ENBRIDGE PIPELINES INC.
1409 HAMMOND AVENUE
SUPERIOR, WI 54880
USA
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LINE 5 WSRP
AFE# 20009293
SPECIFIC DRAWINGS FOR CHANNEL REMEDIATION
CWP XXX
ISSUED FOR BID

SPECIFIC DRAWINGS FOR CHANNEL REMEDIATION LIST

PROJECT TITLE AND ACRONYM: LINE 5 SEGMENT RELOCATION PROJECT, L5WSRP

AFE # AND PROJECT ID: AFE # 20009293

STATION / TERMINAL: INO (WI) STATION TO SAXON (WI) STATION

IN SERVICE DATE: 09/01/2021

			Dwg Set Issue Issue Date	ISSUED FOR BID 2020-08-17	
Page No.	**Discipline**	**CWP Number**	**DWG Number**	**Latest Revision**	**Description of Revision**
1	ADMIN	-	D-5-000-SKG012-135	00A	ISSUED FOR BID
2	PIPELINE	-	SASE006P-WXR	00A	ISSUED FOR BID
3	PIPELINE	-	SASA047I-WXR	00A	ISSUED FOR BID
4	PIPELINE	-	SASB007I-WXR	00A	ISSUED FOR BID
5	PIPELINE	-	SASC039I-WXR	00A	ISSUED FOR BID
6	PIPELINE	-	SASE1015I-WXR	00A	ISSUED FOR BID
7	PIPELINE	-	SASC1006P-WXR	00A	ISSUED FOR BID
8	PIPELINE	-	SASW011-WXR	00A	ISSUED FOR BID

REV:	PROJECT TITLE:	SE #:
0.A	L5WSRP	
AFE: 20009293	PROJ NO.: 2000105	
WP NO.:		

REV	REVISION DESCRIPTION	DATE BY	CHK APPR
0.A	ISSUED FOR BID	2020-08-17 SRK	JMO LSC

LAKE SUPERIOR CONSULTING
A SHAWCOR COMPANY

REFERENCE DRAWINGS

REV NO	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

ENBRIDGE LINE 5 WSRP
INDEX SHEET
ASHLAND COUNTY/IRON COUNTY, WI
WATERBODY REMEDIATION PLAN

BY: SRK	CHK: JMO	ENG.: NIN	ENB APPR: M. STATTERS
DATE: 2020-08-07		SCALE: NONE	STATUS: DESIGN

DWG NO.: D-5-0.0-SKG012-135 REV NO: 0.A

RESTORATION DETAILS

CREEK BED

STEP 1. SALVAGE AND RE-USE BED MATERIAL. BACKFILL AND RECONTOUR THE STREAMBED TO PRE-CONSTRUCTION PROFILE AND GRADIENT. IF GRANULAR MATERIAL WAS EXCAVATED, TOP STREAMBED TRENCH WITH CLEAN GRANULAR MIXTURE. ENSURE UPSTREAM AND DOWNSTREAM EDGES OF THE DITCH HAVE SMOOTH TRANSITION TO NATURAL STREAMBED.

NORTH BANK (DOWNSTREAM BANK LEFT)

STEP 1. RE-CONTOUR TOE OF SLOPE, LINE WITH GEOTEXTILE AND INSTALL RIP-RAP ALONG TOE, (TOE OF RIP-RAP IN AT LEAST 2 FT BELOW THE STREAMBED LEVEL)
STEP 2. INSTALL ROCK RIP-RAP UP TO 1 FT ABOVE CHANNEL BOTTOM
STEP 3. LAYER WILLOW BRANCES AS BRUSH LAYERS ON TOP OF RIP-RAP
STEP 4. INSTALL FIRST SUBSOIL LIFT WRAPPED WITH COIR MATTING (LAY COIR MATTING UNDER, BACKFILL BANK MATERIAL, INSTALL SEED MIX PER EPP, AND WRAP FRONT EDGE OF COIR MATTING AROUND AND OVER TOP). WRAP LAYER HEIGHTS SHOULD BE NO MORE THAN 1 FOOT HIGH AND GRADE BACK AT AN ANGLE SIMILAR TO THE ADJACENT NATURAL BANK SLOPES.
STEP 5. INSTALL ANOTHER LAYER OF WILLOW BRUSH BETWEEN SOIL LIFTS AND BEGIN THE NEXT SOIL WRAP WITH COIR MATTING. REPEAT STEPS UNTIL DESIRED BANK HEIGHT HAS BEEN REACHED. ENSURE THE TOP LAYER WITHIN THE SOIL WRAP CONTAINS SALVAGED TOPSOIL. CROWN THE TRENCH SLIGHTLY HIGHER TO ALLEVIATE SUBSIDENCE ISSUES.
STEP 6. ON THE TOP OF THE BANK, INSTALL RIPRARIAN SEED MIX PER EPP, COIR MATTING, AND WILLOW STAKES TO HOLD COIR MATTING IN PLACE. INSTALL WILLOW STAKES THROUGH THE FINAL SOIL WRAP AND APPROXIMATELY 10 FT BEYOND BANK EDGE AT APPROXIMATELY 1 PER 8 SF (STAGGARD FORMATION). STAKES SHOULD BE INSTALLED WITH 1/4 OF THE STAKES EXPOSED (3/4 IN THE GROUND), ANGLED TOWARD THE WATERCOURSE.
STEP 7. IF BANKS WERE GRADED FOR THE VEHICLE AND E UIPMENT ACCESS CROSSING, CROWN BANK AREA AND STABILIZE SOILD WITH COIR MATTING, WILLOW STAKES, AND RIPRARIAN SEEDING PER EPP.

SOUTH BANK (DOWNSTREAM BANK RIGHT)

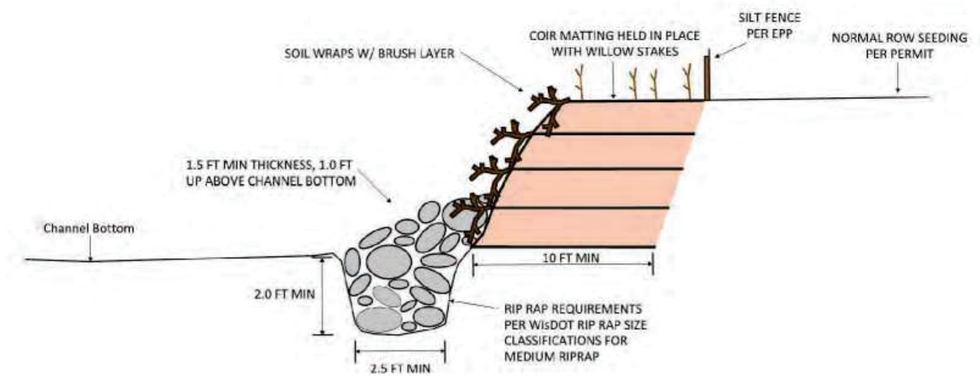
STEP 1. RE-CONTOUR TOE OF SLOPE, LINE WITH GEOTEXTILE AND INSTALL RIP-RAP ALONG TOE, (TOE OF RIP-RAP IN AT LEAST 2 FT BELOW THE STREAMBED LEVEL)
STEP 2. INSTALL ROCK RIP-RAP UP TO 1 FT ABOVE CHANNEL BOTTOM
STEP 3. LAYER WILLOW BRANCES AS BRUSH LAYERS ON TOP OF RIP-RAP
STEP 4. INSTALL FIRST SUBSOIL LIFT WRAPPED WITH COIR MATTING (LAY COIR MATTING UNDER, BACKFILL BANK MATERIAL, INSTALL SEED MIX PER EPP, AND WRAP FRONT EDGE OF COIR MATTING AROUND AND OVER TOP). WRAP LAYER HEIGHTS SHOULD BE NO MORE THAN 1 FOOT HIGH AND GRADE BACK AT AN ANGLE SIMILAR TO THE ADJACENT NATURAL BANK SLOPES.
STEP 5. INSTALL ANOTHER LAYER OF WILLOW BRUSH BETWEEN SOIL LIFTS AND BEGIN THE NEXT SOIL WRAP WITH COIR MATTING. REPEAT STEPS UNTIL DESIRED BANK HEIGHT HAS BEEN REACHED. ENSURE THE TOP LAYER WITHIN THE SOIL WRAP CONTAINS SALVAGED TOPSOIL. CROWN THE TRENCH SLIGHTLY HIGHER TO ALLEVIATE SUBSIDENCE ISSUES.
STEP 6. ON THE TOP OF THE BANK, INSTALL RIPRARIAN SEED MIX PER EPP, COIR MATTING, AND WILLOW STAKES TO HOLD COIR MATTING IN PLACE. INSTALL WILLOW STAKES THROUGH THE FINAL SOIL WRAP AND APPROXIMATELY 10 FT BEYOND BANK EDGE AT APPROXIMATELY 1 PER 8 SF (STAGGARD FORMATION). STAKES SHOULD BE INSTALLED WITH 1/4 OF THE STAKES EXPOSED (3/4 IN THE GROUND), ANGLED TOWARD THE WATERCOURSE.
STEP 7. IF BANKS WERE GRADED FOR THE VEHICLE AND E UIPMENT ACCESS CROSSING, CROWN BANK AREA AND STABILIZE SOILD WITH COIR MATTING, WILLOW STAKES, AND RIPRARIAN SEEDING PER EPP.

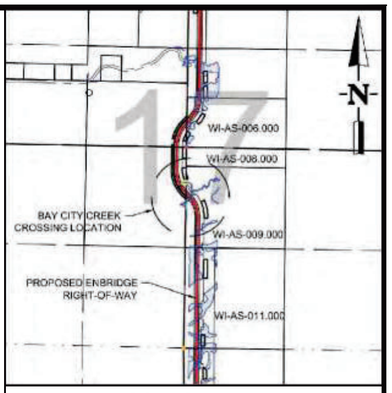
APPROXIMATE QUANTITIES OF REMEDIATION MATERIALS REQUIRED*

- 250 WILLOW STAKES (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS COVERAGE X 10 FT WILLOW SETBACK WIDTH * 1 EA/8 SF WILLOW STAKE SPACING. CUT TO APPROXIMATELY 2-3 FEET LONG, BRANCHES REMOVED, AND COLLECT ALL BRUSH FROM FROM WILLOW STAKE TRIMMINGS (CUT BRANCHES)
- 800 BRANCHES (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 4 BRANCHES / LINEAL FOOT
- 9 ROLLS COIR MATTING (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 53 FT LENGTH OF COIR MATTING PER LINEAL FOOT OF BANK (ASSUMING 4 FT CHANNEL WITH 3.0 H: 1 V SLOPE)* 1 ROLL/1200 SF
- 1 BAG OF WATERBODY BAG SEED MIX (EA) - SEE TABLE 8-4 OF EPP
- 53 (CY) OF MEDIUM RIP-RAP - ASSUME 7.12 SF PER LINEAL FOOT * 100 FOOT WORKSPACE * 2 BANKS * 1 CY / 27 CF
- 144 (SY) OF GEOTEXTILE FABRIC TYPE HR - ASSUME 6.5 SF / 1 LF X 100 FT WORKSPACE X 2 BANKS X 1 SY / 9 SF
- 19 (CY) OF SELECT CRUSHED MATERIAL (REPLACEMENT OF DRIVEABLE PATH) - ASSUME 0.5 FT DEPTH X 10 FT WIDE X 100 FT LENGTH
- 2 ROLLS OF SILT FENCE (EA) - ASSUME 100FT WORKSPACE WIDTH X 1.2 BANK COVERAGE X 1 ROLL/100FT

* NOTE THAT THE ABOVE UANTITIES ARE BASED ON ESTIMATES ONLY FOR REMEDIATION MATERIALS BEYOND STANDARD E S CONTROLS FOR CHANNEL REMEDIATION. PROPOSED WORKSPACE AND ESTIMATED DITCH DIMENSIONS WERE USED. ADDITIONAL MATERIALS MAY BE NEEDED OR MATERIALS MAY BE EXCESS.

TYPICAL SIDE VIEW OF SOIL WRAPS W/ BRUSH LAYER & RIP RAP TOE





LOCATION PLAN

CHANNEL DESCRIPTION

TYPE: INTERMITTENT STREAM
TROUT WATER: NO (THOUGH TROUT WERE FOUND DURING FIELD INVESTIGATION)
OUTSTANDING /EXCEPTIONAL WATER: NO
IMPAIRED WATER: YES
DESCRIPTION: CHANNEL AT CROSSING IS APPROX 14 FT WIDE. BANKS SHOW SIGNS OF EROSION AND ARE APPROX. 2.75-3.00H:1V SLOPES. CHANNEL BED IS MOSTLY SAND W/ PEBBLES SMALLER ROCKS

CONSTRUCTION DETAILS*

CONSTRUCTION TIMING: SUMMER
CONSTRUCTION METHODS:
PRIMARY - FLOW ISOLATION
SECONDARY - OPEN TRENCH (ONLY IF DRY OR FROZEN TO THE BOTTOM)
EQUIPMENT: CROSSING METHOD

*AS PER EPP AND CROSSING DRAWINGS

NOTES

THIS DRAWING IS TO AID IN THE REMEDIATION OF THE CHANNEL BANKS. REMEDIATION OF THE CHANNEL TO CONFORM TO THE METHODS DICTATED IN THIS DRAWING, RE UIREMENTS OF THE EPP, AND AGENCY RE UIREMENTS. EXTENTS OF REMEDIATION, UANTITIES, AND DIMENSIONS DEPENDENT ON THE EXTENT OF REMEDIATION RE UIRED

REV:	PROJECT TITLE:	SE #:
0.A	L5WSRP	
AFE: 20009293	PROJ NO.: 2000105	
WP NO.:		

REV	SUBSE UENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR BID	2020-08-10 FJS	JMO LSC

EPP FIGURE 19 — TYPICAL DEWATERING MEASURES
EPP FIGURE 17 — TYPICAL FINAL STREAM STABLIZATION
EPP FIGURES 14-16 — TYPICAL WATERBODY CROSSING METHOD
EPP FIGURE 12 SASE006P-WX — TYPICAL SPAN TYPE BRIDGE WATERBODY CROSSING DRAWING BAY CITY CREEK

THIS DRAWING REPRESENTS THE INITIAL ENGINEERING DESIGN AND SHALL BE USED ONLY FOR THE PURPOSE OF PREPARING A BID. THIS DRAWING DOES NOT PRESENT THE FINAL ENGINEERING DESIGN AND SHALL NOT BE USED FOR CONSTRUCTION.

REFERENCE DRAWINGS

REV NO	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 0.631 (STA 33+31)
LINE 5 CROSSING (ID SASE006P)
BAY CITY CREEK CREEK IN S17, T47N, R4W
WATERBODY REMEDIATION PLAN

BY: FJS	CHK: JMO	ENG. .NIN	ENB APPR: M. STATTERS
DATE: 08/10/2020		SCALE: NTS	STATUS: DESIGN

DWG NO.: SASE006P-WXR | REV. NO.: 0.A

DOWNSTREAM RIGHT, EXISTING CHANNEL (NORTH BANK BACKGROUND, SOUTH BANK FOREGROUND)

DOWNSTREAM RIGHT, PROPOSED CONCEPT (NORTH BANK BACKGROUND, SOUTH BANK FOREGROUND)

LEGEND

RESTORATION DETAILS

CREEK BED

STEP 1. SALVAGE AND RE-USE BED MATERIAL. BACKFILL AND RECONTOUR THE STREAMBED TO PRE-CONSTRUCTION PROFILE AND GRADIENT. IF GRANULAR MATERIAL WAS EXCAVATED, TOP STREAMBED TRENCH WITH CLEAN GRANULAR MIXTURE. ENSURE UPSTREAM AND DOWNSTREAM EDGES OF THE DITCH HAVE SMOOTH TRANSITION TO NATURAL STREAMBED.

NORTH BANK (LEFT DOWNSTREAM BANK)

ROOTWAD

STEP 1. CLEAR AND GRUB THE WORK AREA AT THE DIRECTION OF THE SITE ENGINEER AND SALVAGE LARGE TREES AS DIRECTED.
STEP 2. RE-CONTOUR TOE OF SLOPE, SET FOOTER LOG BEHIND BANK AND BACKFILL WITH NATIVE BANK MATERIAL
STEP 3. RE-GRADE TO PRE-CONSTRUCTION CONDITIONS HALFWAY UP CHANNEL BANK, UTILIZING STANDARD E S CONTROLS AS RE UIRED.
STEP 4. SET SALVAGED ROOTWAD AS SHOWN IN ROOTWAD TYPICAL, CANTILEVERED OVER FOOTER LOGS.
STEP 5. CONTINUE TO RE-GRADE TO PRE-CONSTRUCTION CONDITION, UTILIZING STANDARD E S CONTROLS AS RE UIRED.

RE-GRADING TO 3 H : 1 V

STEP 1. RE-CONTOUR TOE OF SLOPE
STEP 2. GRADE AT A 3 H : 1 V TO PRE-CONSTRUCTION CONDITIONS, UTILIZING STANDARD E S CONTROLS AS RE UIRED.

SOUTH BANK (RIGHT DOWNSTREAM BANK)

ROOTWAD

STEP 1. CLEAR AND GRUB THE WORK AREA AT THE DIRECTION OF THE SITE ENGINEER AND SALVAGE LARGE TREES AS DIRECTED.
STEP 2. RE-CONTOUR TOE OF SLOPE, SET FOOTER LOG BEHIND BANK AND BACKFILL WITH NATIVE BANK MATERIAL
STEP 3. RE-GRADE TO PRE-CONSTRUCTION CONDITIONS HALFWAY UP CHANNEL BANK, UTILIZING STANDARD E S CONTROLS AS RE UIRED.
STEP 4. SET SALVAGED ROOTWAD AS SHOWN IN ROOTWAD TYPICAL, CANTILEVERED OVER FOOTER LOGS.
STEP 5. CONTINUE TO RE-GRADE TO PRE-CONSTRUCTION CONDITION, UTILIZING STANDARD E S CONTROLS AS RE UIRED.

RE-GRADING TO 3 H : 1 V

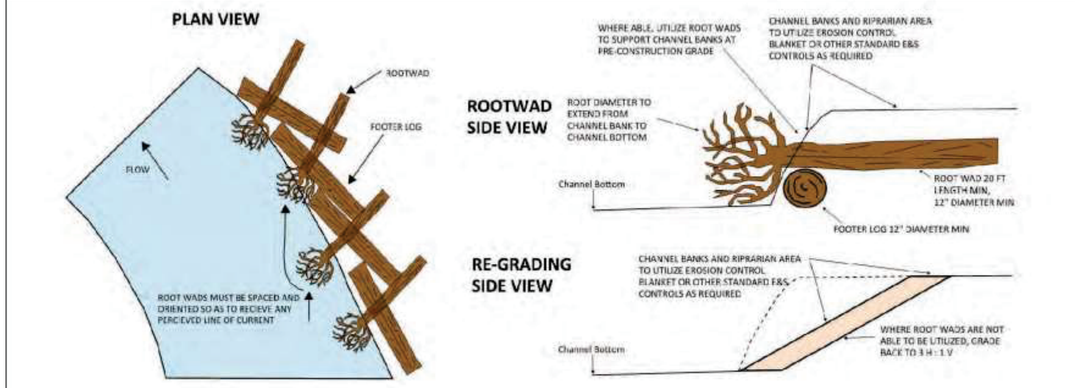
STEP 1. RE-CONTOUR TOE OF SLOPE
STEP 2. GRADE AT A 3 H : 1 V TO PRE-CONSTRUCTION CONDITIONS, UTILIZING STANDARD E S CONTROLS AS RE UIRED.

APPROXIMATE QUANTITIES OF REMEDIATION MATERIALS REQUIRED*

- 1 BAG OF WATERBODY BAG SEED MIX (EA) - SEE TABLE 8-4 OF EPP
- 2 ROLLS OF SILT FENCE (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 1 ROLL/100FT
- 10 ROOTWADS (EA) - ASSUME 100 FT WORKSPACE X 2 BANKS X 1 ROOTWAD / 20 FT
- 10 FOOTER LOG (EA) - ASSUME 1 FOOTER LOG / ROOTWAD

* NOTE THAT THE ABOVE UANTITIES ARE BASED ON ESTIMATES ONLY FOR REMEDIATION MATERIALS BEYOND STANDARD E S CONTROLS FOR CHANNEL REMEDIATION. PROPOSED WORKSPACE AND ESTIMATED DITCH DIMENSIONS WERE USED. ADDITIONAL MATERIALS MAY BE NEEDED OR MATERIALS MAY BE EXCESS.

TYPICAL PLAN AND SIDE VIEW OF ROOTWADS AND RE-GRADING



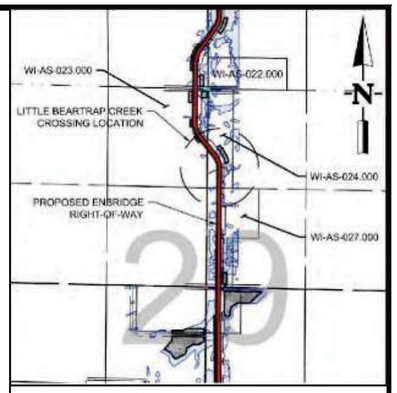
DOWNSTREAM LEFT, EXISTING CHANNEL (NORTH BANK FOREGROUND, SOUTH BANK BACKGROUND)

DOWNSTREAM LEFT, PROPOSED CONCEPT (NORTH BANK FOREGROUND, SOUTH BANK BACKGROUND)

LEGEND

ROOTWAD

BANKS TO BE RE-GRADED OR STABILIZED WITH ROOTWADS



LOCATION PLAN

CHANNEL DESCRIPTION

TYPE: INTERMITTENT STREAM
TROUT WATER: NO
OUTSTANDING /EXCEPTIONAL WATER: NO
IMPAIRED WATER: NO
DESCRIPTION: CHANNEL AT CROSSING IS APPROX 7 FT WIDE. BANKS SHOW SIGNS OF EROSION AND ARE APPROX. 1H:1V SLOPES. CHANNEL BED IS MOSTLY FINES/CLAY MATERIAL.

CONSTRUCTION DETAILS*

CONSTRUCTION TIMING: SUMMER
CONSTRUCTION METHODS:
PRIMARY - FLOW ISOLATION
SECONDARY - OPEN TRENCH (ONLY IF DRY OR FROZEN TO THE BOTTOM)
EQUIPMENT: CROSSING METHOD

*AS PER EPP AND CROSSING DRAWINGS

NOTES

THIS DRAWING IS TO AID IN THE REMEDIATION OF THE CHANNEL BANKS. REMEDIATION OF THE CHANNEL TO CONFORM TO THE METHODS DICTATED IN THIS DRAWING, RE UIREMENTS OF THE EPP, AND AGENCY RE UIREMENTS. EXTENTS OF REMEDIATION, UANTITIES, AND DIMENSIONS DEPENDENT ON THE EXTENT OF REMEDIATION RE UIRED

REV:	PROJECT TITLE:		SE #:
0.A	LSWSRP		
AFE: 20009293		PROJ NO: 2000105	
WP NO:			

REV	SUBSE UENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR BID	2020-08-10 FJS	JMO LSC

EPP FIGURE 19	TYPICAL DEWATERING MEASURES
EPP FIGURE 17	TYPICAL FINAL STREAM STABLIZATION
EPP FIGURES 14-16	TYPICAL WATERBODY CROSSING METHOD
EPP FIGURE 12	TYPICAL SPAN TYPE BRIDGE
SASA0471-WX	WATERBODY CROSSING DRAWING LITTLE BEARTRAP CREEK

THIS DRAWING REPRESENTS THE INITIAL ENGINEERING DESIGN AND SHALL BE USED ONLY FOR THE PURPOSE OF PREPARING A BID. THIS DRAWING DOES NOT PRESENT THE FINAL ENGINEERING DESIGN AND SHALL NOT BE USED FOR CONSTRUCTION.

REFERENCE DRAWINGS

REV NO	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 2.239 (STA 118+21)
LINE 5 CROSSING (ID SASA0471)
LITTLE BEARTRAP CREEK IN S29, T47N, R4W
WATERBODY REMEDIATION PLAN

BY: FJS	CHK: JMO	ENG. .NIN	ENB APPR: M. STATTERS
DATE: 08/10/2020		SCALE: NTS	STATUS: DESIGN

DWG NO.: SASA047I-WXR | REV NO.: 0.A

RESTORATION DETAILS

CREEK BED

STEP 1. SALVAGE AND RE-USE BED MATERIAL. BACKFILL AND RECONTOUR THE STREAMBED TO PRE-CONSTRUCTION PROFILE AND GRADIENT. IF GRANULAR MATERIAL WAS EXCAVATED, TOP STREAMBED TRENCH WITH CLEAN GRANULAR MIXTURE. ENSURE UPSTREAM AND DOWNSTREAM EDGES OF THE DITCH HAVE SMOOTH TRANSITION TO NATURAL STREAMBED.

NORTH BANK (LEFT DOWNSTREAM BANK)

STEP 1. CLEAR AND GRUB THE WORK AREA AT THE DIRECTION OF THE SITE ENGINEER AND SALVAGE LARGE TREES AS DIRECTED.
STEP 2. RE-CONTOUR TOE OF SLOPE, LINE WITH GEOTEXTILE AND INSTALL RIP-RAP ALONG TOE, (TOE OF RIP-RAP IN AT LEAST 2 FT BELOW THE STREAMBED LEVEL)
STEP 3. INSTALL ROCK RIP-RAP UP TO THE 1 FT ABOVE CHANNEL BOTTOM
STEP 4. LAYER WILLOW BRANCES AS BRUSH LAYERS ON TOP OF RIP-RAP
STEP 5. INSTALL FIRST SUBSOIL LIFT WITH FOOTER LOGS WRAPPED WITH COIR MATTING ALLOWING FOR HALF CYLINDRICAL SHAPE FOR ROOTWAD IN SUBSOIL LIFT (LAY COIR MATTING UNDER, BACKFILL BANK MATERIAL, INSTALL SEED MIX PER EPP, AND WRAP FRONT EDGE OF COIR MATTING AROUND AND OVER TOP). WRAP LAYER HEIGHTS SHOULD BE NO MORE THAN 1 FOOT HIGH AND GRADE BACK AT AN ANGLE SIMILAR TO THE ADJACENT NATURAL BANK SLOPES.
STEP 6. INSTALL SALVAGED ROOTWADS AS SHOWN IN TYPICAL PLAN ON TOP OF COIR MATTING.
STEP 7. INSTALL ANOTHER LAYER OF WILLOW BRUSH BETWEEN SOIL LIFTS AND BEGIN THE NEXT SOIL LIFT ON TOP OF ROOTWADS AND WRAP WITH COIR MATTING. REPEAT SOIL LIFTS AND COIR WRAPPING UNTIL DESIRED BANK HEIGHT HAS BEEN REACHED. ENSURE THE TOP LAYER WITHIN THE SOIL WRAP CONTAINS SALVAGED TOPSOIL. CROWN THE TRENCH SLIGHTLY HIGHER TO ALLEVIATE SUBSIDENCE ISSUES.
STEP 8. ON THE TOP OF THE BANK, INSTALL RIPRARIAN SEED MIX PER EPP, COIR MATTING, AND WILLOW STAKES TO HOLD COIR MATTING IN PLACE. INSTALL WILLOW STAKES THROUGH THE FINAL SOIL WRAP AND APPROXIMATELY 10 FT BEYOND BANK EDGE AT APPROXIMATELY 1 PER 8 SF (STAGGARD FORMATION). STAKES SHOULD BE INSTALLED WITH 1/4 OF THE STAKES EXPOSED (3/4 IN THE GROUND), ANGLED TOWARD THE WATERCOURSE.
STEP 9. IF BANKS WERE GRADED FOR THE VEHICLE AND E UIPMENT ACCESS CROSSING, CROWN BANK AREA AND STABILIZE SOILD WITH COIR MATTING, WILLOW STAKES, AND RIPRARIAN SEEDING PER EPP.

SOUTH BANK (RIGHT DOWNSTREAM BANK)

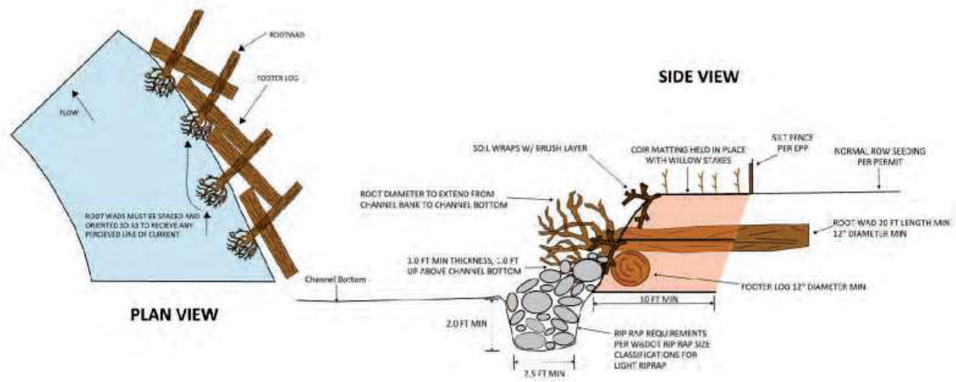
STEP 1. CLEAR AND GRUB THE WORK AREA AT THE DIRECTION OF THE SITE ENGINEER AND SALVAGE LARGE TREES AS DIRECTED.
STEP 2. RE-CONTOUR TOE OF SLOPE, LINE WITH GEOTEXTILE AND INSTALL RIP-RAP ALONG TOE, (TOE OF RIP-RAP IN AT LEAST 2 FT BELOW THE STREAMBED LEVEL)
STEP 3. INSTALL ROCK RIP-RAP UP TO THE 1 FT ABOVE CHANNEL BOTTOM
STEP 4. LAYER WILLOW BRANCES AS BRUSH LAYERS ON TOP OF RIP-RAP
STEP 5. INSTALL FIRST SUBSOIL LIFT WITH FOOTER LOGS WRAPPED WITH COIR MATTING ALLOWING FOR HALF CYLINDRICAL SHAPE FOR ROOTWAD IN SUBSOIL LIFT (LAY COIR MATTING UNDER, BACKFILL BANK MATERIAL, INSTALL SEED MIX PER EPP, AND WRAP FRONT EDGE OF COIR MATTING AROUND AND OVER TOP). WRAP LAYER HEIGHTS SHOULD BE NO MORE THAN 1 FOOT HIGH AND GRADE BACK AT AN ANGLE SIMILAR TO THE ADJACENT NATURAL BANK SLOPES.
STEP 6. INSTALL SALVAGED ROOTWADS AS SHOWN IN TYPICAL PLAN ON TOP OF COIR MATTING.
STEP 7. INSTALL ANOTHER LAYER OF WILLOW BRUSH BETWEEN SOIL LIFTS AND BEGIN THE NEXT SOIL LIFT ON TOP OF ROOTWADS AND WRAP WITH COIR MATTING. REPEAT SOIL LIFTS AND COIR WRAPPING UNTIL DESIRED BANK HEIGHT HAS BEEN REACHED. ENSURE THE TOP LAYER WITHIN THE SOIL WRAP CONTAINS SALVAGED TOPSOIL. CROWN THE TRENCH SLIGHTLY HIGHER TO ALLEVIATE SUBSIDENCE ISSUES.
STEP 8. ON THE TOP OF THE BANK, INSTALL RIPRARIAN SEED MIX PER EPP, COIR MATTING, AND WILLOW STAKES TO HOLD COIR MATTING IN PLACE. INSTALL WILLOW STAKES THROUGH THE FINAL SOIL WRAP AND APPROXIMATELY 10 FT BEYOND BANK EDGE AT APPROXIMATELY 1 PER 8 SF (STAGGARD FORMATION). STAKES SHOULD BE INSTALLED WITH 1/4 OF THE STAKES EXPOSED (3/4 IN THE GROUND), ANGLED TOWARD THE WATERCOURSE.
STEP 9. IF BANKS WERE GRADED FOR THE VEHICLE AND E UIPMENT ACCESS CROSSING, CROWN BANK AREA AND STABILIZE SOILD WITH COIR MATTING, WILLOW STAKES, AND RIPRARIAN SEEDING PER EPP.

APPROXIMATE QUANTITIES OF REMEDIATION MATERIALS REQUIRED*

- 275 WILLOW STAKES (EA) - ASSUME 110 FT WORKSPACE WIDTH X 2 BANKS X 10 FT WILLOW SETBACK WIDTH * 1 EA/8 SF WILLOW STAKE SPACING. CUT TO APPROXIMATELY 2-3 FEET LONG, BRANCHES REMOVED, AND COLLECT ALL BRUSH FROM FROM WILLOW STAKE TRIMMINGS (CUT BRANCHES)
- 440 BRANCHES (EA) - ASSUME 110 FT WORKSPACE WIDTH X 2 BANKS X 2 BRANCH / LINEAL FOOT
- 3 ROLLS COIR MATTING (EA) - ASSUME 110 FT WORKSPACE WIDTH X 2 BANKS X 18 FT LENGTH OF COIR MATTING PER LINEAL FOOT OF BANK (ASSUMING 2 FT CHANNEL WITH 1.5 H: 1 V SLOPE)* 1 ROLL/1200 SF
- 1 BAG OF WATERBODY BAG SEED MIX (EA) - SEE TABLE 8-4 OF EPP
- 52 CY OF LIGHT RIP-RAP - ASSUME 6.41 SF PER LINEAL FOOT * 110 FOOT WORKSPACE * 2 BANKS * 1 CY / 27 CF
- 159 SY OF GEOTEXTILE FABRIC TYPE R - ASSUME 6.5 SF / 1 LF OF BANK X 2 BANKS X 110 FT WORKSPACE X 1 SY / 9 SF
- 3 ROLLS OF SILT FENCE (EA) - ASSUME 110 FT WORKSPACE WIDTH X 2 BANKS X 1 ROLL/100FT
- 22 ROOTWADS (EA) - ASSUME 110 FT WORKSPACE X 2 BANKS X 1 ROOTWAD / 10 FT
- 22 FOOTER LOG (EA) - ASSUME 1 FOOTER LOG / ROOTWAD

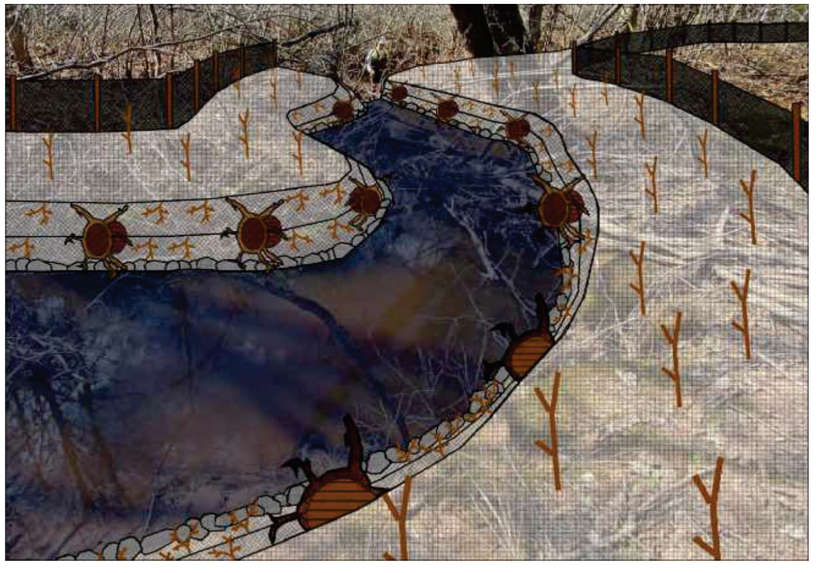
* NOTE THAT THE ABOVE UANTITIES ARE BASED ON ESTIMATES ONLY FOR REMEDIATION MATERIALS BEYOND STANDARD E S CONTROLS FOR CHANNEL REMEDIATION. PROPOSED WORKSPACE AND ESTIMATED DITCH DIMENSIONS WERE USED. ADDITIONAL MATERIALS MAY BE NEEDED OR MATERIALS MAY BE EXCESS.

TYPICAL PLAN AND SIDE VIEW OF ROOTWADS, SOIL WRAPS W/ BRUSH LAYER, AND STONE TOE

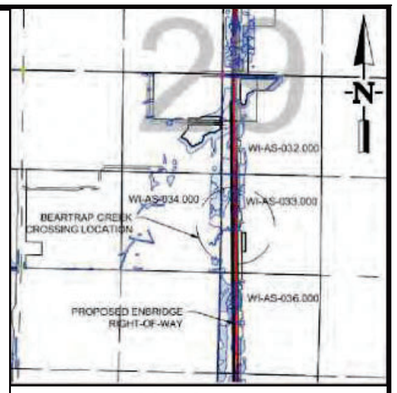


FACING DOWNSTREAM, EXISTING CHANNEL (NORTH BANK LEFT, SOUTH BANK RIGHT)

FACING DOWNSTREAM, PROPOSED CONCEPT (NORTH BANK LEFT, SOUTH BANK RIGHT)



LEGEND



LOCATION PLAN

CHANNEL DESCRIPTION

TYPE: INTERMITTENT STREAM
TROUT WATER: NO
OUTSTANDING /EXCEPTIONAL WATER: NO
IMPAIRED WATER: NO
DESCRIPTION: CHANNEL AT CROSSING IS APPROX 15 FT WIDE. BANKS SHOW SIGNS OF EROSION AND ARE APPROX. 1.5-1.75H:1V SLOPES. CHANNEL BED IS MOSTLY FINES/CLAY MATERIAL

CONSTRUCTION DETAILS*

CONSTRUCTION TIMING: SUMMER
CONSTRUCTION METHODS:
PRIMARY - FLOW ISOLATION
SECONDARY - OPEN TRENCH (ONLY IF DRY OR FROZEN TO THE BOTTOM)
EQUIPMENT: CROSSING METHOD

*AS PER EPP AND CROSSING DRAWINGS

NOTES

THIS DRAWING IS TO AID IN THE REMEDIATION OF THE CHANNEL BANKS. REMEDIATION OF THE CHANNEL TO CONFORM TO THE METHODS DICTATED IN THIS DRAWING, RE UIREMENTS OF THE EPP, AND AGENCY RE UIREMENTS. EXTENTS OF REMEDIATION, UANTITIES, AND DIMENSIONS DEPENDENT ON THE EXTENT OF REMEDIATION RE UIRED

REV:	PROJECT TITLE:	SE #:
0.A	L5WSRP	
AFE: 20009293	PROJ NO.: 2000105	
WP NO.:		

REV	SUBSE UENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR BID	2020-08-10 FJS	JMO LSC

EPP FIGURE 19	TYPICAL DEWATERING MEASURES
EPP FIGURE 17	TYPICAL FINAL STREAM STABLIZATION
EPP FIGURES 14-16	TYPICAL WATERBODY CROSSING METHOD
EPP FIGURE 12	TYPICAL SPAN TYPE BRIDGE
SASB007I-WX	WATERBODY CROSSING DRAWING BEARTRAP CREEK

THIS DRAWING REPRESENTS THE INITIAL ENGINEERING DESIGN AND SHALL BE USED ONLY FOR THE PURPOSE OF PREPARING A BID0 THIS DRAWING DOES NOT PRESENT THE FINAL ENGINEERING DESIGN AND SHALL NOT BE USED FOR CONSTRUCTION0

REFERENCE DRAWINGS

REV NO	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 2.912 (STA 153+75)
LINE 5 CROSSING (ID SASB007I)
BEARTRAP CREEK IN S29-T47N-R4W
WATERBODY REMEDIATION PLAN

BY: FJS	CHK: JMO	ENG. : NIN	ENB APPR: M. STATTERS
DATE: 08/10/2020	SCALE: NTS	STATUS: DESIGN	

DWG NO.: SASB007I-WXR | REV NO.: 0.A

RESTORATION DETAILS

CREEK BED

STEP 1. SALVAGE AND RE-USE BED MATERIAL. BACKFILL AND RECONTOUR THE STREAMBED TO PRE-CONSTRUCTION PROFILE AND GRADIENT. IF GRANULAR MATERIAL WAS EXCAVATED, TOP STREAMBED TRENCH WITH CLEAN GRANULAR MIXTURE. ENSURE UPSTREAM AND DOWNSTREAM EDGES OF THE DITCH HAVE SMOOTH TRANSITION TO NATURAL STREAMBED.

NORTH BANK (LEFT DOWNSTREAM BANK)

STEP 1. UTILIZE STANDARD E S CONTROLS AS RE UIRED.

SOUTH BANK (RIGHT DOWNSTREAM BANK)

ROOTWAD

STEP 1. CLEAR AND GRUB THE WORK AREA AT THE DIRECTION OF THE SITE ENGINEER AND SALVAGE LARGE TREES AS DIRECTED.
STEP 2. RE-CONTOUR TOE OF SLOPE, SET FOOTER LOG BEHIND BANK AND BACKFILL WITH NATIVE BANK MATERIAL
STEP 3. RE-GRADE TO PRE-CONSTRUCTION CONDITIONS HALFWAY UP CHANNEL BANK, UTILIZING STANDARD E S CONTROLS AS RE UIRED.
STEP 4. SET SALVAGED ROOTWAD AS SHOWN IN ROOTWAD TYPICAL, CANTILEVERED OVER FOOTER LOGS.
STEP 5. CONTINUE TO RE-GRADE TO PRE-CONSTRUCTION CONDITION, UTILIZING STANDARD E S CONTROLS AS RE UIRED.

ARMOR CHANNEL BANK W/ RIP RAP

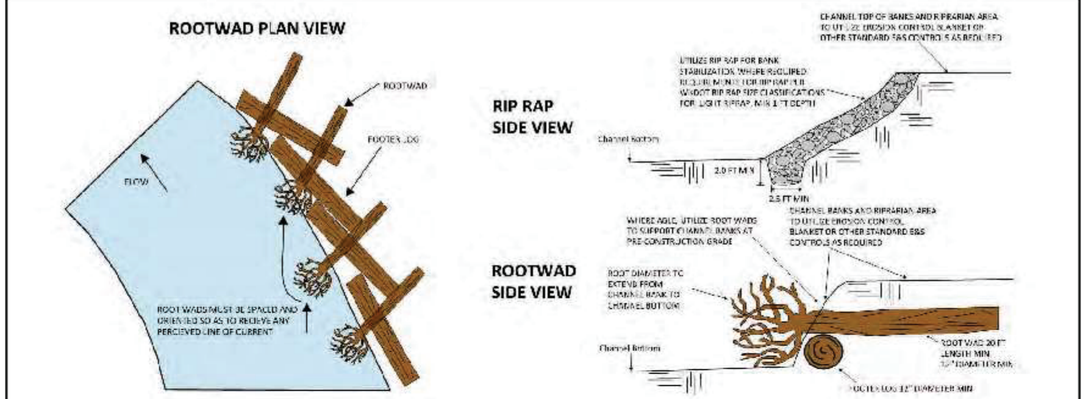
STEP 1. RE-CONTOUR TOE OF SLOPE, LINE WITH GEOTEXTILE AND INSTALL RIP-RAP ALONG TOE, (TOE OF RIP-RAP IN AT LEAST 2 FT BELOW THE STREAMBED LEVEL)
STEP 2. INSTALL ROCK RIP-RAP UP TO 10 FT ABOVE CHANNEL BOTTOM (OR UNTIL BREAK LINE OF TOP OF BANK) AND TO A DEPTH OF 1 FOOT AS RE UIRED BY WisDOT RE UIREMENTS FOR LIGHT RIP RAP

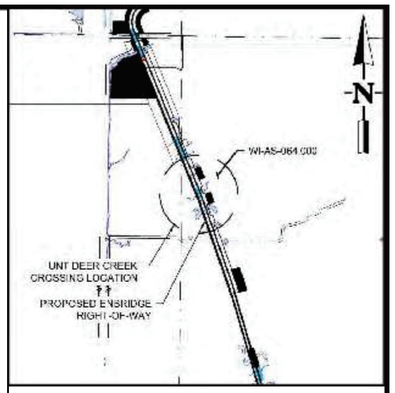
APPROXIMATE QUANTITIES OF REMEDIATION MATERIALS REQUIRED*

- 1 BAG OF WATERBODY BAG SEED MIX (EA) - SEE TABLE 8-4 OF EPP
- 2 ROLLS OF SILT FENCE (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 1 ROLL/100FT
- 3 ROOTWADS (EA) - ASSUME 30 FT OF REMEDIATION BY ROOTWAD RE UIRED X 1 BANK X 1 ROOTWAD / 10 FT
- 3 FOOTER LOG (EA) - ASSUME 1 FOOTER LOG / ROOTWAD
- 28 (CY) OF LIGHT RIP-RAP - ASSUME 15 CF / 1 LF * 50 LF OF REMEDIATION BY RIP RAP * 1 BANK * 1 CY / 27 CF
- 92 (SY) OF GEOTEXTILE FABRIC TYPE R - ASSUME 16.5 SF / 1 LF X 50 LF OF REMEDIATION BY RIP RAP X 1 BANK X 1 SY / 9 SF

* NOTE THAT THE ABOVE UANTITIES ARE BASED ON ESTIMATES ONLY FOR REMEDIATION MATERIALS BEYOND STANDARD E S CONTROLS FOR CHANNEL REMEDIATION. PROPOSED WORKSPACE AND ESTIMATED DITCH DIMENSIONS WERE USED. ADDITIONAL MATERIALS MAY BE NEEDED OR MATERIALS MAY BE EXCESS.

TYPICAL PLAN AND SIDE VIEW OF ROOTWADS AND RIP RAP





LOCATION PLAN

TYPE: INTERMITTENT STREAM
TROUT WATER: NO
OUTSTANDING /EXCEPTIONAL WATER: NO
IMPAIRED WATER: NO
DESCRIPTION: CHANNEL AT CROSSING IS APPROX 5 FT WIDE. SOUTH BANK SHOWS SIGNS OF EROSION AND ARE 1H:1V IN PLACES. CHANNEL BED IS MOSTLY FINES W/ SOME PEBBLES.

CONSTRUCTION DETAILS*

CONSTRUCTION TIMING: SUMMER
CONSTRUCTION METHODS:
PRIMARY - FLOW ISOLATION
SECONDARY - OPEN TRENCH (ONLY IF DRY OR FROZEN TO THE BOTTOM)
EQUIPMENT: CROSSING METHOD

*AS PER EPP AND CROSSING DRAWINGS

NOTES

THIS DRAWING IS TO AID IN THE REMEDIATION OF THE CHANNEL BANKS. REMEDIATION OF THE CHANNEL TO CONFORM TO THE METHODS DICTATED IN THIS DRAWING, RE UIREMENTS OF THE EPP, AND AGENCY RE UIREMENTS. EXTENTS OF REMEDIATION, UANTITIES, AND DIMENSIONS DEPENDENT ON THE EXTENT OF REMEDIATION RE UIRED

REV:	PROJECT TITLE:	SE #:
0.A	LSWSRP	
AFE: 20009293	PROJ NO.: 2000105	
WP NO.:		

REV	SUBSE UENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR BID	2020-08-10 FJS	JMO LSC

EPP FIGURE 19 — TYPICAL DEWATERING MEASURES
EPP FIGURE 17 — TYPICAL FINAL STREAM STABILIZATION
EPP FIGURES 14-16 — TYPICAL WATERBODY CROSSING METHOD
EPP FIGURE 12 — TYPICAL SPAN TYPE BRIDGE

THIS DRAWING REPRESENTS THE INITIAL ENGINEERING DESIGN AND SHALL BE USED ONLY FOR THE PURPOSE OF PREPARING A BIDD THIS DRAWING DOES NOT PRESENT THE FINAL ENGINEERING DESIGN AND SHALL NOT BE USED FOR CONSTRUCTIONO

REFERENCE DRAWINGS

REV NO	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 5.928 (STA 312+98)
LINE 5 CROSSING (ID SASC039I)
UNT DEER CREEK IN S15, T45N, R3W
WATERBODY REMEDIATION PLAN

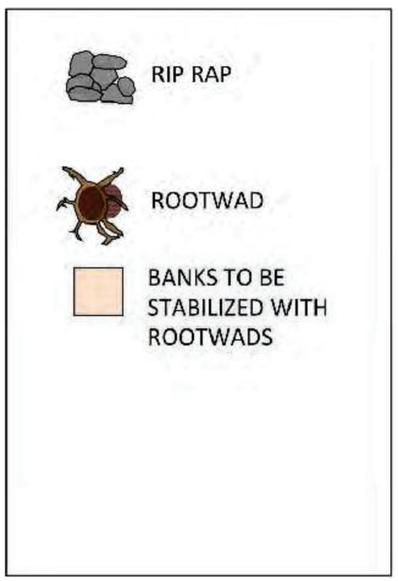
BY: FJS	CHK: JMO	ENG. :NIN	ENB APPR: M. STATTERS
DATE: 08/10/2020		SCALE: NTS	STATUS: DESIGN

DWG NO.: SASC039I-WXR
REV NO.: 0.A

DOWNSTREAM RIGHT, EXISTING CHANNEL (NORTH BANK FOREGROUND, SOUTH BANK BACKGROUND)

DOWNSTREAM RIGHT, PROPOSED CONCEPT (NORTH BANK FOREGROUND, SOUTH BANK BACKGROUND)

LEGEND



RESTORATION DETAILS

CREEK BED

STEP 1. SALVAGE AND RE-USE BED MATERIAL. BACKFILL AND RECONTOUR THE STREAMBED TO PRE-CONSTRUCTION PROFILE AND GRADIENT. IF GRANULAR MATERIAL WAS EXCAVATED, TOP STREAMBED TRENCH WITH CLEAN GRANULAR MIXTURE. ENSURE UPSTREAM AND DOWNSTREAM EDGES OF THE DITCH HAVE SMOOTH TRANSITION TO NATURAL STREAMBED.

EAST BANK (RIGHT DOWNSTREAM BANK)

STEP 1. RE-CONTOUR TOE OF SLOPE.
STEP 2. SET BIOLOG TO STABILIZE TOP OF BANK AT PRE-CONSTRUCTION CONDITIONS.
STEP 3. GRADE BACK AT PRE-CONSTRUCTION CONDITIONS UTILIZING STANDARD E S CONTROLS AS RE UIRED.
STEP 4. WHERE PRE-CONSTRUCTION CONDITIONS AT BANK CAN NOT BE MAINTAINED, GRADE BACK AT 3 H:1 V TO PRE-CONSTRUCTION CONDITIONS UTILIZING STANDARD E S CONTROLS AS RE UIRED.

WEST BANK (LEFT DOWNSTREAM BANK)

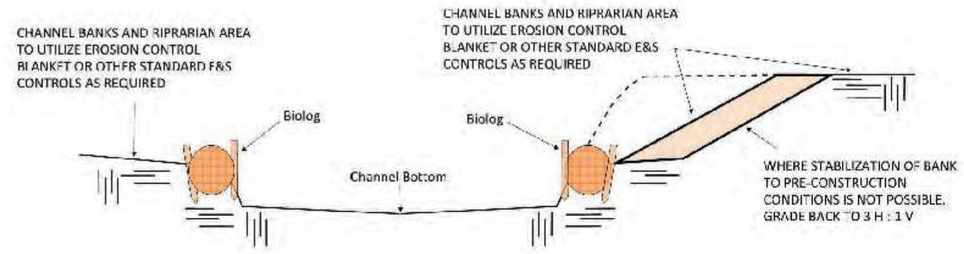
STEP 1. RE-CONTOUR TOE OF SLOPE.
STEP 2. SET BIOLOG TO STABILIZE TOP OF BANK AT PRE-CONSTRUCTION CONDITIONS.
STEP 3. GRADE BACK AT PRE-CONSTRUCTION CONDITIONS UTILIZING STANDARD E S CONTROLS AS RE UIRED.
STEP 4. WHERE PRE-CONSTRUCTION CONDITIONS AT BANK CAN NOT BE MAINTAINED, GRADE BACK AT 3 H:1 V TO PRE-CONSTRUCTION CONDITIONS UTILIZING STANDARD E S CONTROLS AS RE UIRED.

APPROXIMATE QUANTITIES OF REMEDIATION MATERIALS REQUIRED*

- 1 BAG OF WATERBODY BAG SEED MIX (EA) - SEE TABLE 8-4 OF EPP
- 2 ROLLS OF SILT FENCE (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 1 ROLL/100FT
- 8 ROLLS OF BIOLOG (EA) - ASSUME 100 FT WORKSPACE X 2 BANKS X 1 ROLL / 25 FT BIOLOG

* NOTE THAT THE ABOVE UANTITIES ARE BASED ON ESTIMATES ONLY FOR REMEDIATION MATERIALS BEYOND STANDARD E S CONTROLS FOR CHANNEL REMEDIATION. PROPOSED WORKSPACE AND ESTIMATED DITCH DIMENSIONS WERE USED. ADDITIONAL MATERIALS MAY BE NEEDED OR MATERIALS MAY BE EXCESS.

SIDE VIEW OF BIOLOG AND RE-GRADING



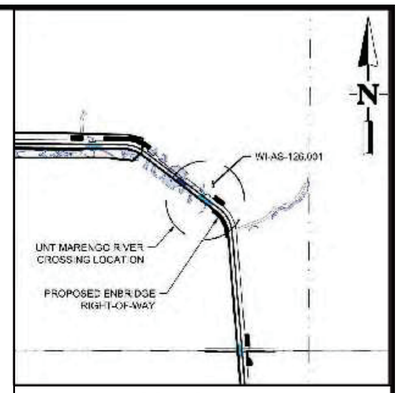
FACING UPSTREAM, EXISTING CHANNEL (EAST BANK LEFT, WEST BANK RIGHT)

FACING UPSTREAM, PROPOSED CONCEPT (EAST BANK LEFT, WEST BANK RIGHT)

LEGEND

BANKS TO BE RE-GRADED AS NEEDED

BIOLOG



LOCATION PLAN

TYPE: INTERMITTENT STREAM
TROUT WATER: *
OUTSTANDING /EXCEPTIONAL WATER: *
IMPAIRED WATER: *
DESCRIPTION: CHANNEL AT CROSSING IS APPROX 6 FT WIDE. BANKS ARE MOSTLY SHALLOW SLOPES WITH OCCASIANAL STEEPER SLOPES. CHANNEL BED IS MOSTLY FINES WITH SMALLER PEBBLES.
* NO DESCRIPTION FROM DNR SWDV

CONSTRUCTION DETAILS*

CONSTRUCTION TIMING: SUMMER
CONSTRUCTION METHODS:
PRIMARY - FLOW ISOLATION
SECONDARY - OPEN TRENCH (ONLY IF DRY OR FROZEN TO THE BOTTOM)
EQUIPMENT: CROSSING METHOD

*AS PER EPP AND CROSSING DRAWINGS

NOTES

THIS DRAWING IS TO AID IN THE REMEDIATION OF THE CHANNEL BANKS. REMEDIATION OF THE CHANNEL TO CONFORM TO THE METHODS DICTATED IN THIS DRAWING, RE UIREMENTS OF THE EPP, AND AGENCY RE UIREMENTS. EXTENTS OF REMEDIATION, UANTITIES, AND DIMENSIONS DEPENDENT ON THE EXTENT OF REMEDIATION RE UIRED

REV:	PROJECT TITLE:	SE #:
0.A	L5WSRP	
AFE: 20009293	PROJ NO.: 2000105	
WP NO:		

REV	SUBSE UENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR BID	2020-08-10 FJS	JMO LSC

EPP FIGURE 19 — TYPICAL DEWATERING MEASURES
EPP FIGURE 17 — TYPICAL FINAL STREAM STABILIZATION
EPP FIGURES 14-16 — TYPICAL WATERBODY CROSSING METHOD
EPP FIGURE 12 — TYPICAL SPAN TYPE BRIDGE

THIS DRAWING REPRESENTS THE INITIAL ENGINEERING DESIGN AND SHALL BE USED ONLY FOR THE PURPOSE OF PREPARING A BIDD THIS DRAWING DOES NOT PRESENT THE FINAL ENGINEERING DESIGN AND SHALL NOT BE USED FOR CONSTRUCTIONO

REFERENCE DRAWINGS

REV NO	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 12.753 (STA 673+36)
LINE 5 CROSSING (ID SASE1015I)
UNT MARENGO RIVER IN S15, T45N, R3W
WATERBODY REMEDIATION PLAN

BY: FJS	CHK: JMO	ENG.: NIN	ENB APPR: M. STATTERS
DATE: 08/10/2020		SCALE: NTS	STATUS: DESIGN

DWG NO.: SASE1015I-WXR — REV NO.: 0.A

RESTORATION DETAILS

CREEK BED

STEP 1. SALVAGE AND RE-USE BED MATERIAL. BACKFILL AND RECONTOUR THE STREAMBED TO PRE-CONSTRUCTION PROFILE AND GRADIENT. IF GRANULAR MATERIAL WAS EXCAVATED, TOP STREAMBED TRENCH WITH CLEAN GRANULAR MIXTURE. ENSURE UPSTREAM AND DOWNSTREAM EDGES OF THE DITCH HAVE SMOOTH TRANSITION TO NATURAL STREAMBED.

NORTHWEST BANK (LEFT DOWNSTREAM BANK)

STEP 1. RE-CONTOUR TOE OF SLOPE AND GRADE BANK SLOPE TO 3 H : 1 V. FIRST SOIL WRAP SHOULD BE SET 1/2 FOOT BELOW TOE.
STEP 2. INSTALL FIRST SUBSOIL LIFT WRAPPED WITH COIR MATTING (LAY COIR MATTING UNDER, BACKFILL BANK MATERIAL, INSTALL SEED MIX PER EPP, AND WRAP FRONT EDGE OF COIR MATTING AROUND AND OVER TOP). WRAP LAYER HEIGHTS SHOULD BE NO MORE THAN 1 FOOT HIGH AND GRADE BACK AT A 3 H : 1 V ANGLE TRANSITIONING TO ADJACENT NATURAL BANK SLOPES.
STEP 3. INSTALL A LAYER OF WILLOW BRUSH BETWEEN SOIL LIFTS AND BEGIN THE NEXT SOIL WRAP WITH COIR MATTING. REPEAT STEPS UNTIL DESIRED BANK HEIGHT HAS BEEN REACHED. ENSURE THE TOP LAYER WITHIN THE SOIL WRAP CONTAINS SALVAGED TOPSOIL. CROWN THE TRENCH SLIGHTLY HIGHER TO ALLEVIATE SUBSIDENCE ISSUES.
STEP 4. ON THE TOP OF THE BANK, INSTALL RIPRARIAN SEED MIX PER EPP, COIR MATTING, AND WILLOW STAKES TO HOLD COIR MATTING IN PLACE. INSTALL WILLOW STAKES THROUGH THE FINAL SOIL WRAP AND APPROXIMATELY 10 FT BEYOND BANK EDGE AT APPROXIMATELY 1 PER 8 SF (STAGGARD FORMATION). STAKES SHOULD BE INSTALLED WITH 1/4 OF THE STAKES EXPOSED (3/4 IN THE GROUND), ANGLED TOWARD THE WATERCOURSE.
STEP 5. IF BANKS WERE GRADED FOR THE VEHICLE AND E UIPMENT ACCESS CROSSING, CROWN BANK AREA AND STABILIZE SOLID WITH COIR MATTING, WILLOW STAKES, AND RIPRARIAN SEEDING PER EPP.

SOUTHEAST BANK (RIGHT DOWNSTREAM BANK)

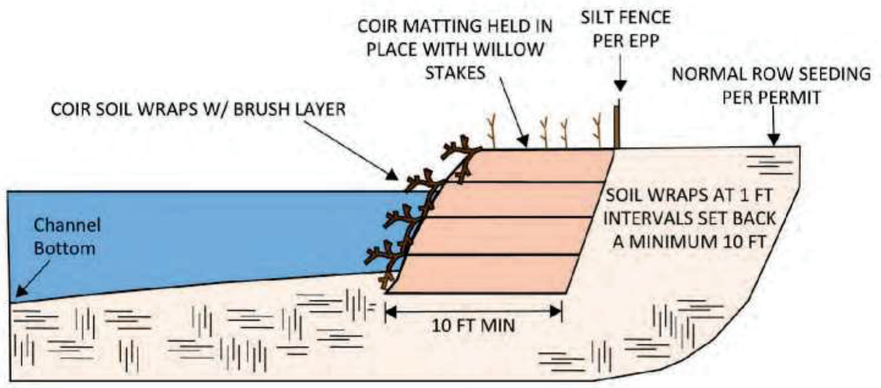
STEP 1. RE-CONTOUR TOE OF SLOPE AND GRADE BANK SLOPE TO 3 H : 1 V. FIRST SOIL WRAP SHOULD BE SET 1/2 FOOT BELOW TOE.
STEP 2. INSTALL FIRST SUBSOIL LIFT WRAPPED WITH COIR MATTING (LAY COIR MATTING UNDER, BACKFILL BANK MATERIAL, INSTALL SEED MIX PER EPP, AND WRAP FRONT EDGE OF COIR MATTING AROUND AND OVER TOP). WRAP LAYER HEIGHTS SHOULD BE NO MORE THAN 1 FOOT HIGH AND GRADE BACK AT A 3 H : 1 V ANGLE TRANSITIONING TO ADJACENT NATURAL BANK SLOPES.
STEP 3. INSTALL A LAYER OF WILLOW BRUSH BETWEEN SOIL LIFTS AND BEGIN THE NEXT SOIL WRAP WITH COIR MATTING. REPEAT STEPS UNTIL DESIRED BANK HEIGHT HAS BEEN REACHED. ENSURE THE TOP LAYER WITHIN THE SOIL WRAP CONTAINS SALVAGED TOPSOIL. CROWN THE TRENCH SLIGHTLY HIGHER TO ALLEVIATE SUBSIDENCE ISSUES.
STEP 4. ON THE TOP OF THE BANK, INSTALL RIPRARIAN SEED MIX PER EPP, COIR MATTING, AND WILLOW STAKES TO HOLD COIR MATTING IN PLACE. INSTALL WILLOW STAKES THROUGH THE FINAL SOIL WRAP AND APPROXIMATELY 10 FT BEYOND BANK EDGE AT APPROXIMATELY 1 PER 8 SF (STAGGARD FORMATION). STAKES SHOULD BE INSTALLED WITH 1/4 OF THE STAKES EXPOSED (3/4 IN THE GROUND), ANGLED TOWARD THE WATERCOURSE.
STEP 5. IF BANKS WERE GRADED FOR THE VEHICLE AND E UIPMENT ACCESS CROSSING, CROWN BANK AREA AND STABILIZE SOLID WITH COIR MATTING, WILLOW STAKES, AND RIPRARIAN SEEDING PER EPP.

APPROXIMATE QUANTITIES OF REMEDIATION MATERIALS REQUIRED*

- 250 WILLOW STAKES (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 10 FT WILLOW SETBACK WIDTH * 1 EA/8 SF WILLOW STAKE SPACING. CUT TO APPROXIMATELY 2-3 FEET LONG, BRANCHES REMOVED, AND COLLECT ALL BRUSH FROM FROM WILLOW STAKE TRIMMINGS (CUT BRANCHES)
- 1400 BRANCHES (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 7 BRANCH / LINEAL FOOT
- 19 ROLLS COIR MATTING (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 116 FT LENGTH OF COIR MATTING PER LINEAL FOOT OF BANK (ASSUMING 7 FT CHANNEL WITH 3 H: 1 V SLOPE) X 1 ROLL/1200 SF
- 1 BAG OF WATERBODY BAG SEED MIX (EA) - SEE TABLE 8-4 OF EPP
- 2 ROLLS OF SILT FENCE (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 1 ROLL/100FT

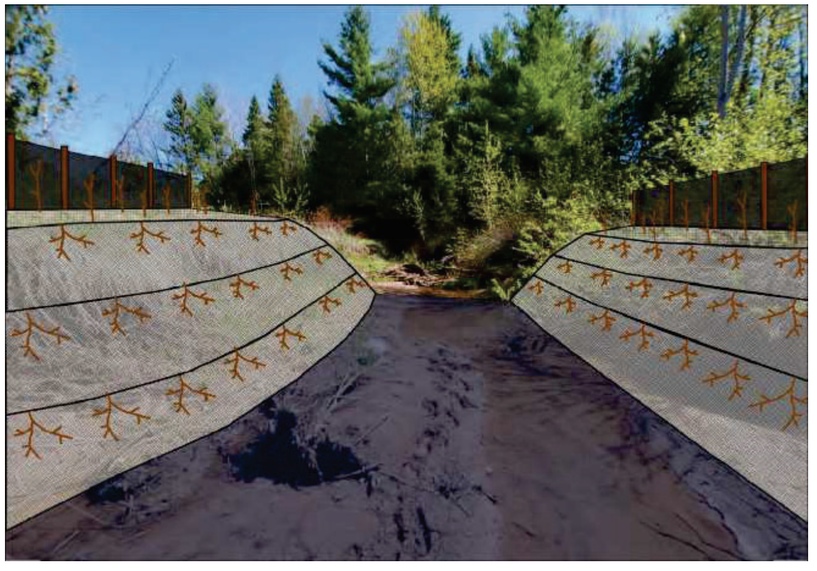
* NOTE THAT THE ABOVE UANTITIES ARE BASED ON ESTIMATES ONLY FOR REMEDIATION MATERIALS BEYOND STANDARD E S CONTROLS FOR CHANNEL REMEDIATION. PROPOSED WORKSPACE AND ESTIMATED DITCH DIMENSIONS WERE USED. ADDITIONAL MATERIALS MAY BE NEEDED OR MATERIALS MAY BE EXCESS.

TYPICAL SIDE VIEW OF SOIL WRAPS W/ BRUSH LAYER



FACING DOWNSTREAM, EXISTING CHANNEL (NORTHWEST BANK LEFT, SOUTHEAST BANK RIGHT)

FACING DOWNSTREAM, PROPOSED CONCEPT (NORTHWEST BANK LEFT, SOUTHEAST BANK RIGHT)



LEGEND

LOCATION PLAN

CHANNEL DESCRIPTION

TYPE: INTERMITTENT STREAM
TROUT WATER: NO
OUTSTANDING /EXCEPTIONAL WATER: NO
IMPAIRED WATER: NO
DESCRIPTION: CHANNEL AT CROSSING IS APPROX 15 FT WIDE. BANKS SHOW SIGNS OF EROSION AND ARE APPROX. 2H:1V SLOPES. CHANNEL BED IS MOSTLY SAND/ FINES WITH SPORADIC PEA SIZE PEBBLES.

CONSTRUCTION DETAILS*

CONSTRUCTION TIMING: SUMMER
CONSTRUCTION METHODS:
PRIMARY - FLOW ISOLATION
SECONDARY - OPEN TRENCH (ONLY IF DRY OR FROZEN TO THE BOTTOM)
EQUIPMENT: CROSSING METHOD

*AS PER EPP AND CROSSING DRAWINGS

NOTES

THIS DRAWING IS TO AID IN THE REMEDIATION OF THE CHANNEL BANKS. REMEDIATION OF THE CHANNEL TO CONFORM TO THE METHODS DICTATED IN THIS DRAWING, RE UIREMENTS OF THE EPP, AND AGENCY RE UIREMENTS. EXTENTS OF REMEDIATION, UANTITIES, AND DIMENSIONS DEPENDENT ON THE EXTENT OF REMEDIATION RE UIRED

REV:	PROJECT TITLE:	SE #:
0.A	L5WSRP	
AFE: 20009293	PROJ NO: 2000105	
WP NO.:		

REV	SUBSE UENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR BID	2020-08-10 FJS	JMO LSC

EPP FIGURE 19	TYPICAL DEWATERING MEASURES
EPP FIGURE 17	TYPICAL FINAL STREAM STABLIZATION
EPP FIGURES 14-16	TYPICAL WATERBODY CROSSING METHOD
EPP FIGURE 12	TYPICAL SPAN TYPE BRIDGE
SASC1006P-WX	WATERBODY CROSSING DRAWING UNT BRUNSWEILER RIVER

THIS DRAWING REPRESENTS THE INITIAL ENGINEERING DESIGN AND SHALL BE USED ONLY FOR THE PURPOSE OF PREPARING A BID0 THIS DRAWING DOES NOT PRESENT THE FINAL ENGINEERING DESIGN AND SHALL NOT BE USED FOR CONSTRUCTION0

REFERENCE DRAWINGS

REV NO	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 14.726 (STA 777+54)
LINE 5 CROSSING (ID SASC1006P)
UNT BRUNSWEILER RIVER IN S1, T45N, R4W
WATERBODY REMEDIATION PLAN

BY: FJS	CHK: JMO	ENG. :NIN	ENB APPR: M. STATTERS
DATE: 08/10/2020		SCALE: NTS	STATUS: DESIGN

DWG NO.:	REV NO.:
SASC1006P-WXR	0.A

RESTORATION DETAILS

CREEK BED

STEP 1. SALVAGE AND RE-USE BED MATERIAL. BACKFILL AND RECONTOUR THE STREAMBED TO PRE-CONSTRUCTION PROFILE AND GRADIENT. IF GRANULAR MATERIAL WAS EXCAVATED, TOP STREAMBED TRENCH WITH CLEAN GRANULAR MIXTURE. ENSURE UPSTREAM AND DOWNSTREAM EDGES OF THE DITCH HAVE SMOOTH TRANSITION TO NATURAL STREAMBED.

EAST BANK (RIGHT DOWNSTREAM BANK)

STEP 1. RE-CONTOUR TOE OF SLOPE.

STEP 2. SET BIOLOG TO STABILIZE TOP OF BANK AT PRE-CONSTRUCTION CONDITIONS.

STEP 3. GRADE BACK AT PRE-CONSTRUCTION CONDITIONS UTILIZING STANDARD E S CONTROLS AS RE UIRED.

WEST BANK (LEFT DOWNSTREAM BANK)

STEP 1. RE-CONTOUR TOE OF SLOPE.

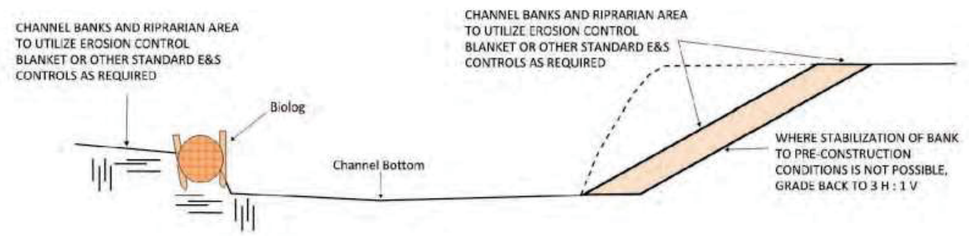
STEP 2. WHERE STABILIZATION OF BANK TO PRE-CONSTRUCTION GRADE IS NOT POSSIBLE, GRADE AT A 3 H : 1 V TO PRE-CONSTRUCTION CONDITIONS, UTILIZING STANDARD E S CONTROLS AS RE UIRED.

APPROXIMATE QUANTITIES OF REMEDIATION MATERIALS REQUIRED*

- 1 BAG OF WATERBODY BAG SEED MIX (EA) - SEE TABLE 8-4 OF EPP
- 2 ROLLS OF SILT FENCE (EA) - ASSUME 100 FT WORKSPACE WIDTH X 2 BANKS X 1 ROLL/100FT
- 4 ROLLS OF BIOLOG (EA) - ASSUME 100 FT WORKSPACE X 1 BANKS X 1 ROLL / 25 FT BIOLOG

* NOTE THAT THE ABOVE UANTITIES ARE BASED ON ESTIMATES ONLY FOR REMEDIATION MATERIALS BEYOND STANDARD E S CONTROLS FOR CHANNEL REMEDIATION. PROPOSED WORKSPACE AND ESTIMATED DITCH DIMENSIONS WERE USED. ADDITIONAL MATERIALS MAY BE NEEDED OR MATERIALS MAY BE EXCESS.

TYPICAL SIDE VIEW OF BIOLOG AND RE-GRADING



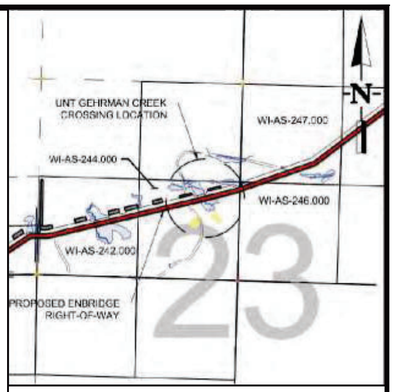
FACING UPSTREAM, EXISTING CHANNEL (EAST BANK LEFT, WEST BANK RIGHT)

FACING UPSTREAM, PROPOSED CONCEPT (EAST BANK LEFT, WEST BANK RIGHT)

LEGEND

BANKS TO BE RE-GRADED AS NEEDED

BIOLOG



LOCATION PLAN

CHANNEL DESCRIPTION

TYPE: INTERMITTENT STREAM
TROUT WATER: NO
OUTSTANDING /EXCEPTIONAL WATER: NO
IMPAIRED WATER: NO
DESCRIPTION: CHANNEL AT CROSSING IS APPROX 5 FT WIDE. WEST BANK IS STEEP AT APPROX. 1H:1V SLOPE. CHANNEL BED IS GOOD MIX OF SAND/PEBBLES/SMALLER ROCKS.

CONSTRUCTION DETAILS*

CONSTRUCTION TIMING: SUMMER
CONSTRUCTION METHODS:
PRIMARY - FLOW ISOLATION
SECONDARY - OPEN TRENCH (ONLY IF DRY OR FROZEN TO THE BOTTOM)
EQUIPMENT: CROSSING METHOD

*AS PER EPP AND CROSSING DRAWINGS

NOTES

THIS DRAWING IS TO AID IN THE REMEDIATION OF THE CHANNEL BANKS. REMEDIATION OF THE CHANNEL TO CONFORM TO THE METHODS DICTATED IN THIS DRAWING, RE UIREMENTS OF THE EPP, AND AGENCY RE UIREMENTS. EXTENTS OF REMEDIATION, UANTITIES, AND DIMENSIONS DEPENDENT ON THE EXTENT OF REMEDIATION RE UIRED

REV:	PROJECT TITLE:	SE #:
0.A	LSWSRP	

AFE:	20009293	PROJ NO:	2000105
WP NO:			

REV	SUBSE UENT REVISION	DATE BY	CHK APPR
0.A	ISSUED FOR BID	2020-08-10 FJS	JMO LSC

EPP FIGURE 19	TYPICAL DEWATERING MEASURES
EPP FIGURE 17	TYPICAL FINAL STREAM STABLIZATION
EPP FIGURES 14-16	TYPICAL WATERBODY CROSSING METHOD
EPP FIGURE 12	TYPICAL SPAN TYPE BRIDGE
SASW011-WX	WATERBODY CROSSING DRAWING UNT GEHRMAN CREEK

THIS DRAWING REPRESENTS THE INITIAL ENGINEERING DESIGN AND SHALL BE USED ONLY FOR THE PURPOSE OF PREPARING A BID0 THIS DRAWING DOES NOT PRESENT THE FINAL ENGINEERING DESIGN AND SHALL NOT BE USED FOR CONSTRUCTION0

REFERENCE DRAWINGS

REV NO.	REVISION DESCRIPTION	DATE BY	CHK	APPR

ENBRIDGE

MP 28.669 (STA 1513+74)
LINE 5 CROSSING (ID SASW011)
UNT GEHRMAN CREEK IN S23, T45N, R2W
WATERBODY REMEDIATION PLAN

BY: FJS	CHK: JMO	ENG. : NIN	ENB APPR: M. STATTERS
DATE: 08/10/2020		SCALE: NTS	STATUS: DESIGN

DWG NO.: SASW011-WXR REV NO.: 0.A