

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

Knowledge Sharing Report

Appendices i–viii

Calendar Year 2016

Submitted on March 31, 2017

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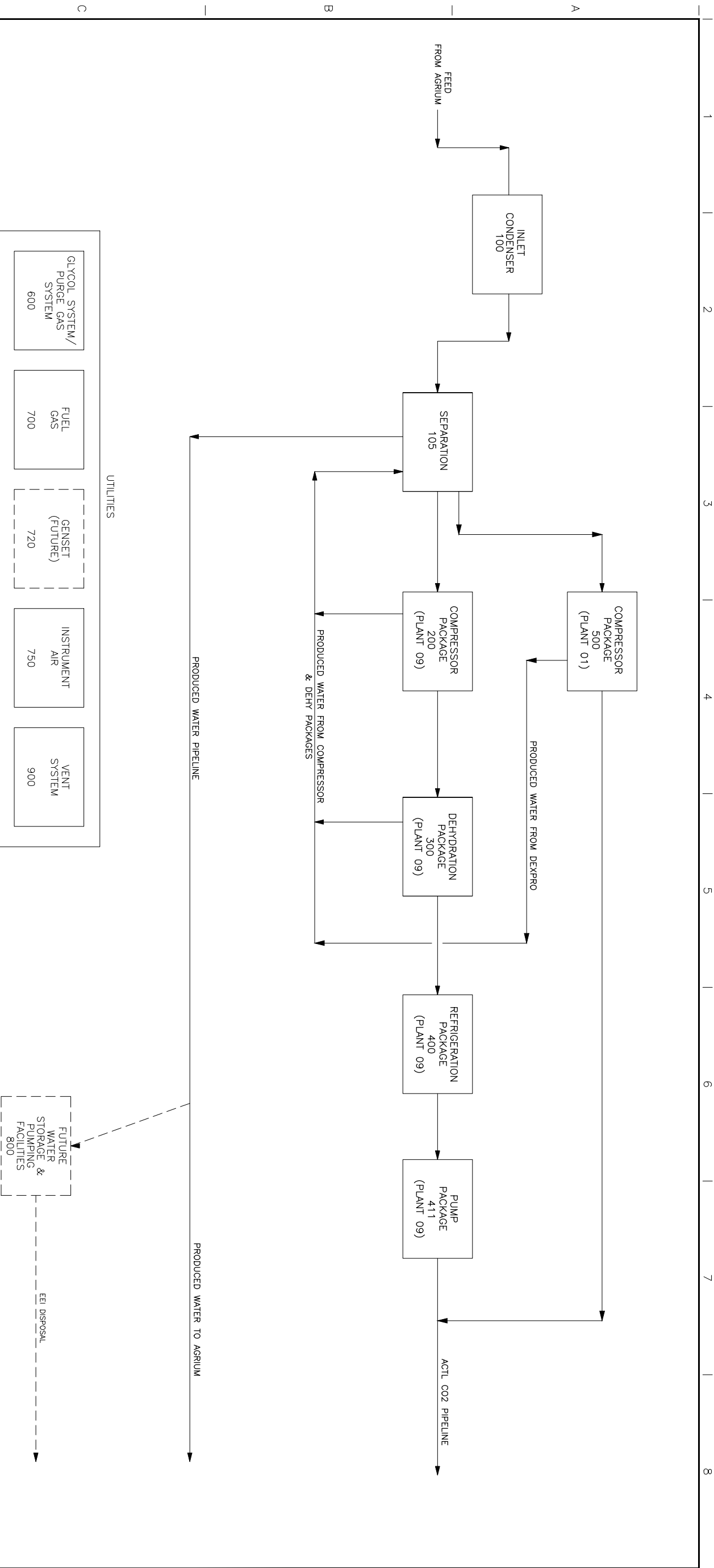
# Enhance Energy Inc. and North West Redwater Partnership

## APPENDIX i Agrium CRF Block Flow Diagram



*Green River, by Tom Milosz*





REF. NO.	DATE	DESCRIPTION	BY	APPD.	ISSUE STAGE	DATE	BY	CHKD.	APPD.
CD					A - ISSUED FOR REVIEW	14-06-18	CL	SW	TB
					B - RE-ISSUED FOR REVIEW	14-07-24	KH	SW	

NO.	DATE	PROJECT DESCRIPTION	PROJ.	BY	APPD.

REV. NUMBER	DATE	BY	CHKD.	APPD.

ENGINEER'S STAMP			
TITLE: UNIT 09 AGRUM CO2 BLOCK FLOW DIAGRAM AREA: STURGEON COUNTY		SITE: CO2 RECOVERY FACILITY DRAWING NO: 04-17-056-21 W4M SCALE: NONE REVISION: SAW 12-100	
PERMIT No. P10437 A		PROFESSIONAL STAMP AFFIXED ABOVE SHALL APPLY ONLY TO REV(S)	

# Enhance Energy Inc. and North West Redwater Partnership

## APPENDIX ii Agrium CRF Heat & Mass Balance

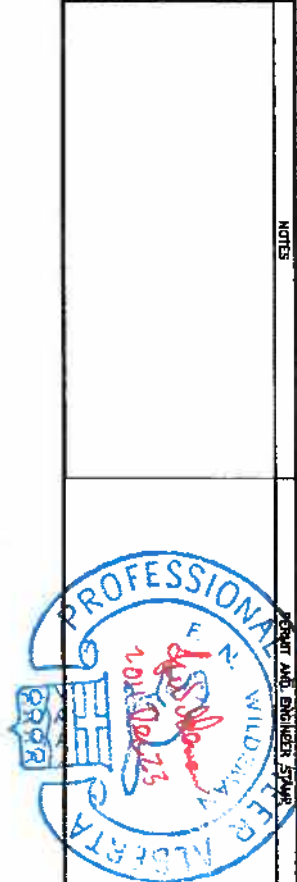



*Green River, by Tom Milosz*




PRO Stream Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	
FROM	Agrium	V-100	E-101/102	V-105	K-200 Stage 1	V-212	K-200 Stage 2	V-213	K-200 Stage 3	V-214	K-200 Stage 4	V-215	K-200 Stage 5	V-216	K-200 Stage 6	V-300	V-300	E-401	E-405	V-410	P-490	P-411	E-401	PV on CO2 Pipeline
TO	Enhance	E-101/102	V-105	K-200 Suc	E-221	K-200 Stage 2	E-222	K-200 Stage 3	E-223	K-200 Stage 4	E-224	K-200 Stage 5	E-225	K-200 Stage 6	E-226	V-300	E-401	E-405	V-410	P-490	P-411	E-401	PV on CO2 Pipeline	
Mass Flow CO2	990	800	800	805	805	805	805	805	805	805	805	805	805	805	805	800	800	800	798	798	789	789	789	789
Units	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day	mT/day
BULK PHASE																								
Vapor Mole Frae	1.0000	1.0000	0.4082	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	1.0000	0.0099	0.0000	0.0000	0.0000	
Temperature	98.1	95.0	43.0	42.8	96.8	43.0	97.0	43.0	97.0	43.0	87.3	43.0	97.7	43.0	98.5	43.0	46.3	8.8	-10.0	-10.0	3.78	3778	4123	18030
Pressure	48	36	34	34	130	127	300	287	804	801	1145	1142	2109	2105	3827	3825	3820	3783	3778	3788	4123	4123	18030	18020
Total Mole Flow	2008.1	2008.1	2008.1	824.8	824.8	801.3	801.3	801.3	801.3	801.3	780.0	775.8	775.8	773.5	773.5	33.988	33.988	33.988	33.988	33.988	33.988	33.988	33.988	33.988
Total Mass Flow	55,798	55,798	55,798	34,597	34,597	34,170	34,170	33,923	33,923	33,787	33,787	33,711	33,711	33,668	33,668	415.9	415.9	421.2	317.1	317.1	33.988	33.988	33.988	33.988
Volume Flow	42839.6	46817.8	16818.4	11227.7	11227.7	9418.4	8178.9	5188.8	3402.9	2853.5	1871.2	1553.8	1019.8	828.9	544.1	33.988	33.988	33.988	33.988	33.988	33.988	33.988	33.988	33.988
Total Heat Flow	6,735	6,735	-4,713	2,234	2,706	2,158	2,615	2,104	2,550	2,057	2,492	1,999	2,421	1,907	2,307	1,734	1,754	1,321	-1,104	-1,105	-1,098	-910	-478	-478
Units	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW	kW
<b>MOLE FRACTION VAPOR PHASE</b>																								
Vapor Carbon Dioxide	37.72	37.72	92.35	92.36	92.36	95.08	95.08	96.74	96.74	97.87	97.87	98.20	98.20	98.49	98.49	98.64	98.95	98.95	98.95	98.95	98.95	98.95	98.95	98.95
Vapor Nitrogen	0.29	0.11	0.28	0.28	0.28	0.29	0.29	0.29	0.29	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30	0.30
Vapor Water	81.88	61.88	6.67	6.68	6.98	3.81	3.81	2.24	2.24	1.30	1.30	0.76	0.76	0.47	0.47	0.31	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vapor Ethylene Glycol	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vapor Ammonia	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Vapor Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00
<b>LIQUID PHASE</b>																								
Liquid Mole Flow	1188.5	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Mass Flow	21,422	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Actual Volume Flow	21.6	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Std Volume Flow	21.4	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Mass Density	990.1	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Viscosity	0.6184	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Specific Heat	4.2212	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Thermal Conductivity	0.6303	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Surface Tension	69.08	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
<b>MOLE FRACTION LIQUID PHASE</b>																								
Liquid Carbon Dioxide	0.04	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Nitrogen	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Water	99.96	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Ethylene Glycol	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Triethylene Glycol	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Ammonia	0.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	
Liquid Total	100.00	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	

NUMBER	REFERENCE DRAWINGS	TITLE	NO.	ISSUE	DATE	BY	CHK'D	ENG	APP'D	NOTES
0	ISSUED FOR CONSTRUCTION				2011 DEC 23	J5				





CONSULTANTS LOGO



**ENHANCE**  
LABOR INC.

LSD: 04-17-056-21 WAM  
CO2 RECOVERY FACILITY #1  
HEAT AND MASS BALANCE  
SHEET 1 OF 3

REV.	NO.	DESCRIPTION
0		



PROD Stream Number	113	118	117	131	132	133	134	135	138	137	138	139	140	141	142	143	144	148	150	151	153	
FROM	AC-410/441	EG Supply	K-400	EG Supply	E-101/102	EG Return	E-221	EG Return	E-222	EG Supply	E-223	EG Supply	E-224	EG Supply	E-225	EG Supply	E-226	Delv Coolers	EG Return	EG Return	EG Return	
TO	V-445	K-400	EG Return	E-101/102	EG Return	E-221	EG Return	E-222	EG Return	E-223	EG Return	E-224	EG Return	E-225	EG Return	E-226	Delv Coolers	EG Return	EG Return	EG Return	EG Return	
Mass Flow CO2		0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
BULK PHASE																						
Vapor Mole Frac	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	0.0000	
Temperature	38.0	38.0	43.8	38.0	75.0	38.0	48.0	38.0	45.0	38.0	45.0	38.0	45.0	38.0	45.0	38.0	45.0	38.0	80.0	80.0	80.0	
Pressure	1374	431	378	431	425	431	339	431	376	431	325	431	346	431	352	431	388	431	411	411	411	
Total Mole Flow	474.3	3304.6	3304.6	13383.9	13383.9	3075.2	3075.2	2921.7	2921.7	2582.9	2582.9	2439.6	2439.6	2454.7	2454.7	2682.0	2682.0	148.6	148.6	40.8	5.1	
Total Mass Flow	8.078	97.653	97.653	395.506	395.506	90.875	90.875	86.336	86.336	80.7	80.7	72.092	72.092	72.538	72.538	79.257	79.257	4.390	4.390	1.206	152	
Volume Flow	13.7	80.8	80.8	387.7	377.9	85.7	85.7	80.3	80.3	80.7	81.4	68.0	67.4	67.4	68.4	74.7	74.7	4.1	4.1	1.1	0.1	
Total Heat Flow	-1.296	-34.081	-33.488	-137.951	-122.502	-31.697	-30.931	-30.114	-28.478	-28.823	-25.145	-24.614	-25.301	-24.785	-27.844	-27.059	-1.531	-1.430	-393	-49		
VAPOUR PHASE																						
Vapor Mole Flow																						
Vapor Mass Flow																						
Vapor Actual Volume Flow																						
Vapor Std. Volume Flow																						
Vapor Molecular Weight																						
Vapor Mass Density																						
Vapor Viscosity																						
Vapor Specific Heat																						
Vap Thermal Conductivity																						
Vapor Z Factor																						
Vapor Cp / Cv																						
MOLE FRACTION VAPOUR PHASE																						
Vap Carbon Dioxide																						
Vap Hydrogen																						
Vap Nitrogen																						
Vap Water																						
Vap Ethylene Glycol																						
Vap Ammonia																						
Vapor Total																						
LIQUID PHASE																						
Liquid Mole Flow	474.3	3304.6	3304.6	13383.9	13383.9	3075.2	3075.2	2921.7	2921.7	2582.9	2582.9	2439.6	2439.6	2454.7	2454.7	2682.0	2682.0	148.6	148.6	40.8	5.1	
Liquid Mass Flow	8.078	97.653	97.653	395.506	395.506	90.875	90.875	86.336	86.336	80.7	80.7	72.092	72.092	72.538	72.538	79.257	79.257	4.390	4.390	1.206	152	
Liquid Actual Volume Flow	13.7	80.8	80.8	387.7	377.9	85.7	85.7	80.3	80.3	80.7	81.4	68.0	67.4	67.4	68.4	74.7	74.7	4.1	4.1	1.1	0.1	
Liquid Std Volume Flow	13.1	82.1	82.1	372.9	372.9	85.7	85.7	81.4	81.4	81.4	81.4	68.0	68.0	68.4	68.4	74.7	74.7	4.1	4.1	1.1	0.1	
Liquid Mass Density	587.9	1,075.5	1,075.5	1,075.5	1,046.9	1,075.5	1,089.7	1,075.5	1,075.5	1,075.5	1,075.5	1,070.4	1,075.5	1,070.4	1,075.5	1,075.5	1,070.4	1,075.5	1,059.0	1,059.0	1,059.0	
Liquid Specific Heat	0.1161	4.3719	3.7699	4.3719	1.8898	4.3719	3.5419	4.3719	3.6328	4.3719	3.6327	4.3719	3.6327	4.3719	3.6328	4.3719	3.6328	4.3719	2.5499	2.5499	2.5499	
Thermal Conductivity	5.2266	3.6980	3.7014	3.6980	3.7443	3.6980	3.7034	3.6980	3.7025	3.6980	3.7025	3.7025	3.6980	3.7025	3.6980	3.7025	3.6980	3.7025	3.7190	3.7190	3.7190	
Surface Tension	0.4499	0.3630	0.3661	0.3630	0.3608	0.3630	0.3675	0.3630	0.3669	0.3630	0.3669	0.3630	0.3669	0.3630	0.3669	0.3630	0.3669	0.3630	0.3745	0.3745	0.3745	
Surface Tension	16.87	64.07	63.15	64.07	67.73	64.07	62.74	64.07	62.91	64.07	62.91	64.07	62.91	64.07	62.91	64.07	62.91	64.07	60.37	60.37	60.37	
MOLE FRACTION LIQUID PHASE																						
Liquid Carbon Dioxide																						
Liquid Hydrogen																						
Liquid Nitrogen																						
Liquid Water																						
Liquid Ethylene Glycol																						
Liqo Triethylene Glycol																						
Liquid Ammonia																						
Liquid Total	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	100.00	

NUMBER	REVISIONS	DATE	BY	CHK'D	ENG	APP'D
0	ISSUED FOR CONSTRUCTION	2011 DEC 23	JG			

PROFESSIONAL ENGINEERING  
2014 DEC 23



CONSULTANTS LOGO



DRAWING NO. A1-ET1-82205-021

REV. 0

**ENHANCE**  
SHEET INC.

LSD: 04-17-056-21 WAM  
CO2 RECOVERY FACILITY #1  
HEAT AND MASS BALANCE  
SHEET 3 OF 3



# Enhance Energy Inc. and North West Redwater Partnership

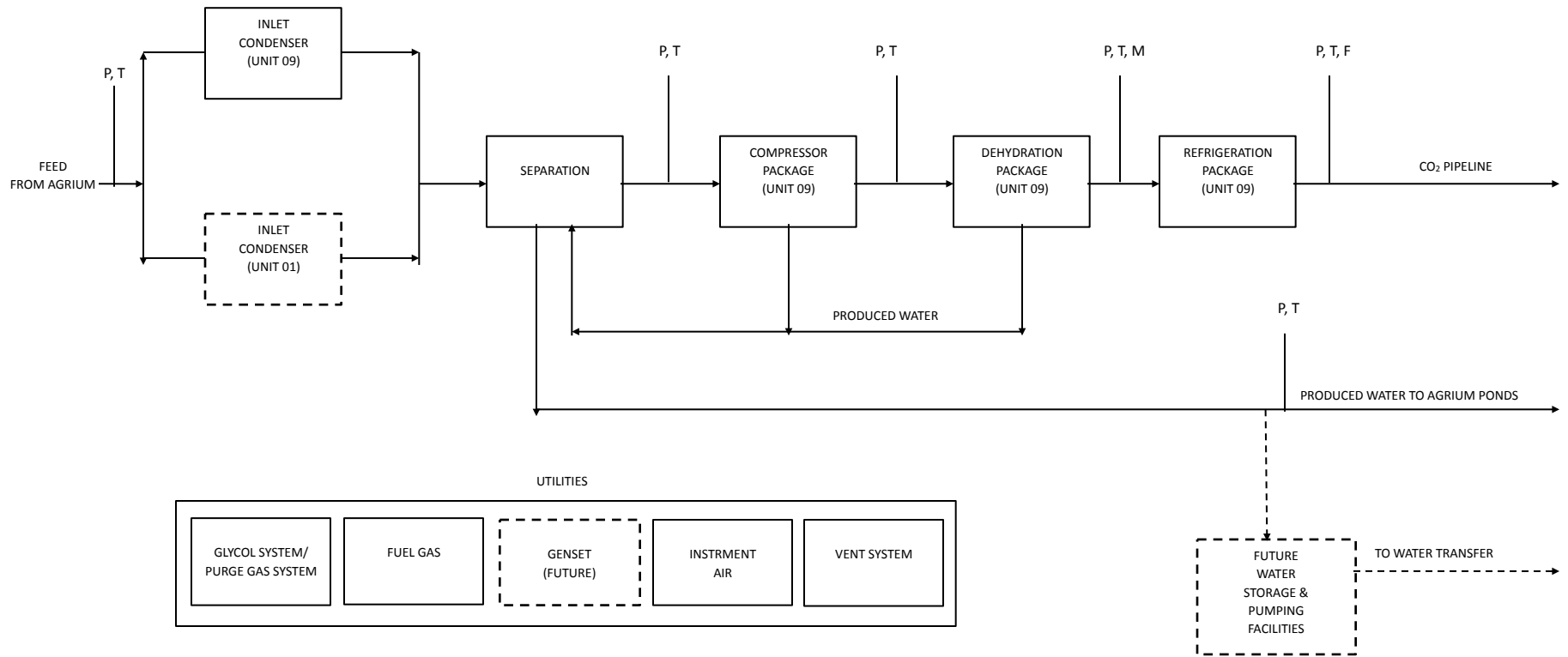
## APPENDIX iii Agrium CRF Measurement Point Block Diagram



*Green River, by Tom Milosz*



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



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

# Enhance Energy Inc. and North West Redwater Partnership

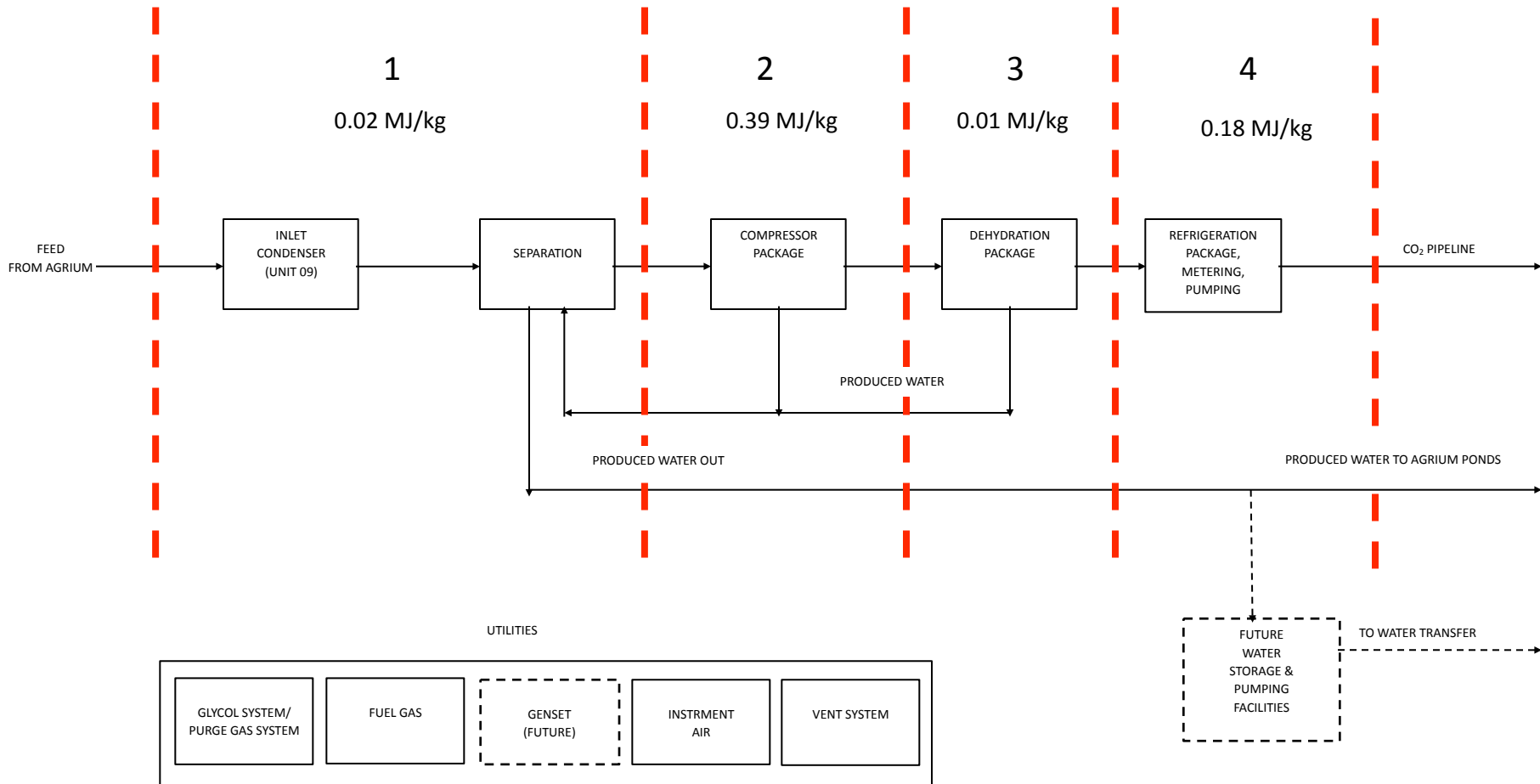
## APPENDIX iv Agrium CRF Energy Boundary Block Diagram



*Green River, by Tom Milosz*



### 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

# Enhance Energy Inc. and North West Redwater Partnership

## APPENDIX v Agrium CRF Produced Water Analysis Report



*Green River, by Tom Milosz*





**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 All Canada  
 Sample Marked: T-903 Overhead Condensate  
 SAP Sold To 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 (PO <sub>4</sub> )	<31.0	<29.7 mg/L
Potassium (K)	<7.1	6.9 mg/L.
Silica (SiO <sub>2</sub> )	<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 (CaCO <sub>3</sub> )	<2.5	<2.4 mg/l.
Magnesium (CaCO <sub>3</sub> )	<16.7	<16.0 mg/L
Sodium (CaCO <sub>3</sub> )	<4.4	<4.2 mg/L
Calculated Hardness (CaCO <sub>3</sub> )	NR*	NR*

#### Anions

Bromide (Br)	<10.0 mg/l.
Chloride (Cl)	11 mg/L
Nitrate (NO <sub>3</sub> )	<10.0 mg/L
Nitrite (NO <sub>2</sub> )	<10.0 mg/L
Sulfate (SO <sub>4</sub> )	<10.0 mg/L
Chloride (CaCO <sub>3</sub> )	15 mg/L
Nitrate (CaCO <sub>3</sub> )	<8.1 mg/L
Sulfate (CaCO <sub>3</sub> )	<10.0 mg/L

Authorized by : David R. Szymborski





**Nalco Analytical Resources**  
 1601 West Diehl Road, Naperville, Illinois 60563-1198  
 Phone: (630) 305-2315, Fax: (630) 305-2946, Analytical.Lab.Naperville@Nalco.com



Agrium Redwater	Sample Number:	NW0702633
Redwater AB Canada	Date Sampled:	16-Jan-2007
Sample Marked: T-903 Overhead Condensate	Date Received:	15-Feb-2007
SAP Sold To Number: 0001000024	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

Authorized by : David R. Szymborski



# Enhance Energy Inc. and North West Redwater Partnership

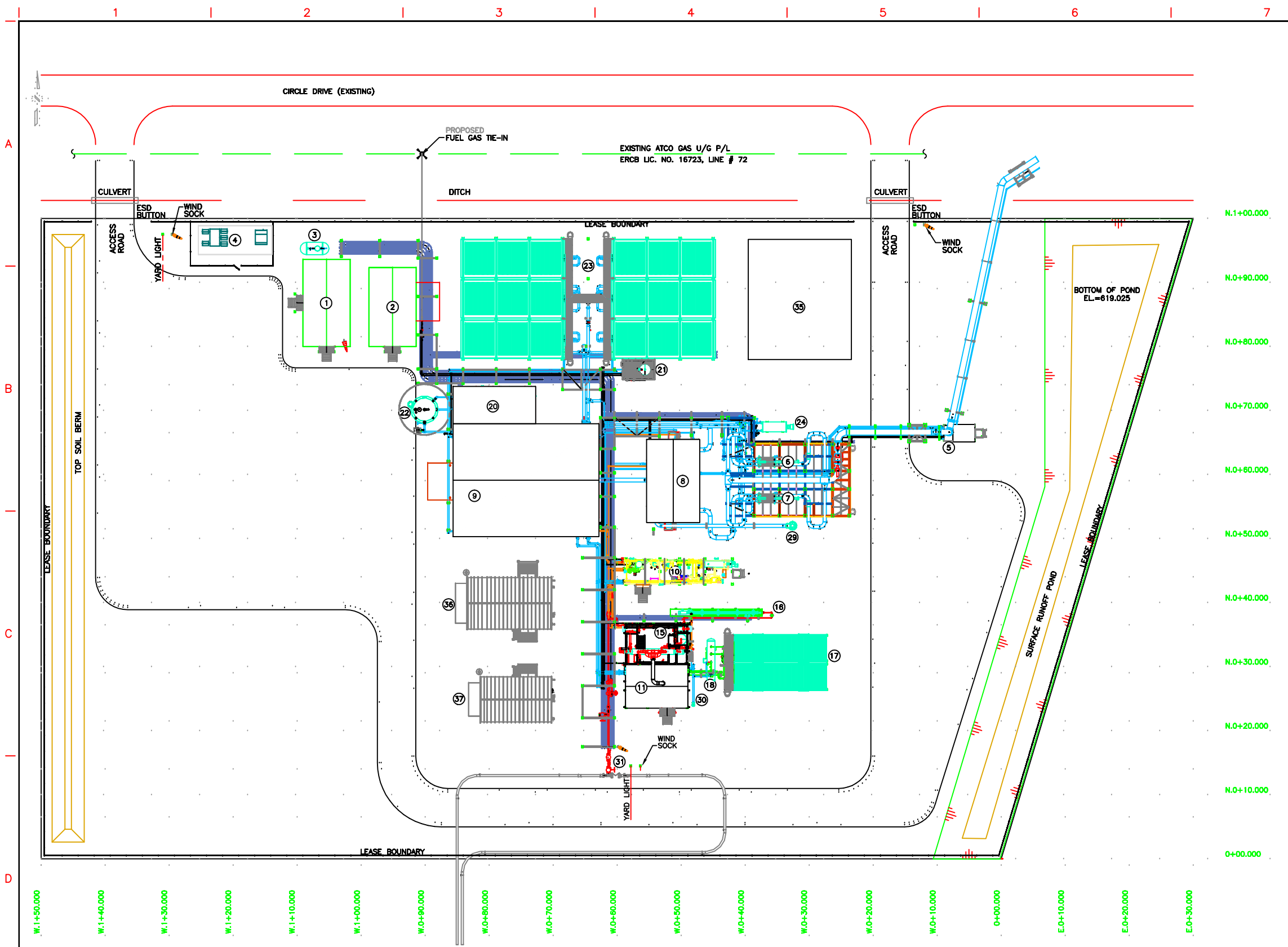
## APPENDIX vi Agrium CRF Plot Plan



*Green River, by Tom Milosz*







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
8	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

REFERENCE DRAWINGS	DWG. NO.	NO.	DATE	PROJECT DESCRIPTION	PROJ.	BY	APPD.	ISSUE STAGE	DATE	BY	CHKD.	APPD.
								A - TRANSFER FROM CABER DWG A1-EF1-62215-099A	12-12-18	CL	RSN	
								B - ISSUED FOR REVIEW	12-12-18	CL	RSN	
								C - ISSUED FOR BID	13-10-08	SW	RSN	
								D - ISSUED FOR CONSTRUCTION BID	14-03-31	KH	SW	

ENGINEER'S STAMP

**S.A.W. ENGINEERING LTD.**

ENHANCE ENERGY INC.

PERMIT No. P10437

PROFESSIONAL STAMP AFFIXED ABOVE SHALL APPLY ONLY TO REV(S)

SITE TYPE: CO2 RECOVERY FACILITY

MAN. LSD: 04-17-056-21 W4M

SCALE: 1:300

REVISION: SAW 12-100

TITLE: CO2 RECOVERY FACILITY #1 PLOT PLAN

AREA: STURGEON COUNTY

FILE NO.: 12-100-P-I-0001

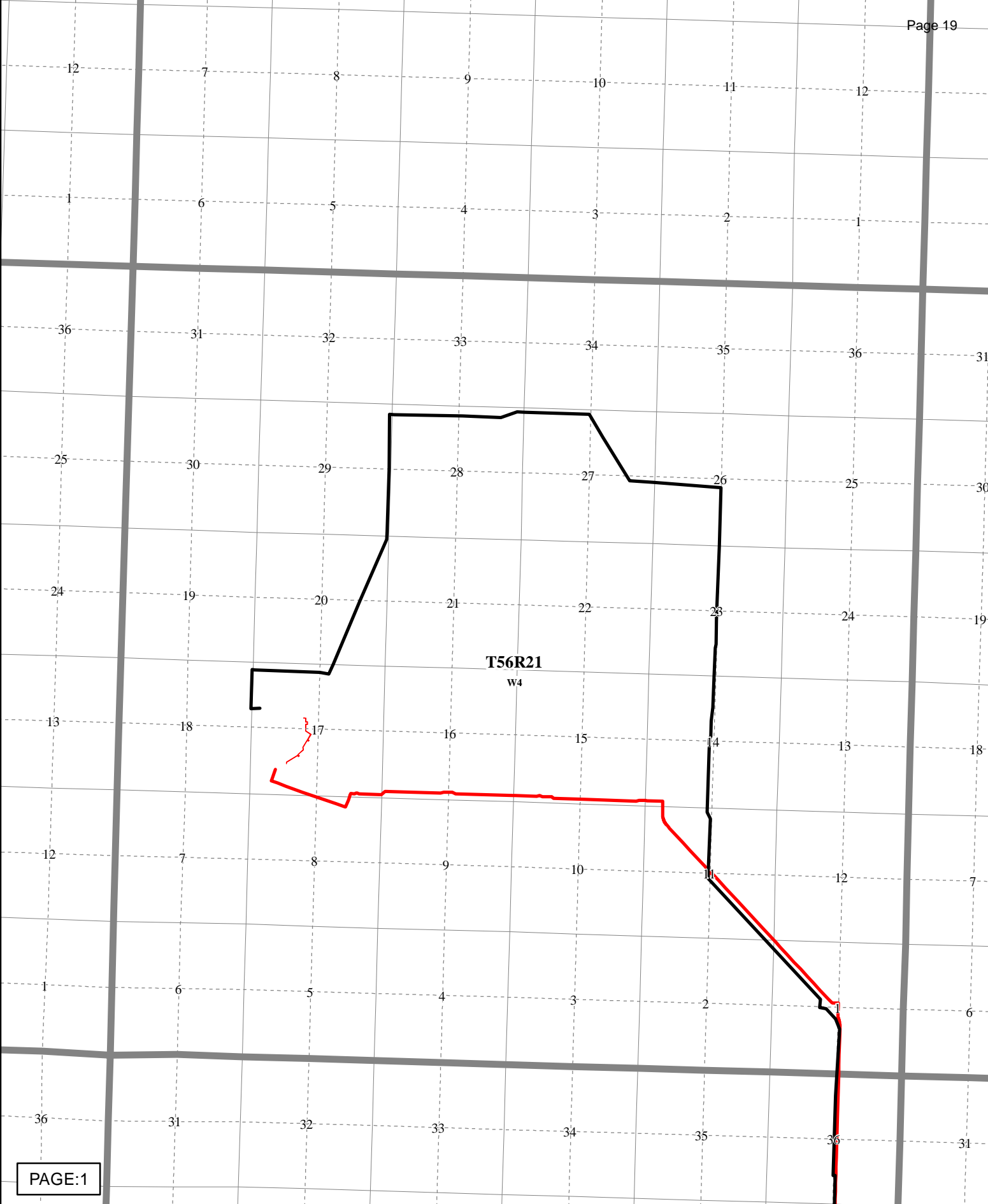
# Enhance Energy Inc. and North West Redwater Partnership

## APPENDIX vii AER ACTL Base Maps



*Green River, by Tom Milosz*





T56R21  
w4

PAGE:1



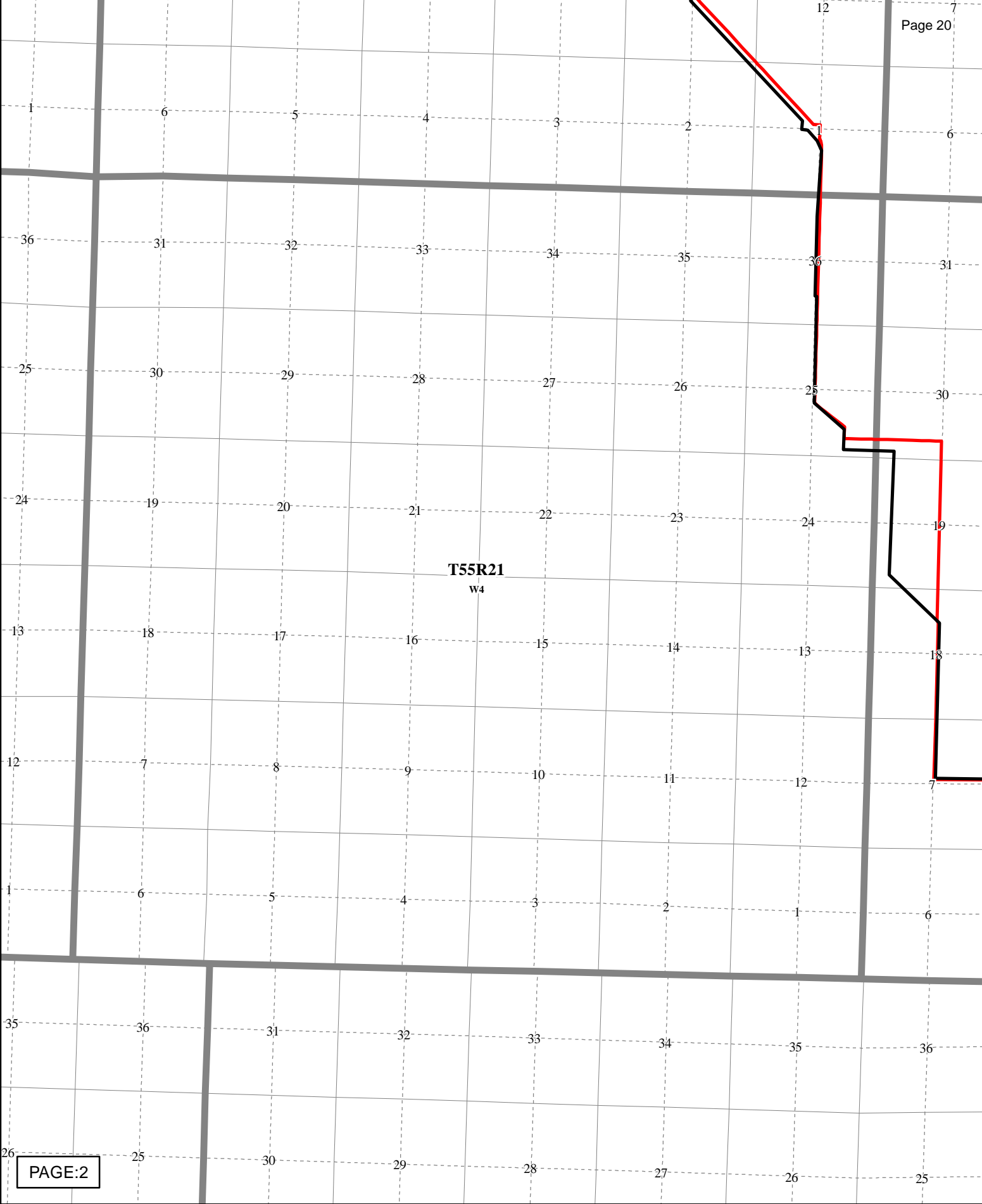
### Alberta Carbon Trunk Lines

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

Sunstone Projects Ltd.  
 Suite 2000-555 4<sup>th</sup> Ave SW  
 Calgary, Alberta T2P 3E7  
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 Web : www.sunstone.ab.ca

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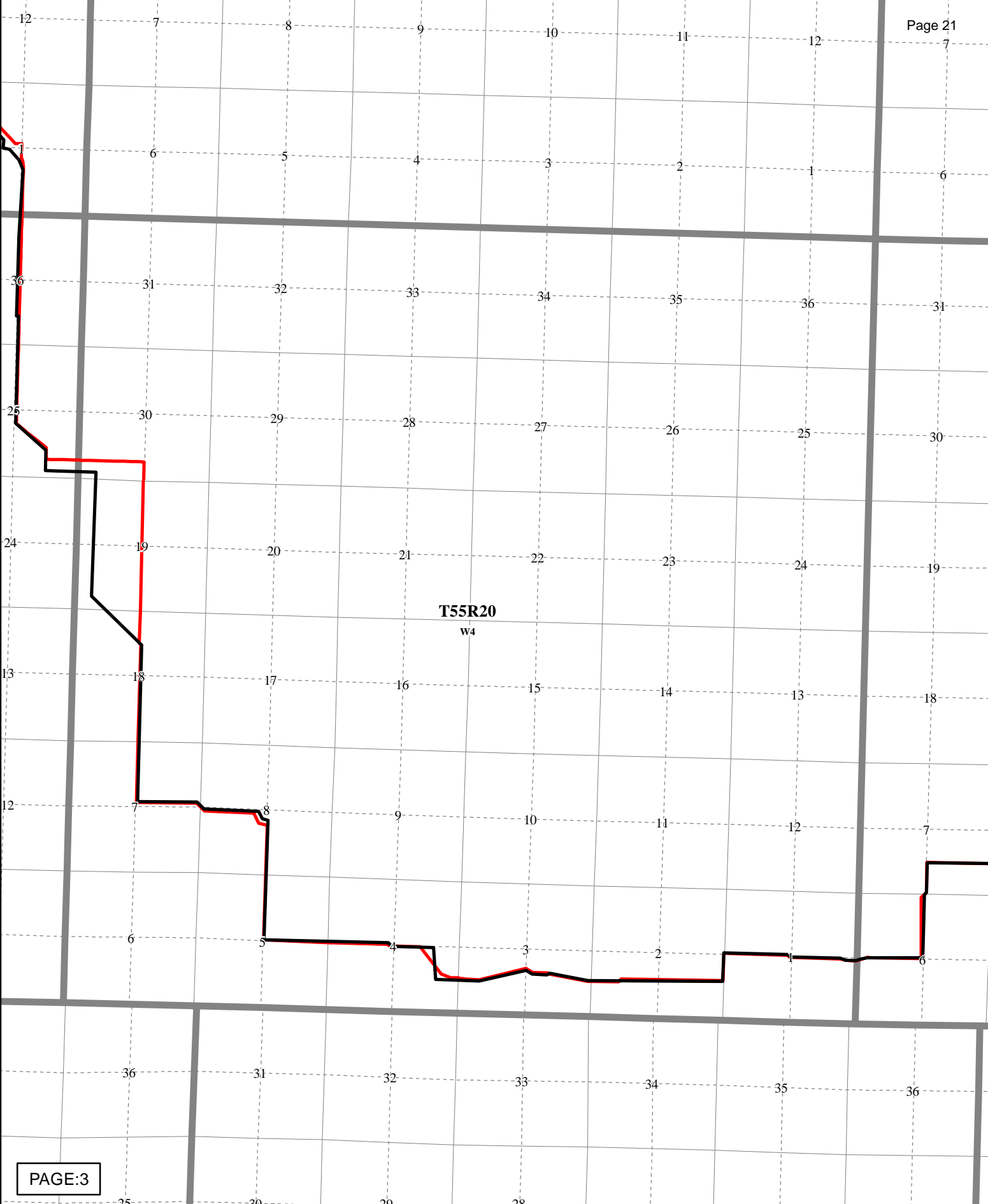
### Alberta Carbon Trunk Lines

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

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 Suite 2000-555 4<sup>th</sup> Ave SW  
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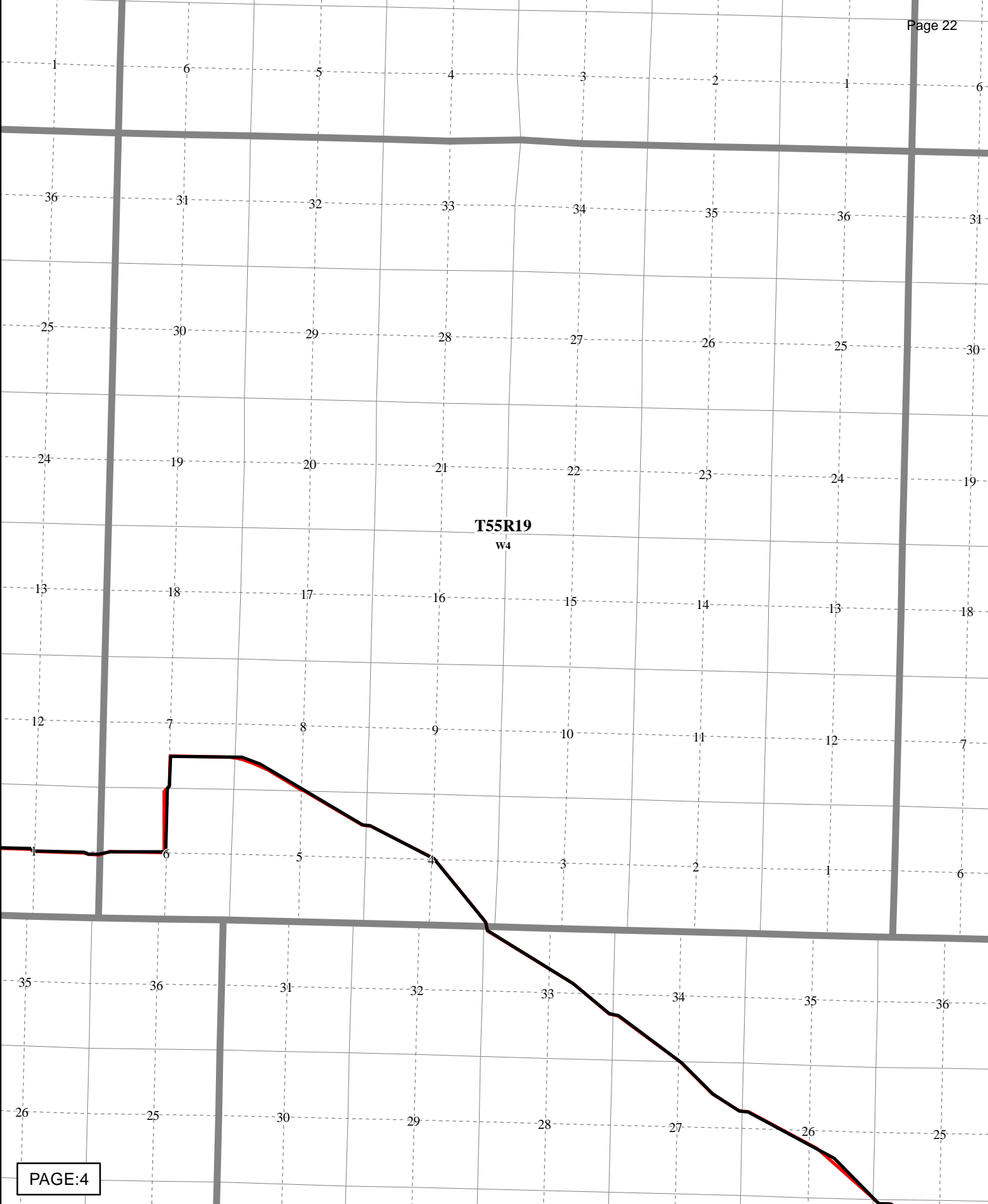
**Alberta Carbon Trunk Lines**

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

**Sunstone Projects Ltd.**  
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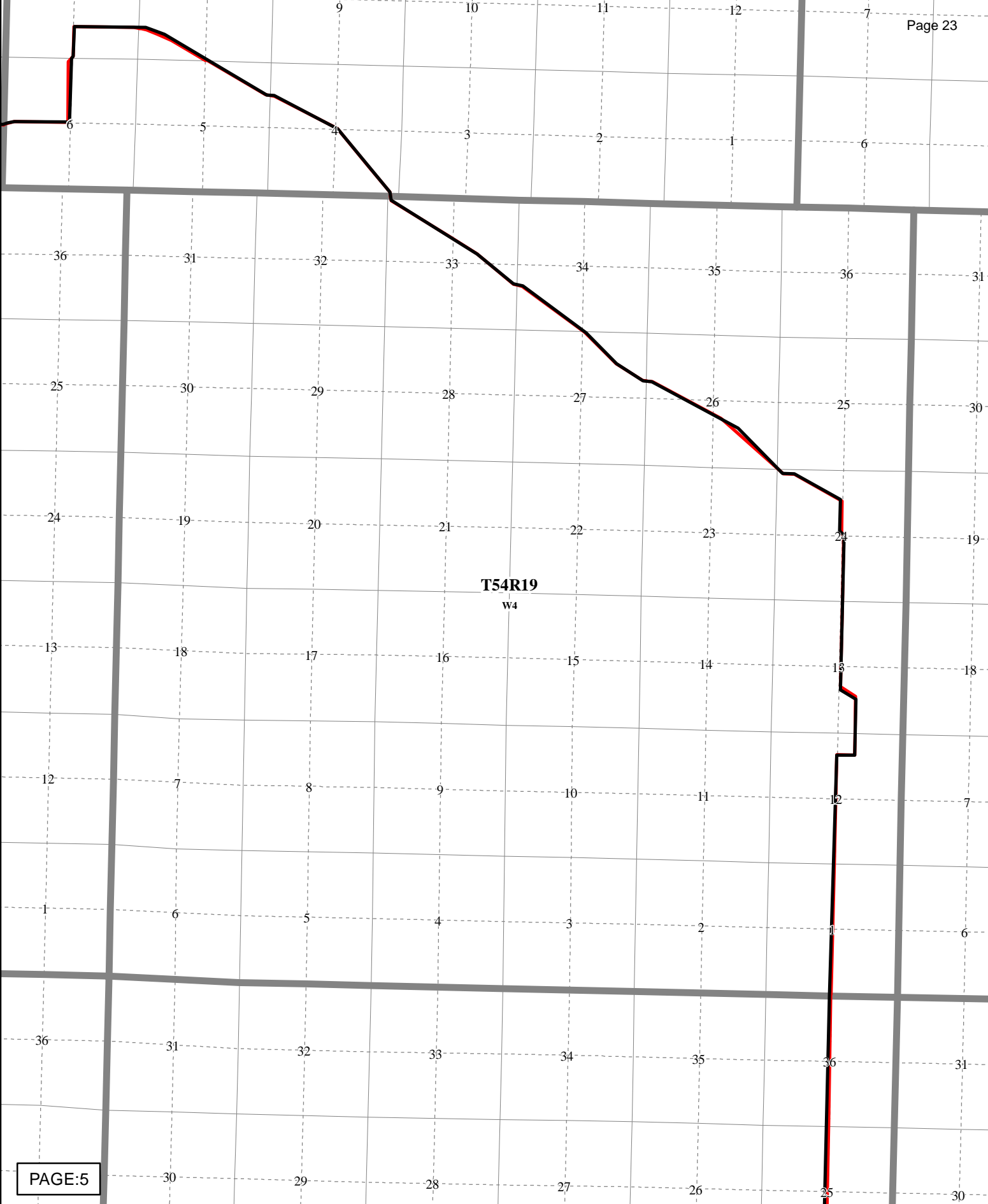
**Alberta Carbon Trunk Lines**

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

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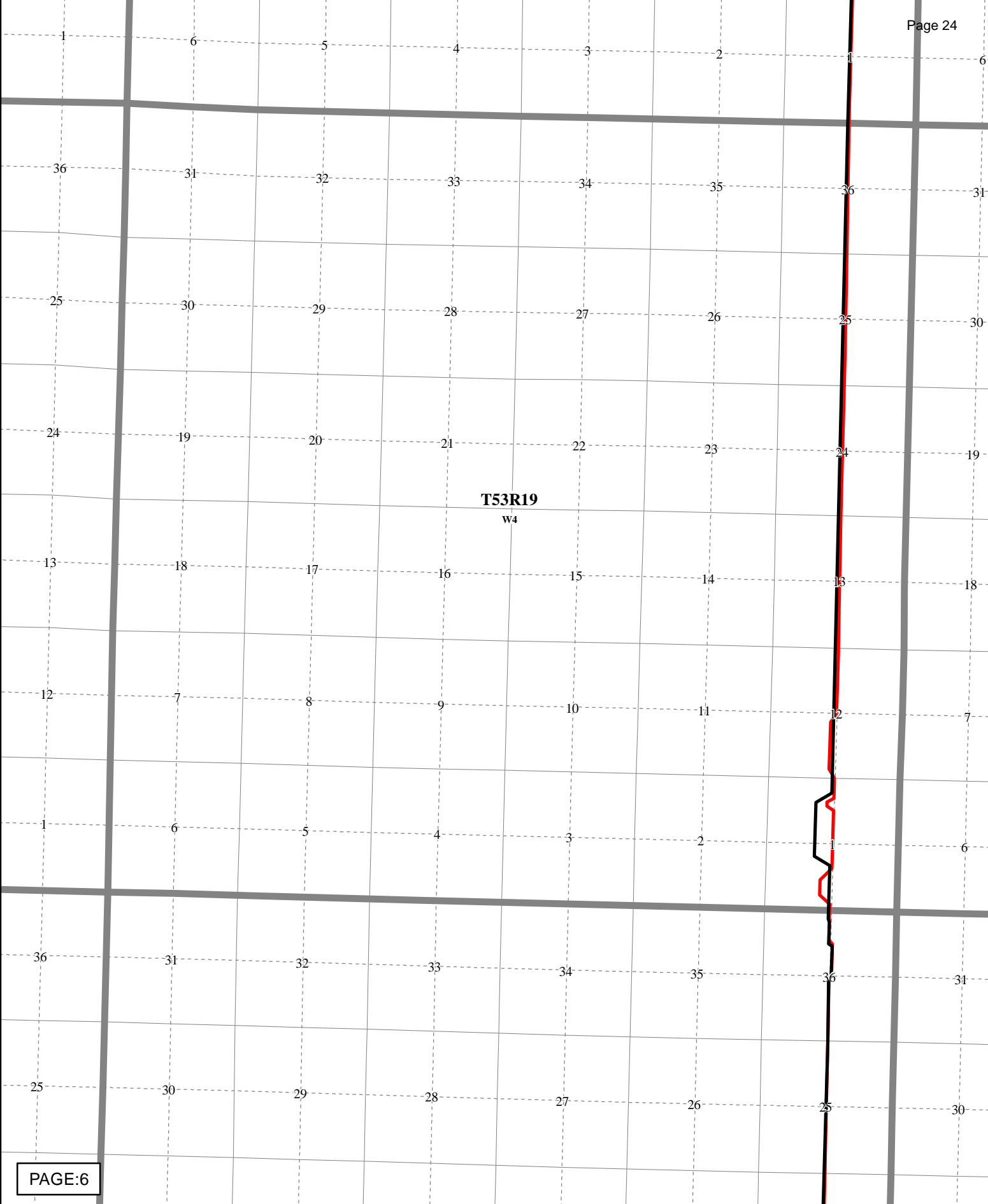
### Alberta Carbon Trunk Lines

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

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**Alberta Carbon Trunk Lines**

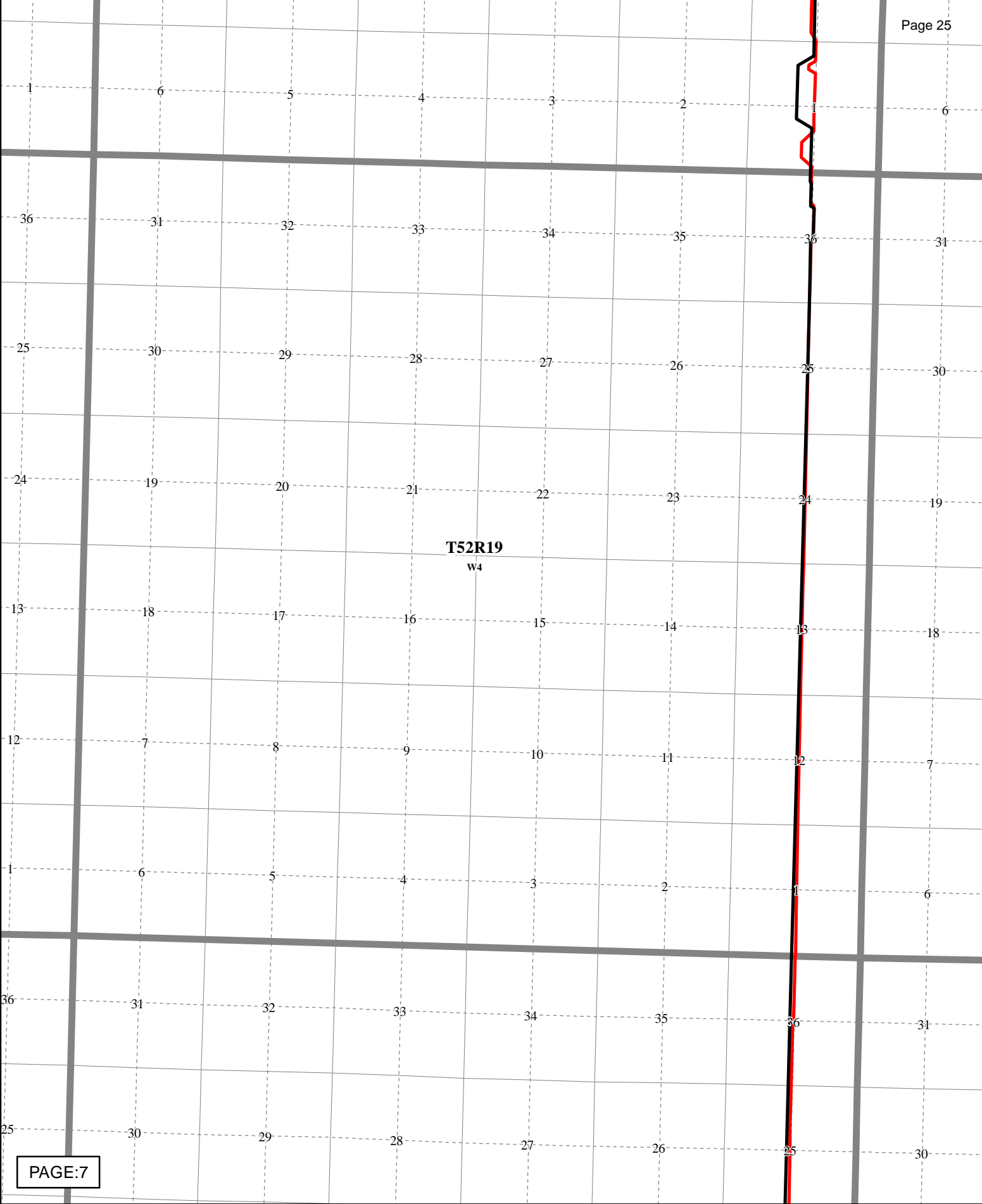
- Legend**
- AER Pipeline Database
  - Enhance 2014 Route

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T52R19  
w4

PAGE:7



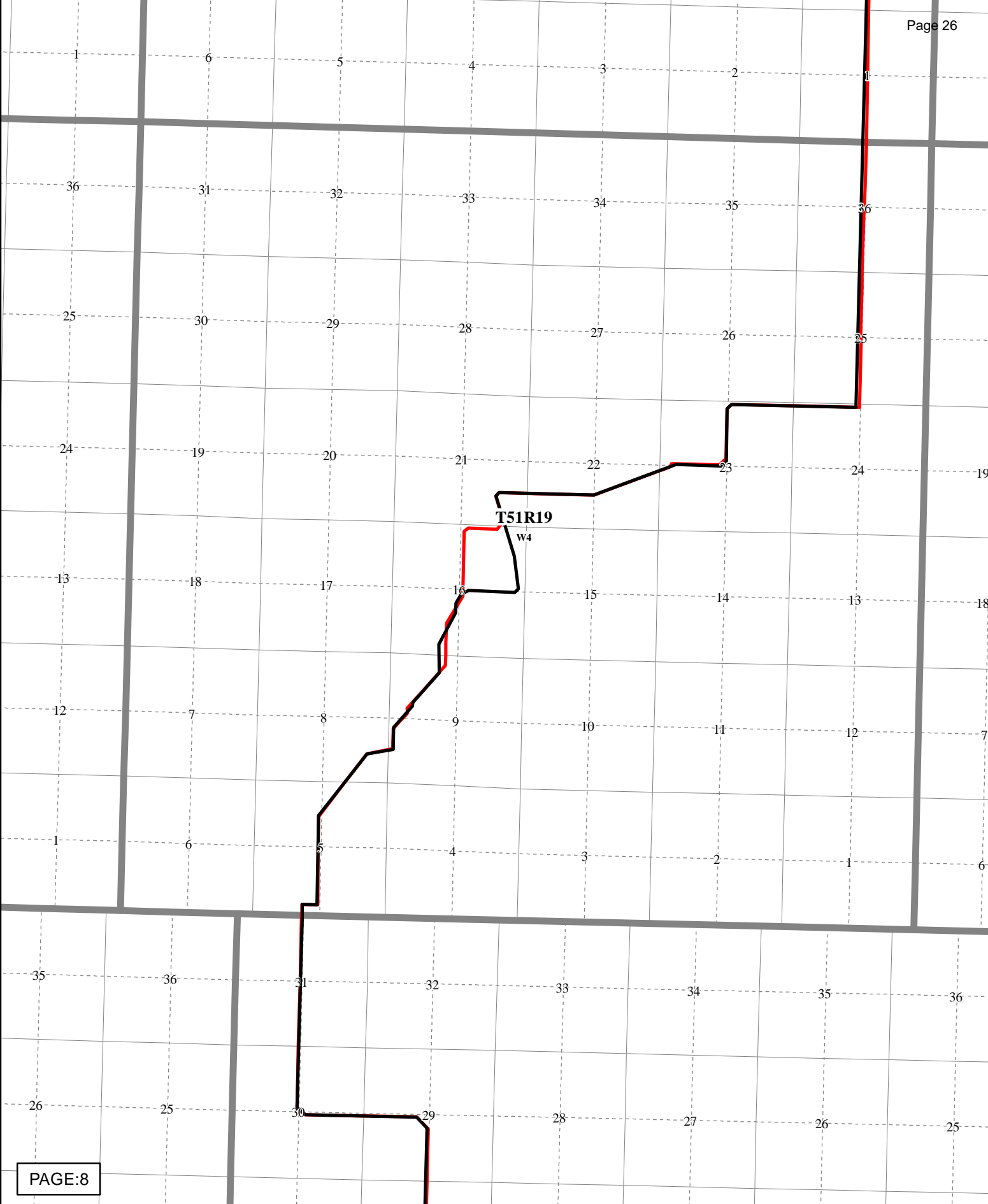
**Alberta Carbon  
Trunk Lines**

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

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T51R19  
w4

PAGE:8



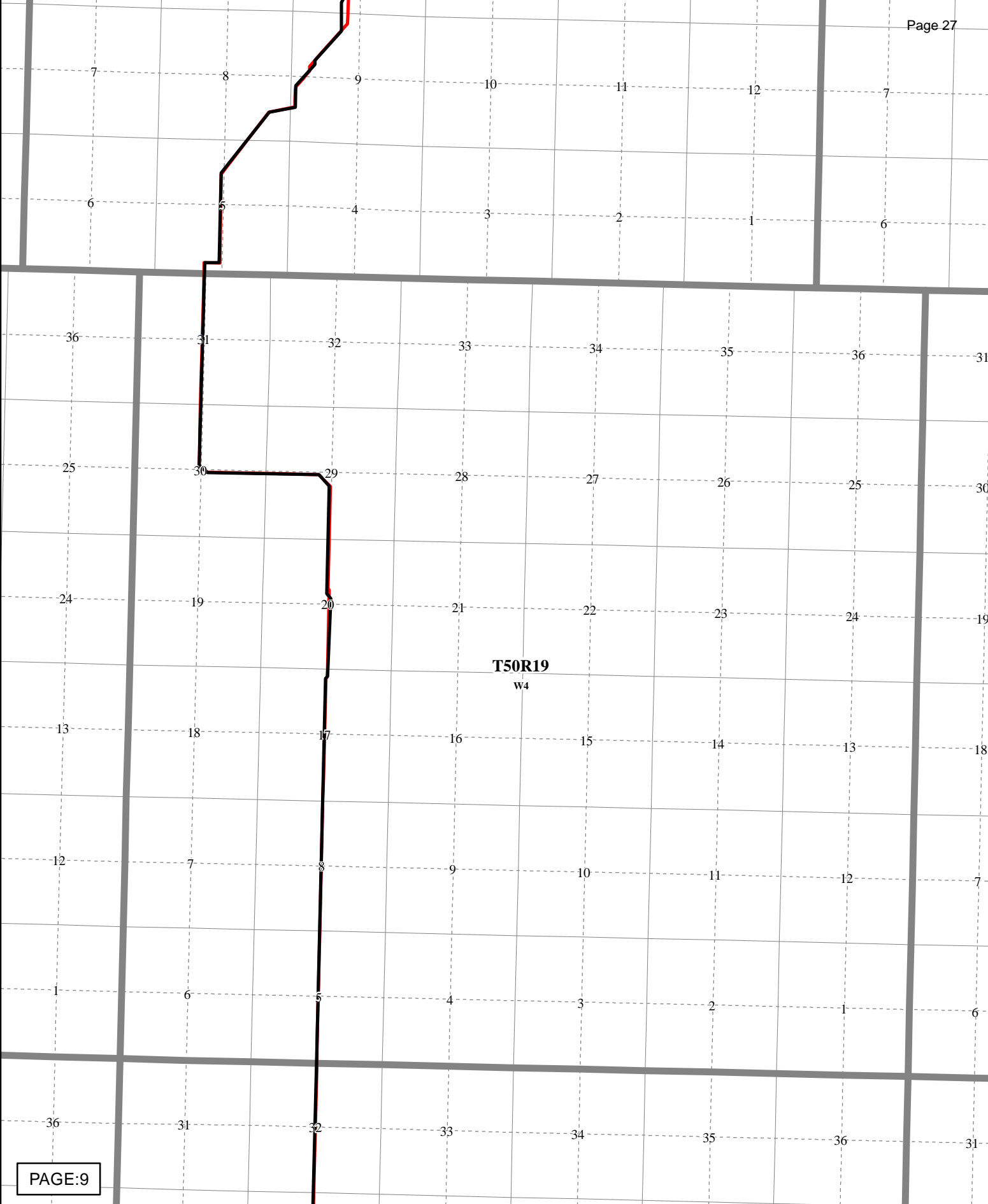
### Alberta Carbon Trunk Lines

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

Sunstone Projects Ltd.  
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T50R19  
w4


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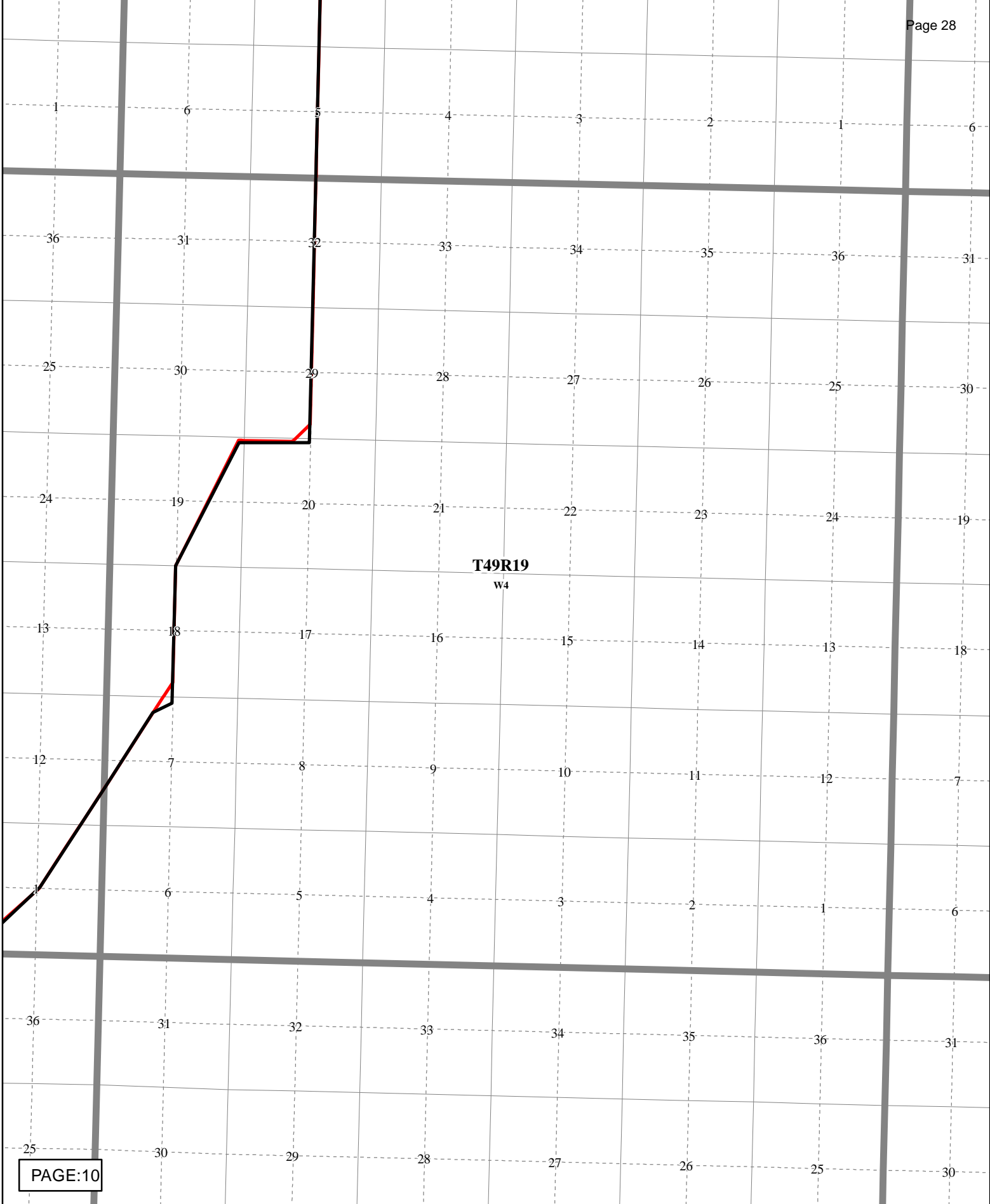
### Alberta Carbon Trunk Lines

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

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T49R19  
W4

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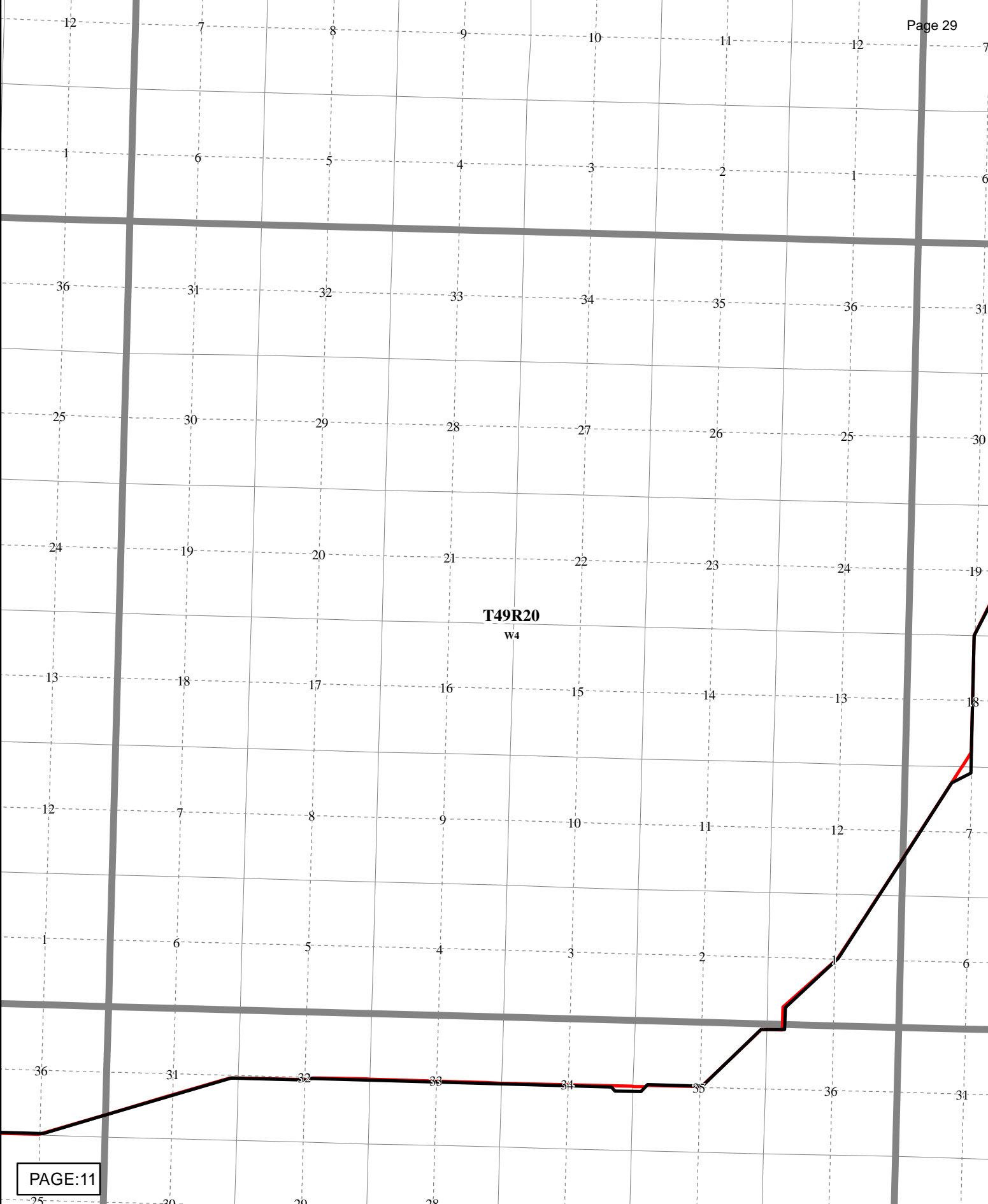
### Alberta Carbon Trunk Lines

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

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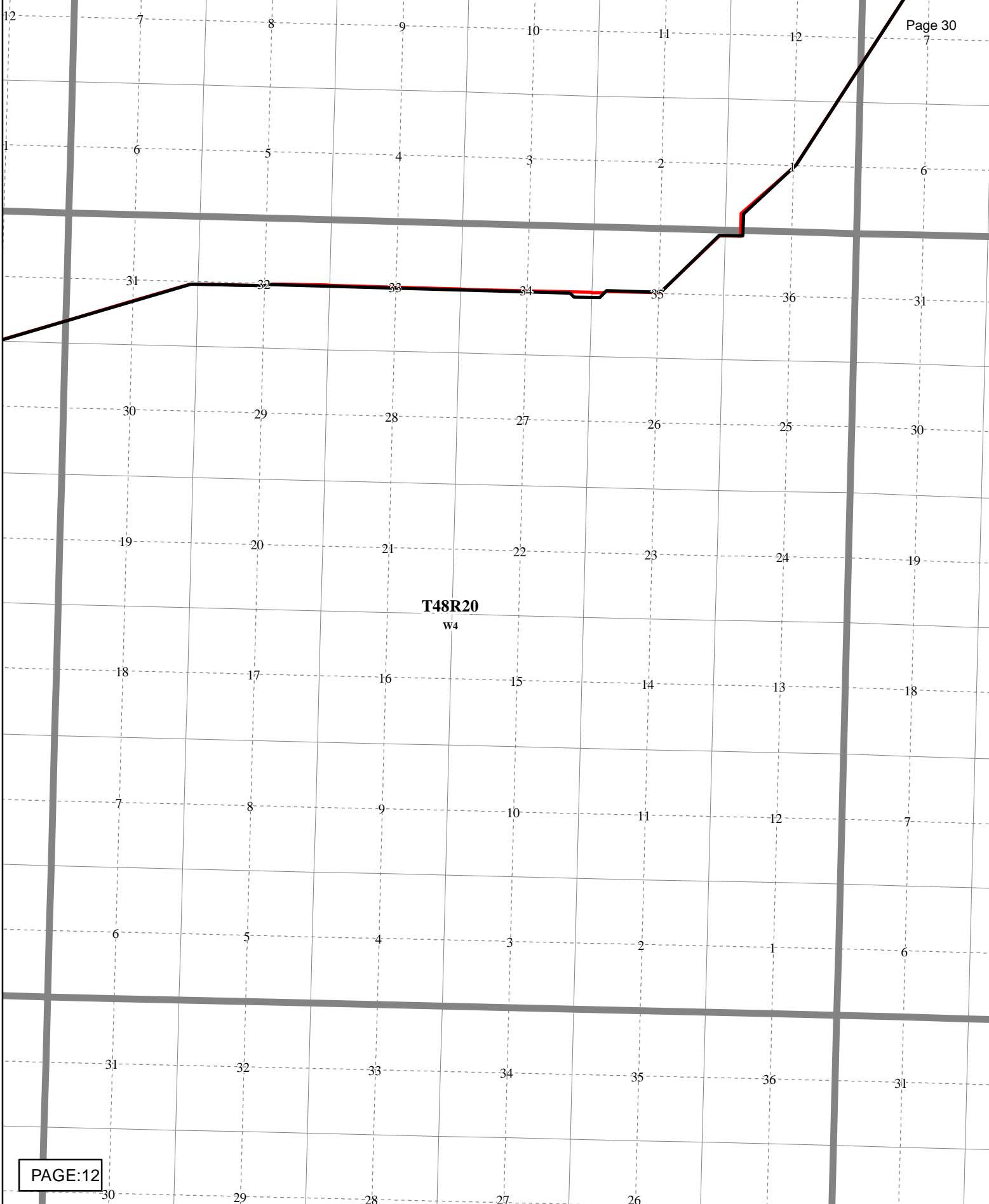
**Alberta Carbon Trunk Lines**

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

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T48R20  
w4

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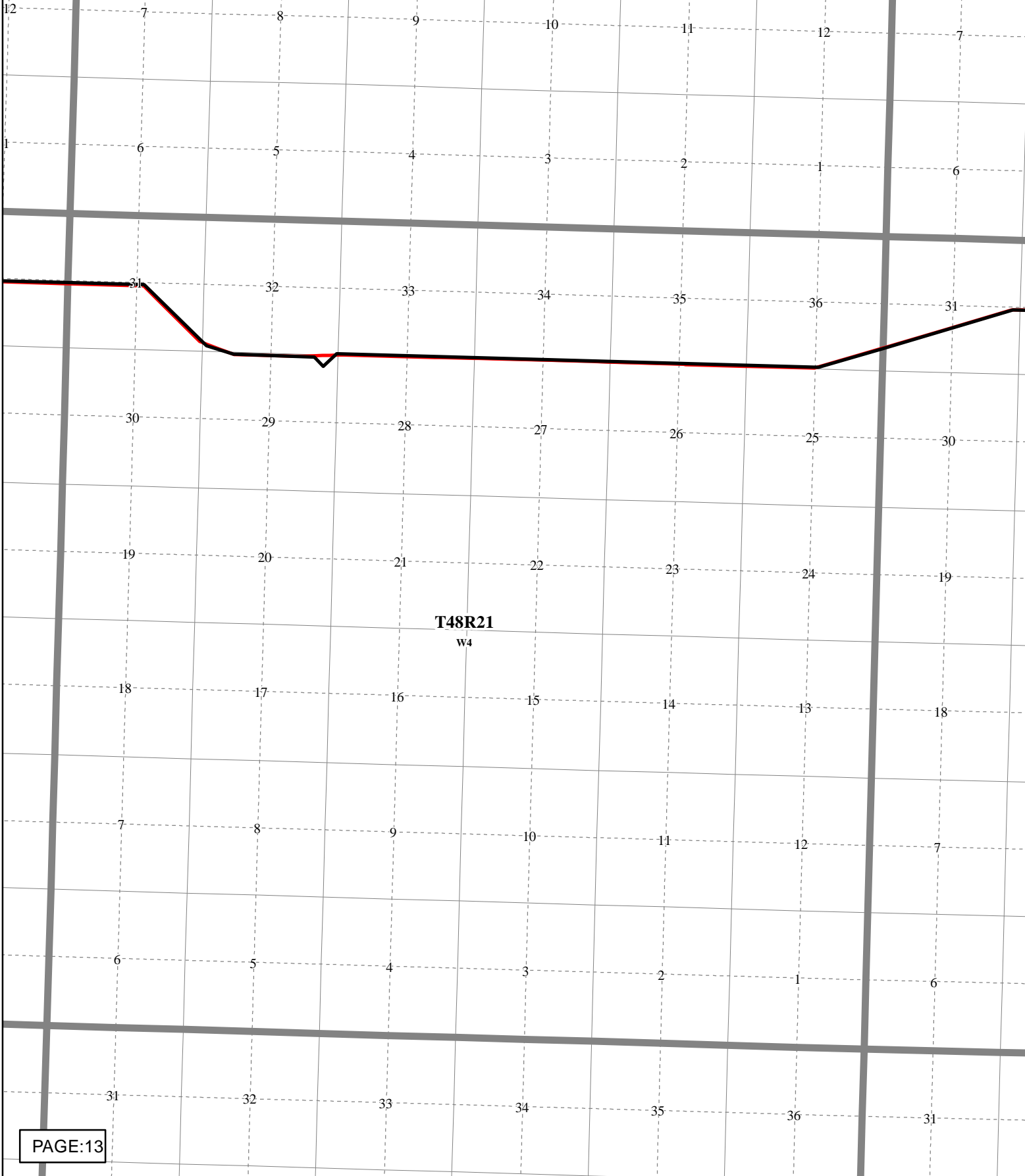
### Alberta Carbon Trunk Lines

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

Sunstone Projects Ltd.  
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T48R21  
w4

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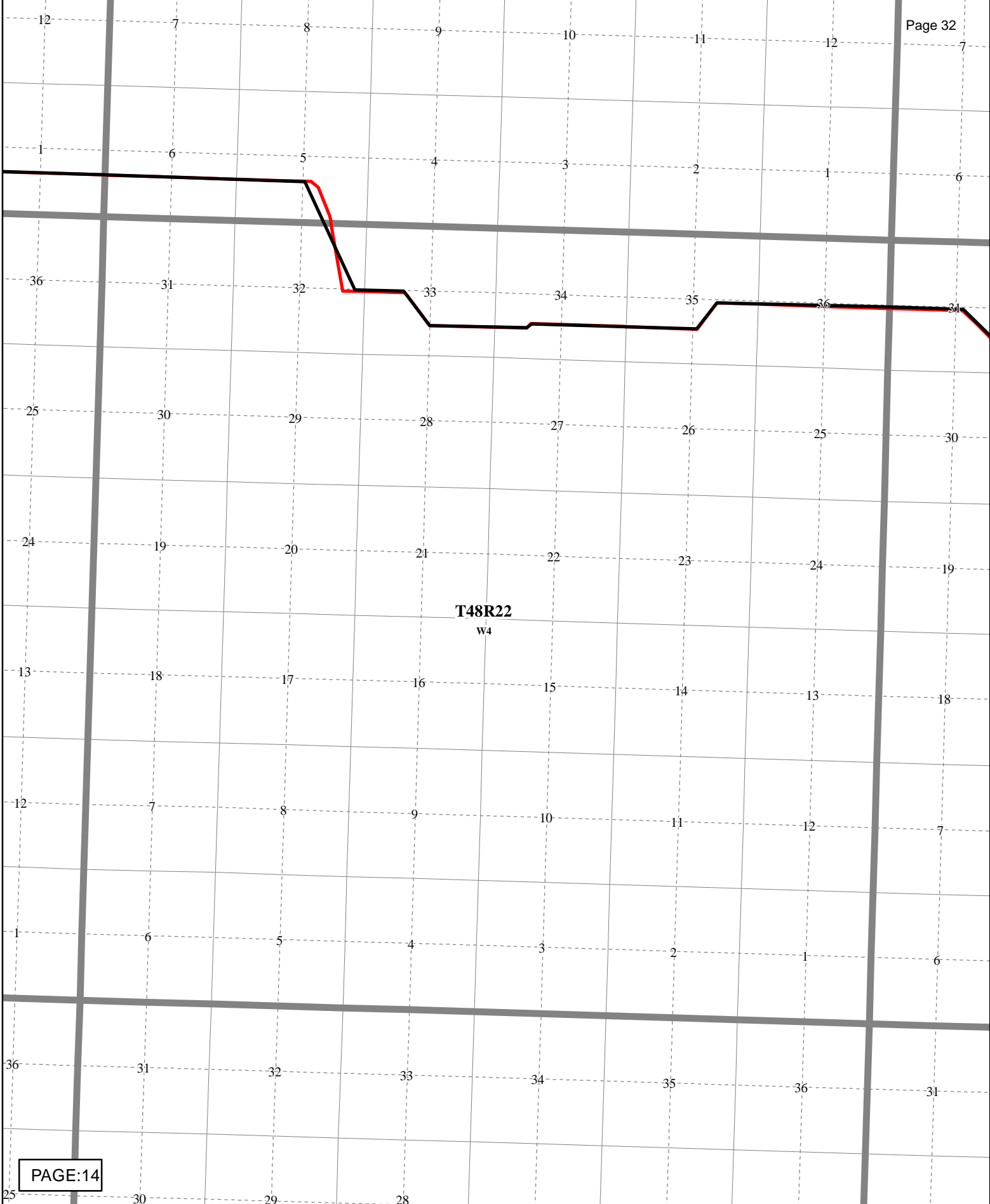
### Alberta Carbon Trunk Lines

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

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**Alberta Carbon Trunk Lines**

**Legend**

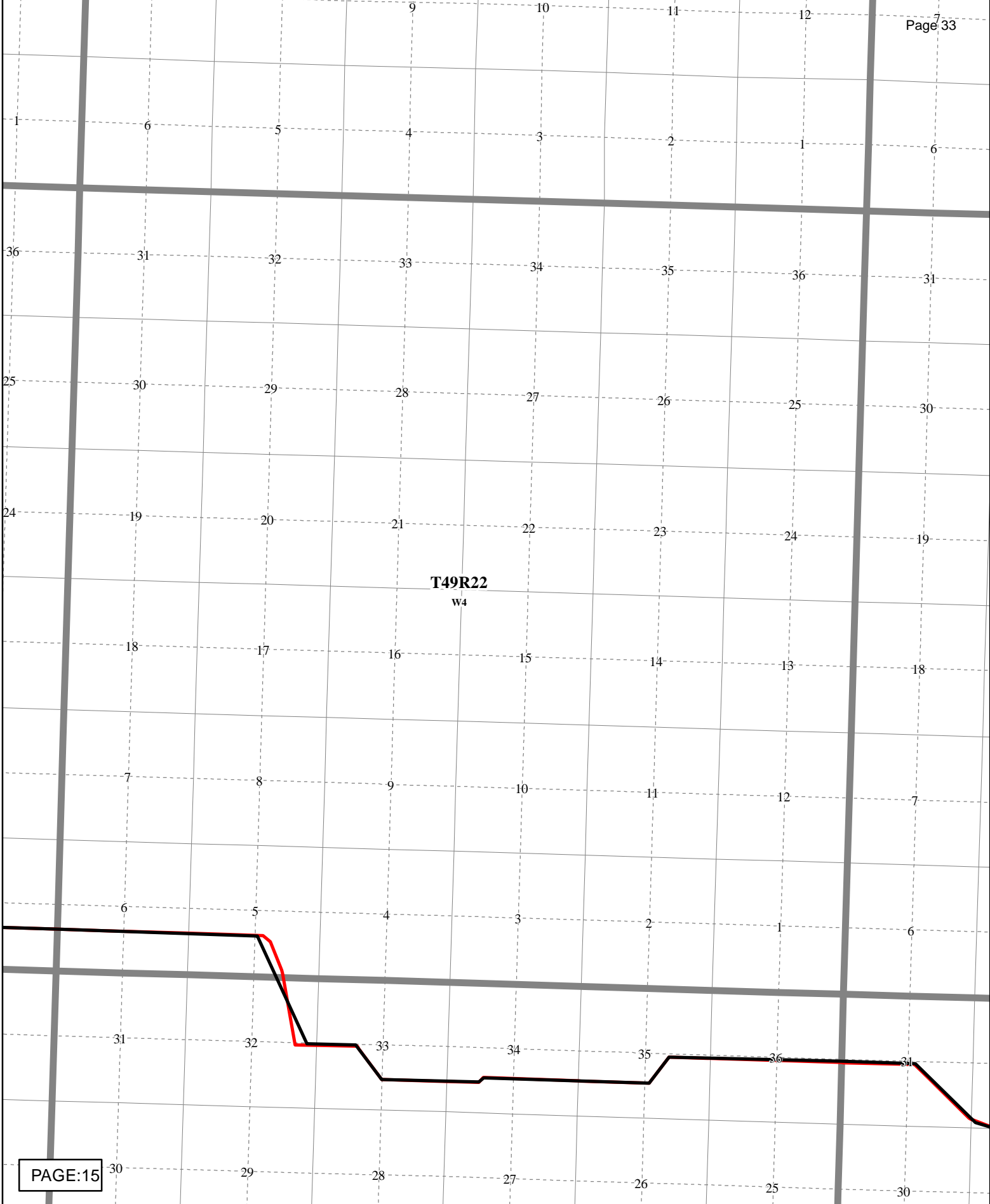
- AER Pipeline Database
- Enhance 2014 Route

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T49R22  
w4

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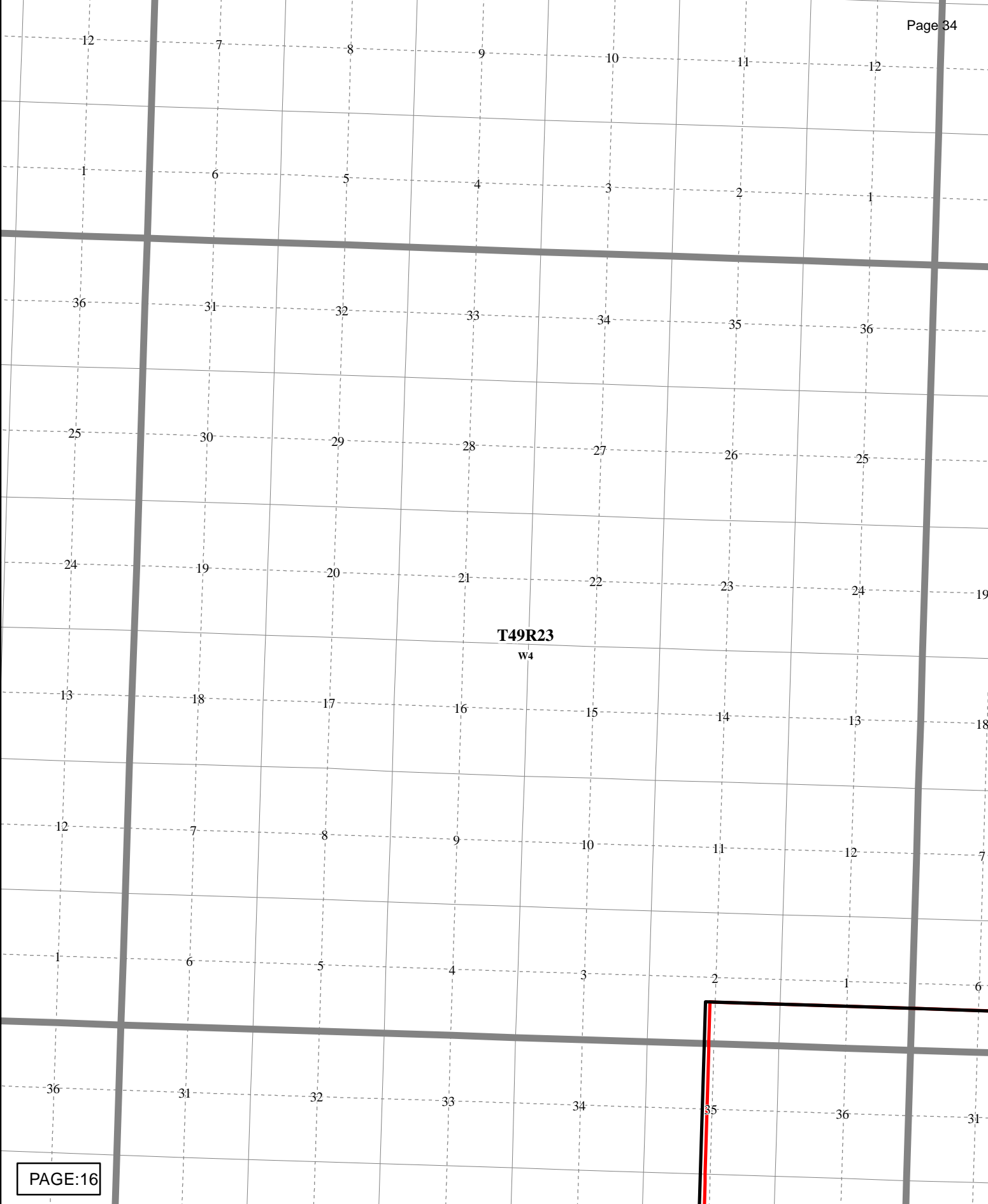
### Alberta Carbon Trunk Lines

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

Sunstone Projects Ltd.  
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**T49R23**  
W4

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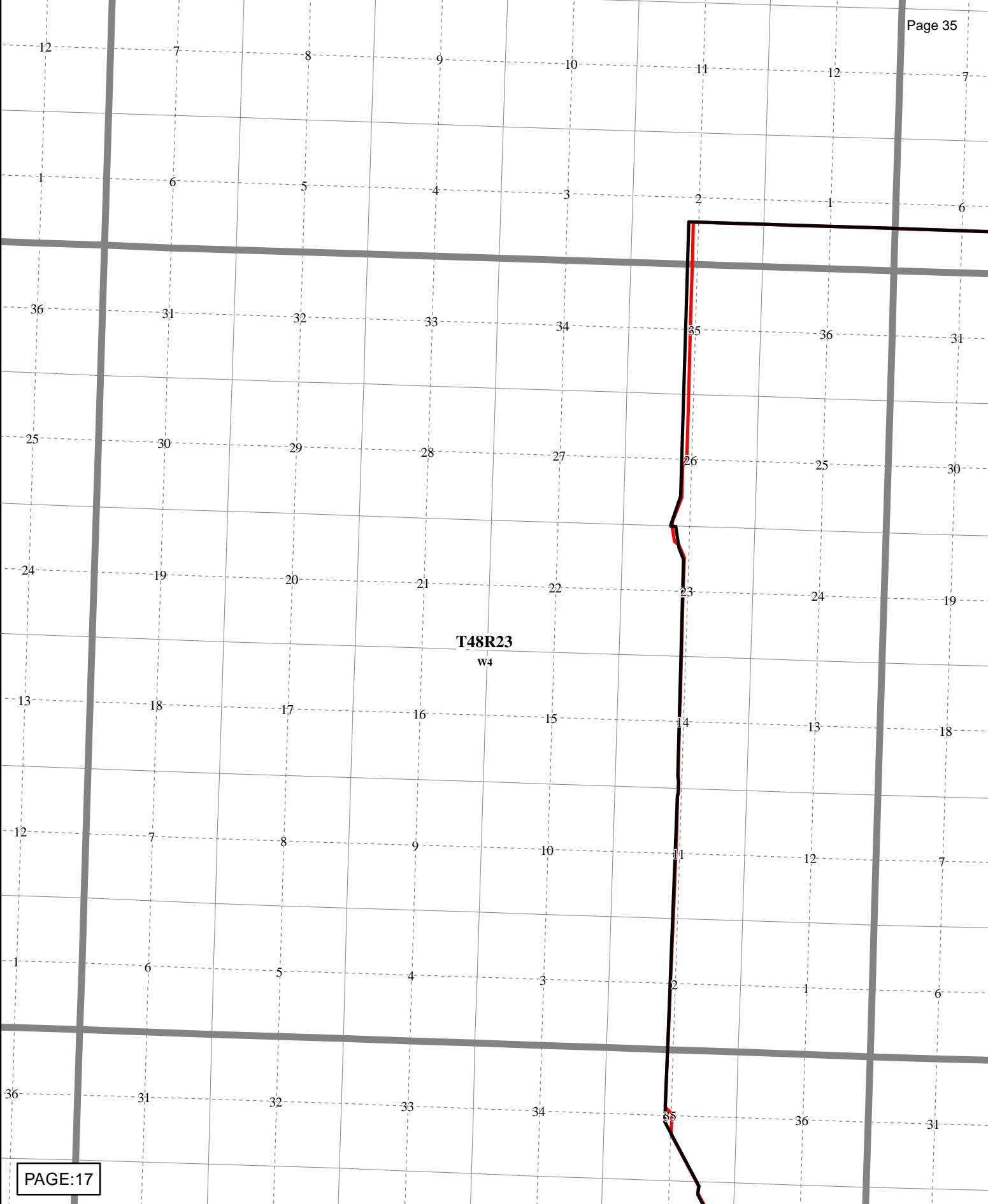
### Alberta Carbon Trunk Lines

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

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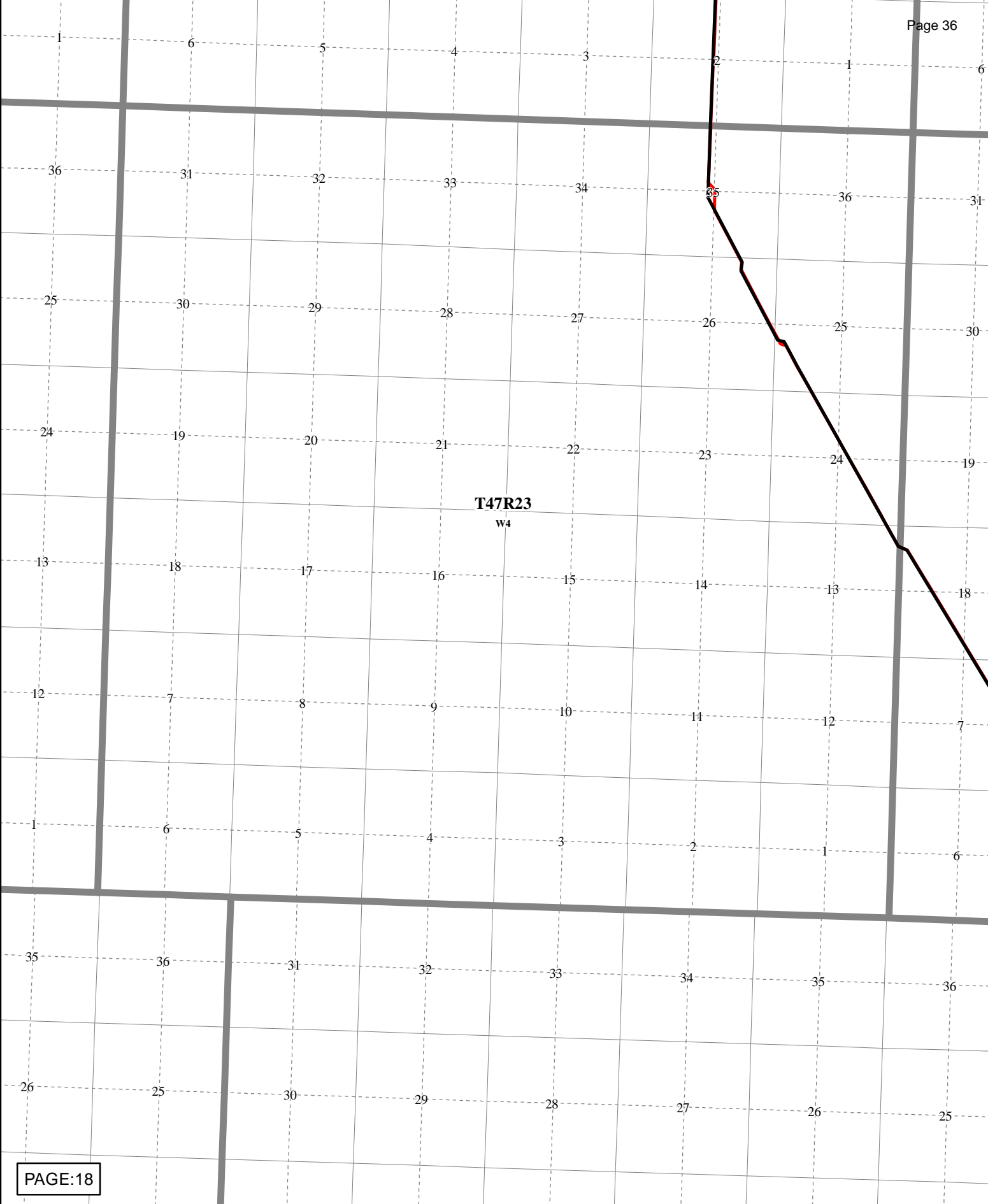
**Alberta Carbon Trunk Lines**

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

Sunstone Projects Ltd.  
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T47R23  
w4



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- Legend**
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T47R22  
w4

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### Alberta Carbon Trunk Lines

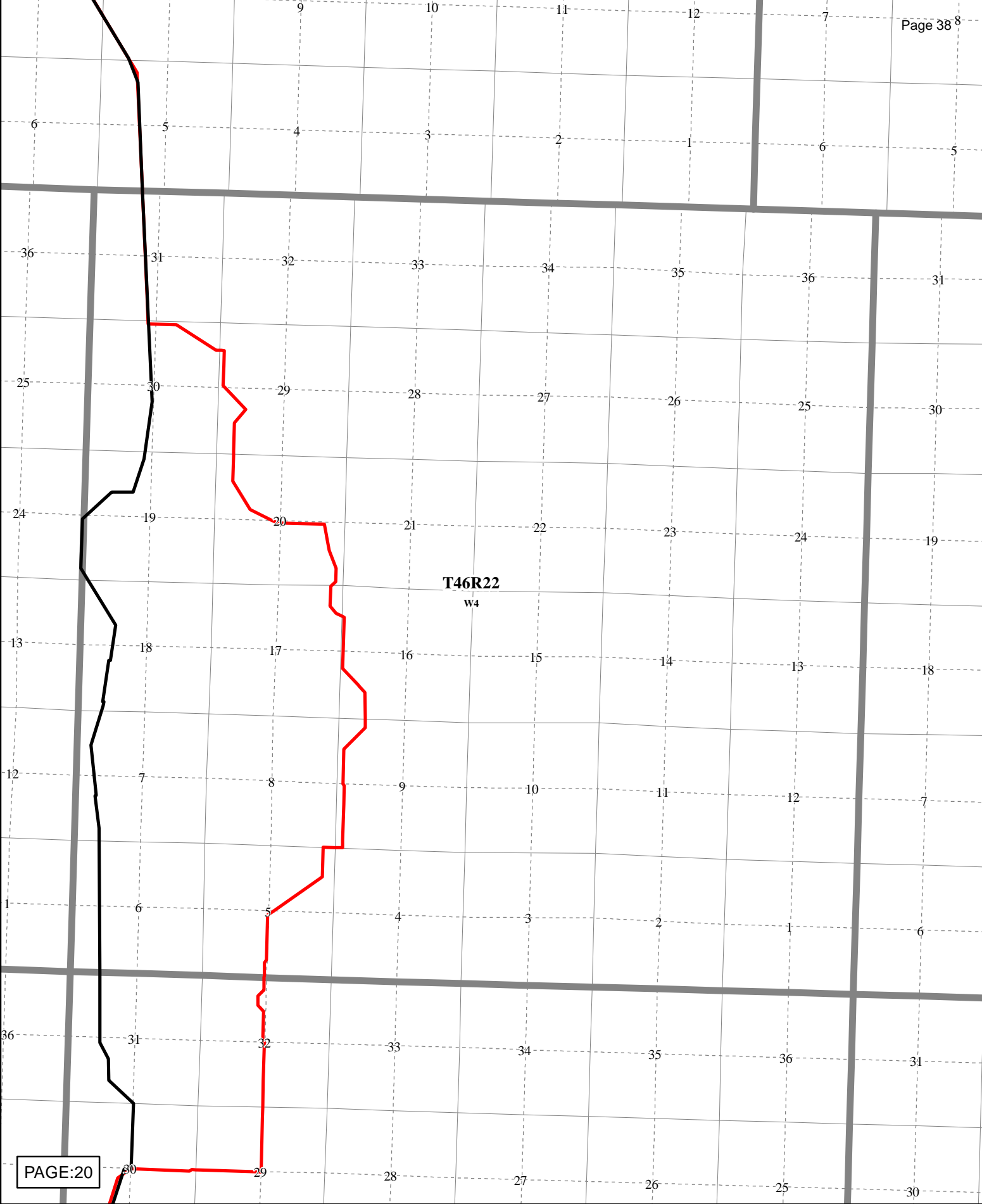
### Legend

-  AER Pipeline Database
-  Enhance 2014 Route

Sunstone Projects Ltd.  
 Suite 2000-555 4<sup>th</sup> Ave SW  
 Calgary, Alberta T2P 3E7  
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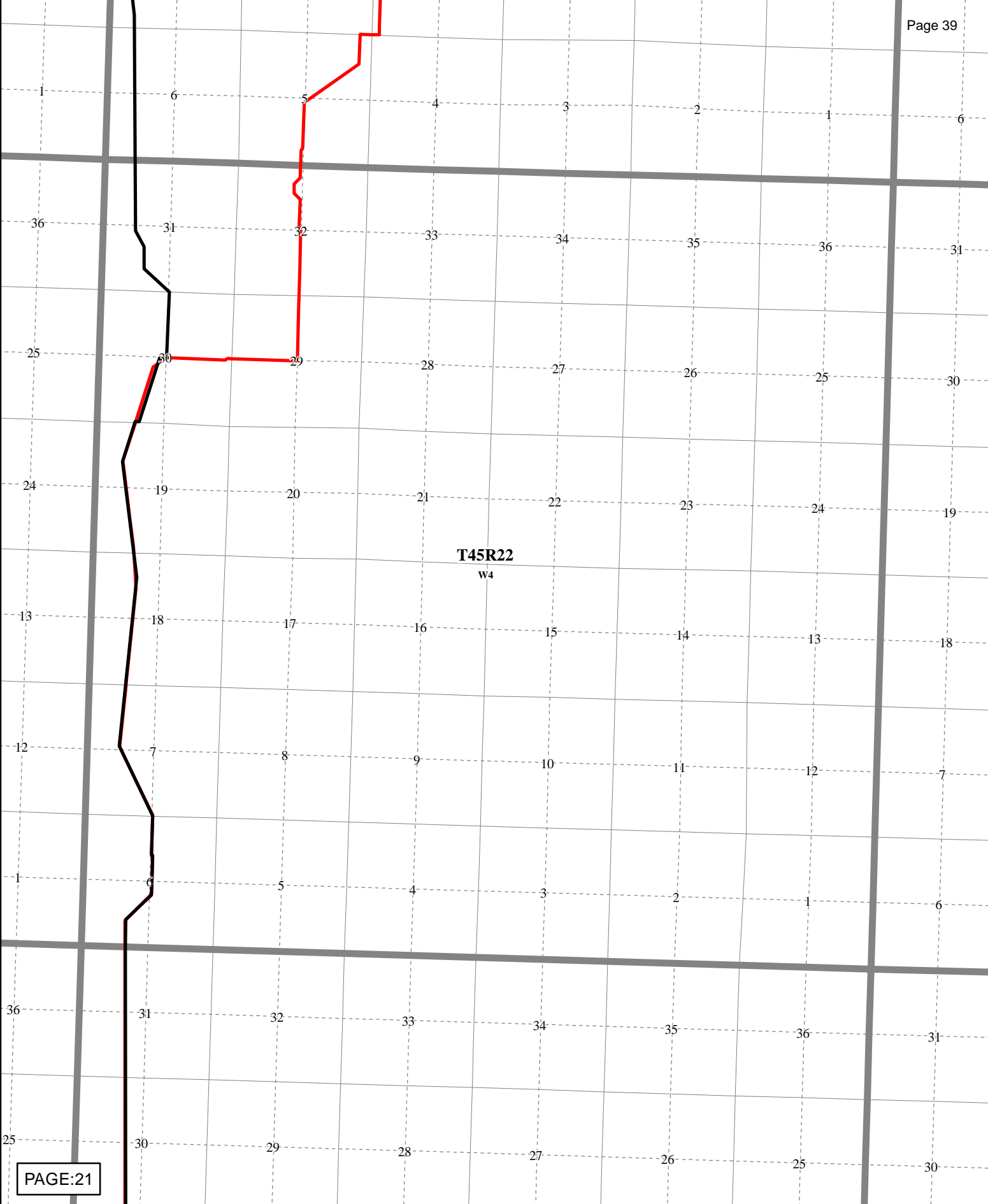
**Alberta Carbon Trunk Lines**

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

Sunstone Projects Ltd.  
 Suite 2000-555 4<sup>th</sup> Ave SW  
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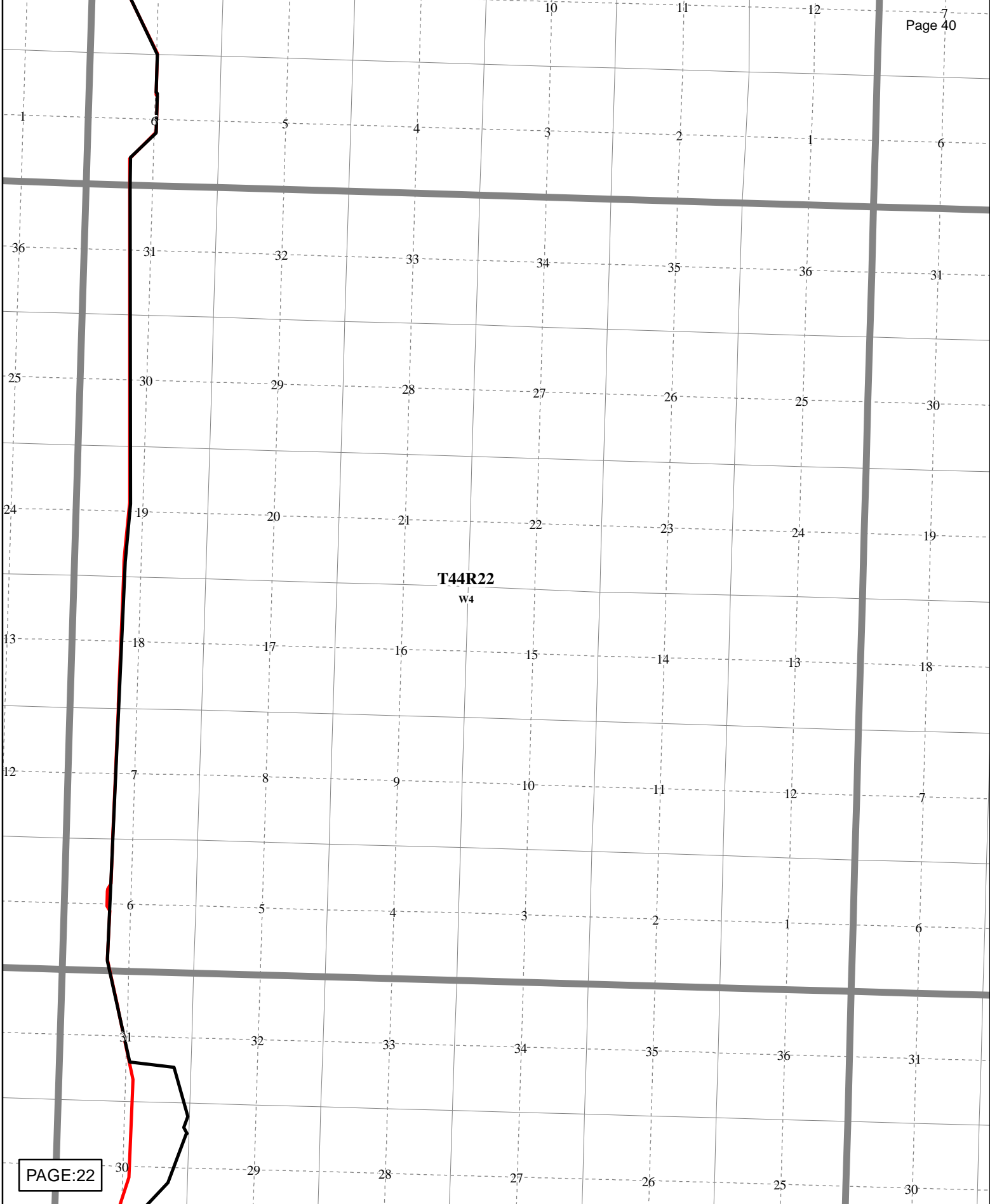
T45R22  
W4



### Alberta Carbon Trunk Lines

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







PAGE:22



**Alberta Carbon  
Trunk Lines**

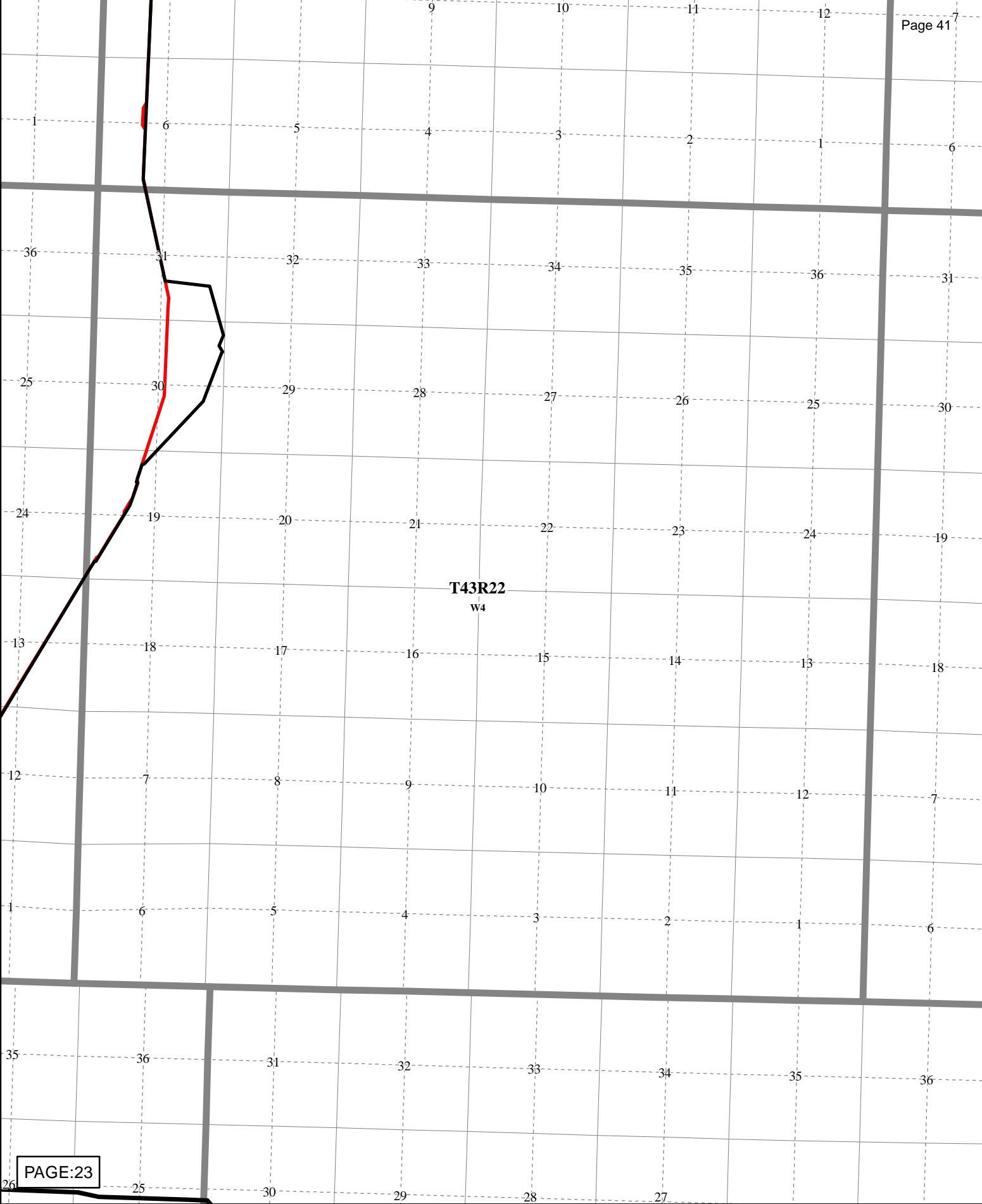
- Legend**
-  AER Pipeline Database
  -  Enhance 2014 Route

Sunstone Projects Ltd.  
 Suite 2000-555 4<sup>th</sup> Ave SW  
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T43R22  
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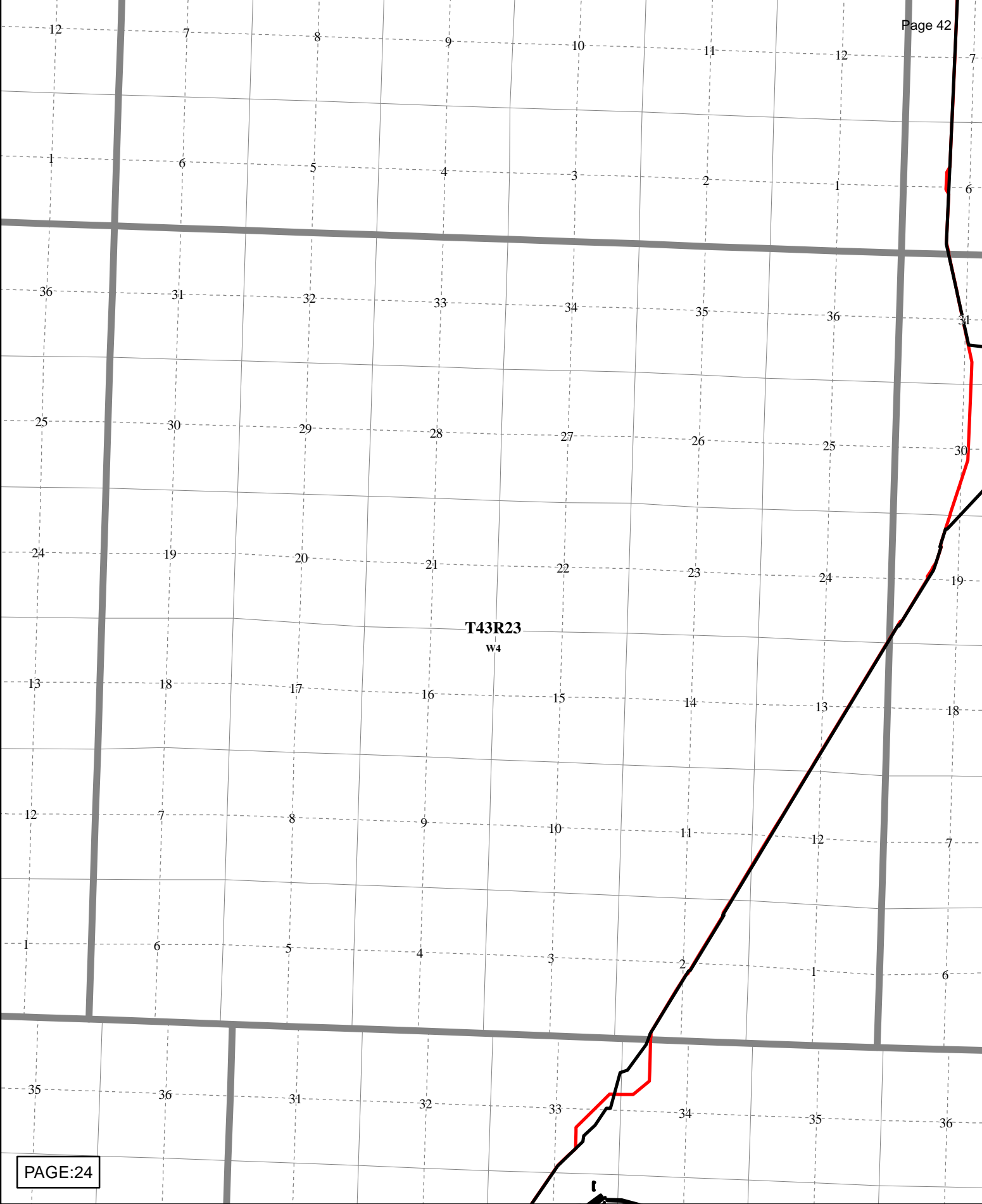
### Alberta Carbon Trunk Lines

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

Sunstone Projects Ltd.  
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 Calgary, Alberta T2P 3E7  
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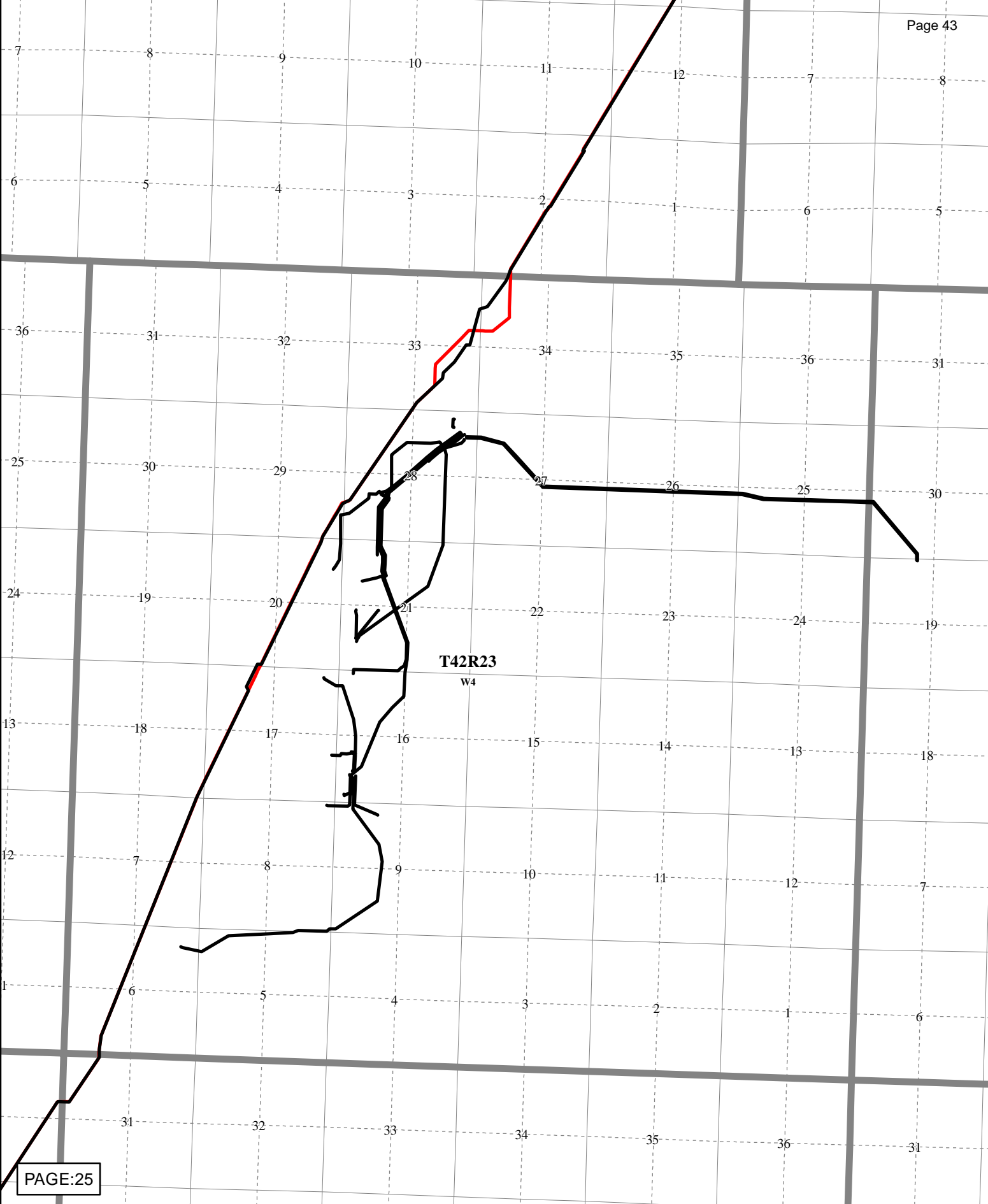
**Alberta Carbon Trunk Lines**

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

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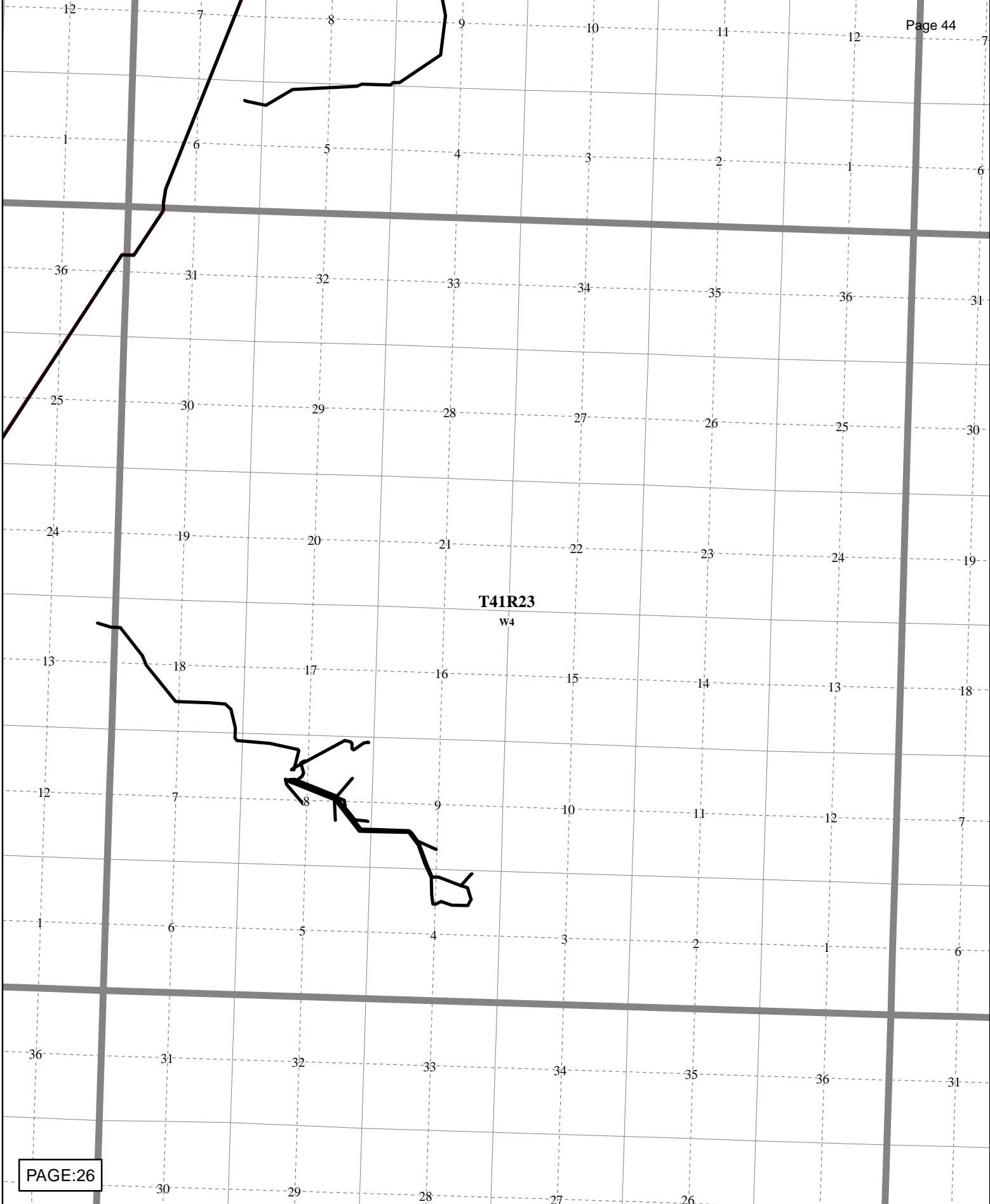
**Alberta Carbon Trunk Lines**

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

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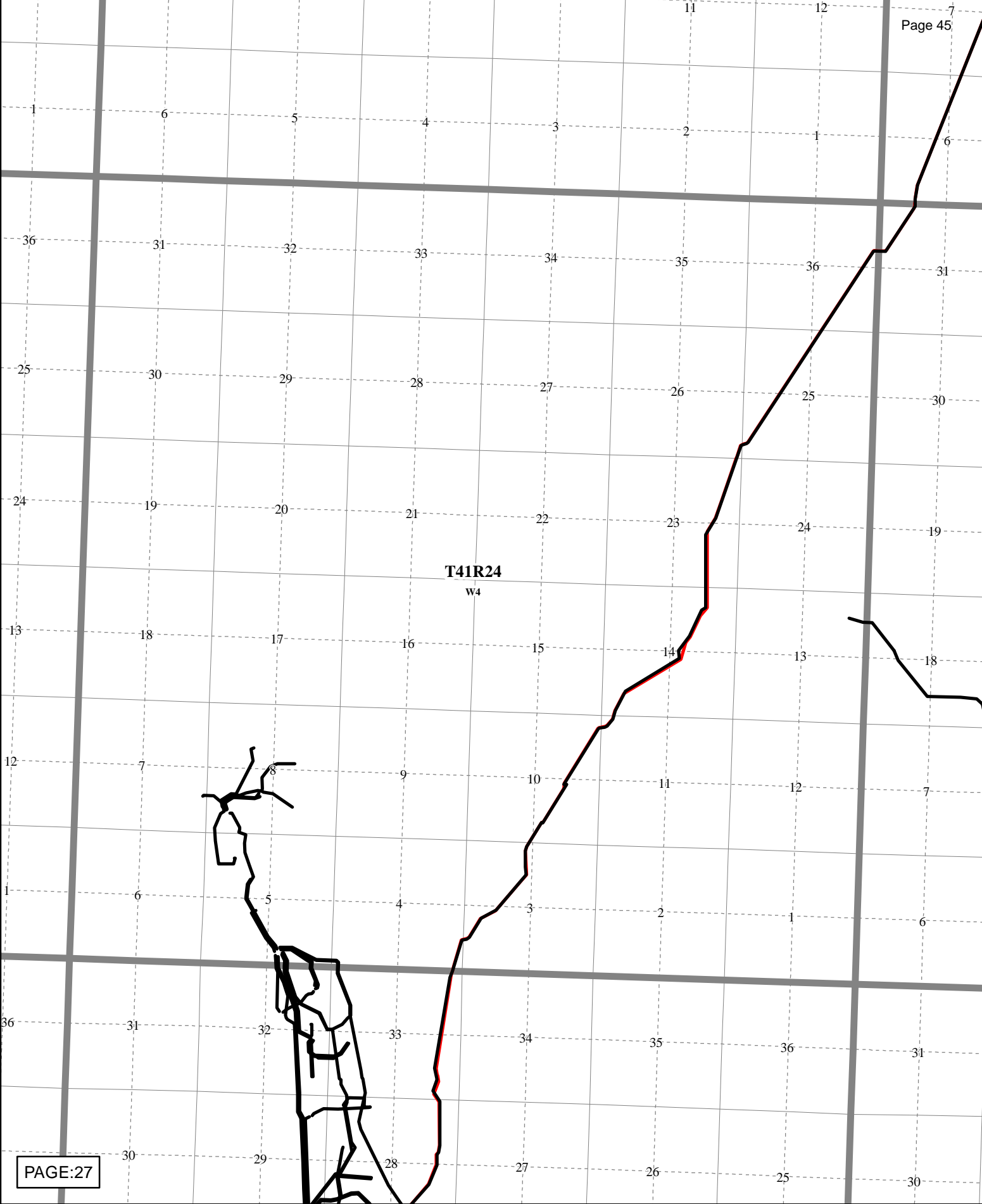
**Alberta Carbon Trunk Lines**

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

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T41R24  
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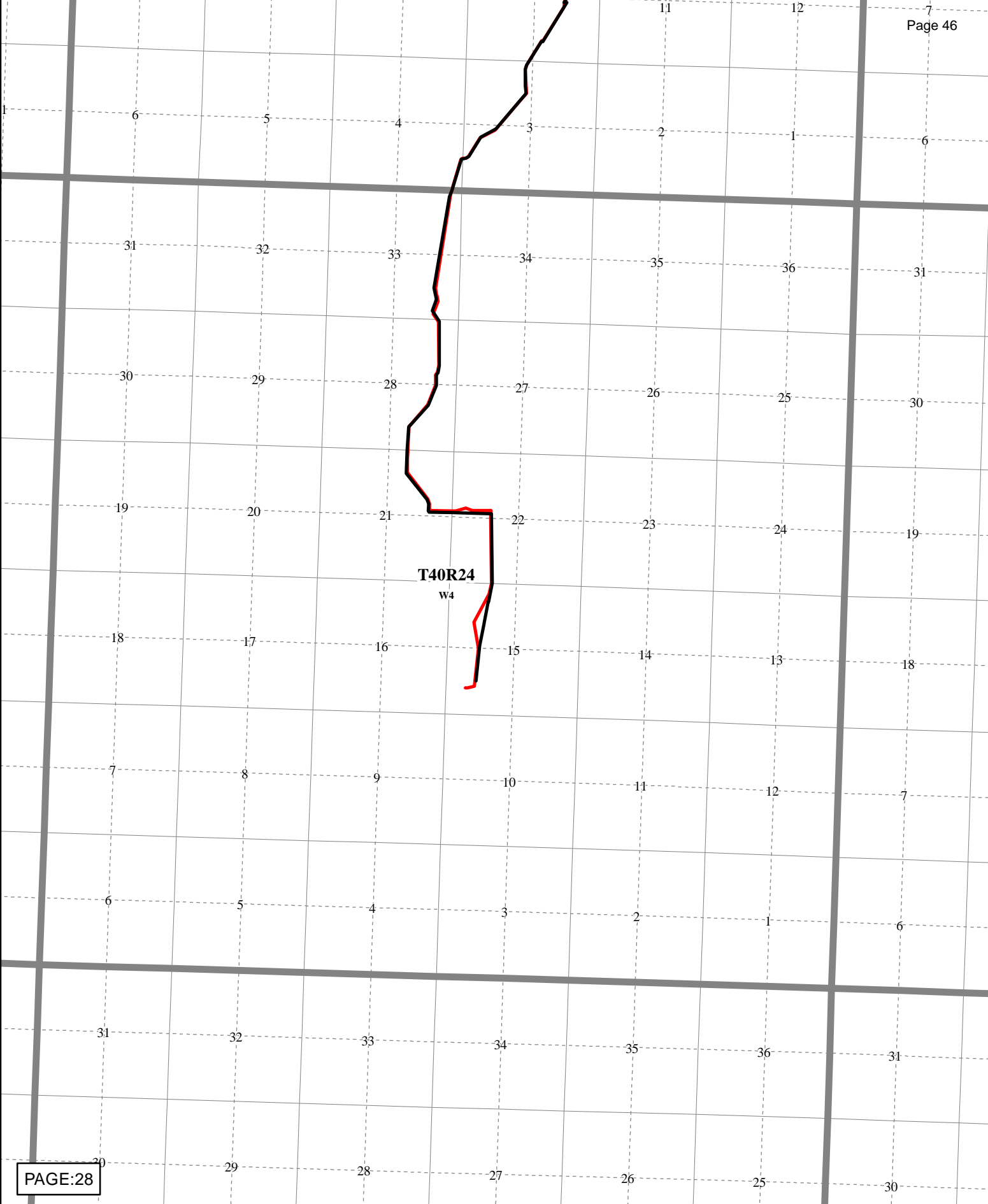
### Alberta Carbon Trunk Lines

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

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- Legend**
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  - Enhance 2014 Route



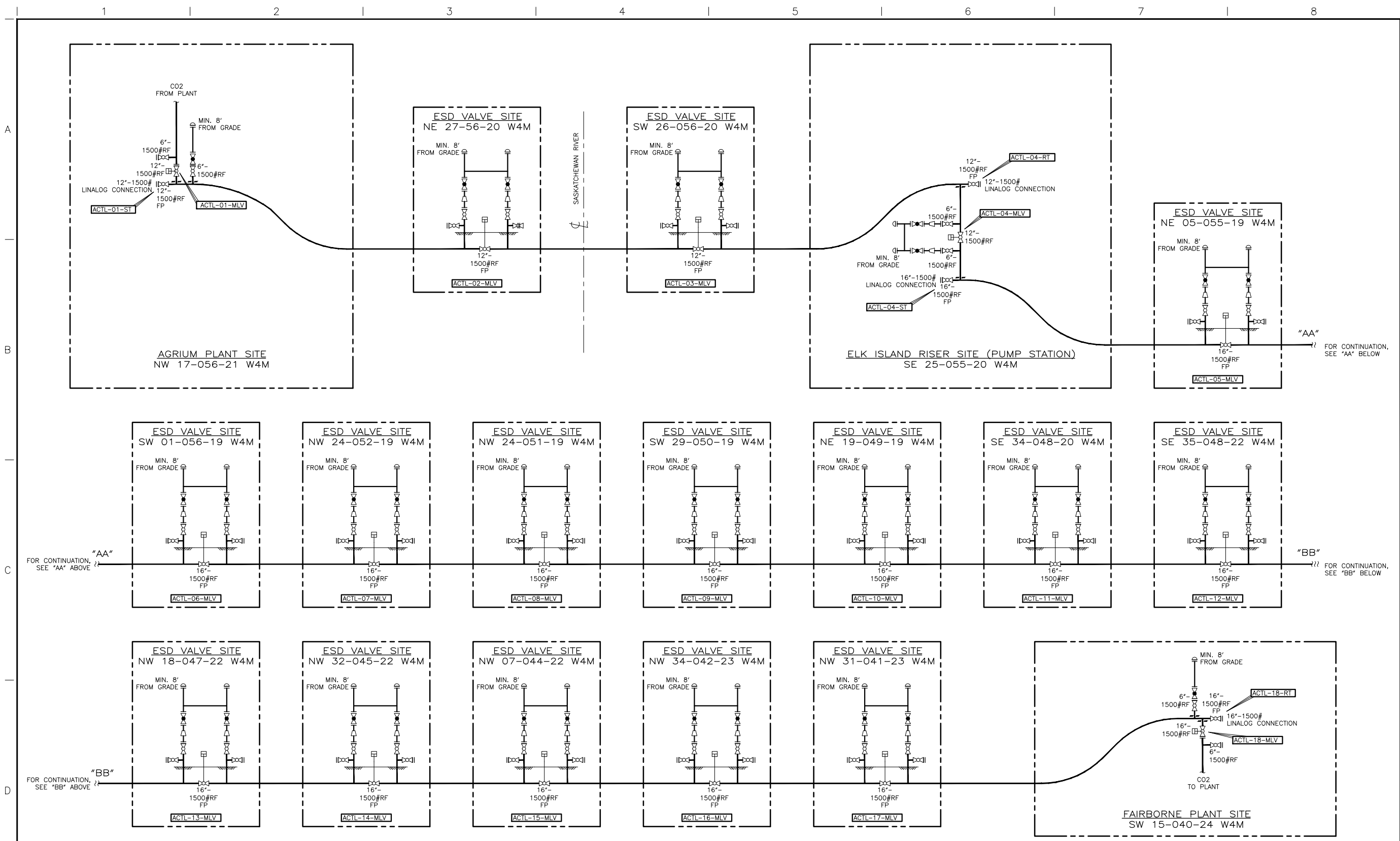
# Enhance Energy Inc. and North West Redwater Partnership

## 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 EPCM No.: SAW-11-004		FILE NO.: 11-004-SCH-0001	