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# REGION 5 RAC2

## REMEDIAL ACTION CONTRACT FOR

Remedial, Enforcement Oversight, and  
Non-Time Critical Removal Activities at Sites of Release  
or Threatened Release of Hazardous Substances in Region 5

### **BASIS OF DESIGN REPORT**

### **APPENDIX B—DESIGN DRAWINGS**

Lincoln Park/Milwaukee River Channel Sediments Site  
Milwaukee, Wisconsin  
Final Remedial Design (Phase I)

WA No. 065-RDRD-2508/Contract No. EP-S5-06-01

March 2011

PREPARED FOR

U.S. Environmental Protection Agency



PREPARED BY

**CH2M HILL**

Ecology and Environment, Inc.  
Environmental Design International, Inc.  
Teska Associates, Inc.

FOR OFFICIAL USE ONLY

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*Issued For Bid*

# **Lincoln Park/Milwaukee River Channel Sediment Site**

United States Environmental  
Protection Agency

Volume II  
**Drawings**

**Project No. 405068**

March 2011







# CIVIL LEGEND

EXISTING	THIS CONTRACT	
		SPOT ELEVATION
		CONTOUR LINE
		EMBANKMENT AND SLOPE
		DRAINAGWAY OR DITCH
		CATCH BASIN OR INLET
		TRENCH DRAIN
		SIGN
		MANHOLE
		ELECTRICAL MANHOLE
		ELECTRIC HANDHOLE
		POST OR GUARD POST
		GUY ANCHOR
		FIRE HYDRANT
		UTILITY POLE
		LIGHT POLE
		BENCH MARK
		SURVEY CONTROL POINT OR POINT OF INTERSECTION
		BRUSH/TREE LINE
		TREE
		PROPERTY LINE
		CENTER LINE, BUILDING, ROAD, ETC.
		STAGING OR WORK AREA LIMITS
		STRUCTURE, BUILDING OR FACILITY LOCATION POINT - COORDINATES
		BORING LOCATION AND NUMBER
		TEST PIT LOCATION AND NUMBER
		PIEZOMETER LOCATION AND NUMBER
		DEMOLITION
		STRUCTURE, BUILDING OR FACILITY
		ASPHALT CONCRETE PAVEMENT
		GRAVEL SURFACING
		CONCRETE PAVEMENT
		CURB
		CURB AND GUTTER
		SINGLE SWING GATE
		DOUBLE SWING GATE
		SLIDING GATE
		GUARD RAIL
		CHAIN LINK FENCE
		ARCHITECTURAL FENCE
		WIRE FENCE
		CULVERT

# YARD PIPING LEGEND

EXISTING	THIS CONTRACT	
		NOMINAL PIPE DIAMETER
		PIPE USE IDENTIFICATION
		PIPING < 30" DIAMETER
		PIPING >= 30" DIAMETER
		EXISTING PIPE TO BE ABANDONED
		EXISTING PIPE TO BE REMOVED
		NON-FREEZE HOSE VALVE (V-X) X = NO. IN SPECIFICATIONS
		NON-FREEZE HOSE VALVE WITH HOSE RACK (V-X) X = NO. IN SPECIFICATIONS
		INDICATOR POST VALVE
		GATE VALVE AND VALVE BOX
		BUTTERFLY VALVE AND VALVE BOX
		PLUG VALVE AND VALVE BOX
		FLEXIBLE COUPLING
		90° ELBOW UP
		90° ELBOW DOWN
		BEND < 90° UP
		BEND < 90° DOWN
		CONCENTRIC REDUCER
		CAP OR PLUG
		CLEANOUT
		FIRE HYDRANT

# EROSION CONTROL LEGEND

COVER PRACTICES	SYMBOL
TEMPORARY SEEDING	
MULCHING AND MATTING	
CLEAR PLASTIC COVERING	
BUFFER ZONES	
PERMANENT SEEDING AND PLANTING	
CONSTRUCTION ENTRANCE	
INTERCEPTOR DIKE	
INTERCEPTOR SWALE	
CHECK DAMS	
OUTLET PROTECTION / RIPRAP	
FILTER FENCE	
STRAW BALE BARRIER (BIOFILTER)	
SEDIMENT TRAP (OR SUMP)	
SEDIMENT POND OR BASIN	

# SECTION / DETAIL DESIGNATIONS LEGEND

ON DRAWING WHERE DETAIL IS CALLED OUT:		DETAIL NUMBER DRAWING NUMBER WHERE DETAIL IS SHOWN
ON DRAWING WHERE SECTION IS SHOWN:		SECTION (LETTERS) <b>A</b> SECTION SCALE
ON DRAWING WHERE DETAIL IS SHOWN:		DETAIL (NUMBERS) <b>1</b> DETAIL SCALE
ON DRAWING WHERE ONLY A TITLE IS REQUIRED WITH NO REFERENCE (eg: ELEVATIONS)		<b>DRAWING TITLE</b> SCALE
ON DRAWING WHERE SECTION CALLOUT CUT EXTENDS TO A FIXED LIMIT:		SECTION LETTER DRAWING NUMBER WHERE SECTION IS SHOWN
ON DRAWING WHERE SECTION CALLOUT CUT EXTENDS THROUGHOUT ENTIRE SHEET:		
KEYED NOTES:		REFER TO KEYED NOTE ON DRAWING WHERE SHOWN.

# DRAWING NUMBERING DESIGNATION LEGEND

	INDICATES DRAWING NUMBER
	INDICATES DISCIPLINE(S) OR CATEGORY:
C	= CIVIL
G	= GENERAL

# STANDARD DETAILS DESIGNATION LEGEND

ON DRAWING WHERE STANDARD DETAIL IS CALLED OUT:	
ON DRAWING WHERE STANDARD DETAIL IS SHOWN:	

# GENERAL NOTES:

- EXISTING STRUCTURES AND FACILITIES ARE SHOWN AS SCREENED BACKGROUND. NEW STRUCTURES ARE SHOWN IN HEAVY LINE WEIGHTS.
- EXISTING PIPING AND EQUIPMENT IS SHOWN SCREENED. NEW PIPING AND EQUIPMENT IS SHOWN HEAVY-LINED.
- THIS IS A STANDARD LEGEND SHEET. SOME SYMBOLS MAY APPEAR ON THIS SHEET AND NOT ON THE PLANS.

<b>CH2MHILL</b> GENERAL CIVIL LEGEND AND DESIGNATION LEGENDS		LINCOLN PARK/ MILWAUKEE RIVER CHANNEL SEDIMENTS SITE US ENVIRONMENTAL PROTECTION AGENCY MILWAUKEE, WISCONSIN	
		WM ANDRAE PA KARABAN MA BOEKENHAUER	WM ANDRAE PA KARABAN MA BOEKENHAUER
DATE	MARCH 2011	PROJ	405068
DWG	G-003	SHEET	3
NOT TO SCALE		VERIFY SCALE	
BAR IS ONE INCH ON ORIGINAL DRAWING.			



**BENCHMARK DATA**

**STATION LOCATION**  
 NORTHING 425,546.15 EASTING 2,518,581.81  
 STATION IS 263 FEET NORTH OF THE CENTERLINE OF THE WESTBOUND LANES OF GOOD HOPE ROAD (CTH PP), 81 FEET SOUTH OF LIGHT POLE 72-10508, 36.7 FEET EAST OF THE CENTERLINE OF THE SOUTHBOUND LANES OF GREEN BAY ROAD (HWY 57) AND 19 FEET WEST OF THE NORTHBOUND LANES OF THE CENTERLINE FOR GREEN BAY ROAD (HWY 57).

**STATION DESCRIPTION**  
 BENCHMARK IS A BRONZE WISDOT GEODETIC SURVEY CONTROL STATION DISK SET IN THE TOP OF A 16-INCH DIAMETER CONCRETE POST AND ABOUT LEVEL WITH THE HIGHWAY PAVEMENT.

**STATION LOCATION**  
 NORTHING 385,895.29 EASTING 2,4994,127.43  
 TO REACH THE STATION FROM THE JUNCTION OF I-94/US 45 AND I-894 NEAR THE MILWAUKEE COUNTY ZOO, GO NORTH 1.5 MILES ON US 45 AND EXIT AT WATERTOWN PLANK ROAD, TURN LEFT AND GO WEST .10 MILE AND RE-ENTER US 45 SOUTHBOUND ON-RAMP FOR .35 MILE TO THE STATION ON THE RIGHT STATION IS 87 FEET SOUTH-SOUTHEAST (AFTER) A 14-2 FEET AHEAD SIGN POST.

**STATION DESCRIPTION**  
 BENCHMARK IS A STANDARD NGS HORIZONTAL CONTROL DISK SET INTO THE TOP OF A 16-INCH DIAMETER CONCRETE POST PROJECTING 2-INCHES ABOVE GROUND AND IS ABOUT 13.1 FEET ABOVE THE HIGHWAY PAVEMENT.

**STATION LOCATION**  
 NORTHING 123,950. EASTING 770,960. UNITS METRIC  
 AT SHOREWOOD, WI, 0.3 MILE WEST ALONG CAPITOL DRIVE FROM THE SHOREWOOD POST OFFICE, THENCE 0.55 MILE NORTHWEST ALONG THE CHICAGO AND NORTHWESTERN RAILWAY, 50 FEET NORTHEAST OF THE NORTHEAST RAIL, 50 FEET SOUTHWEST OF THE CENTERLINE OF THE INTERSECTION OF NORTH WILSON DRIVE AND EAST CONGRESS STREET, 18.5 FEET SOUTHWEST OF THE SOUTHWEST CURB OF NORTH WILSON DRIVE, AT AN 8-FOOT WIDE PEDESTRAIN TUNNEL PASSING UNDER THE RAILWAY.

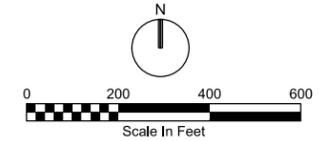
**STATION DESCRIPTION**  
 BENCHMARK IS A DISK SET IN THE TOP OF THE NORTHEAST END OF THE NORTHWEST CONCRETE RETAINING WALL OF TUNNEL, 1.8 FEET SOUTHWEST OF THE NORTHEAST END OF THE RETAINING WALL AND ABOUT LEVEL WITH THE TRACK.

**COORDINATE SYSTEM AND DATUM**

**HORIZONTAL:** WISCONSIN STATE PLANE ZONE SOUTH NAD 83 (2007 ADJUSTMENT) US SURVEY FEET GROUND  
**VERTICAL:** NAVD88 GEOID 2003

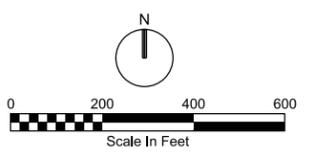
**LEGEND**

- EXISTING OUTFALL
- ▨ DECON PAD
- ⋈ EARTHEN CUT-OFF STRUCTURE
- STAGE 1 TEMPORARY SHEET PILE CUT-OFF
- STAGE 2 TEMPORARY SHEET PILE CUT-OFF
- ACCESS ROAD
- - - PERIMETER FENCE
- ⋈ 100-YEAR FLOODPLAIN
- ▨ AREA NOT AVAILABLE TO SUBCONTRACTOR
- ⋈ EARTHEN CUT-OFF STRUCTURE AREA



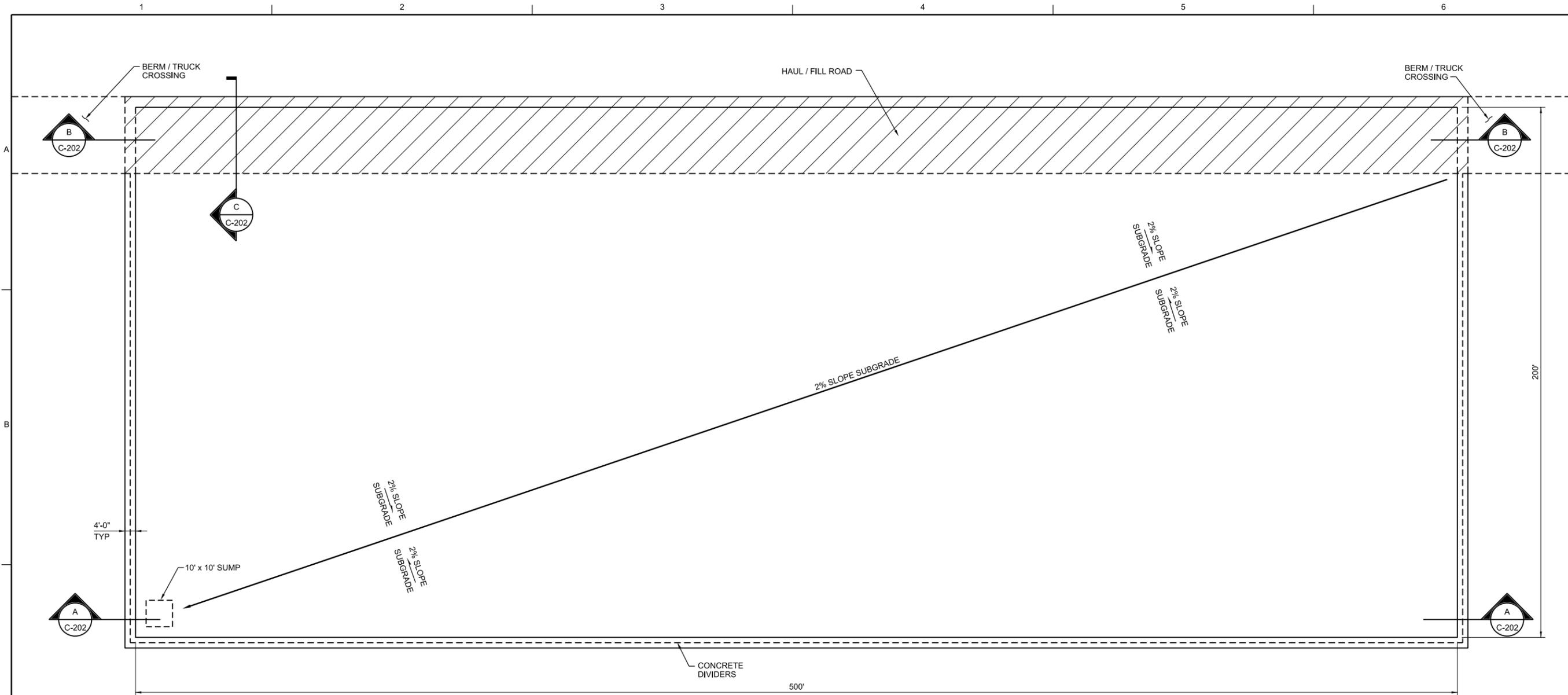
<b>CH2MHILL</b> GENERAL <b>OVERALL SITE PLAN</b>		LINCOLN PARK/ MILWAUKEE RIVER CHANNEL SEDIMENT'S SITE US ENVIRONMENTAL PROTECTION AGENCY MILWAUKEE, WISCONSIN	
		REUSE OF DOCUMENTS: THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2M HILL. ©CH2M HILL 2010. ALL RIGHTS RESERVED.	
1"=200' VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING.		DATE MARCH 2011 PROJ 405068 DWG G-004 SHEET 4	
FILENAME: 001-G-004_405068.dgn PLOT DATE: 3/1/2011		PLOT TIME: 11:41:25 AM	

**ISSUED FOR BID**

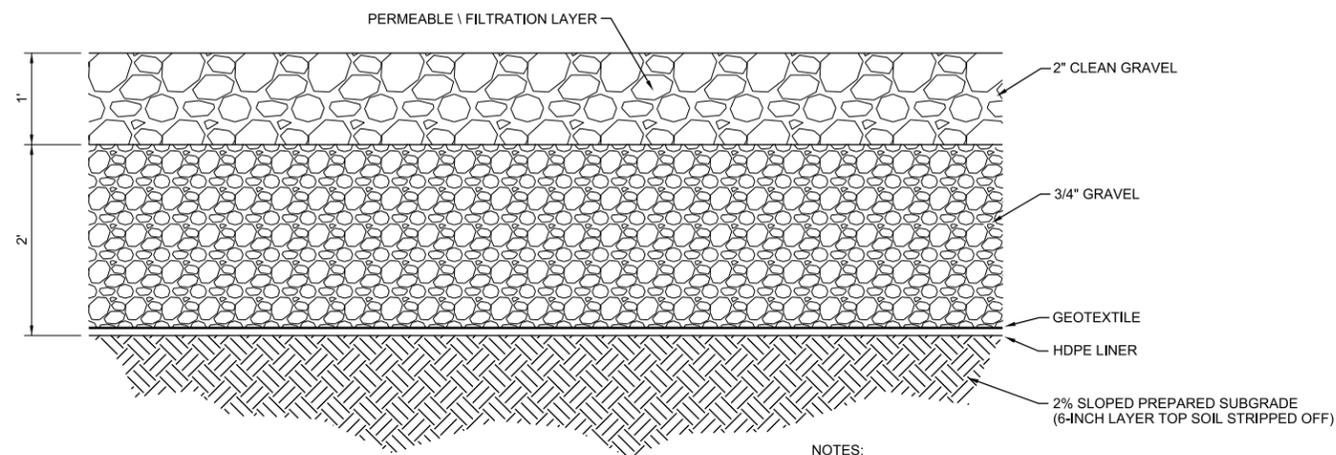


<b>CH2MHILL</b>	CIVIL <b>SITE KEY MAP</b>	LINCOLN PARK/ MILWAUKEE RIVER CHANNEL SEDIMENT'S SITE US ENVIRONMENTAL PROTECTION AGENCY MILWAUKEE, WISCONSIN	
		REUSE OF DOCUMENTS: THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2M HILL. ©CH2M HILL 2010. ALL RIGHTS RESERVED.	
1"=200' VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING.		DATE MARCH 2011 PROJ 405068 DWG C-200 SHEET 5	
		DGN	DR
		NO.	DATE
		REVISION	CHK
		BY	APVD
		MA ANDRAE	MA BOEKENHAUER





**DEWATERING PAD PLAN**  
1"=20'-0"



**TYPICAL LINER SECTION**  
NTS

- NOTES:
- 60 MIL HDPE LINER.
  - MEDIUM NON-WOVEN GEOTEXTILE SEPARATOR (8 OZ).

NO.	DATE	DR	CHK	REVISION	BY	APVD

LINCOLN PARK / MILWAUKEE RIVER  
CHANNEL SEDIMENT'S SITE  
US ENVIRONMENTAL PROTECTION AGENCY  
MILWAUKEE, WISCONSIN

S. RAMAMURTHY  
J. PEREZ  
WM. ANDRAE  
MA. BOEKENHAUER

**CH2MHILL**  
CIVIL

**DEWATERING PAD PLAN AND SECTION**

SCALE AS SHOWN
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
DATE: MARCH 2011
PROJ: 405068
DWG: C-202
SHEET: 7

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**ISSUED FOR BID**



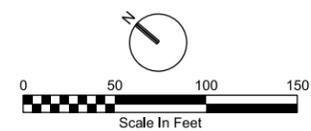
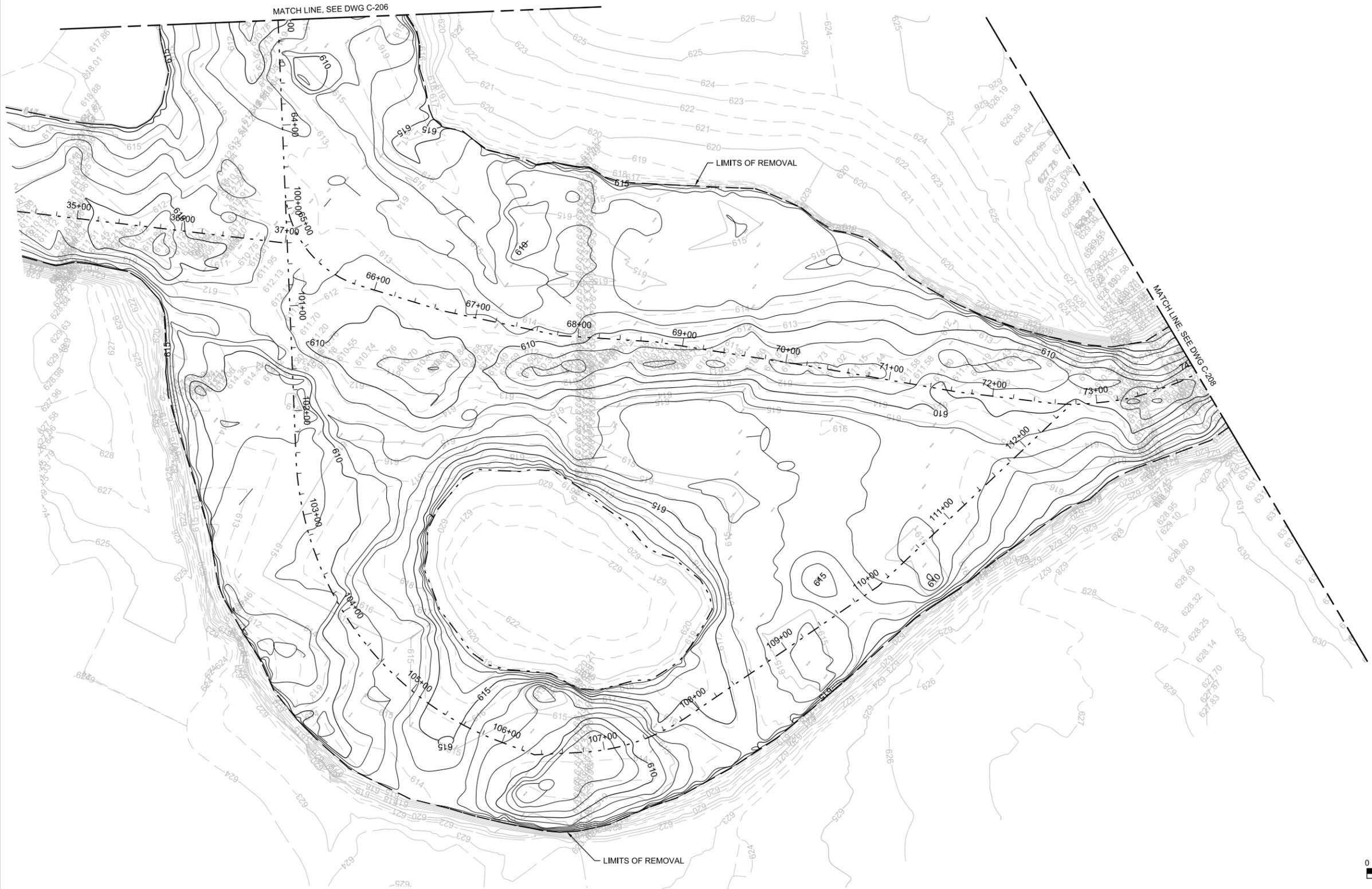




<b>CH2MHILL</b> CIVIL <b>ZONE 1 EXCAVATION PLAN</b>	LINCOLN PARK/ MILWAUKEE RIVER CHANNEL SEDIMENTS SITE US ENVIRONMENTAL PROTECTION AGENCY MILWAUKEE, WISCONSIN		DSGN NO. DATE REVISION CHK APVD BY	DR APVD MA ANDRAE GF BOWLES WM ANDRAE MA BOEKENHAUER
	REUSE OF DOCUMENTS: THIS DOCUMENT, AND THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, IS THE PROPERTY OF CH2M HILL AND IS NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF CH2M HILL. © CH2M HILL 2010. ALL RIGHTS RESERVED.			
1"=50' VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING.				
DATE	MARCH 2011			
PROJ	405068			
DWG	C-205			
SHEET	10			



A  
B  
C  
D



NO.	DATE	DR	CHK	REVISION	BY	APVD
		WM ANDRAE	GF BOWLES			MA BOEKENHAUER

LINCOLN PARK/ MILWAUKEE RIVER  
CHANNEL SEDIMENTS SITE  
US ENVIRONMENTAL PROTECTION AGENCY  
MILWAUKEE, WISCONSIN

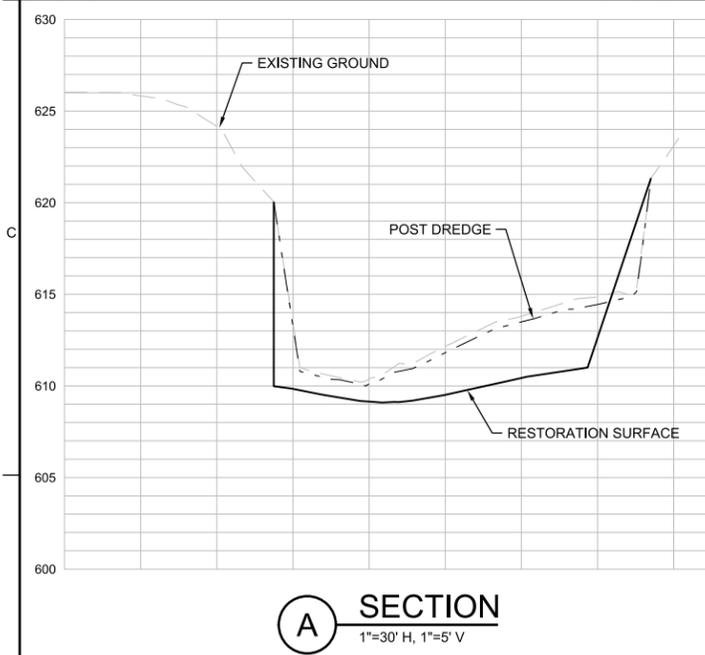
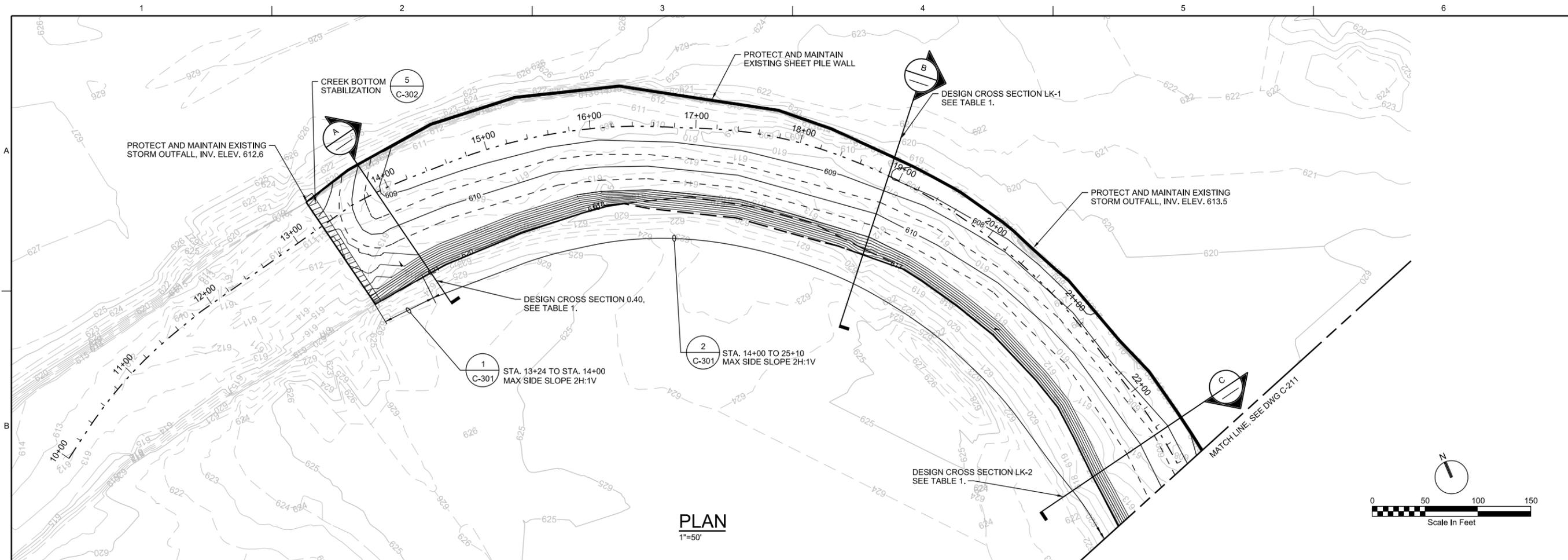
**CH2MHILL**  
CIVIL  
**ZONE 2B EXCAVATION  
PLAN**

DATE	MARCH 2011
PROJ	405068
DWG	C-207
SHEET	12

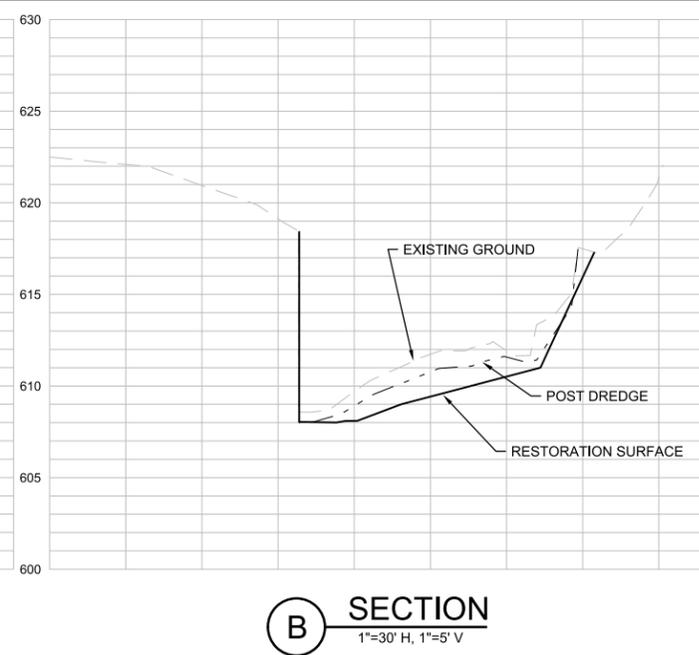
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**ISSUED FOR BID**

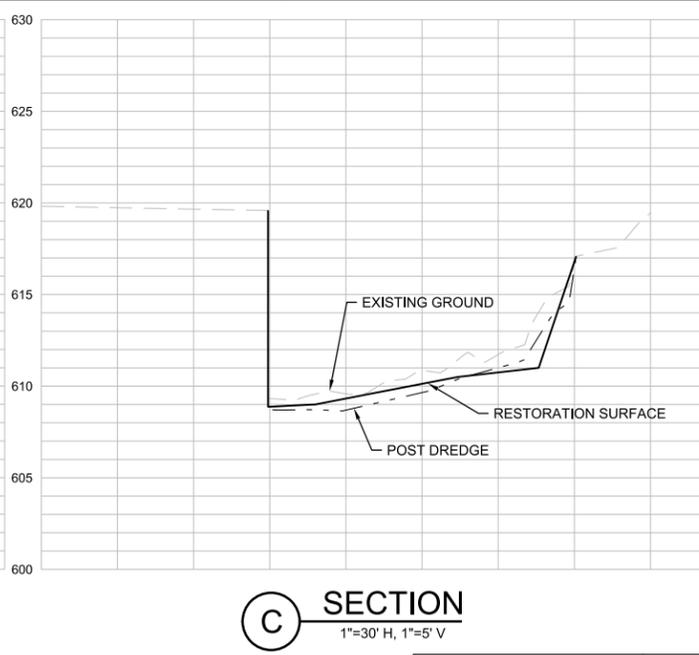




**A SECTION**  
1"=30' H, 1"=5' V



**B SECTION**  
1"=30' H, 1"=5' V



**C SECTION**  
1"=30' H, 1"=5' V

- GENERAL NOTES:**
1. PROVIDE SMOOTH TRANSITIONS OF TOE WIDTHS AND RESTORED BANKS BETWEEN DESIGN CROSS SECTIONS.
  2. STOCK PILE WOODY DEBRIS WITH TRUNK DIAMETERS GREATER THAN 8 INCHES FOR PLACEMENT AS WOODY HABITAT AS DIRECTED ON SITE BY ENGINEER. WOODY DEBRIS FOR HABITAT IS ANTICIPATED IN THE WESTERN OXBOW.
  3. SEE TABLE 1 ON DRAWING C-301 FOR BANK SIDE SLOPES, TOE ELEVATIONS AND MINIMUM TOE WIDTHS IN LINCOLN CREEK. SEE TABLE 2 ON DRAWING C-304 FOR WESTERN OXBOW.
  4. STATIONING FOR BANK STABILIZATION TECHNIQUES ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY ENGINEER BASED ON HEIGHTS AND LOCATION OF EXISTING STABLE BANKS THAT RESTORATION WILL TIE INTO.
  5. THE BANK STABILIZATION DESIGN IS BASED ON A PERMANENT POOL ELEVATION OF 617.40 FT. THROUGHOUT THE PROJECT AREA.
  6. ALL CROSS SECTIONS ARE DISPLAYED LEFT BANK TO RIGHT BANK FACING DOWNSTREAM.

**TABLE 1: LINCOLN CREEK BANK STABILIZATION GEOMETRY AT SURVEYED CROSS SECTIONS**

LOCATION	STATION	I.D.	TOE ELEVATION		MINIMUM DISTANCE BETWEEN BANK TOES (FT)	MAXIMUM BANK SIDE SLOPE	
			LEFT BANK	RIGHT BANK		LEFT BANK	RIGHT BANK
LINCOLN CREEK	13+88	0.40	611	611	97	EXISTING VERTICAL SHEET PILE	2H:1V
LINCOLN CREEK	18+89	LK-1	611	611	80	EXISTING VERTICAL SHEET PILE	2H:1V
LINCOLN CREEK	22+46	LK-2	611	611	78	EXISTING VERTICAL SHEET PILE	2H:1V
LINCOLN CREEK	25+12	AB-1	611	611	102	2H:1V	2H:1V
LINCOLN CREEK	25+82	AB-2	611	611	101	2H:1V	2H:1V
LINCOLN CREEK	25+84	AB-3	611	611	101	2H:1V	2H:1V
LINCOLN CREEK	28+35	AB-4	611	611	99	2H:1V	2H:1V
LINCOLN CREEK	29+10	LK-6	611	611	98	3H:1V	2H:1V
LINCOLN CREEK	30+02	LK-4	611	611	95	3H:1V	2H:1V
LINCOLN CREEK	32+31	LK-3	611	611	100	3H:1V	2H:1V
LINCOLN CREEK	34+87	LK-5	611	611	104	3H:1V	2H:1V

LEFT AND RIGHT BANKS ARE REFERENCED WHEN FACING DOWNSTREAM.

123456

ABC

630625620615610605600

CD

PROTECT AND MAINTAIN EXISTING STORM OUTFALL, INV. ELEV. 612.6

CREEK BOTTOM STABILIZATION C-302

DESIGN CROSS SECTION 0.40, SEE TABLE 1.

1 STA. 13+24 TO STA. 14+00  
MAX SIDE SLOPE 2H:1V  
C-301

2 STA. 14+00 TO 25+10  
MAX SIDE SLOPE 2H:1V  
C-301

PROTECT AND MAINTAIN EXISTING SHEET PILE WALL

DESIGN CROSS SECTION LK-1  
SEE TABLE 1.

PROTECT AND MAINTAIN EXISTING STORM OUTFALL, INV. ELEV. 613.5

DESIGN CROSS SECTION LK-2  
SEE TABLE 1.

MATCH LINE. SEE DWG C-211

Scale In Feet

0 50 100 150

**PLAN**  
1"=50'

NO. DATE

DRG. DATE

CHK. DATE

REVISION

BY APVD

MA BOEKENHAUER

BA BROWN

GF BOWLES

BA BROWN

GENERAL NOTES:

1. PROVIDE SMOOTH TRANSITIONS OF TOE WIDTHS AND RESTORED BANKS BETWEEN DESIGN CROSS SECTIONS.
2. STOCK PILE WOODY DEBRIS WITH TRUNK DIAMETERS GREATER THAN 8 INCHES FOR PLACEMENT AS WOODY HABITAT AS DIRECTED ON SITE BY ENGINEER. WOODY DEBRIS FOR HABITAT IS ANTICIPATED IN THE WESTERN OXBOW.
3. SEE TABLE 1 ON DRAWING C-301 FOR BANK SIDE SLOPES, TOE ELEVATIONS AND MINIMUM TOE WIDTHS IN LINCOLN CREEK. SEE TABLE 2 ON DRAWING C-304 FOR WESTERN OXBOW.
4. STATIONING FOR BANK STABILIZATION TECHNIQUES ARE APPROXIMATE AND MAY BE ADJUSTED IN THE FIELD BY ENGINEER BASED ON HEIGHTS AND LOCATION OF EXISTING STABLE BANKS THAT RESTORATION WILL TIE INTO.
5. THE BANK STABILIZATION DESIGN IS BASED ON A PERMANENT POOL ELEVATION OF 617.40 FT. THROUGHOUT THE PROJECT AREA.
6. ALL CROSS SECTIONS ARE DISPLAYED LEFT BANK TO RIGHT BANK FACING DOWNSTREAM.

US ENVIRONMENTAL PROTECTION AGENCY  
MILWAUKEE, WISCONSIN

LINCOLN PARK/ MILWAUKEE RIVER  
CHANNEL SEDIMENT'S SITE

**A SECTION**  
1"=30' H, 1"=5' V

**B SECTION**  
1"=30' H, 1"=5' V

**C SECTION**  
1"=30' H, 1"=5' V

TABLE 1: LINCOLN CREEK BANK STABILIZATION GEOMETRY AT SURVEYED CROSS SECTIONS

LOCATION	STATION	I.D.	TOE ELEVATION		MINIMUM DISTANCE BETWEEN BANK TOES (FT)	MAXIMUM BANK SIDE SLOPE	
			LEFT BANK	RIGHT BANK		LEFT BANK	RIGHT BANK
LINCOLN CREEK	13+88	0.40	611	611	97	EXISTING VERTICAL SHEET PILE	2H:1V
LINCOLN CREEK	18+89	LK-1	611	611	80	EXISTING VERTICAL SHEET PILE	2H:1V
LINCOLN CREEK	22+46	LK-2	611	611	78	EXISTING VERTICAL SHEET PILE	2H:1V
LINCOLN CREEK	25+12	AB-1	611	611	102	2H:1V	2H:1V
LINCOLN CREEK	25+82	AB-2	611	611	101	2H:1V	2H:1V
LINCOLN CREEK	25+84	AB-3	611	611	101	2H:1V	2H:1V
LINCOLN CREEK	28+35	AB-4	611	611	99	2H:1V	2H:1V
LINCOLN CREEK	29+10	LK-6	611	611	98	3H:1V	2H:1V
LINCOLN CREEK	30+02	LK-4	611	611	95	3H:1V	2H:1V
LINCOLN CREEK	32+31	LK-3	611	611	100	3H:1V	2H:1V
LINCOLN CREEK	34+87	LK-5	611	611	104	3H:1V	2H:1V

LEFT AND RIGHT BANKS ARE REFERENCED WHEN FACING DOWNSTREAM.

CH2MHILL

CIVIL

LINCOLN CREEK BANK STABILIZATION DESIGN  
PLAN AND SECTIONS 1

SCALE AS SHOWN

VERIFY SCALE

BAR IS ONE INCH ON ORIGINAL DRAWING.

DATE MARCH 2011

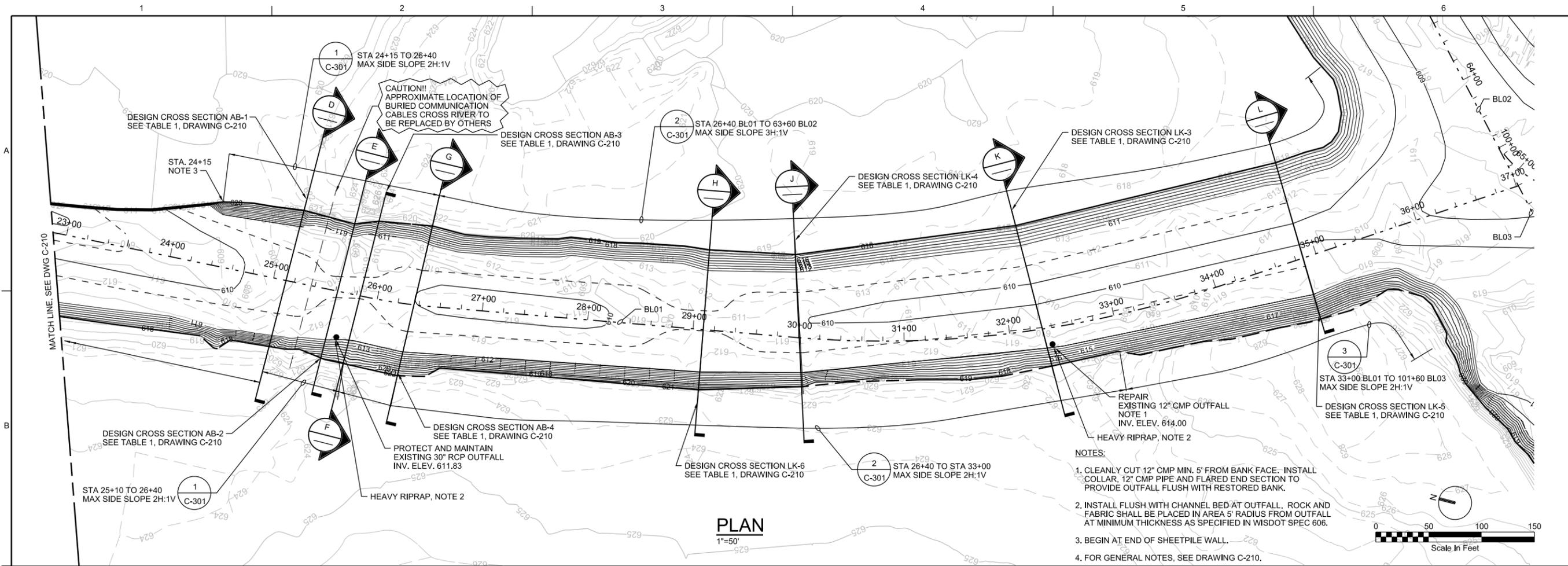
PROJ 405068

DWG C-210

SHEET 14

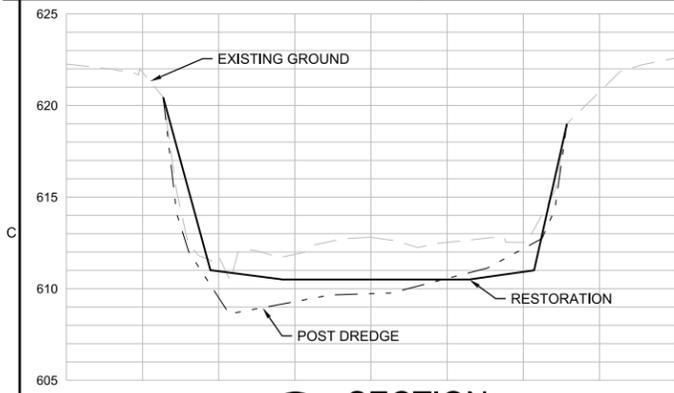
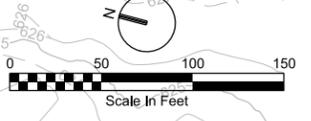
FILENAME: 005-C-210\_405068.dgn PLOT DATE: 3/1/2011

PLOT TIME: 11:43:25 AM

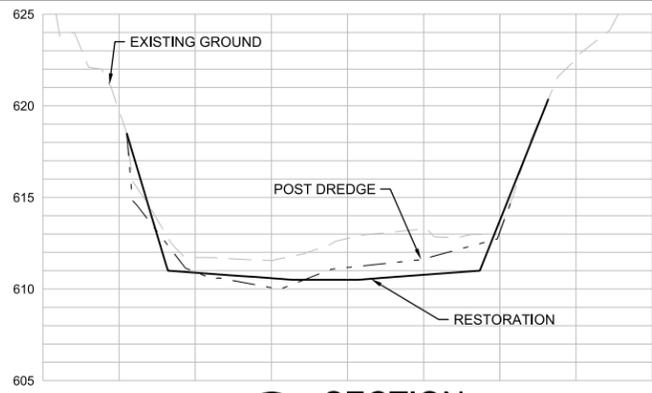


**PLAN**  
1"=50'

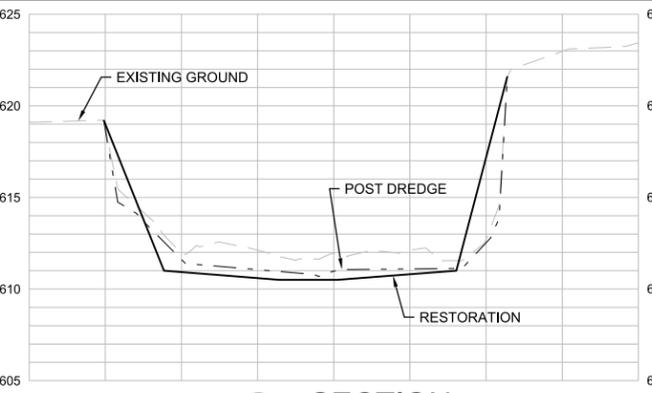
- NOTES:**
- CLEANLY CUT 12" CMP MIN. 5' FROM BANK FACE. INSTALL COLLAR, 12" CMP PIPE AND FLARED END SECTION TO PROVIDE OUTFALL FLUSH WITH RESTORED BANK.
  - INSTALL FLUSH WITH CHANNEL BED AT OUTFALL. ROCK AND FABRIC SHALL BE PLACED IN AREA 5' RADIUS FROM OUTFALL AT MINIMUM THICKNESS AS SPECIFIED IN WISDOT SPEC 606.
  - BEGIN AT END OF SHEETPILE WALL.
  - FOR GENERAL NOTES, SEE DRAWING C-210.



**D SECTION**  
1"=30' H, 1"=5' V



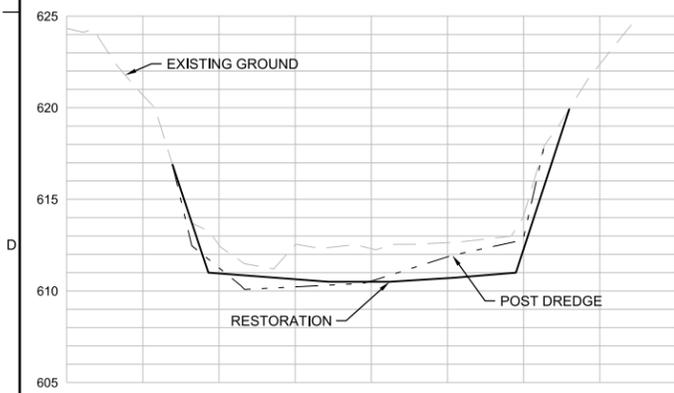
**F SECTION**  
1"=30' H, 1"=5' V



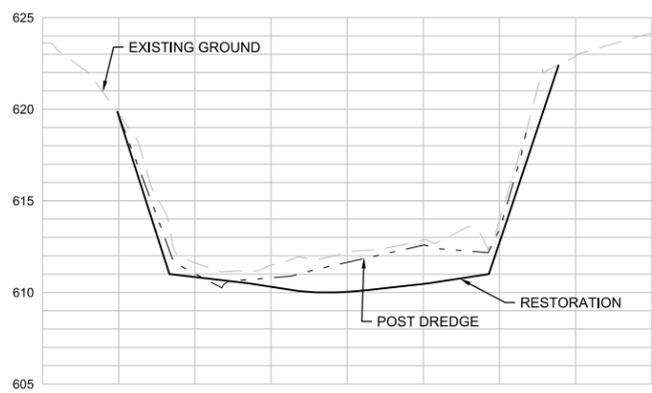
**H SECTION**  
1"=30' H, 1"=5' V



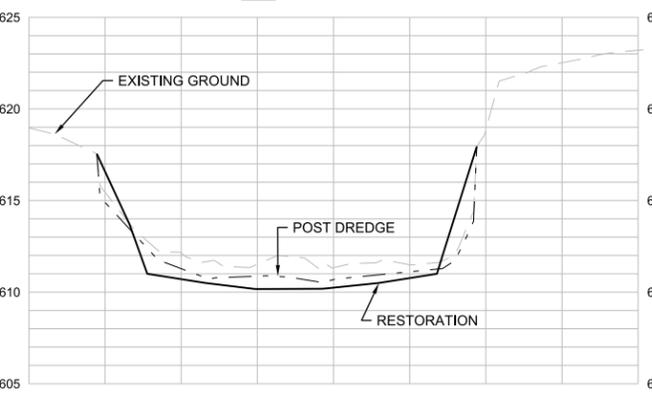
**K SECTION**  
1"=30' H, 1"=5' V



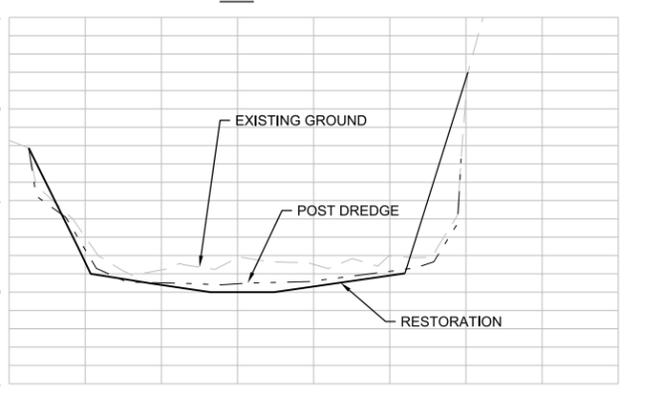
**E SECTION**  
1"=30' H, 1"=5' V



**G SECTION**  
1"=30' H, 1"=5' V



**J SECTION**  
1"=30' H, 1"=5' V



**L SECTION**  
1"=30' H, 1"=5' V

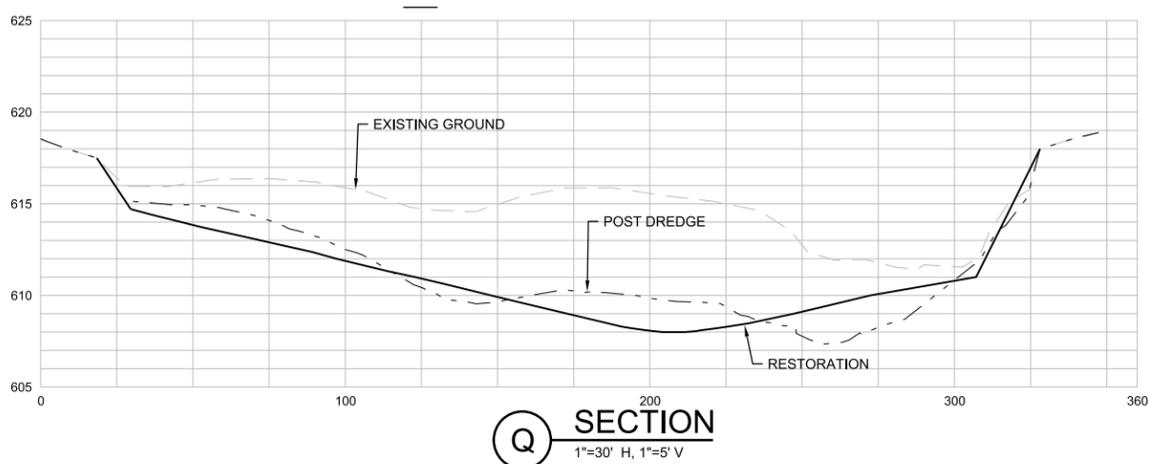
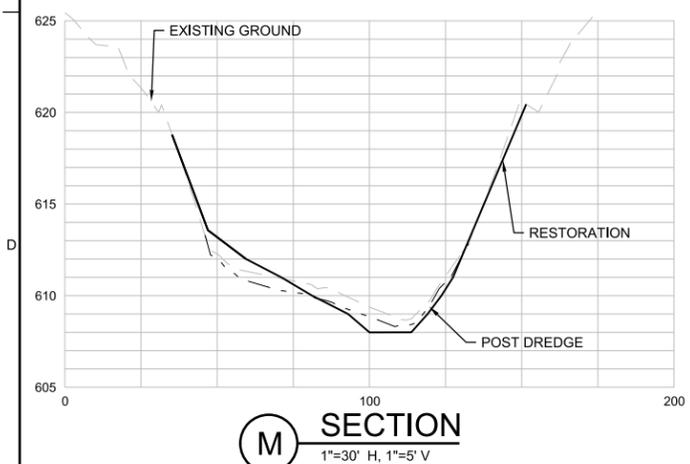
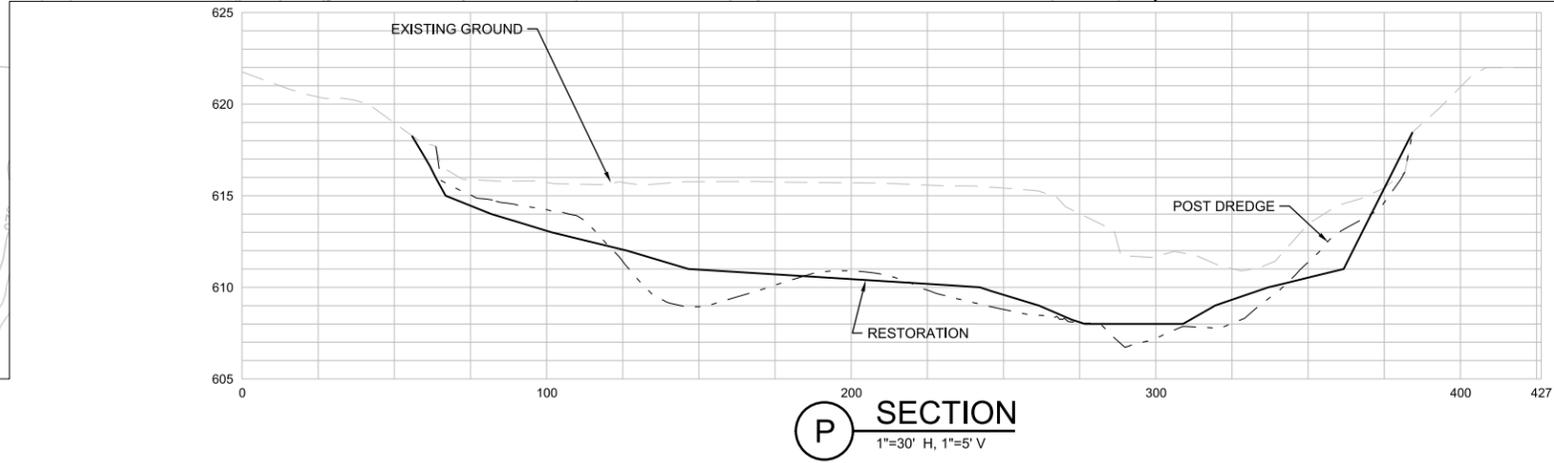
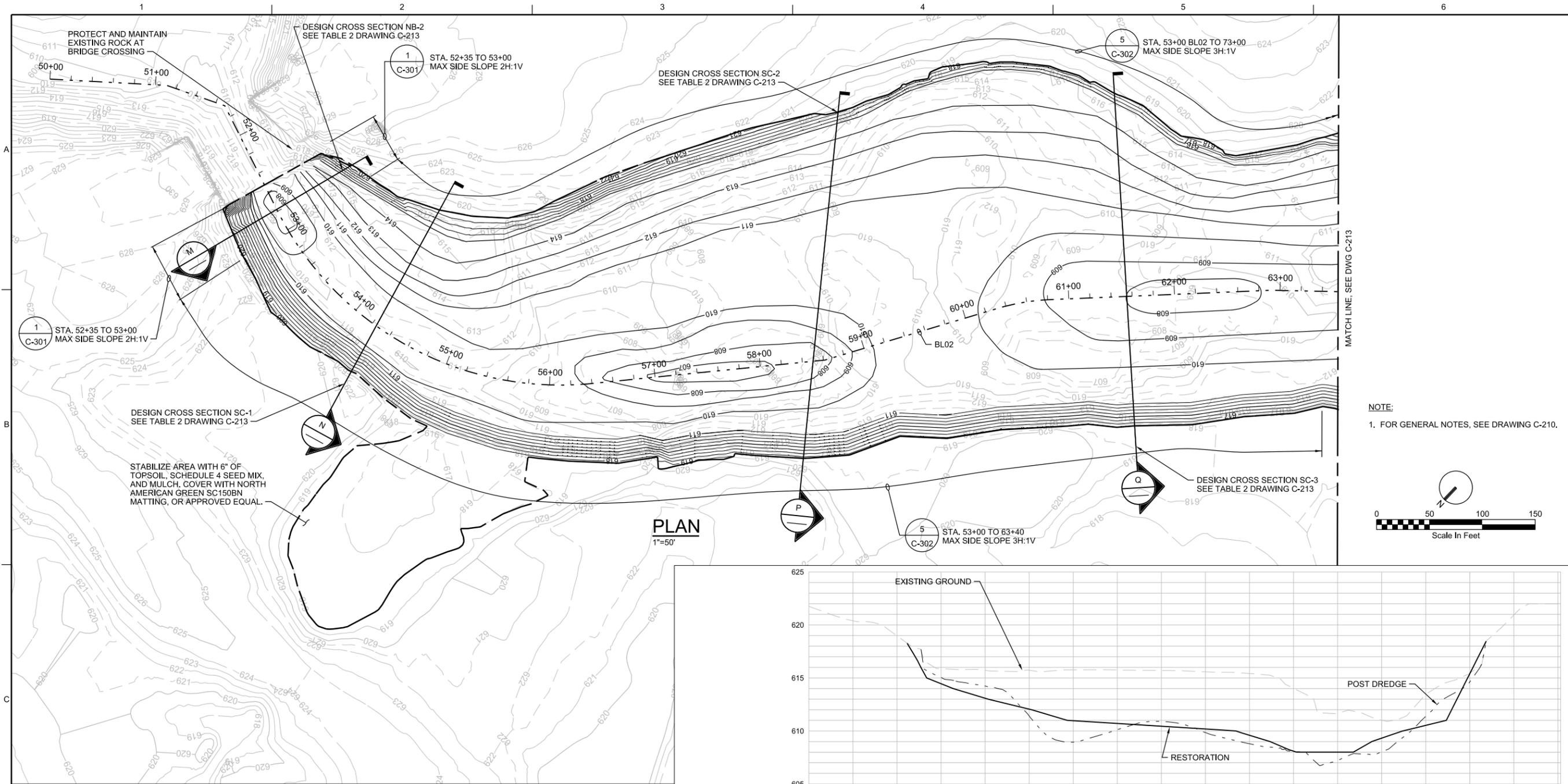
NO.	DATE	DR	CHK	REVISION	BY	APVD

LINCOLN PARK/ MILWAUKEE RIVER  
CHANNEL SEDIMENTS SITE  
US ENVIRONMENTAL PROTECTION AGENCY  
MILWAUKEE, WISCONSIN

**CH2MHILL**  
CIVIL  
**LINCOLN CREEK  
BANK STABILIZATION DESIGN  
PLAN AND SECTIONS 2**

SCALE AS SHOWN
VERIFY SCALE
BAR IS ONE INCH ON ORIGINAL DRAWING.
DATE MARCH 2011
PROJ 405068
DWG C-211
SHEET 15

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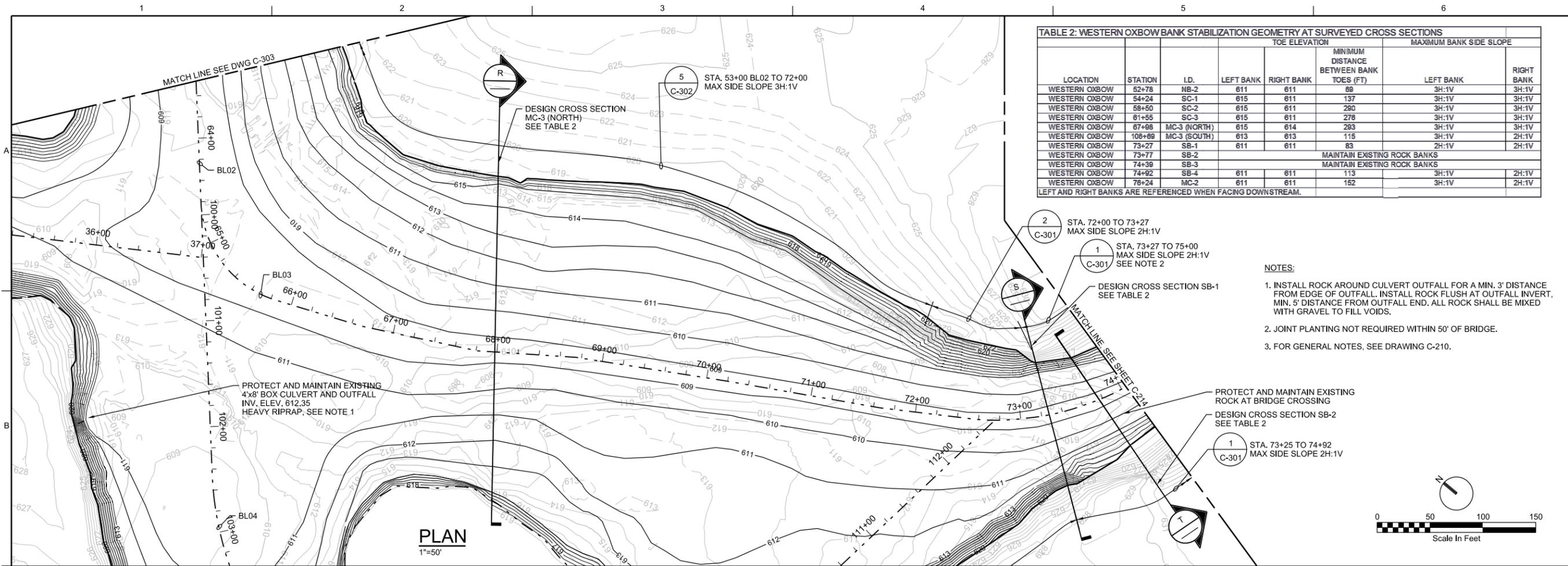
LINCOLN PARK/ MILWAUKEE RIVER  
CHANNEL SEDIMENT'S SITE  
US ENVIRONMENTAL PROTECTION AGENCY  
MILWAUKEE, WISCONSIN

**CH2MHILL**  
CIVIL  
WESTERN OXBOW  
BANK STABILIZATION DESIGN  
PLAN AND SECTIONS 1

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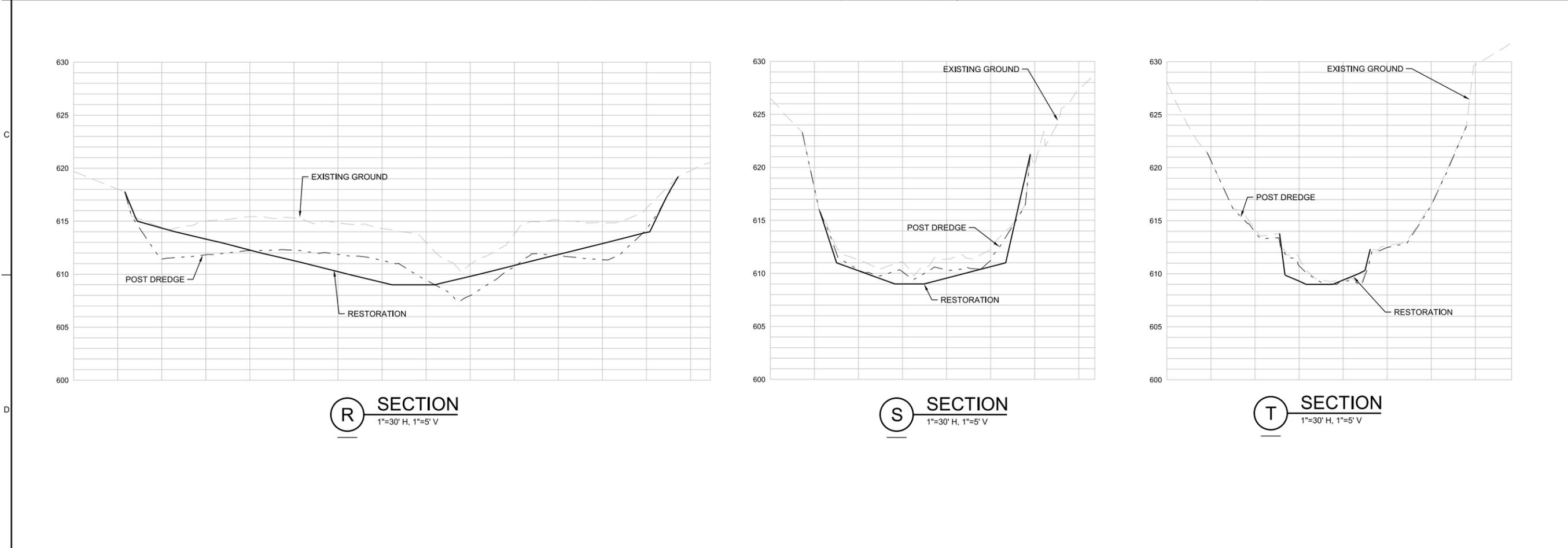


**TABLE 2: WESTERN OXBOW BANK STABILIZATION GEOMETRY AT SURVEYED CROSS SECTIONS**

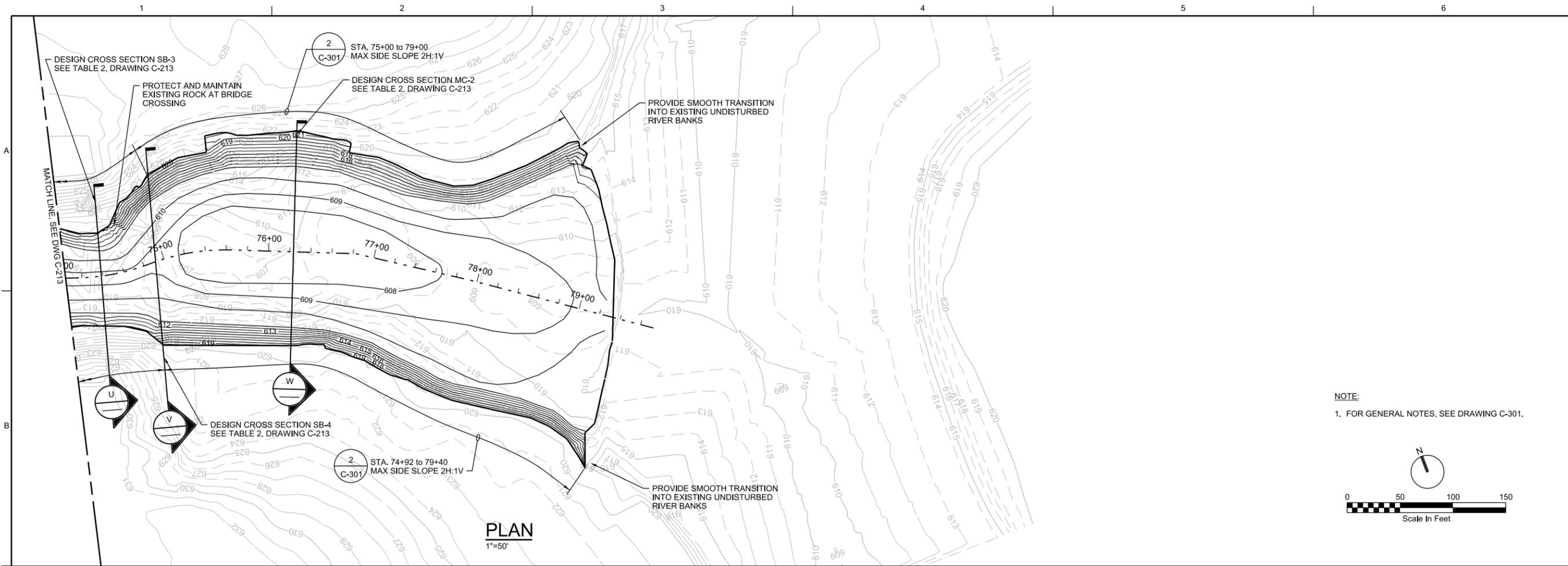
LOCATION	STATION	I.D.	TOE ELEVATION		MINIMUM DISTANCE BETWEEN BANK TOES (FT)	MAXIMUM BANK SIDE SLOPE	
			LEFT BANK	RIGHT BANK		LEFT BANK	RIGHT BANK
WESTERN OXBOW	52+78	NB-2	611	611	69	3H:1V	3H:1V
WESTERN OXBOW	54+24	SC-1	615	611	137	3H:1V	3H:1V
WESTERN OXBOW	58+60	SC-2	615	611	280	3H:1V	3H:1V
WESTERN OXBOW	61+55	SC-3	615	611	278	3H:1V	3H:1V
WESTERN OXBOW	67+98	MC-3 (NORTH)	615	614	283	3H:1V	3H:1V
WESTERN OXBOW	108+89	MC-3 (SOUTH)	613	613	115	3H:1V	2H:1V
WESTERN OXBOW	73+27	SB-1	611	611	83	2H:1V	2H:1V
WESTERN OXBOW	73+77	SB-2	MAINTAIN EXISTING ROCK BANKS				
WESTERN OXBOW	74+39	SB-3	MAINTAIN EXISTING ROCK BANKS				
WESTERN OXBOW	74+92	SB-4	611	611	113	3H:1V	2H:1V
WESTERN OXBOW	76+24	MC-2	611	611	152	3H:1V	2H:1V

LEFT AND RIGHT BANKS ARE REFERENCED WHEN FACING DOWNSTREAM.

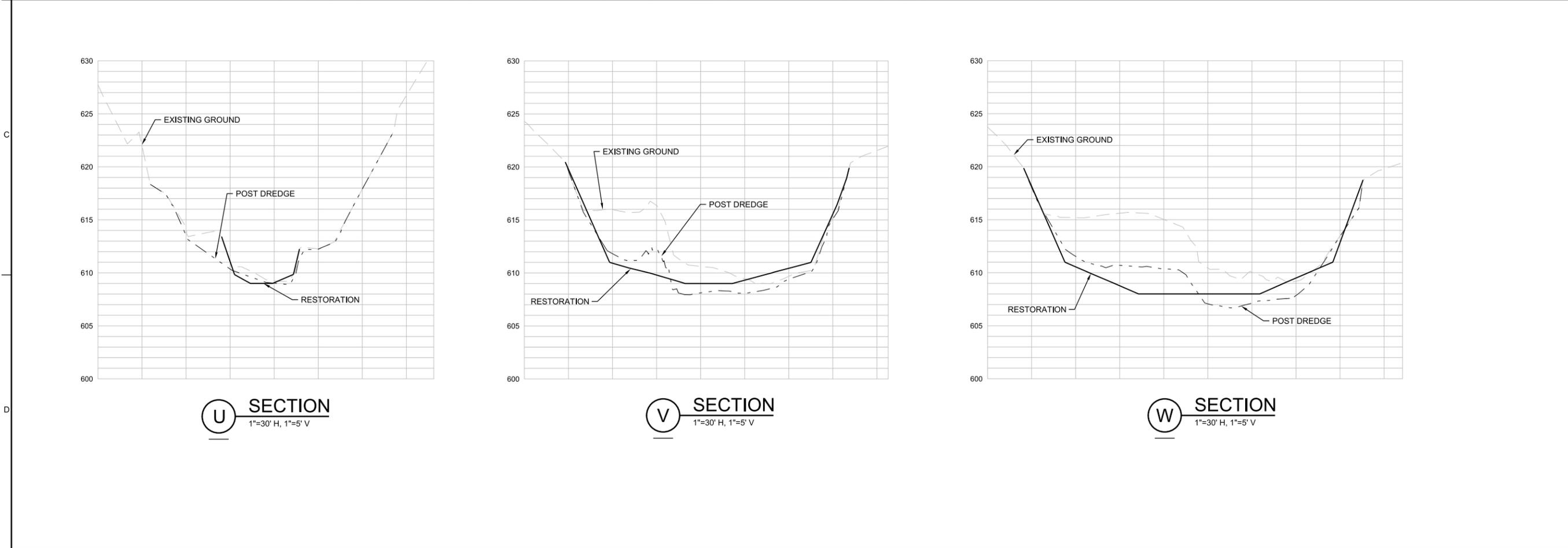
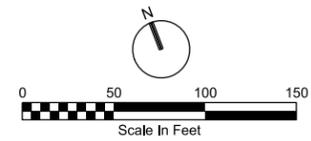
- NOTES:**
1. INSTALL ROCK AROUND CULVERT OUTFALL FOR A MIN. 3' DISTANCE FROM EDGE OF OUTFALL. INSTALL ROCK FLUSH AT OUTFALL INVERT. MIN. 5' DISTANCE FROM OUTFALL END. ALL ROCK SHALL BE MIXED WITH GRAVEL TO FILL VOIDS.
  2. JOINT PLANTING NOT REQUIRED WITHIN 50' OF BRIDGE.
  3. FOR GENERAL NOTES, SEE DRAWING C-210.



MA BOEKENHAUER		APVD	BY
BA BROWN		APVD	BY
GF BOWLES		CHK	REVISION
BA BROWN		DR	NO. DATE
LINCOLN PARK/ MILWAUKEE RIVER CHANNEL SEDIMENT'S SITE		US ENVIRONMENTAL PROTECTION AGENCY MILWAUKEE, WISCONSIN	
<b>CH2MHILL</b>		CIVIL	
WESTERN OXBOW BANK STABILIZATION DESIGN PLAN AND SECTIONS 2		SCALE AS SHOWN	
VERIFY SCALE		BAR IS ONE INCH ON ORIGINAL DRAWING.	
DATE	MARCH 2011	ISSUED FOR BID	
PROJ	405068		
DWG	C-213		
SHEET	17		

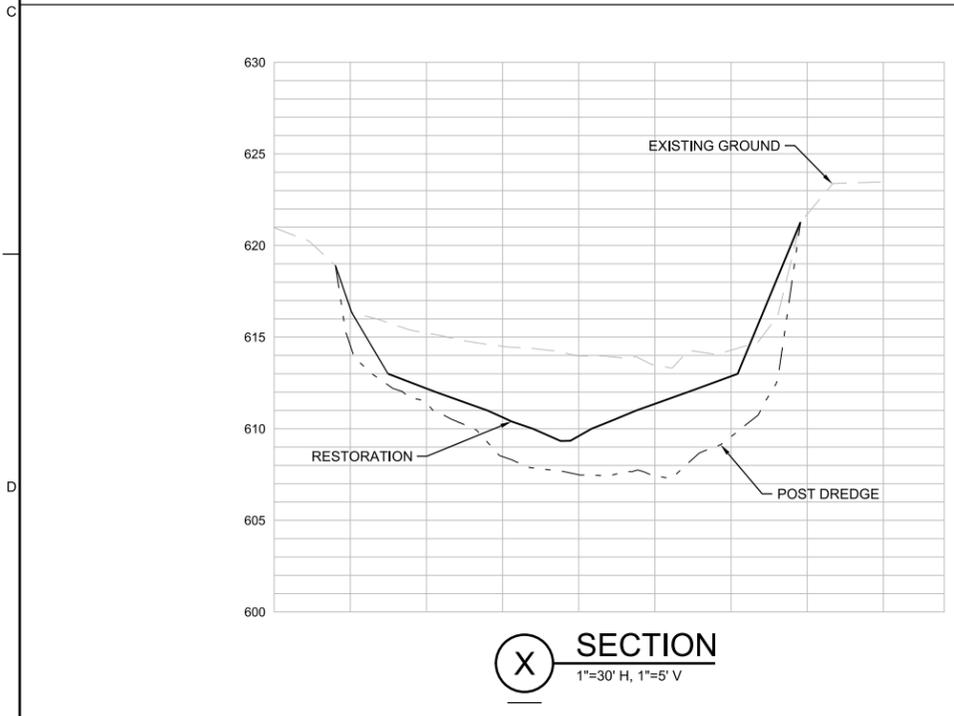
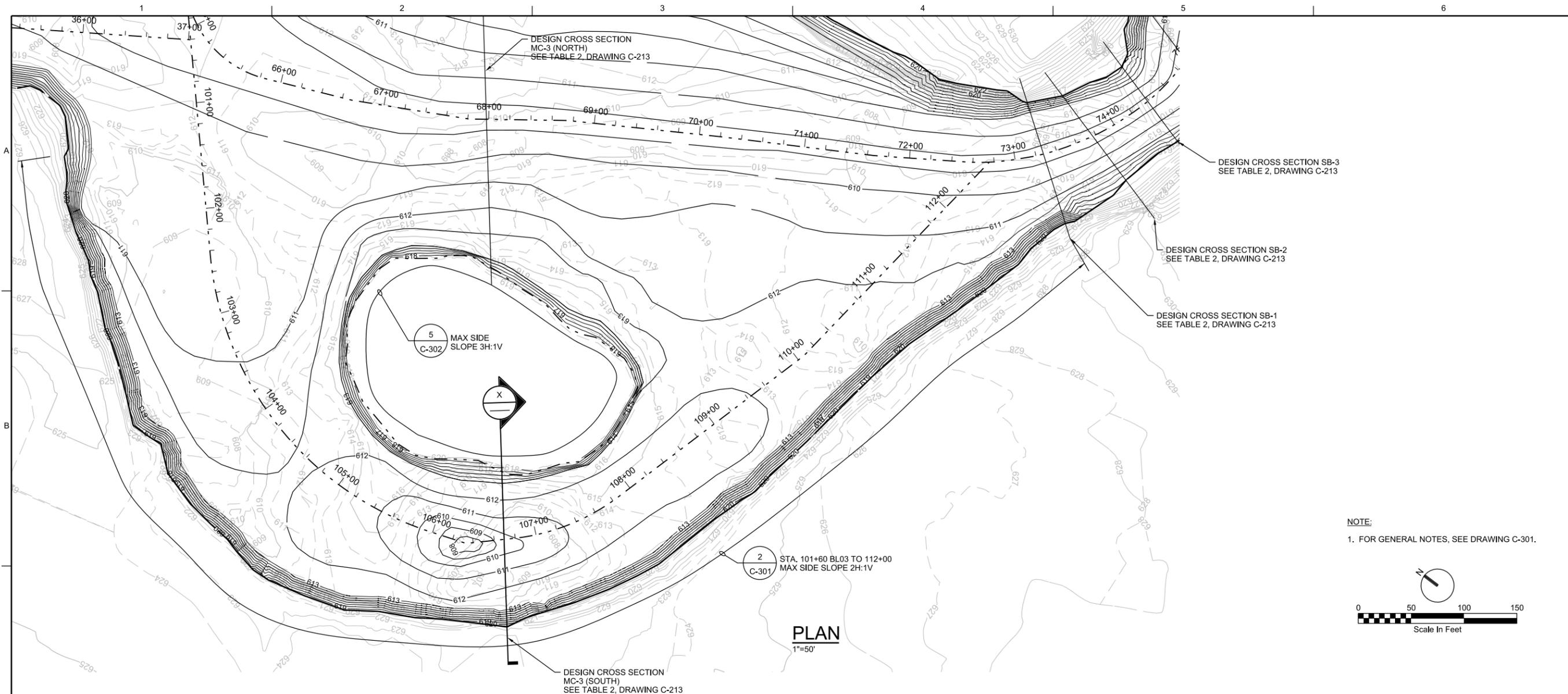


NOTE:  
1. FOR GENERAL NOTES, SEE DRAWING C-301.

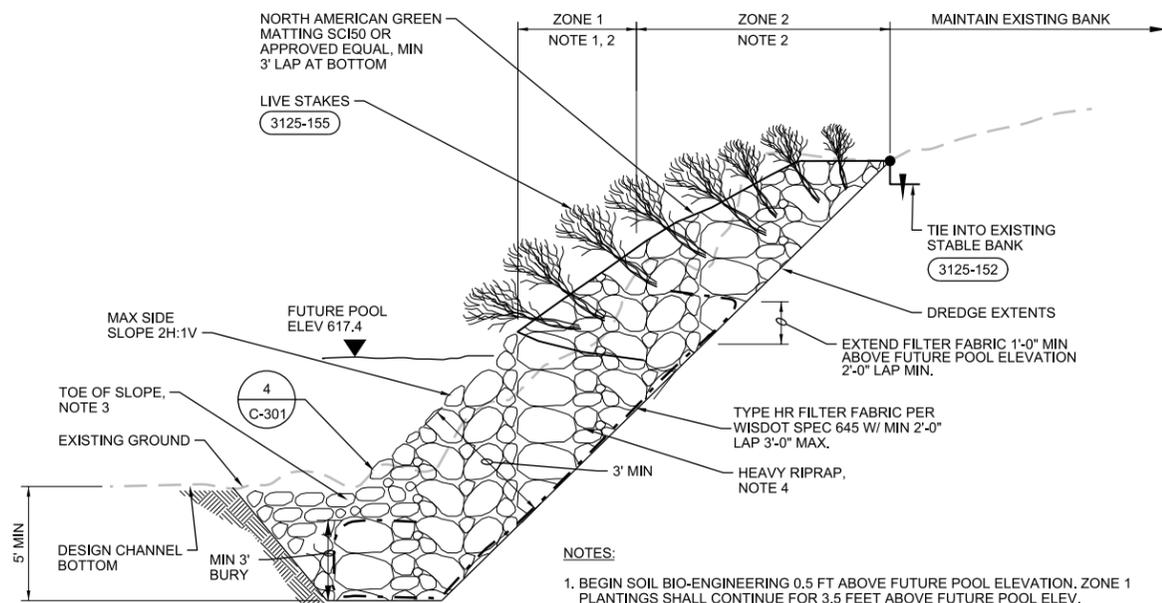


<b>CH2MHILL</b> CIVIL WESTERN OXBOW BANK STABILIZATION DESIGN PLAN AND SECTIONS 3		LINCOLN PARK/ MILWAUKEE RIVER CHANNEL SEDIMENTS SITE US ENVIRONMENTAL PROTECTION AGENCY MILWAUKEE, WISCONSIN	
DSGN NO. DATE BA BROWN 18 03/11	DR REVISION GF BOWLES BA BROWN MA BOEKENHAUER	BY APVD MA BOEKENHAUER	18 03/11
SCALE AS SHOWN VERIFY SCALE BAR IS ONE INCH ON ORIGINAL DRAWING.		DATE MARCH 2011 PROJ 405068 DWG C-214 SHEET 18	

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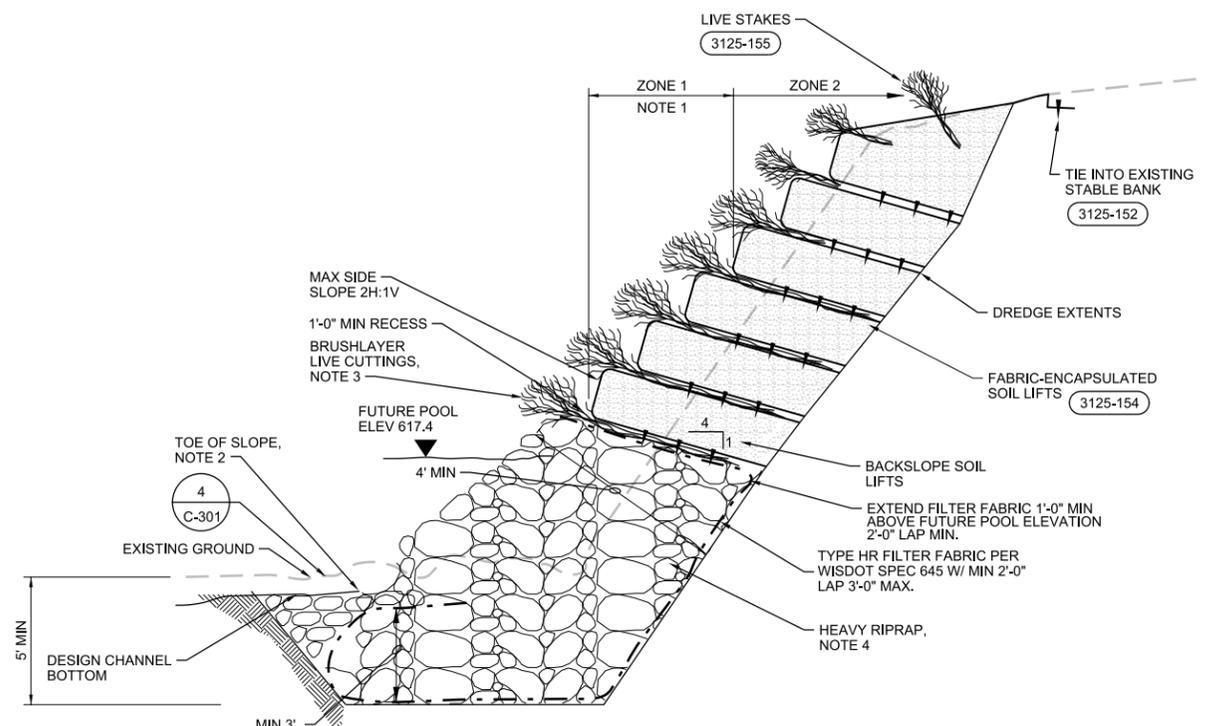


CH2MHILL		CIVIL		WESTERN OXBOW BANK STABILIZATION DESIGN PLAN AND SECTIONS 4	
LINCOLN PARK/ MILWAUKEE RIVER CHANNEL SEDIMENTS SITE US ENVIRONMENTAL PROTECTION AGENCY MILWAUKEE, WISCONSIN		SCALE AS SHOWN		VERIFY SCALE	
BAR IS ONE INCH ON ORIGINAL DRAWING.		DATE		MARCH 2011	
PROJECT		PROJ		405068	
DRAWING		DWG		C-215	
SHEET		SHEET		19	
REVISION		NO.		DATE	
DR		DGN		CHK	
BA BROWN		GF BOWLES		MA BOEKENHAUER	
BA BROWN		BA BROWN		MA BOEKENHAUER	
BY		APVD		BY	
APVD		APVD		BY	
APVD		APVD		BY	



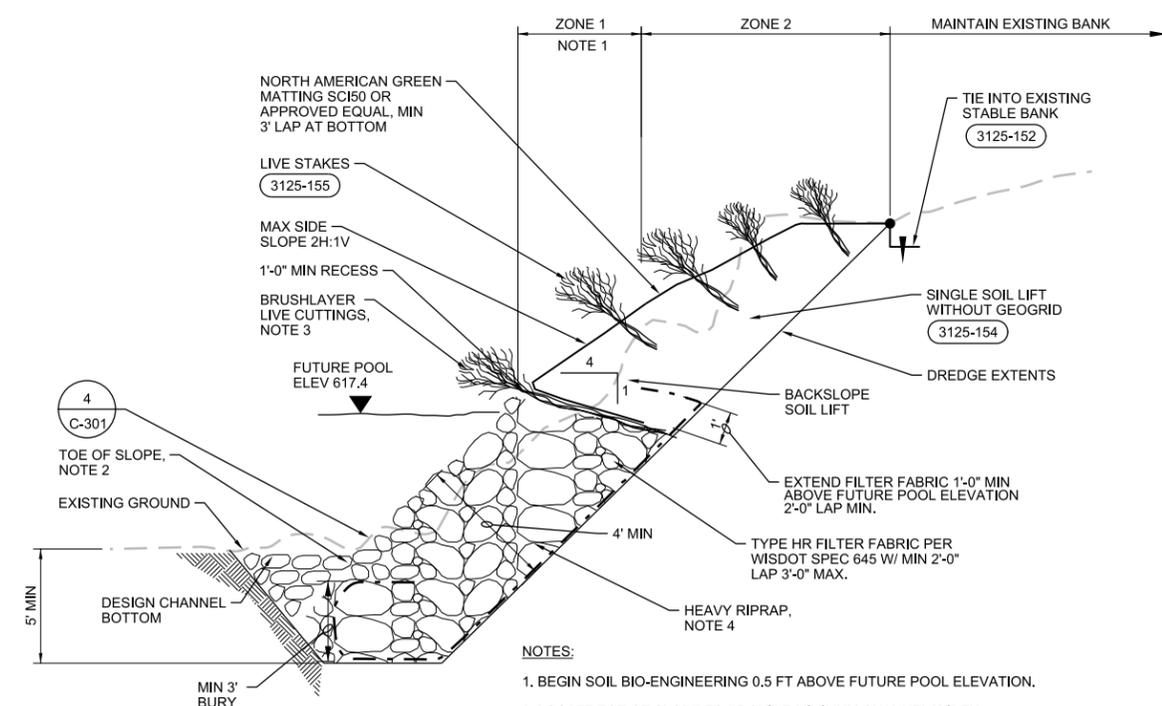
- NOTES:**
- BEGIN SOIL BIO-ENGINEERING 0.5 FT ABOVE FUTURE POOL ELEVATION. ZONE 1 PLANTINGS SHALL CONTINUE FOR 3.5 FEET ABOVE FUTURE POOL ELEV.
  - JOINT PLANT RIPRAP ABOVE FUTURE POOL ELEVATION WITH LIVE STAKES. MIX RIPRAP WITH GRAVEL TO FILL VOIDS. COVER RIPRAP WITH 6 INCHES TOPSOIL, SEED, MULCH, AND TOP WITH EROSION MATTING.
  - LOCATE TOE OF SLOPE TO PROVIDE MINIMUM CHANNEL WIDTH.
  - RIPRAP AND FABRIC PER WISDOT SPEC 606 AND 645 RESPECTIVELY. MINIMUM DEPTH OF ROCK ALONG BANK SHALL BE 1.5 TIMES THE MINIMUM SPECIFIED ROCK THICKNESS, MEASURED PERPENDICULAR FROM THE EXCAVATED BANK FACE.

**1 JOINT PLANTED RIPRAP**  
NTS



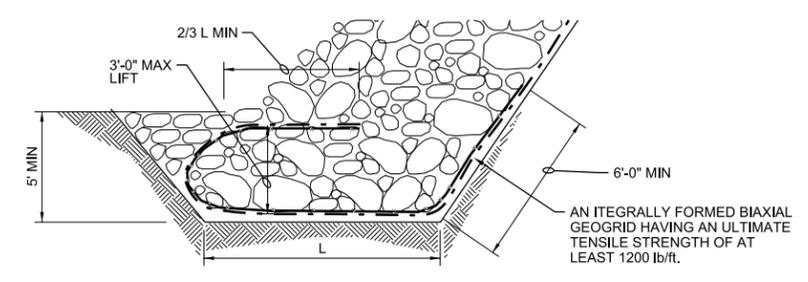
- NOTES:**
- BEGIN SOIL BIO-ENGINEERING 0.5 FT ABOVE FUTURE POOL ELEVATION. AND CONTINUE UP BANK FOR 3.5 FEET ABOVE FUTURE POOL ELEV.
  - LOCATE TOE OF SLOPE TO PROVIDE MINIMUM CHANNEL WIDTH.
  - LIVE CUTTINGS FOR BRUSHLAYER SHALL BE DENSELY PLACED BETWEEN LIFTS AT A RATE NO LESS THAN ONE CUTTING PER INCH MEASURED ALONG THE LENGTH OF THE BANK.
  - MIX RIPRAP WITH GRAVEL TO FILL VOIDS. RIPRAP AND FABRIC PER WISDOT SPEC 606 AND 645 RESPECTIVELY.

**3 SOIL LIFTS FOR BANKS ≥10' HIGH**  
NTS



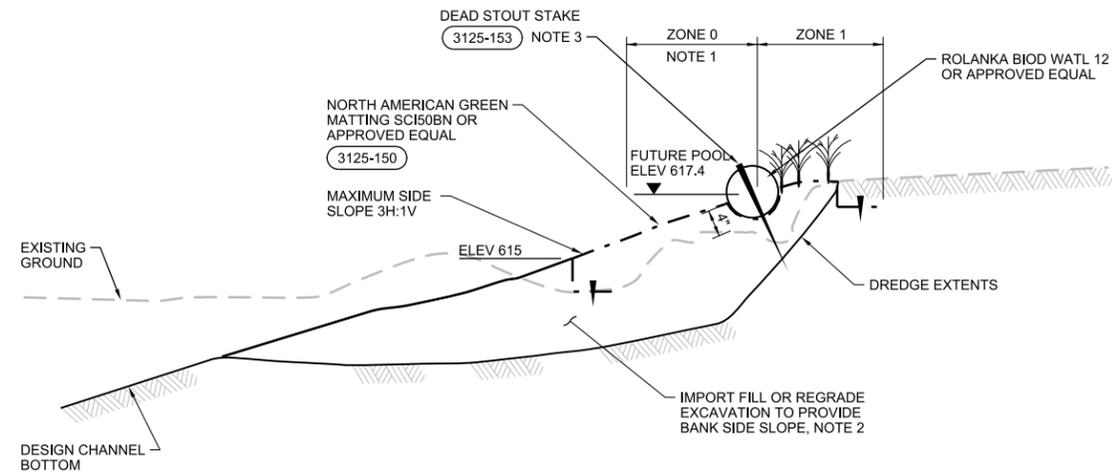
- NOTES:**
- BEGIN SOIL BIO-ENGINEERING 0.5 FT ABOVE FUTURE POOL ELEVATION.
  - LOCATE TOE OF SLOPE TO PROVIDE MINIMUM CHANNEL WIDTH.
  - LIVE CUTTINGS FOR BRUSHLAYER SHALL BE DENSELY PLACED BETWEEN LIFTS AT A RATE NO LESS THAN ONE CUTTING PER INCH MEASURED ALONG THE LENGTH OF THE BANK.
  - RIPRAP AND FABRIC PER WISDOT SPEC 606 AND 645 RESPECTIVELY. MINIMUM DEPTH OF ROCK ALONG BANK SHALL BE 1.5 TIMES THE MINIMUM SPECIFIED ROCK THICKNESS, MEASURED PERPENDICULAR FROM THE EXCAVATED BANK FACE.

**2 SOIL LIFT FOR BANKS <10' HIGH**  
NTS



**4 DETAIL (TYPICAL TOE)**  
NTS

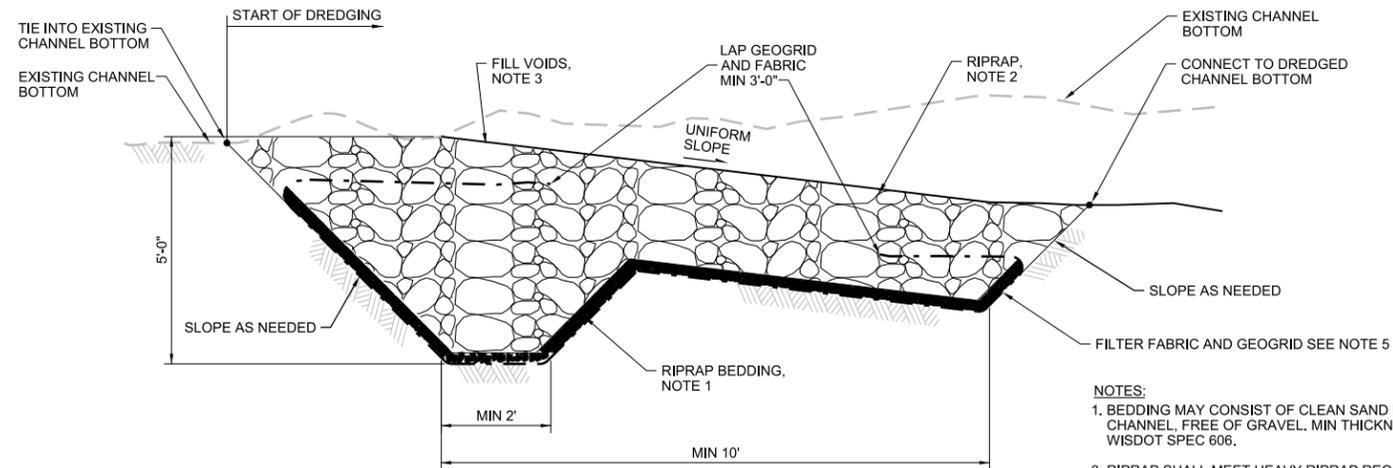
CH2MHILL		CIVIL		LINCOLN PARK/ MILWAUKEE RIVER CHANNEL SEDIMENT'S SITE		US ENVIRONMENTAL PROTECTION AGENCY MILWAUKEE, WISCONSIN	
BANK STABILIZATION DETAILS		NOT TO SCALE		VERIFY SCALE		BAR IS ONE INCH ON ORIGINAL DRAWING.	
DATE		MARCH 2011		PROJ		405068	
DWG		C-301		SHEET		20	
ISSUED FOR BID		MA BOEKENHAUER		BY		APVD	
		BA BROWN		CHK		APVD	
		GF BOWLES		DR		APVD	
		NO.		DATE		NO.	
		DSGN		NO.		DATE	



**NOTES:**

1. PLANTINGS IN ZONE 0 SHALL OCCUR NO MORE THAN 1' BELOW THE FUTURE POOL ELEVATION. TOP OF STAKES SHALL EXTEND UPWARD AND TERMINATE MIN 6" ABOVE THE FUTURE POOL ELEV.
2. FILL FROM THE CALUMET STOCKPILE IS ALLOWED.
3. STAKES SHALL BE SPACED NO GREATER THAN 3' ALONG THE LENGTH OF THE BANK.

**5 BIO-ENGINEERING BANK RESTORATION**  
NTS



**NOTES:**

1. BEDDING MAY CONSIST OF CLEAN SAND FROM WITHIN DREDGED CHANNEL, FREE OF GRAVEL. MIN THICKNESS AS SPECIFIED IN WISDOT SPEC 606.
2. RIPRAP SHALL MEET HEAVY RIPRAP REQUIREMENTS AS DEFINED IN WISDOT SPEC 606.2
3. USE CLEAN CHANNEL BOTTOM MATERIAL WITHIN DREDGED CHANNEL TO FILL VOIDS IN ROCK.
4. FILTER FABRIC SHALL MEET HR TYPE FABRIC REQUIREMENTS AS DEFINED IN WISDOT SPEC. 645.2.
5. GEOGRID SHALL BE INTEGALLY FORMED BIAXIAL GEOGRID HAVING AN ULTIMATE TENSIL STRENGTH OF AT LEAST 1200 lb/ft.

**6 CREEK BOTTOM STABILIZATION AT PROJECT START**  
NTS  
(NEAR GREEN BAY AVE BRIDGE)

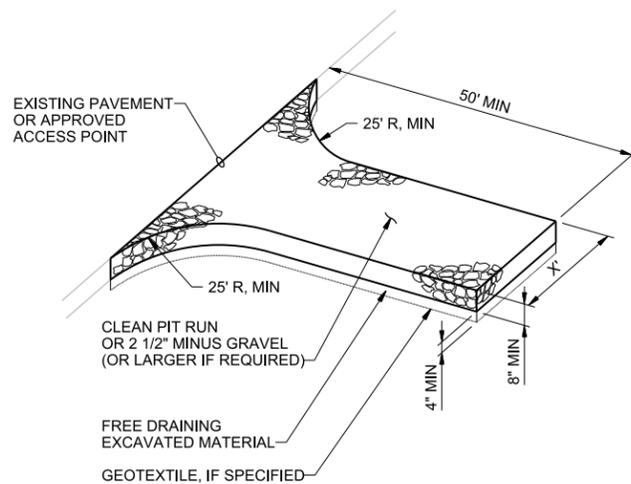
NO.	DATE	DR	CHK	BY
		BA BROWN	GF BOWLES	MA BOEKENHAUER
		BA BROWN	BA BROWN	APVD
				APVD

LINCOLN PARK/ MILWAUKEE RIVER  
CHANNEL SEDIMENTS SIRE  
US ENVIRONMENTAL PROTECTION AGENCY  
MILWAUKEE, WISCONSIN

**CH2MHILL**  
CIVIL  
**BANK STABILIZATION  
DETAILS**

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SHEET	21

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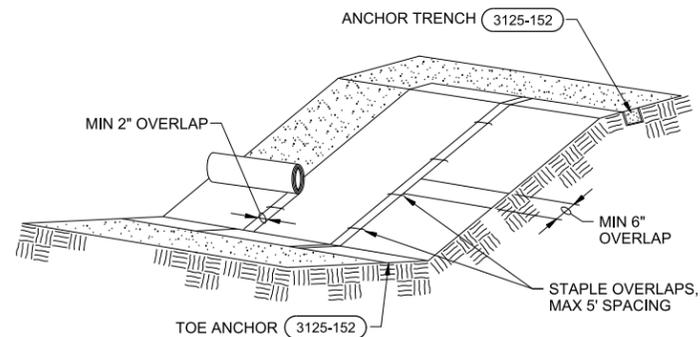
**NOTES:**

- ADDITIONAL GRAVEL MAY HAVE TO BE ADDED PERIODICALLY TO MAINTAIN PROPER FUNCTION OF THE PAD.
- REMOVE GRAVEL ENTRANCE AND REPLACE WITH NEW BASE COURSE PRIOR TO COMPLETION OF ACCESS ROAD.

**GRAVEL CONSTRUCTION ENTRANCE**

NTS

3125-130



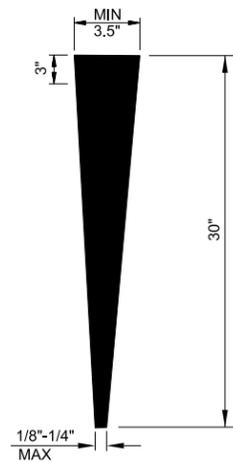
**NOTES:**

- IF THERE IS A BERM AT THE TOP OF SLOPE, ANCHOR UPSLOPE OF THE BERM.
- SLOPE SURFACE SHALL BE SMOOTH BEFORE PLACEMENT FOR PROPER SOIL CONTACT.
- DO NOT STRETCH BLANKETS/MATTINGS TIGHT, ALLOW THE ROLLS TO MOLD TO ANY IRREGULARITIES.
- STAPLING PATTERN AS PER MANUFACTURER'S RECOMMENDATIONS.
- FOR SLOPES FLATTER THAN 3:1, ROLLS MAY BE PLACED IN HORIZONTAL STRIPS.
- FERTILIZE, SEED AND MULCH BEFORE INSTALLATION. PLANTING OF SHRUBS, TREES, ETC SHOULD OCCUR AFTER INSTALLATION.

**EROSION CONTROL MATTING ON SLOPE**

NTS

3125-150



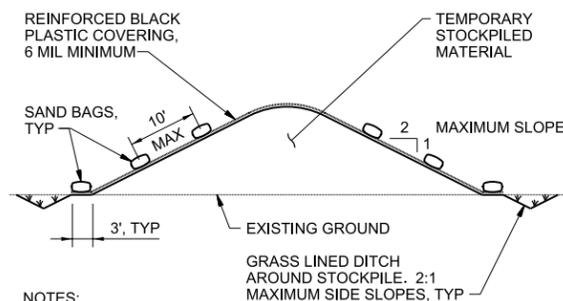
**NOTES:**

- DEAD STOUT STAKES SHALL BE FASHIONED FROM UNTREATED 2" BY 4" (NOMINAL) PINE BOARDS.
- DEAD STOUT STAKES TO BE USED IN LIEU OF METAL OR OTHER STAPLES OR FASTENERS FOR SECURING EROSION FABRIC ON TOP AND TOE OF SLOPES.
- DEAD STOUT STAKES SHALL BE INSTALLED SUCH THAT 3" OF STAKE IS ABOVE GROUND.

**DEAD STOUT STAKE**

NTS

3125-153



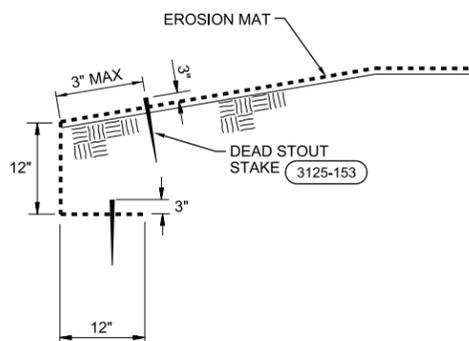
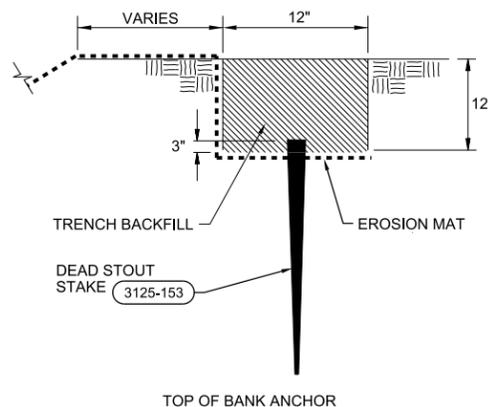
**NOTES:**

- ALL SEAMS SHALL BE TAPED OR WEIGHTED DOWN FULL LENGTH. ALL SEAMS SHALL HAVE A MINIMUM 12" OVERLAP.
- SEAMS PARALLEL TO THE SLOPE CONTOUR SHALL HAVE THE UPHILL SHEET OVERLAP THE DOWN HILL SHEET.
- NO SURFACE RUN-OFF SHALL BE ALLOWED TO RUN UNDER THE PLASTIC COVERING.
- DRAINAGE FROM AREAS COVERED BY REINFORCED PLASTIC SHEETING SHALL BE CONTROLLED SUCH THAT NO DISCHARGE OCCURS DIRECTLY ONTO UNCONTROLLED DISTURBED AREAS OF THE CONSTRUCTION SITE.
- ALL SAND BAGS SHALL BE MAINTAINED IN PLACE WITH ROPE.

**TEMPORARY STOCKPILE COVERING**

NTS

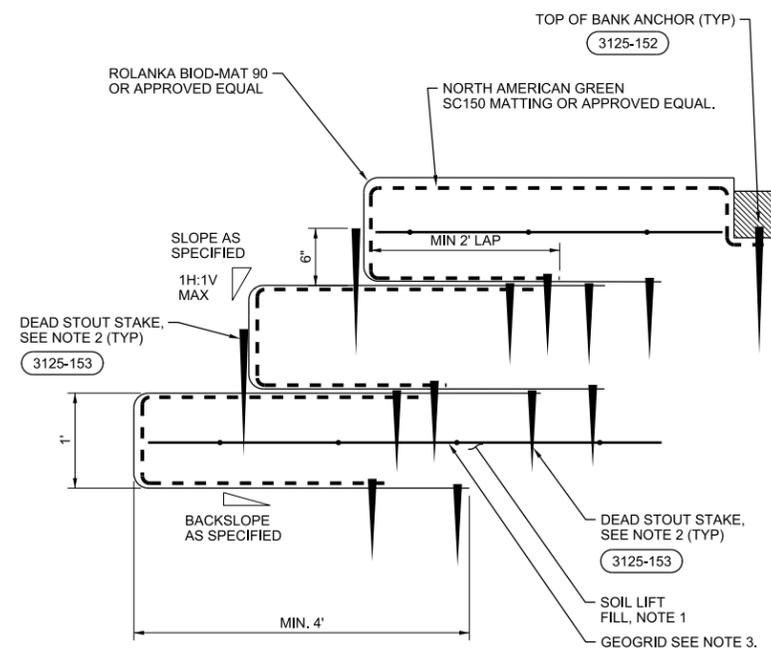
3125-140



**EROSION MAT ANCHORS**

NTS

3125-152



**NOTES:**

- COMPACTED BACKFILL SHALL BE CLAYEY SAND WITH <50% FINES AND NO GRAVEL. COMPACT IN 3" LIFTS TO 95% STANDARD PROCTOR. FILL FROM CALUMET STOCKPILE IS ACCEPTABLE, LESS THE GRAVEL AND LARGER PARTICLES.
- STAKES AT FACE OF SOIL LIFTS SHALL BE SPACED NO GREATER THAN 3 FEET ALONG LENGTH OF CHANNEL. STAKES WITHIN SOIL LIFTS SHALL BE SPACED NO GREATER THAN 5 FEET.
- INTEGRALLY FORMED BIAXIAL GEOGRID HAVING AN ULTIMATE TENSILE STRENGTH OF AT LEAST 800 LB/FT EXTENDING 6'-0" BACK FROM THE FACE (MIN) W/ 2'-0" LAP. ALTERNATE LIFTS AS SHOWN.

**FABRIC ENCAPSULATED SOIL LIFT**

NTS

3125-154

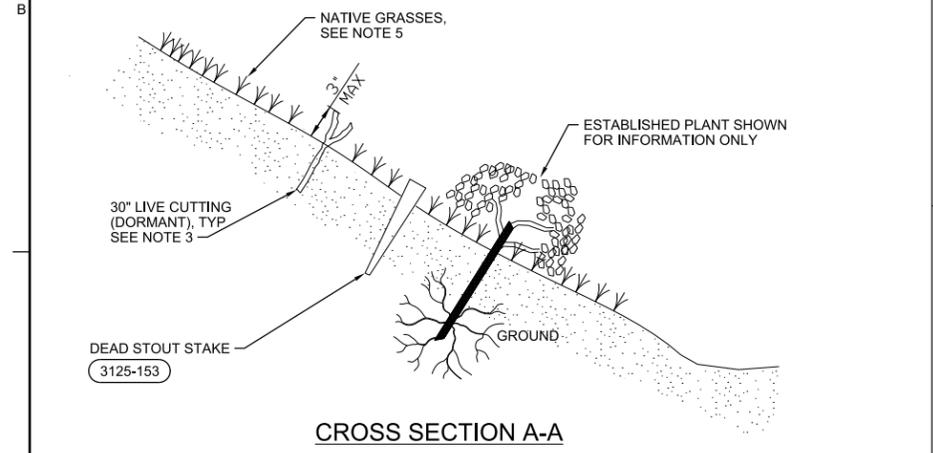
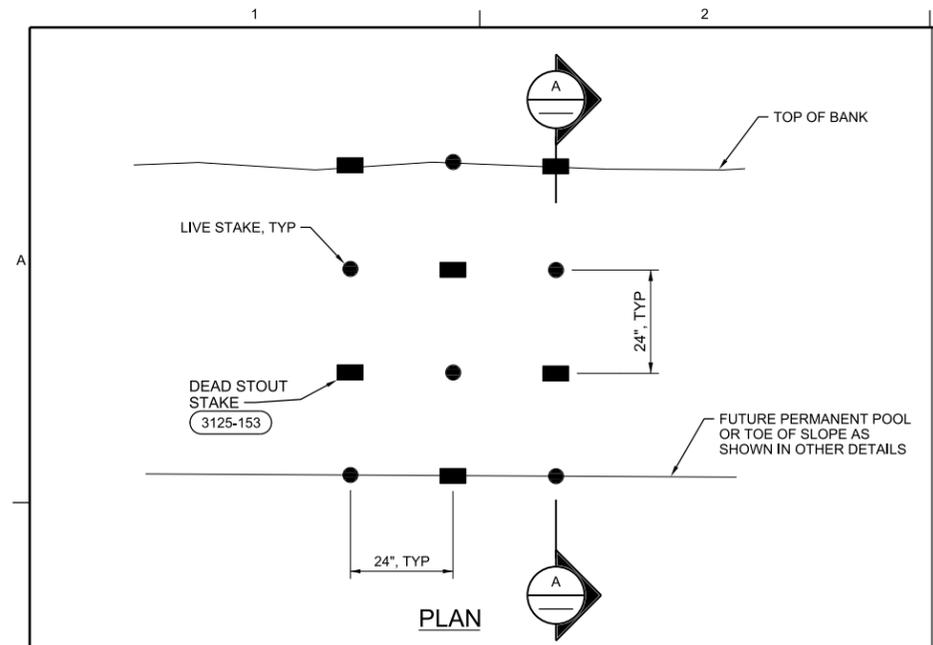
NO.	DATE	DR	BA BROWN	DG	BA BROWN	GF BOWLES	CHK	REVISION	BY	APVD	MA BOEKENHAUER
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LINCOLN PARK/ MILWAUKEE RIVER CHANNEL SEDIMENTS SITE	US ENVIRONMENTAL PROTECTION AGENCY MILWAUKEE, WISCONSIN
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<b>CH2MHILL</b>	CIVIL
	STANDARD DETAILS

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DATE MARCH 2011
PROJ 405068
DWG C-501
SHEET 22

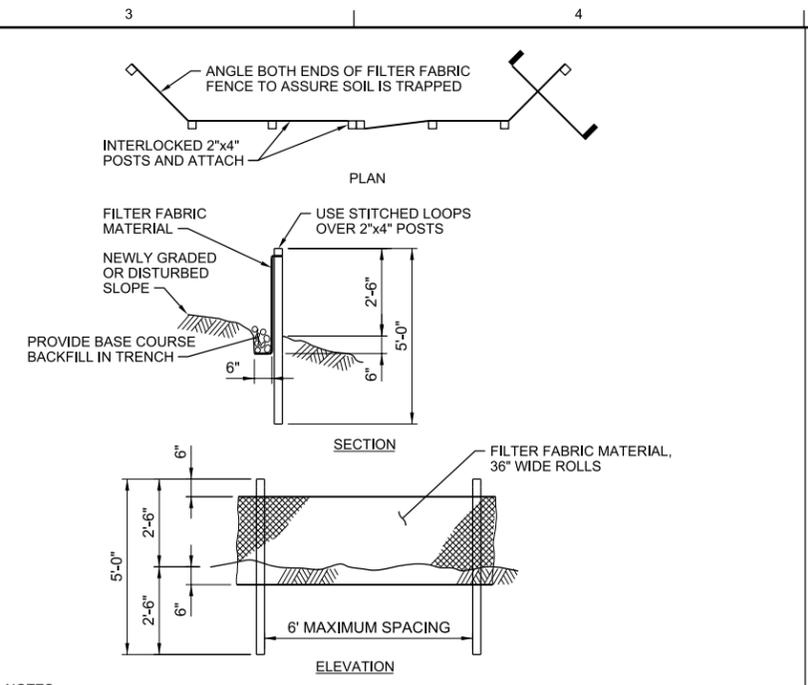
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- NOTES:**
1. THE BEST SOURCE OF PLANT MATERIAL ON ANY PROJECT IS THE PROJECT SITE ITSELF. ALL PUBLIC AND PRIVATE SITES, WHICH MAY CONTAIN DESIRABLE PLANT MATERIAL FOR TRANSPLANTING AND LIVE CUTTINGS, REQUIRE PERMISSION FROM THE PROPERTY OWNER AND APPROVAL OF THE OWNER PRIOR TO HARVESTING.
  2. WOODY SPECIES FOR SOIL BIOENGINEERING (LIVE CUTTINGS FOR LIVE STAKES AND ) ARE LISTED ON SCHEDULES 1, 2 AND 3, DWG C-601. THE SUBCONTRACTOR MAY USE OTHER SPECIES UPON APPROVAL.
  3. WHERE LIVE CUTTINGS ARE REQUIRED FOR SOIL BIOENGINEERING A MINIMUM OF THREE SPECIES SHALL BE USED IN RELATIVELY EQUAL AMOUNTS (IE - FOR THREE SPECIES THE MIXTURE SHALL ROUGHLY BE 33% OF EACH SPECIES).
  4. THE SUBCONTRACTOR IS RESPONSIBLE FOR SOIL BIOENGINEERING SUCCESS. TWO TYPES OF SOIL BIOENGINEERING ARE SPECIFIED FOR THIS PROJECT - LIVE STAKES AND . 100% OF LIVE STAKES SHALL TAKE ROOT AND GROW DURING THE FIRST GROWING SEASON FOLLOWING INSTALLATION. 80% OF LIVE CUTTINGS IN SHALL TAKE ROOT AND GROW DURING THE FIRST GROWING SEASON FOLLOWING INSTALLATION. NATIVE GRASSES SHALL EXHIBIT AT LEAST 90% COVERAGE DURING THE FIRST GROWING SEASON FOLLOWING INSTALLATION.
  5. NATIVE GRASSES SHALL BE USED IN BETWEEN THE DORMANT LIVE CUTTINGS OF WOODY VEGETATION IN THE PROPOSED SOIL BIOENGINEERING. NATIVE GRASSES SHALL BE EITHER SEEDED, INSTALLED AS PLUGS, OR INSTALLED AS SOD MATS. ALL INSTALLATION SHALL BE IN ACCORDANCE WITH THESE PLANS AND THE GROWERS' AND/OR SUPPLIERS' CRITERIA. ALL SUCH CRITERIA, INCLUDING BUT NOT LIMITED TO SEEDING RATE, SOIL AMENDMENTS (FERTILIZATION) REQUIREMENTS, WATER REQUIREMENTS, LIGHT REQUIREMENTS, SEED BED PREPARATION REQUIREMENTS SHALL BE SUBMITTED FOR REVIEW PRIOR TO INSTALLATION/PLANTING. NATIVE GRASS SEEDING/INSTALLATION METHOD SHALL NOT AFFECT THE SUCCESS CRITERIA OF 90% COVERAGE.

**LIVE STAKE DETAIL**  
NTS

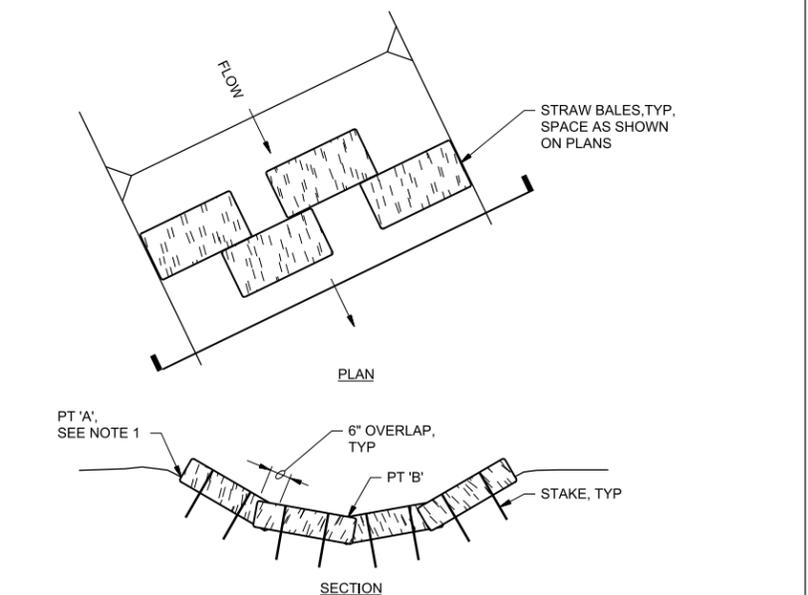
3125-155



- NOTES:**
1. BURY BOTTOM OF FILTER FABRIC 6" VERTICALLY BELOW FINISHED GRADE.
  2. 2"x4" DOUGLAS FIR OR STEEL FENCE POSTS.
  3. STITCHED LOOPS TO BE INSTALLED DOWNHILL SIDE OF SLOPE.
  4. COMPACT ALL AREAS OF FILTER FABRIC TRENCH.

**SEDIMENT FENCE**  
NTS

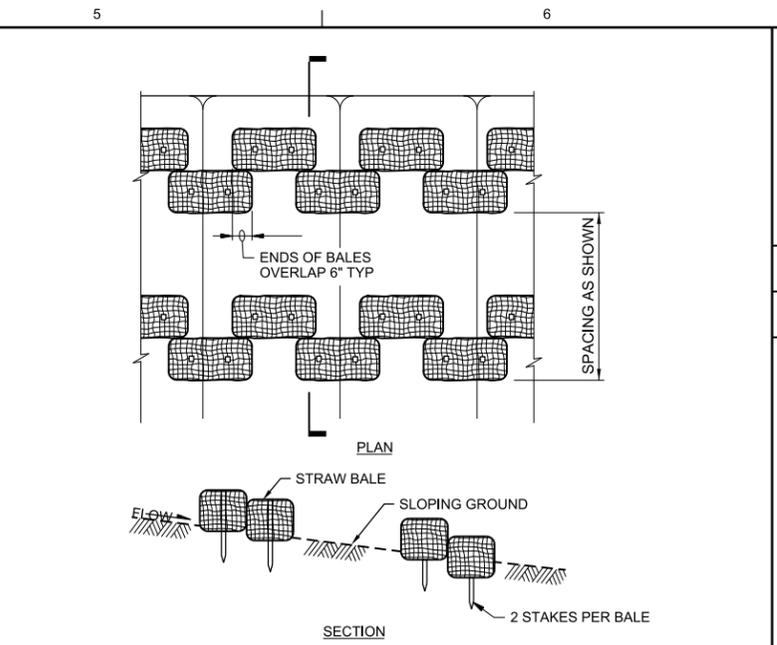
3125-165



- NOTES:**
1. POINT 'A' MUST BE 6" MINIMUM HIGHER THAN PT 'B'.
  2. STAKING OF BALES IS REQUIRED USING (2)2"x2"x3' LONG WOOD STAKES OR APPROVED EQUAL PER BALE.
  3. DRIVE STAKES MINIMUM 12" INTO GROUND AND FLUSH WITH TOP OF BALES.
  4. EMBED BALES MINIMUM OF 4" INTO GROUND SURFACE.
  5. BIOFILTER BAGS TO BE USED, IF SPECIFIED.

**STRAW BALES IN DITCHES**  
NTS

3125-170



- NOTES:**
1. STAKING OF BALES IS REQUIRED USING (2) 2"x2"x3' LONG WOOD STAKES OR APPROVED EQUAL PER BALE.
  2. DRIVE STAKES MINIMUM 12" INTO GROUND AND FLUSH WITH TOP OF BALES.
  3. EMBED BALES MINIMUM OF 4" INTO GROUND SURFACE.
  4. BILFILTER BAGS TO BE USED, IF SPECIFIED.

**STRAW BALES FOR OVERLAND FLOW**  
NTS

3125-171

NO.	DATE	DR	REVISION	BY	APVD
		BA BROWN	CHK	MA BOEKENHAUER	
		GF BOWLES			
		BA BROWN			

LINCOLN PARK / MILWAUKEE RIVER  
CHANNEL SEDIMENTS SITE  
US ENVIRONMENTAL PROTECTION AGENCY  
MILWAUKEE, WISCONSIN

**CH2MHILL**  
CIVIL  
STANDARD DETAILS

NOT TO SCALE  
VERIFY SCALE  
BAR IS ONE INCH ON ORIGINAL DRAWING.

DATE	MARCH 2011
PROJ	405068
DWG	C-502
SHEET	23

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**SCHEDULE 1**  
**Zone 0 Live Stakes**

COMMON NAME	SCIENTIFIC NAME (SPECIES)	FORM	SIZE	STAKING DENSITY	PLANTS/ACRE
SPECKLED ALDER/TAG ALDER	<i>Alnus incana ssp. rugosa/Alnus rugosa</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
EASTERN COTTONWOOD	<i>Populus deltoides</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
BLACK WILLOW	<i>Salix nigra</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
BUTTONBUSH	<i>Cephalanthus occidentalis</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729

NOTE:  
1. ALL 4 SPECIES MUST BE USED WITH NO MORE THAN 50 % OF ANY ONE SPECIES AND AT LEAST 10 % OF EACH.

**SCHEDULE 2**  
**Zone 1 Live Stakes**

COMMON NAME	SCIENTIFIC NAME (SPECIES)	FORM	SIZE 1	STAKING DENSITY	PLANTS/ACRE
SPECKLED ALDER/TAG ALDER	<i>Alnus incana ssp. rugosa/Alnus rugosa</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
EASTERN COTTONWOOD	<i>Populus deltoides</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
BLACK WILLOW	<i>Salix nigra</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
BUTTONBUSH	<i>Cephalanthus occidentalis</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
RED MAPLE	<i>Acer rubrum ssp. rubrum</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
RED-OSIER DOGWOOD	<i>Cornus sericea/Cornus stolonifera</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
AMERICAN SYCAMORE	<i>Platanus occidentalis</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729

NOTES:  
1. FOR PLACING LIVE STAKES IN ROCK RATHER THAN BETWEEN SOIL LIFTS, SIZE IS INCREASED TO 2 TO 4 INCHES IN DIAMETER.  
2. AT LEAST 5 OF THE 7 SPECIES MUST BE USED WITH NO MORE THAN 40 % OF ANY ONE SPECIES AND AT LEAST 10 % OF EACH.

**SCHEDULE 3**  
**Zone 2 Live Stakes**

COMMON NAME	SCIENTIFIC NAME (SPECIES)	FORM	SIZE 1	STAKING DENSITY	PLANTS/ACRE
AMERICAN SYCAMORE	<i>Platanus occidentalis</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
EASTERN COTTONWOOD	<i>Populus deltoides</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
CORALBERRY	<i>Symphoricarpos orbiculatus</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
ELDERBERRY	<i>Sambucus canadensis/Sambucus nigra ssp. canadensis</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
NINEBARK	<i>Physocarpus opulifolius</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
NANNYBERRY	<i>Viburnum lentago</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
WHITE-ROD	<i>Viburnum nudum var. cassinoides</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
BOXELDER	<i>Acer negundo</i>	LIVE STAKE	1 TO 3 INCH DIAMETER	2' ON CENTER	729
HOPHORNBEAM	<i>Ostrya Virginiana</i>	CONTAINER	3 GALLON	10' ON CENTER	81
DOWNY JUNE BERRY	<i>Amelanchier arborea</i>	CONTAINER	1 GALLON	10' ON CENTER	81

NOTES:  
1. FOR PLACING LIVE STAKES IN ROCK RATHER THAN BETWEEN SOIL LIFTS, SIZE IS INCREASED TO 2 TO 4 INCHES IN DIAMETER. DO NOT PLANT CONTAINER PLANTS IN ROCK OR LIFTS, ONLY WHERE SOIL IS PLACED.  
2. AT LEAST 6 OF THE 8 LIVE STAKE SPECIES MUST BE USED WITH NO MORE THAN 40 % OF ANY ONE SPECIES AND AT LEAST 10 % OF EACH.  
3. BOTH SPECIES OF CONTAINER PLANTS MUST BE PLANTED IN SUITABLE AREAS.

**SCHEDULE 4**  
**Herbaceous Seed Mix (Zones 0 - 2)**

COMMON NAME	SCIENTIFIC NAME (SPECIES)	FORM	SEEDING RATE (OZ/AC) PLS	SEEDS/OZ
<b>GRASSES</b>				
BIG BLUESTEM	<i>Andropogon gerardii</i>	SEED	4	9,801
SIDE OATS GRAMA	<i>Bouteloua curtipendula</i>	SEED	24	5,990
JUNE GRASS	<i>Koeleria cristata</i>	SEED	0.96	208,725
LITTLE BLUESTEM	<i>Schizachyrium scoparium</i>	SEED	24	15,065
INDIAN GRASS	<i>Sorghastrum nutans</i>	SEED	8	11,979
SAND DROPS	<i>Sporobolus cryptandrus</i>	SEED	2.08	192,669
<b>WILDFLOWERS</b>				
LEAD PLANT	<i>Amorpha canescens</i>	SEED	0.5	17,424
SILKY ASTER	<i>Aster sericeus</i>	SEED	0.5	26,136
PRAIRIE COREOPSIS	<i>Coreopsis palmata</i>	SEED	0.5	8,712
PURPLE PRAIRIE CLOVER	<i>Dalea purpurea</i>	SEED	2	15,246
SPOTTED BEE BALM	<i>Monarda punctata</i>	SEED	0.25	87,120
PRAIRIE CINQUEFOIL	<i>Potentilla arguta</i>	SEED	0.25	226,512
YELLOW CONEFLOWER	<i>Ratibida pinnata</i>	SEED	0.5	26,136
STIFF GOLDENROD	<i>Solidago rigida</i>	SEED	0.5	43,560
OHIO SPIDERWORT	<i>Tradescantia ohioensis</i>	SEED	1	8,712
HOARY VERVAIN	<i>Verbena stricta</i>	SEED	0.5	26,136

NOTES:  
1. SEED MIX SHALL BE "VI CP25 DRY PRAIRIE MIX" FROM SHOOTING STAR NATIVE SEEDS OR APPROVED EQUAL.  
2. APPLY AT A MINIMUM OF 6 POUNDS PER ACRE.

**SCHEDULE 4A**  
**Annual Seed Mix (Zones 0 - 2)**

COMMON NAME	SCIENTIFIC NAME (SPECIES)	FORM	SEEDING RATE (OZ/AC) PLS
<b>ANNUAL GRASSES</b>			
COMMON OAT	<i>Avena fatua</i>	SEED	300
ANNUAL RYE	<i>Lolium multiflorum</i>	SEED	300

NOTE:  
1. APPLY AT A MINIMUM RATE OF 37.5 POUNDS PER ACRE.

**SCHEDULE 5**  
**Top of Bank Transition (park land within 50 feet of Top of Bank)**

COMMON NAME	SCIENTIFIC NAME (SPECIES)	FORM	SEEDING RATE (OZ/AC) PLS	%
SPARTAN HARD FESCUE	<i>Festuca ovina</i>	SEED	1,800	45
AZAY SHEEP FESCUE	<i>Festuca ovina</i>	SEED	1,800	40
TRANSIT ANNUAL RYEGRASS	<i>Lolium multiflorum</i>	SEED	600	15

NOTES:  
1. SEED MIX SHALL BE "NO MOW/LOW GROW" SEED MIX BY REINDERS, INC. OR APPROVED EQUAL.  
2. APPLY AT A MINIMUM RATE OF 250 POUNDS PER ACRE.

**SCHEDULE 6**  
**Mowed Turfgrass**

COMMON NAME	SCIENTIFIC NAME (SPECIES)	FORM	SEEDING RATE (OZ/AC) PLS	%
<b>DELUXE 50 (REINDER, INC.)</b>				
KENTUCKY BLUEGRASS (SOD QUALITY)	<i>Poa pratensis</i>	SEED	640	20
NEWPORT KENTUCKY BLUEGRASS	<i>Poa pratensis</i>	SEED	480	15
KEN BLUE KENTUCKY BLUEGRASS	<i>Poa pratensis</i>	SEED	480	15
CREeping RED FESCUE	<i>Festuca rubra</i>	SEED	800	25
QUEBEC PERENNIAL RYEGRASS	<i>Lolium perenne</i>	SEED	480	15
FIESTA III PERENNIAL RYEGRASS	<i>Lolium perenne</i>	SEED	320	10
<b>MADISON PARKS (OLDS SEED COMPANY)</b>				
KENTUCKY BLUEGRASS	<i>Poa pratensis</i>	SEED	1,394	50
CREeping RED FESCUE	<i>Festuca rubra</i>	SEED	697	25
PERENNIAL RYEGRASS	<i>Lolium perenne</i>	SEED	697	25

NOTES:  
1. EITHER SEED MIX IS ACCEPTABLE OR APPROVED EQUAL.  
2. APPLY DELUXE 50 (REINDERS, INC.) AT A MINIMUM RATE OF 200 POUNDS PER ACRE.  
3. APPLY MADISON PARKS (OLDS SEED CO.) AT A MINIMUM RATE OF 175 POUNDS PER ACRE.

**GENERAL PLANTING NOTES:**

- REMOVE ALL BUCKTHORN FROM THE CREEK AND WESTERN OXBOW BANKS AND IMMEDIATELY ADJOINING AREAS, MINIMUM OF 25 FT CLEARANCE BEYOND CONSTRUCTION LIMITS. PULL STEMS LESS THAN 1-INCH DIAMETER, CUT LARGER AT GROUND SURFACE. APPLY CHEMICAL TREATMENT AS RECOMMENDED BY CERTIFIED ARBORIST AND AS APPROVED BY ENGINEER.
- SMALL (LESS THAN 3-INCH DIAMETER) SYCAMORE AND RED MAPLE SHALL BE CUT BACK TO PROVIDE MORE SUNLIGHT TO THE NEWLY PLANTED AREAS. ROOT MASS OF THESE EXISTING SPECIES SHALL NOT BE DISTURBED. ALL TRIMMING SHALL BE COMPLETED BY A CERTIFIED ARBORIST AND COORDINATED WITH THE MILWAUKEE COUNTY PARKS DEPARTMENT.
- LIVE STAKES SHALL BE STORED IN SHADED, COOL, MOIST CONDITIONS BEFORE PLANTING. THEY SHALL BE COVERED IN BURLAP AND THOROUGHLY WETTED DAILY. STORE FOR NO LONGER THAN TWO WEEKS.
- LIVE STAKE HARVEST/INSTALLATION SHALL BE PERFORMED DURING THE DORMANT SEASON, LATE FALL TO EARLY SPRING. IF BRUSHLAYER MUST BE CONSTRUCTED IN NON-DORMANT SEASON, CUTTING PLACEMENT MAY BE DELAYED AND SURFACE OF SOIL LIFTS SHALL BE LIVE STAKED DURING NEXT DORMANT SEASON.
- SUBCONTRACTOR AND CERTIFIED ARBORIST OR LANDSCAPE ARCHITECT SHALL PERFORM SITE RECONNAISSANCE TO IDENTIFY SPECIES, GROWTH FORM, SOIL, AND SITE CONDITIONS ON ADJACENT SITES AND COMPARE WITH THE PROJECT SITE. SUBCONTRACTOR AND ARBORIST SHALL DETERMINE AND SUBMIT FOR APPROVAL NECESSARY SOIL AMENDMENTS AND PREPARATION TO ENSURE SUCCESSFUL ESTABLISHMENT.
- USE LIVE WOOD AT LEAST ONE OR MORE YEARS OLD WITH SMOOTH BARK THAT IS NOT DEEPLY FURROWED. SUCKERS OR GROWTH FROM CURRENT YEAR IS NOT ALLOWED.
- LIVE STAKES SHALL HAVE CLEAN CUTS WITH UNSPLIT ENDS. TRIM BRANCHES FROM CUTTING AS CLOSE AS POSSIBLE. THE BUTT END OF THE CUTTING SHALL BE POINTED OR ANGLED AND THE TOP END SHALL HAVE A SQUARE CUT. IDENTIFICATION OF THE TOP AND BOTTOM OF CUTTINGS IS ACCOMPLISHED BY ANGLE CUTTING THE BUTT END. THE TOP, SQUARE CUT, SHALL BE SEALED BY DIPPING THE TOP 1 TO 2 INCHES INTO A 50/50 MIX OF LIGHT-COLORED LATEX PAINT AND WATER.
- ALL BARE ROOT CONTAINER PLANTING, SEEDING, PLUGGING, ETC. SHALL BE ACCOMPLISHED PER PLANT SUPPLIERS RECOMMENDATIONS FOR SOIL AMENDMENTS, LIGHT, WATERING, ETC.
- THE SUBCONTRACTOR IS RESPONSIBLE FOR SOIL BIOENGINEERING SUCCESS. TWO TYPES OF SOIL BIOENGINEERING ARE PROPOSED FOR THIS PROJECT - LIVE STAKES AND BRUSHLAYER. 100% OF LIVE STAKES SHALL TAKE ROOT AND GROW DURING THE FIRST GROWING SEASON FOLLOWING INSTALLATION. 80% OF LIVE CUTTINGS IN BRUSHLAYER SHALL TAKE ROOT AND GROW DURING THE FIRST GROWING SEASON FOLLOWING INSTALLATION. NATIVE GRASSES SHALL EXHIBIT AT LEAST 90% COVERAGE DURING THE FIRST GROWING SEASON FOLLOWING INSTALLATION.
- THE BEST SOURCE OF PLANT MATERIAL IS THE PROJECT SITE ITSELF. ALL PUBLIC AND PRIVATE SITES WHICH MAY CONTAIN DESIRABLE PLANT MATERIAL REQUIRE WRITTEN PERMISSION FROM THE PROPERTY OWNER PRIOR TO COMMENCING CUTTINGS, AND IN SOME CASES READY-TO-INSTALL LIVE STAKES, FASCINES, AND OTHER SOIL BIOENGINEERING SYSTEMS EXIST. LISTS OF COMMERCIAL LIVING MATERIAL SUPPLIERS AND KNOWN LOCAL HARVESTING SITES ARE AVAILABLE FROM THE LOCAL NATURAL RESOURCES CONSERVATION SERVICE (NRCS), AND/OR AGRICULTURE EXTENSION OFFICE.
- ALL DISTURBED AREAS OF THE PROJECT SHALL BE VEGETATED UPON COMPLETION OF CONSTRUCTION IN ACCORDANCE WITH THE PLANT SCHEDULES, PLANTING PLANS, AND TYPICAL SECTIONS. CLEARED AREAS SHALL BE TEMPORARILY STABILIZED IF THEY WILL NOT BE BROUGHT TO FINAL GRADE FOR A PERIOD OF MORE THAN 14 WORKING DAYS.
- THE CONTRACTOR SHALL SUBMIT A PLANTING PLAN WITH PLANT LIST TO THE ENGINEER FOR REVIEW PRIOR TO COMMENCING PLANTING. THE CONTRACTOR MAY SUBSTITUTE OTHER SPECIES FOR THOSE LISTED IN THE PLANT SCHEDULES IN COORDINATION WITH AND SUBJECT TO REVIEW BY THE ENGINEER.
- SPECIES USED FOR PLANTING SHALL BE DISTRIBUTED IN A RANDOM PATTERN THROUGHOUT THE CORRESPONDING ZONES UNLESS OTHERWISE DIRECTED BY THE ENGINEER.
- NATIVE GRASSES SHALL BE USED BETWEEN THE DORMANT LIVE CUTTINGS OF WOODY VEGETATION IN THE PROPOSED SOIL BIOENGINEERING. NATIVE GRASSES SHALL BE EITHER SEEDED OR INSTALLED PLUGS. ALL INSTALLATION SHALL BE IN ACCORDANCE WITH THESE PLANS AND THE GROWERS' AND/OR SUPPLIERS' CRITERIA. ALL SUCH CRITERIA, INCLUDING BUT NOT LIMITED TO, SEEDING RATE, SOIL AMENDMENT (FERTILIZATION) REQUIREMENTS, WATER REQUIREMENTS, LIGHT REQUIREMENTS, SEED BED PREPARATION REQUIREMENTS SHALL BE SUBMITTED TO THE CONTRACTOR FOR REVIEW PRIOR TO INSTALLATION/PLANTING. NATIVE GRASS SEEDINGS/INSTALLATION METHOD SHALL NOT AFFECT THE SUCCESS CRITERIA OF 90% COVERAGE.
- ALL AREAS RECEIVING PLANTINGS SHALL INCLUDE 6 INCHES OF TOPSOIL, MULCH, AND APPROPRIATE SOIL AMENDMENTS WITHIN THE EROSION MATTING, UNLESS OTHERWISE SPECIFIED.

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SCHEDULES  
BANK STABILIZATION  
PLANTING NOTES AND SCHEDULES

NOT TO SCALE  
VERIFY SCALE  
BAR IS ONE INCH ON ORIGINAL DRAWING.

DATE: MARCH 2011  
PROJ: 405068  
DWG: C-601  
SHEET: 24

NO. DATE  
DGSN  
REVISION  
CHK  
DR  
BA BROWN  
GF BOWLES  
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MA BOEKENHAUER

BY: APVD

US ENVIRONMENTAL PROTECTION AGENCY  
MILWAUKEE, WISCONSIN

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