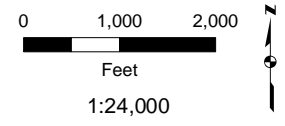


This information is for environmental review purposes only.



- Milepost
- Project Limit-of-Disturbance
- Named Waterbody



**WDNR ERR Log #20-034 – Renewal
Proposed Project Location
Line 5 Wisconsin Segment Relocation Project**
Enbridge Energy, L.P.





Line 5 Wisconsin Segment Relocation Project

Ashland, Bayfield, Douglas, and Iron Counties Wisconsin

Water Resources Application for Project Permits

Environmental Impact Report

Revised August 2020

EIR Attachment J

Cumulative Impacts Projects

**Attachment J
Projects Located in the Cumulative Effects Geographic Boundary
Ashland and Iron Counties, Wisconsin
Line 5 Relocation Project**

Project	Company Name	County	State	Location	Facility Type	Duration	Construction Years	Project Description	Anticipated Impacts - Total	Anticipated Impacts - Wetlands	Anticipated Impacts - Forest	Permits, Authorizations, or Environmental Review Required	Project within 1/4 Mile ^a	Project within 1 mile ^a	Sub-Watershed (HUC-12)
Travel Corridors															
WIS 13 Corridor Project: Morse Road to Caguya Road (4.4 miles)	Wisconsin Department of Transportation	Ashland	WI	Between Park Falls, WI and Mellen, WI	Highway Improvement	< 1 year	2020	Culvert replacement and slope flattening projects on WIS 13 to address steep foreslopes behind the shoulder as well as replacing the aging culverts locating between these roads. Culvert replacements will occur during the 2020 construction season. Letting will occur in December 2019.	Not Available	Not Available	Not Available	State Highway Rehabilitation Program - 3R Improvement Policy	No	No	Minnow Creek
WIS 13 Corridor Project: Caguya Road to Jefferson Avenue (5.7)	Wisconsin Department of Transportation	Ashland	WI	Between Park Falls, WI and Mellen, WI	Highway Improvement	< 1 year	2020	Culvert replacement and slope flattening projects on WIS 13 to address steep foreslopes behind the shoulder as well as replacing the aging culverts locating between these roads. Culvert replacements will occur during the 2020 construction season. Letting will occur in December 2019.	Not Available	Not Available	Not Available	State Highway Rehabilitation Program - 3R Improvement Policy	No	Yes	Hardscrable Creek, possibly Minnow Creek
WIS 13 Corridor Project: Soo Line Railroad Bridge	Wisconsin Department of Transportation	Ashland	WI	Between Park Falls, WI and Mellen, WI	Highway Improvement	< 1 year	2020	Resurfacing the bridge deck of the Soo Line Railroad Bridge to restore the bridge's safety and functionality. Resurfacing will occur during the 2020 construction season. Letting will occur in December 2019.	Not Available	Not Available	Not Available	State Highway Rehabilitation Program - 3R Improvement Policy	No	No	Minnow Creek
WIS 13 Corridor Project: Morse Road to Jefferson Avenue (10.4 miles)	Wisconsin Department of Transportation	Ashland	WI	Between Park Falls, WI and Mellen, WI	Highway Improvement	< 1 year	2021	Resurfacing WIS 13 from Morse Road to Jefferson Avenue - resurface the road with a new layer of recycled pavement to improve the aging pavement on WIS 13, resulting in a safer driving surface for the traveling public. Resurfacing will occur after the first three projects, during the 2021 construction season. Letting will occur in December 2020.	Not Available	Not Available	Not Available	State Highway Rehabilitation Program - 3R Improvement Policy	No	Yes	Minnow Creek, Hardscrable Creek
Electric Transmission															
Ashland-Ironwood Transmission Line Relocation	XCEL Energy	Ashland, Iron	WI	Throughout Ashland and Iron Counties	Electric Transmission	4 years	2025-2028 (timeline subject to change)	Relocation of two existing electric transmission lines that run between XCEL Gingles Substation SE of Ashland, WI and Ironwood Substation in Ironwood, MI. The 88 kilovolt and 115 kilovolt lines are each about 35 miles long. This is still a proposed project and is in the routing evaluation/public outreach phase. Approval needed from Public Service Commission of Wisconsin; Hopes to submit an application in 2020, with the ultimate goal of starting construction in year 2025.	35 miles of power lines, acreage not available	Not Available	Not Available	Public Service Commission of Wisconsin, State of Wisconsin, Wisconsin DNR	Yes	Yes	Multiple potential watersheds, including Ashland County's Beartrap Creek, Deer Creek, Meadow Creek, Troutmore Creek, Brunsweller River, Marengo River, Hardscrable Creek, Devils Creeks, and some in Iron County.
Ashland County Solar Garden	XCEL Energy (built by OneEnergy Renewables)	Ashland	WI	Ashland, WI	Solar Garden	< 1 year	Completed in August 2019	1-megawatt Solar*Connect Community Garden - members purchase a share and receive a credit on their bill for the clean energy it produces. OneEnergy Renewables built the garden on property owned by Xcel Energy.	~7.0 acres	Not Available	Not Available	Wisconsin Public Service Commission	No	No	Fish Creek
Recreational															
Trail System Expansion	Grand Funded; DNR; State funded	Iron	WI	Throughout the County	Trail system	Ongoing	Ongoing	Bike trail expansion. Working on plans for more expansion of trails. Maintenance and improvements of snowmobile trails.	Not Available	Not Available	Not Available	Not Available	Not Available	Not Available	Multiple potential watershed throughout the county
Saxon Harbor Campground	Iron County Forestry and Parks Development	Iron	WI	Hurley, WI	Campground Development	12 months	TBD - EA Submitted March 2019	The Iron County Forestry Department applied for funding from FEMA's PA Program to be applied to the costs for relocating the campground. The project is the relocation of a public campground located adjacent to Saxon Harbor on Lake Superior's southern shore and Oronto Creek, which joins Parker Creek and from there drains into Lake Superior.	Not Available	Area 1: 0.75 acre Area 2: 1.75 acres	Temporary impacts unavailable	USACE - Section 404 Wetland Disturbance Permit WDNR - Individual Wetland Permit WDNR - Wetland Mitigation Banking WDNR - Construction Permit WDNR - SWPPP (potentially) WDNR - Post Construction Stormwater Permit	No	No	Graveyard Creek
Broadband															
Broadband Initiative Project	Iron County; Public Service Commission	Iron	WI	Throughout the County	Broadband Initiative	Ongoing for past 6 years	Probably going to continue for another few more years	Installing towers to upgrade the telecommunications and internet throughout the county.	Not Available	Not Available	Not Available	Not Available	No	No	Multiple potential watersheds in Iron County
Other															
Saxon Harbor Dredging	USACE (Detroit District)	Iron	WI	Saxon Harbor, WI	Dredging Project	Every 4 to 7 Years	Most Recent was 2018	Periodic maintenance dredging of approximately 7,000 cubic yards is required every 4 to 7 years.	-Project depth in outer channel is 10 ft, inner basin and side channel is 8 ft *Project length total is 3,800 ft *Approximately 1,000 ft of breakwaters *Dredged material placed in upland site	Not Available	Not Available	USACE - Rivers and Harbors Act of 1958	No	No	Graveyard Creek
Ashland Ore Dock Redevelopment	Smithgroup JJR, City of Ashland	Ashland	WI	Ashland, WI	Dock Redevelopment	TBD	TBD - Project still needs funding with hopes to start construction in 2020 or 2021	Funds are currently being raised to open the entire dock for public recreation. The dock was originally constructed in the early 1900's and needs funding for significant improvements to be able to open it to the public.	Not Available	Not Available	Not Available	An Environmental Impact Assessment was done; cannot find documentation	No	No	Fish Creek

^a - Distances are from Line 5 Construction Right-of-Way unless noted otherwise.
WIS, WI = Wisconsin
ft = feet

Notes:
FEMA PA Program = Federal Emergency Management Agency Public Assistance Program
USACE - U.S. Army Corps of Engineers
WDNR = Wisconsin Department of Natural Resources

Sources (accessed December 2019)
<https://wisconsin.gov/Pages/projects/by-region/nw/wis13parkfalls/WIS-13-Corridor-Projects.aspx>
<https://www.transmission.xcelenergy.com/Projects/Wisconsin/Ashland-and-Ironwood-Project>
https://www.chegbayrenewables.org/uploads/1/0/9/8/109801585/0518ashgarden3_.pdf
https://co.ashland.wi.us/vertical/sites/%7B215E4EAC-21AA-4D0B-8377-85A847C0D0ED%7D/uploads/Ashland_LWRM_Plan_2020_FINAL.pdf
<https://www.lre.usace.army.mil/Missions/Operations/Saxon-Harbor-WI/>
<https://www.fema.gov/media-library-data/1554138337760-2330a27680f8c3b66abe273e8ff6a5dd/SaxonHarborEA.pdf>
<https://ironcountywi.com/broadband-expansion/>
<https://www.coawi.org/DocumentCenter/View/291/Final-Report-PDF?bidid=>



Line 5 Wisconsin Segment Relocation Project

Ashland, Bayfield, Douglas, and Iron Counties Wisconsin

Water Resources Application for Project Permits

Environmental Impact Report

Revised August 2020

EIR Attachment K

Draft Hydrotest Plan

Draft
Hydrostatic Test Plan
Rev. 1

L5WSR Hydrostatic Test Water Appropriations and Discharge Planning

The Enbridge Line 5 Wisconsin Segment Relocation Project (“L5WSRP” or “Project”) consists of the installation of approximately 42 miles of 30-inch diameter, Grade X-70 carbon steel pipe via open trench, conventional bore, and trenchless crossing techniques to reroute the existing Line 5. As part of the construction process the newly installed pipe will be hydrotested prior to being placed into service. The summary below provides details on the preferred test section design and water appropriation sources, volumes, and discharge points.

Test section breaks depend on access requirements, water sourcing, elevation change, and material strength parameters. Test sections breaks will be determined by the water sources that can be utilized for testing activities. Water will be withdrawn and discharged for each mainline test section independent of other test segments. Enbridge’s proposed test sections are discussed below:

Option A (Preferred): *Two test sections, water appropriation from Bad River*

The preferred scenario is to withdraw water from Bad River and test the mainline in two test sections with Test Section 1 extending from the Bad River at approximately MP 24.1 to the west at MP 0. Test Section 2 would extend from Bad River at approximately MP 24.1 to the east to MP 41.1.

Test Section	Start MP	End MP
1	0.0	24.1
2	24.1	41.1

Option B (Alternative): *Three test sections, water appropriation from Silver Creek and Tyler Forks*

An alternative testing scenario would create three test sections. Test Section 1 from MP 0.0 to 19.5 and Test Section 2 from MP 19.5 to MP 33.8 would utilize water from Silver Creek. Test Section 3 would extend from MP 33.8 to MP 41.1 and utilize water from Tyler Forks.

Test Section	Start MP	End MP
1	0.0	19.5
2	19.5	33.8
3	33.8	41.1

Water quantity estimates for the hydrotesting include the fill volume, squeeze volume, and 15% contingency water. The cumulative water volume required for testing purposes is approximately 8.7 million gallons. Water will not be re-used between test sections; therefore, separate appropriations are proposed to test each pipeline segment. When filling from a natural waterbody, suction piping shall be maintained at sufficient depth to eliminate the introduction of air, debris, silt, or other granular materials into the test medium. Additionally, a mesh screening will be used to prevent aquatic species from entering the system. Proposed withdrawal rates range from 1,000-1,500 gallons per minute, subject to permit conditions. Hydrostatic test water will be returned (discharged) to the source water according to permit conditions and in a manner to prevent erosion, scour, or flooding.

The table below illustrates how that volume would be utilized in the two testing scenarios described above. Water

Option	Test Description	Length (ft)	Theoretical Fill Volume (gal)	Theoretical Squeeze Volume (gal)	15% Contingency Volume (gal)	Total Water Required (gal)
A	Section 1	127,037	4,359,000	51,000	662,000	5,072,000
A	Section 2	89,971	3,088,000	37,000	469,000	3,594,000
B	Section 1	102,960	3,533,000	42,000	537,000	4,112,000
B	Section 2	75,504	2,591,000	31,000	394,000	3,016,000
B	Section 3	38,544	1,323,000	16,000	201,000	1,540,000

Additionally, for the proposed reroute, Enbridge intends to install the pipeline using trenchless techniques (i.e., horizontal directional drill [HDD] or direct pipe method) at 13 locations. All piping installed via HDD pipe will be pretested prior to installation. After installation, these sections will then be welded to the rest of the mainline and included in the mainline pressure tests. Crossings utilizing conventional boring methods (non-HDD) do not require a pre-installation pressure test. For many of the sections Enbridge intends to utilize water from municipal sources and will haul water to and from the site for purposes of testing the pipe sections. Enbridge proposes to utilize water at four of the crossing locations as indicated in the table below. For the Trout Brook and Billy Creek HDDs, Enbridge proposes to utilize water from Trout Brook, and at Silver Creek and Tyler Forks, Enbridge proposes to utilize water from the respective waterbodies utilizing the same appropriations and discharge criteria described for the mainline hydrotest.

Test Description	Length (ft)	Water Source	Theoretical Fill Volume (gal)	Theoretical Squeeze Volume (gal)	15% Contingency Volume (gal)	Total Water Required (gal)
White River	4,439	Hauled In	147,200	1,700	22,400	171,300
Deer Creek	1,777	Hauled In	60,000	800	9,100	69,900
Marengo River	1,985	Hauled In	67,000	800	10,200	78,000
Brunswailer River	2,790	Hauled In	94,100	1,200	14,300	109,600
Hwy13/Canadian National Railroad	1,998	Hauled In	66,300	800	10,100	77,200
Trout Brook	2,337	Trout Brook	78,900	1,000	12,000	91,900
Billy Creek	1,775	Trout Brook	59,900	800	9,100	69,800
Silver Creek	3,435	Silver Creek	113,900	1,300	17,300	132,500
Krause Creek	1,597	Hauled In	53,900	700	8,200	62,800
Bad River	1,774	Hauled In	58,800	700	9,000	68,500
Tyler Forks	1,841	Tyler Forks	62,100	800	9,500	72,400
Potato River	3,472	Hauled In	115,100	1,300	17,500	133,900
Vaughn Creek	2,055	Hauled In	69,400	900	10,600	80,900



Line 5 Wisconsin Segment Relocation Project

Ashland, Bayfield, Douglas, and Iron Counties Wisconsin

Water Resources Application for Project Permits

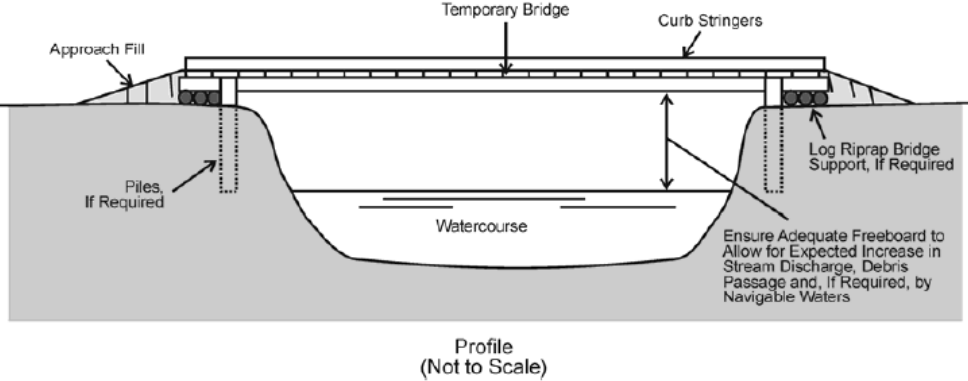
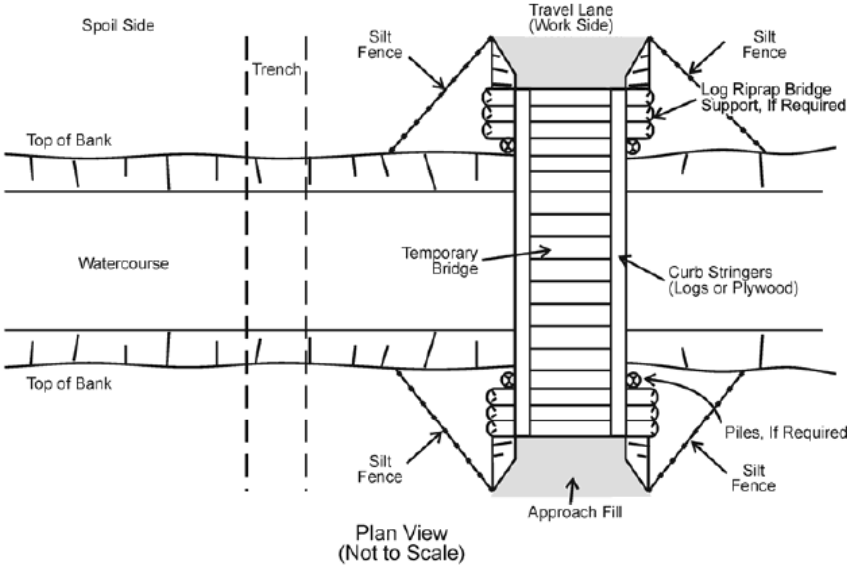
Environmental Impact Report

Revised August 2020

EIR Attachment L

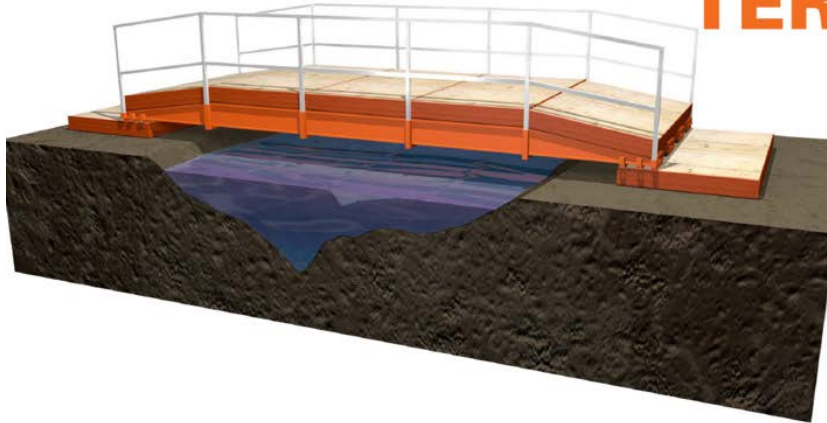
Water Bridging Drawings

Bridge Crossing Typical



Vehicle Crossing - Engineered Bridge

Type B = 20' to 60'



TERRACROSS

Fully Engineered
Bridging Solution
for Utility &
Construction
Access

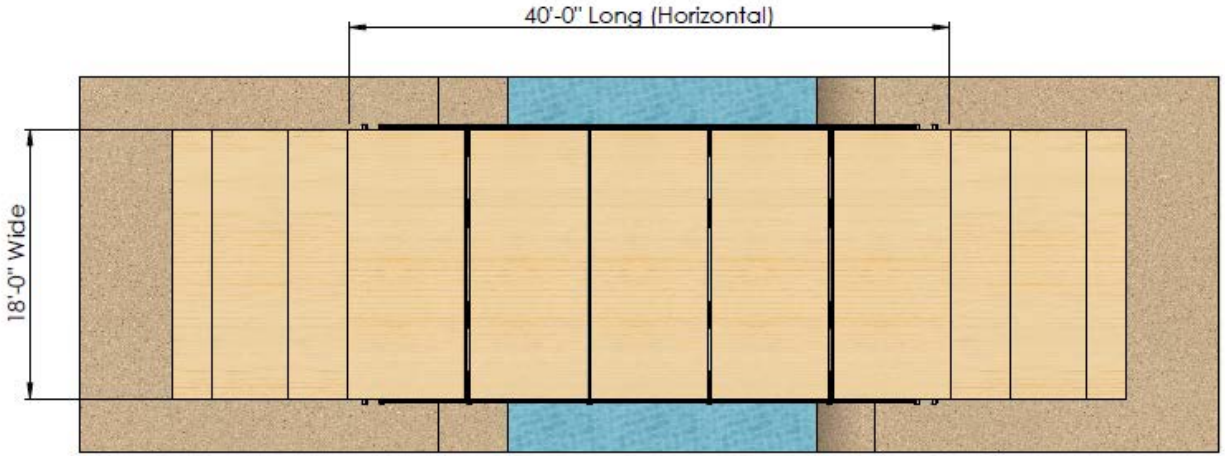
ENGINEERED BRIDGING SYSTEM

TerraCross will support vehicles up to 100 tons and span gaps up to 35' with a total system length of 40'

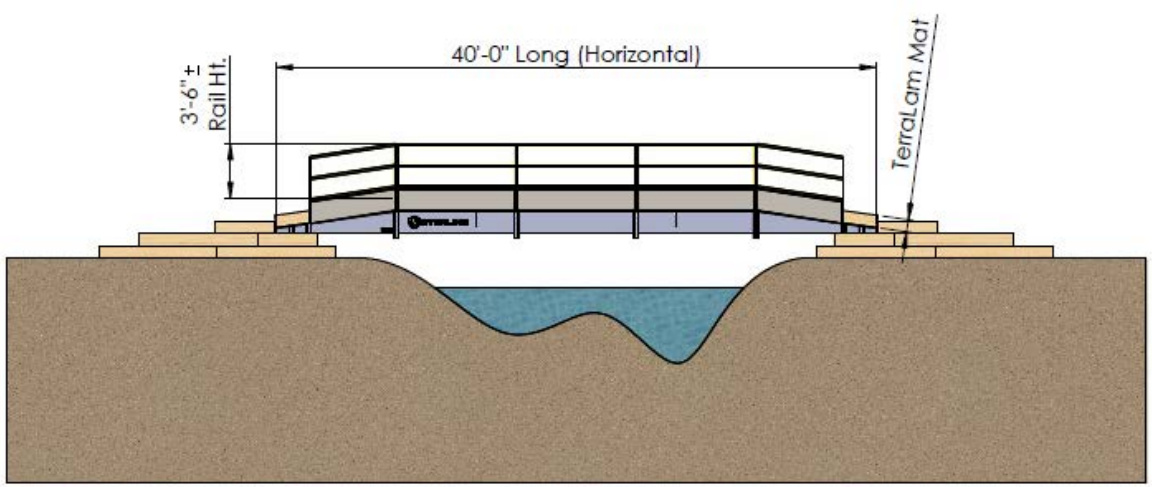
LIGHTWEIGHT & FAST SETUP

System allows for single truck delivery and rapid deployment with equipment you already have on site





General Plan

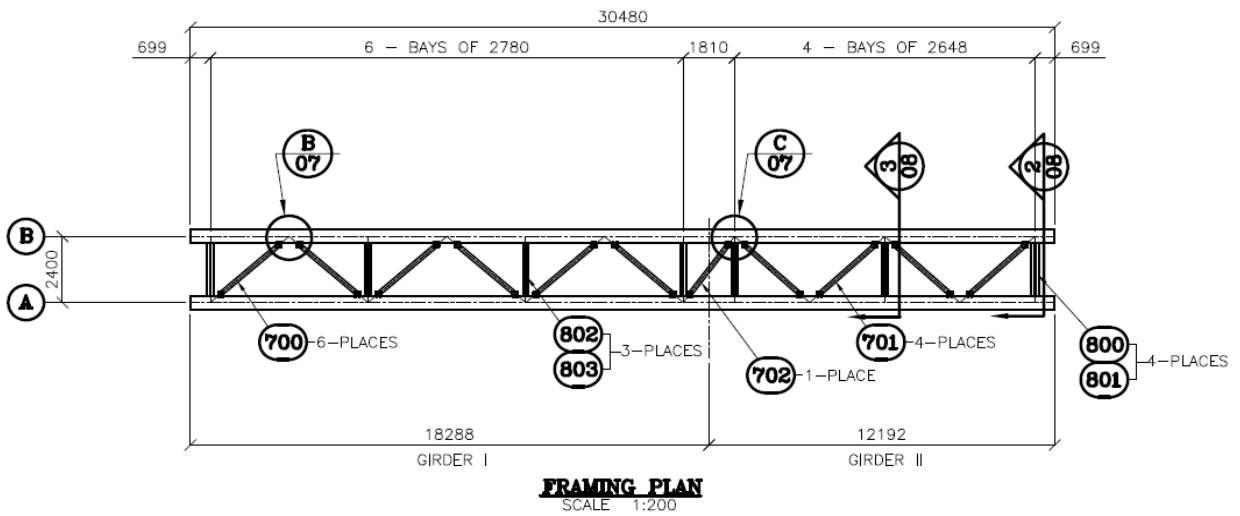
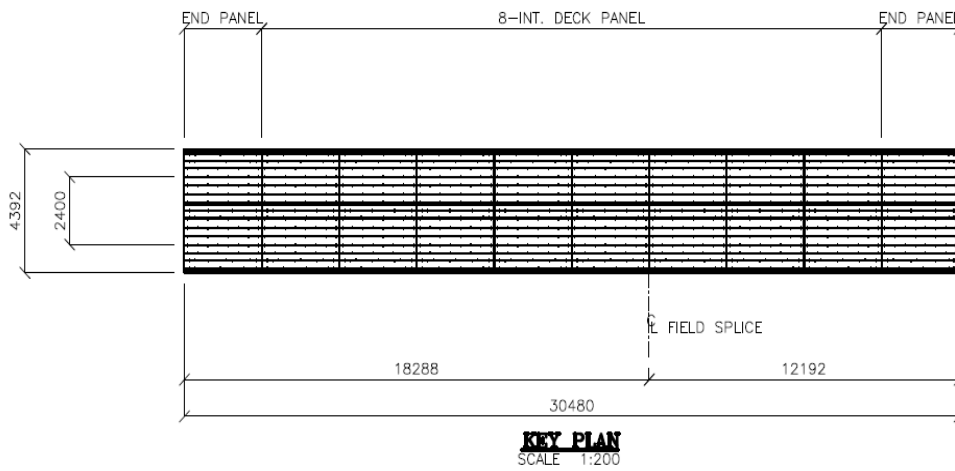
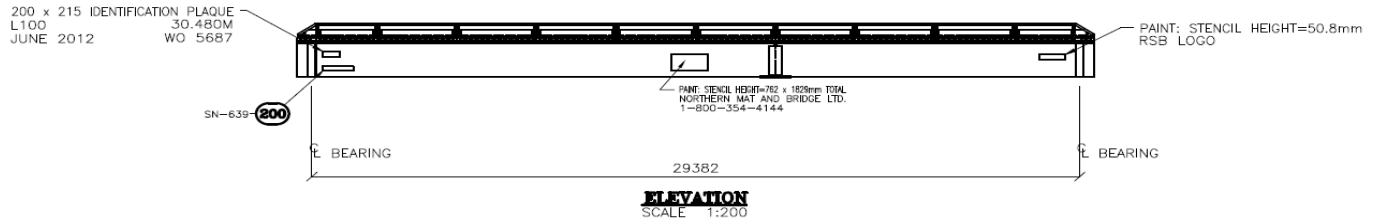


General Elevation



Vehicle Crossing - Engineered Bridge

Type C - 60' and greater





Line 5 Wisconsin Segment Relocation Project

Ashland, Bayfield, Douglas, and Iron Counties Wisconsin

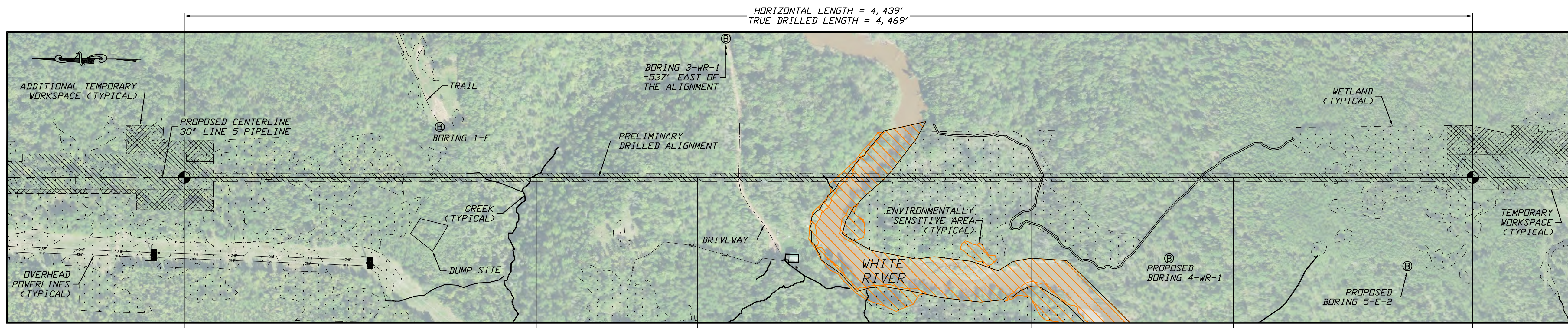
Water Resources Application for Project Permits

Environmental Impact Report

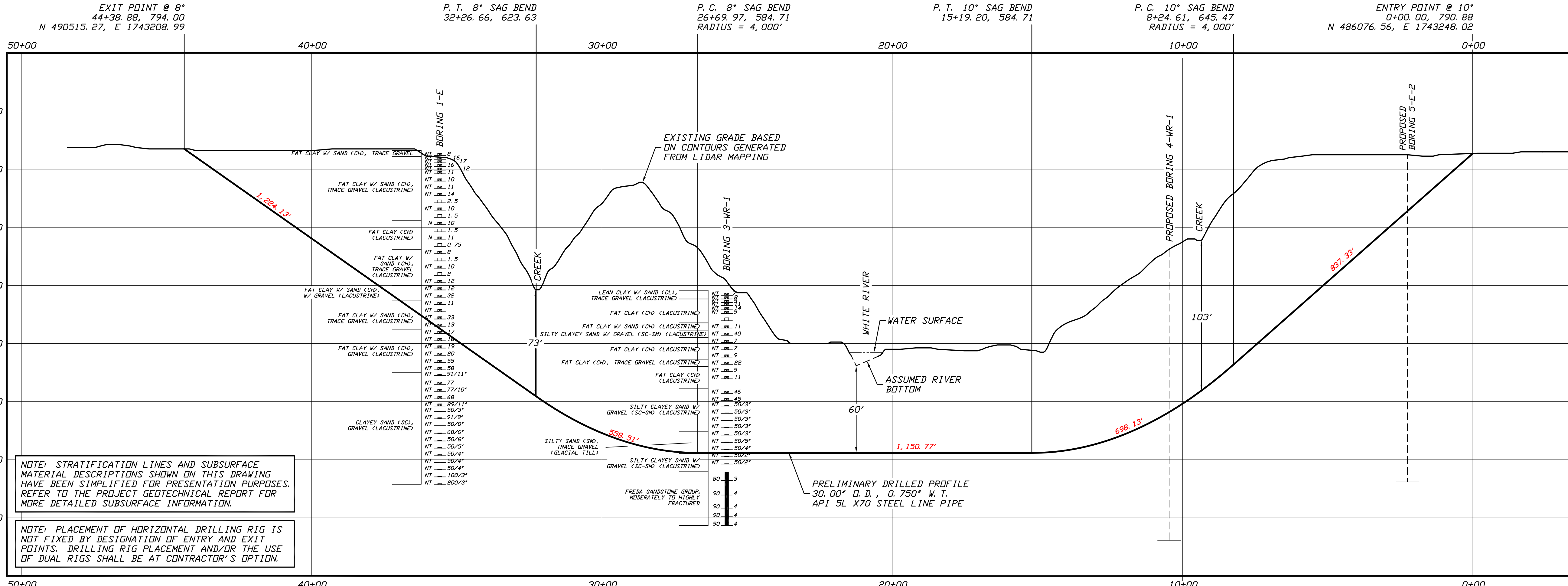
Revised August 2020

EIR Attachment M

HDD and Direct Pipe Site-Specific Drawings



PLAN
SCALE: 1"=200'



PROFILE
SCALE: 1"=200' HORIZONTAL
1"= 40' VERTICAL

- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
- GEOLOGICAL LEGEND**
- ⊙ BORING LOCATION
 - ⊞ THIN WALL SAMPLE
 - ⊞ 1.5 — COMPRESSIVE STRENGTH (TSF)
 - ⊞ 23 — PENETRATION RESISTANCE IN BLDWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
 - ⊞ CORE BARREL SAMPLE
 - ⊞ UCS 6,250 — UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - ⊞ 53.6 — MOHS HARDNESS
 - ⊞ — ROCK QUALITY DESIGNATION (PERCENT)
- GEOLOGICAL NOTES**
- GEOLOGICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MINNESOTA. REFER TO THE PRELIMINARY BORING LOGS DATED MAY AND JULY 2020 FOR MORE DETAILED SUBSURFACE INFORMATION.
 - THE LETTER 'N' TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS 'NT' INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
 - THE GEOLOGICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.
- TOPOGRAPHIC SURVEY NOTES**
- TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
 - NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
 - ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.
- DRILLED PATH NOTES**
- DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 - DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.
- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
- ENTRY POINT: AS STAKED BY COMPANY
 - EXIT POINT: UP TO 10 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 - ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)
- PROTECTION OF EXISTING FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.
- CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 - POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 - MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

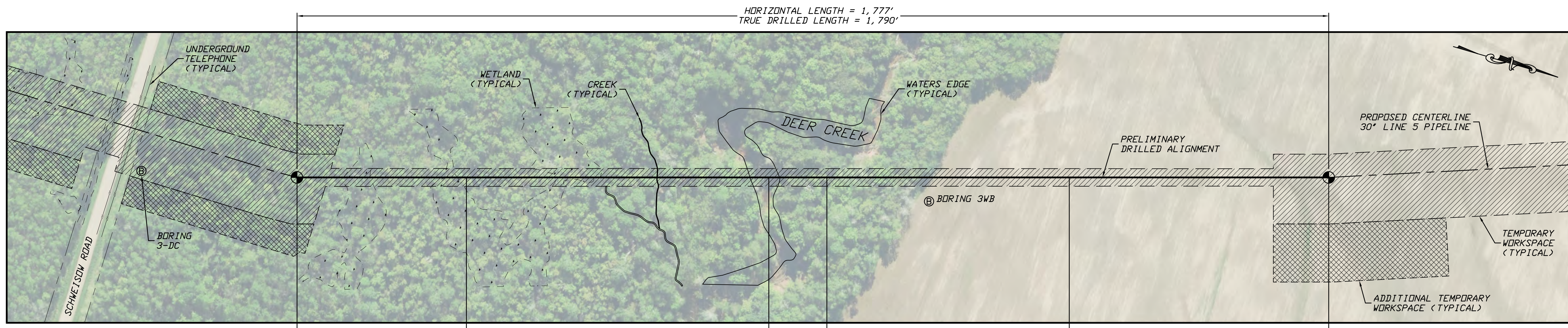
PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT MP 4- PLAN AND PROFILE 30-INCH PIPELINE CROSSING OF THE WHITE RIVER BY HORIZONTAL DIRECTIONAL DRILLING		LOCATION: ASHLAND COUNTY, WISCONSIN
		DRAWN: DMP CHECKED: KWW APPROVED: JSP DATE: 01/15/20
DRAWING LABEL: WHITE RIVER	SCALE: SHOWN FOR D-SIZED PLOT	REVISION: P1

NO.	DATE	REVISION DESCRIPTION	BY	CHK'D APP.
P1	07/22/20	ADJUST ENDPOINTS, ADD GEOTECH, UPDATE BASE DATA	JSP	

J.D. Hair & Associates, Inc.
Consulting Engineers
2424 East 21st Street
Tulsa, Oklahoma 74114

PROJECT NO. Enbridge\1938
SHEET NUMBER 1



PLAN
SCALE: 1"=100'

ENTRY POINT @ 10° 0+00.00, 828.00
N 477544.26, E 1742037.95

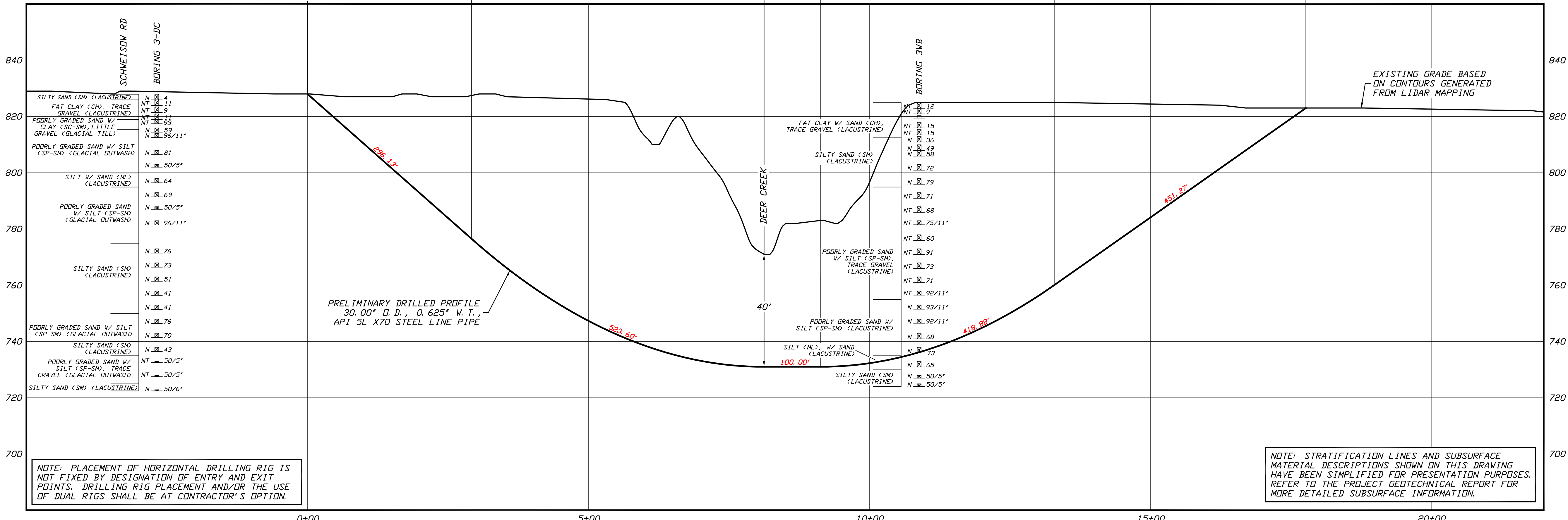
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RADIUS = 3,000'

P.T. 10° SAG BEND 8+12.58, 731.00

P.C. 8° SAG BEND 9+12.58, 731.00
RADIUS = 3,000'

P.T. 8° SAG BEND 13+30.10, 760.20

EXIT POINT @ 8° 17+76.98, 823.00
N 479249.91, E 1741539.53



PROFILE
SCALE: 1"=100' HORIZONTAL
1"= 20' VERTICAL

- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
- GEOTECHNICAL LEGEND**
- ⊙ BORING LOCATION
 - ⊕ THIN WALL SAMPLE
 - ⊖ RECOVERY AMOUNT
 - 53.1.23 PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
 - PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
 - UCS 6,250 UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 53.1.6 MOHS HARDNESS
 - ROCK QUALITY DESIGNATION (PERCENT)

- GEOTECHNICAL NOTES**
1. GEOTECHNICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MINNESOTA. REFER TO THE PRELIMINARY BORING LOGS DATED JULY 2020. FOR MORE DETAILED SUBSURFACE INFORMATION.
 2. THE LETTER 'N' TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS 'NT' INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
 3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

- TOPOGRAPHIC SURVEY NOTES**
1. TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
 2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
 3. ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.
- DRILLED PATH NOTES**
1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
1. ENTRY POINT: AS STAKED BY COMPANY
 2. EXIT POINT: UP TO 10 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 3. ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 4. ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 5. CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

PROTECTION OF EXISTING FACILITIES

CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.

1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT

MP 6 - PLAN AND PROFILE
30-INCH PIPELINE CROSSING OF DEER CREEK
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: ASHLAND COUNTY, WISCONSIN

DATE	CHECKED	APPROVED	SCALE	DRAWING LABEL	REVISION
06/17/20	DLB	JSP	SHOWN FOR D-SIZED PLOT	DEER CREEK	P1

DRAWN: KWW

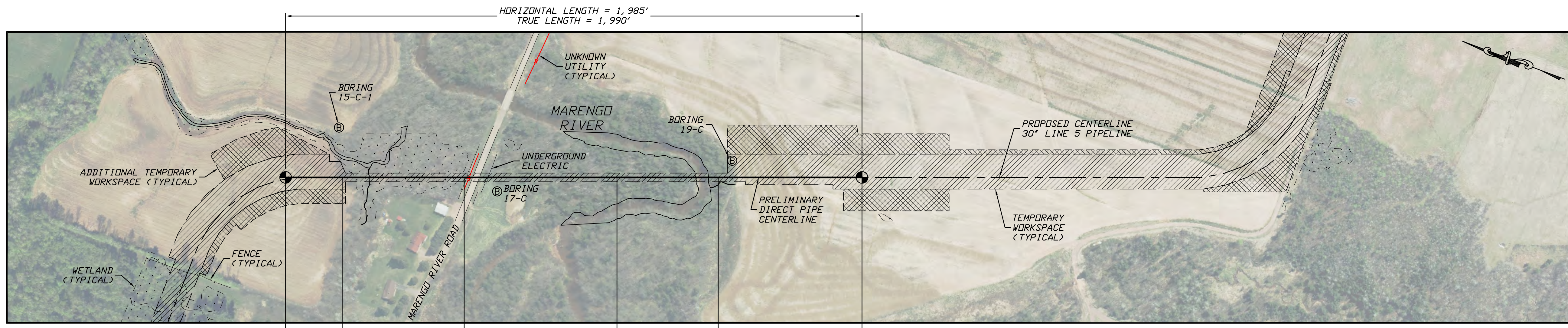
NO.	DATE	REVISION DESCRIPTION	BY	CHK'D APP.
P1	07/22/20	ADD GEOTECH, ADD LABELS, UPDATE BASE DATA	JSP	DMP

J.D.Hair & Associates, Inc.
Consulting Engineers

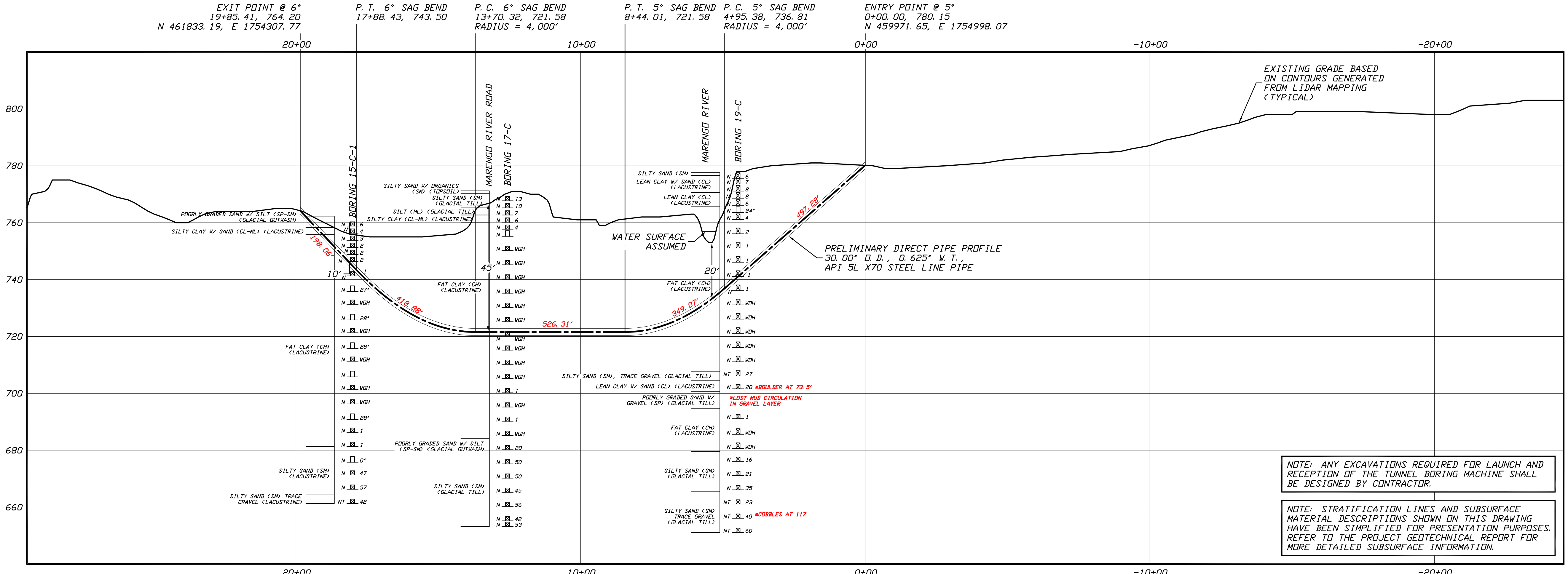
2424 East 21st Street
Suite 110
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge\1938

SHEET NUMBER
1



PLAN
SCALE: 1"=200'



NOTE: ANY EXCAVATIONS REQUIRED FOR LAUNCH AND RECEPTION OF THE TUNNEL BORING MACHINE SHALL BE DESIGNED BY CONTRACTOR.

NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

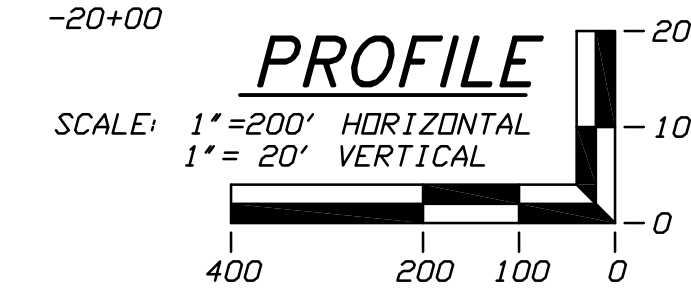
- GENERAL LEGEND**
- DIRECT PIPE ENTRY/EXIT POINT
- GEOTECHNICAL LEGEND**
- ⊙ BORING LOCATION
 - ⊕ THIN WALL SAMPLE
 - SPLIT SPOON SAMPLE
 - 15' — RECOVERY AMOUNT
 - 53.23 — PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
 - UCS 6,250 — UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 53.6 — MOHS HARDNESS
 - ROCK QUALITY DESIGNATION (PERCENT)

- GEOTECHNICAL NOTES**
- GEOTECHNICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MINNESOTA. REFER TO THE DRAFT BORING LOGS DATED MAY 2020 FOR MORE DETAILED SUBSURFACE INFORMATION.
 - THE LETTER 'N' TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS 'NT' INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
 - THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

- TOPOGRAPHIC SURVEY NOTES**
- TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
 - NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
 - ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.
- COORDINATE GEOMETRY NOTES**
- STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DIRECT PIPE SEGMENT.
 - COORDINATES REFER TO DIRECT PIPE CENTERLINE AS OPPOSED TO TOP OF INSTALLED PIPE.

- DIRECTIONAL TOLERANCES**
- THE CENTERLINE OF THE DIRECT PIPE INSTALLATION SHALL CONFORM TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
- ELEVATION: UP TO 2 FEET ABOVE AND 5 FEET BELOW THE DESIGNED PROFILE
 - ALIGNMENT: UP TO 10 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - CURVE RADIUS: NO LESS THAN 2,000 FEET

- PROTECTION OF EXISTING FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DIRECT PIPE OPERATIONS.
- CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 - POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DIRECT PIPE CENTERLINE SHALL BE EXPOSED.
 - MODIFY DIRECT PIPE OPERATIONS AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.



PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT

MP 11 - PLAN AND PROFILE
30-INCH PIPELINE CROSSING OF THE MARENGO RIVER
BY THE DIRECT PIPE METHOD

LOCATION: ASHLAND COUNTY, WISCONSIN

DATE	CHECKED	APPROVED	SCALE	SHOWN FOR	DRAWING LABEL	REVISION
05/12/20	LKB	JSP	JSP	D-SIZED PLOT	MARENGO DP	P2
DLB						

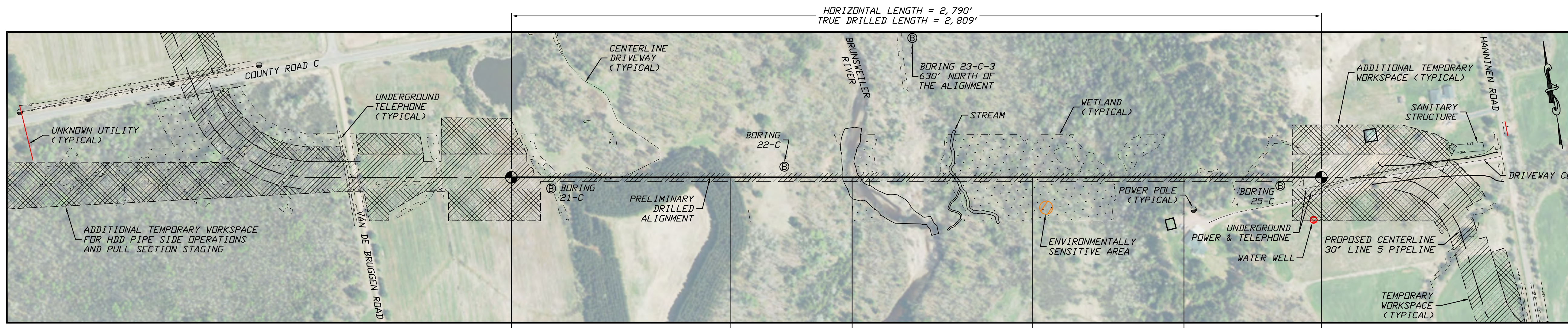
NO.	DATE	REVISION DESCRIPTION	BY	CHK'D APP.
P2	07/22/20	UPDATE BASE DATA, LABELS, & DESIGN RADIUS	DLB	DMP, JSP
P1	06/24/20	ADD BORING DATA, PRODUCE DIRECT PIPE DESIGN	DLB	CDS, JSP

J.D.Hair & Associates, Inc.
Consulting Engineers

2424 East 21st Street
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge\1938

SHEET NUMBER
1



PLAN
SCALE: 1"=200'

EXIT POINT @ 8°
27+89.85, 844.46
N 452839.95, E 1762415.17

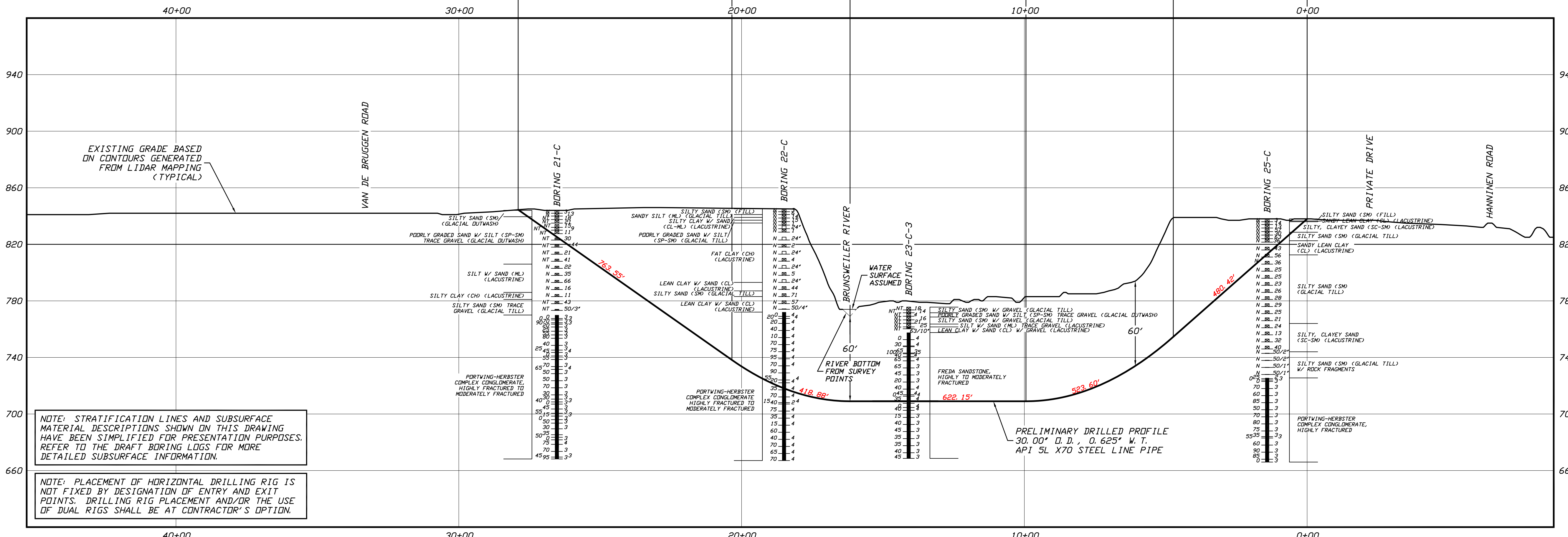
P. T. 8° SAG BEND
20+33.73, 738.20

P. C. 8° SAG BEND
16+16.21, 709.00
RADIUS = 3,000'

P. T. 10° SAG BEND
9+94.06, 709.00

P. C. 10° SAG BEND
4+73.12, 754.58
RADIUS = 3,000'

ENTRY POINT @ 10°
0+00.00, 838.00
N 452339.40, E 1765159.75



PROFILE
SCALE: 1"=200' HORIZONTAL
1"= 40' VERTICAL

- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
- GEOTECHNICAL LEGEND**
- ⊙ BORING LOCATION
 - ⊕ THIN WALL SAMPLE
 - ⊖ RECOVERY AMOUNT
 - 53.23 PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
 - PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
 - UCS 6,250 UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 53.6 MOHS HARDNESS
 - ROCK QUALITY DESIGNATION (PERCENT)

- GEOTECHNICAL NOTES**
- GEOTECHNICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MINNESOTA. REFER TO THE DRAFT BORING LOGS DATED MAY & JUNE 2020 FOR MORE DETAILED SUBSURFACE INFORMATION.
 - THE LETTER 'N' TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS 'NT' INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
 - THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

- TOPOGRAPHIC SURVEY NOTES**
- TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
 - NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
 - ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.
- DRILLED PATH NOTES**
- DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 - DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
- ENTRY POINT: AS STAKED BY COMPANY
 - EXIT POINT: UP TO 10 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 - ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

- PROTECTION OF EXISTING FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.
- CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 - POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 - MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT

MP 14 - PLAN AND PROFILE
30-INCH PIPELINE CROSSING OF THE BRUNSWELLER RIVER
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: ASHLAND COUNTY, WISCONSIN

DRAWN	DMP	CHECKED	KWW	APPROVED	JSP	SCALE	SHOWN FOR D-SIZED PLOT	DRAWING LABEL	BRUNSWELLER	REVISION	P2
DATE	12/17/19										

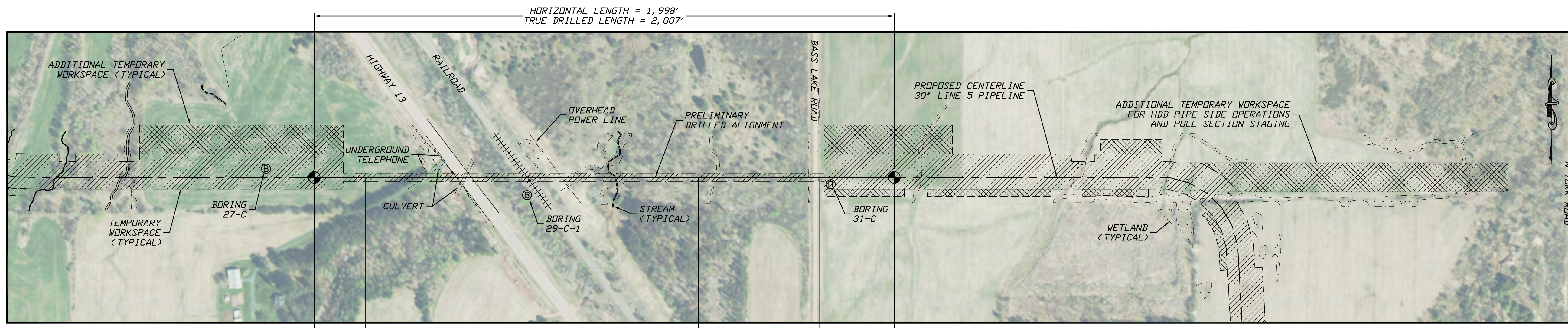
NO.	DATE	REVISION DESCRIPTION	BY	CHK'D APP.
P2	07/23/20	UPDATE BASE DATA AND LABELS	JSP	JSP
P1	07/01/20	ADD LABELS & GEOTECHNICAL DATA TO THE DRAWING	JDH, JDA, JSP	JSP

J.D. Hair & Associates, Inc.
Consulting Engineers

2424 East 21st Street
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge\1938

SHEET NUMBER
1



PLAN
SCALE: 1"=200'

ENTRY POINT @ 10°
0+00.00, 835.85
N 450755.17, E 1767910.54

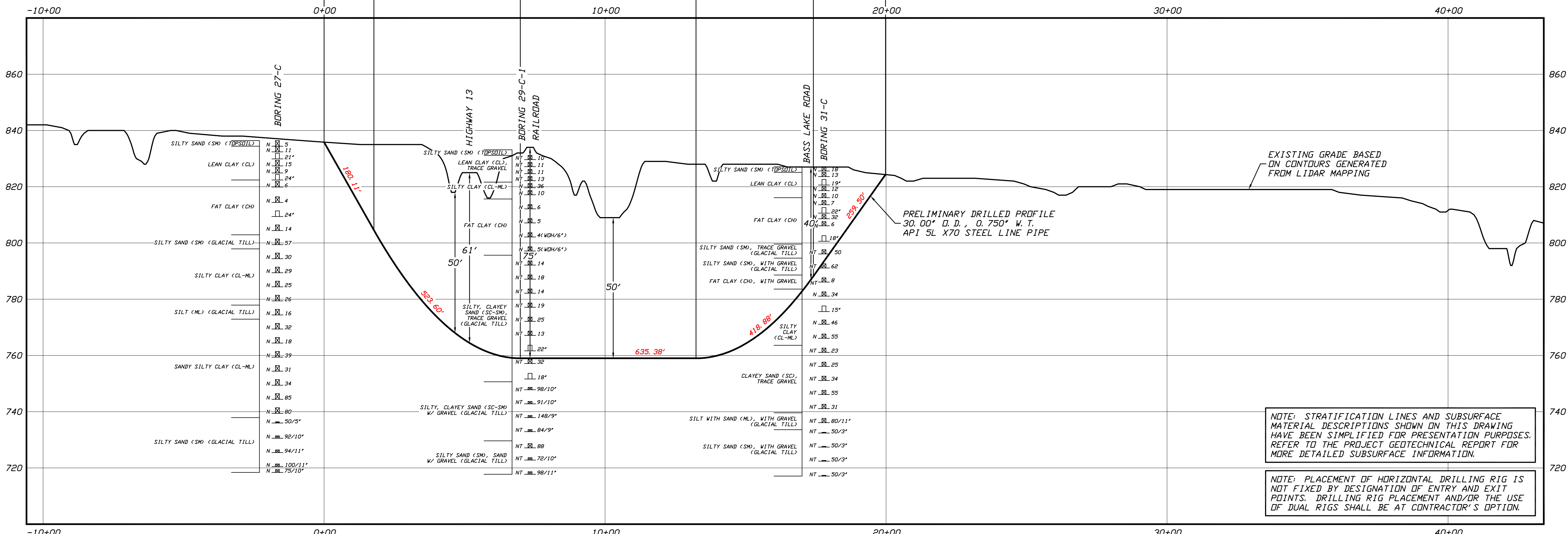
P.C. 10° SAG BEND
1+77.38, 804.58
RADIUS = 3,000'

P.T. 10° SAG BEND
6+98.32, 759.00

P.C. 8° SAG BEND
13+23.71, 759.00
RADIUS = 3,000'

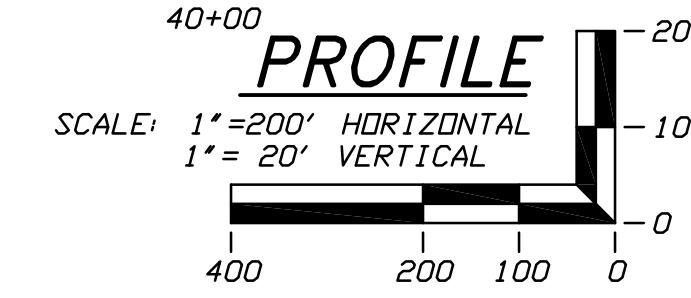
P.T. 8° SAG BEND
17+41.22, 788.20

EXIT POINT @ 8°
19+98.20, 824.31
N 450749.71, E 1769908.73



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: PLACEMENT OF HORIZONTAL DRILLING RIG IS NOT FIXED BY DESIGNATION OF ENTRY AND EXIT POINTS. DRILLING RIG PLACEMENT AND/OR THE USE OF DUAL RIGS SHALL BE AT CONTRACTOR'S OPTION.



GENERAL LEGEND

- DRILLED PATH ENTRY/EXIT POINT
- ⊙ BORING LOCATION
- ⊕ THIN WALL SAMPLE
- ⊖ RECOVERY AMOUNT
- SPILT SPOON SAMPLE
- 53.23 PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
- CORE BARREL SAMPLE
- UCS 6,250 UNCONFINED COMPRESSIVE STRENGTH (PSI)
- 53.6 MOHS HARDNESS
- ROCK QUALITY DESIGNATION (PERCENT)

GEOTECHNICAL NOTES

1. GEOTECHNICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MINNESOTA. REFER TO THE SUBSURFACE INVESTIGATION REPORT DATED 05/27/20 FOR MORE DETAILED SUBSURFACE INFORMATION.
2. THE LETTER 'N' TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS 'NT' INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

TOPOGRAPHIC SURVEY NOTES

1. TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
3. ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.

DRILLED PATH NOTES

1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

PILOT HOLE TOLERANCES

- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
1. ENTRY POINT: AS STAKED BY COMPANY
 2. EXIT POINT: UP TO 10 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 3. ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 4. ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 5. CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

PROTECTION OF EXISTING FACILITIES

- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.
1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT

MP 15 - PLAN AND PROFILE
30-INCH PIPELINE CROSSING OF HIGHWAY 13
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: ASHLAND COUNTY, WISCONSIN

DRAWN	DMP	CHECKED	KWW	APPROVED	JSP	SCALE	SHOWN FOR D-SIZED PLOT	DRAWING LABEL	REVISION
								HIGHWAY 13	P4
DATE	12/18/19								

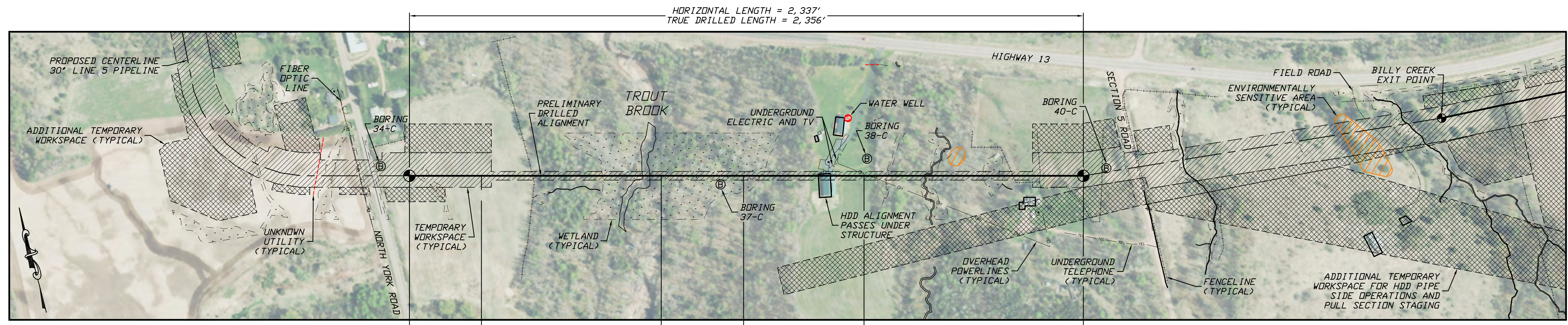
P4	07/23/20	UPDATE BASE DATA	KWW	JSP
P3	06/03/20	MINOR UPDATES, ISSUE FOR PERMIT	DLB	JSP
P2	05/20/20	ADD LABELS, ADD SECOND SHEET	JDHA	JDHA
P1	05/07/20	ENTER GEOTECH DATA & UPDATE THE DESIGN	DLB	JSP
		REVISION DESCRIPTION	KWW	JSP
NO.	DATE		BY	CHK'D APP.

J.D.Hair & Associates, Inc.
Consulting Engineers

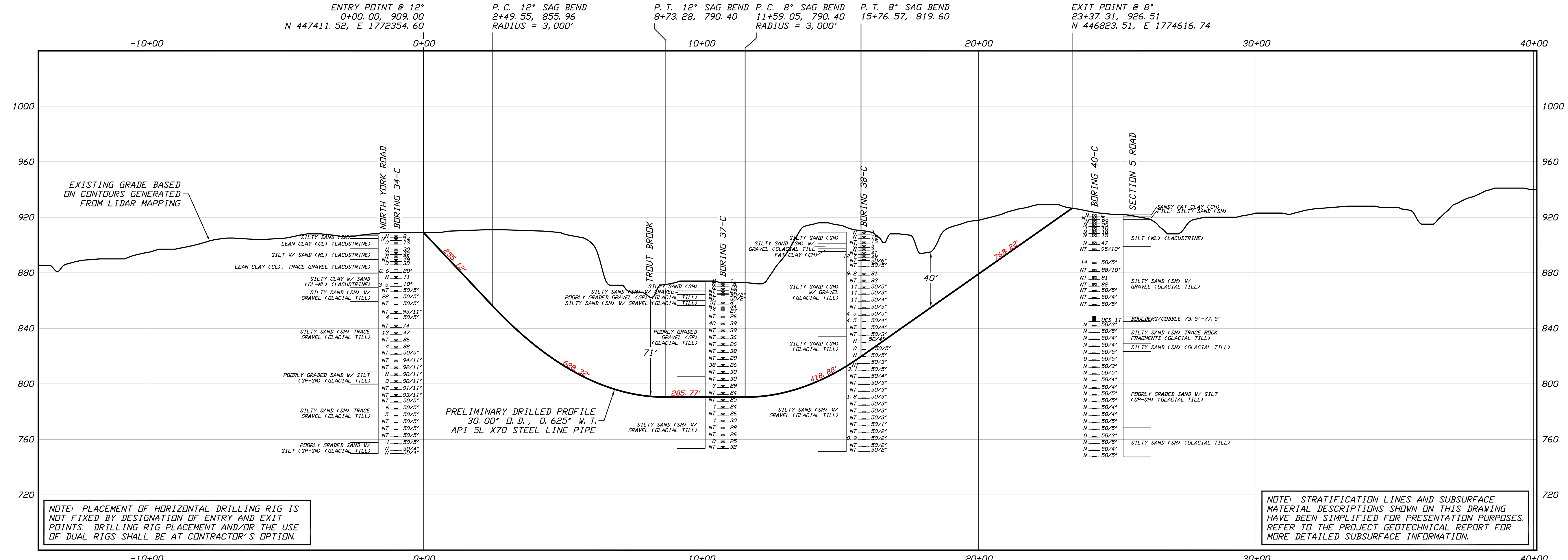
2424 East 21st Street
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge\1938

SHEET NUMBER
1



PLAN
SCALE: 1"=200'



- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
 - ⊙ BORING LOCATION
 - ⊞ 15" RECOVERY AMOUNT
 - 53.23 PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
 - UCS 6,250 UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 53.16 MOHS HARDNESS
 - ROCK QUALITY DESIGNATION (PERCENT)

- GEOTECHNICAL NOTES**
- GEOTECHNICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MINNESOTA. REFER TO THE SUBSURFACE INVESTIGATION REPORT DATED 06/19/20 FOR MORE DETAILED SUBSURFACE INFORMATION.
 - THE LETTER "N" TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
 - THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

- TOPOGRAPHIC SURVEY NOTES**
- TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
 - NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
 - ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.
- DRILLED PATH NOTES**
- DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 - DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
- ENTRY POINT: AS STAKED BY COMPANY
 - EXIT POINT: UP TO 10 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 - ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

- PROTECTION OF EXISTING FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.
- CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 - POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 - MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT

MP 16- PLAN AND PROFILE
30-INCH PIPELINE CROSSING OF TROUT BROOK
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: ASHLAND COUNTY, WISCONSIN

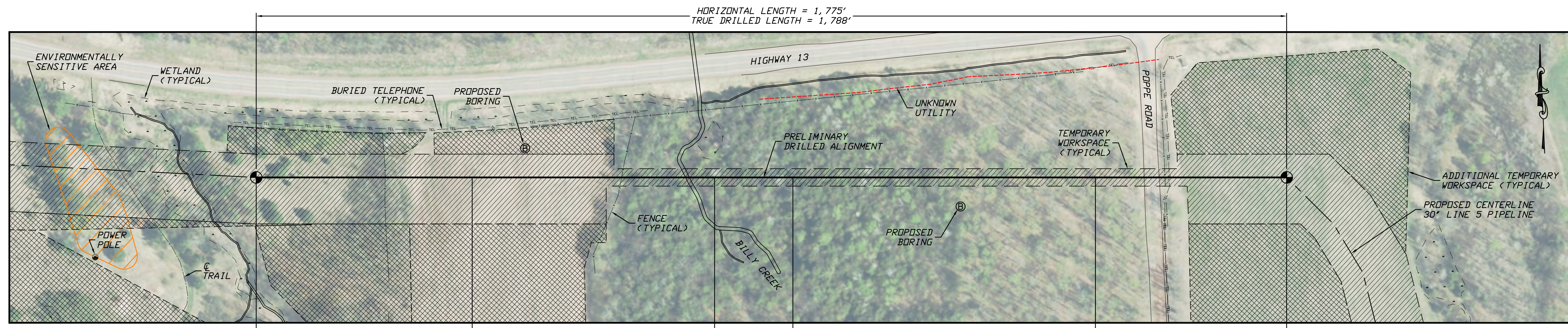
DATE	CHECKED	APPROVED	SCALE	SHOWN FOR	DRAWING LABEL	REVISION
01/15/20	DMP	JSP	D-SIZED PLOT	TROUT BROOK		P3

NO.	DATE	REVISION DESCRIPTION	BY	CHECKED	APP.
P3	07/23/20	UPDATE BASE DATA, ADD INFORMATION TO SHEET 2	JDHA	JDHA	JSP
P2	07/01/20	ADD LABELS & GEOTECHNICAL DATA TO THE DRAWING	JDHA	JDHA	JSP
P1	03/04/20	ADJUST THE DESIGN END POINTS	DLB	KWW	---

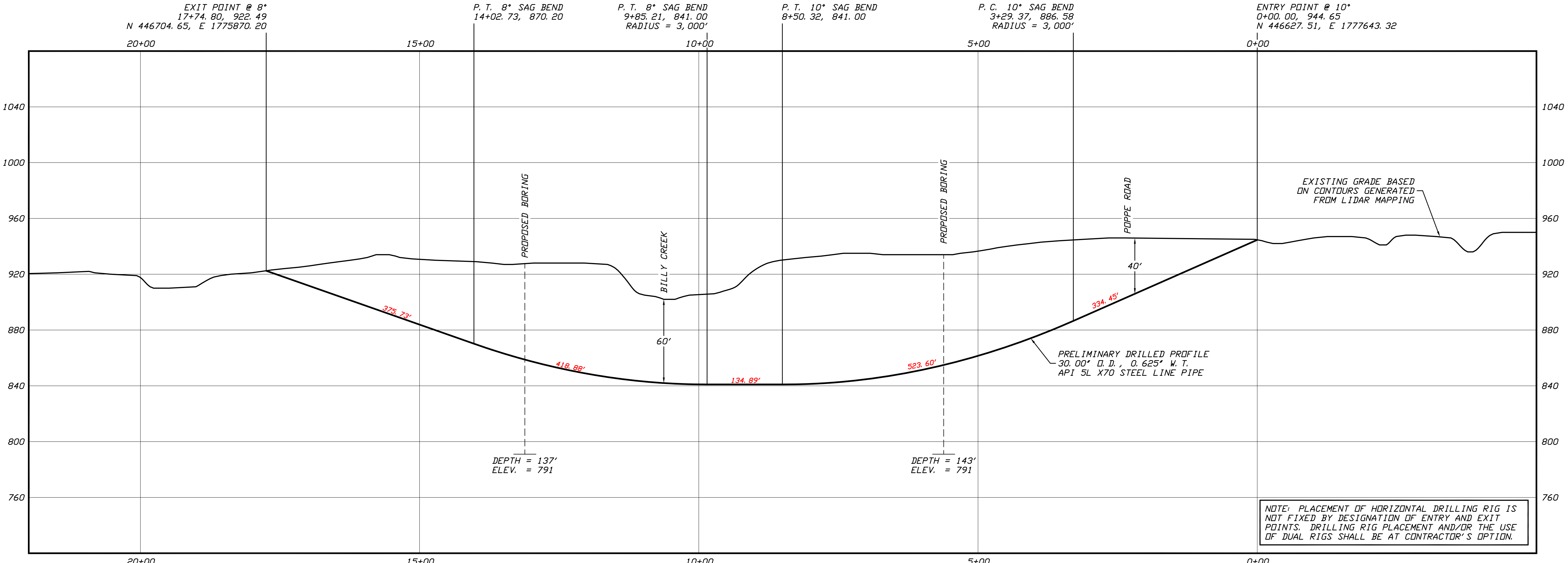
J.D.Hair & Associates, Inc.
Consulting Engineers
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge\1938

SHEET NUMBER
1



PLAN
SCALE: 1"=100'



PROFILE
SCALE: 1"=100' HORIZONTAL
1"= 40' VERTICAL

NOTE: PLACEMENT OF HORIZONTAL DRILLING RIG IS NOT FIXED BY DESIGNATION OF ENTRY AND EXIT POINTS. DRILLING RIG PLACEMENT AND/OR THE USE OF DUAL RIGS SHALL BE AT CONTRACTOR'S OPTION.

GENERAL LEGEND
● DRILLED PATH ENTRY/EXIT POINT

- TOPOGRAPHIC SURVEY NOTES**
1. TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
 2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
 3. ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.

- DRILLED PATH NOTES**
1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
1. ENTRY POINT: AS STAKED BY COMPANY
 2. EXIT POINT: UP TO 10 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT, UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 3. ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 4. ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 5. CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

- PROTECTION OF EXISTING FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.
1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT

MP 17 - PLAN AND PROFILE
30-INCH PIPELINE CROSSING OF BILLY CREEK
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: ASHLAND COUNTY, WISCONSIN

DRAWN	DMP	DATE	1/10/20	CHECKED	KWW	APPROVED	SCALE	SHOWN FOR D-SIZED PLOT	DRAWING LABEL	REVISION
							---		BILLY CREEK	P2

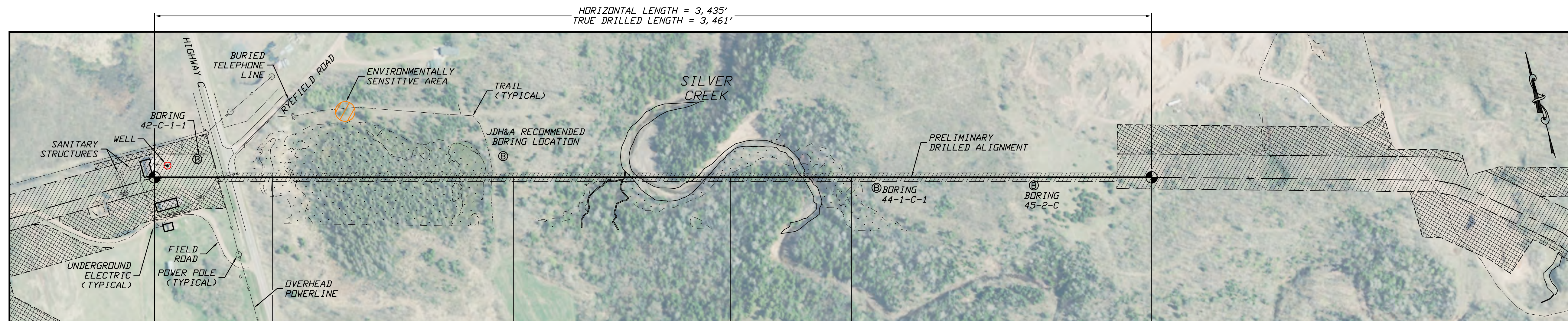
NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APP.
P1	07/01/20	SET UP DESIGN ON THE UPDATED ALIGNMENT	CDS	JSP	JSP
P2	07/24/20	UPDATE BASE DATA	KWW	JSP	JSP

J.D. Hair & Associates, Inc.
Consulting Engineers

2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

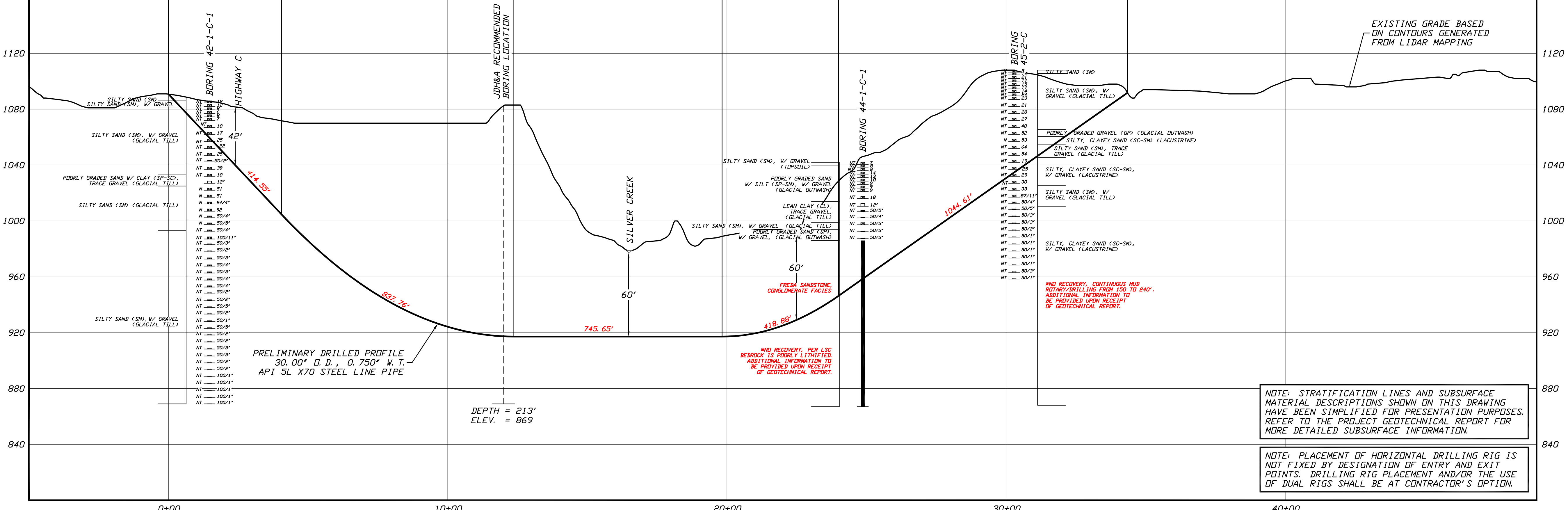
PROJECT NO.
Enbridge\1938

SHEET NUMBER
1



PLAN
SCALE: 1"=200'

ENTRY POINT @ 12° 0+00.00, 1090.79
 N 442547.71, E 1782393.83
 P.C. 12° SAG BEND 4+05.49, 1004.60
 RADIUS = 4,000'
 P.T. 12° SAG BEND 12+37.14, 917.19
 P.C. 8° SAG BEND 19+82.79, 917.19
 RADIUS = 3,000'
 P.T. 8° SAG BEND 24+00.31, 946.39
 EXIT POINT @ 8° 34+34.75, 1091.77
 N 441612.25, E 1785698.74



NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

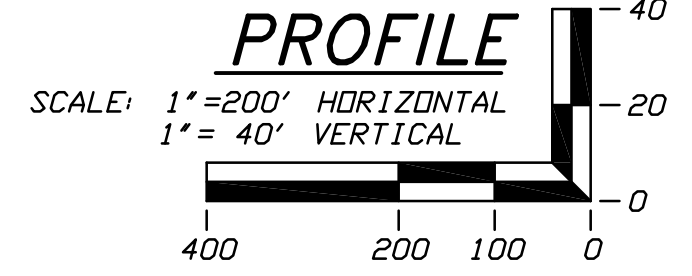
NOTE: PLACEMENT OF HORIZONTAL DRILLING RIG IS NOT FIXED BY DESIGNATION OF ENTRY AND EXIT POINTS. DRILLING RIG PLACEMENT AND/OR THE USE OF DUAL RIGS SHALL BE AT CONTRACTOR'S OPTION.

- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
- GEOTECHNICAL LEGEND**
- ⊙ BORING LOCATION
 - ⊞ THIN WALL SAMPLE
 - ⊞ RECOVERY AMOUNT
 - 53.1.23 PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
 - PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
 - CORE BARREL SAMPLE
 - UCS 6,250 UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 53.1.6 MOHS HARDNESS
 - ROCK QUALITY DESIGNATION (PERCENT)

- GEOTECHNICAL NOTES**
- GEOTECHNICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MINNESOTA. REFER TO THE DRAFT BORING LOGS DATED 05/08/20 FOR MORE DETAILED SUBSURFACE INFORMATION.
 - THE LETTER "N" TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
 - THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

- TOPOGRAPHIC SURVEY NOTES**
- TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
 - NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
 - ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.
- DRILLED PATH NOTES**
- DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 - DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
- ENTRY POINT: AS STAKED BY COMPANY
 - EXIT POINT: UP TO 10 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 - ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)



- PROTECTION OF EXISTING FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.
- CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 - POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 - MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

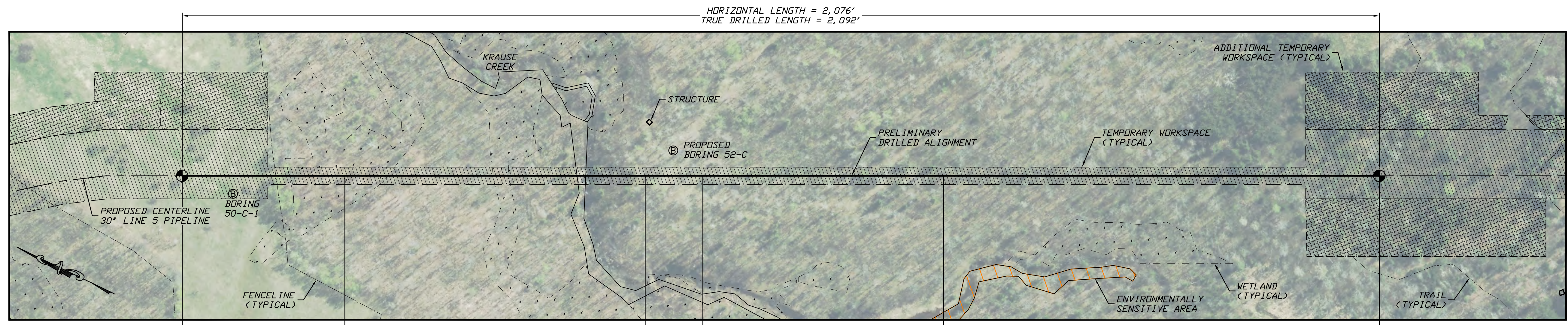
PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT MP 19 - PLAN AND PROFILE 30-INCH PIPELINE CROSSING OF SILVER CREEK BY HORIZONTAL DIRECTIONAL DRILLING		DATE	CHECKED	APPROVED	SCALE	DRAWING LABEL	REVISION
		DRAWN	DLB	KWW	JSP	SHOWN FOR D-SIZED PLOT	SILVER CREEK ALT
LOCATION: ASHLAND COUNTY, WISCONSIN							

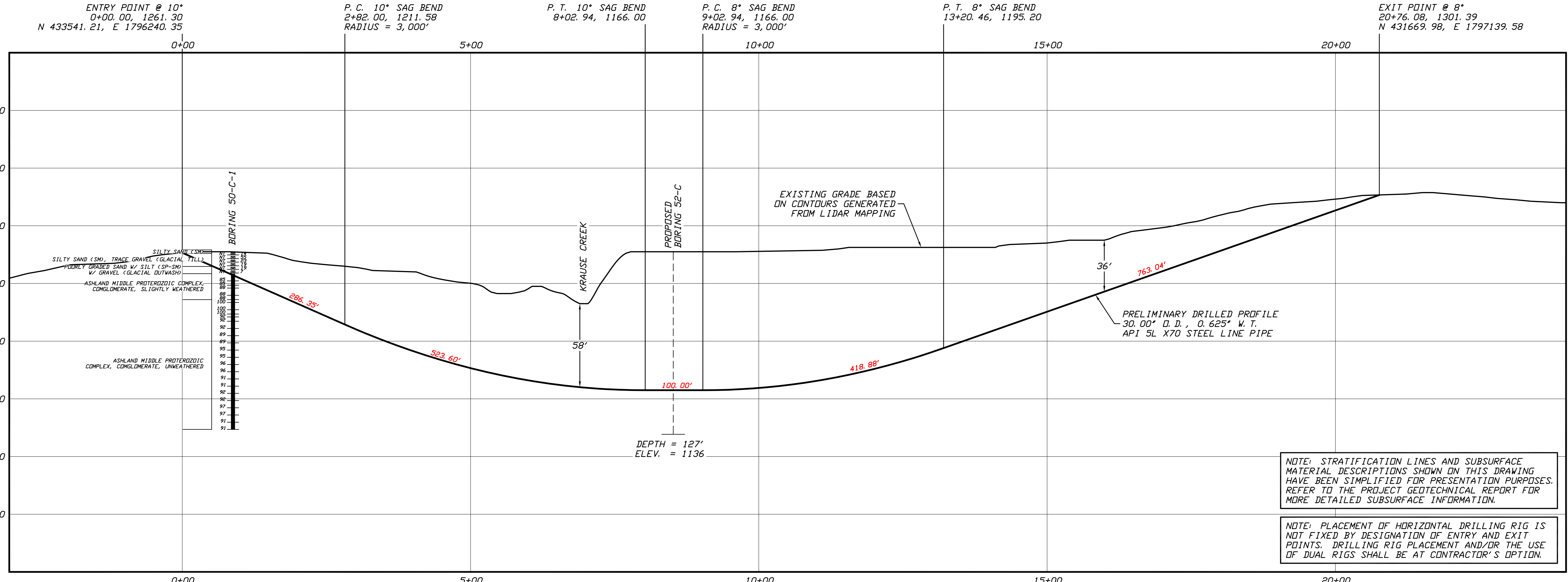
NO.	DATE	REVISION DESCRIPTION	BY	CHECKED	APP.
P1	07/24/20	ADD UPDATED BASE & GEOTECH DATA & EDIT LABELS	JDA	DMP	JSP

J.D.Hair & Associates, Inc.
 Consulting Engineers
 2424 East 21st Street
 Suite 510
 Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge\1938
 SHEET NUMBER
1



PLAN
SCALE: 1"=100'



PROFILE
SCALE: 1"=100' HORIZONTAL
1"= 40' VERTICAL

NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: PLACEMENT OF HORIZONTAL DRILLING RIG IS NOT FIXED BY DESIGNATION OF ENTRY AND EXIT POINTS. DRILLING RIG PLACEMENT AND/OR THE USE OF DUAL RIGS SHALL BE AT CONTRACTOR'S OPTION.

- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
- GEOTECHNICAL LEGEND**
- ⊙ BORING LOCATION
 - THIN WALL SAMPLE
 - 15" RECOVERY AMOUNT
 - 53.23 PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES
 - PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
 - CORE BARREL SAMPLE
 - UCS 6,290 UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 53.6 MOHS HARDNESS
 - ROCK QUALITY DESIGNATION (PERCENT)

- GEOTECHNICAL NOTES**
1. GEOTECHNICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MN. REFER TO THE DRAFT BORING LOG DATED 2/19/20 FOR MORE DETAILED SUBSURFACE INFORMATION.
 2. THE LETTER "N" TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
 3. THE GEOTECHNICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

- TOPOGRAPHIC SURVEY NOTES**
1. TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
 2. NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
 3. ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.
- DRILLED PATH NOTES**
1. DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 2. DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
1. ENTRY POINT: AS STAKED BY COMPANY
 2. EXIT POINT: UP TO 10 FEET SHORT OR 20 FEET LONG RELATIVE TO THE DESIGNED EXIT POINT; UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 3. ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 4. ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 5. CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

- PROTECTION OF EXISTING FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.
1. CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 2. POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 3. MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

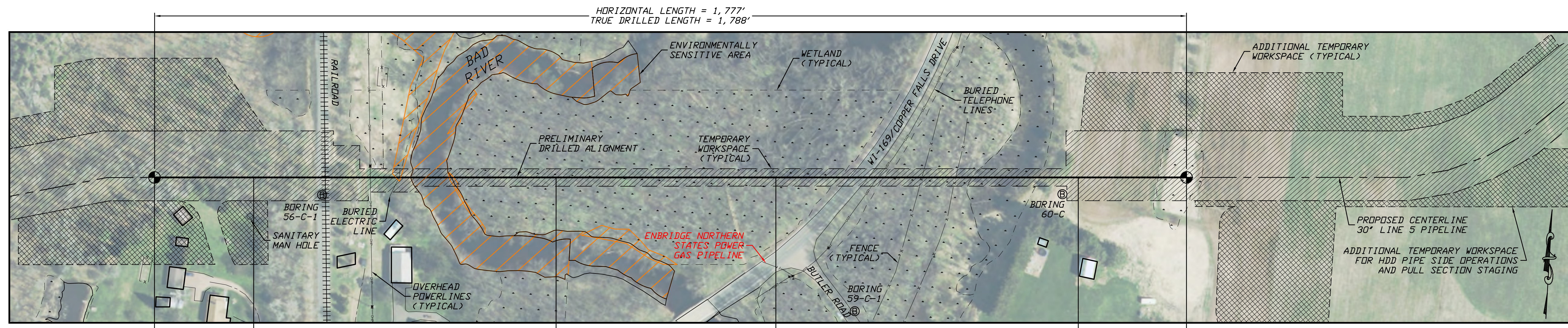
PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT MP 22 - PLAN AND PROFILE 30-INCH PIPELINE CROSSING OF KRAUSE CREEK BY HORIZONTAL DIRECTIONAL DRILLING		LOCATION: ASHLAND COUNTY, WISCONSIN
		DRAWN: KWW DATE: 01/10/20 CHECKED: DMP APPROVED: JSP
SCALE: SHOWN FOR D-SIZED PLOT	DRAWING LABEL: KRAUSE CREEK	REVISION: P1

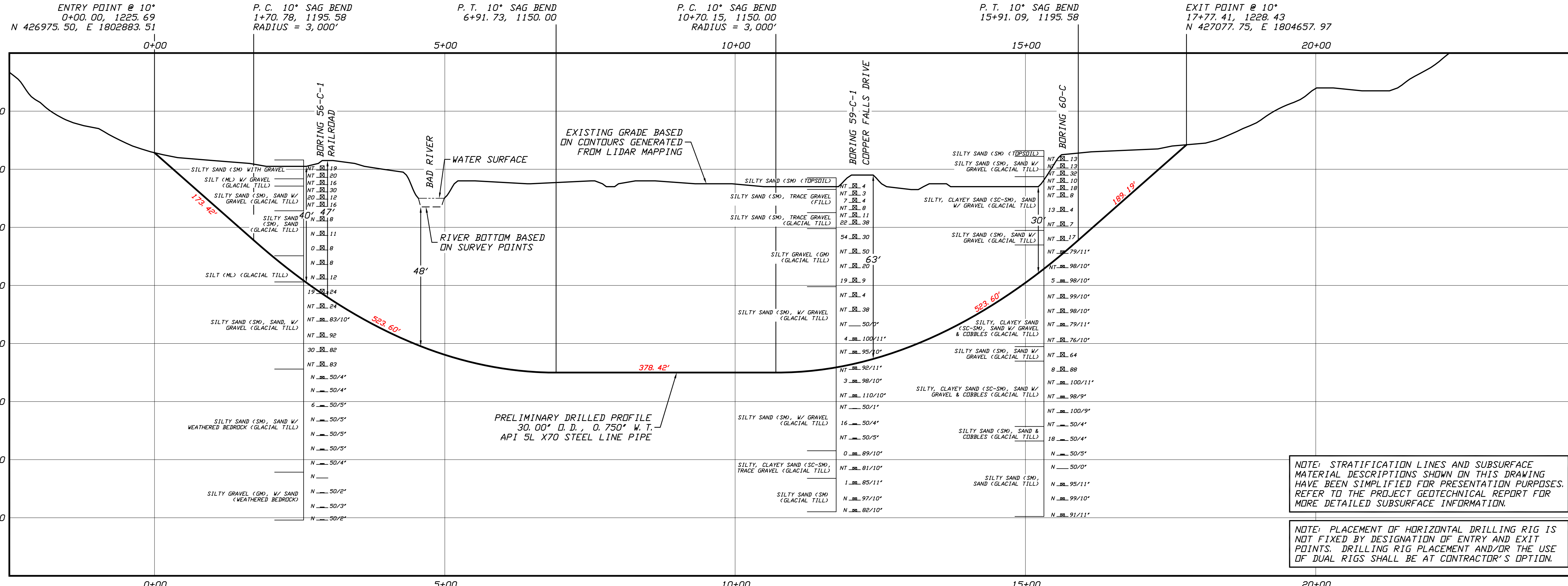
NO.	DATE	REVISION DESCRIPTION	BY	CHKD	APP.
P1	07/23/20	UPDATE BASE DATA, DESIGN, & ADD GEOTECH	DLB	DMP	JSP

J.D.Hair & Associates, Inc.
 Consulting Engineers
 2424 East 21st Street
 Suite 510
 Tulsa, Oklahoma 74114

PROJECT NO. Enbridge\1938
SHEET NUMBER 1



PLAN
SCALE: 1"=100'



PROFILE
SCALE: 1"=100' HORIZONTAL
1"= 20' VERTICAL

- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
- GEOLOGICAL LEGEND**
- ⊗ BORING LOCATION
- SPLIT SPOON SAMPLE**
- 53.1.23 PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
- CORE BARREL SAMPLING**
- UCS 6,250 UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 53.1.6 MOHS HARDNESS
 - ROCK QUALITY DESIGNATION (PERCENT)

- GEOLOGICAL NOTES**
- GEOLOGICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MINNESOTA. REFER TO THE SUBSURFACE INVESTIGATION REPORT DATED 5/27/20 FOR MORE DETAILED SUBSURFACE INFORMATION.
 - THE LETTER "N" TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS "NT" INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
 - THE GEOLOGICAL DATA IS ONLY DESCRIPTIVE OF THE LOCATIONS ACTUALLY SAMPLED. EXTENSION OF THIS DATA OUTSIDE OF THE ORIGINAL BORINGS MAY BE DONE TO CHARACTERIZE THE SOIL CONDITIONS, HOWEVER, COMPANY DOES NOT GUARANTEE THESE CHARACTERIZATIONS TO BE ACCURATE. CONTRACTOR MUST USE HIS OWN EXPERIENCE AND JUDGMENT IN INTERPRETING THIS DATA.

- TOPOGRAPHIC SURVEY NOTES**
- TOPOGRAPHIC SURVEY DATA PROVIDED BY ENBRIDGE, DULUTH, MINNESOTA.
 - NORTHINGS AND EASTINGS ARE IN U.S. SURVEY FEET REFERENCED TO WISCONSIN STATE PLANE COORDINATES, NORTH ZONE, NAD 83.
 - ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.
- DRILLED PATH NOTES**
- DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 - DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
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 - ELEVATION: UP TO 2 FEET ABOVE AND 10 FEET BELOW THE DESIGNED PROFILE
 - ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

NOTE: STRATIFICATION LINES AND SUBSURFACE MATERIAL DESCRIPTIONS SHOWN ON THIS DRAWING HAVE BEEN SIMPLIFIED FOR PRESENTATION PURPOSES. REFER TO THE PROJECT GEOTECHNICAL REPORT FOR MORE DETAILED SUBSURFACE INFORMATION.

NOTE: PLACEMENT OF HORIZONTAL DRILLING RIG IS NOT FIXED BY DESIGNATION OF ENTRY AND EXIT POINTS. DRILLING RIG PLACEMENT AND/OR THE USE OF DUAL RIGS SHALL BE AT CONTRACTOR'S OPTION.

LINE 5 PIPELINE PROJECT

MP 24 - PLAN AND PROFILE
30-INCH PIPELINE CROSSING OF THE BAD RIVER
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: ASHLAND COUNTY, WISCONSIN

DRAWN	DMP	CHECKED	CDS	APPROVED	JSP	SCALE	SHOWN FOR D-SIZED PLOT	DRAWING LABEL	REVISION
DATE	01/10/20							BAD RIVER	P4

PRELIMINARY - NOT FOR CONSTRUCTION

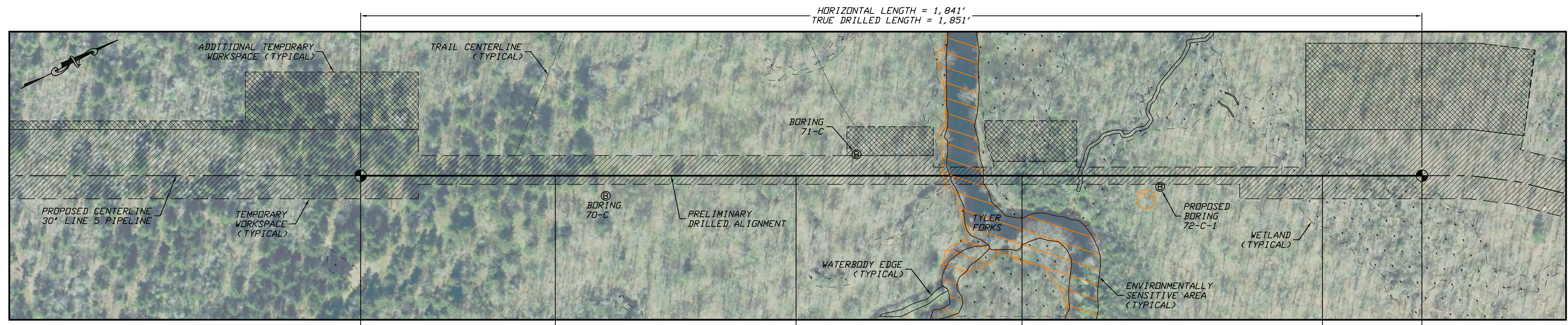
NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APP.
P4	07/22/20	UPDATE BASE DATA	JSP	JSP	JSP
P3	06/03/20	MINOR UPDATES, ISSUE FOR PERMIT	JSP	DLB	JSP
P2	05/13/20	UPDATE GEOTECH DATA, ADD LABELS, ADD 2ND SHEET	JSP	JDA	JDA
P1	04/29/20	ADD PRELIMINARY GEOTECHNICAL DATA	KWW	DLB	JSP

J.D. Hair & Associates, Inc.
Consulting Engineers

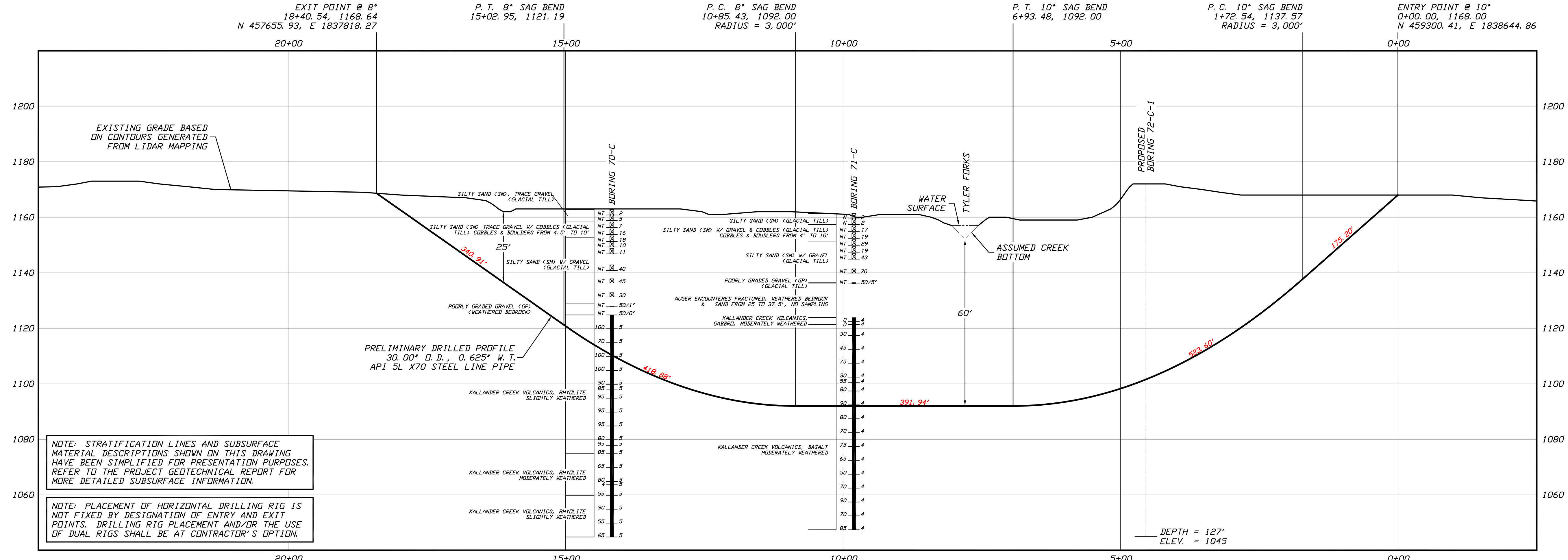
2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge\1938

SHEET NUMBER
1



PLAN
SCALE: 1"=100'



PROFILE
SCALE: 1"=100' HORIZONTAL
1"= 20' VERTICAL

- GENERAL LEGEND**
- DRILLED PATH ENTRY/EXIT POINT
- GEOTECHNICAL LEGEND**
- ⊙ BORING LOCATION
 - 53.1 23 PENETRATION RESISTANCE IN BLOWS PER FOOT FOR A 140 POUND HAMMER FALLING 30 INCHES PERCENTAGE OF GRAVEL BY WEIGHT FOR SAMPLES CONTAINING GRAVEL
 - 53.1 6 UCS 6, 250 UNCONFINED COMPRESSIVE STRENGTH (PSI)
 - 53.1 6 MOHS HARDNESS
 - ROCK QUALITY DESIGNATION (PERCENT)

- GEOTECHNICAL NOTES**
- GEOTECHNICAL DATA PROVIDED BY BRAUN INTERTEC, DULUTH, MN. REFER TO THE PROJECT DRAFT BORING LOGS DATED JUNE 2020 FOR MORE DETAILED SUBSURFACE INFORMATION.
 - THE LETTER 'N' TO THE LEFT OF A SAMPLE INDICATES THAT NO GRAVEL WAS OBSERVED IN THE SAMPLE. THE LETTERS 'NT' INDICATE THAT GRAVEL WAS OBSERVED BUT NO GRADATION TEST WAS PERFORMED.
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 - ELEVATIONS ARE IN FEET REFERENCED TO NAVD 88.
- DRILLED PATH NOTES**
- DRILLED PATH STATIONING IS IN FEET BY HORIZONTAL MEASUREMENT AND IS REFERENCED TO CONTROL ESTABLISHED FOR THE DRILLED SEGMENT.
 - DRILLED PATH COORDINATES REFER TO CENTERLINE OF PILOT HOLE AS OPPOSED TO TOP OF INSTALLED PIPE.

- PILOT HOLE TOLERANCES**
- THE PILOT HOLE SHALL BE DRILLED TO THE TOLERANCES LISTED BELOW. HOWEVER, IN ALL CASES, RIGHT-OF-WAY RESTRICTIONS AND CONCERN FOR ADJACENT FACILITIES SHALL TAKE PRECEDENCE OVER THESE TOLERANCES.
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 - ALIGNMENT: UP TO 5 FEET RIGHT OR LEFT OF THE DESIGNED ALIGNMENT
 - CURVE RADIUS: NO LESS THAN 2,000 FEET BASED ON A 3-JOINT AVERAGE (ASSUMING RANGE 2 DRILL PIPE)

- PROTECTION OF EXISTING FACILITIES**
- CONTRACTOR SHALL UNDERTAKE THE FOLLOWING STEPS PRIOR TO COMMENCING DRILLING OPERATIONS.
- CONTACT THE UTILITY LOCATION/NOTIFICATION SERVICE FOR THE CONSTRUCTION AREA.
 - POSITIVELY LOCATE AND STAKE ALL EXISTING UNDERGROUND FACILITIES. ANY FACILITIES LOCATED WITHIN 10 FEET OF THE DESIGNED DRILLED PATH SHALL BE EXPOSED.
 - MODIFY DRILLING PRACTICES AND DOWNHOLE ASSEMBLIES AS NECESSARY TO PREVENT DAMAGE TO EXISTING FACILITIES.

PRELIMINARY - NOT FOR CONSTRUCTION

LINE 5 PIPELINE PROJECT

MP 34 - PLAN AND PROFILE
30-INCH PIPELINE CROSSING OF TYLER FORKS
BY HORIZONTAL DIRECTIONAL DRILLING

LOCATION: IRON COUNTY, WISCONSIN

DATE	CHECKED	APPROVED	SCALE	DRAWING LABEL	REVISION
01/14/19	DMP	JSP	SHOWN FOR D-SIZED PLOT	TYLER FORKS	P2
CDS					

NO.	DATE	REVISION DESCRIPTION	BY	CHK'D	APP.
P1	07/08/20	UPDATE ENTRY POINT, ADD GEOTECHNICAL INFORMATION	DLB	KWW	JSP
P2	07/23/20	UPDATE BASE DATA	DLB	KWW	JSP

J.D.Hair & Associates, Inc.
Consulting Engineers

2424 East 21st Street
Suite 510
Tulsa, Oklahoma 74114

PROJECT NO.
Enbridge\1938

SHEET NUMBER
1