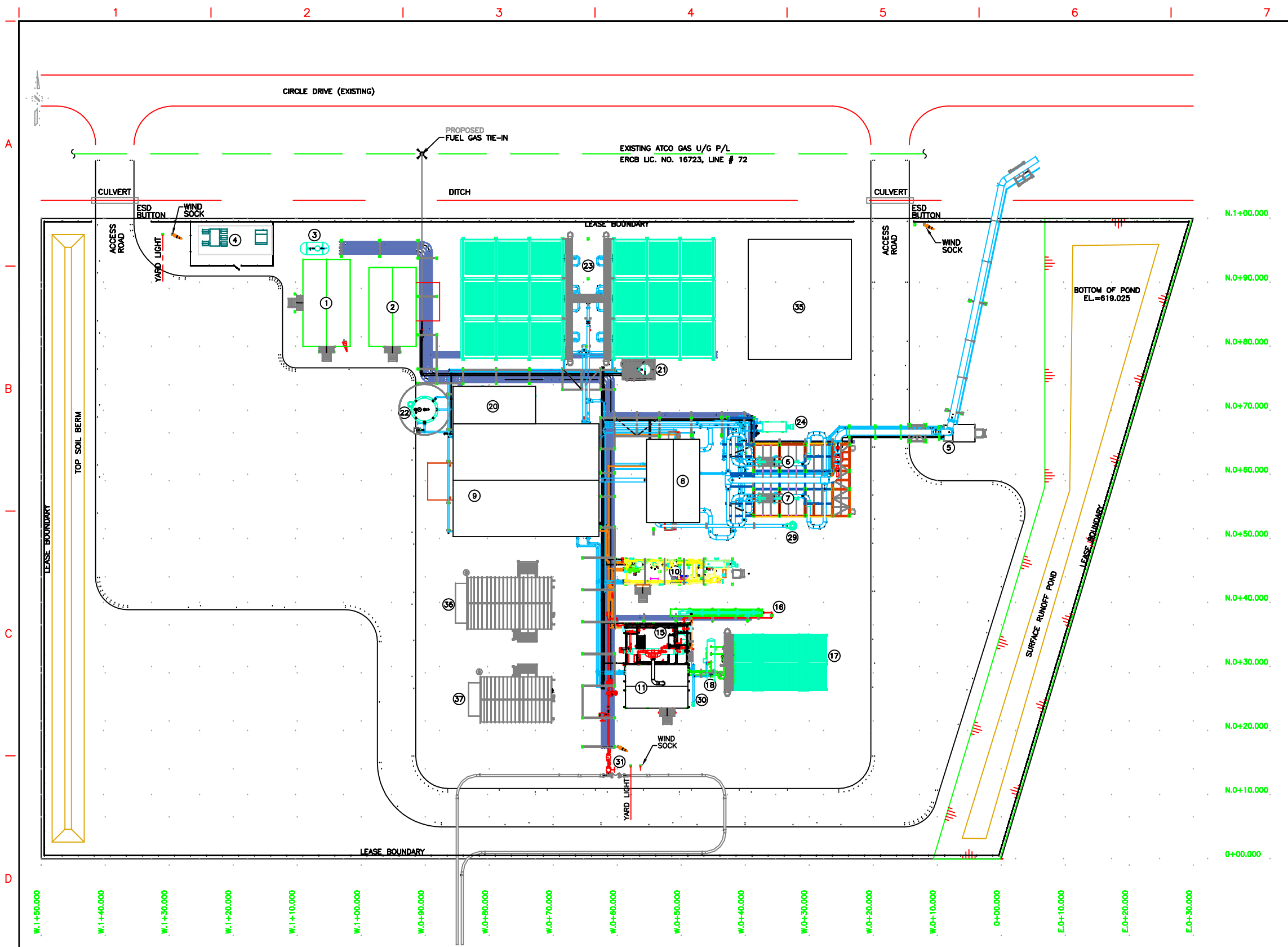
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EQUIPMENT LEGEND		
1	Q-010	OFFICE & MCC BUILDING
2	Q-011	SKV BUILDING
3	TK-011	SEPTIC TANK
4	-	TRANSFORMERS
5	Q-103	DRAIN POT BUILDING
6	E-101	INLET CONDENSER
7	E-102	INLET CONDENSER
8	Q-105	INLET CO2 SEPARATOR BUILDING
9	Q-200	INLET CO2 COMPRESSOR BUILDING
10	Q-300	DEHYDRATION BUILDING
11	Q-400	REFRIGERATION COMPRESSOR PACKAGE
12		
13		
14		
15	Q-410	CO2 LIQUEFACTION SKID
16	P-411	CO2 TRANSFER PUMP (SHIPPING)
17	AC-440/441	NH3 CONDENSER
18	V-445	NH3 ACCUMULATOR
19		
20	Q-600	E-GLYCOL BLDG. (P-601/P-602)
21	V-600	EG SURGE DRUM
22	TK-608	EG POP TANK
23	AC-620	ETHYLENE GLYCOL AIR COOLER
24	H-650	H-650 EG HEATER
25		
26		
27	Q-720	AREA FOR BACK-UP GENERATOR (FUTURE)
28		
29	VS-910	H.V. VENT STACK
30	VS-930	L.V. VENT STACK
31	-	RISER AREA
32	-	-
33	-	-
34	-	-
35	AC-630	FUTURE ETHYLENE GLYCOL AIR COOLER
36	Q-510	FUTURE BOOSTER COMPRESSOR
37	Q-520	FUTURE MAIN COMPRESSOR

ENGINEER'S STAMP										<b>S.A.W. ENGINEERING LTD.</b>	
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APPENDIX vii  
AER ACTL Base Maps

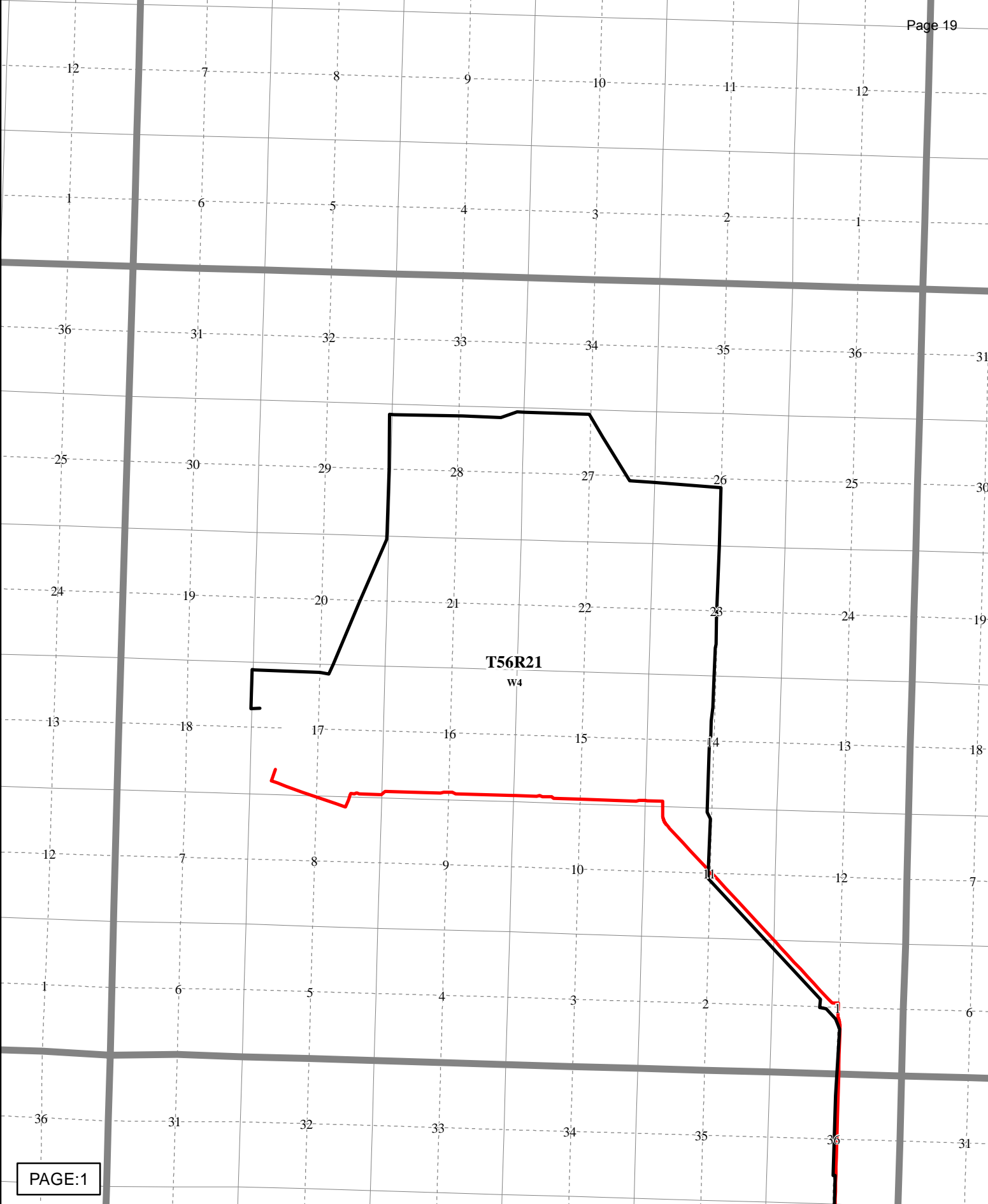


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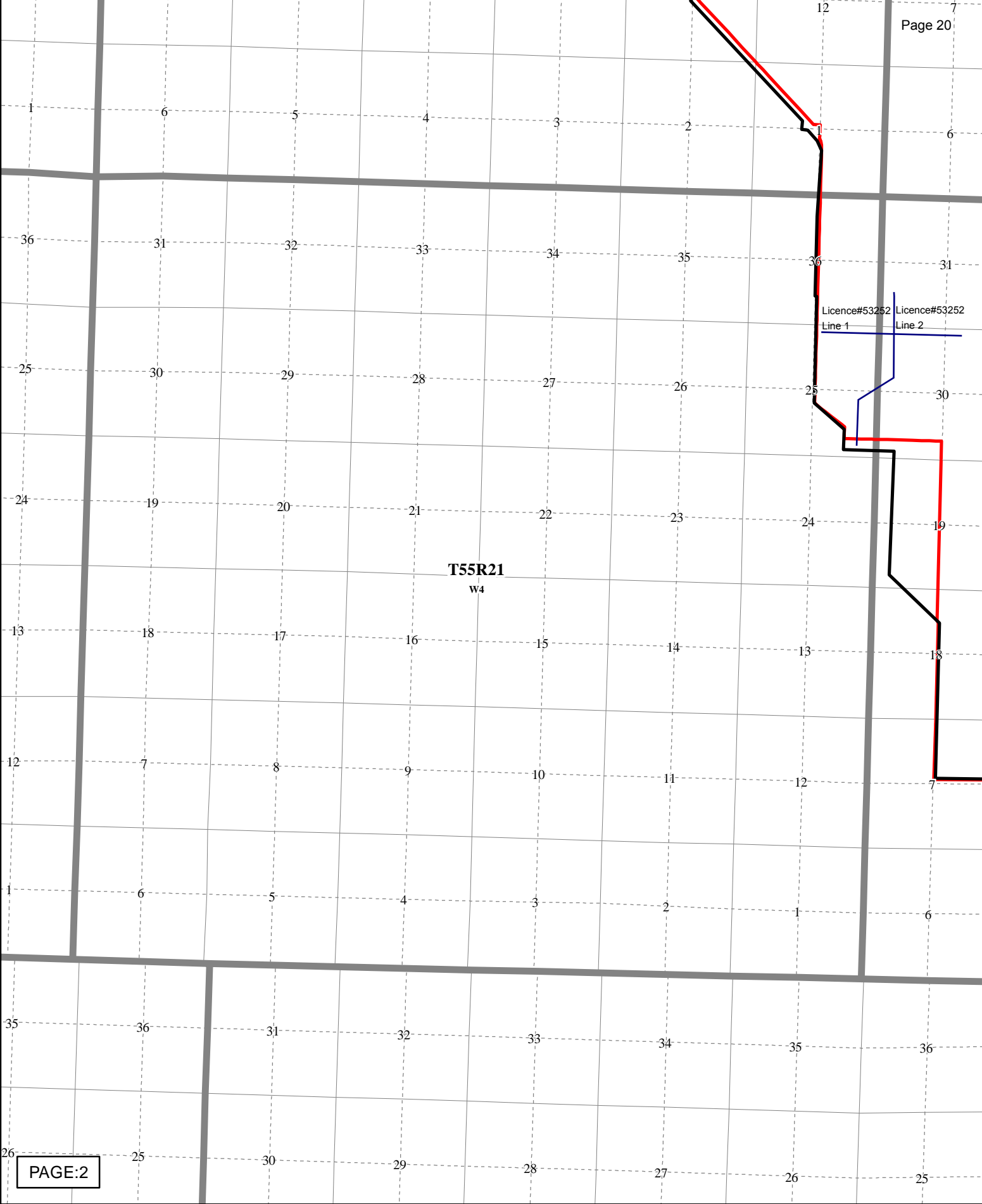
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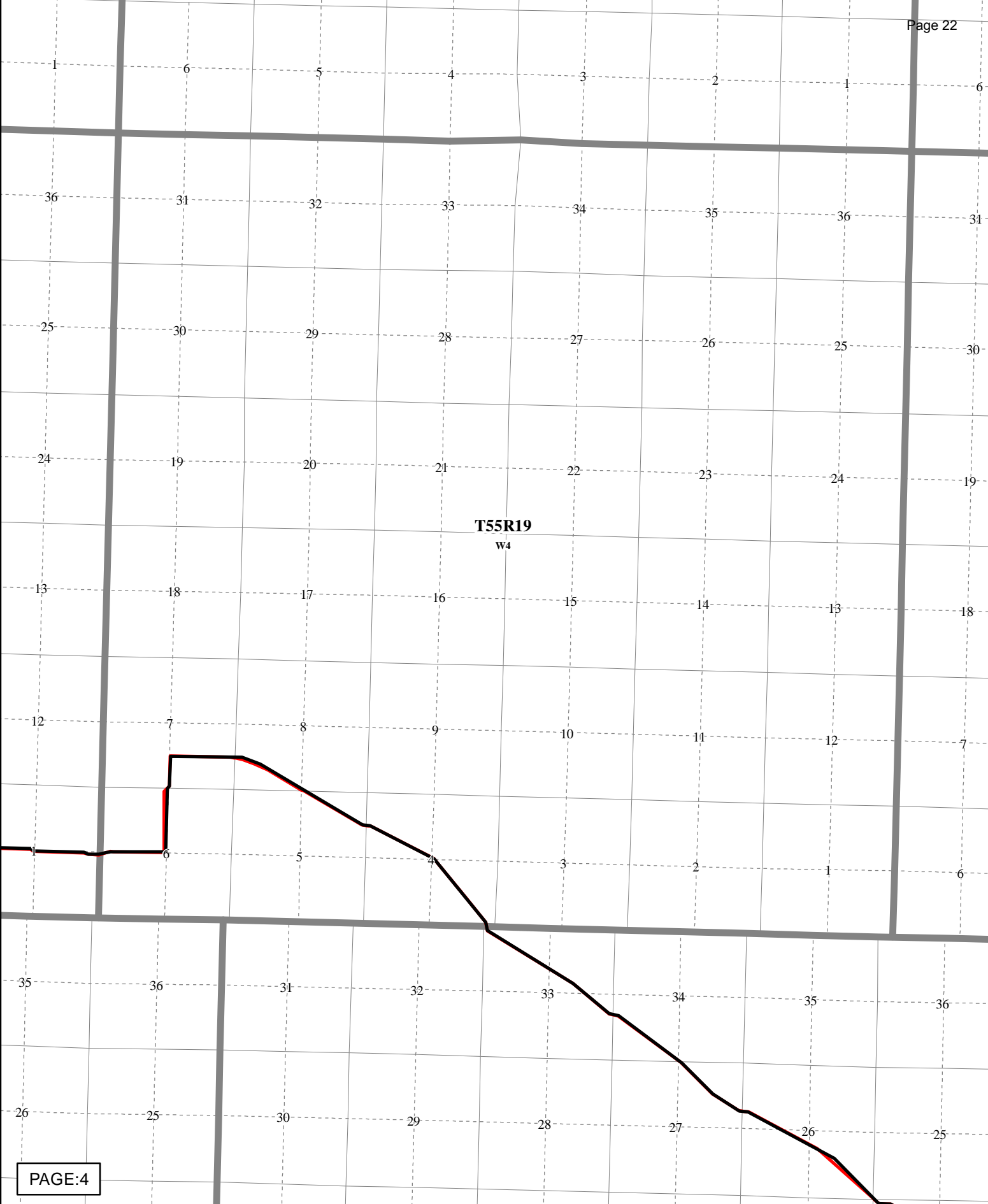
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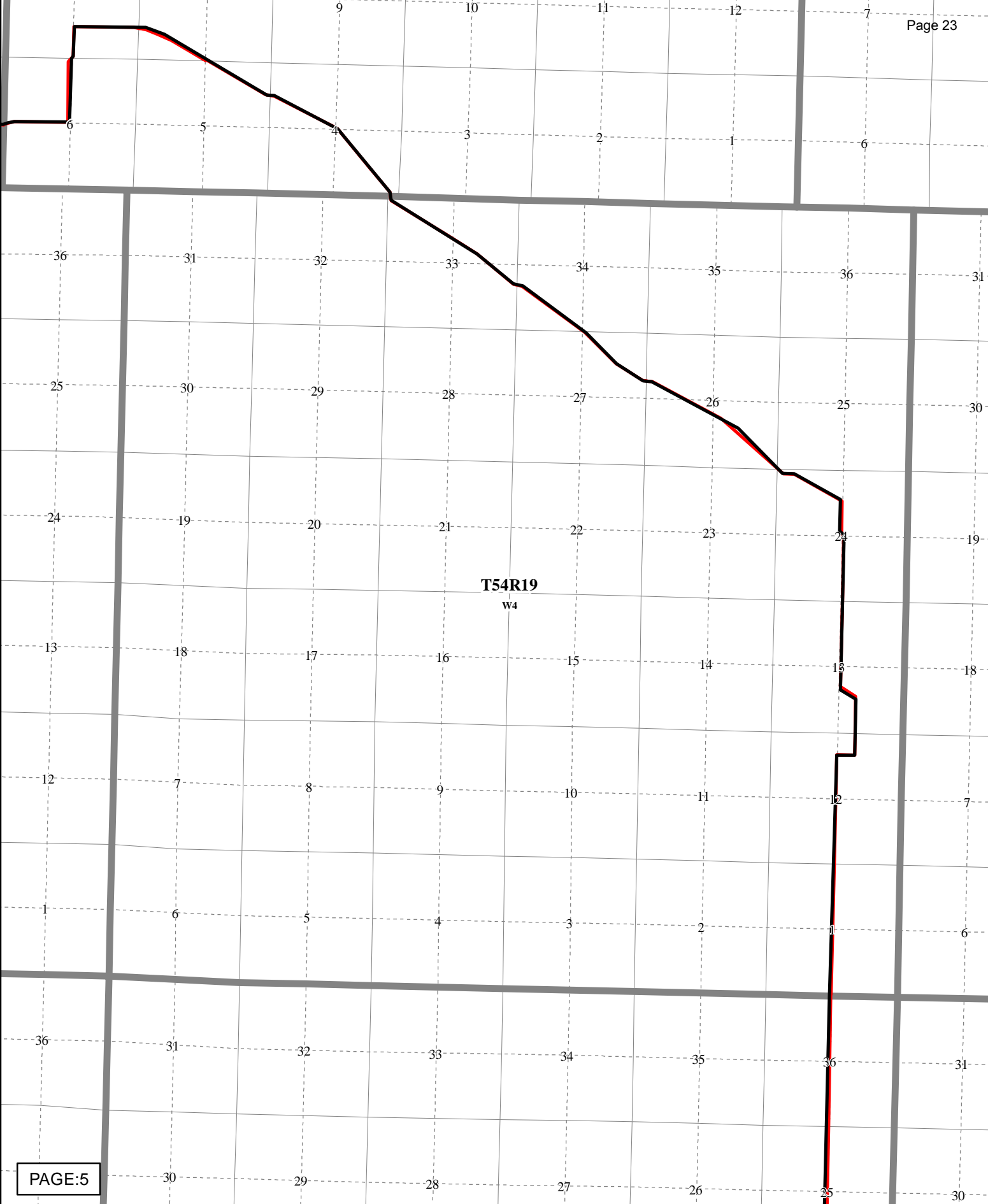
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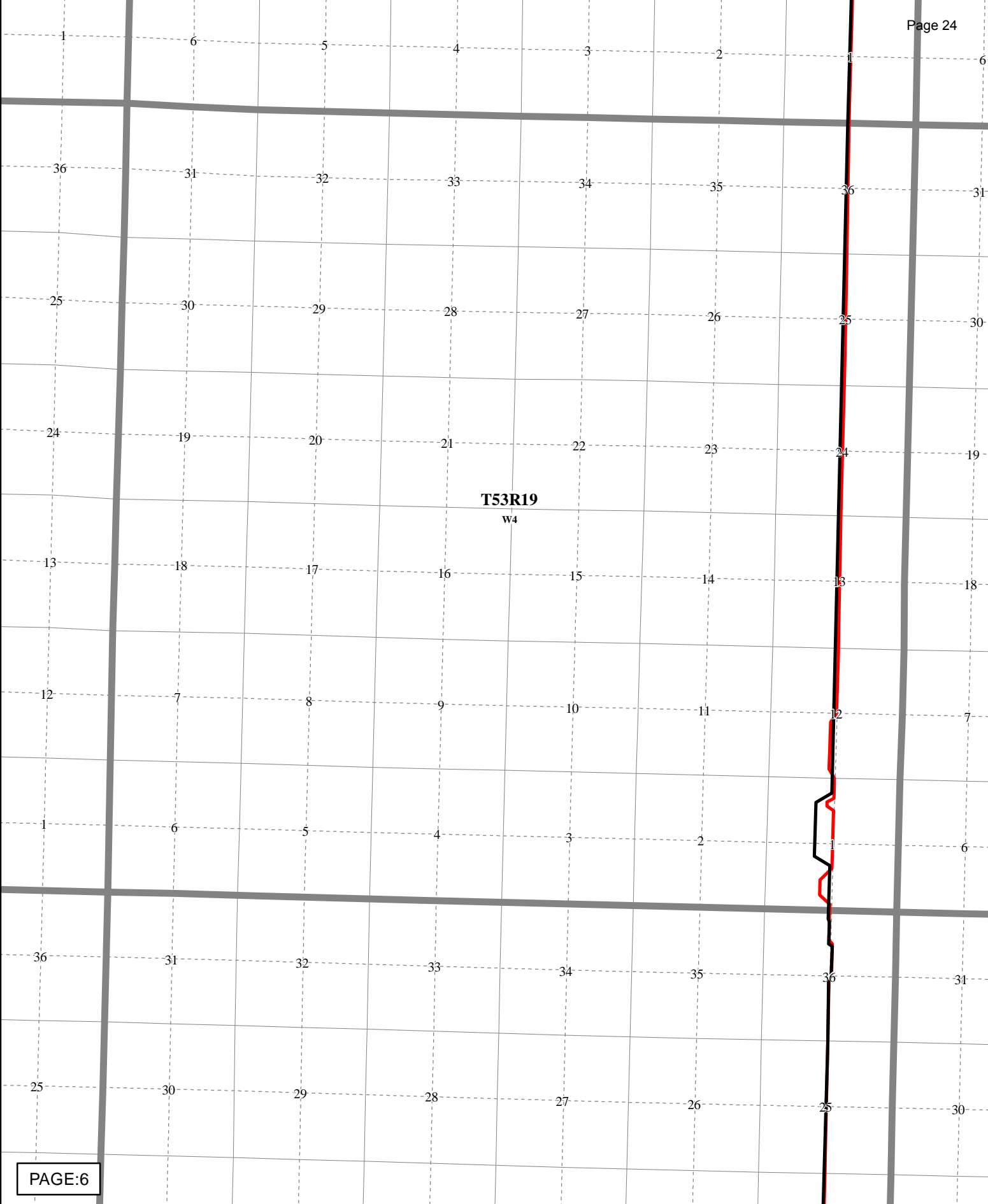
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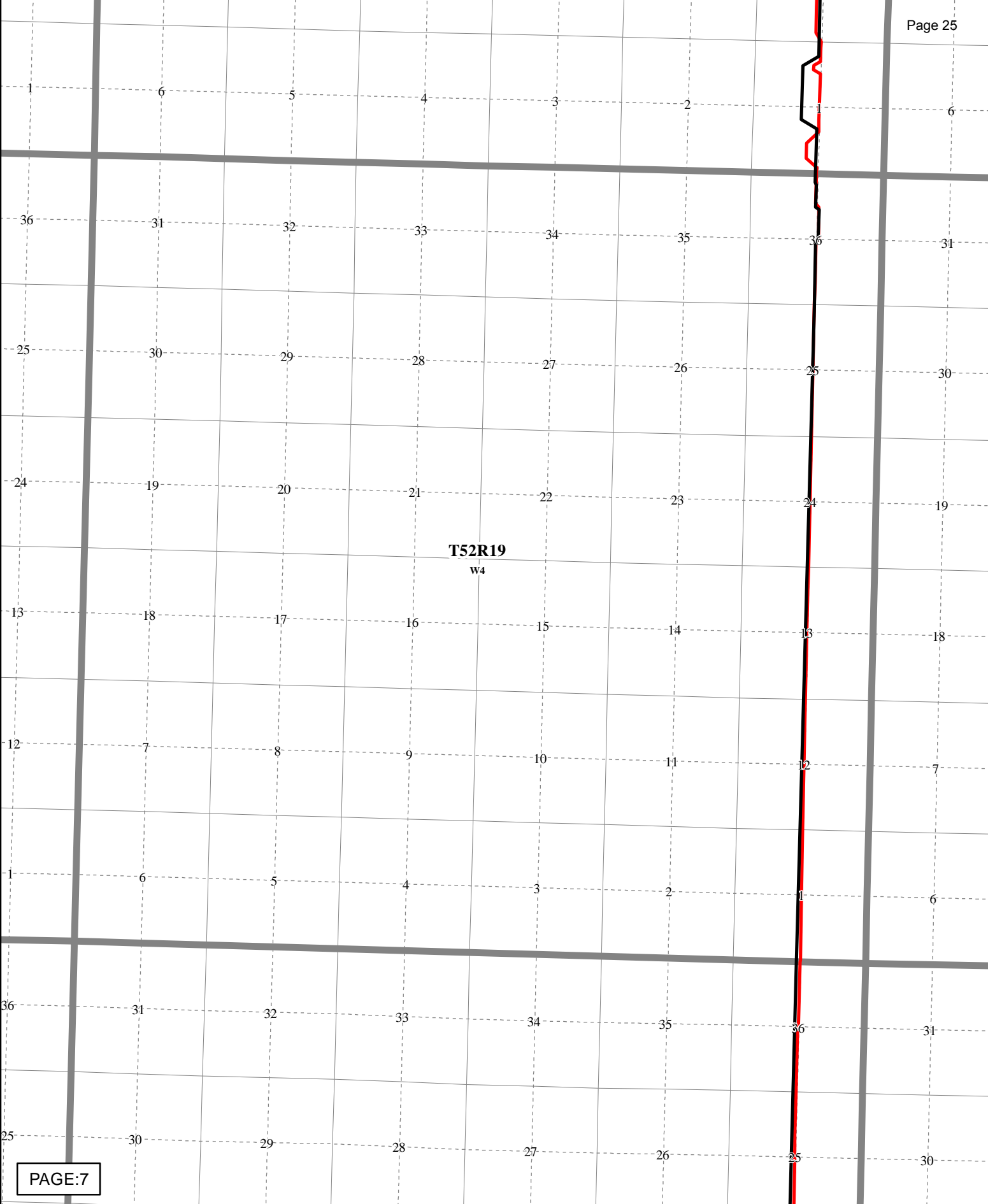
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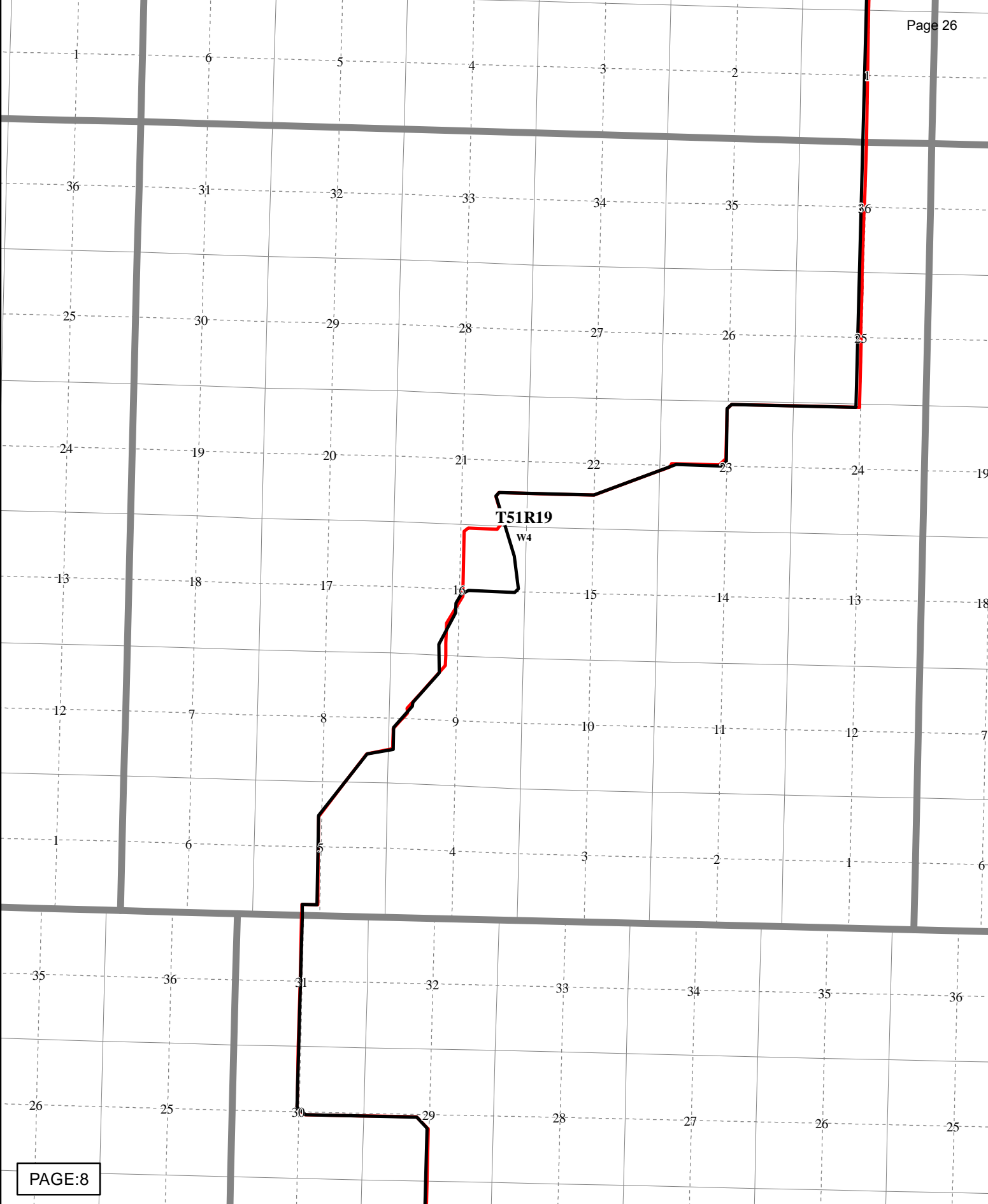
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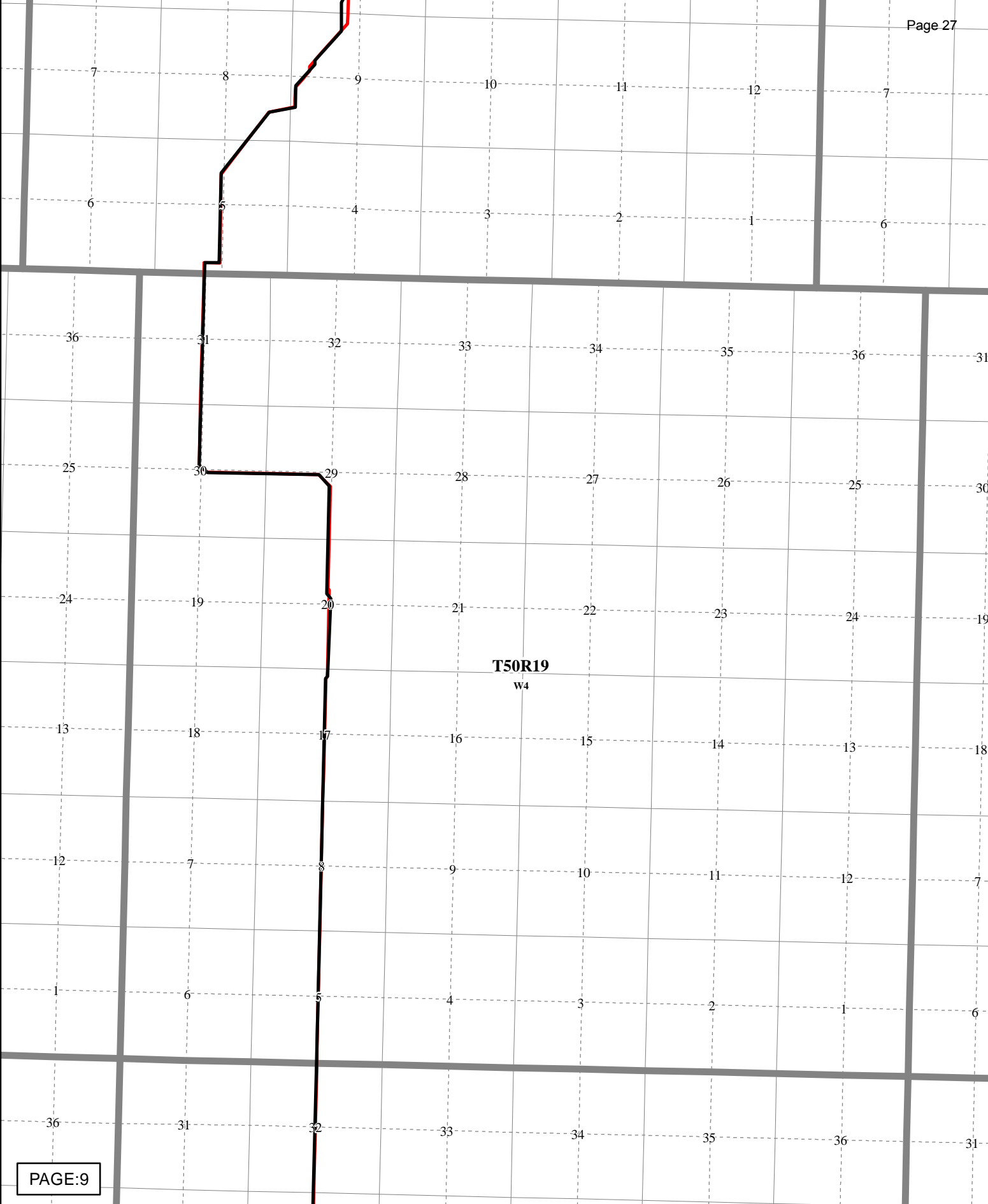
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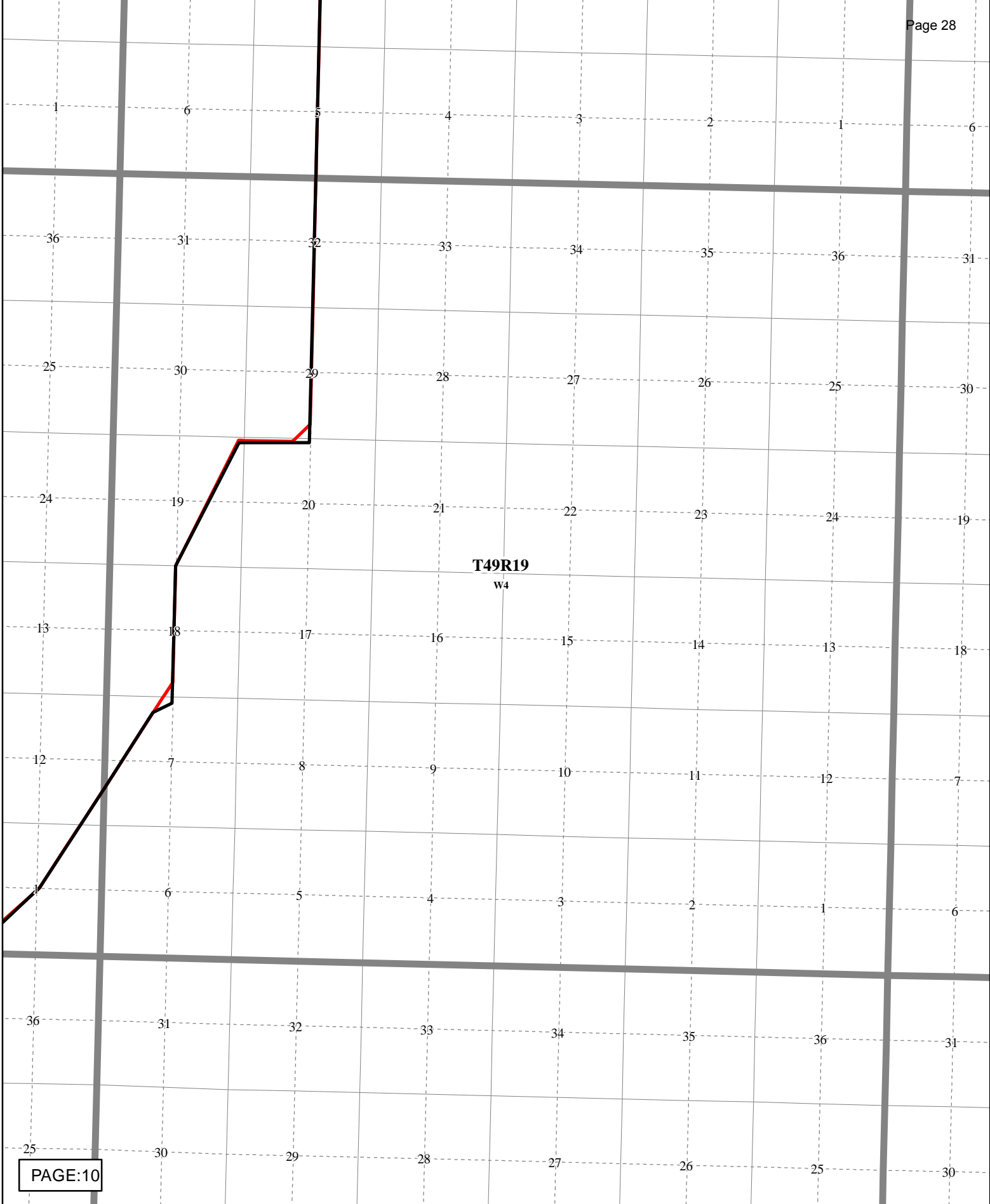
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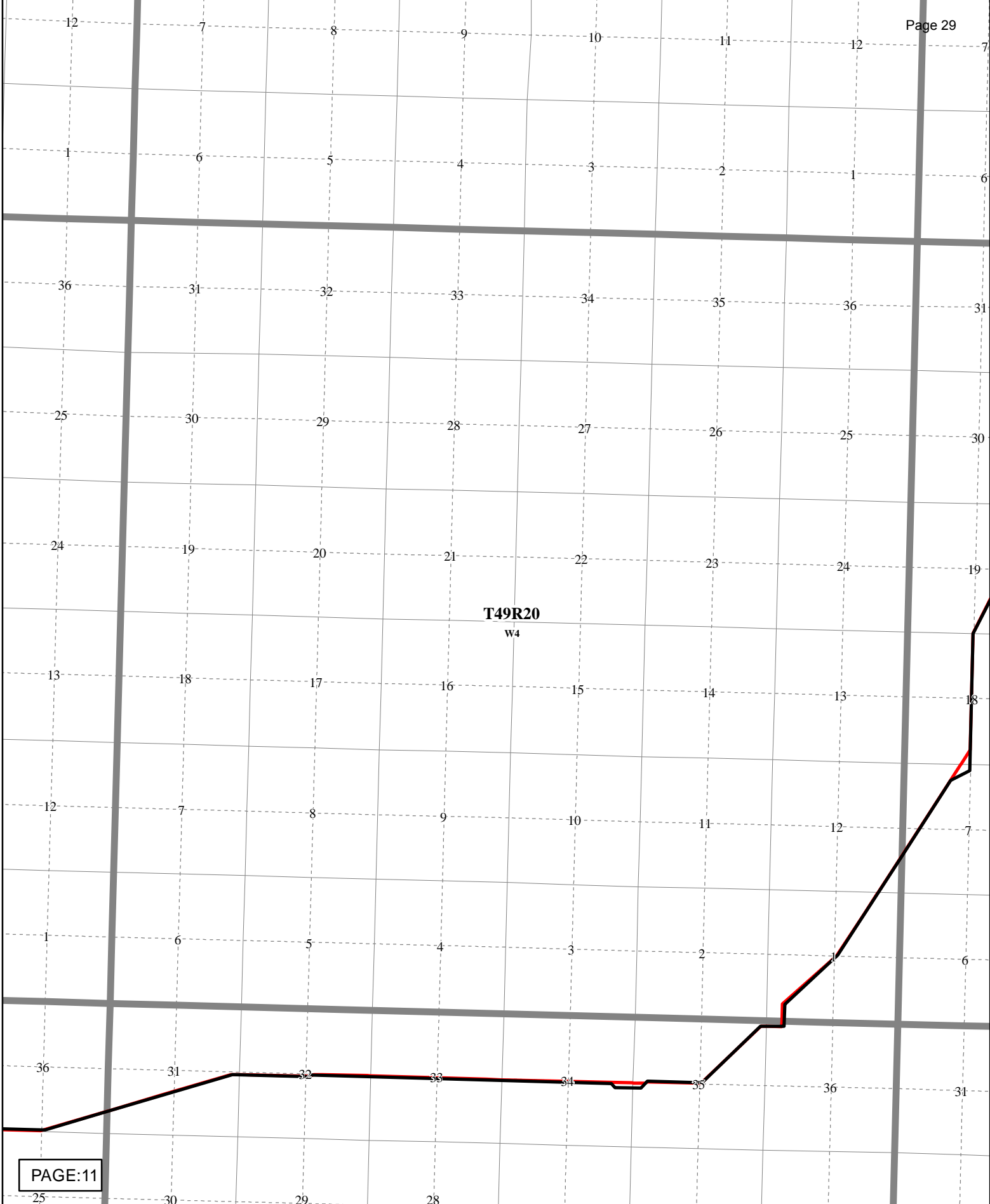
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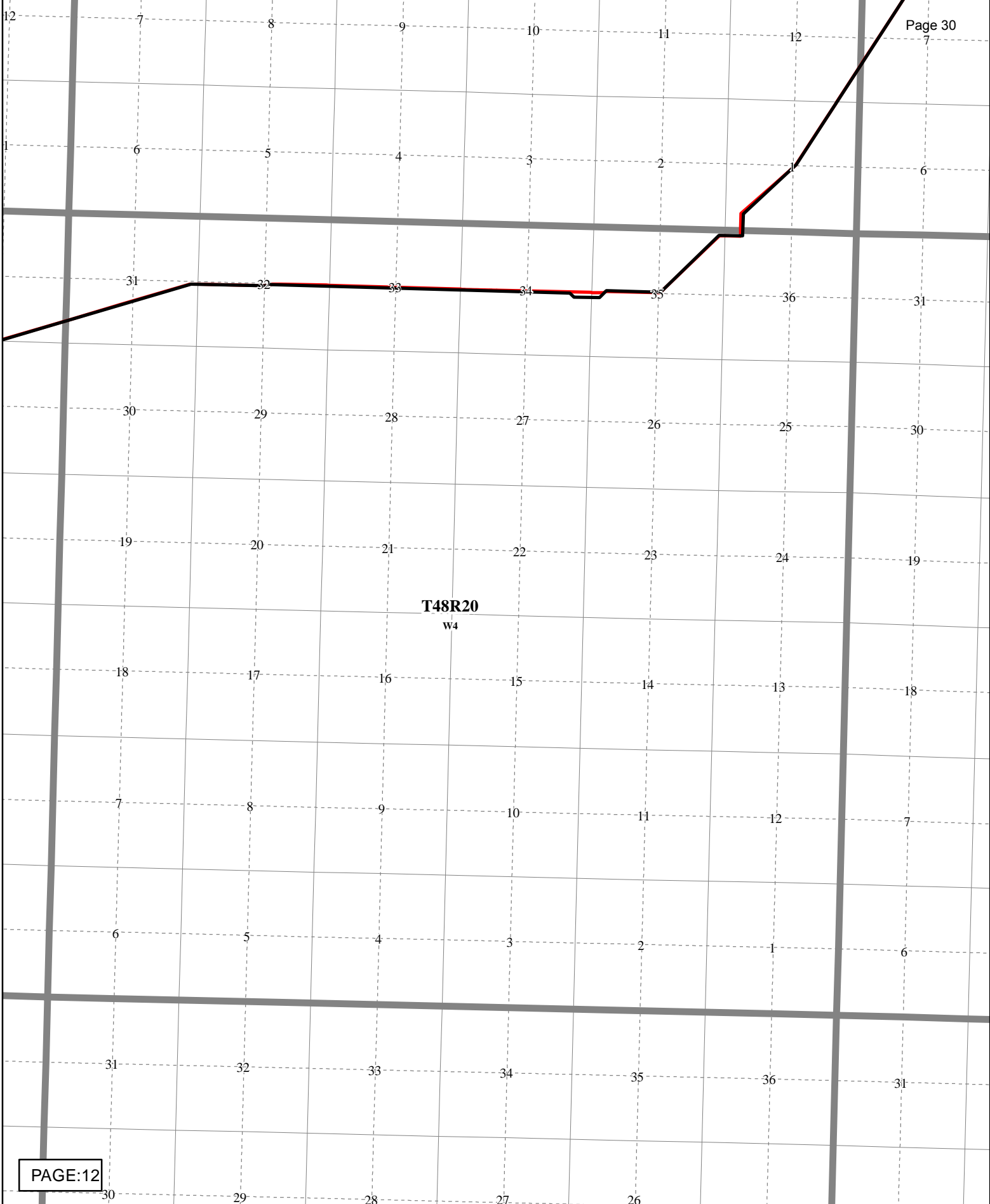
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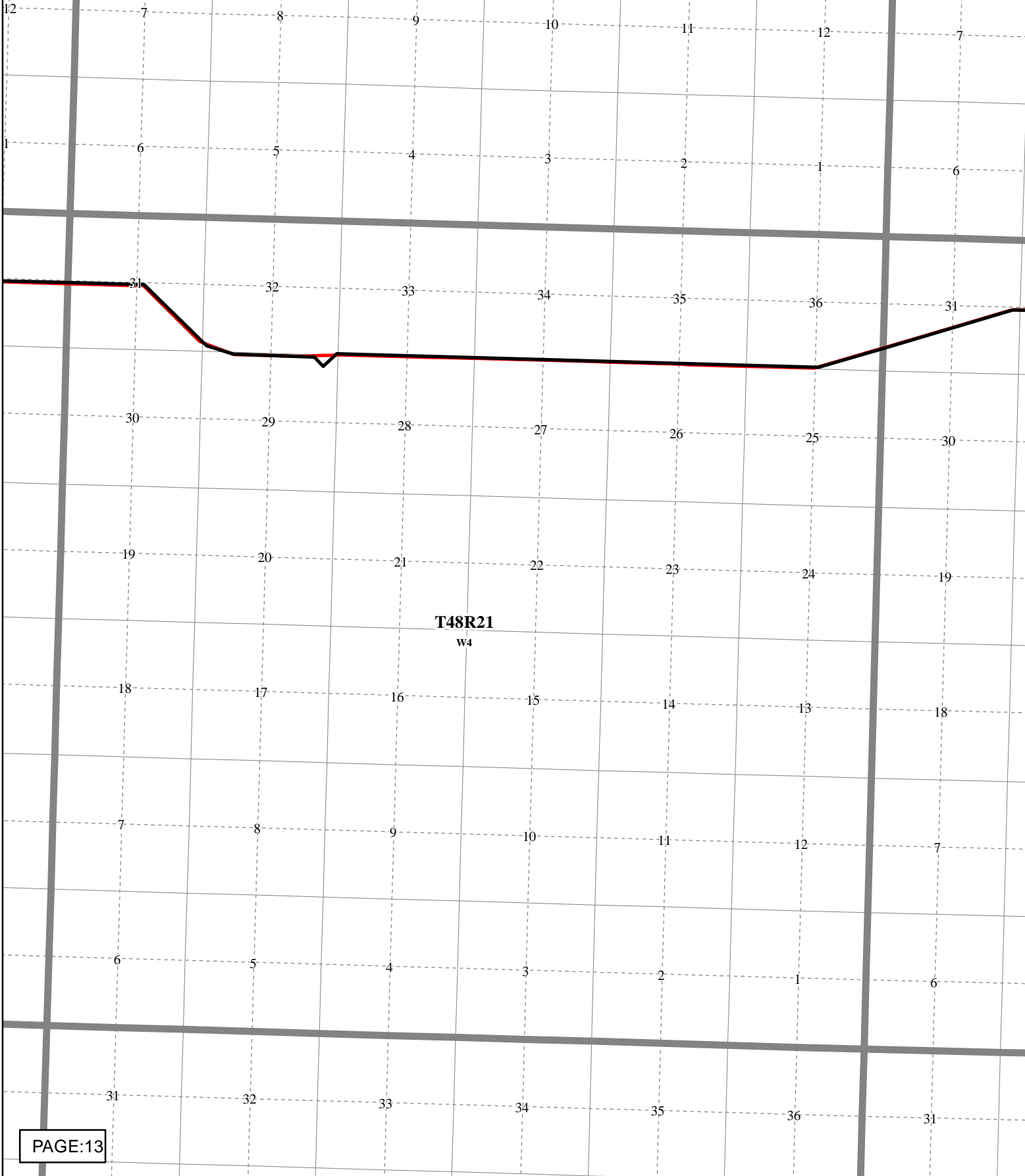


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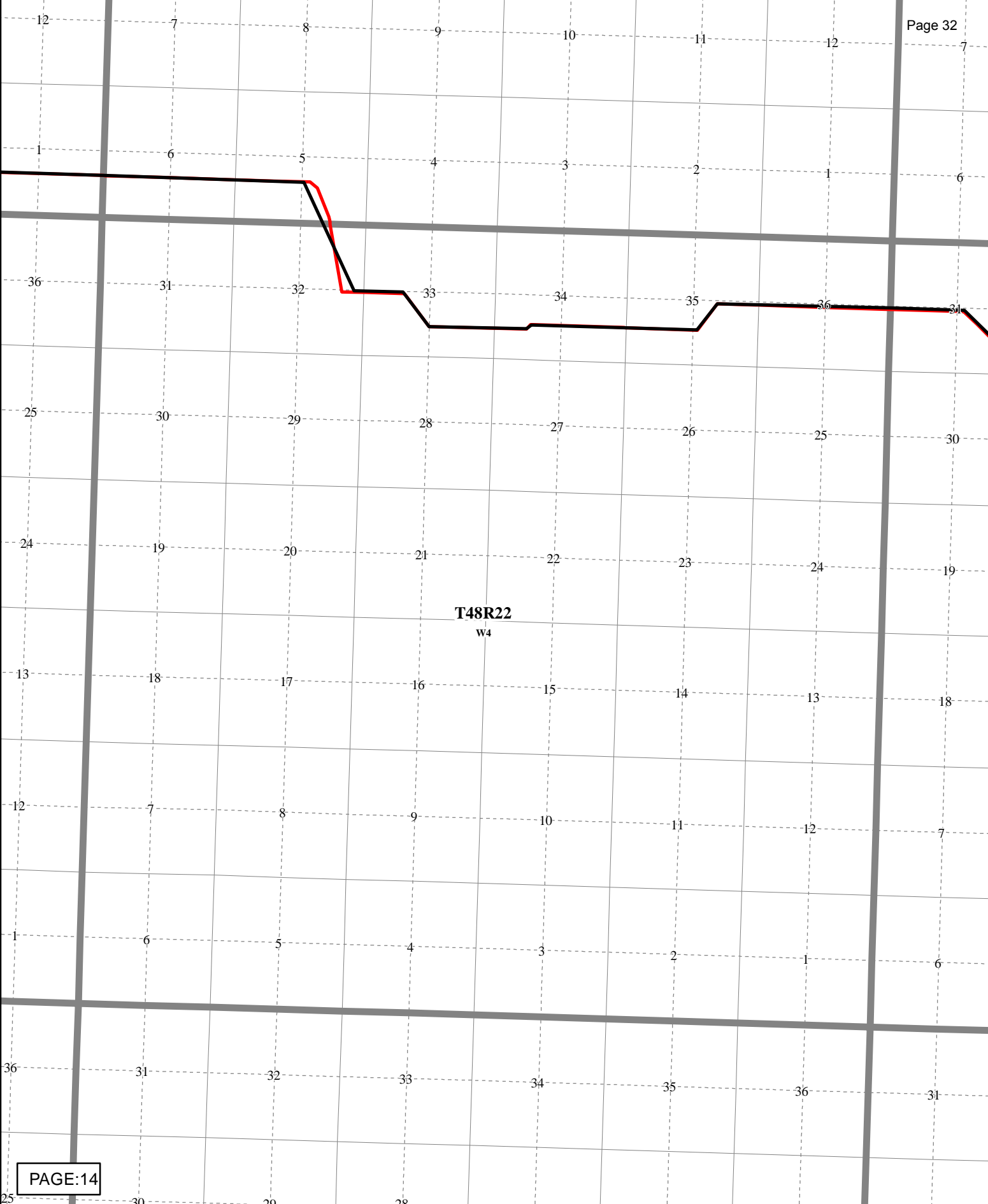
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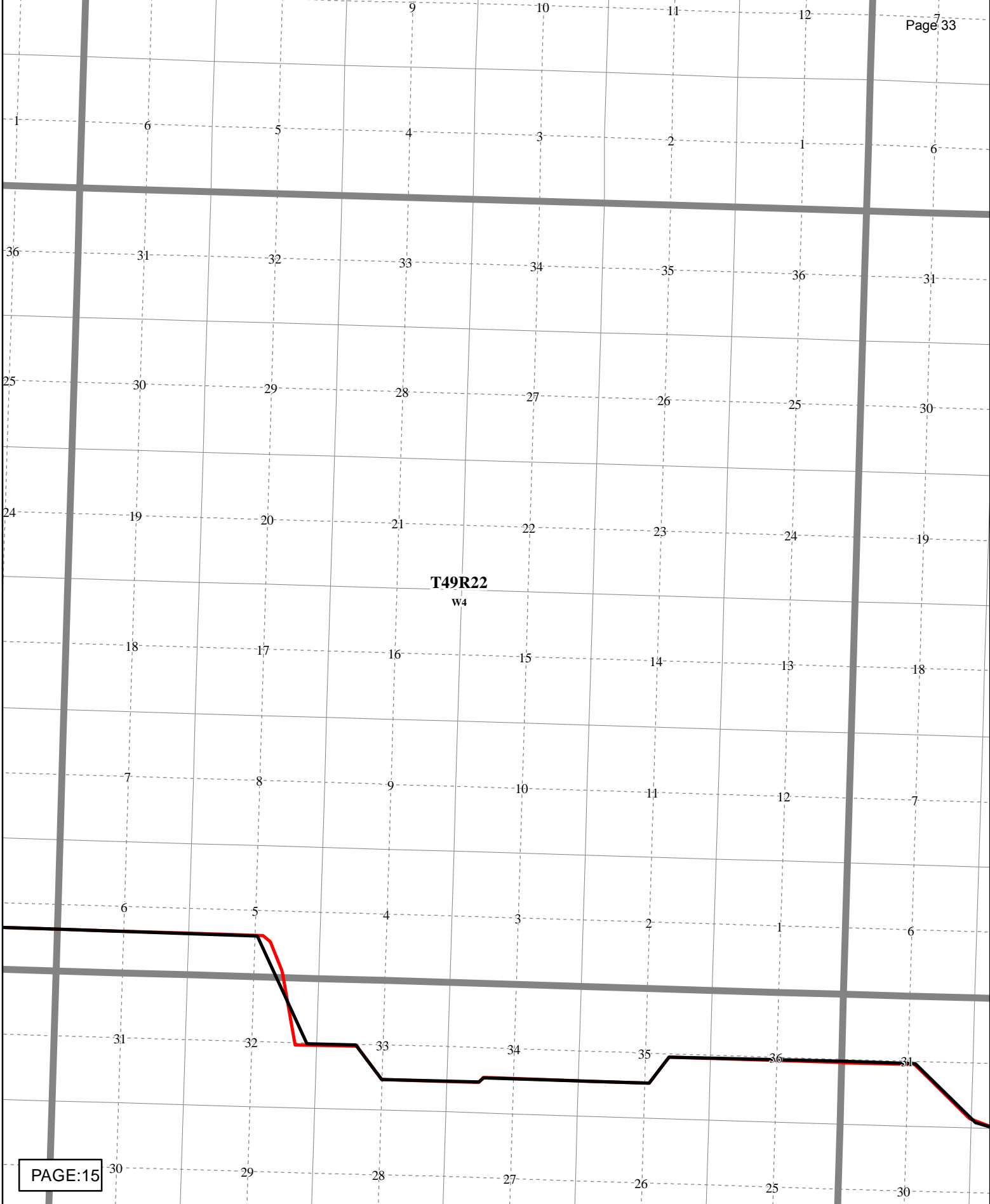
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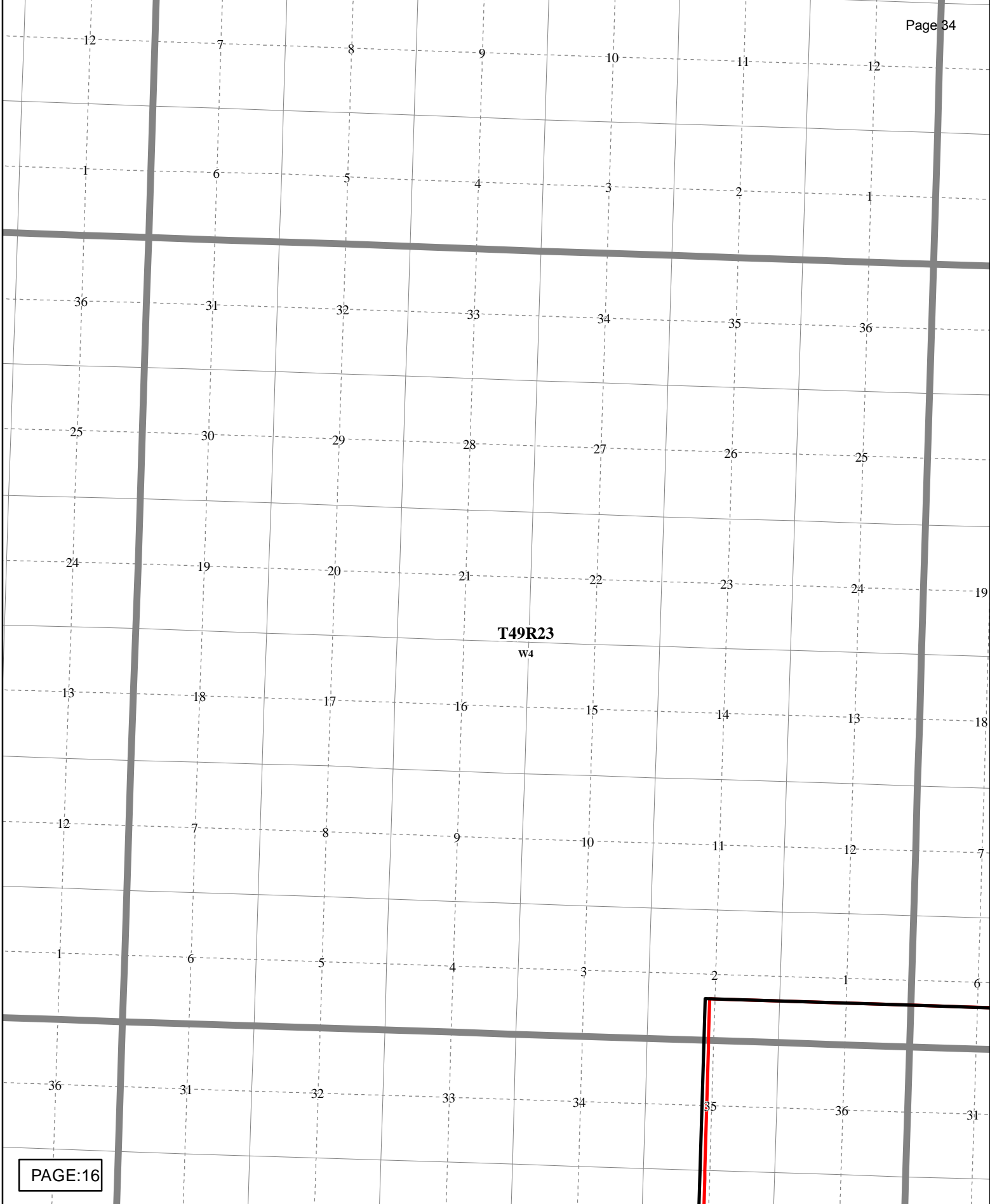
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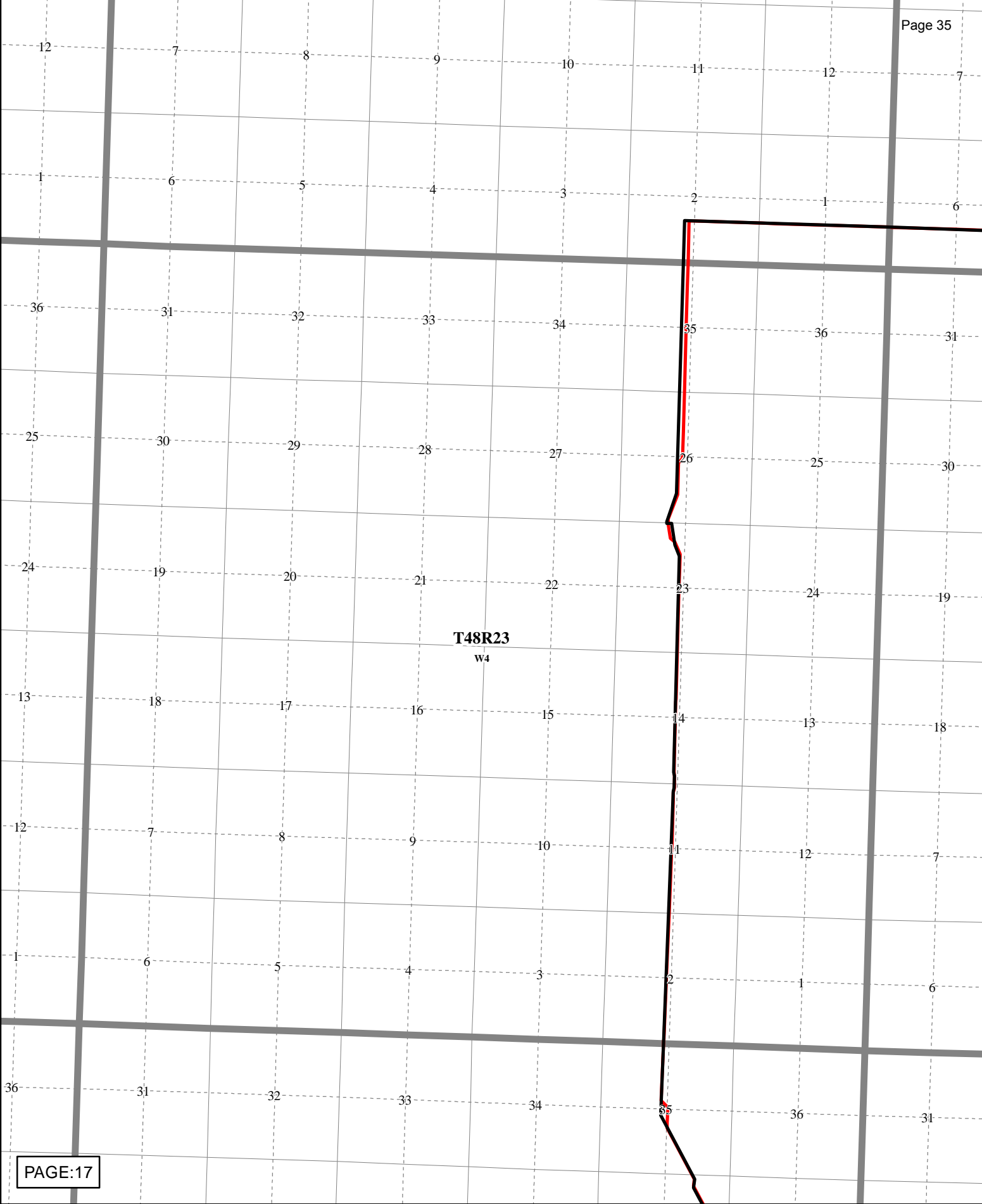
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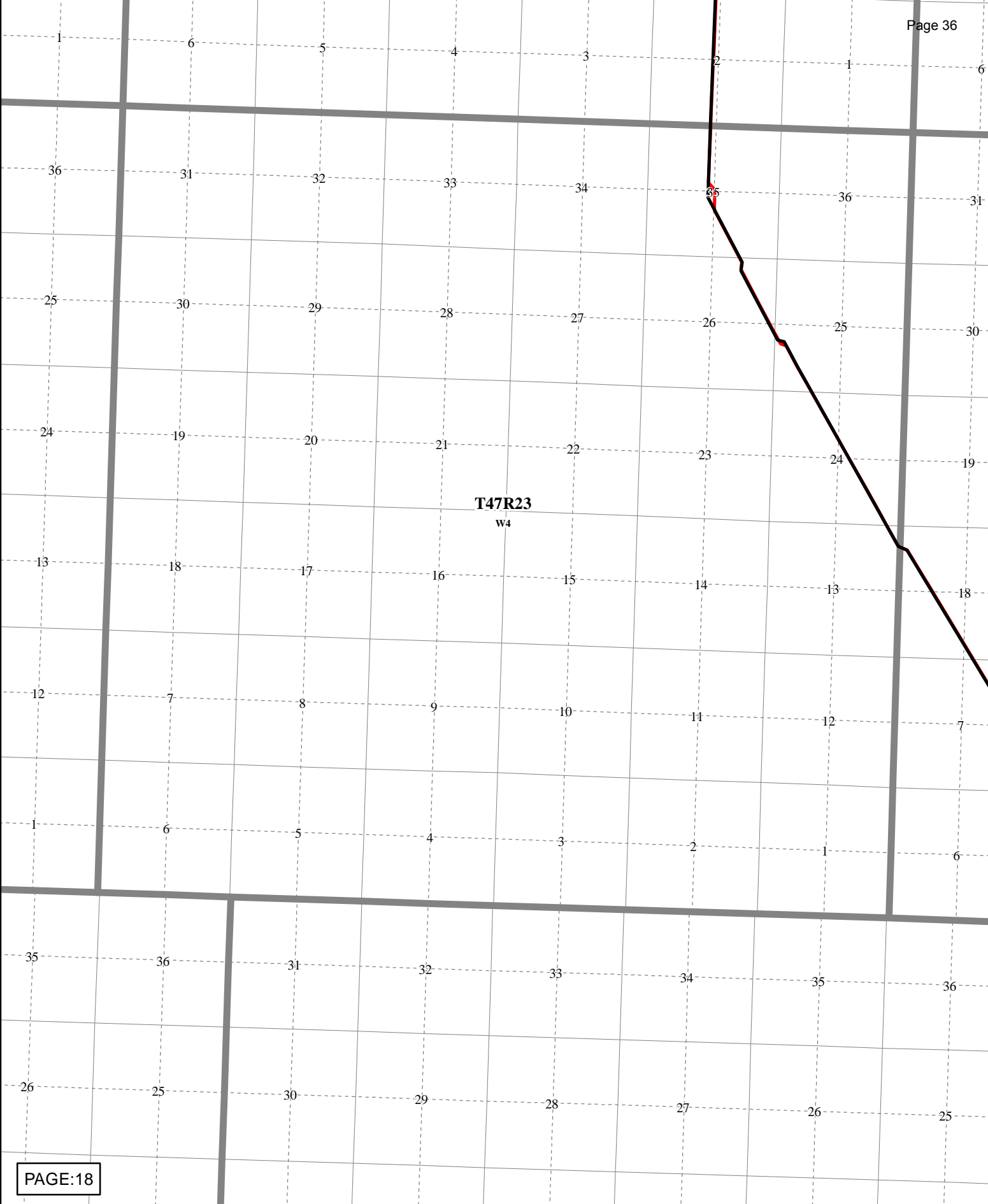
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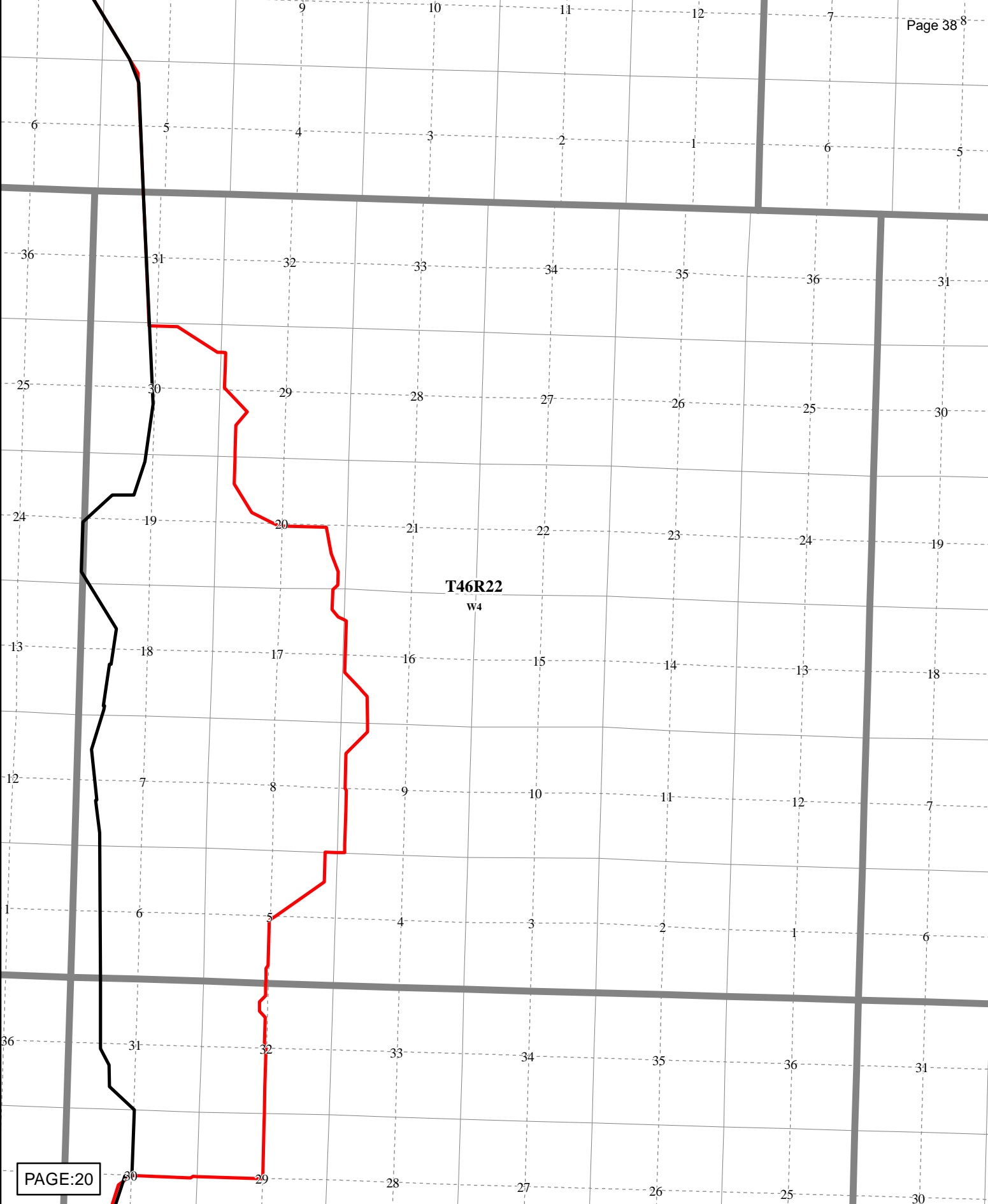
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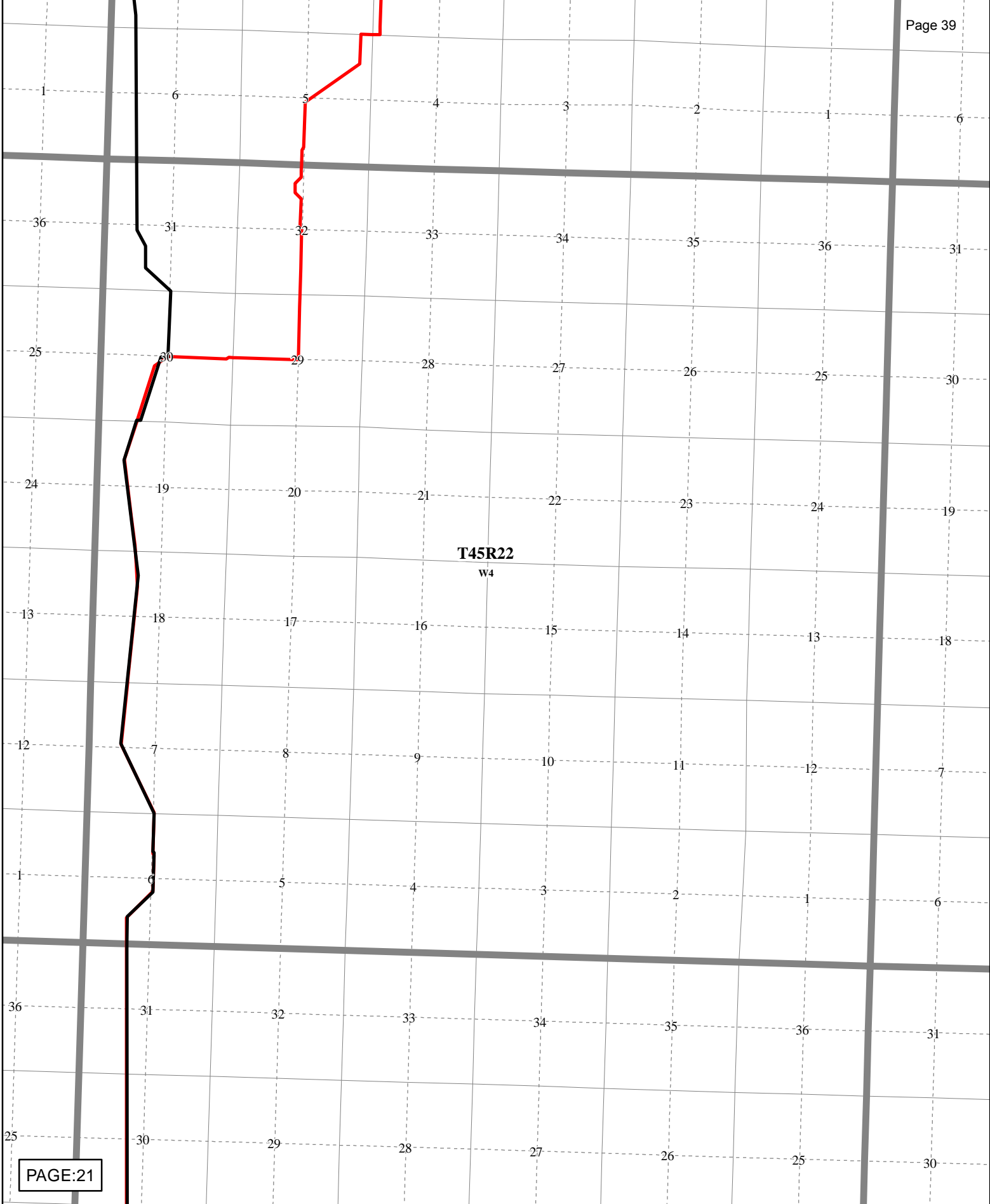
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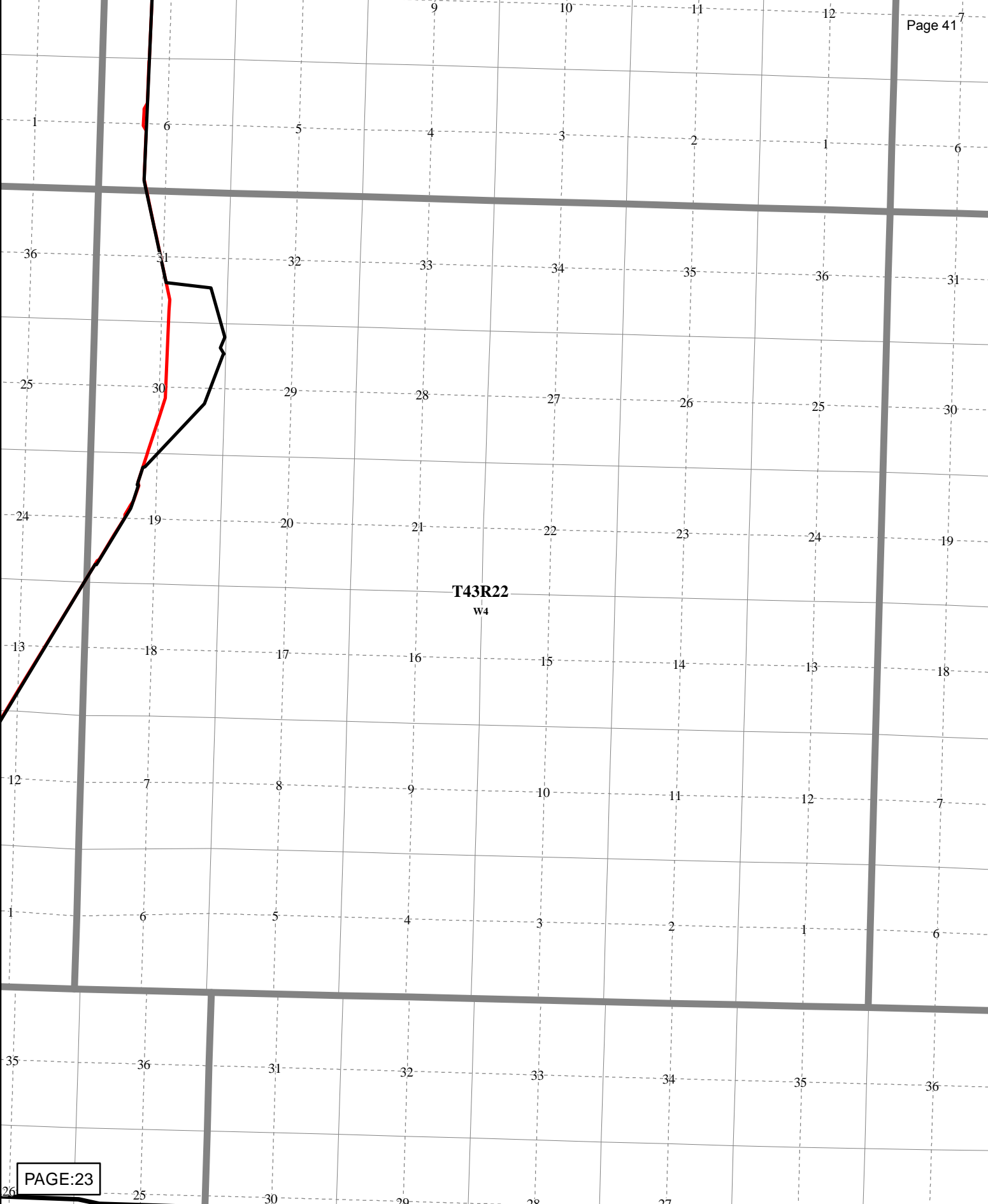
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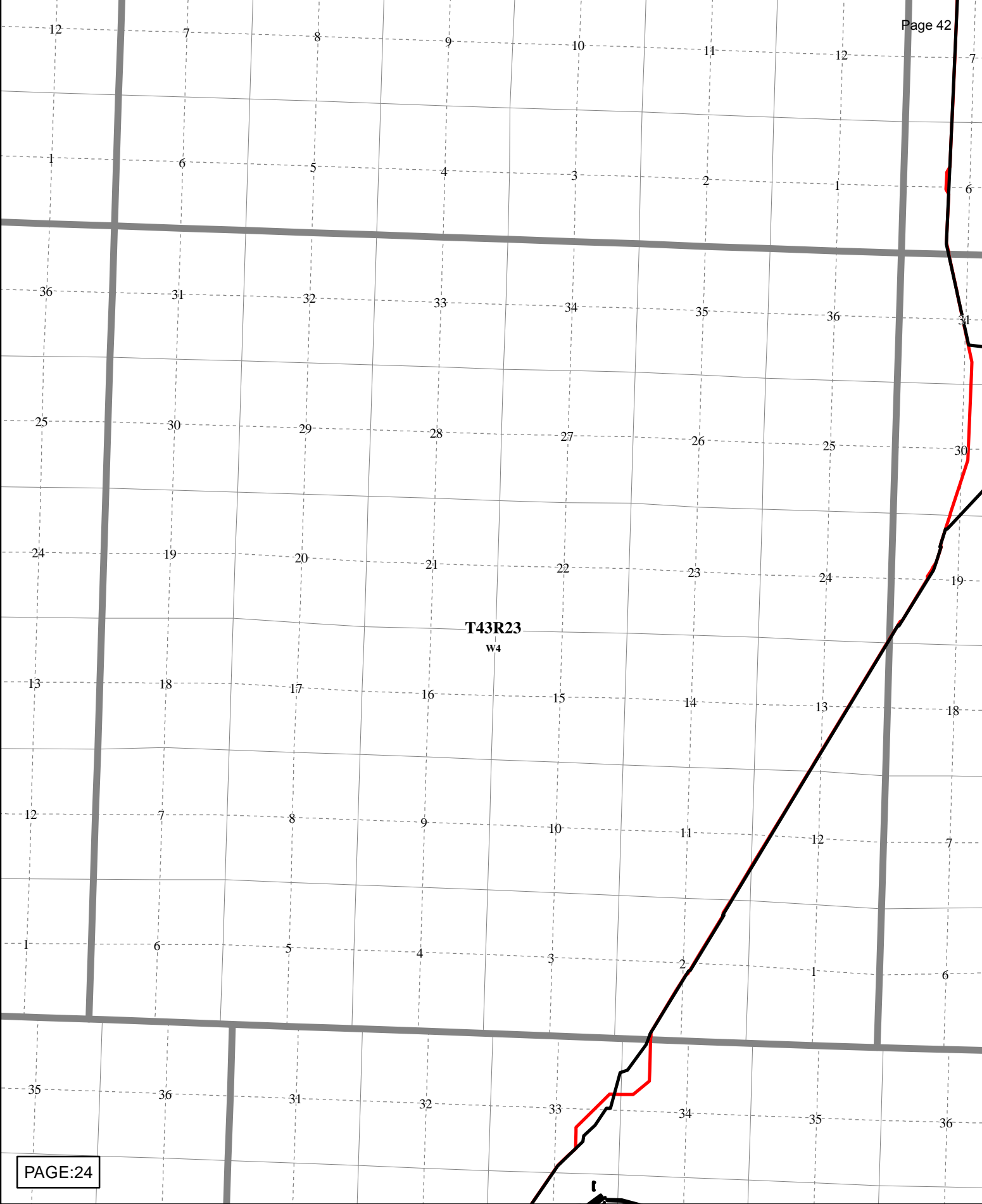
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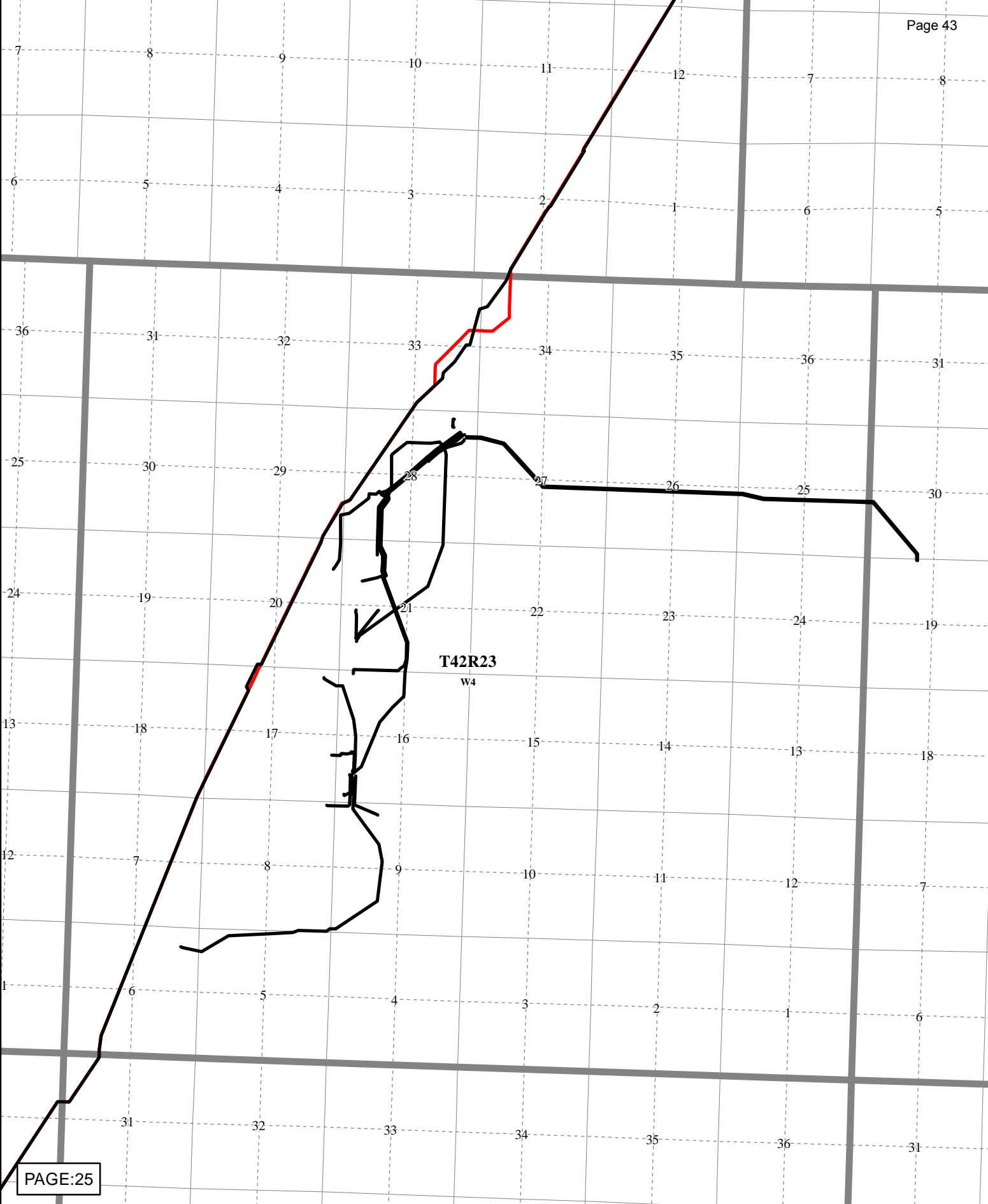
**Alberta Carbon Trunk Lines**

- Legend**
-  AER Pipeline Database
  -  Enhance 2014 Route

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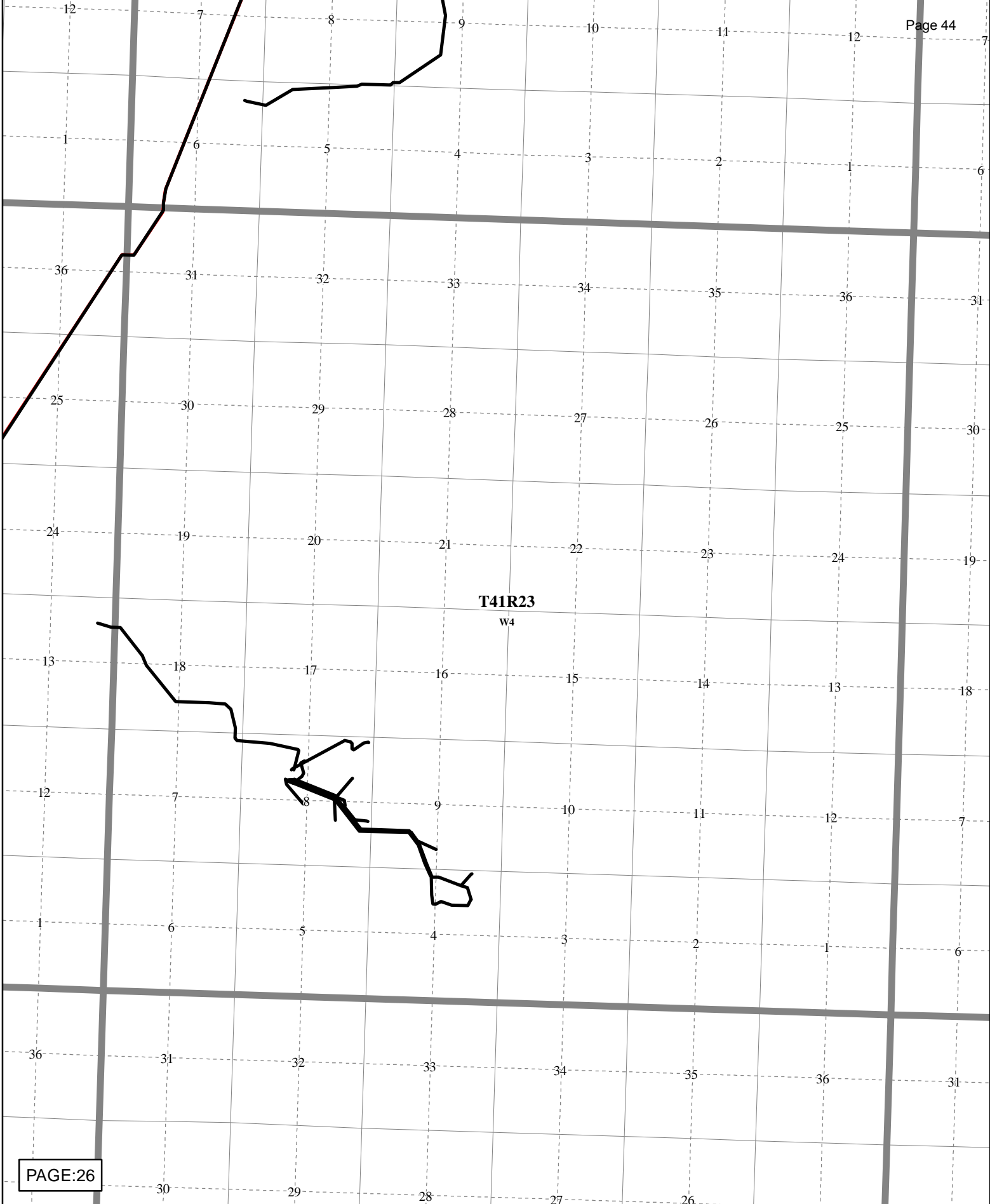
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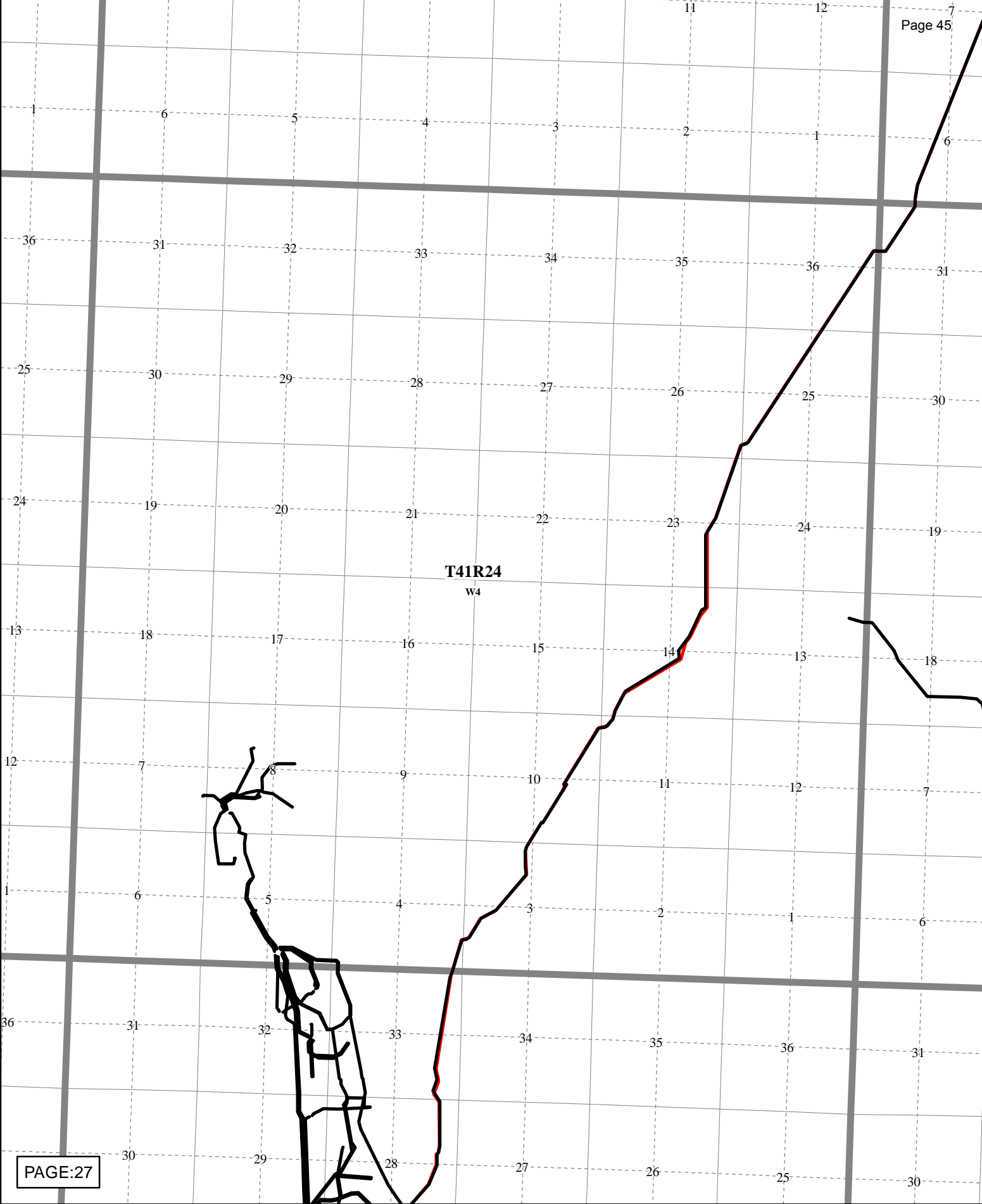
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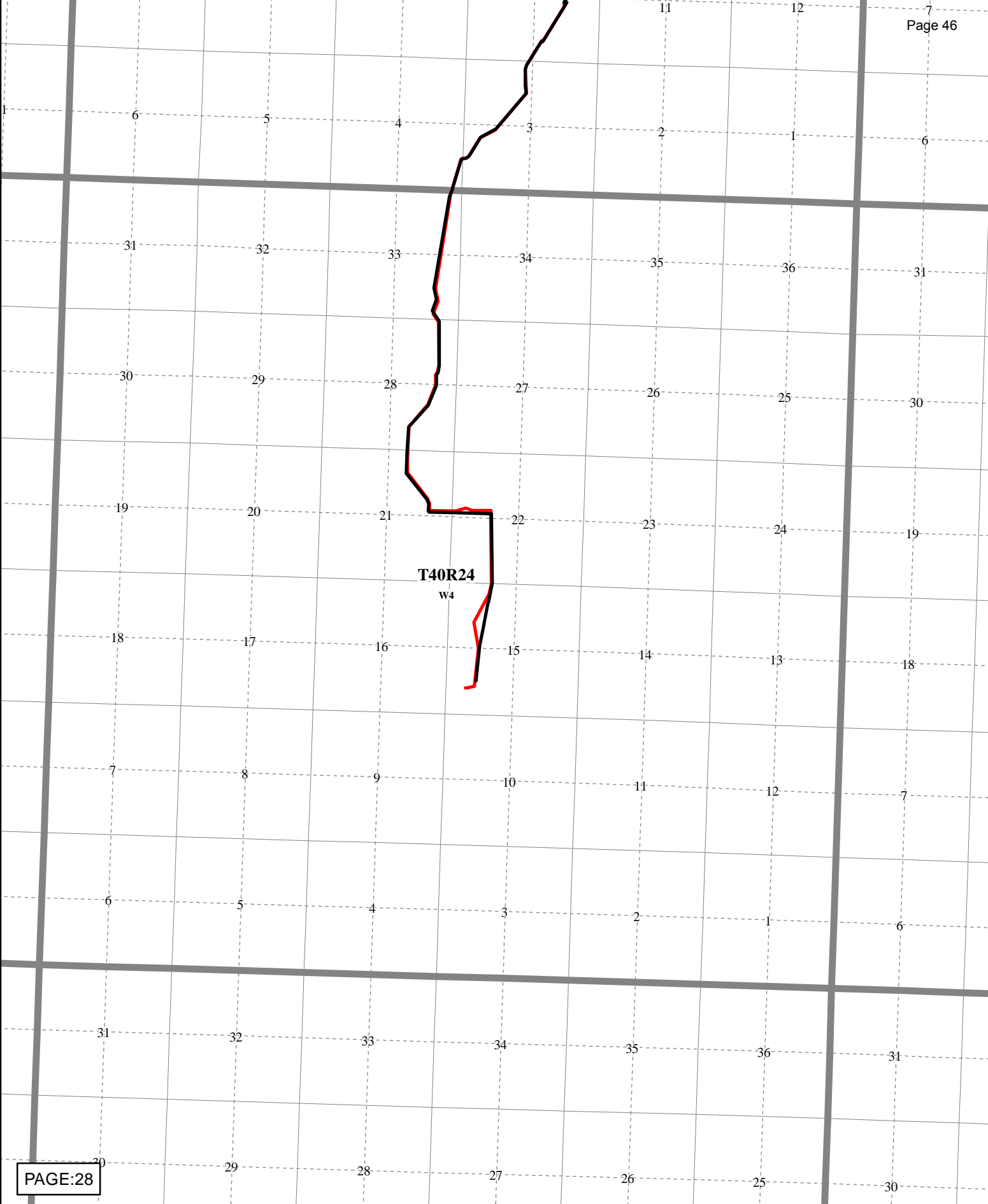
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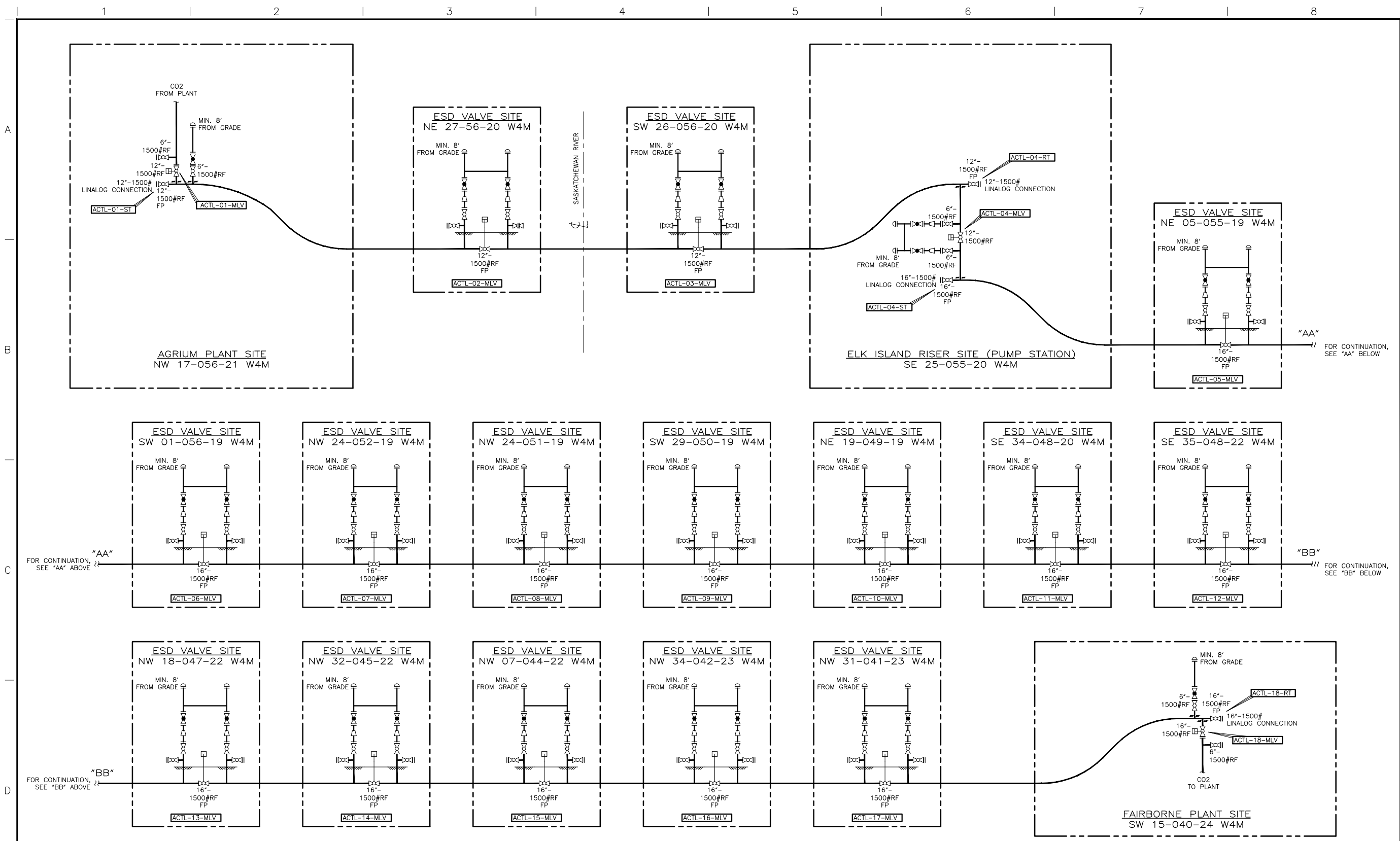
# Enhance Energy Inc. and North West Redwater Partnership

## APPENDIX viii ACTL Block Valve Schematic



*Green River, by Tom Milosz*





REFERENCE DRAWINGS	DWG. NO.	NO.	DATE	PROJECT DESCRIPTION	PROJ.	BY	APPD.	ISSUE STAGE	DATE	BY	CHKD.	APPD.
								A - ISSUED FOR REVIEW	11-02-11	RSN	SAW	

ENGINEER'S STAMP		<b>S.A.W. ENGINEERING LTD.</b> ENHANCE ENERGY INC. TITLE: CO2 TRUNKLINES SYSTEM SCHEMATIC AREA: ALBERTA	
PERMIT No. P10437 PROFESSIONAL STAMP AFFIXED ABOVE SHALL APPLY ONLY TO REV(S) 0			
SITE TYPE: CO2 TRUNKLINES MAIN L.S.D.: - SCALE: NONE EPCN No.: SAW-11-004		FILE NO.: 11-004-SCH-0001	