

**STATE OF NORTH DAKOTA**  
**PUBLIC SERVICE COMMISSION**

TransCanada Keystone Pipeline, LP  
30-Inch Crude Oil Pipeline/Cavalier to  
Sargent Ctys

Case No, PU-06-421

**TESTIMONY OF LOYS A. GRAY, III**

**IN SUPPORT OF EXTRA WORK SPACE IN FORESTED AREAS**

LOYS A. GRAY, III, BEING FIRST DULY SWORN, ON OATH, DEPOSES AND STATES, AS FOLLOWS

- I have attached a copy of my resume with my educational background and qualifications.
- Over the past 30 years I have served in various pipeline engineering and construction management positions including engineering manager, construction manager and project director on a variety of large diameter pipeline projects throughout the United States and in foreign countries. The larger projects range from 200 to 2,500 miles in length with diameters from 30 to 40 inches. Since the mid 1990s, a significant portion of my work has been in pipeline construction management and I am very familiar with the need for sufficient work space to safely and efficiently install large diameter pipelines.
- I have provided both written and verbal testimony to the PSC regarding Keystone's Application for a certificate of corridor compatibility and route permit and regarding the need for additional temporary workspace in forested areas at stream crossings.
- In accordance with paragraph 13 of the North Dakota Public Service Commission (PSC) Order dated February 21, 2008, I am filing this affidavit in support of Keystone's request for approval of the clearing plans for additional temporary work space in forested areas at certain stream or road crossings shown below:

MP 13.12 Unnamed Creek  
MP 16.13 Tributary to Tongue River  
MP 17 Unnamed Creek  
MP 21.44 Unnamed Creek  
MP 22.7 Unnamed Creek  
MP 23.7 Cart Creek  
MP 24.7 Unnamed Creek  
MP 29.4 North Branch Park River  
MP 31.8 Unnamed Creek  
MP 33.3 Unnamed Stream and Middle Branch Park River  
MP 34.8 Unnamed Creek  
MP 35.3 Unnamed Creek  
MP 36.3 Unnamed Creek  
MP 37.2 Unnamed Creek  
MP 38.1 Unnamed Creek  
MP 42.7 Unnamed Stream

- MP 46.4 North Branch Forest River
- MP 49.2 Unnamed Stream
- MP 54.8 Middle Branch Forest River
- MP 107.1 Bored Crossing of 5<sup>th</sup> Street NE
- MP 123.6 Bored Crossing of 11<sup>th</sup> Street SE
- MP 212.6 Bored Crossing of 97<sup>th</sup> Street

- Keystone’s Application requested a 110-foot wide normal construction right of way and additional work space at topographical features including roads, railroads, streams, and other areas requiring additional workspace, to facilitate normal pipeline construction activities. During the PSC hearings, Keystone presented testimony that 85 feet of construction right of way in forested areas at certain streams was not sufficient for construction of a large diameter pipeline and that additional temporary workspace was needed to ensure that the work could be performed safely in those areas.
- The PSC’s Order, at paragraph 13, included the following condition:  
*“If Keystone needs additional construction work space at stream or river crossings and would like to clear more than an 85 feet width of trees, Keystone shall submit a clearing plan with the Commission to be approved prior to start of construction. The plan shall indicate the width of the cut (up to 135 feet) and the distance from the crossing (number of feet on each side of the crossing) that is needed.”*
- In accordance with paragraph 13, Keystone is requesting PSC approval of the clearing plans and additional work space shown on the drawings attached in Exhibit A for forested areas at the following streams or road crossings:

<b>NORTH DAKOTA FORESTED CROSSING TABLE</b>		
<b>MILE POST</b>	<b>CROSSING</b>	<b>JUSTIFICATION</b>
MP 13.12	Unnamed Creek	Extra work space required to store a significant volume of spoil generated from grading of steep slopes on both sides of the crossing and a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of stream.
MP 16.13	Tributary to Tongue River	Extra work space required to store a significant volume of spoil generated from a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.
MP 17	Unnamed Creek	Extra work space required to store a significant volume of spoil generated from a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.
MP 21.44	Unnamed Creek	Extra work space required to store a significant volume of spoil generated from a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.

MP 22.7	Unnamed Creek	Extra work space required to store a significant volume of spoil generated to grade down the ridge on the north side of the crossing and a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.
MP 23.7	Cart Creek	Extra work space required to store a significant volume of spoil generated from increased depth and length of extra depth ditch at the crossing that is required to address potential scour depth and lateral migration of the stream respectively.
MP 24.7	Unnamed Creek	Extra work space required to store a significant volume of spoil generated from increased depth and length of extra depth ditch at the crossing that is required to address potential scour depth and lateral migration of the stream respectively.
MP 29.4	North Branch Park River	Extra work space required to store a significant volume of spoil generated from increased depth and length of extra depth ditch at the crossing that is required to address potential scour depth and lateral migration of the River respectively.
MP 31.8	Unnamed Creek	Extra work space required to store a significant volume of spoil generated from grading of steep slopes on both sides of the crossing and a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.
MP 33.3	Unnamed Stream and Middle Branch Park River	Extra work space required to store a significant volume of spoil generated from grading of the steep slope on the north side of the crossing and a substantial length of extra depth ditch at both crossings that is required to address potential lateral migration of both streams.
MP 34.8	Unnamed Creek	Extra work space required to store a significant volume of spoil generated from a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.
MP 35.3	Unnamed Creek	Extra work space required to store a significant volume of spoil generated from grading of steep slopes on both sides of the crossing and a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.
MP 36.3	Unnamed Creek	Extra work space required to store a significant volume of spoil generated from grading of steep slopes on both sides of the crossing and a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.
MP 37.2	Unnamed Creek	Extra work space required to store a significant volume of spoil generated from grading of the steep slope on the north side of the crossing and a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.
MP 38.1	Unnamed Creek	Extra work space require to store a significant volume of spoil generated from grading of the steep slope on the south side of the crossing and a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.

MP 42.7	Unnamed Stream	Extra work space require to store a significant volume of spoil generated from grading of the steep slopes on both sides of the crossing and a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the stream.
MP 46.4	North Branch Forest River	Extra work space required to store a significant volume of spoil generated from grading of the steep slope on the north side of the crossing and a substantial length of extra depth ditch at the crossing that is required to address potential lateral migration of the River.
MP 49.2	Unnamed Stream	Extra work space required to store a significant volume of spoil generated from grading of the steep slope on the south side of the crossing, increased depth and length of extra depth ditch at the crossing that is required to address potential scour depth and lateral migration of stream respectively.
MP 54.8	Middle Branch Forest River	Extra work space require to store a significant volume of spoil generated from grading of steep slopes on both sides of the River and increased depth and length of extra depth ditch at the crossing that is required to address potential scour depth and lateral migration of the River respectively.
MP 107.1	Bored Crossing of 5 <sup>th</sup> Street NE	Extra work space required to store a significant volume of spoil generated by excavating safe bore and receiving pits. Because workers will operate in the excavation, safety considerations require the trench walls to be appropriately sloped, resulting in a significantly larger and wider excavation, with resulting large spoil volumes generated.
MP 123.6	Bored Crossing of 11 <sup>th</sup> Street SE	Extra work space required to store a significant volume of spoil generated by excavating safe bore and receiving pits. Because workers will operate in the excavation, safety considerations require the trench walls to be appropriately sloped, resulting in a significantly larger and wider excavation, with resulting large spoil volumes generated.
MP 212.6	Bored Crossing of 97 <sup>th</sup> Street	Extra work space required to store a significant volume of spoil generated by excavating safe bore and receiving pits. Because workers will operate in the excavation, safety considerations require the trench walls to be appropriately sloped, resulting in a significantly larger and wider excavation, with resulting large spoil volumes generated.

- Anticipated volumes of spoils that are expected to be contained in extra work spaces of various sizes are provided below. The drawings in Exhibit A describe the estimated soil volumes estimated to be generated from grading and trench excavation at each location.

<b>CAPACITY (CUBIC YARDS) FOR WORK SPACES</b>	
<b>WORK SPACE DIMENSIONS</b>	<b>CAPACITY (CUBIC YARDS)</b>
25 ft x 117 ft	631
25 ft x 125 ft	676
25 ft x 130 ft	704

25 ft x 150 ft	815
25 ft x 175 ft	954
25 ft x 200 ft	1,093
25 ft x 230 ft	1,259
25 ft x 250 ft	1,370
50 ft x 62 ft	807
50 ft x 125 ft	1,741
50 ft x 175 ft	2,481
60 ft x 60 ft	963
80 ft x 140ft x 120 ft	3,148

- Larger flowing stream crossings are typically installed by a special construction crew in order to minimize the amount of time that work is performed in-stream. This stream crossing crew is typically comprised of the personnel and equipment required to complete the entire stream crossing installation, including clearing/grading remaining trees and vegetation at stream buffer zones, excavating the stream crossing, placing the line pipe in the trench, backfilling the trench, and completing initial restoration work to stabilize the stream banks.
- The pipeline typically is placed a minimum of five feet below the existing stream bottom and approximately 15 feet into the stream banks before returning to normal depths of cover unless the potential for stream scour or lateral migration require greater depths. This depth of cover and length of pipe into the stream banks create significant excavations and resultant spoil materials that require adequate temporary storage.
- The trench excavation at streams can be 50 feet wide at the top of the trench to be able to get sufficient depth and width at the trench bottom for the pipe. The pipeline work crew must have sufficient width of workspace adjacent to the trench to lift the pipe section and “walk” it into and across the stream to place it into the trench.
- Attached are Exhibits B and C which include photos depicting extra work space for construction of pipeline at stream crossings. Exhibit B has photos from the REX pipeline project constructed in 2007 in Missouri. Exhibit C has photos from the Alliance pipeline project constructed in North Dakota, Minnesota, Iowa, and Illinois in 1999 and 2000.
- According to Condition 24 and of the PSC Order and Item 11 of the Tree and Shrub Mitigation Specifications, Keystone must reforest the temporary workspace where additional width of trees is cleared. Therefore, over a period of a few years, the temporary work space as well as the construction right of way will be re-vegetated and there will be no permanent impact to the forested areas.
- It is my professional opinion that the additional temporary work space at stream crossings depicted on the site specific drawings included in Exhibit A is necessary to install the pipeline safely and with the least environmental impact to the stream.



# L. A. "BUSTER" GRAY, P.E.

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## Experience Summary:

Over thirty years of experience in the management and design of oil and gas pipeline projects with capital budgets from less than \$1 million to approximately \$5 billion. Experienced in all aspects of pipeline project execution including feasibility and flow studies, route selection, surveying, mapping, detailed engineering design, DOT compliance, material procurement, project and construction management, commissioning, and operations. Projects managed have included a variety of pipeline related facilities including production, separation, dehydration, compression, gas treatment and metering equipment. Owned and operated Pipeline Design Enterprises, Inc. which was merged into Universal Ensco, Inc. in 1989. Senior Vice President of Universal Ensco, Inc.

## Career highlights include:

- **Engineering & Construction Manager** of the 1,280 mile 30" & 36" U.S. portion crude oil pipeline project across North & South Dakota, Nebraska, Kansas, Missouri, Oklahoma, and Illinois. The project involves twelve (12) mainline construction spreads with installation scheduled over a two year period to begin in 2008.
- **Project Director** of the conceptual design, constructability assessment, and cost estimate for Exxon's proposed 900 kilometer 36" Sakhalin Island to China natural gas pipeline project. The pipeline route traverses the remoter area of the Khabarovsk Krai in Far Eastern Russia.
- **Project Director** for the supervision of construction of an approximate 4,000 kilometers (2,500 miles) of 40" OD gas pipeline and related facilities (China West to East Gas Pipeline Project) for PetroChina Company Limited. The pipeline route traversed rugged, mountainous areas as well as desert terrain.
- **Project Director** responsible for the preparation of a cost estimate for construction of the Guangdong LNG Pipeline Project including assessment of the proposed pipeline route for constructability issues and relative complexity to the China West to East Gas Pipeline Project.
- **Project Director** of the Conceptual Design and Cost Estimate for construction of an approximate 4,000 kilometers (2,500 miles) of 40" OD gas pipeline (China West to East Gas Pipeline Project) and related facilities for PetroChina Company Limited – Phase I.
- **Engineering & Construction Manager** of the 900-mile 36" U.S. portion of the Alliance 36" natural gas pipeline project across North Dakota, Minnesota, Iowa, and Illinois. The project involved seven (7) mainline construction spreads with installation scheduled over a two year period beginning in 1999.
- **Project Director** of the 515 mile U.S. portion of the 780-mile 24" crude oil Express Pipeline Project from Wildhorse, Montana to Casper, Wyoming. This project was routed, designed, materials procured and installed in less than one year. The project included management of route selection, survey, engineering design, drafting, procurement, and construction.

- **Engineering Manager** of the design of the 223-mile 20" Tuscarora natural gas pipeline project to serve Reno, Nevada and several small northern California communities. The project included survey, design, and drafting of the pipeline, pigging, measurement, and pressure reduction facilities. The pipeline route traverses rugged, mountainous as well as desert terrain.
- **Project Director** for the route selection, survey, permitting, right-of-way acquisition, and mapping for Tennessee Gas Pipeline Company's 223-mile, 30-inch natural gas pipeline in Louisiana and Mississippi.
- **Project Director** for Seagull Energy Corporation's Multiple Feedstocks Products Pipeline Project. This project, located in the congested Houston Ship Channel area, included the survey, mapping, detailed design, material procurement assistance, and construction inspection for three 8-inch and one 10-inch products pipelines.
- **Project Manager** of natural gas pipelines and related facilities to electric generation utilities including a 23-mile 20" line for Florida Power and Light Company in Florida, a 75-mile 20" line for Cincinnati Gas and Electric Company in eastern Kentucky, and an 11-mile 20" line for Kentucky Utilities in central Kentucky. Responsibilities included route selection, survey, permitting, design, right-of-way acquisition, and construction supervision.
- **Project Manager** for other large diameter pipeline projects including 67-miles of 30-inch and 51-miles of 24-inch natural gas pipelines in the Houston metropolitan area; 3-miles of dual 30-inch gas pipeline and measurement facilities near Hallettsville, Texas, and 11-miles of 24-inch pipeline in the highly congested Houston Ship Channel area.
- **Expert Witness** for regulatory hearings and trial on matters including pipeline flow capacities, cost estimates, construction cost claims, and design safety standards.

#### **Education:**

Bachelor of Science, Civil Engineering, Mississippi State University, 1976

#### **Registrations and Professional Memberships:**

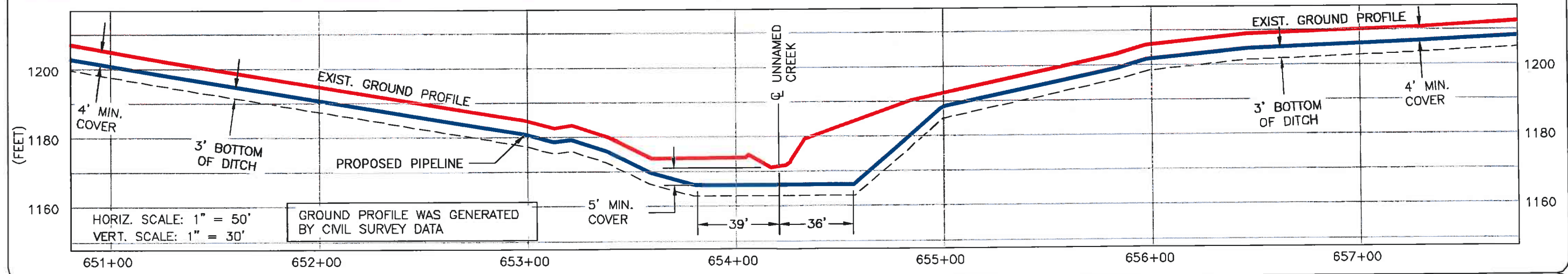
- Professional Engineer, TX, No. 49686; MS, No. 9160; LA, No. 23381; AR, No. 7489; NM, No. 11337; OK, No. 15758; AL, No. 18138; CO, No. 27545; FL, No. 0044425; MT, No. 10706PE; WY, No. 6233; GA, No. 19882; SC, No. 14965; NC, No. 18638; KY, No. 17430; PA, No. PE-043436-R; MO, No. EN-025579; NV, No. 10193; NY, No. 071750, VA, No. 0402025505; MD, No. 20940; NJ, No. 38813; IL, No. 062-050390; MN, No. 24602; IA, No. 13775; KS, No. 14521; MI, No. 43431; WA, No. 34539; WI, 33582-006; OH, No. E-66360; AZ 37034; ND 4714; NE E-11956 and OR 79341PE.
- Professional Land Surveyor, Texas, No. 4257
- American Society of Civil Engineers
- Pipeliners Club of Houston (Former President)

# **EXHIBIT A**



Scale: 1" = 50'

PEMBINA COUNTY




REFERENCE DRAWINGS										
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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES0053885	AH	SS	HF	RG	RG		

DRAFT

## JUSTIFICATION


1. EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF STEEP SLOPES ON BOTH SIDES OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF STREAM.
2. 3550 CUBIC YARDS OF GRADING AND TRENCH SPOIL.



**TransCanada**  
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Fax: 1-850-385-5523



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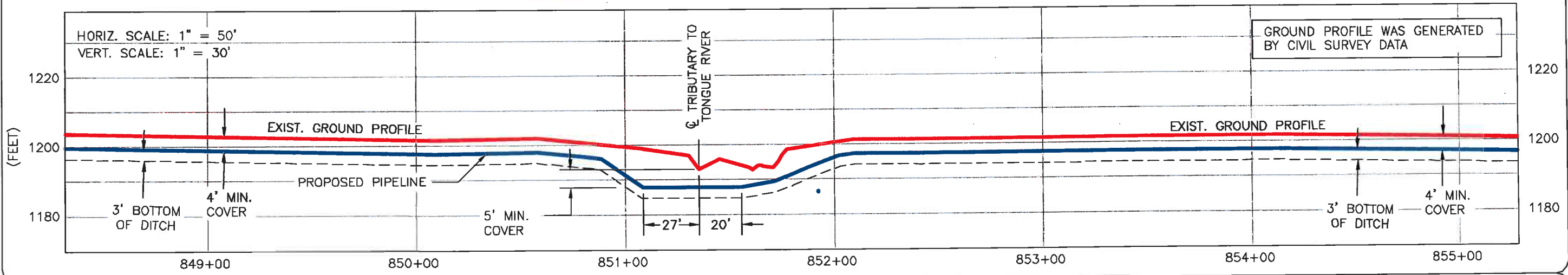
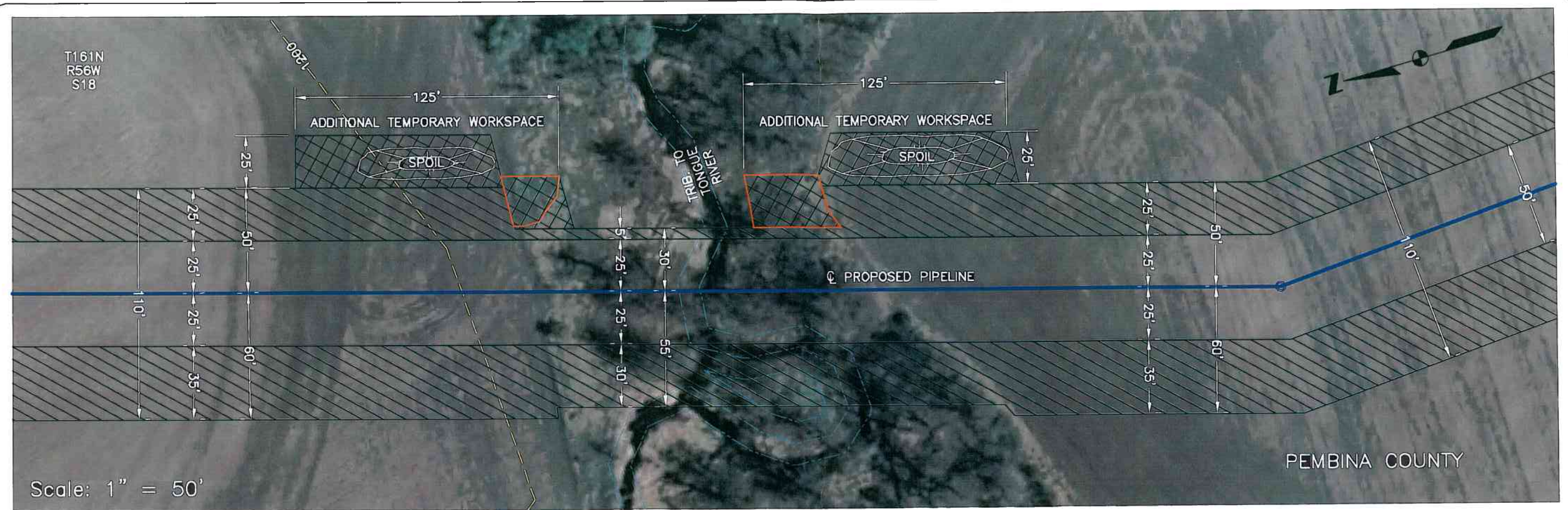
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FIA # 1801	CHAINAGE: MP 13.12	DISCIPLINE # 03
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UNNAMED CREEK  
FORESTED STREAM CROSSING  
PEMBINA COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1801-03-ML-03-050	REV 0
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TIME-DESIGNFILE



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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES0053885	AH	SS	HF	RG	RG

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE STREAM.
- 2470 CUBIC YARDS OF GRADING AND TRENCH SPOIL.

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EDINBURG PUMP STATION

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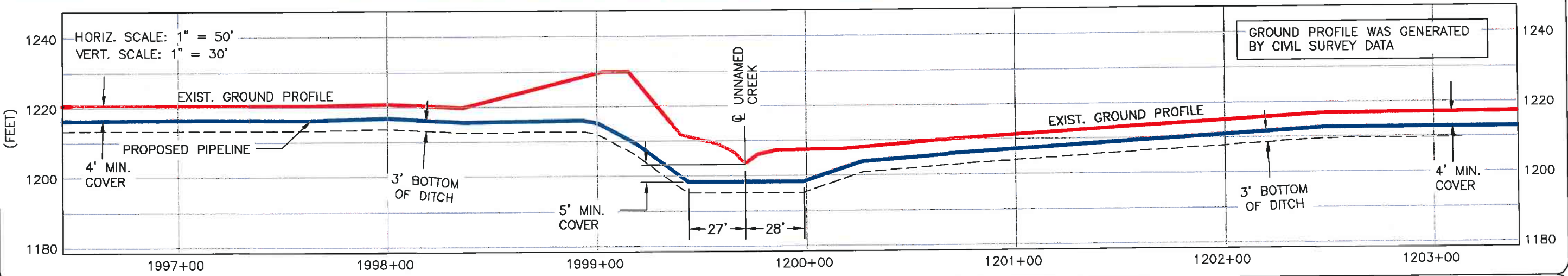
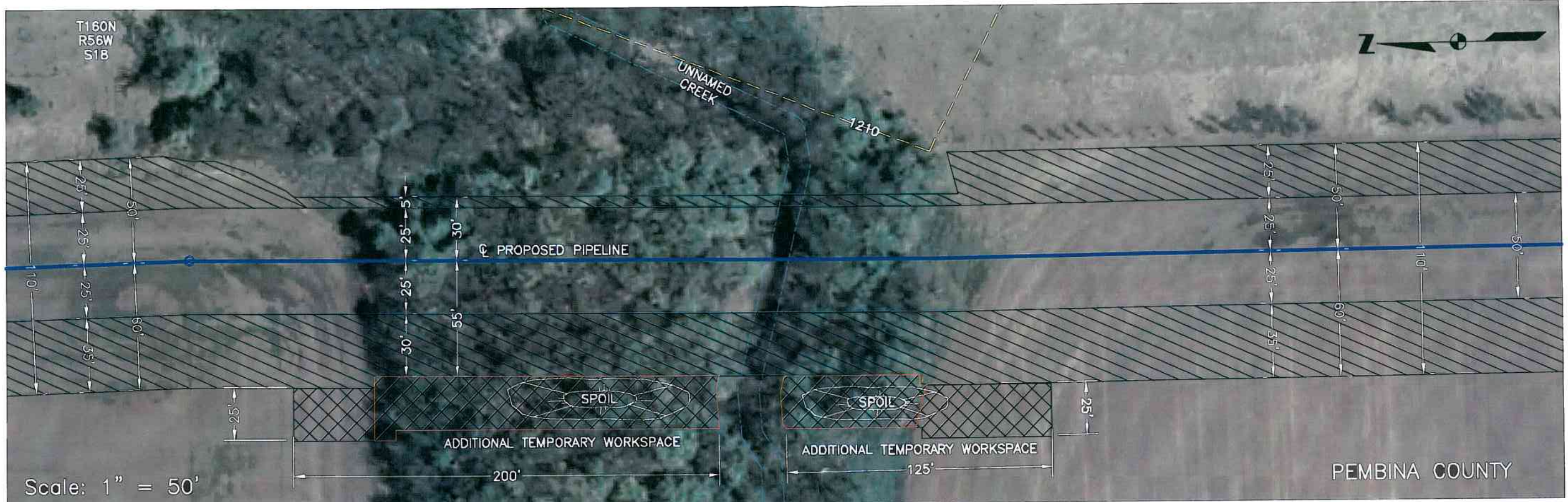
TRIBUTARY TO TONGUE RIVER  
FORESTED STREAM CROSSING  
PEMBINA COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1801-03-ML-03-051	REV 0
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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	AH	SS	HF	RG	RG		

## JUSTIFICATION


- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED TO GRADE DOWN THE RIDGE ON THE NORTH SIDE OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE STREAM.
- 4034 CUBIC YARDS OF GRADING AND TRENCH SPOIL.



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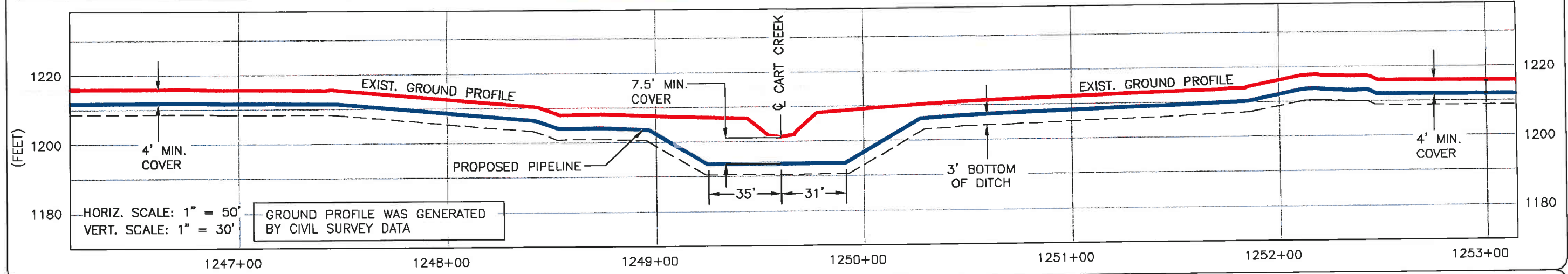
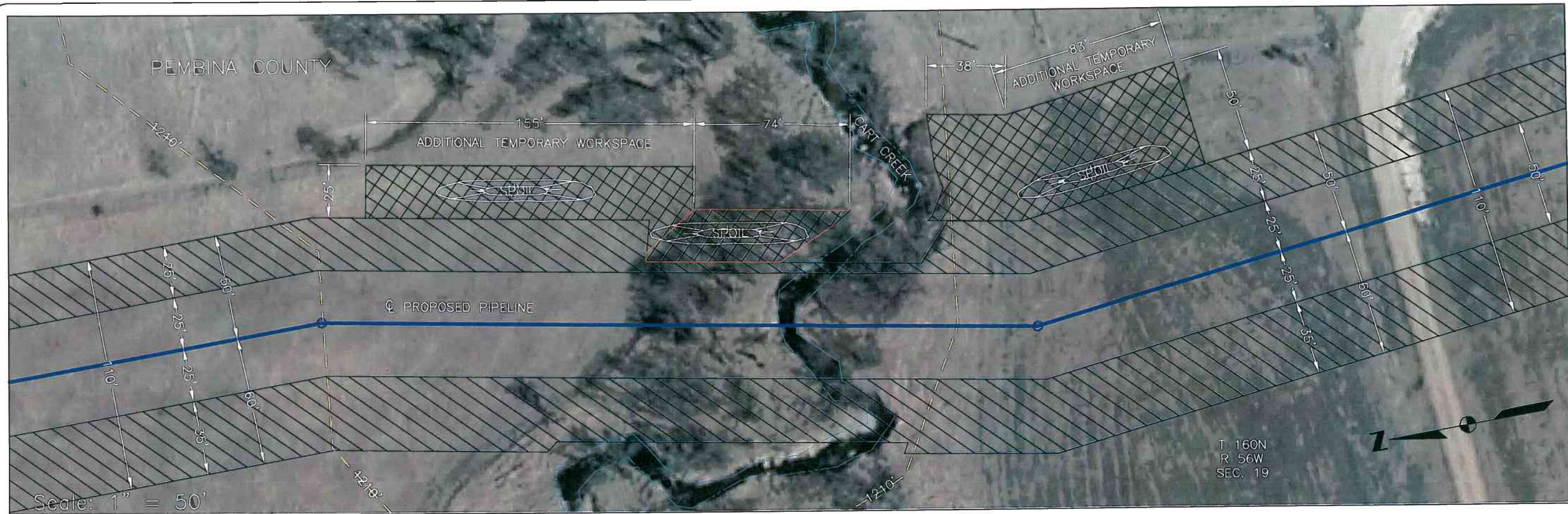
EDINBURG PUMP STATION

FIA # 1801	CHAINAGE: MP 22.7	DISCIPLINE # 03
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UNNAMED CREEK  
FORESTED STREAM CROSSING  
PEMBINA COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1801-03-ML-03-054	REV 00
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TIME-DESIGNFILE



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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	JB	SS	HF	RG	RG

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM INCREASED DEPTH AND LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL SCOUR DEPTH AND LATERAL MIGRATION OF THE STREAM RESPECTIVELY.
- 3551 CUBIC YARDS OF GRADING AND TRENCH SOIL.

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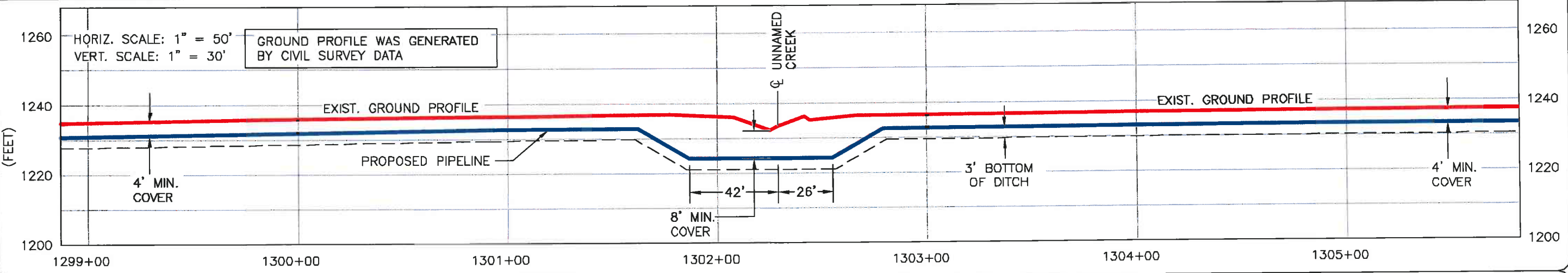
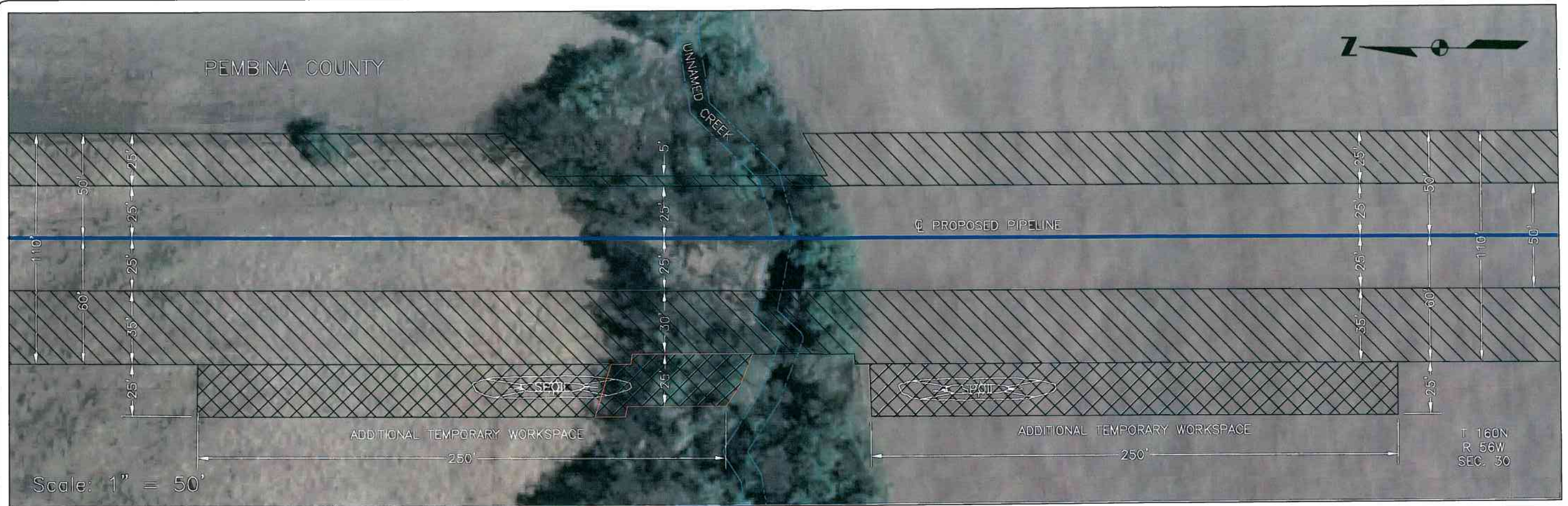
EDINBURG PUMP STATION

FIA # 1801	CHAINAGE: MP 23.7	DISCIPLINE # 03
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### CART CREEK FORESTED STREAM CROSSING PEMBINA COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1801-03-ML-03-055	REV 00
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TIME-DESIGNFILE



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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	JB	SS	HF	RG	RG

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM INCREASED DEPTH AND LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL SCOUR DEPTH AND LATERAL MIGRATION OF THE STREAM RESPECTIVELY.
- 3143 CUBIC YARDS OF GRADING AND TRENCH SOIL.

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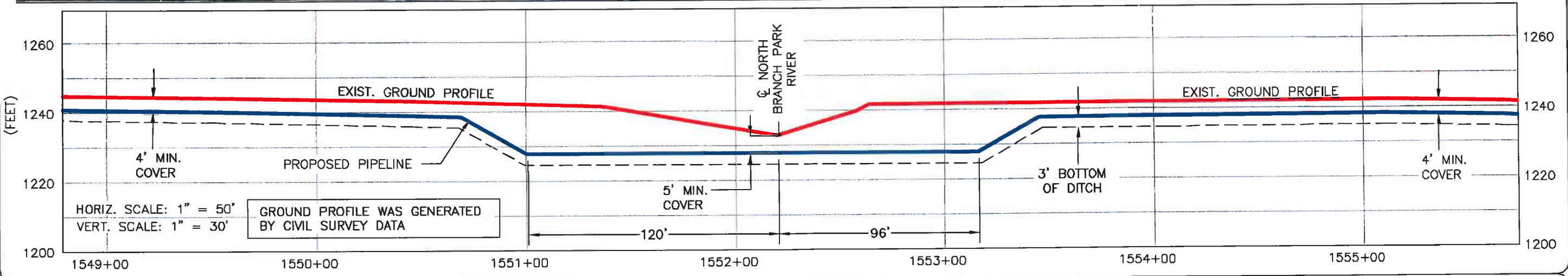
EDINBURG PUMP STATION

FIA # 1801	CHAINAGE: MP 24.7	DISCIPLINE # 03
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UNNAMED CREEK  
FORESTED STREAM CROSSING  
PEMBINA COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1801-03-ML-03-056	REV 00
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TIME-DESIGNFILE



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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	JB	SS	HF	RG	RG		

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM INCREASED DEPTH AND LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL SCOUR DEPTH AND LATERAL MIGRATION OF THE STREAM RESPECTIVELY.
- 3160 CUBIC YARDS OF GRADING AND TRENCH SOIL.

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1300 Metropolitan Boulevard, Suite 200  
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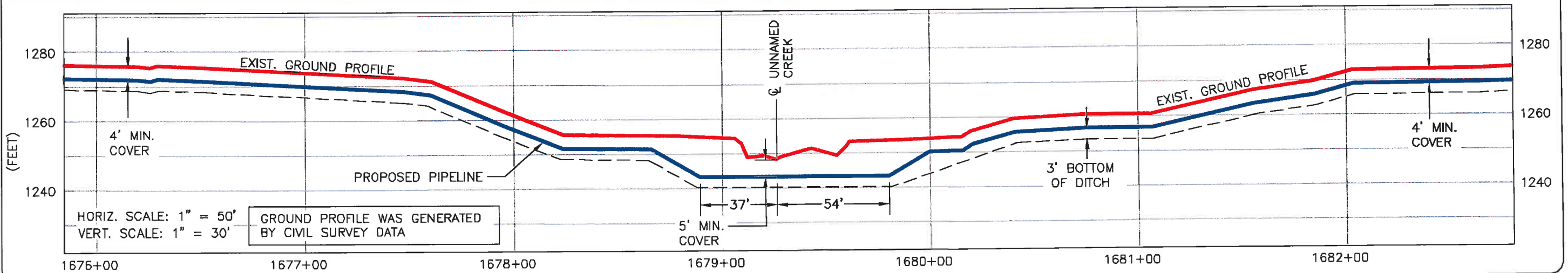
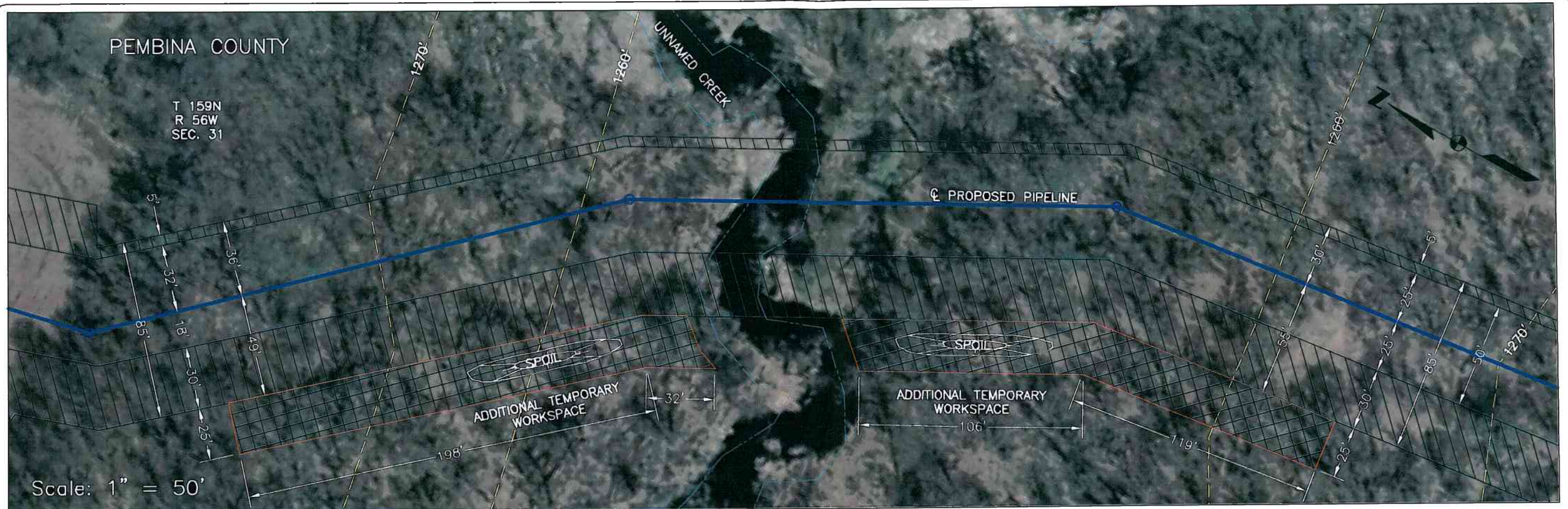
EDINBURG PUMP STATION

FIA # 1801	CHAINAGE: MP 29.4	DISCIPLINE # 03
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NORTH BRANCH PARK RIVER  
FORESTED STREAM CROSSING  
PEMBINA COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1801-03-ML-03-057	REV 0
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TIME-DESIGNFILE



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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	JB	SS	HF	RG	RG		

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF STEEP SLOPES ON BOTH SIDES OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE STREAM.
- 3164 CUBIC YARDS OF GRADING AND TRENCH SPOIL.

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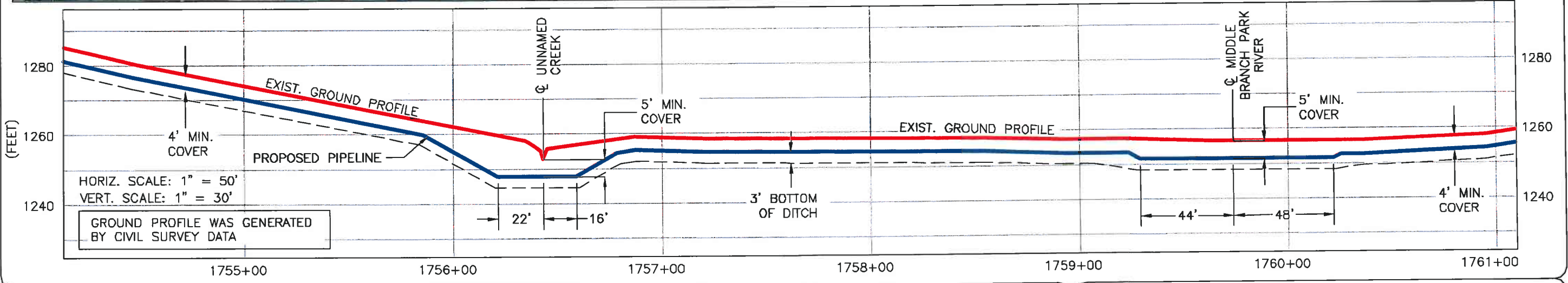
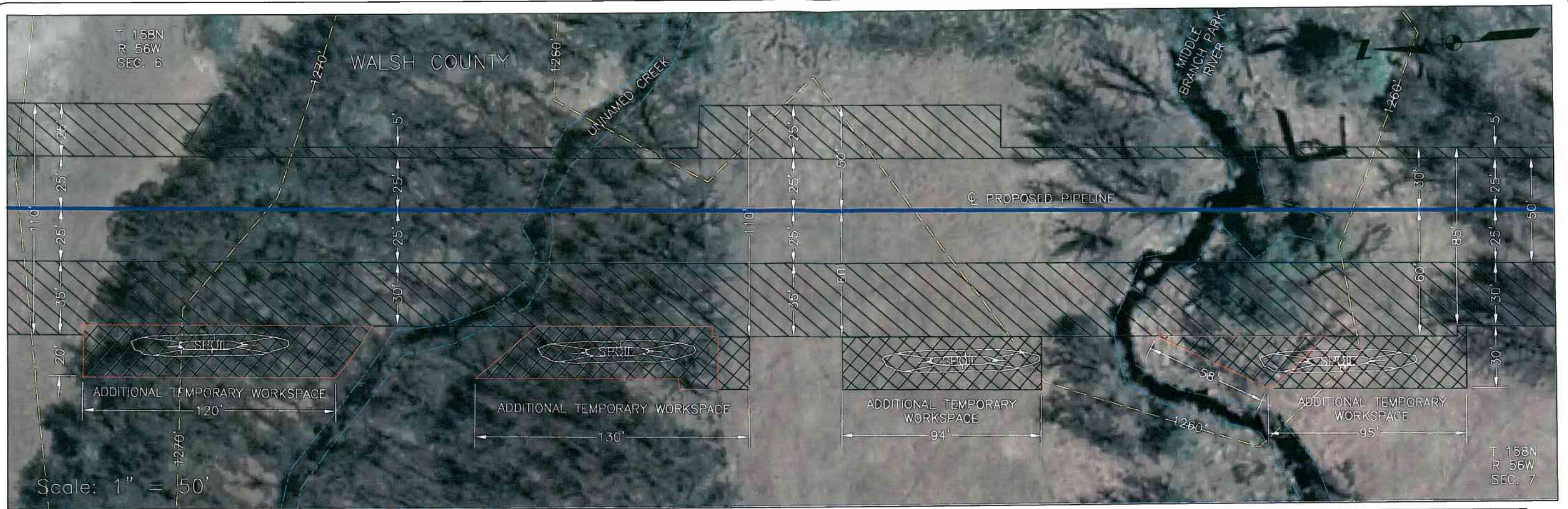
EDINBURG PUMP STATION

FIA # 1801	CHAINAGE: MP 31.8	DISCIPLINE # 03
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UNNAMED CREEK  
FORESTED STREAM CROSSING  
PEMBINA COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1801-03-ML-03-058	REV 00
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TIME-DESIGNFILE



REFERENCE DRAWINGS										
DRAWING No	TITLE									
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REV No	DATE	REVISION	PROJECT CODE	DRAFT BY	DRAFT CHK	DESIGN BY	DESIGN CHK	PROJ MGR		
0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	JB	SS	HF	RG	RG		

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF THE STEEP SLOPE ON THE NORTH SIDE OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT BOTH CROSSINGS THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF BOTH STREAMS.
- 3637 CUBIC YARDS OF GRADING AND TRENCH SPOIL.

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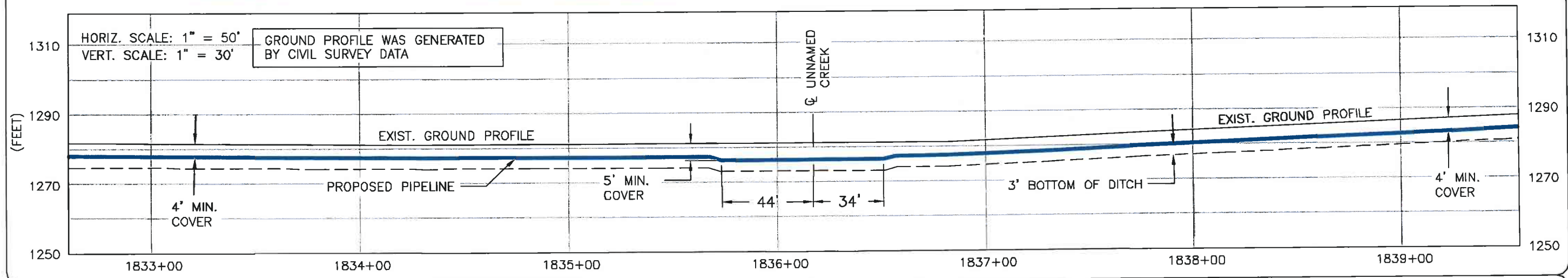
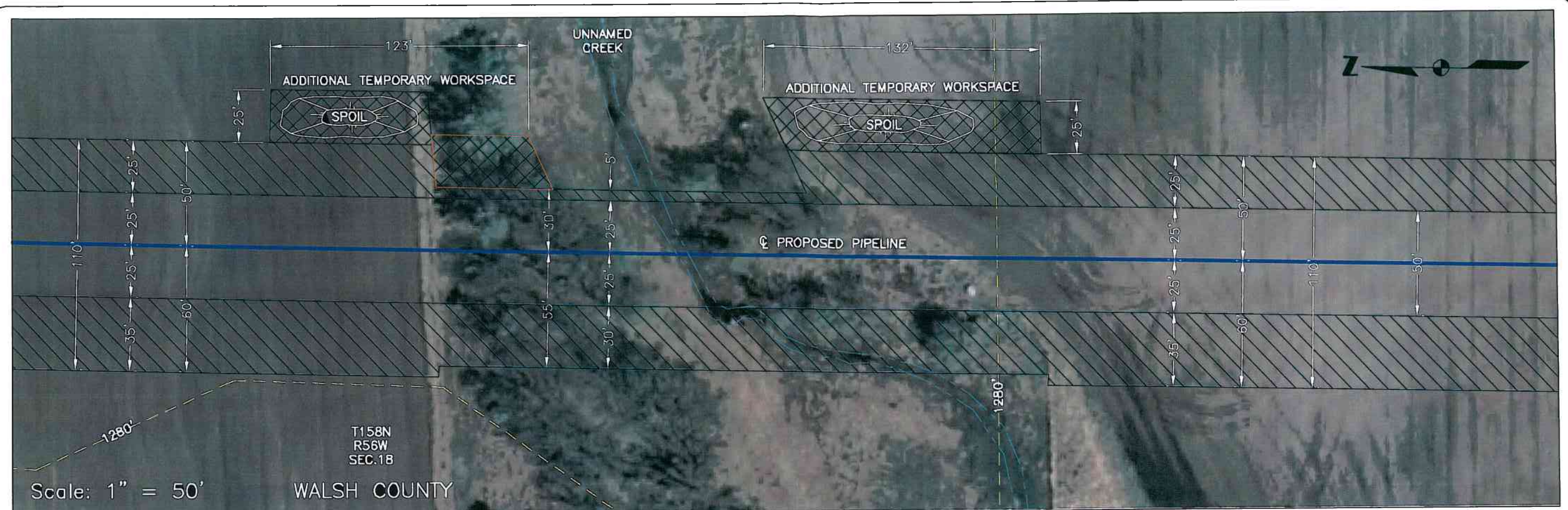
EDINBURG PUMP STATION

FIA # 1801	CHAINAGE: MP 33.3	DISCIPLINE # 03
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UNNAMED STREAM & MIDDLE BRANCH PARK RIVER  
FORESTED STREAM CROSSING  
WALSH COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1801-03-ML-03-059	REV 00
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TIME-DESIGNFILE



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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	CB	SS	HF	RG	RG		

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE STREAM.
- 2202 CUBIC YARDS OF GRADING AND TRENCH SPOIL.

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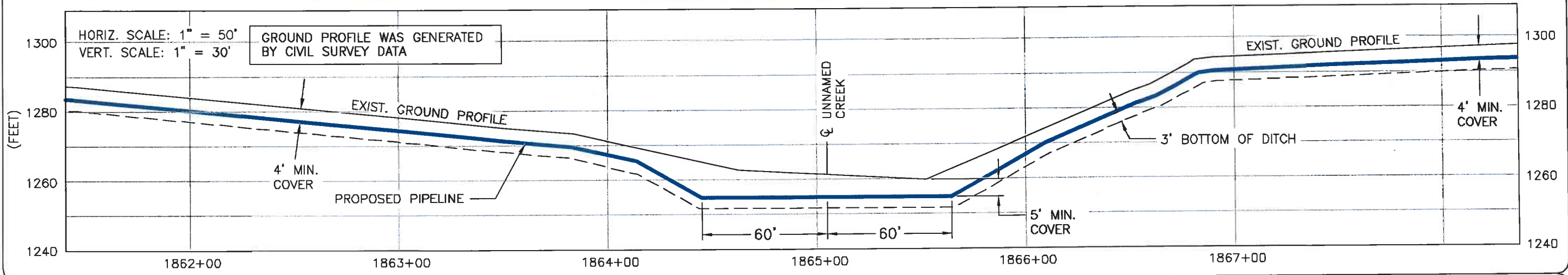
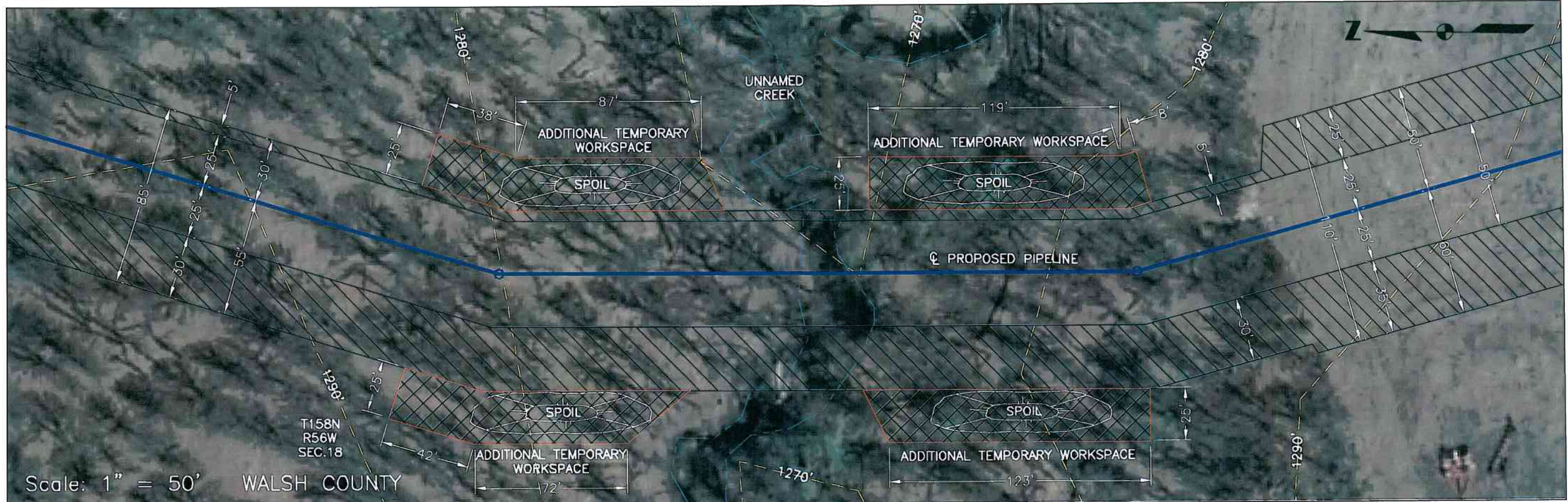
NIAGRA PUMP STATION

FIA # 1802	CHAINAGE: MP 34.8	DISCIPLINE # 03
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UNNAMED CREEK  
FORESTED STREAM CROSSING  
WALSH COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1802-03-ML-03-050	REV 00
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TIME-DESIGNFILE




REFERENCE DRAWINGS										
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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	CB	SS	HF	RG	RG		

DRAFT

## JUSTIFICATION


1. EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF STEEP SLOPES ON BOTH SIDES OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE STREAM.
2. 3416 CUBIC YARDS OF GRADING AND TRENCH SPOIL.



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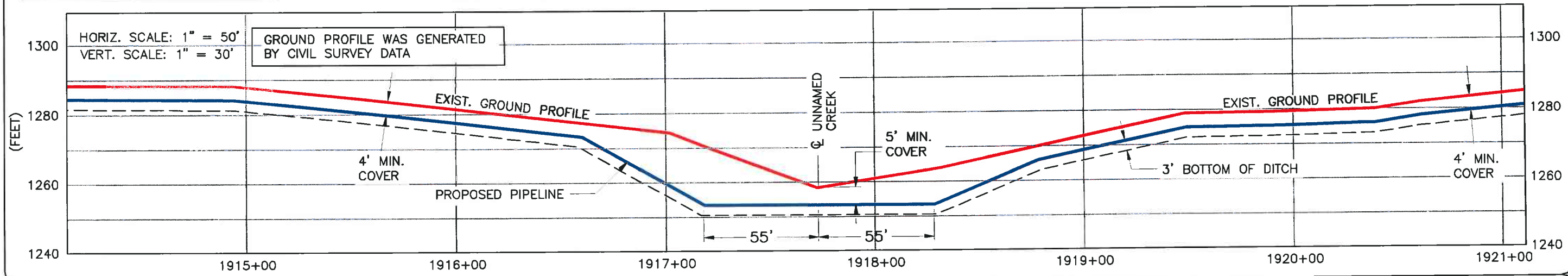
NIAGRA PUMP STATION

FIA # 1802	CHAINAGE: MP 35.3	DISCIPLINE # 03
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UNNAMED CREEK  
FORESTED STREAM CROSSING  
WALSH COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1802-03-ML-03-051	REV 00
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TIME-DESIGNFILE



DRAWING No		TITLE						
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UTM 14 BASE FILE		ML_14_OC_BASE.dwg						
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REV No	DATE	REVISION	PROJECT CODE	DRAFT BY	DRAFT CHK	DESIGN BY	DESIGN CHK	PROJ MGR
0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THE5005388S	CB	SS	HF	RG	RG

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF STEEP SLOPES ON BOTH SIDES OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE STREAM.
- 4472 CUBIC YARDS OF GRADING AND TRENCH SPOIL.

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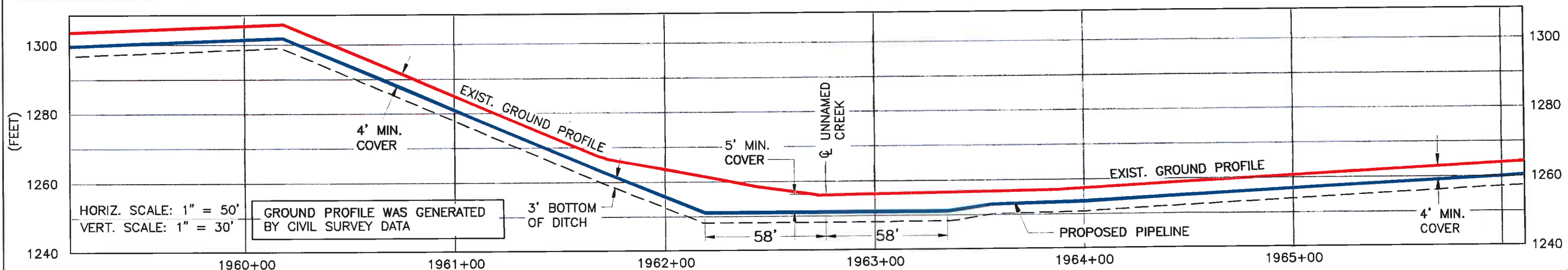
**NIAGRA PUMP STATION**

FIA # 1802	CHAINAGE: MP 36.3	DISCIPLINE # 03
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**UNNAMED CREEK  
FORESTED STREAM CROSSING  
WALSH COUNTY, NORTH DAKOTA**

SCALE As Shown	DRAWING No 1802-03-ML-03-052	REV 00
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TIME-DESIGNFILE



REFERENCE DRAWINGS								
DRAWING No	TITLE							
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REV No	DATE	REVISION	PROJECT CODE	DRAFT BY	DRAFT CHK	DESIGN BY	DESIGN CHK	PROJ MGR
0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES0053885	CB	SS	HF	RG	RG

## JUSTIFICATION


1. EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF THE STEEP SLOPE ON THE NORTH SIDE OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE STREAM.
2. 3173 CUBIC YARDS OF GRADING AND TRENCH SPOIL.



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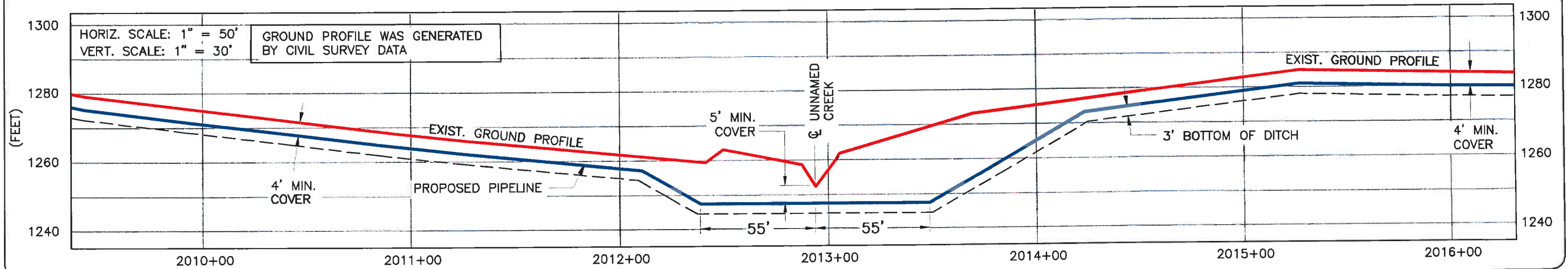
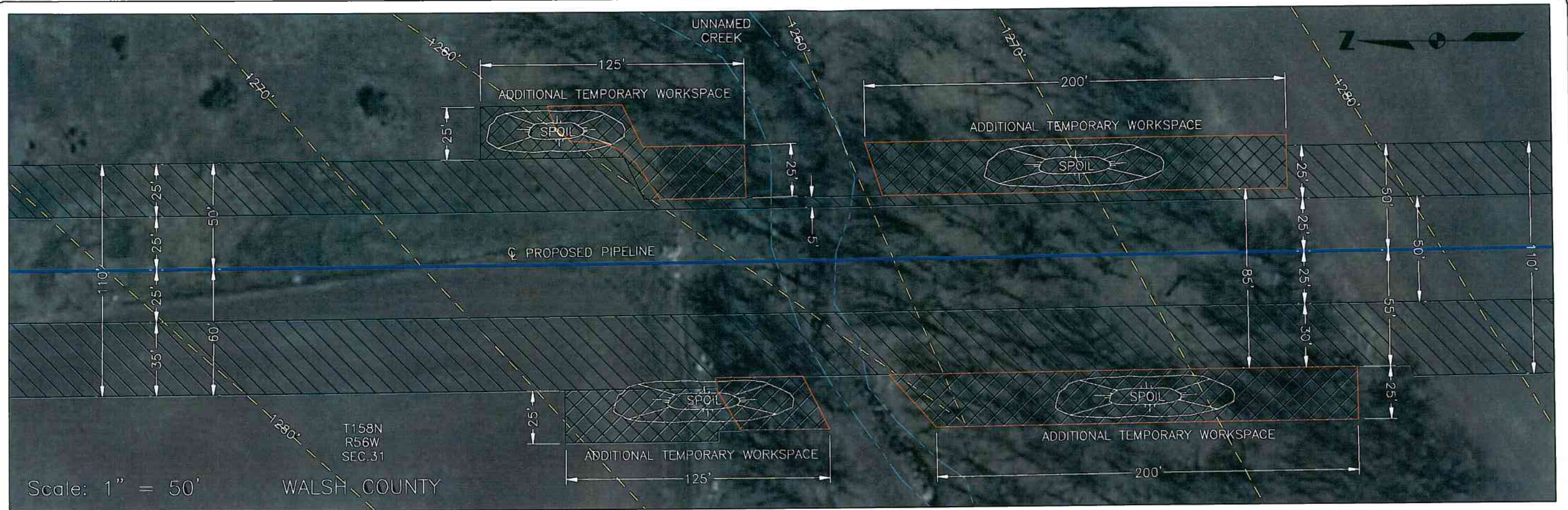
NIAGRA PUMP STATION

FIA # 1802	CHAINAGE: MP 37.2	DISCIPLINE # 03
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UNNAMED CREEK  
FORESTED STREAM CROSSING  
WALSH COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1802-03-ML-03-053	REV 00
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TIME-DESIGNFILE




REFERENCE DRAWINGS										
DRAWING No	TITLE									
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REV No	DATE	REVISION	PROJECT CODE	DRAFT BY	DRAFT CHK	DESIGN BY	DESIGN CHK	PROJ MGR		
0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES0053885	CB	SS	HF	RG	RG		

DRAFT

## JUSTIFICATION


- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF THE STEEP SLOPE ON THE SOUTH SIDE OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE STREAM.
- 6000 CUBIC YARDS OF GRADING AND TRENCH SPOIL.



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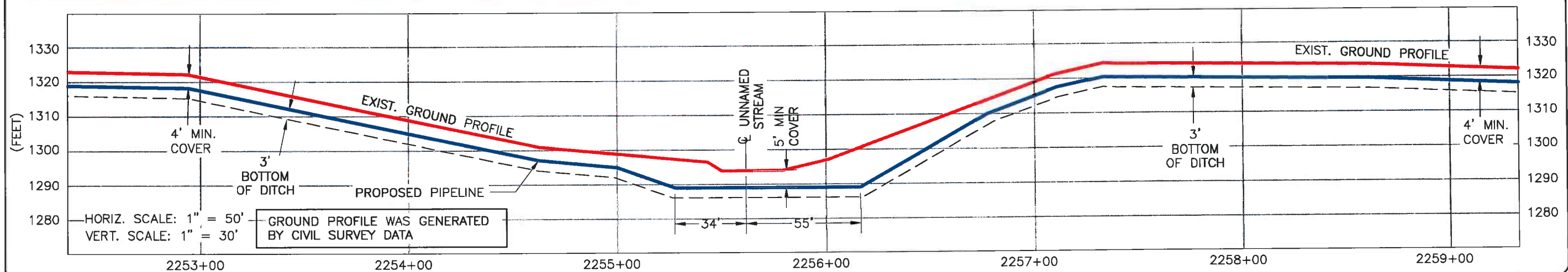
NIAGRA PUMP STATION

FIA # 1802	CHAINAGE: MP 38.1	DISCIPLINE # 03
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UNNAMED CREEK  
FORESTED STREAM CROSSING  
WALSH COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1802-03-ML-03-054	REV 00
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TIME DESIGNFILE



REFERENCE DRAWINGS										
DRAWING No	TITLE									
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UTM 14 BASE FILE	ML_14_OC_BASE.dwg									
NOTES AND LEGEND	ND 18.sid									
REV No	DATE	REVISION	PROJECT CODE	DRAFT BY	DRAFT CHK	DESIGN BY	DESIGN CHK	PROJ MGR		
0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	BM	SS	HF	RG	RG		

### JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF THE STEEP SLOPES ON BOTH SIDES OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE STREAM.
- 3180 CUBIC YARDS OF GRADING AND TRENCH SPOIL.

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**Trow**

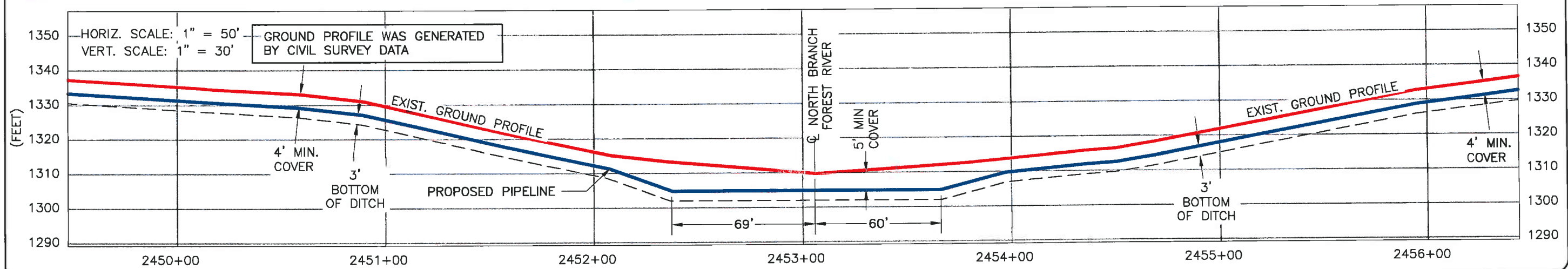
EDINBURG PUMP STATION

FIA # 1802    CHAINAGE: MP 42.7    DISCIPLINE # 03

UNNAMED STREAM  
FORESTED STREAM CROSSING  
WALSH COUNTY, NORTH DAKOTA

SCALE: As Shown    DRAWING No: 1802-03-ML-03-055    REV: 00


TIME-DESIGNFILE




REFERENCE DRAWINGS								
DRAWING No	TITLE							
MAIN LINE PROFILE	PROFILE_ML.dwg							
UTM 14 BASE FILE	ML_14_OC_BASE.dwg							
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REV No	DATE	REVISION	PROJECT CODE	DRAFT BY	DRAFT CHK	DESIGN BY	DESIGN CHK	PROJ MGR
0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	BM	SS	HF	RG	RG

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF THE STEEP SLOPES ON THE NORTH SIDE OF THE CROSSING AND A SUBSTANTIAL LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL LATERAL MIGRATION OF THE RIVER.
- 3258 CUBIC YARDS OF GRADING AND TRENCH SPOIL.

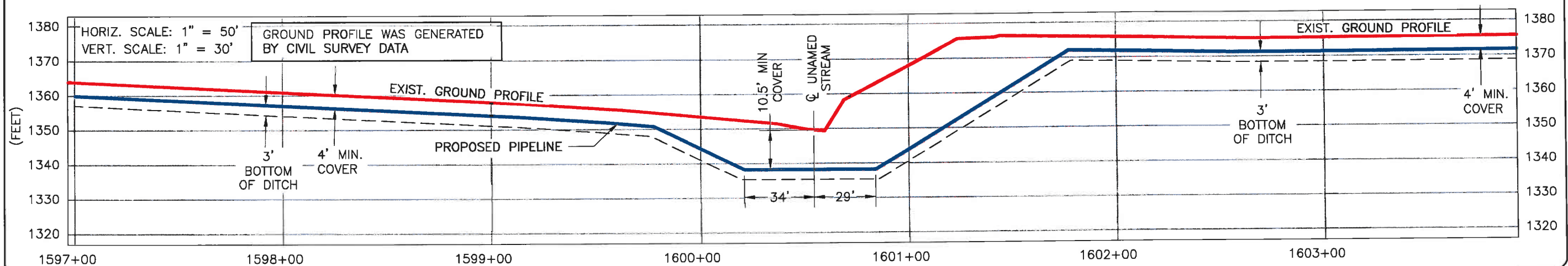
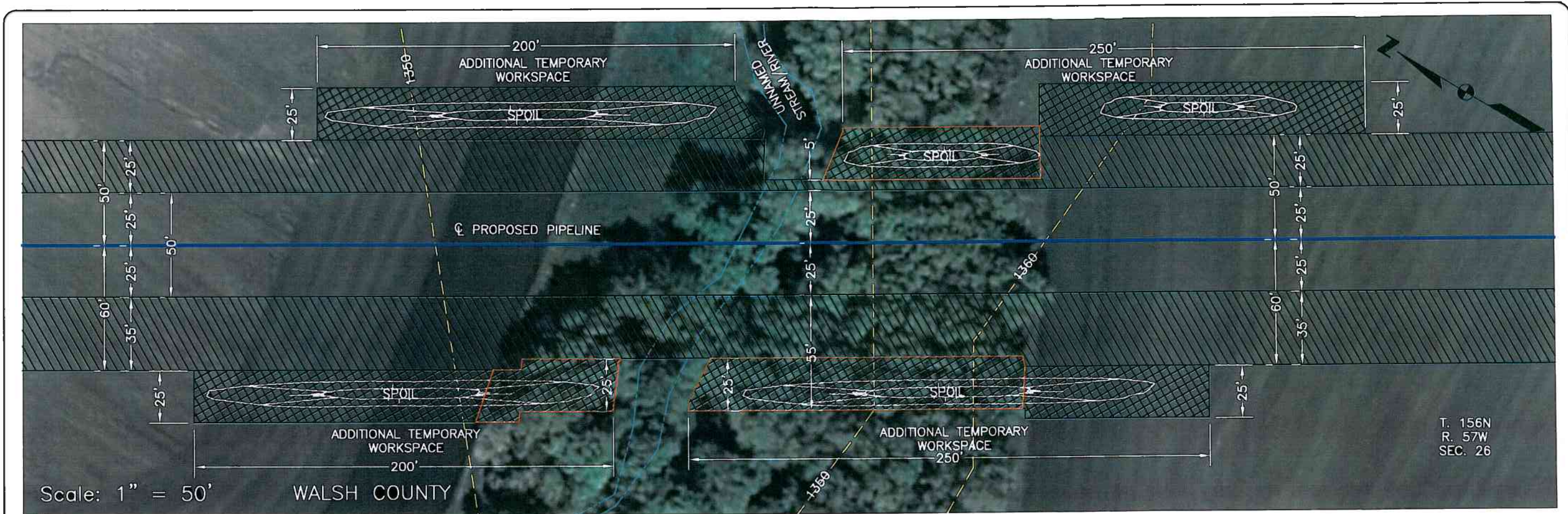

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**EDINBURG PUMP STATION**  
 FIA # 1802    CHAINAGE: MP 46.4    DISCIPLINE # 03

**NORTH BRANCH FOREST RIVER  
 FORESTED STREAM CROSSING  
 WALSH COUNTY, NORTH DAKOTA**

SCALE: As Shown    DRAWING No: 1802-03-ML-03-056    REV: 00



DRAWING No		TITLE						
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UTM 14 BASE FILE		ML_14_OC_BASE.dwg						
NOTES AND LEGEND		ND 20.sid						
REV No	DATE	REVISION	PROJECT CODE	DRAFT BY	DRAFT CHK	DESIGN BY	DESIGN CHK	PROJ MGR
0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	BM	SS	HF	RG	RG

### JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF THE STEEP SLOPE ON THE SOUTH SIDE OF THE CROSSING, INCREASED DEPTH AND LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL SCOUR DEPTH AND LATERAL MIGRATION OF STREAM RESPECTIVELY.
- 6142 CUBIC YARDS OF GRADING AND TRENCH SPOIL.

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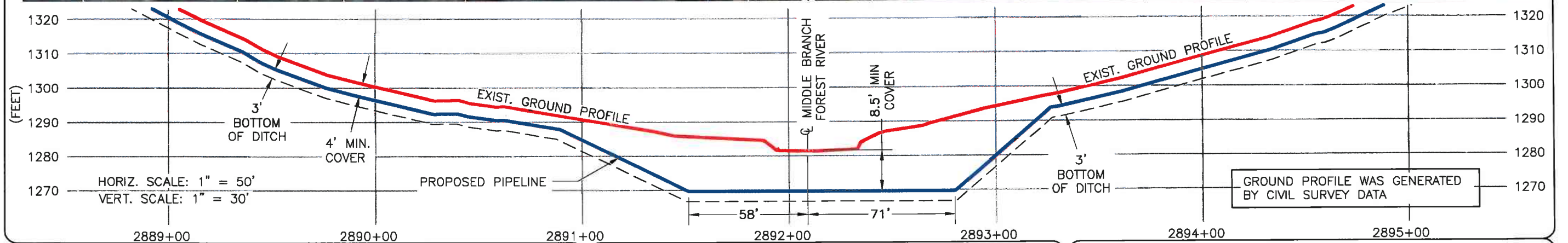
**EDINBURG PUMP STATION**

FIA # 1801	CHAINAGE: MP 49.2	DISCIPLINE # 03
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**UNNAMED STREAM  
FORESTED STREAM CROSSING  
WALSH COUNTY, NORTH DAKOTA**

SCALE As Shown	DRAWING No 1802-03-ML-03-057	REV 00
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TIME-DESIGNFILE



REFERENCE DRAWINGS										
DRAWING No	TITLE									
MAIN LINE PROFILE	PROFILE_ML.dwg									
UTM 14 BASE FILE	ML_14_OC_BASE.dwg									
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REV No	DATE	REVISION	PROJECT CODE	DRAFT BY	DRAFT CHK	DESIGN BY	DESIGN CHK	PROJ MGR		
0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	BM	SS	HF	RG	RG		

### JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED FROM GRADING OF STEEP SLOPES ON BOTH SIDES OF THE RIVER AND INCREASED DEPTH AND LENGTH OF EXTRA DEPTH DITCH AT THE CROSSING THAT IS REQUIRED TO ADDRESS POTENTIAL SCOUR DEPTH AND LATERAL MIGRATION OF THE RIVER RESPECTIVELY.
- 6625 CUBIC YARDS OF GRADING AND TRENCH SPOIL.

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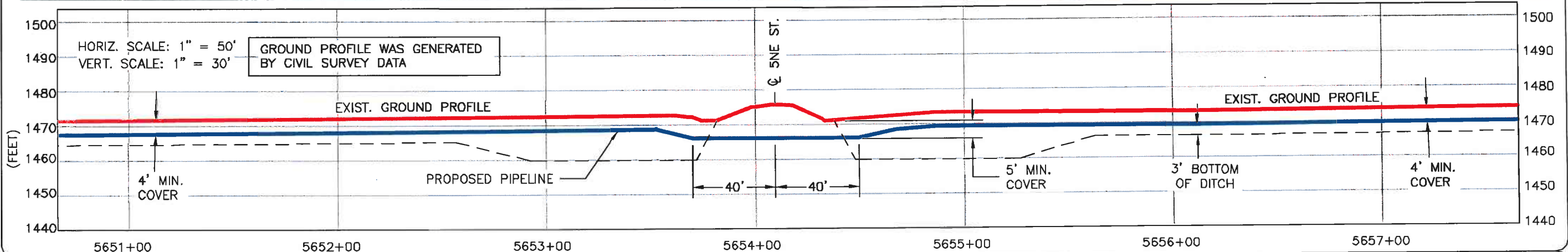
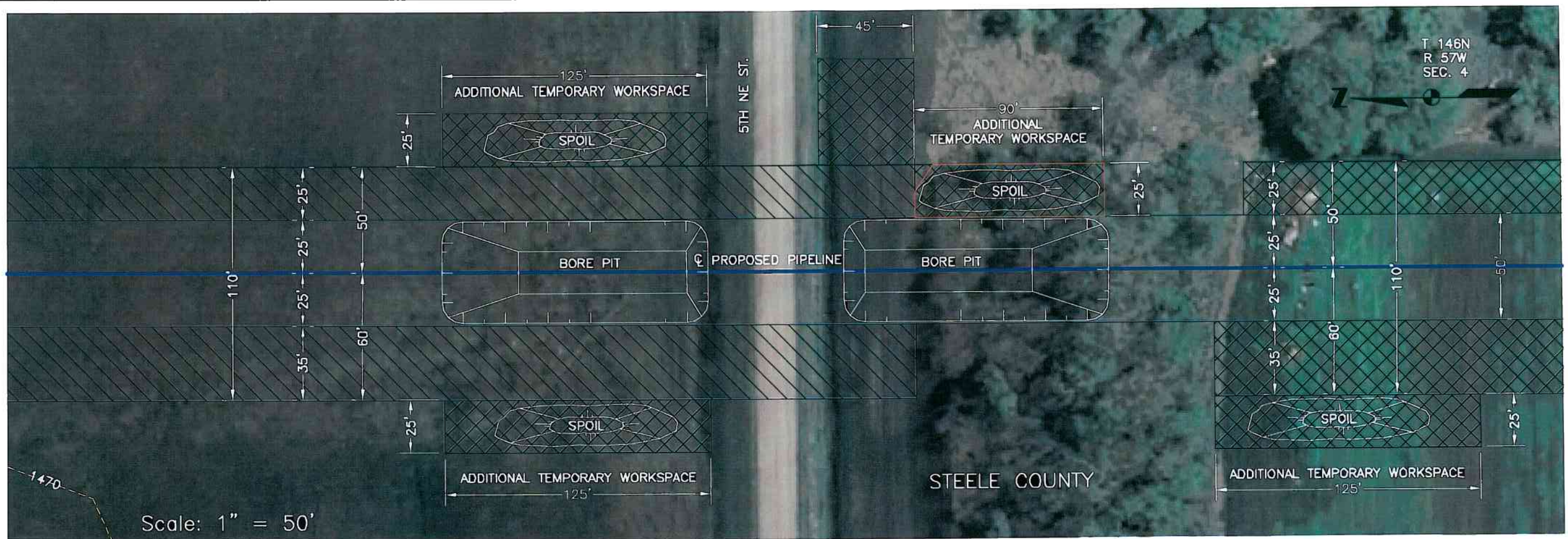
**EDINBURG PUMP STATION**

FIA # 1802	CHAINAGE: MP 54.8	DISCIPLINE # 03
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**MIDDLE BRANCH FOREST RIVER  
FORESTED STREAM CROSSING  
WALSH COUNTY, NORTH DAKOTA**

SCALE As Shown	DRAWING No 1802-03-ML-03-058	REV 00
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TIME-DESIGNFILE



DRAWING No		TITLE	
MAIN LINE PROFILE		PROFILE_ML.dwg	
UTM 14 BASE FILE		ML_14_OC_BASE.dwg	
NOTES AND LEGEND		NOTES_LEGEND.dwg	

REV No	DATE	REVISION	PROJECT CODE	DRAFT BY	DRAFT CHK	DESIGN BY	DESIGN CHK	PROJ MGR
0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388E	TB	SS	HF	RG	RG

### JUSTIFICATION

1. EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED BY EXCAVATING SAFE BORE AND RECEIVING PITS. BECAUSE WORKERS WILL OPERATE IN THE EXCAVATION, SAFETY CONSIDERATIONS REQUIRE THE TRENCH WALLS TO BE APPROPRIATELY SLOPED, RESULTING IN A SIGNIFICANTLY LARGER AND WIDER EXCAVATION, WITH RESULTING LARGE VOLUMES GENERATED.

2. 4,213 CUBIC YARDS OF GRADING AND BORE PITS.

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EDINBURG PUMP STATION

FIA # 1803	CHAINAGE: MP107.1	DISCIPLINE # 03
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5TH NE STREET  
FORESTED ROAD CROSSING  
STEELE COUNTY, NORTH DAKOTA

SCALE As Shown	DRAWING No 1803-03-ML-03-101	REV 00
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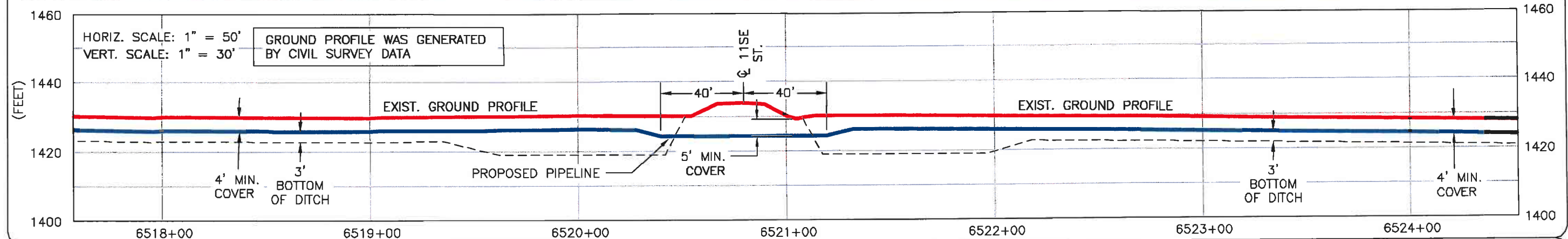
TIME-DESIGNFILE



Scale: 1" = 50'

STEELE COUNTY

T144N  
R57W  
SEC.28



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0	MAR 28 08	FILED WITH THE ND PSC MAR 28 08	THES005388S	TB	SS	HF	RG	RG		

## JUSTIFICATION

- EXTRA WORK SPACE REQUIRED TO STORE A SIGNIFICANT VOLUME OF SPOIL GENERATED BY EXCAVATING SAFE BORE AND RECEIVING PITS. BECAUSE WORKERS WILL OPERATE IN THE EXCAVATION, SAFETY CONSIDERATIONS REQUIRE THE TRENCH WALLS TO BE APPROPRIATELY SLOPED, RESULTING IN A SIGNIFICANTLY LARGER AND WIDER EXCAVATION, WITH RESULTING LARGE VOLUMES GENERATED.
- 4,213 CUBIC YARDS OF GRADING AND BORE PITS.

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LUVERNE PUMP STATION

FIA # 1803 CHAINAGE: MP 123.6 DISCIPLINE # 03

11TH SE STREET  
FORESTED ROAD CROSSING  
STEELE COUNTY, NORTH DAKOTA

SCALE As Shown DRAWING No 1803-03-ML-03-102 REV 00

TIME-DESIGNFILE



# **EXHIBIT B**



2007/11/29 10:34



2007/11/29 10:35



2007/11/29 10:39



2007/11/29 10:58



2007/11/29 11:00

# **EXHIBIT C**

