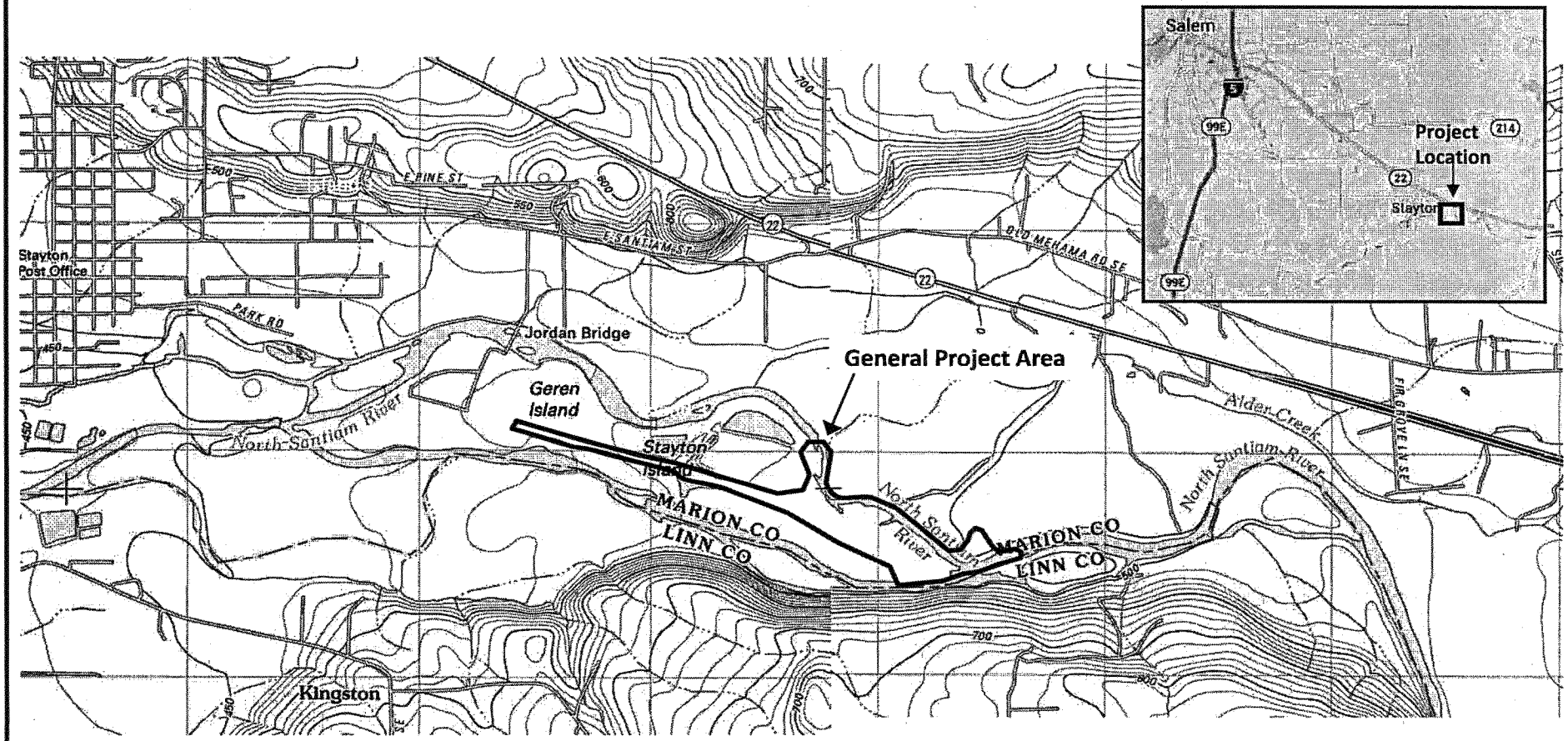
Appendix A

Figures



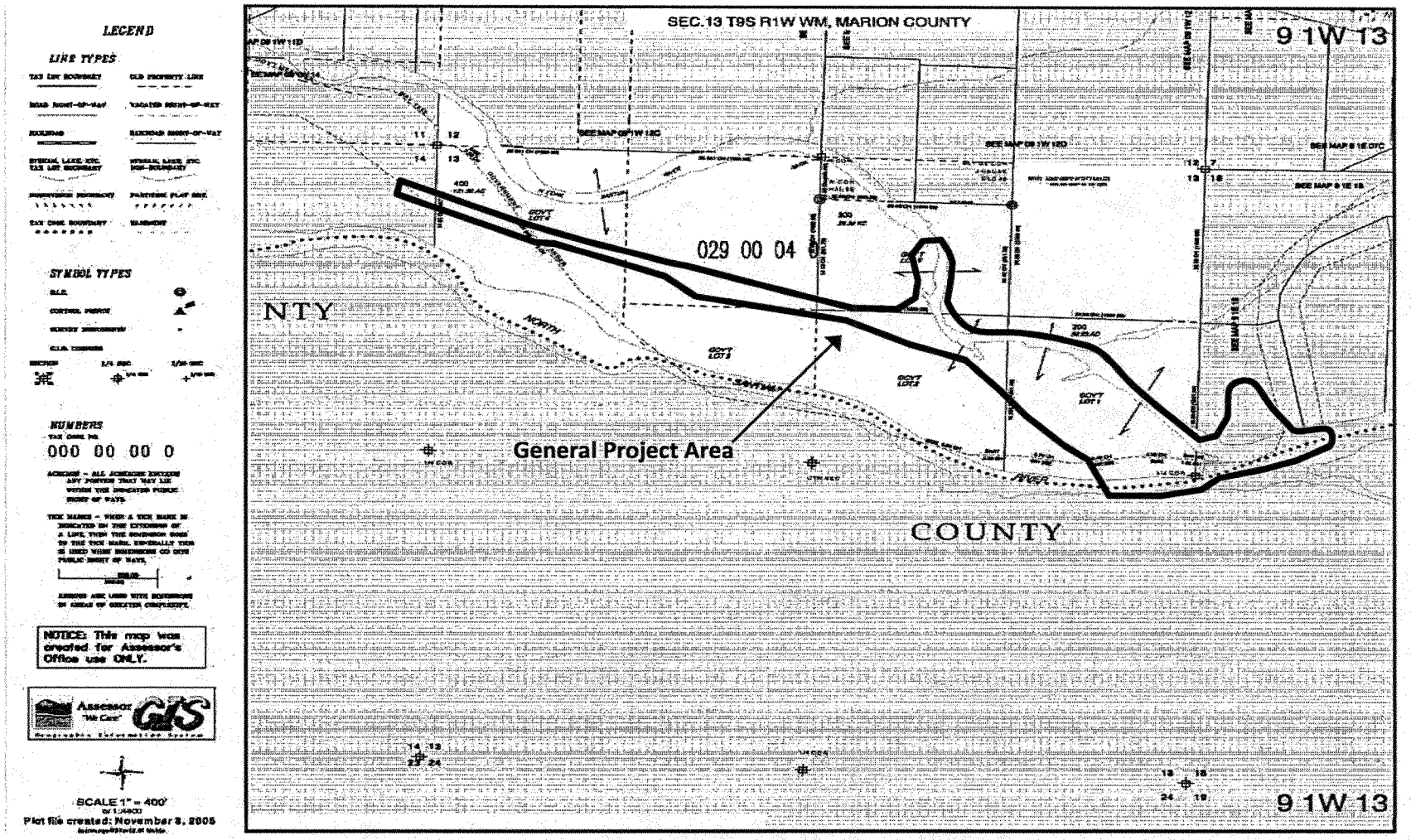
5092
12/4/13

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Location and General topography
Geren Island Flow Maintenance Project, Stayton, Oregon
(USGS Stayton, OR Quadrangle, 2011)

FIGURE
1

NWP-2014-195



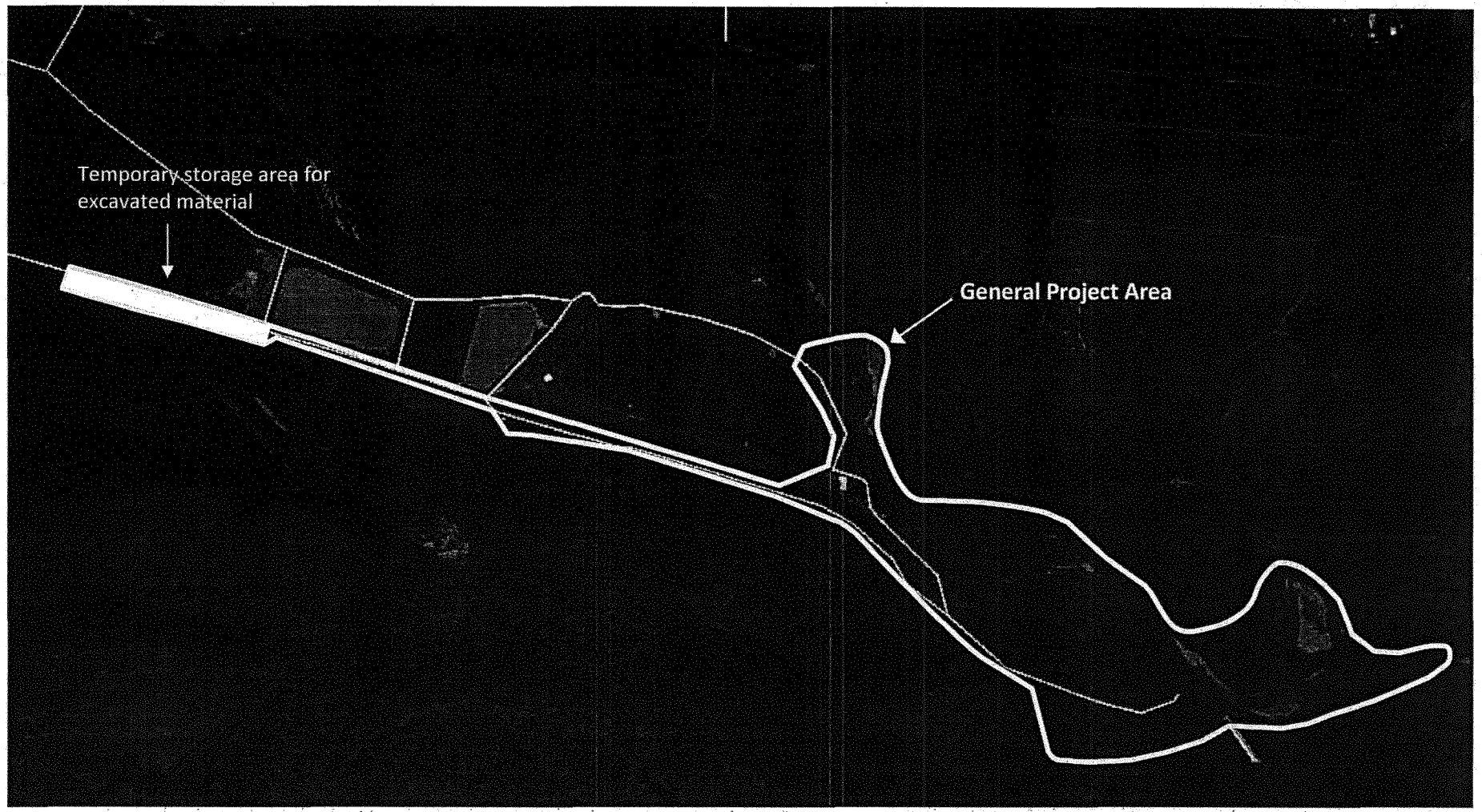
5092
12/4/13

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Tax lot map, Marion County
Geren Island Flow Maintenance Project, Stayton Oregon
(ormap.net, 2013)

FIGURE
2

NWP-2014-195



5092
12/4/13

Pacific Habitat Services, Inc.
9450 SW Commerce Circle, Suite 180
Wilsonville, OR 97070

Aerial Photo
Geren Island Flow Maintenance Project, Stayton Oregon
(Google Earth, 2013)

FIGURE
3

NWP-2014-195

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

DRAFT

PERMIT DRAWINGS

PROJECT PARTNERS

CITY OF Salem AT YOUR SERVICE

PROJECT DESCRIPTION

WEST CONSULTANTS, INC. RETAINED RIVER DESIGN GROUP, INC. TO HELP DEVELOP FLOW MAINTENANCE AND RESTORATION CONCEPTS AS PART OF A COMPREHENSIVE EFFORT TO IMPROVE THE CITY OF SALEM WATER INTAKE SYSTEM AT GEREN ISLAND ON THE NORTH SANTIAM RIVER. THE RESULTING PROJECT CONCEPTS FOCUS ON THE DEVELOPMENT OF TECHNIQUES AND STRUCTURES TO HELP REDUCE MAINTENANCE AND IMPROVE FISHERIES HABITAT.

SPATIAL REFERENCE

FIELD SURVEY DATA AND EXISTING CONDITIONS TERRAIN SURFACE DTM COMPRISED OF LIDAR AND BATHYMETRIC SURVEY DATA PROVIDED BY WEST CONSULTANTS, INC.

HORIZONTAL PROJECTION: OREGON STATE PLANE NORTH
HORIZ DATUM: NAD83 UNITS: INTERNATIONAL FEET
VERT DATUM: NAVD88 UNITS: US SURVEY FEET

REUSE OF DRAWINGS

THESE DRAWINGS, THE IDEAS AND DESIGNS INCORPORATED HEREIN, AS AN INSTRUMENT OF PROFESSIONAL SERVICE, ARE THE PROPERTY OF RIVER DESIGN GROUP, INC. (RDG) AND ARE NOT TO BE USED, IN WHOLE OR IN PART, FOR ANY OTHER PROJECT WITHOUT THE WRITTEN AUTHORIZATION OF RDG. LIKEWISE, THESE DRAWINGS MAY NOT BE ALTERED OR MODIFIED WITHOUT AUTHORIZATION OF RDG. DRAWING DUPLICATION IS ALLOWED IF THE ORIGINAL CONTENT IS NOT MODIFIED.

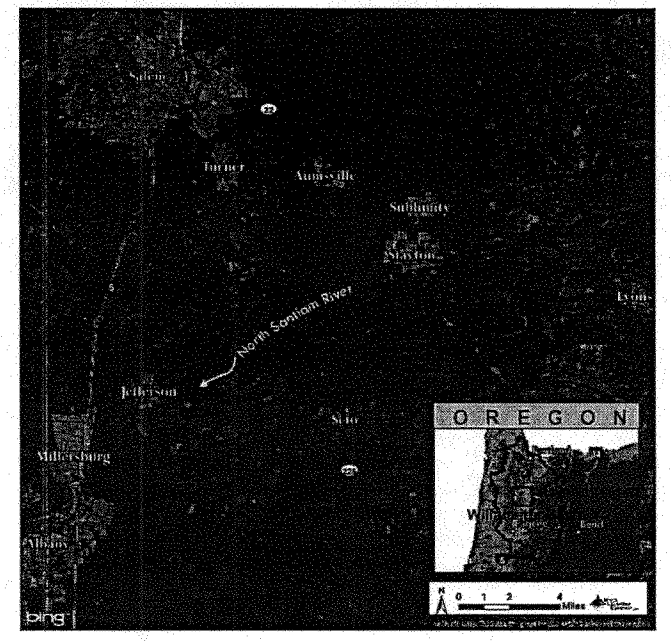
STANDARD OF PRACTICE

RDG WORKS EXCLUSIVELY IN THE RIVER ENVIRONMENT AND EMPLOYS THE MOST CURRENT AND ACCEPTED PRACTICES AVAILABLE FOR PLANNING AND DESIGN OF RESTORATION AND CHANNEL ENHANCEMENT PROJECTS. ALL PLANNING WORK WAS PERFORMED OR DIRECTED BY A REGISTERED PROFESSIONAL CIVIL ENGINEER WITH PAST EXPERIENCE IN THE DESIGN AND IMPLEMENTATION OF STREAM HABITAT RESTORATION.

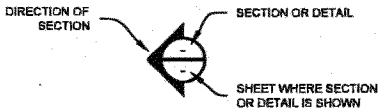
DRAWING INDEX

1.0 COVER PAGE AND NOTES
1.1 EXISTING CONDITIONS & PROJECT KEY
2.0 OVERALL SITE ACCESS & STAGING
3.0 SITE 1 WOOD STRUCTURES
3.1 SITE 1 STRUCTURES DETAILS
3.2 SITE 1 INTAKE BYPASS FILL
4.0 SITE 2 LAYOUT
4.1 SITE 2 SECTIONS
5.0 SITE 3 WOOD STRUCTURE
5.1 SITE 3 STRUCTURE DETAILS
6.0 SITE 4 LAYOUT
6.1 SITE 4 SECTIONS
7.0 SITE 6 LAYOUT
7.1 SITE 6 SECTIONS
8.0 SITE 8 LAYOUT
9.0 SITE 10 LAYOUT
10.0 SITE 11 LAYOUT
11.0 SITE 12 WOOD STRUCTURE
11.1 SITE 12 STRUCTURE DETAILS
12.0 SITE 1 & 3 WORK AREA ISOLATION
12.1 SITE 2 WORK AREA ISOLATION
12.2 SITE 4 WORK AREA ISOLATION
12.3 SITE 6 WORK AREA ISOLATION
12.4 SITE 8 WORK AREA ISOLATION
12.5 SITE 10, 11, & 12 WORK AREA ISOLATION
12.6 WORK AREA ISOLATION AND EROSION CONTROL NOTES
12.7 TYPICAL TEMPORARY BRIDGE
13.0 SITE RESTORATION & REVEGETATION
13.1 REVEGETATION NOTES

PROJECT VICINITY MAP



T.09S., R.01E., WILLAMETTE MERIDIAN
MARION COUNTY, OREGON
USGS QUADRANGLE: STOUT MOUNTAIN, OR
STAYTON, OR



CROSS-SECTION SHEET REFERENCE

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4627
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2520

COVER PAGE AND NOTES
GEREN ISLAND FLOW MAINTENANCE PROJECT
NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER RDG-13-042

DRAWING NUMBER 1.0

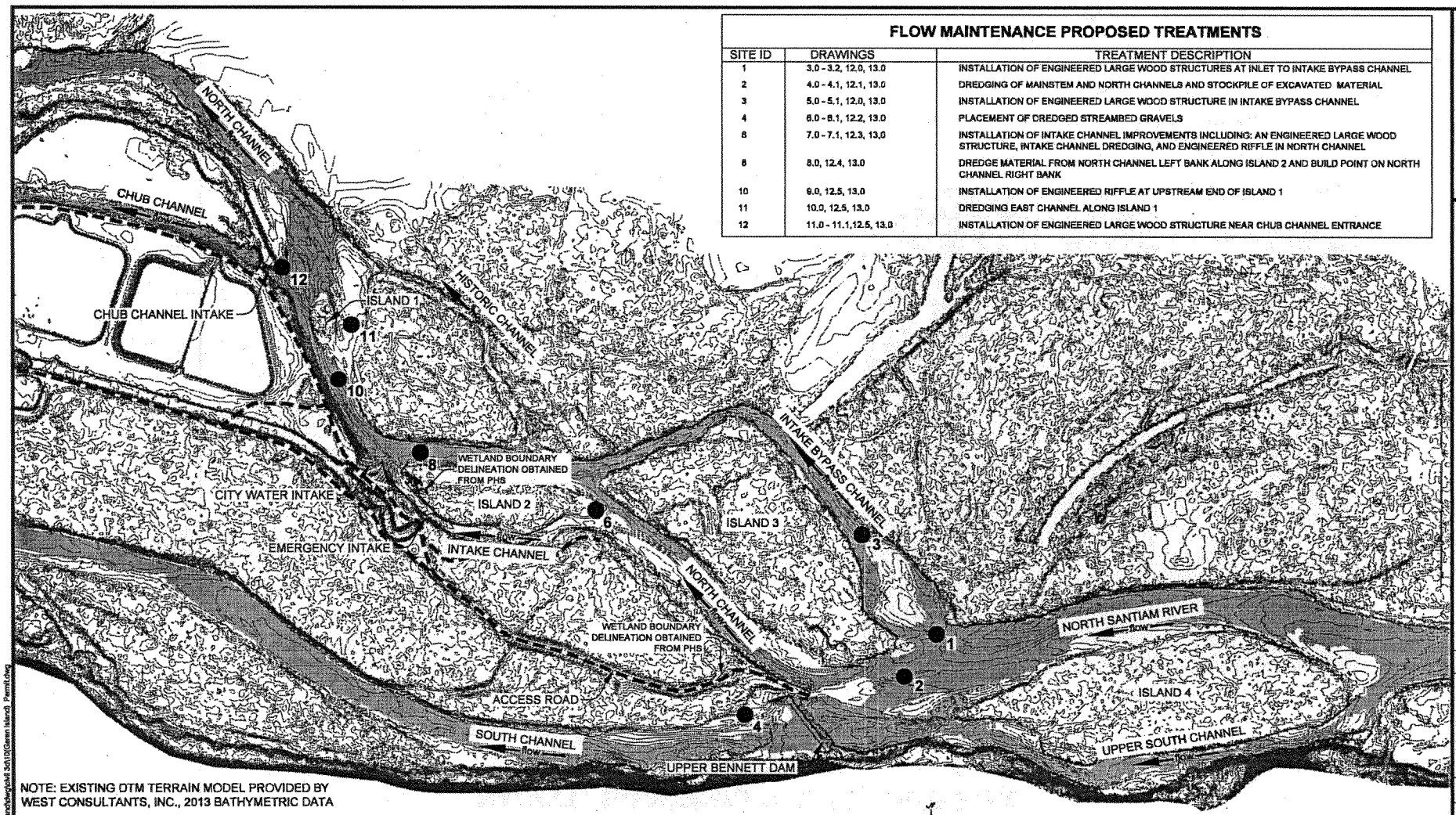
Drawing 1 of 29

M:\CAD-Data\2013\RDG-13-042 Geren Island\dwg\cd\ 3d\10\Geren Island\ Permit.dwg

NWP-2014-195

FLOW MAINTENANCE PROPOSED TREATMENTS

SITE ID	DRAWINGS	TREATMENT DESCRIPTION
1	3.0 - 3.2, 12.0, 13.0	INSTALLATION OF ENGINEERED LARGE WOOD STRUCTURES AT INLET TO INTAKE BYPASS CHANNEL
2	4.0 - 4.1, 12.1, 13.0	DREDGING OF MAINSTEM AND NORTH CHANNELS AND STOCKPILE OF EXCAVATED MATERIAL
3	5.0 - 5.1, 12.0, 13.0	INSTALLATION OF ENGINEERED LARGE WOOD STRUCTURE IN INTAKE BYPASS CHANNEL
4	6.0 - 6.1, 12.2, 13.0	PLACEMENT OF DREDGED STREAMBED GRAVELS
6	7.0 - 7.1, 12.3, 13.0	INSTALLATION OF INTAKE CHANNEL IMPROVEMENTS INCLUDING: AN ENGINEERED LARGE WOOD STRUCTURE, INTAKE CHANNEL DREDGING, AND ENGINEERED RIFFLE IN NORTH CHANNEL
8	8.0, 12.4, 13.0	DREDGE MATERIAL FROM NORTH CHANNEL LEFT BANK ALONG ISLAND 2 AND BUILD POINT ON NORTH CHANNEL RIGHT BANK
10	9.0, 12.5, 13.0	INSTALLATION OF ENGINEERED RIFFLE AT UPSTREAM END OF ISLAND 1
11	10.0, 12.5, 13.0	DREDGING EAST CHANNEL ALONG ISLAND 1
12	11.0 - 11.1,12.5, 13.0	INSTALLATION OF ENGINEERED LARGE WOOD STRUCTURE NEAR CHUB CHANNEL ENTRANCE



NOTE: EXISTING DTM TERRAIN MODEL PROVIDED BY WEST CONSULTANTS, INC., 2013 BATHYMETRIC DATA

1 **EXISTING CONDITIONS**
EXISTING 1' CONTOURS
1" = 400'

REACH CHARACTERISTICS

DRAINAGE AREA	654 SQ. MILES
2-YEAR FLOW	19,400 cfs
5-YEAR FLOW	25,000 cfs
10-YEAR FLOW	29,600 cfs
50-YEAR FLOW	44,000 cfs
100-YEAR FLOW	54,000 cfs
IN WATER WORK PERIOD	JULY 15 - AUGUST 31

DRAFT PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

EXISTING CONDITIONS & PROJECT KEY

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
-	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER RDG-13-042

DRAWING NUMBER 1.1

Drawing 2 of 29

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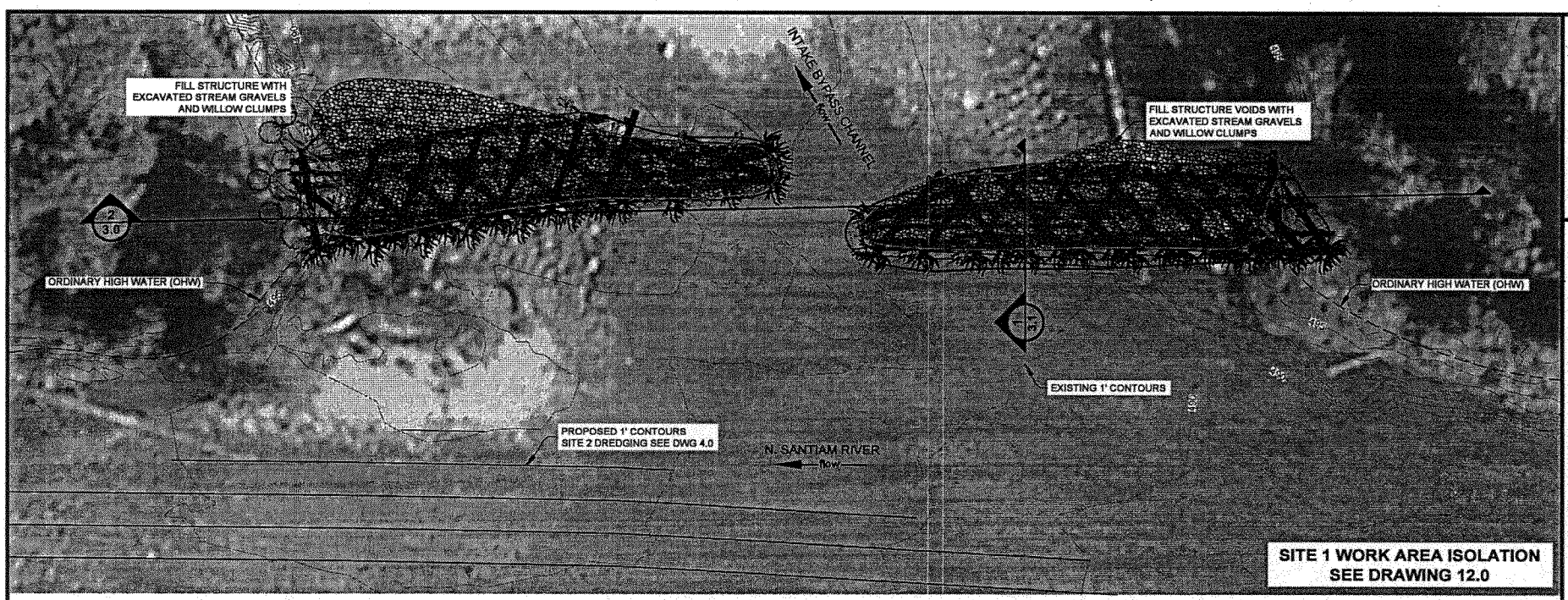
NWP-2014-195

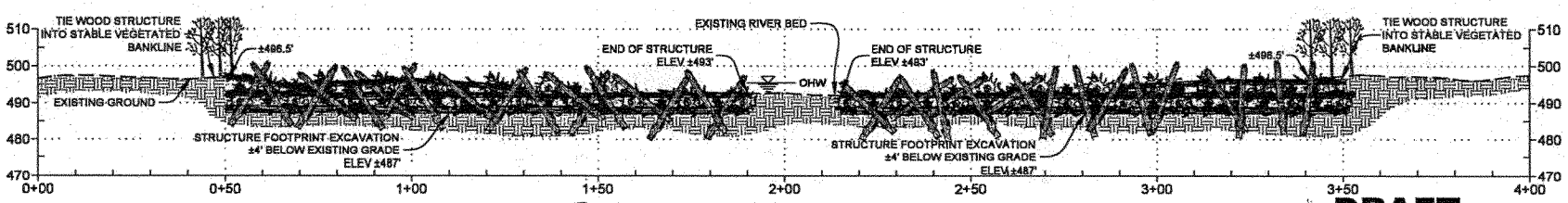
OVERALL SITE ACCESS AND STAGING
GEREN ISLAND FLOW MAINTENANCE PROJECT
NORTH SANTIAM RIVER, OREGON
RIVER DESIGN GROUP, INC.
DRAFT
PERMIT DRAWINGS
SITE ACCESS AND STAGING
EXISTING 1' CONTOURS
1" = 50'
2.0

NWP-2014-195



1 **SITE 1 LAYOUT**

1" = 30'



2 **INLET BYPASS SECTION**

HORIZ 1" = 30'
VERT 1" = 30'

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PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5038 Hwy 93 South
Whitefish, MT 59937
406.862.4927
511 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 1 WOOD STRUCTURES

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
•	12/09/13	RB	DRAFT PERMIT	

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
3.0

Drawing 4 of 29

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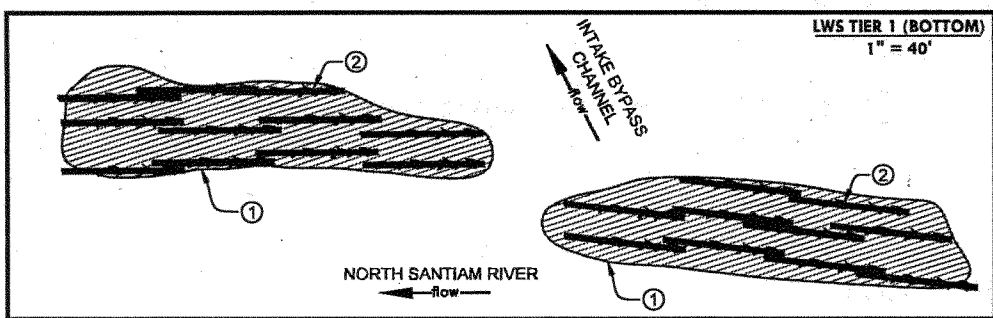
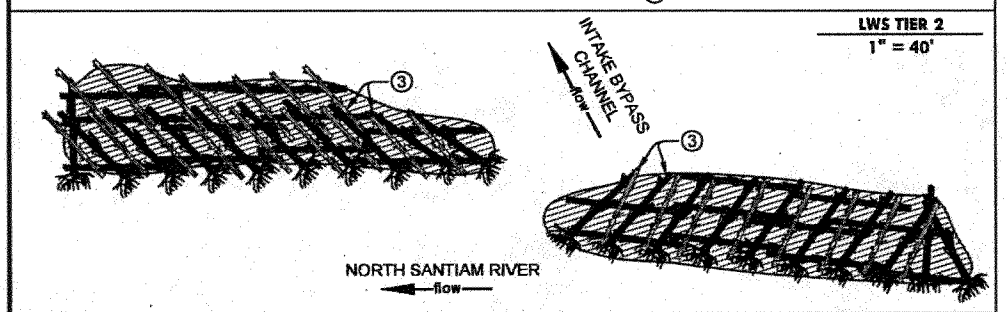
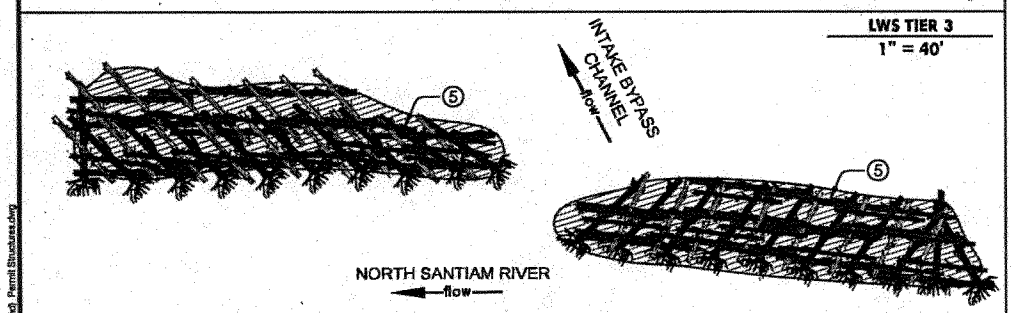
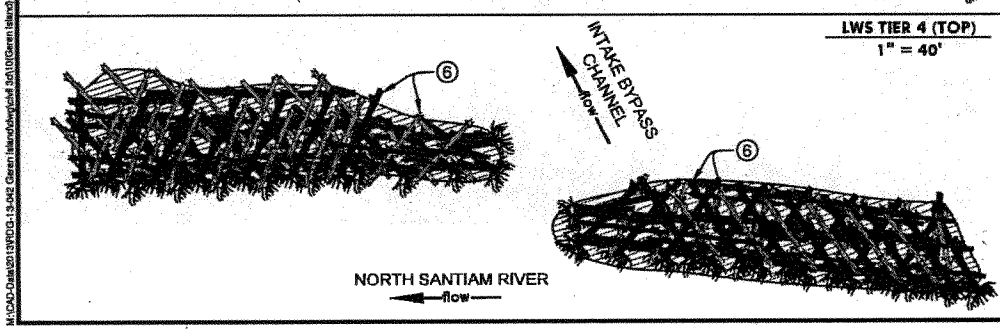
NWP-2014-195



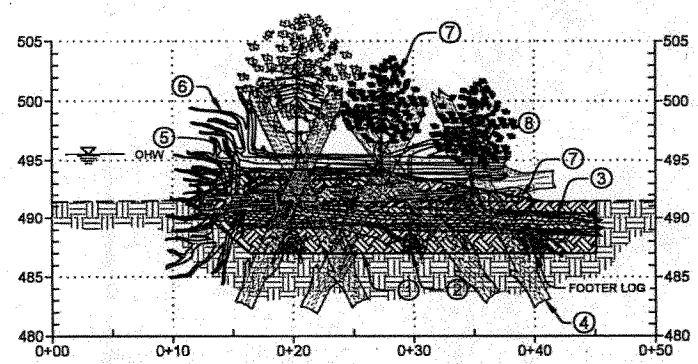






CONSTRUCTION NOTES

1. EXCAVATE LOG STRUCTURE FOOTPRINT TO SPECIFIED DESIGN ELEVATIONS. STAGE EXCAVATED BOULDERS AND MATERIAL NEARBY AND OUTSIDE OF MOVING WATER. EXCAVATED MATERIAL WILL BE USED TO BACKFILL STRUCTURE AND AS BALLAST FOR LARGE WOOD.
2. PLACE LONGITUDINAL LARGE WOOD BASE MEMBERS (TIER 1) IN STRUCTURE FOUNDATION FOOTPRINT. WEDGE LARGE WOOD BETWEEN BOULDERS IF PRESENT.
3. PLACE KEY MEMBERS (TIER 2) WITH AND WITHOUT ROOTWADS AND CONNECT TO BASE MEMBERS (TIER 1) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
4. WEAVE SMALL DIAMETER WOOD INTO BASE MEMBERS AND KEY MEMBERS AT VARIABLE VERTICAL ANGLES AND EXTEND TO TOP OF LOG STRUCTURE. WOOD TO BE PUSHED INTO UNDISTURBED GROUND BELOW EXCAVATED FOOTPRINT. WOOD TO BE CUT IF NECESSARY SO AS TO NOT EXTEND MORE THAN 5' ABOVE TOP OF STRUCTURE. ALL SAWED ENDS SHALL BE ROUGHENED AND BROKEN.
5. PLACE KEY MEMBERS (TIER 3) AND CONNECT TO BASE MEMBERS (TIER 1) AND KEY MEMBERS (TIER 2) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
6. PLACE TOP MEMBERS (TIER 4) WITH AND WITHOUT RODTWADS AND CONNECT TO KEY MEMBERS (TIER 2 & 3) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
7. PLACE BALLAST BOULDERS WITHIN STRUCTURE CONSISTING OF 3 FT DIAMETER BOULDERS. PLACE A MINIMUM OF 4 BOULDERS PER PIECE OF LARGE WOOD EXCLUDING SMALL DIAMETER WOOD PIECES. BACKFILL IN AND AROUND STRUCTURE WITH GRAVELS AND COBBLES EXCAVATED FROM THE STRUCTURE FOOTPRINT. BACKFILL SHALL BE WASHED INTO THE LARGE WOOD OPENING TO ENSURE ADEQUATE BALLAST. NEARBY CLUMP PLANTINGS OF WILLOW AND OTHER REPARIAN PLANTS SHALL BE SECURED AND PLACED WITHIN THE BACKFILL AREAS AT A MINIMUM OF 1 CLUMP PLANT EVERY 10 FEET THROUGHOUT THE STRUCTURE.
8. ANCHOR LARGE WOOD MEMBERS TOGETHER USING 1" DIAMETER ALL-THREAD ROD AT A MINIMUM OF 2 LOCATIONS FOR EACH PIECE OF LARGE WOOD. UTILIZE 1" DIAMETER ASTM A449 WITH 4" O.D. HEAVY PLATE WASHERS AND NUTS (A563B HEX HEAD NUT). ROD SHALL BE CUT FLUSH WITH NUT HEAD AFTER TIGHTENED AND EXPOSED END SHALL BE PAINTED WITH BROWN, RUST INHIBITING ALL WEATHER PAINT.



1 LWS SECTION

HORIZ 1" = 10'
VERT 1" = 10'

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RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 1 STRCUTURES DETAILS

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
•	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
3.1

Drawing 5 of 29

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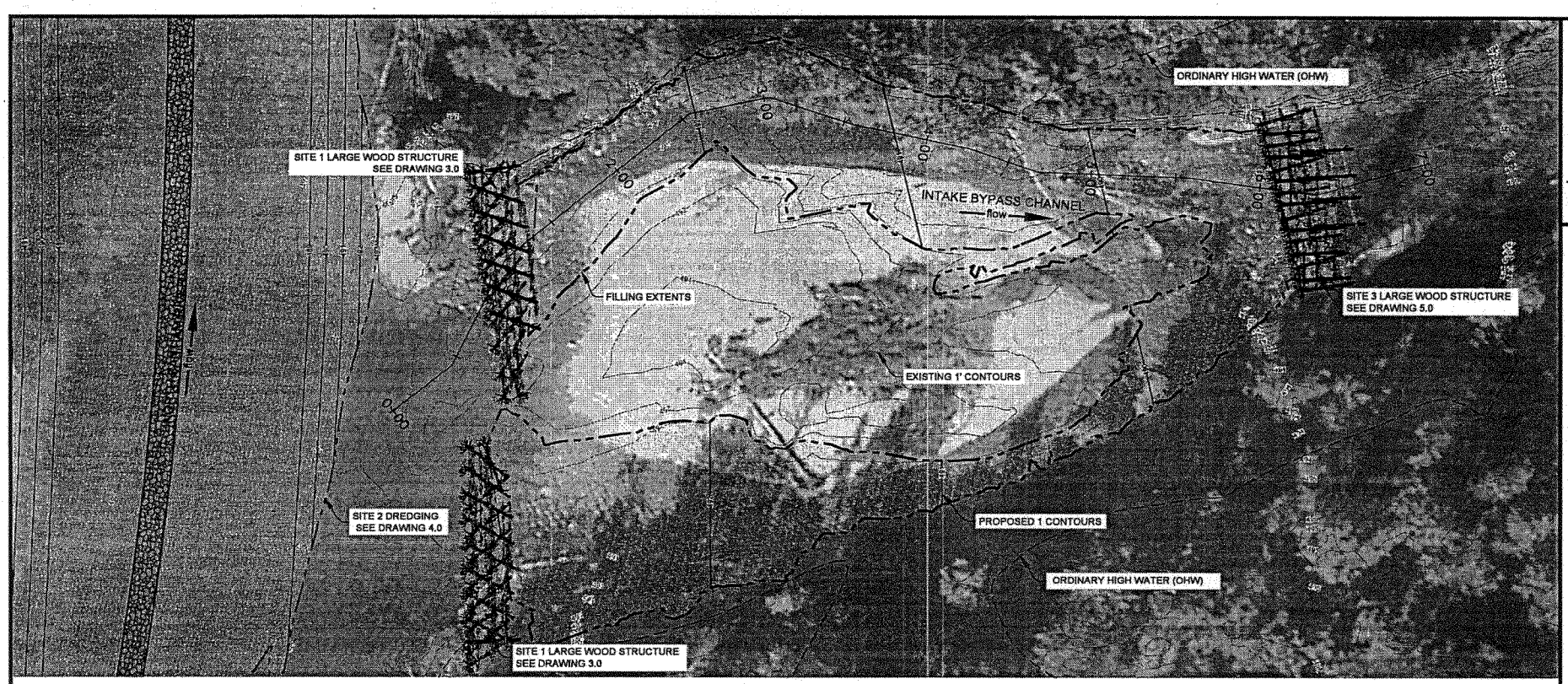
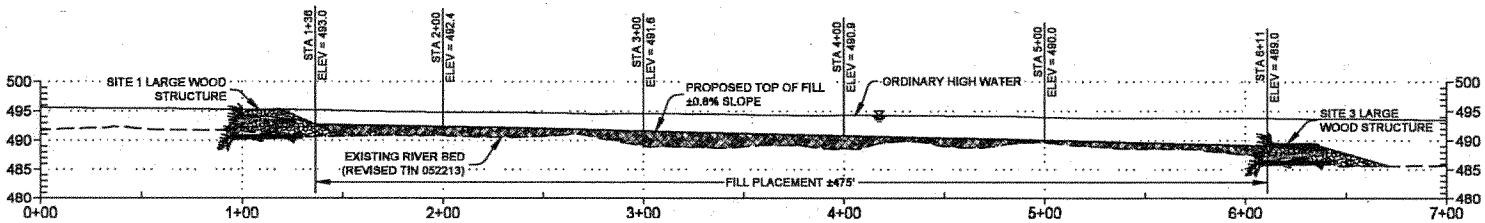
NWP-2014-195



APPROXIMATE FILL VOLUME = 2,820 CUBIC YARDS

1 SITE 1 TO 3 FILL LAYOUT

1" = 60'



2 SITE 1 TO 3 FILL PROFILE

HORIZ 1" = 60'
VERT 1" = 20'

DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5038 Hwy 99 South
Newberg, OR 97132
503.852.1027
311 SW Jefferson Avenue
Corvallis, OR 97333
541.752.3200

SITE 1 INTAKE BYPASS FILL

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
•	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
3.2

Drawing 8 of 29

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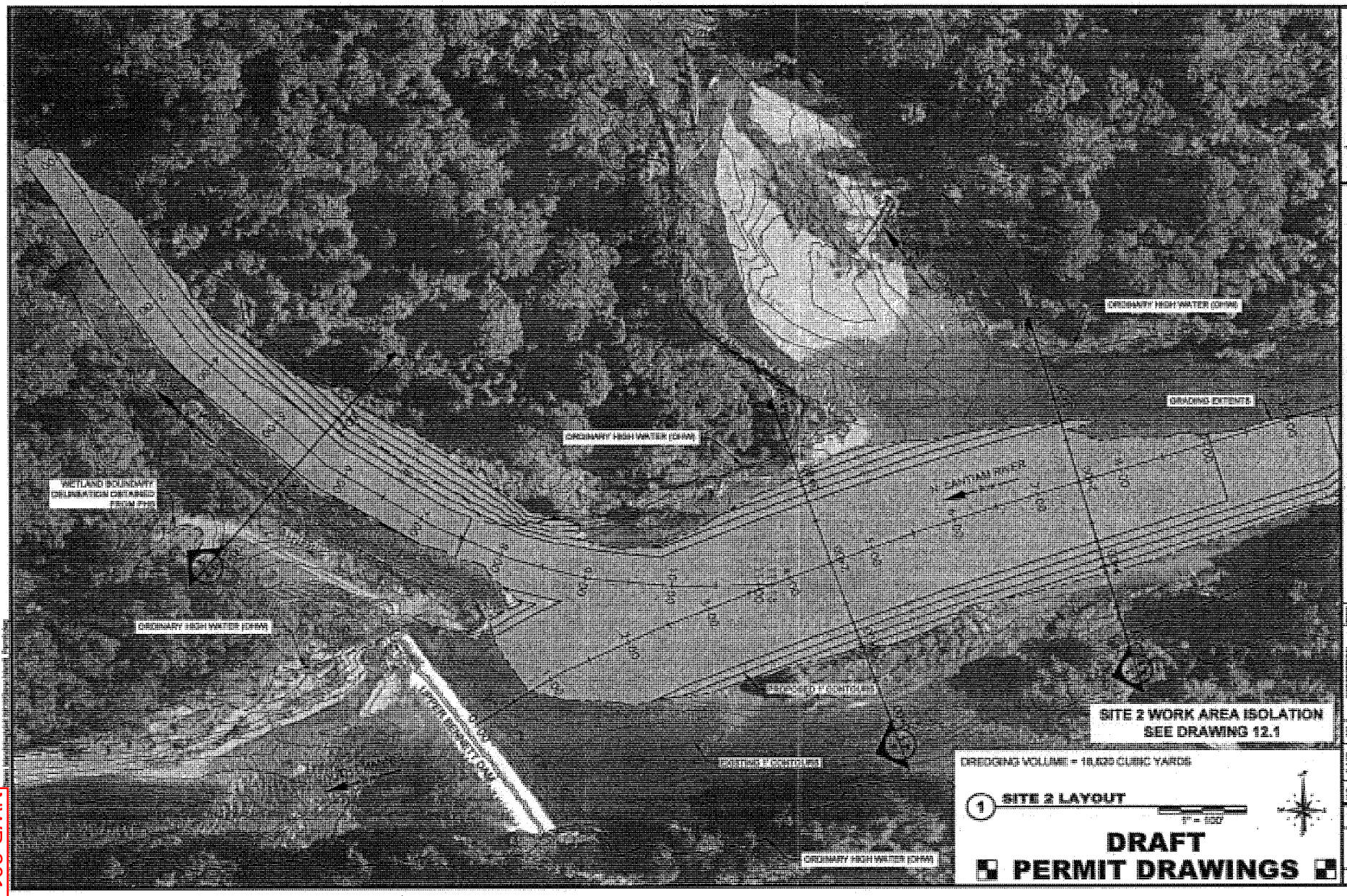
NWP-2014-195



RIVER DESIGN GROUP, INC.

SITE 2 LAYOUT

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
-	12/07/13	RB	DRAFT PERMIT	RW

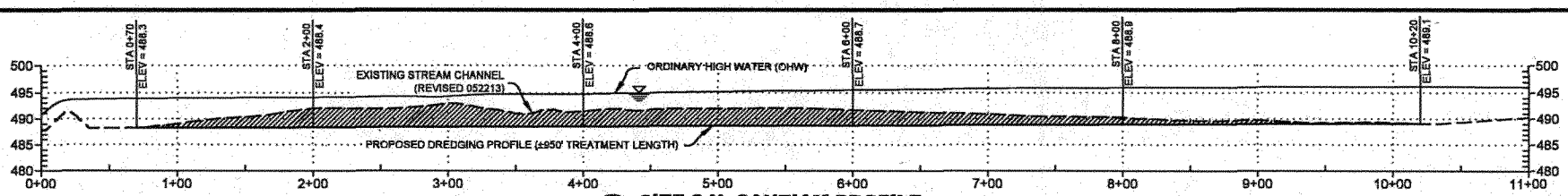
PROJECT NUMBER

DRAWING NUMBER

4.0

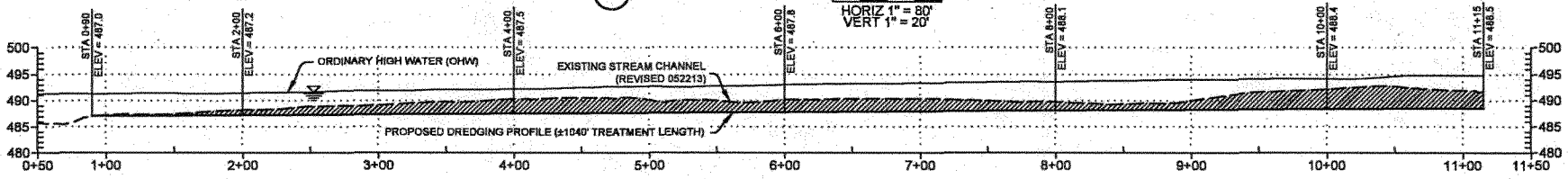
Drawing 7 of 29

NWP-2014-195



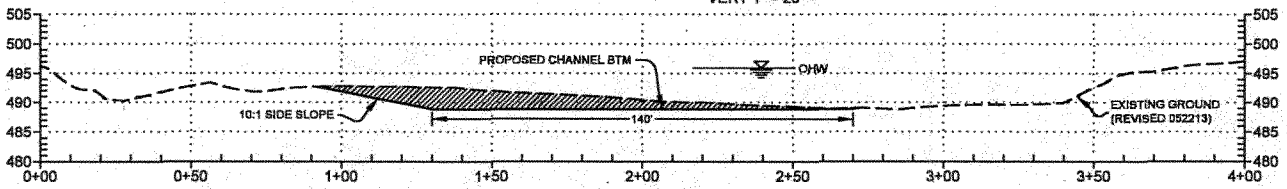
1 SITE 2 N. SANTIAM PROFILE

HORIZ 1" = 80'
VERT 1" = 20'



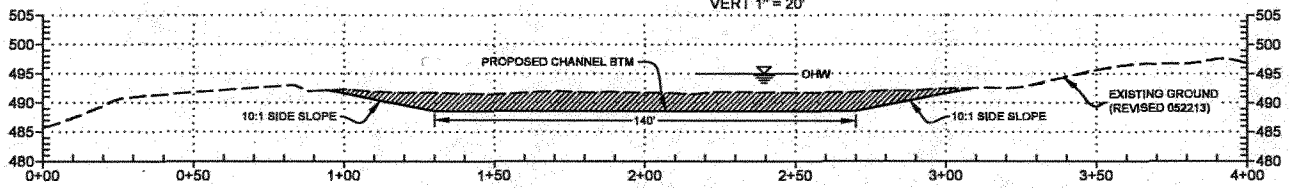
2 SITE 2 N. CHANNEL PROFILE

HORIZ 1" = 80'
VERT 1" = 20'



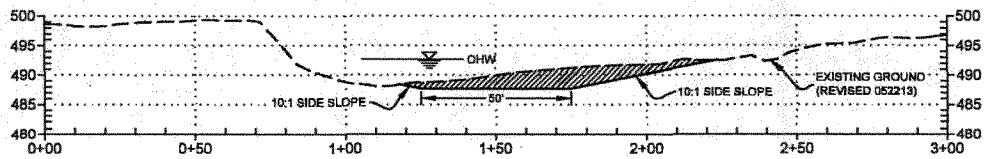
3 N. SANTIAM SECTION STA 7+50

HORIZ 1" = 40'
VERT 1" = 20'



4 N. SANTIAM SECTION STA 4+50

HORIZ 1" = 40'
VERT 1" = 20'



5 N. CHANNEL SECTION STA 5+50

HORIZ 1" = 40'
VERT 1" = 20'

DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2820

SITE 2 SECTIONS

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
-	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
4.1

Drawing 8 of 29

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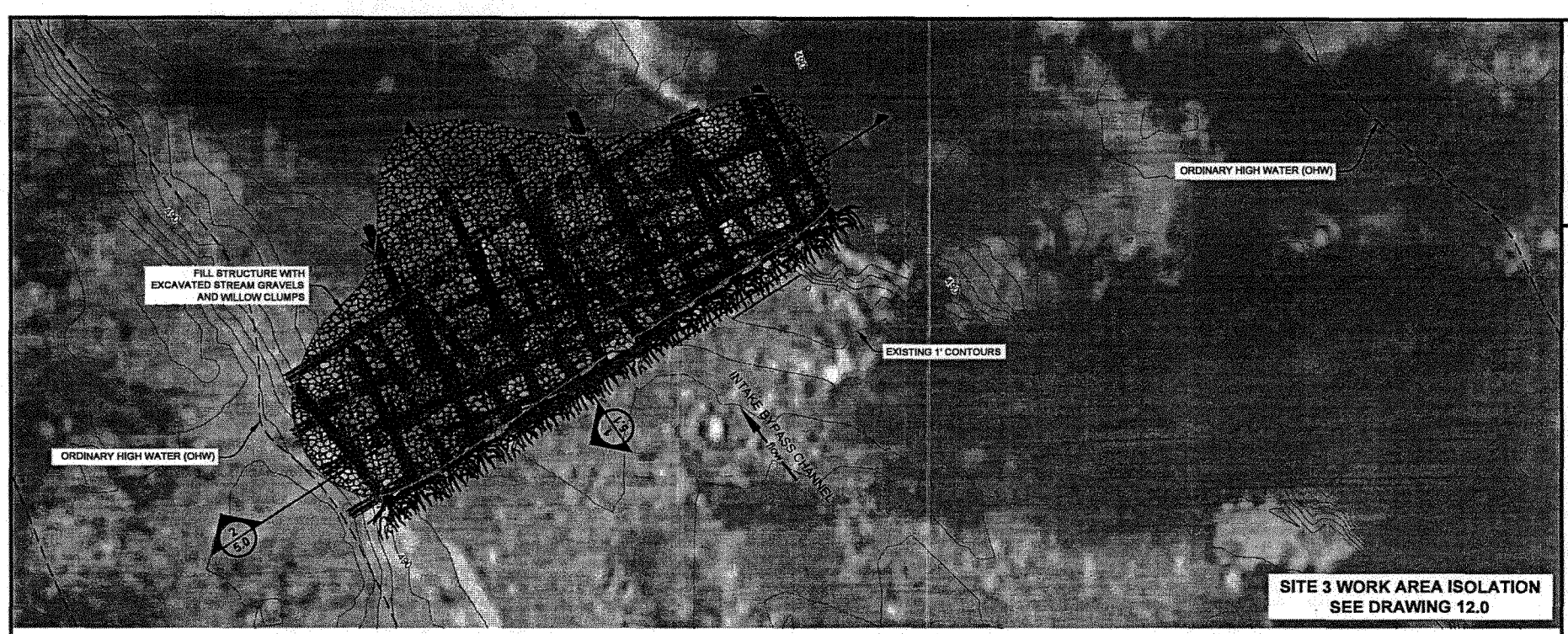
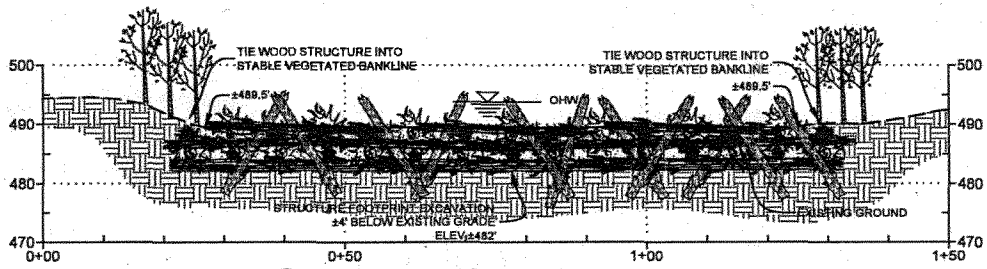
NWP-2014-195



1 SITE 3 LAYOUT

1" = 20'



2 INLET BYPASS SECTION

HORIZ 1" = 20'
VERT 1" = 20'

DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 3 WOOD STRUCTURE

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
•	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
5.0

Drawing 9 of 29

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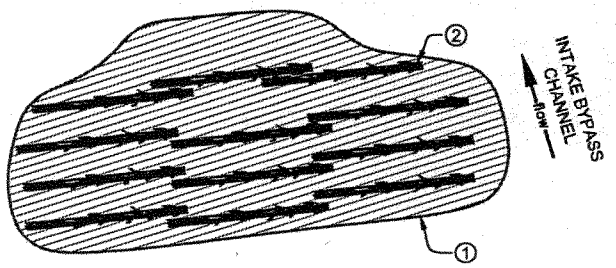
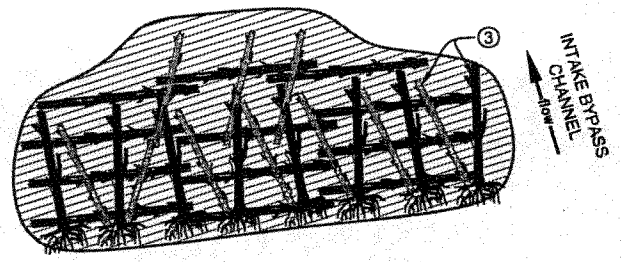
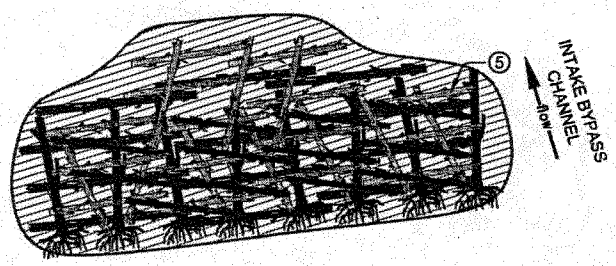
NWP-2014-195

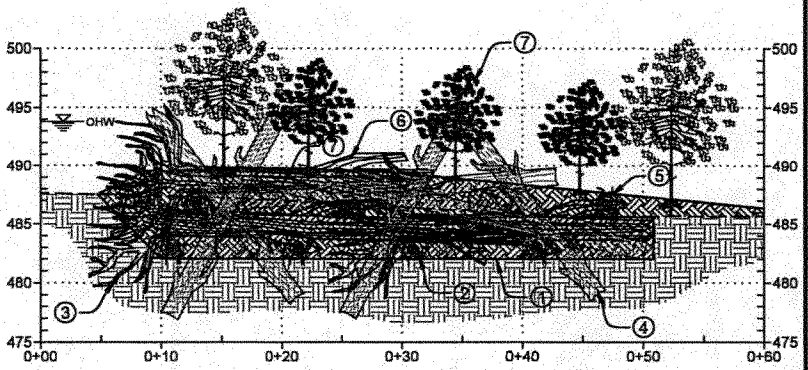






CONSTRUCTION NOTES

1. EXCAVATE LOG STRUCTURE FOOTPRINT TO SPECIFIED DESIGN ELEVATIONS. STAGE EXCAVATED BOULDERS AND MATERIAL NEARBY AND OUTSIDE OF MOVING WATER. EXCAVATED MATERIAL WILL BE USED TO BACKFILL STRUCTURE AND AS BALLAST FOR LARGE WOOD.
2. PLACE LONGITUDINAL LARGE WOOD BASE MEMBERS (TIER 1) IN STRUCTURE FOUNDATION FOOTPRINT. WEDGE LARGE WOOD BETWEEN BOULDERS IF PRESENT.
3. PLACE KEY MEMBERS (TIER 2) WITH AND WITHOUT ROOTWADS AND CONNECT TO BASE MEMBERS (TIER 1) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
4. WEAVE SMALL DIAMETER WOOD INTO BASE MEMBERS AND KEY MEMBERS AT VARIABLE VERTICAL ANGLES AND EXTEND TO TOP OF LOG STRUCTURE. WOOD TO BE PUSHED INTO UNDISTURBED GROUND BELOW EXCAVATED FOOTPRINT. WOOD TO BE CUT IF NECESSARY SO AS TO NOT EXTEND MORE THAN 5' ABOVE TOP OF STRUCTURE. ALL SAWED ENDS SHALL BE ROUGHENED AND BROKEN.
5. PLACE KEY MEMBERS (TIER 3) AND CONNECT TO BASE MEMBERS (TIER 1) AND KEY MEMBERS (TIER 2) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
6. PLACE TOP MEMBERS (TIER 4) WITH AND WITHOUT ROOTWADS AND CONNECT TO KEY MEMBERS (TIER 2 & 3) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
7. PLACE BALLAST BOULDERS WITHIN STRUCTURE CONSISTING OF 3 FT DIAMETER BOULDERS. PLACE A MINIMUM OF 4 BOULDERS PER PIECE OF LARGE WOOD EXCLUDING SMALL DIAMETER WOOD PIECES. BACKFILL IN AND AROUND STRUCTURE WITH GRAVELS AND COBBLES EXCAVATED FROM THE STRUCTURE FOOTPRINT. BACKFILL SHALL BE WASHED INTO THE LARGE WOOD OPENING TO ENSURE ADEQUATE BALLAST. NEARBY CLUMP PLANTINGS OF WILLOW AND OTHER RIPARIAN PLANTS SHALL BE SECURED AND PLACED WITHIN THE BACKFILL AREAS AT A MINIMUM OF 1 CLUMP PLANT EVERY 10 FEET THROUGHOUT THE STRUCTURE.
8. ANCHOR LARGE WOOD MEMBERS TOGETHER USING 1" DIAMETER ALL-THREAD ROD AT A MINIMUM OF 2 LOCATIONS FOR EACH PIECE OF LARGE WOOD. UTILIZE 1" DIAMETER ASTM A449 WITH 4" O.D. HEAVY PLATE WASHERS AND NUTS (A563B HEX HEAD NUT). ROD SHALL BE CUT FLUSH WITH NUT HEAD AFTER TIGHTENED AND EXPOSED END SHALL BE PAINTED WITH BROWN, RUST INHIBITING ALL WEATHER PAINT.



1 LWS SECTION

HORIZ 1" = 10'
VERT 1" = 10'

DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5508 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 3 STRUCTURE DETAILS

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
5.1

Drawing 10 of 29

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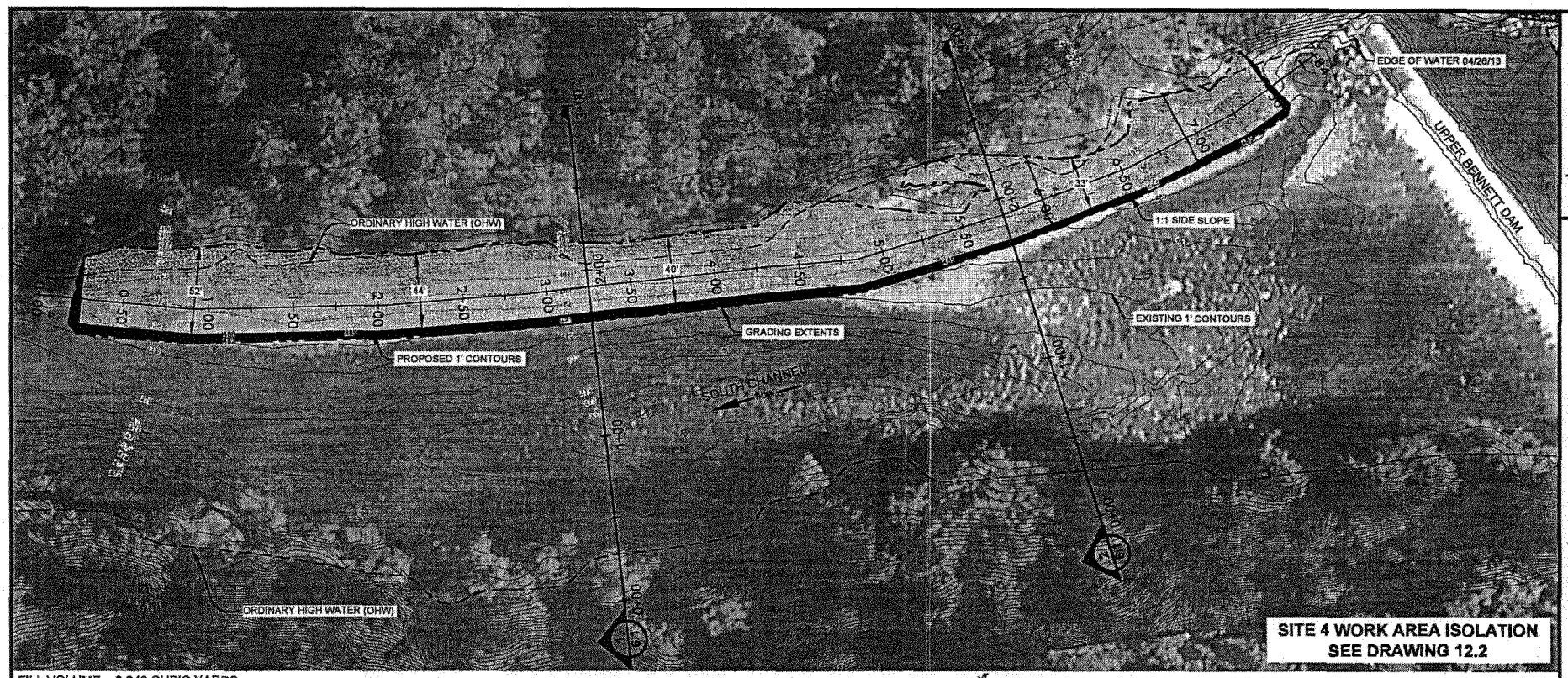
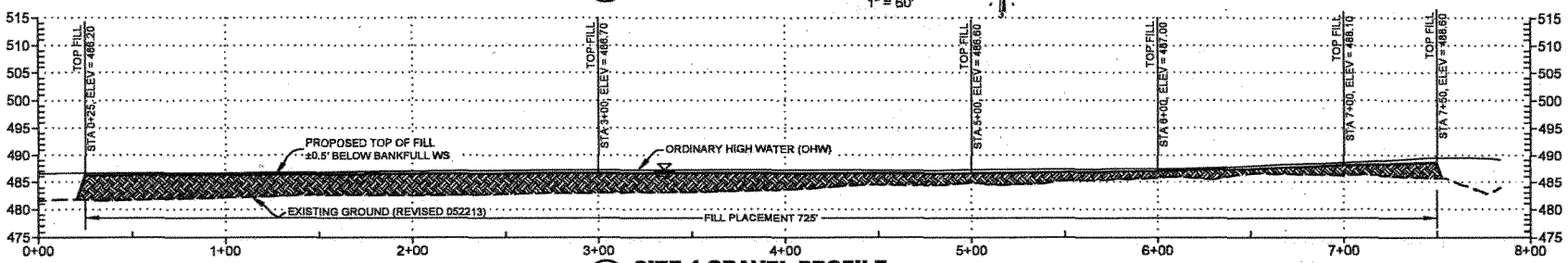
NWP-2014-195



FILL VOLUME = 3,240 CUBIC YARDS

1 SITE 4 GRAVEL LAYOUT

1" = 60'



2 SITE 4 GRAVEL PROFILE

HORIZ 1" = 60'
VERT 1" = 20'

DRAFT PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 4 LAYOUT

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER RDG-13-042

DRAWING NUMBER 6.0

Drawing 11 of 29

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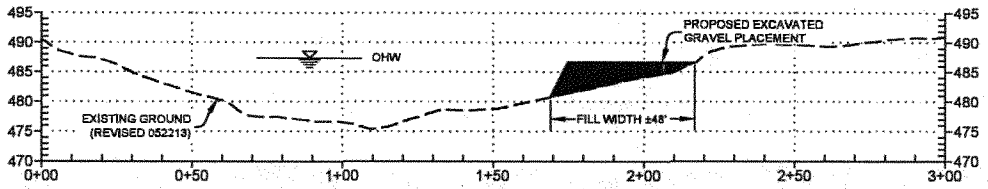
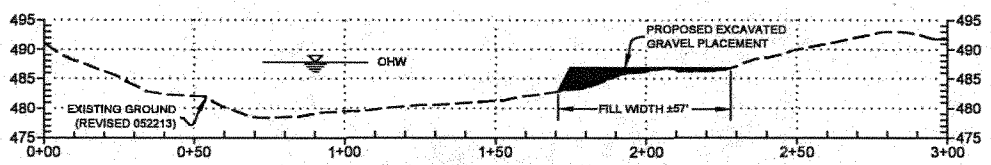
NWP-2014-195



1 **CHANNEL SECTION STA 3+25**

HORIZ 1" = 40'
VERT 1" = 20'



2 **CHANNEL SECTION STA 5+75**

HORIZ 1" = 40'
VERT 1" = 20'

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PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 4 SECTIONS

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
6.1

Drawing 12 of 29

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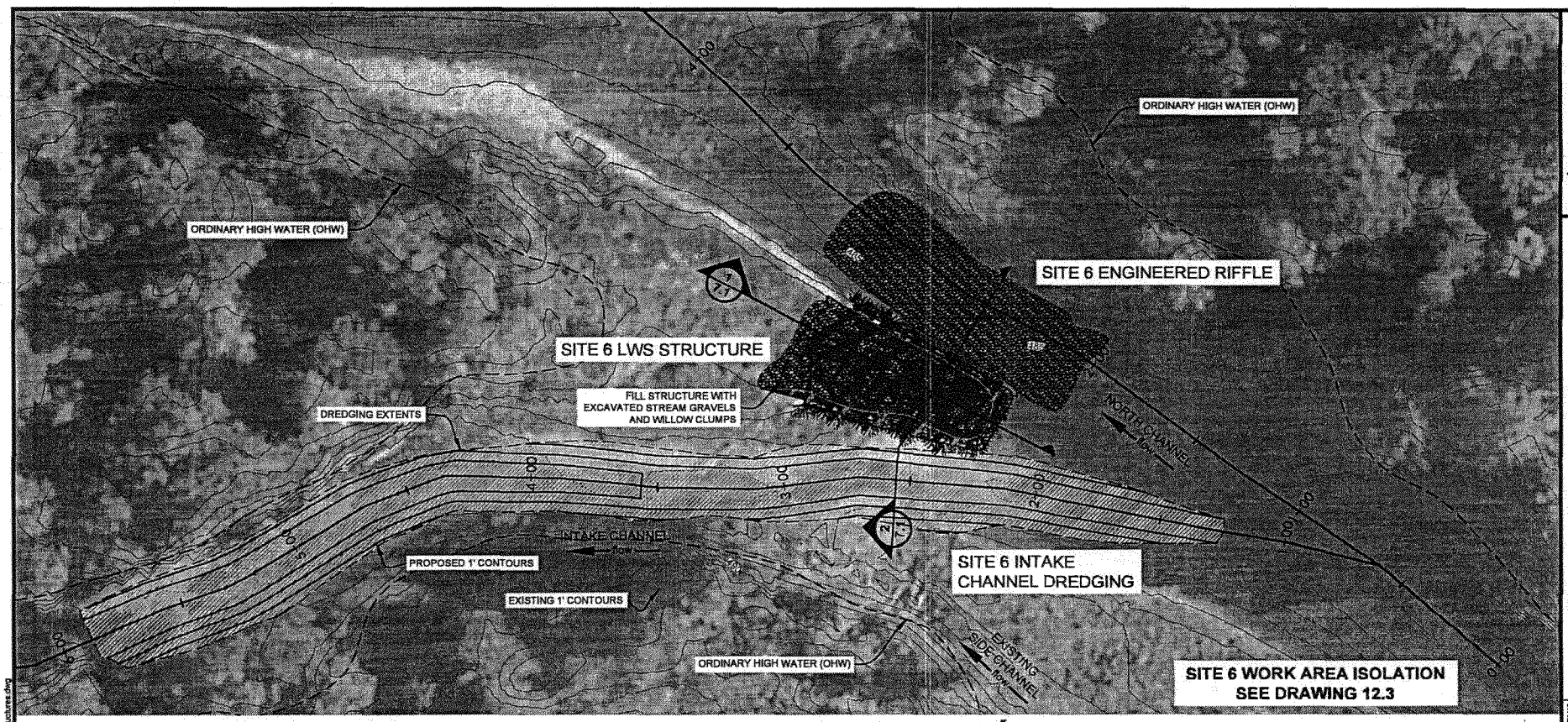

DREDGING VOLUME = 610 CUBIC YARDS

1 SITE 6 LAYOUT

1" = 40'

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 6 LAYOUT

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
-	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER RDG-13-042

DRAWING NUMBER 7.0

Drawing 13 of 29

DRAFT PERMIT DRAWINGS

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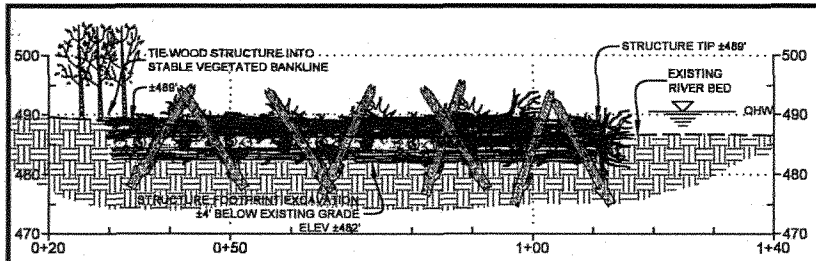
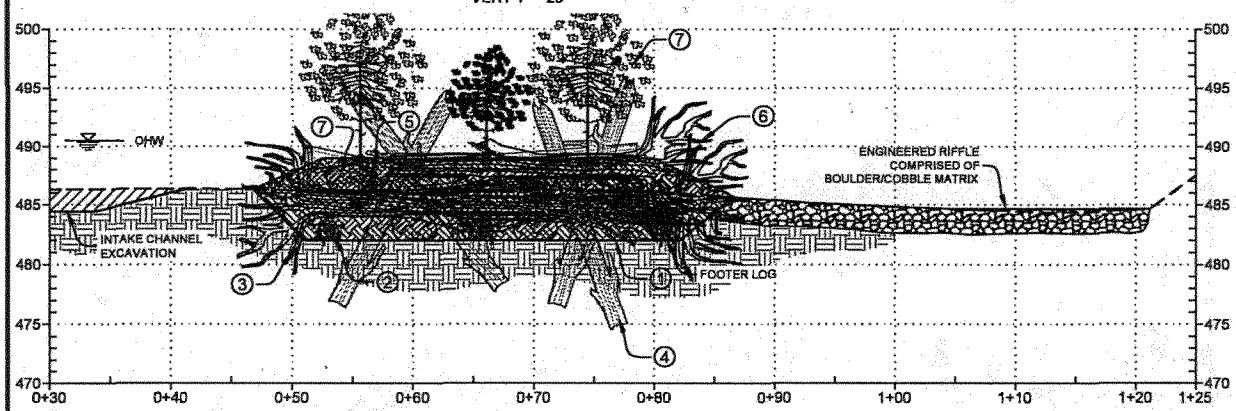
NWP-2014-195



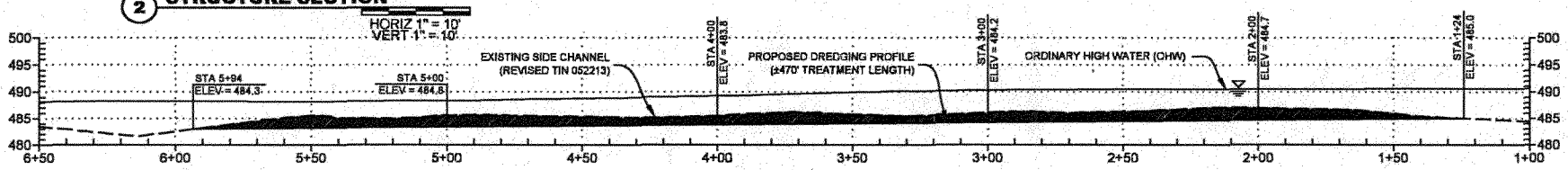
1 STRUCTURE PROFILE

HORIZ 1" = 20'
VERT 1" = 20'



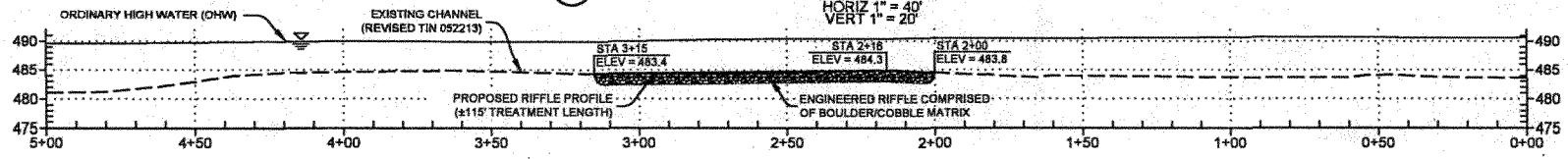
2 STRUCTURE SECTION

HORIZ 1" = 10'
VERT 1" = 10'



3 INTAKE DREDGING PROFILE

HORIZ 1" = 40'
VERT 1" = 20'



4 N. CHANNEL RIFFLE PROFILE

HORIZ 1" = 40'
VERT 1" = 20'

CONSTRUCTION NOTES

1. EXCAVATE LOG STRUCTURE FOOTPRINT TO SPECIFIED DESIGN ELEVATIONS. STAGE EXCAVATED BOULDERS AND MATERIAL NEARBY AND OUTSIDE OF MOVING WATER. EXCAVATED MATERIAL WILL BE USED TO BACKFILL STRUCTURE AND AS BALLAST FOR LARGE WOOD.
2. PLACE LONGITUDINAL LARGE WOOD BASE MEMBERS (TIER 1) IN STRUCTURE FOUNDATION FOOTPRINT. WEDGE LARGE WOOD BETWEEN BOULDERS IF PRESENT.
3. PLACE KEY MEMBERS (TIER 2) WITH AND WITHOUT ROOTWADS AND CONNECT TO BASE MEMBERS (TIER 1) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
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8. ANCHOR LARGE WOOD MEMBERS TOGETHER USING 1" DIAMETER ALL-THREAD ROD AT A MINIMUM OF 2 LOCATIONS FOR EACH PIECE OF LARGE WOOD. UTILIZE 1" DIAMETER ASTM A449 WITH 4" O.D. HEAVY PLATE WASHERS AND NUTS (A563B HEX HEAD NUT). ROD SHALL BE CUT FLUSH WITH NUT HEAD AFTER TIGHTENED AND EXPOSED END SHALL BE PAINTED WITH BROWN, RUST INHIBITING ALL WEATHER PAINT.

DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
311 SW Jefferson Avenue
Corvallis, OR 97333
541.758.3820
5598 Hwy 93 South
Victor, MT 59875
406.642.4427

SITE 6 SECTIONS

GEREN ISLAND FLOW MAINTENANCE PROJECT
NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
•	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER RDG-13-042

DRAWING NUMBER 7.1

Drawing 14 of 29

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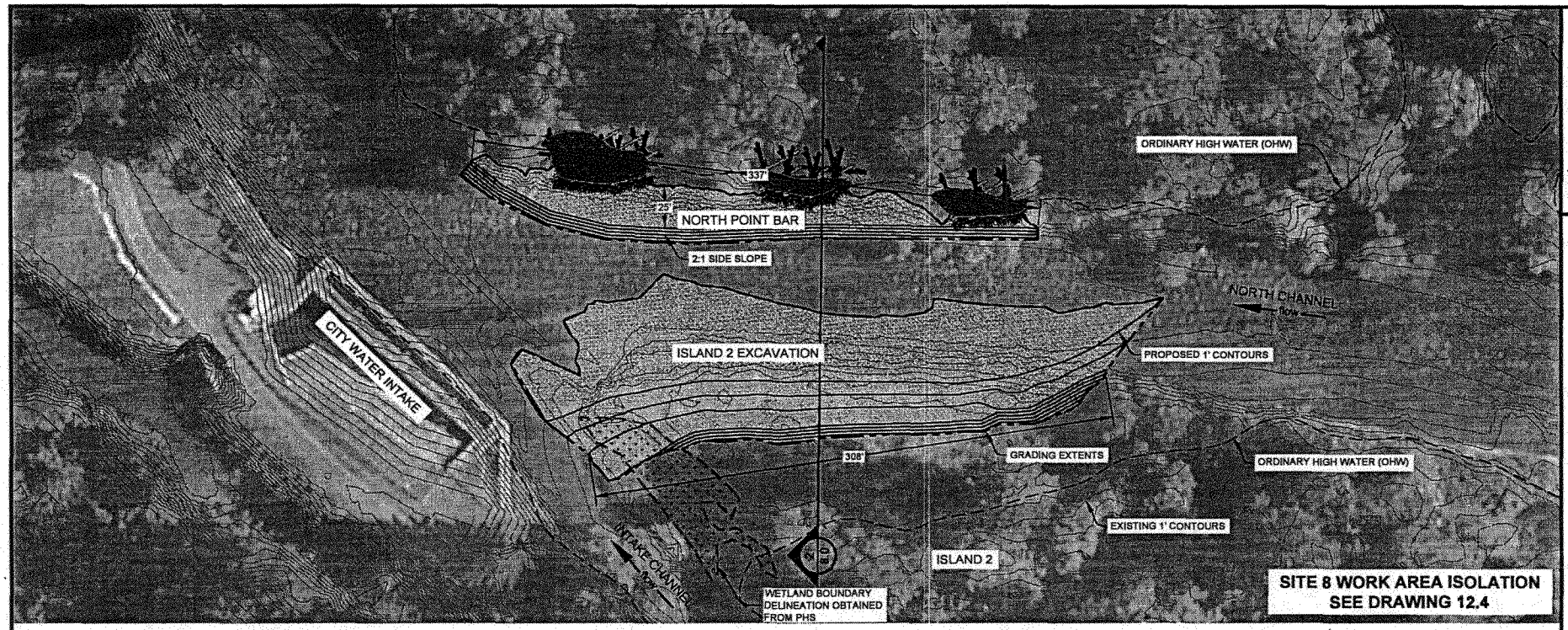
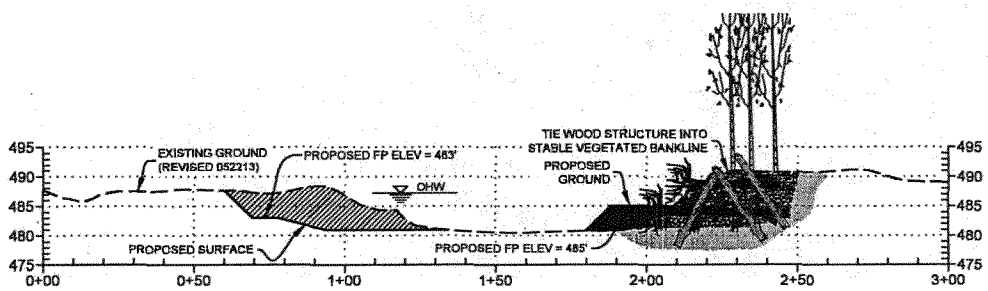
NWP-2014-195



NORTH POINT BAR FILL VOLUME = 845 CUBIC YARDS
ISLAND 2 EXCAVATION VOLUME = 2,700 CUBIC YARDS

1 **SITE 8 LAYOUT**

1" = 60'



2 **SITE 8 SECTION**

HORIZ 1" = 40'
VERT 1" = 20'

DRAFT PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 8 LAYOUT

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER RDG-13-042

DRAWING NUMBER 8.0

Drawing 15 of 29

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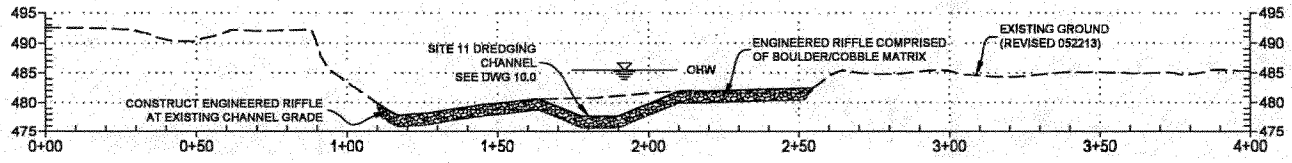
1 SITE 10 LAYOUT

1" = 40'



2 SITE 10 SECTION

HORIZ 1" = 40'
VERT 1" = 20'

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PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 10 LAYOUT

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
-	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
9.0

Drawing 18 of 29

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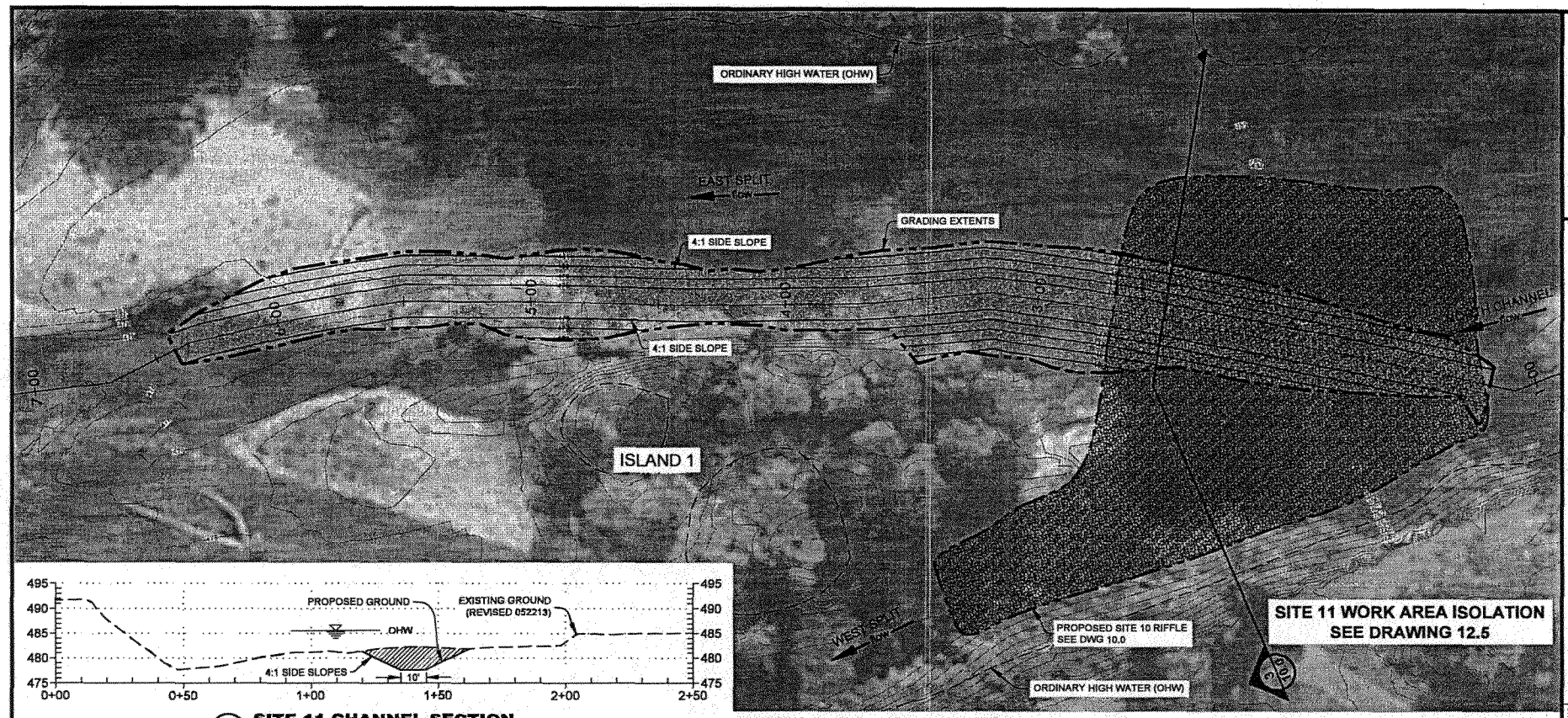
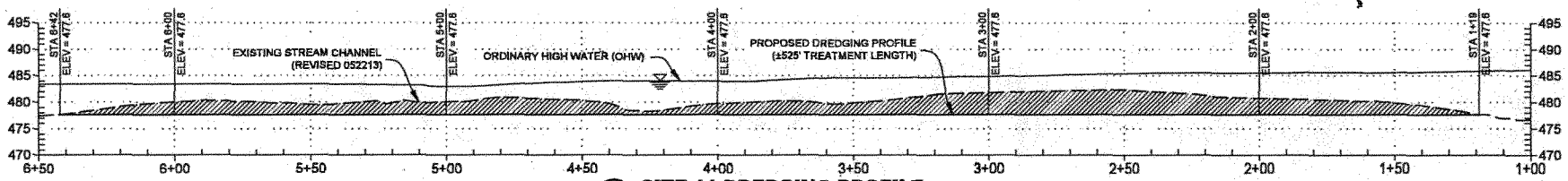
NWP-2014-195



DREDGING VOLUME = 1,220 CUBIC YARDS

3 **SITE 11 CHANNEL SECTION**
HORIZ 1" = 40'
VERT 1" = 20'

1 **SITE 11 LAYOUT**
1' CONTOURS
1" = 40'



2 **SITE 11 DREDGING PROFILE**
HORIZ 1" = 40'
VERT 1" = 20'

DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5089 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.752.5203

SITE 11 LAYOUT

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
•	12/09/13	RB	DRAFT PERMIT	SW

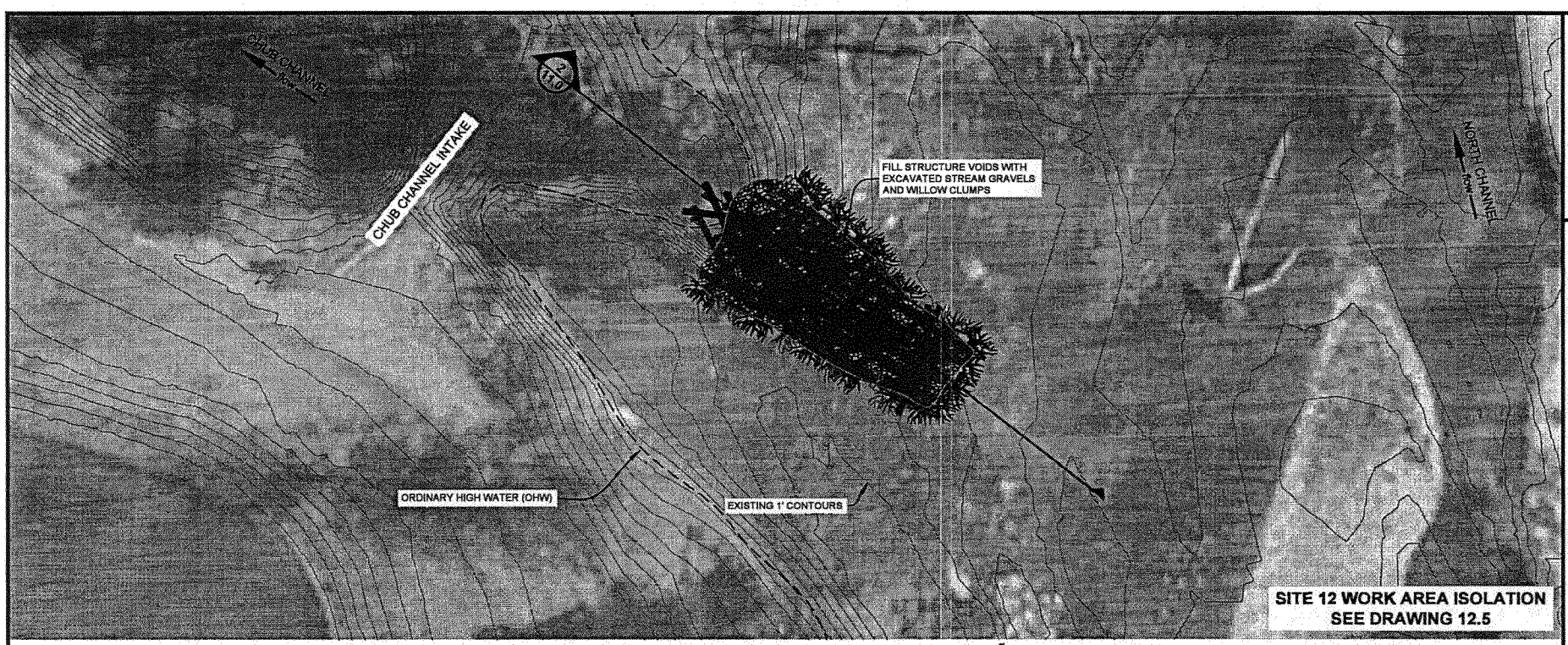
PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
10.0

Drawing 17 of 29

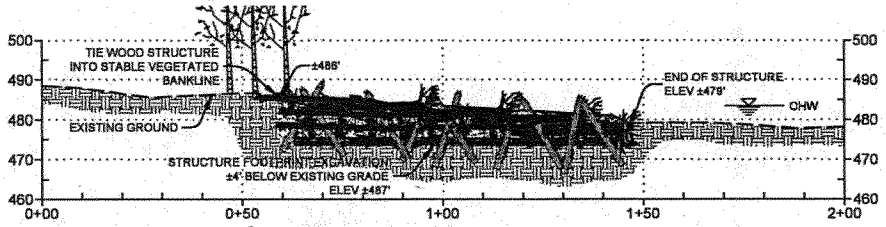
M:\CAD-Data\2013\RDG-13-042 Geren Island\dwg\dwf 3d\10(Geren Island) Permit.dwg

NWP-2014-195



1 SITE 12 LAYOUT

1" = 30'



2 STRUCTURE PROFILE

HORIZ 1" = 30'
VERT 1" = 30'

DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.3920

SITE 12 WOOD STRUCTURE

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

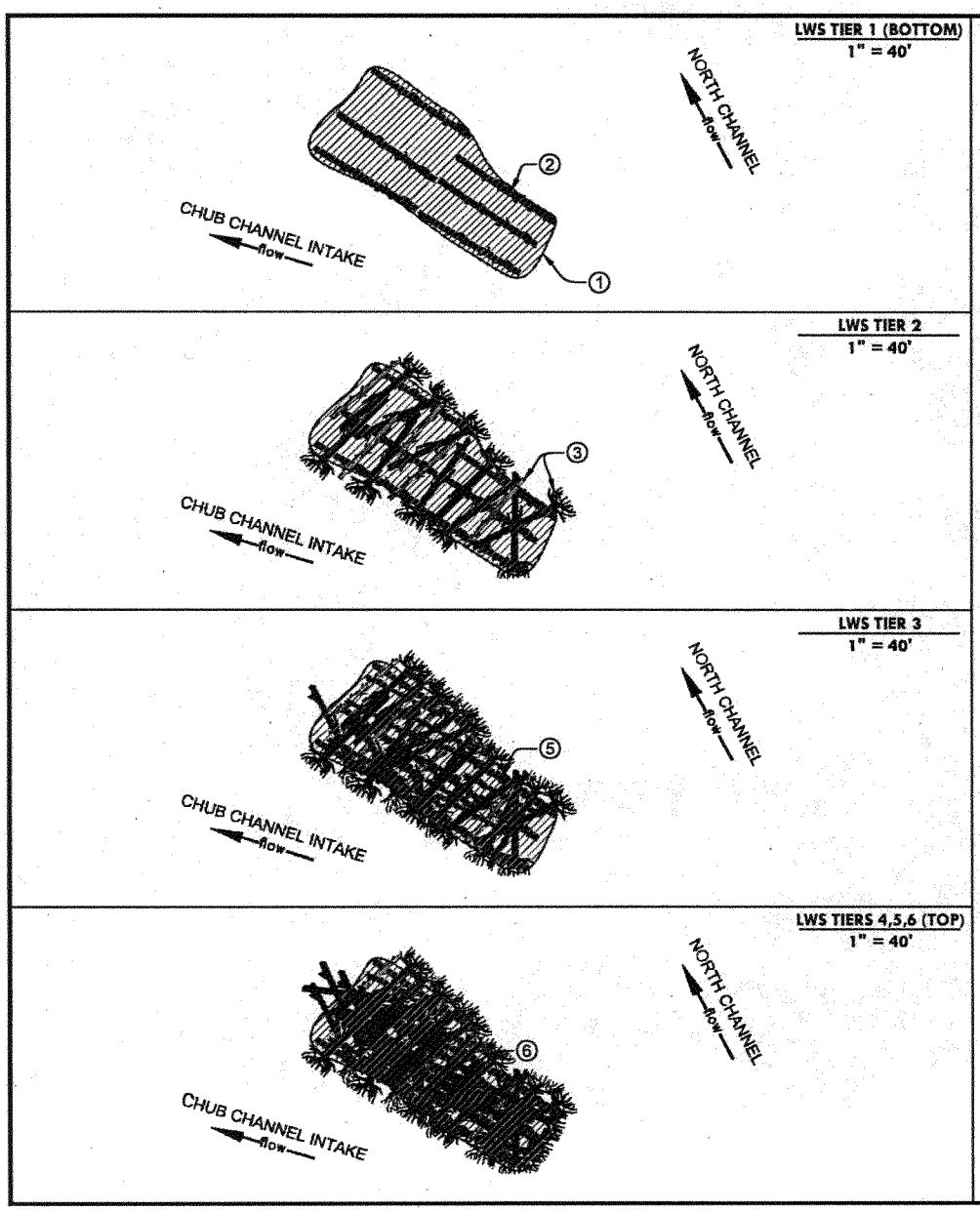
NO.	DATE	BY	DESCRIPTION	CHK
*	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
11.0

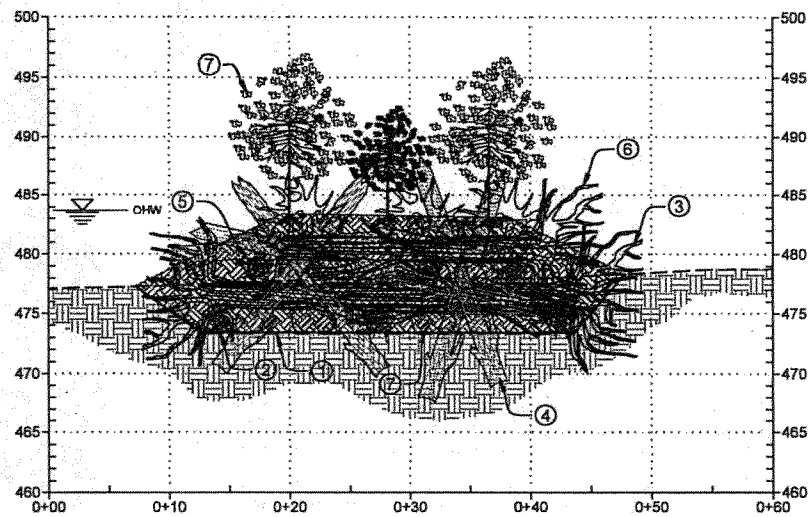
Drawing 18 of 29

NWP-2014-195



CONSTRUCTION NOTES

1. EXCAVATE LOG STRUCTURE FOOTPRINT TO SPECIFIED DESIGN ELEVATIONS. STAGE EXCAVATED BOULDERS AND MATERIAL NEARBY AND OUTSIDE OF MOVING WATER. EXCAVATED MATERIAL WILL BE USED TO BACKFILL STRUCTURE AND AS BALLAST FOR LARGE WOOD.
2. PLACE LONGITUDINAL LARGE WOOD BASE MEMBERS (TIER 1) IN STRUCTURE FOUNDATION FOOTPRINT. WEDGE LARGE WOOD BETWEEN BOULDERS IF PRESENT.
3. PLACE KEY MEMBERS (TIER 2) WITH AND WITHOUT ROOTWADS AND CONNECT TO BASE MEMBERS (TIER 1) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
4. WEAVE SMALL DIAMETER WOOD INTO BASE MEMBERS AND KEY MEMBERS AT VARIABLE VERTICAL ANGLES AND EXTEND TO TOP OF LOG STRUCTURE. WOOD TO BE PUSHED INTO UNDISTURBED GROUND BELOW EXCAVATED FOOTPRINT. WOOD TO BE CUT IF NECESSARY SO AS TO NOT EXTEND MORE THAN 5' ABOVE TOP OF STRUCTURE. ALL SAWED ENDS SHALL BE ROUGHENED AND BROKEN.
5. PLACE KEY MEMBERS (TIER 3) AND CONNECT TO BASE MEMBERS (TIER 1) AND KEY MEMBERS (TIER 2) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
6. PLACE TOP MEMBERS (TIERS 4-6) WITH AND WITHOUT ROOTWADS AND CONNECT TO KEY MEMBERS (TIER 2 & 3) WITH 1" DIAMETER ALL-THREAD ROD AS DESIGNATED IN CONSTRUCTION NOTE 8. EACH MEMBER SHALL BE CONNECTED IN AT LEAST 2 LOCATIONS.
7. PLACE BALLAST BOULDERS WITHIN STRUCTURE CONSISTING OF 3 FT DIAMETER BOULDERS. PLACE A MINIMUM OF 4 BOULDERS PER PIECE OF LARGE WOOD EXCLUDING SMALL DIAMETER WOOD PIECES. BACKFILL IN AND AROUND STRUCTURE WITH GRAVELS AND COBBLES EXCAVATED FROM THE STRUCTURE FOOTPRINT. BACKFILL SHALL BE WASHED INTO THE LARGE WOOD OPENING TO ENSURE ADEQUATE BALLAST. NEARBY CLUMP PLANTINGS OF WILLOW AND OTHER RIPARIAN PLANTS SHALL BE SECURED AND PLACED WITHIN THE BACKFILL AREAS AT A MINIMUM OF 1 CLUMP PLANT EVERY 10 FEET THROUGHOUT THE STRUCTURE.
8. ANCHOR LARGE WOOD MEMBERS TOGETHER USING 1" DIAMETER ALL-THREAD ROD AT A MINIMUM OF 2 LOCATIONS FOR EACH PIECE OF LARGE WOOD. UTILIZE 1" DIAMETER ASTM A449 WITH 4" O.D. HEAVY PLATE WASHERS AND NUTS (A563B HEX HEAD NUT). ROD SHALL BE CUT FLUSH WITH NUT HEAD AFTER TIGHTENED AND EXPOSED END SHALL BE PAINTED WITH BROWN, RUST INHIBITING ALL WEATHER PAINT.



DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

SITE 12 STRUCTURE DETAILS

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

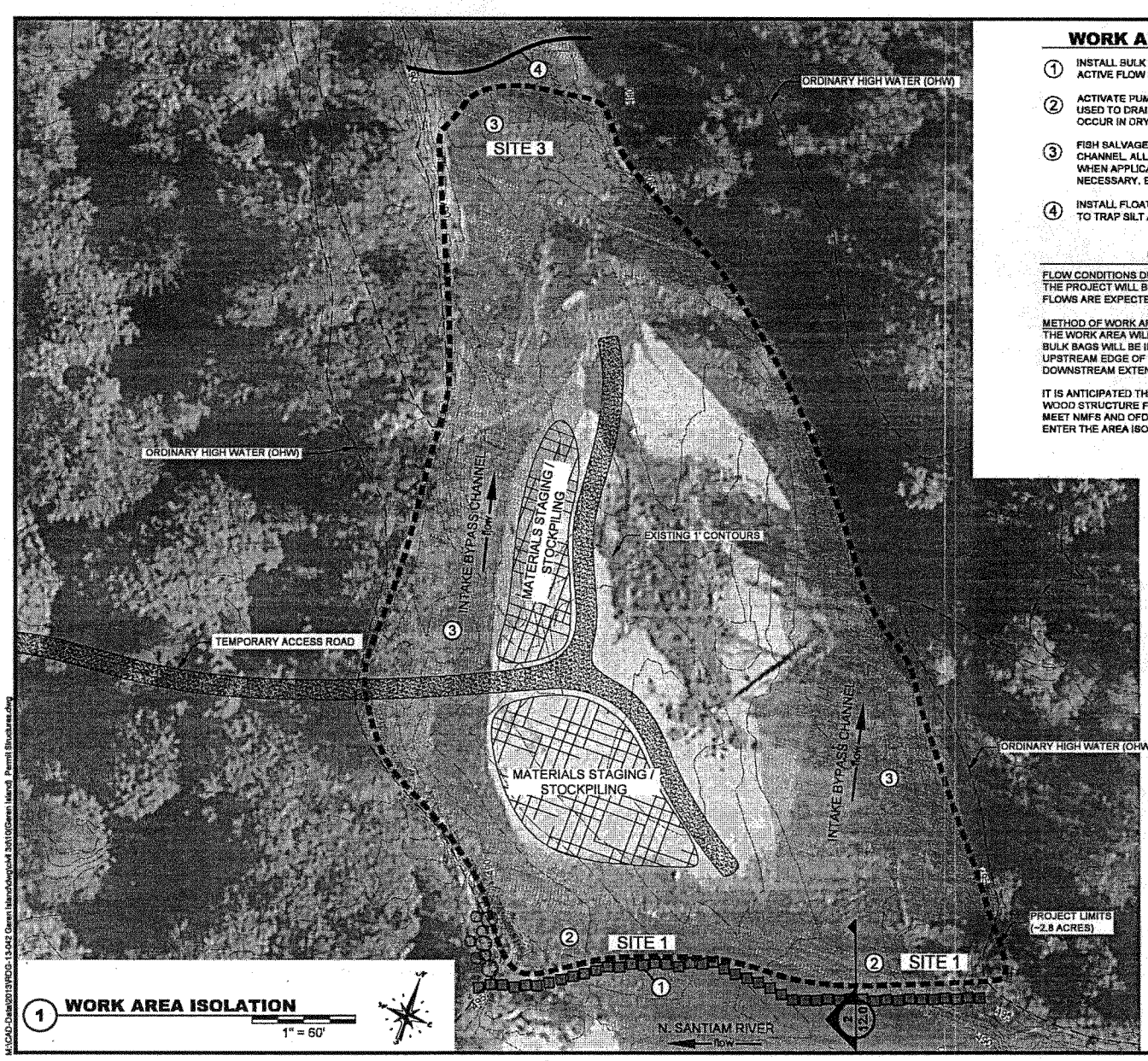
NO.	DATE	BY	DESCRIPTION	CHK
•	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
11.1

Drawing 18 of 29

NWP-2014-195



1 **WORK AREA ISOLATION**

1" = 60'

WORK AREA ISOLATION - CONSTRUCTION NOTES

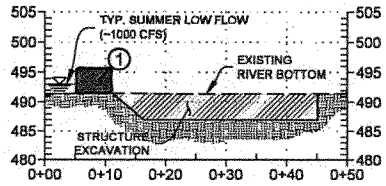
1. INSTALL BULK BAGS, SAND BAGS, OR APPROVED ALTERNATIVE PER DRAWING 12.8 TO ISOLATE ACTIVE FLOW FROM WORK AREA. TOP OF BULK BAGS TO BE PLACED AT MIN 493' ELEVATION.
2. ACTIVATE PUMPING SYSTEM AT ENGINEERED LARGE WOOD STRUCTURES. PUMPS ARE TO BE USED TO DRAIN WORK SITE, ALLOWING FOR CONSTRUCTION OF THE WOOD STRUCTURE TO OCCUR IN DRY OR PARTIALLY WET CONDITIONS.
3. FISH SALVAGE PLAN SHALL BE ACTIVATED FOR THE ISOLATED AREAS WITHIN THE INTAKE BYPASS CHANNEL. ALL AREAS SHALL BE DEFISHED BY LOWERING THE WATER ELEVATION WITH PUMPS WHEN APPLICABLE AND THEN DEFISHING WITH SEINE NETS AND ELECTROSHOCKING IF NECESSARY. ENTIRE SALVAGE SHALL TAKE LESS THAN 24 HOURS.
4. INSTALL FLOATING SILT CURTAINS PER DRAWING 13.0 AT DOWNSTREAM EXTENT OF SITE 1 WORK TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONE.

CARE AND DIVERSION OF WATER

FLOW CONDITIONS DURING IN-WATER WORK
THE PROJECT WILL BE IMPLEMENTED DURING THE IN-STREAM WORK WINDOW JULY 15 - AUGUST 31. FLOWS ARE EXPECTED TO BE APPROXIMATELY 1000 CFS.

METHOD OF WORK AREA ISOLATION
THE WORK AREA WILL BE ISOLATED BY USE OF A BULK BAG OR APPROVED ALTERNATIVE COFFER DAMS. BULK BAGS WILL BE INSTALLED FROM THE BANKLINE EXTENDING INTO THE CHANNEL ALONG THE UPSTREAM EDGE OF THE PROPOSED STRUCTURES. SILT CURTAINS WILL BE INSTALLED AT THE DOWNSTREAM EXTENT OF SITE 1 TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONE.

IT IS ANTICIPATED THAT ACTIVE PUMPING WILL BE REQUIRED TO DEWATER THE ENGINEERED LARGE WOOD STRUCTURE FOOTPRINTS. PUMPS USED FOR DEWATERING SHALL HAVE INTAKE SCREENS THAT MEET NMFS AND OFDW SCREEN CRITERIA OR BE OPERATED IN AN AREA WHERE FISH ARE NOT ABLE TO ENTER THE AREA ISOLATED.



2 **TYP. BULK BAG PLACEMENT**

HORIZ 1" = 20'
VERT 1" = 20'

DRAFT PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 93 South
Whitefish, MT 59937
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311 SW Jefferson Avenue
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SITE 1 & 3 WORK AREA ISOLATION

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
-	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER RDG-13-042

DRAWING NUMBER 12.0

Drawing 20 of 29

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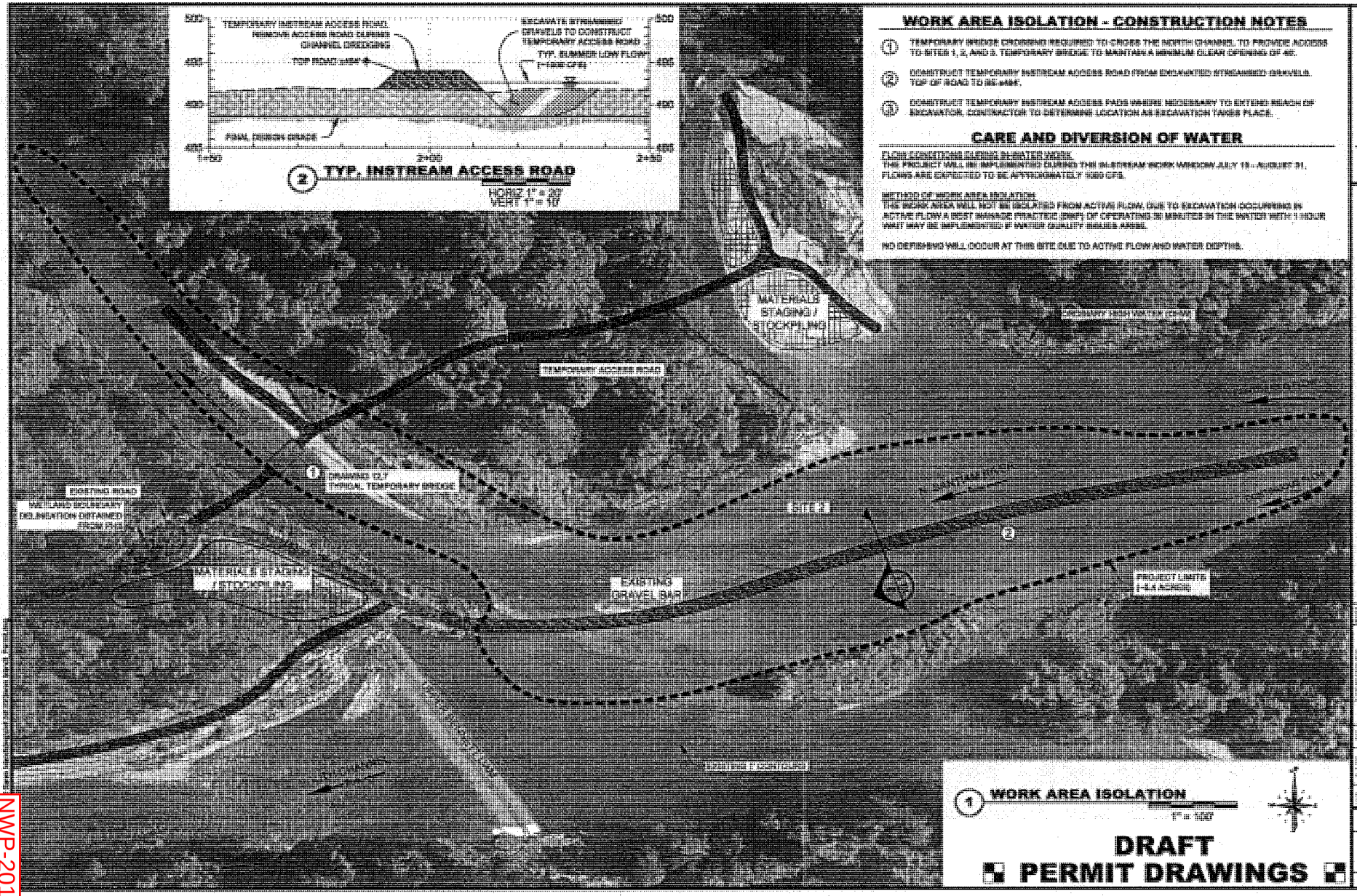
NWP-2014-195



WORK AREA ISOLATION - CONSTRUCTION NOTES

1. TEMPORARY BRIDGE CROSSING REQUIRED TO CROSS THE NORTH CHANNEL TO PROVIDE ACCESS TO SITES 1, 2, AND 3. TEMPORARY BRIDGE TO MAINTAIN A MINIMUM CLEAR OPENING OF 40'.
2. CONSTRUCT TEMPORARY INSTREAM ACCESS ROAD FROM EXCAVATED STREAMBED GRAVELS. TOP OF ROAD TO BE ±484'.
3. CONSTRUCT TEMPORARY INSTREAM ACCESS PADS WHERE NECESSARY TO EXTEND REACH OF EXCAVATOR. CONTRACTOR TO DETERMINE LOCATION AS EXCAVATION TAKES PLACE.

CARE AND DIVERSION OF WATER

FLOW CONDITIONS DURING IN-WATER WORK:
THE PROJECT WILL BE IMPLEMENTED DURING THE IN-STREAM WORK WINDOW JULY 15 - AUGUST 31. FLOWS ARE EXPECTED TO BE APPROXIMATELY 1000 CFS.

METHOD OF WORK AREA ISOLATION:
THE WORK AREA WILL NOT BE ISOLATED FROM ACTIVE FLOW. DUE TO EXCAVATION OCCURRING IN ACTIVE FLOW A BEST MANAGE PRACTICE (BMP) OF OPERATING 30 MINUTES IN THE WATER WITH 1 HOUR WAIT MAY BE IMPLEMENTED IF WATER QUALITY ISSUES ARISE.

NO DEFISHING WILL OCCUR AT THIS SITE DUE TO ACTIVE FLOW AND WATER DEPTHS.

RIVER DESIGN GROUP, INC.

SITE 2 WORK AREA ISOLATION

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
-	12/09/13	RS	DRAFT PERMIT	BR

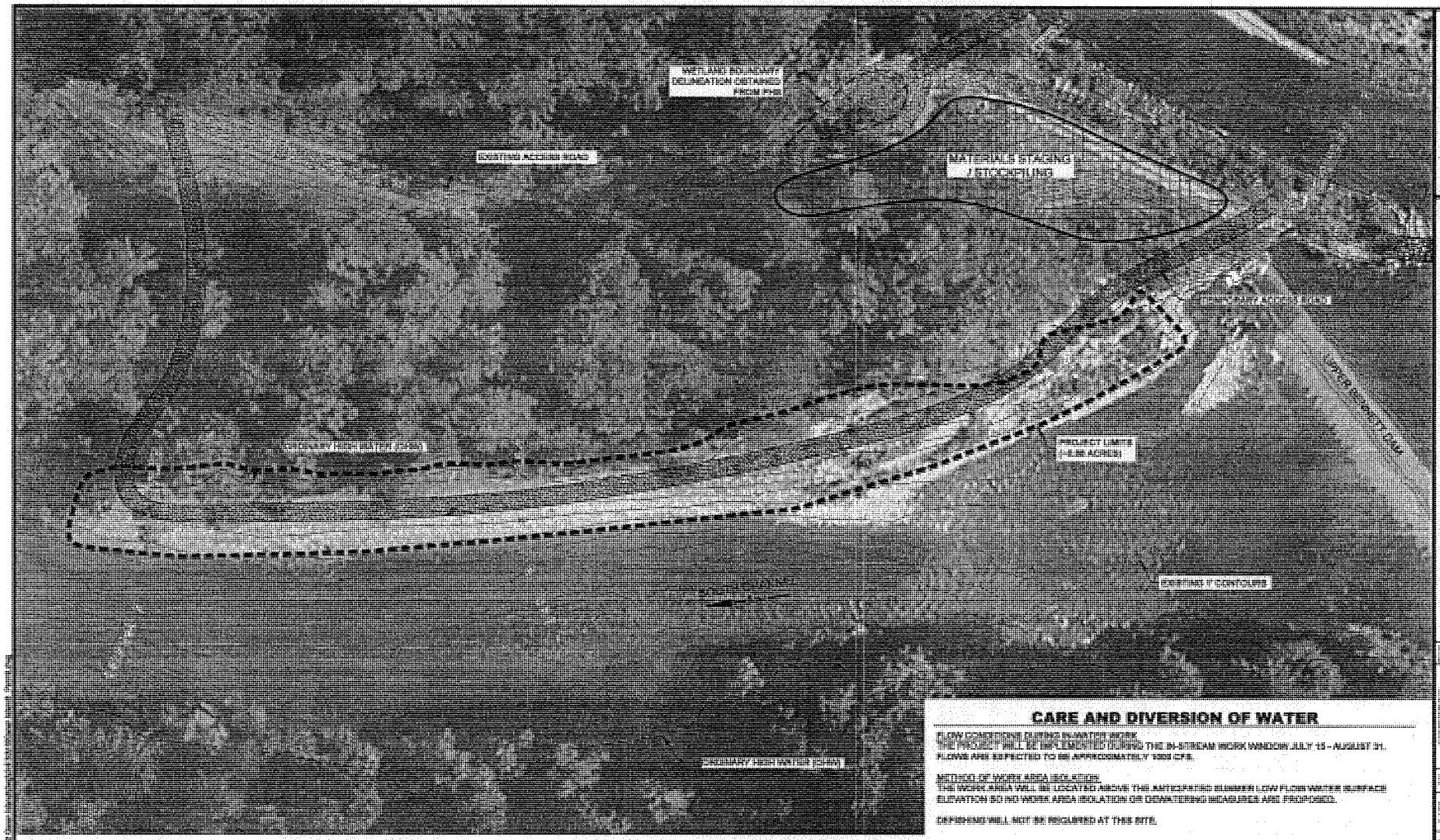
PROJECT NUMBER 8200-13-0402

DRAWING NUMBER 12.1

Drawing 21 of 28

DRAFT PERMIT DRAWINGS

NWP-2014-195



CARE AND DIVERSION OF WATER

FLOW CONDITIONS DURING INWATER WORK
THE PROJECT WILL BE IMPLEMENTED DURING THE IN-STREAM WORK WINDOW JULY 15 - AUGUST 31. FLOWS ARE EXPECTED TO BE APPROXIMATELY 1000 CFS.

METHOD OF WORK AREA ISOLATION
THE WORK AREA WILL BE LOCATED ABOVE THE ANTICIPATED SUMMER LOW FLOW WATER SURFACE ELEVATION SO NO WORK AREA ISOLATION OR DEWATERING MEASURES ARE PROPOSED.

DEFISHING WILL NOT BE REQUIRED AT THIS SITE.

1 WORK AREA ISOLATION
1" = 60'

DRAFT PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.

SITE 4 WORK AREA ISOLATION

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
1	[illegible]	RS	DRAFT PERMIT	TW

PROJECT NUMBER [illegible]

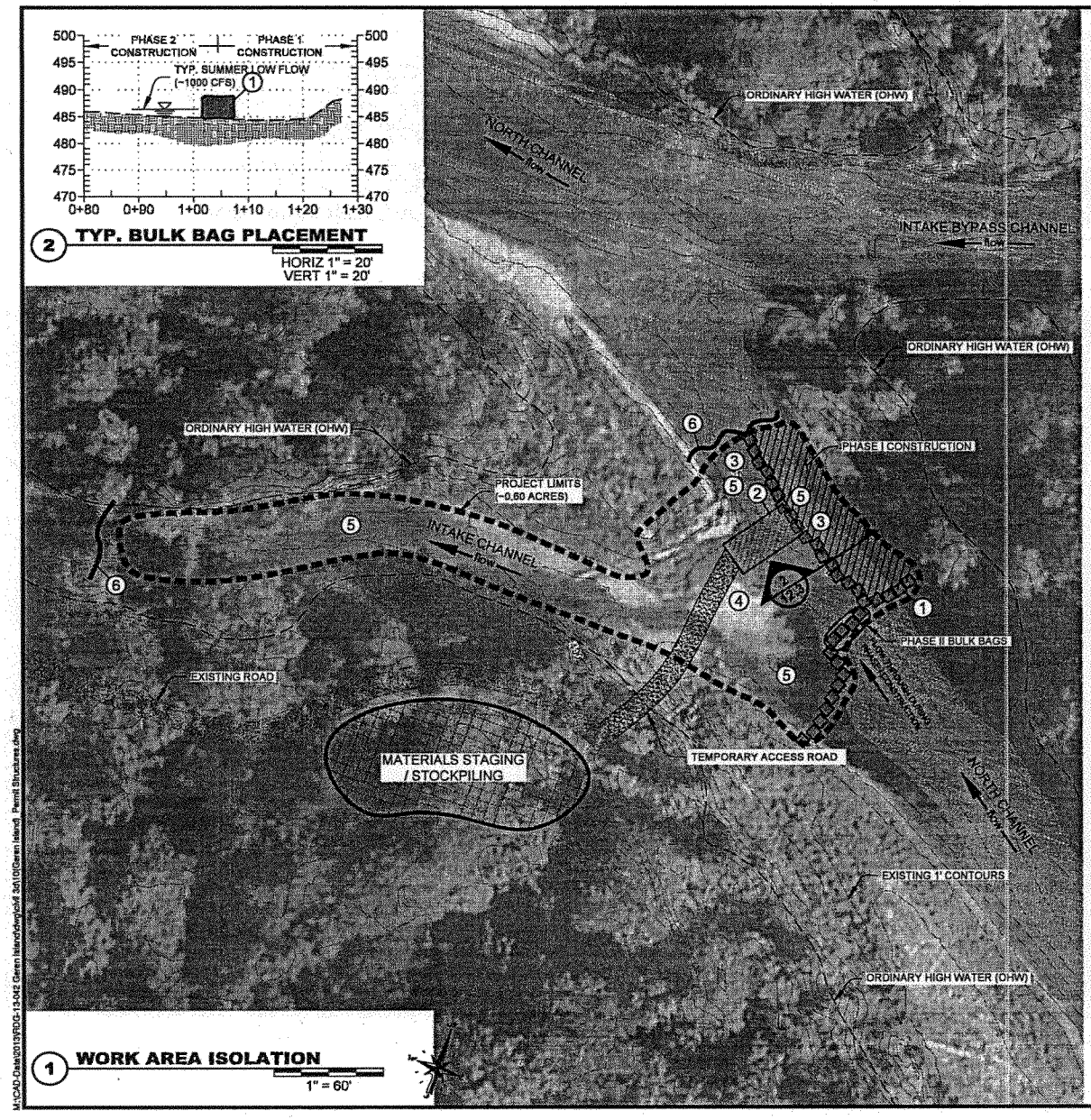
DRAWING NUMBER 12.2

Drawing [illegible] of [illegible]

NWP-2014-195

2 TYP. BULK BAG PLACEMENT

HORIZ 1" = 20'
VERT 1" = 20'



1 WORK AREA ISOLATION

1" = 60'

WORK AREA ISOLATION - CONSTRUCTION NOTES

1. INSTALL BULK BAGS, SAND BAGS, OR APPROVED ALTERNATIVE PER DRAWING 12.6 TO ISOLATE ACTIVE FLOW FROM WORK AREAS. BULK BAGS WILL BE PLACED IN A PHASED APPROACH TO PROVIDE ISOLATION WHILE ALLOWING FLOW THROUGH THE PROJECT SITE. TOP OF BULK BAGS TO BE PLACED AT MIN 487' ELEVATION.
2. INSTALL TEMPORARY BRIDGE CROSSING PER DRAWING 12.7 TO CROSS THE NORTH CHANNEL TO PROVIDE ACCESS TO RIGHT PORTION OF SITE 8 ENGINEERED RIFFLE DEVELOPMENT. TEMPORARY BRIDGE TO MAINTAIN A MINIMUM CLEAR OPENING OF 40'.
3. ACTIVATE PUMPING SYSTEM AT ENGINEERED RIFFLE SITE. PUMPS ARE TO BE USED TO DRAIN WORK SITE, ALLOWING FOR CONSTRUCTION OF THE RIFFLE TO OCCUR IN THE DRY OR PARTIALLY WET CONDITIONS.
4. ACTIVATE PUMPING SYSTEM AT ENGINEERED LARGE WOOD STRUCTURE. PUMPS ARE TO BE USED TO DRAIN WORK SITE, ALLOWING FOR CONSTRUCTION OF THE WOOD STRUCTURE TO OCCUR IN THE DRY OR PARTIALLY WET CONDITIONS.
5. FISH SALVAGE PLAN SHALL BE ACTIVATED FOR THE ISOLATED AREAS WITHIN THE INTAKE CHANNEL AND NORTH CHANNEL. ALL AREAS SHALL BE DEFISHED BY LOWERING THE WATER ELEVATION WITH PUMPS WHEN APPLICABLE AND THEN DEFISHING WITH SEINE NETS AND ELECTROSHOCKING IF NECESSARY. ENTIRE SALVAGE SHALL TAKE LESS THAN 24 HOURS.
6. INSTALL FLOATING SILT CURTAINS PER DRAWING 2.8 AT DOWNSTREAM EXTENTS OF WORK TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONES.

CARE AND DIVERSION OF WATER

FLOW CONDITIONS DURING IN-WATER WORK
THE PROJECT WILL BE IMPLEMENTED DURING THE IN-STREAM WORK WINDOW JULY 15 - AUGUST 31. FLOWS ARE EXPECTED TO BE APPROXIMATELY 1000 CFS.

METHOD OF WORK AREA ISOLATION - INTAKE CHANNEL DREDGING
THE WORK AREA WILL NOT BE ISOLATED FROM ACTIVE FLOW. DUE TO EXCAVATION OCCURRING IN ACTIVE FLOW A BEST MANAGE PRACTICE (BMP) OF OPERATING 30 MINUTES IN THE WATER WITH 1 HOUR WAIT MAY BE IMPLEMENTED IF WATER QUALITY ISSUES ARISE. A SILT CURTAIN WILL BE INSTALLED AT THE DOWNSTREAM DREDGING EXTENT TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONE.

NO DEFISHING WILL OCCUR AT THIS SITE DUE TO ACTIVE FLOW AND WATER DEPTHS.

METHOD OF WORK AREA ISOLATION - NORTH CHANNEL ENGINEERED RIFFLE
THE WORK AREA WILL BE ISOLATED BY USE OF A BULK BAG OR APPROVED ALTERNATIVE COFFER DAM. BULK BAGS WILL BE INSTALLED FROM THE BANKLINE EXTENDING INTO THE CHANNEL, COMPLETELY ISOLATING PORTIONS OF THE NORTH CHANNEL. THE ENGINEERED RIFFLE WILL BE CONSTRUCTED IN A PHASED APPROACH WITH THE RIVER-RIGHT PORTION OF THE CHANNEL ISOLATED AND CONSTRUCTED FISRT AND THEN THE RIVER-LEFT PORTION BEING ISOLATED A CONSTRUCTED SECOND. A SILT CURTAIN WILL BE INSTALLED AT THE DOWNSTREAM EXTENT OF THE RIFFLE TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONE.

IT IS ANTICIPATED THAT ACTIVE PUMPING WILL BE REQUIRED TO DEWATER THE ENGINEERED RIFFLE SITE. PUMPS USED FOR DEWATERING SHALL HAVE INTAKE SCREENS THAT MEET NMFS AND OFDW SCREEN CRITERIA OR BE OPERATED IN AN AREA WHERE FISH ARE NOT ABLE TO ENTER THE AREA ISOLATED.

METHOD OF WORK AREA ISOLATION - NORTH CHANNEL ENGINEERED LARGE WOOD STRUCTURE
THE WORK AREA WILL BE ISOLATED BY USE OF A BULK BAG OR APPROVED ALTERNATIVE COFFER DAM. BULK BAGS WILL BE INSTALLED FROM THE BANKLINE EXTENDING INTO THE CHANNEL ALONG THE UPSTREAM EDGE OF THE STRUCTURE. A SILT CURTAIN WILL BE INSTALLED ALONG THE NORTH AND INTAKE CHANNEL EDGES TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONE.

IT IS ANTICIPATED THAT ACTIVE PUMPING WILL BE REQUIRED TO DEWATER THE ENGINEERED LARGE WOOD STRUCTURE FOOTPRINT. PUMPS USED FOR DEWATERING SHALL HAVE INTAKE SCREENS THAT MEET NMFS AND OFDW SCREEN CRITERIA OR BE OPERATED IN AN AREA WHERE FISH ARE NOT ABLE TO ENTER THE AREA ISOLATED.

WORK AREA ISOLATION IN TWO PHASES
PHASE I: ISOLATE RIVER-RIGHT PORTION OF NORTH CHANNEL AND INLET TO INTAKE CHANNEL. RIVER BYPASS FLOW TO BE THROUGH RIVER-LEFT PORTION OF NORTH CHANNEL. COMPLETE CONSTRUCTION OF RIVER-RIGHT PORTION OF ENGINEERED RIFFLE.
PHASE II: ISOLATE RIVER-LEFT PORTION OF NORTH CHANNEL. RIVER BYPASS FLOW TO BE THROUGH RIVER-RIGHT PORTION OF NORTH CHANNEL. COMPLETE CONSTRUCTION OF RIVER-LEFT PORTION OF ENGINEERED RIFFLE, ENGINEERED LARGE WOOD STRUCTURE, AND EXCAVATION OF INTAKE CHANNEL.

DRAFT
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541.738.2220

SITE 6 WORK AREA ISOLATION

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
•	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
12.3

Drawing 23 of 29

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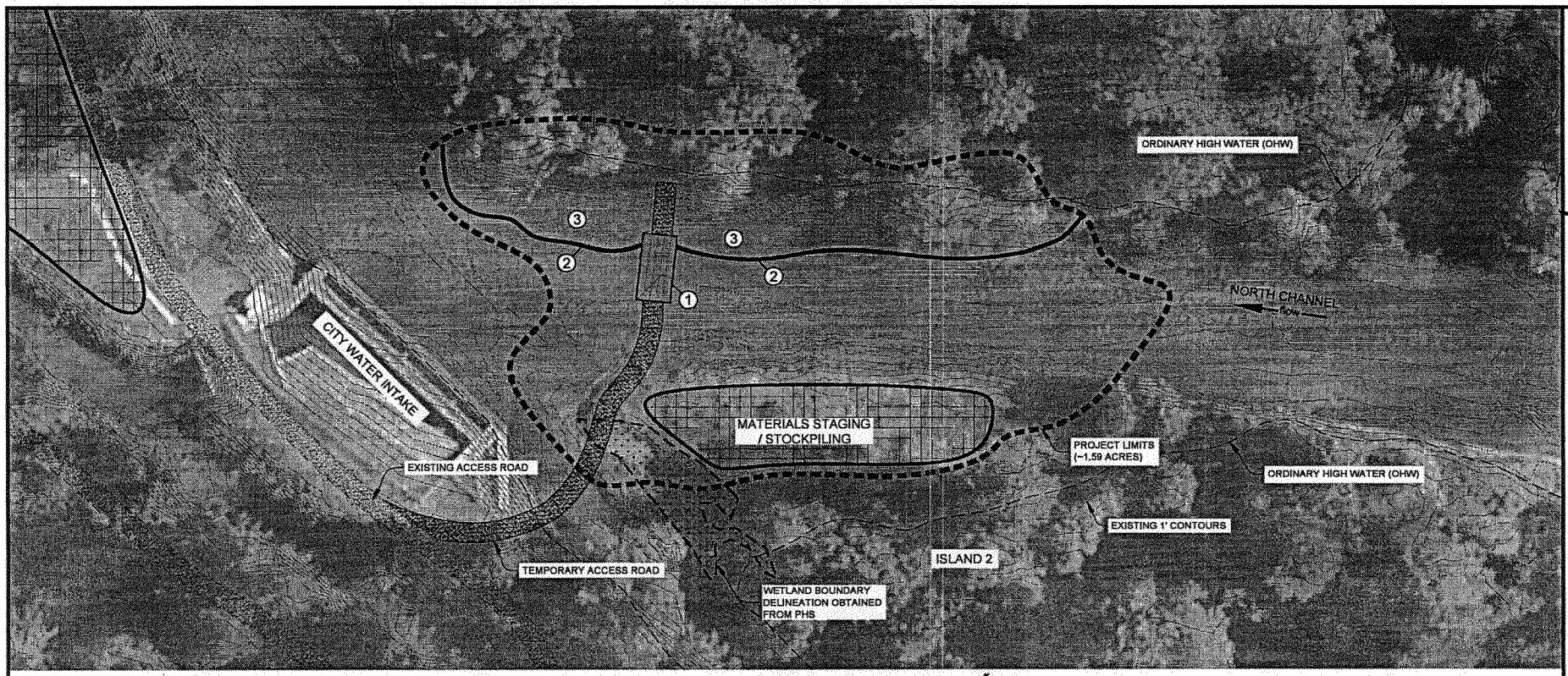
NWP-2014-195



1 WORK AREA ISOLATION

1" = 60'

WORK AREA ISOLATION - CONSTRUCTION NOTES

1. INSTALL TEMPORARY BRIDGE CROSSING REQUIRED TO CROSS THE NORTH CHANNEL PER DRAWING 12.7 TO PROVIDE ACCESS TO RIVER-RIGHT PORTION OF SITE. TEMPORARY BRIDGE TO MAINTAIN A MINIMUM CLEAR OPENING OF 40'.
2. INSTALL FLOATING SILT CURTAINS PER DRAWING 12.6 AT DOWNSTREAM EXTENTS OF WORK TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONES.
3. FISH SALVAGE PLAN SHALL BE ACTIVATED FOR THE ISOLATED AREAS WITHIN THE INTAKE CHANNEL AND NORTH CHANNEL. ALL AREAS SHALL BE DEFISHED BY LOWERING THE WATER ELEVATION WITH PUMPS WHEN APPLICABLE AND THEN DEFISHING WITH SEINE NETS AND ELECTROSHOCKING IF NECESSARY. ENTIRE SALVAGE SHALL TAKE LESS THAN 24 HOURS.

CARE AND DIVERSION OF WATER

FLOW CONDITIONS DURING IN-WATER WORK
THE PROJECT WILL BE IMPLEMENTED DURING THE IN-STREAM WORK WINDOW JULY 15 - AUGUST 31. FLOWS ARE EXPECTED TO BE APPROXIMATELY 1000 CFS.

METHOD OF WORK AREA ISOLATION - RIVER-LEFT AND ISLAND 2 DREDGING
THE WORK AREA WILL NOT BE ISOLATED FROM ACTIVE FLOW. DUE TO EXCAVATION OCCURRING IN ACTIVE FLOW A BEST MANAGE PRACTICE (BMP) OF OPERATING 30 MINUTES IN THE WATER WITH 1 HOUR WAIT MAY BE IMPLEMENTED IF WATER QUALITY ISSUES ARISE.

METHOD OF WORK AREA ISOLATION - POINT BAR AND ENGINEERED LARGE WOOD DEVELOPMENT
THE WORK AREA WILL NOT BE ISOLATED FROM ACTIVE FLOW. DUE TO EXCAVATION OCCURRING IN ACTIVE FLOW A BEST MANAGE PRACTICE (BMP) OF OPERATING 30 MINUTES IN THE WATER WITH 1 HOUR WAIT MAY BE IMPLEMENTED IF WATER QUALITY ISSUES ARISE. A SILT CURTAIN WILL BE INSTALLED ALONG THE CHANNEL EDGE TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONE.

ISOLATED AREAS TO BE DEFISHED IF PRATICAL.

DRAFT PERMIT DRAWINGS

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SITE 8 WORK AREA ISOLATION

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER RDG-13-042

DRAWING NUMBER 12.4

Drawing 24 of 29

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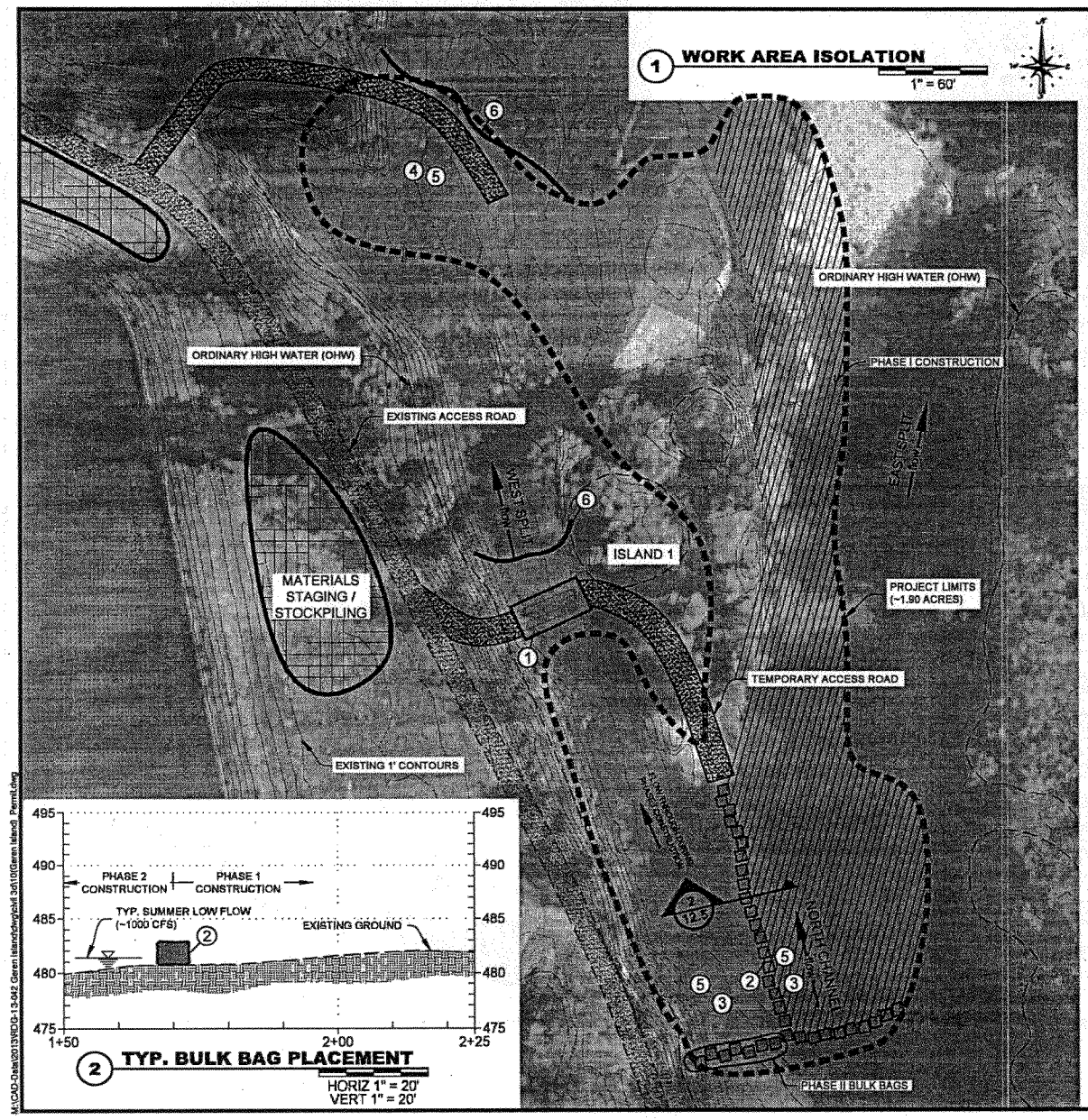

WORK AREA ISOLATION - CONSTRUCTION NOTES

1. INSTALL TEMPORARY BRIDGE CROSSING REQUIRED TO CROSS THE WEST SPLIT OF THE NORTH CHANNEL PER DRAWING 12.7 TO PROVIDE ACCESS TO ISLAND 1 FOR ENGINEERED RIFFLE DEVELOPMENT AND EAST SPLIT CHANNEL EXCAVATION. TEMPORARY BRIDGE TO MAINTAIN A MINIMUM CLEAR OPENING OF 40'.
2. INSTALL BULK BAGS, SAND BAGS, OR APPROVED ALTERNATIVE PER DRAWING 12.7 TO ISOLATE ACTIVE FLOW FROM WORK AREAS. BULK BAGS WILL BE PLACED IN A PHASED APPROACH TO PROVIDE ISOLATION WHILE ALLOWING FLOW THOUGH THE PROJECT SITE. TOP OF BULK BAGS TO BE PLACED AT MIN 482' ELEVATION.
3. ACTIVATE PUMPING SYSTEM AT ENGINEERED RIFFLE SITE. PUMPS ARE TO BE USED TO DRAIN WORK SITE, ALLOWING FOR CONSTRUCTION OF THE RIFFLE TO OCCUR IN THE DRY.
4. ACTIVATE PUMPING SYSTEM AT ENGINEERED LARGE WOOD STRUCTURE. PUMPS ARE TO BE USED TO DRAIN WORK SITE, ALLOWING FOR CONSTRUCTION OF THE WOOD STRUCTURE TO OCCUR IN THE DRY.
5. FISH SALVAGE PLAN SHALL BE ACTIVATED FOR THE ISOLATED AREAS WITHIN THE NORTH CHANNEL. ALL AREAS SHALL BE DEFISHED BY LOWERING THE WATER ELEVATION WITH PUMPS WHEN APPLICABLE AND THEN DEFISHING WITH SEINE NETS AND ELECTROSHOCKING IF NECESSARY. ENTIRE SALVAGE SHALL TAKE LESS THAN 24 HOURS.
6. INSTALL FLOATING SILT CURTAINS PER DRAWING 2.8 AT DOWNSTREAM EXTENTS OF WORK TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONES.

CARE AND DIVERSION OF WATER

FLOW CONDITIONS DURING IN-WATER WORK
THE PROJECT WILL BE IMPLEMENTED DURING THE IN-STREAM WORK WINDOW JULY 15 - AUGUST 31. FLOWS ARE EXPECTED TO BE APPROXIMATELY 1000 CFS.

METHOD OF WORK AREA ISOLATION - EAST SPLIT CHANNEL DREDGING
THE WORK AREA WILL NOT BE ISOLATED FROM ACTIVE FLOW. DUE TO EXCAVATION OCCURRING IN ACTIVE FLOW A BEST MANAGE PRACTICE (BMP) OF OPERATING 30 MINUTES IN THE WATER WITH 1 HOUR WAIT MAY BE IMPLEMENTED IF WATER QUALITY ISSUES ARISE. A SILT CURTAIN WILL BE INSTALLED AT THE DOWNSTREAM DREDGING EXTENT TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONE.

METHOD OF WORK AREA ISOLATION - NORTH CHANNEL ENGINEERED RIFFLE
THE WORK AREA WILL BE ISOLATED BY USE OF A BULK BAG OR APPROVED ALTERNATIVE COFFER DAM. BULK BAGS WILL BE INSTALLED FROM THE BANKLINE EXTENDING INTO THE CHANNEL, COMPLETELY ISOLATING PORTIONS OF THE NORTH CHANNEL. THE ENGINEERED RIFFLE WILL BE CONSTRUCTED IN A PHASED APPROACH WITH THE RIVER-RIGHT PORTION OF THE CHANNEL ISOLATED AND CONSTRUCTED FIRST AND THEN THE RIVER-LEFT PORTION BEING ISOLATED A CONSTRUCTED SECOND. A SILT CURTAIN WILL BE INSTALLED AT THE DOWNSTREAM EXTENT OF THE RIFFLE TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONE.

IT IS ANTICIPATED THAT ACTIVE PUMPING WILL BE REQUIRED TO DEWATER THE ENGINEERED RIFFLE SITE. PUMPS USED FOR DEWATERING SHALL HAVE INTAKE SCREENS THAT MEET NMFS AND OFDW SCREEN CRITERIA OR BE OPERATED IN AN AREA WHERE FISH ARE NOT ABLE TO ENTER THE AREA ISOLATED.

METHOD OF WORK AREA ISOLATION - LARGE WOOD STRUCTURE
THE WORK AREA WILL BE ISOLATED BY USE OF A BULK BAG OR APPROVED ALTERNATIVE COFFER DAM. BULK BAGS WILL BE INSTALLED FROM THE BANKLINE EXTENDING INTO THE CHANNEL ALONG THE UPSTREAM EDGE OF THE STRUCTURE. A SILT CURTAIN WILL BE INSTALLED ALONG THE NORTH AND INTAKE CHANNEL EDGES TO TRAP SILT AND SEDIMENT WITHIN THE DISTURBED WORK ZONE.

IT IS ANTICIPATED THAT ACTIVE PUMPING WILL BE REQUIRED TO DEWATER THE ENGINEERED LARGE WOOD STRUCTURE FOOTPRINT. PUMPS USED FOR DEWATERING SHALL HAVE INTAKE SCREENS THAT MEET NMFS AND OFDW SCREEN CRITERIA OR BE OPERATED IN AN AREA WHERE FISH ARE NOT ABLE TO ENTER THE AREA ISOLATED.

WORK AREA ISOLATION IN TWO PHASES
PHASE I: ISOLATE RIVER-RIGHT PORTION (EAST CHANNEL) OF NORTH CHANNEL. RIVER BYPASS FLOW TO BE THROUGH RIVER-LEFT PORTION (WEST CHANNEL) OF NORTH CHANNEL. COMPLETE CONSTRUCTION OF RIVER-RIGHT PORTION OF ENGINEERED RIFFLE AND EXCAVATION OF EAST CHANNEL.
PHASE II: ISOLATE RIVER-LEFT PORTION OF NORTH CHANNEL. RIVER BYPASS FLOW TO BE THROUGH RIVER-RIGHT PORTION OF NORTH CHANNEL. COMPLETE CONSTRUCTION OF RIVER-RIGHT PORTION OF ENGINEERED RIFFLE AND ENGINEERED LARGE WOOD STRUCTURE.

DRAFT PERMIT DRAWINGS

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SITES 10, 11, & 12 WORK AREA ISOLATION

GEREN ISLAND FLOW MAINTENANCE PROJECT
NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
•	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER RDG-13-042

DRAWING NUMBER 12.5

Drawing 25 of 29

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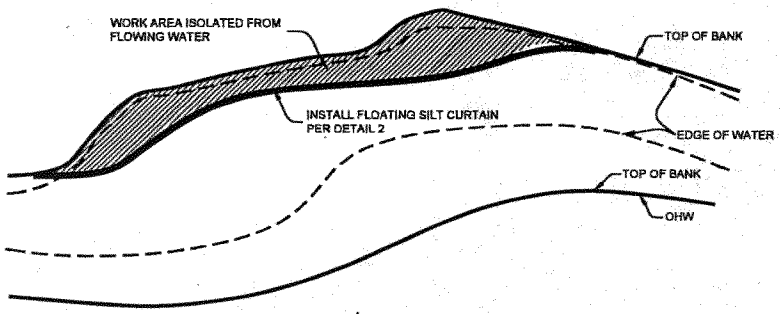
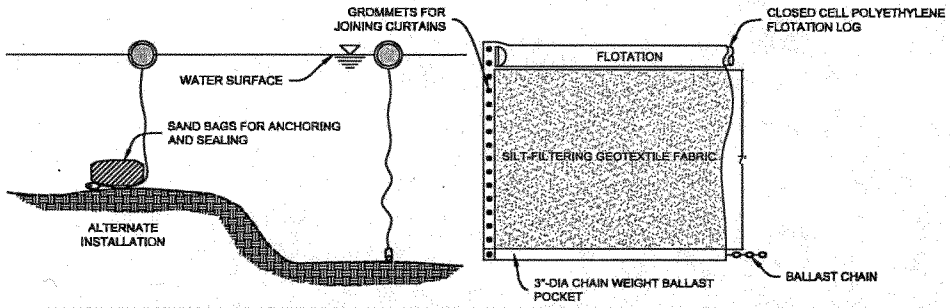
NWP-2014-195



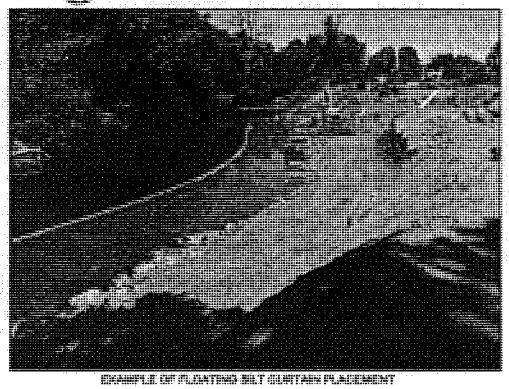
1 WORK AREA ISOLATION - TYPICAL

NOT TO SCALE



FLOATING SILT CURTAIN SHALL BE A "LAYFIELD FSC 13" OR APPROVED EQUAL. THE BODY OF THE FLOATING SILT CURTAIN IS MADE FROM A STRONG, HIGH-FILTRATION FABRIC THAT RETAINS FINE SILTS AND SEDIMENTS ON-SITE. THE FLOAT AND BOTTOM SLEEVE ARE CONSTRUCTED FROM A UV-STABLE, HIGH-STRENGTH POLYETHYLENE (I.E. RIPSTOP-TYPE MATERIAL). THE FLOATING SILT CURTAIN IS INCREASED IN LENGTH BY JOINING ADDITIONAL SECTIONS OF CURTAIN, WHICH TYPICALLY COMES IN 50' LENGTHS.

2 FLOATING SILT CURTAIN



EXAMPLE OF FLOATING SILT CURTAIN PLACEMENT

EROSION CONTROL NOTES

AT A MINIMUM, EROSION CONTROL MEASURES SHOWN ON THE PLANS SHALL BE IN PLACE PRIOR TO COMMENCING CONSTRUCTION.

DURING CONSTRUCTION, ALL EROSION CONTROLS SHALL BE INSPECTED BY THE PROJECT ENGINEER DAILY TO ENSURE THEY ARE WORKING ADEQUATELY.
(1) IF INSPECTION SHOWS THAT THE EROSION CONTROLS ARE INEFFECTIVE, WORK CREWS WILL BE MOBILIZED IMMEDIATELY TO MAKE REPAIRS, INSTALL REPLACEMENTS, OR INSTALL ADDITIONAL CONTROLS AS NECESSARY.
(2) SEDIMENT MUST BE REMOVED FROM EROSION CONTROLS ONCE IT HAS REACHED 1/3 OF THE EXPOSED HEIGHT OF THE CONTROL.

CONTRACTOR SHALL PROVIDE MEASURES TO PREVENT MOVEMENT OF SOIL INTO WATERWAYS OR WETLANDS, E.G. FILTER BAGS, SEDIMENT TRAPS OR CATCH BASINS, VEGETATIVE STRIPS, BERMS, JERSEY BARRIERS, FIBER BLANKETS, BONDED FIBER MATRICES, GEOTEXTILES, MULCHES OR COMPOST, WATTLES AND SEDIMENT FENCES.

CONTRACTOR SHALL PROVIDE MEASURES TO PREVENT STOCKPILE EROSION DURING RAIN EVENTS OR WHEN THE STOCKPILE SITE IS NOT MOVED OR RESHAPED FOR MORE THAN 48 HOURS, BY SURROUNDING PILES WITH COMPOST BERMS, COVERING PILES WITH IMPERVIOUS MATERIALS OR OTHER EQUALLY EFFECTIVE METHODS.

CONTRACTOR SHALL PROVIDE MEASURES TO PREVENT CONSTRUCTION VEHICLES FROM TRACKING SEDIMENT OFFSITE OR ONTO ROADWAYS WHERE IT IS SUBJECT TO WASHING INTO STORM DRAINS, WATERWAYS, OR WETLANDS; INCLUDING GRAVEL ACCESS PADS, WHEEL WASH STATIONS, OR OTHER EQUALLY EFFECTIVE METHODS.

CONTRACTOR SHALL INSTALL REMOVABLE PADS OR MATS TO PREVENT SOIL COMPACTION IN ALL TEMPORARY CONSTRUCTION ACCESS POINTS AND STAGING AREAS IN RIPARIAN OR WETLAND AREAS.

CONTRACTOR SHALL PREPARE AND HAVE ON-SITE A SPILL CONTAINMENT AND CONTROL PLAN WITH NOTIFICATION PROCEDURES, EQUIPMENT, SPECIFIC CLEANUP AND DISPOSAL INSTRUCTIONS FOR ALL PRODUCTS USED ON SITE.

CONTRACTOR SHALL HAVE AN EMERGENCY SUPPLY OF SEDIMENT CONTROL MATERIALS ON HAND (SILT FENCE, STRAW BALES, ETC.), AN OIL ADSORBING FLOATING BOOM, AND ABSORBENT PADS.

STATIONARY POWER EQUIPMENT, SUCH AS GENERATORS, WITHIN 150 FEET OF THE WATER SHALL BE DIAPERED TO PREVENT LEAKS.

ALL POWER EQUIPMENT WITHIN 150 FEET OF THE WATER SHALL BE INSPECTED DAILY FOR FLUID LEAKS AND REPAIRED. THE CONTRACTOR MUST KEEP DAILY INSPECTION REPORTS IN A DIARY.

ALL EQUIPMENT TO REMAIN WITHIN THE BOUNDS OF THE CONSTRUCTION STAGING AREA, ACCESS ROADS, OR PROJECT CONSTRUCTION AREA.

DUST CONTROL: ALL HEAVY USE AREAS ARE TO BE MAINTAINED IN A CONDITION THAT MINIMIZES DUST ON THE PROJECT SITE AND THE CONTRACTOR SHALL HAVE ACCESS TO A WATER TRUCK FOR DUST MANAGEMENT IF REQUIRED. THE PROJECT ENGINEER WILL NOTIFY THE CONTRACTOR TO MOBILIZE DUST CONTROL ACTIVITIES (INCLUDING WATERING) IF CONDITIONS REQUIRE.

BULK BAG NOTES

BULK BAGS ARE ALSO CALLED FLEXIBLE INTERMEDIATE BULK CONTAINERS (FIBC) THAT CAN BE CUSTOM MADE FROM VARIOUS FABRIC. THE FOLLOWING REQUIREMENTS ARE NECESSARY FOR THE RIVER ENVIRONMENT:

BULK BAGS SHALL BE CONSTRUCTED OF 8 oz WOVEN FABRIC, 1200 HOUR UV RESISTANT WITH SEWN LIFTING LOOPS. WHEN FILLED WITH NATIVE RIVER SAND AND GRAVEL, THE BAGS ARE APPROXIMATELY 6' WIDE x 6' LONG x 4' HIGH.

BULK BAGS SHALL BE CAREFULLY PLACED TO ENSURE NO TEARING OR CUTTING OF THE BAGS OCCURS.

BULK BAGS SHALL BE PLACED USING A HYDRAULIC CRANE OR TRACKHOE USING LIFTING BARS AND STEEL CABLES TO EQUALIZE LOAD ON LIFTING LOOPS.

DRAFT
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408.862.4027

WORK AREA ISOLATION AND EROSION CONTROL NOTES

GEREN ISLAND FLOW MAINTENANCE PROJECT
NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
*	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

DRAWING NUMBER
12.6

Drawing 28 of 29

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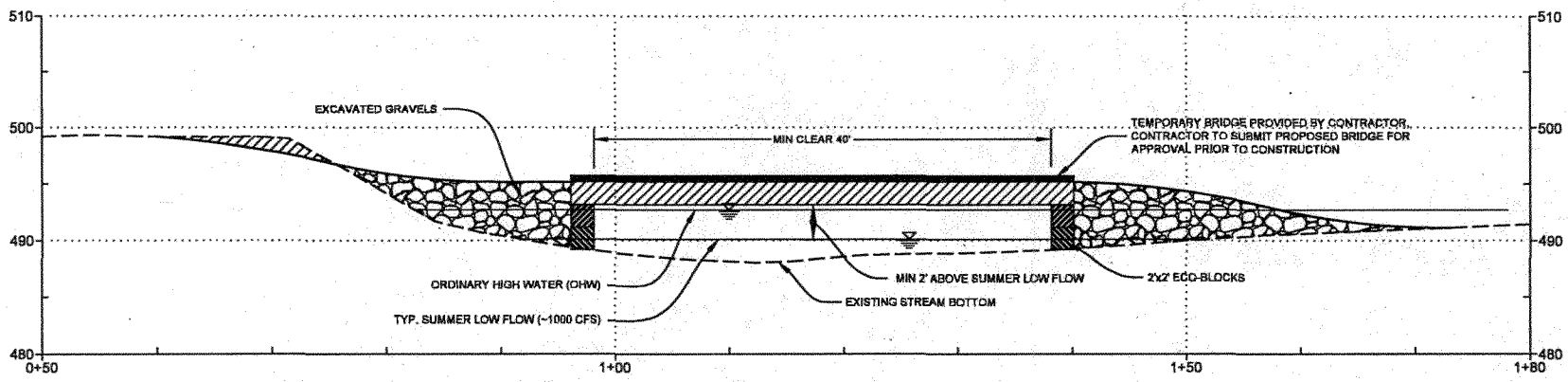
NWP-2014-195



1 TYPICAL TEMPORARY BRIDGE

HORIZ 1" = 10'
VERT 1" = 10'

DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5208 Hwy 93 South
Whitefish, MT 59937
406.862.4927
311 SW Jefferson Avenue
Corvallis, OR 97333
541.738.2920

TYPICAL TEMPORARY BRIDGE

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

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SITE RESTORATION NOTES

ALL DAMAGED OR DISTURBED STREAMBANKS ARE TO BE RESTORED TO A NATURAL SLOPE PATTERN AND PROFILE SUITABLE FOR ESTABLISHMENT OF PERMANENT WOODY VEGETATION.

ALL DISTURBED STREAMBANK VEGETATION IS TO BE REPLACED. USE A VARIETY OF SPECIES NATIVE TO THE PROJECT ARE PER DRAWING 13.1, REPLANT AND RESEED EACH AREA REQUIRING REVEGETATION BEFORE THE END OF THE FIRST PLANTING SEASON FOLLOWING CONSTRUCTION.

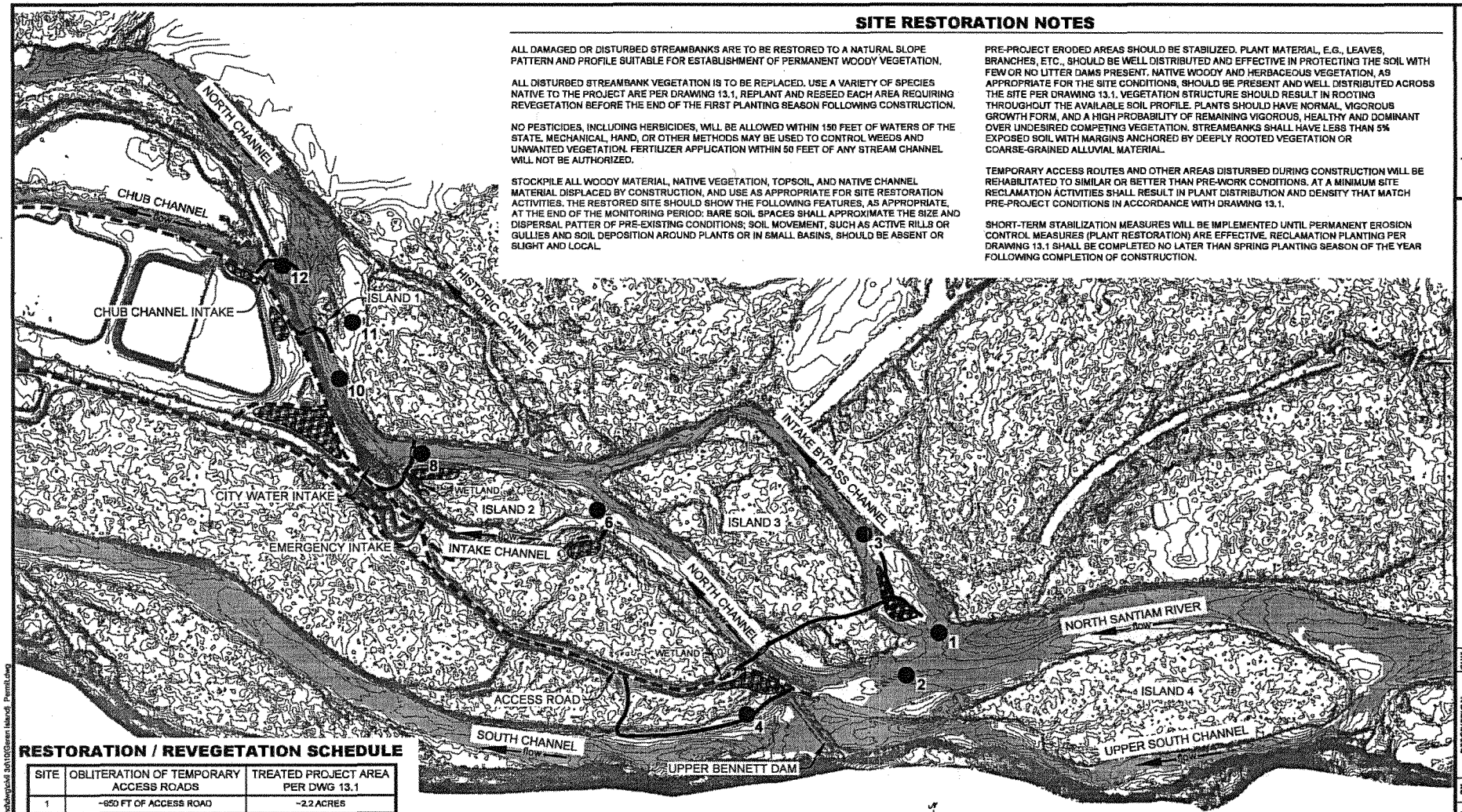
NO PESTICIDES, INCLUDING HERBICIDES, WILL BE ALLOWED WITHIN 150 FEET OF WATERS OF THE STATE. MECHANICAL, HAND, OR OTHER METHODS MAY BE USED TO CONTROL WEEDS AND UNWANTED VEGETATION. FERTILIZER APPLICATION WITHIN 50 FEET OF ANY STREAM CHANNEL WILL NOT BE AUTHORIZED.

STOCKPILE ALL WOODY MATERIAL, NATIVE VEGETATION, TOPSOIL, AND NATIVE CHANNEL MATERIAL DISPLACED BY CONSTRUCTION, AND USE AS APPROPRIATE FOR SITE RESTORATION ACTIVITIES. THE RESTORED SITE SHOULD SHOW THE FOLLOWING FEATURES, AS APPROPRIATE, AT THE END OF THE MONITORING PERIOD: BARE SOIL SPACES SHALL APPROXIMATE THE SIZE AND DISPERSAL PATTER OF PRE-EXISTING CONDITIONS; SOIL MOVEMENT, SUCH AS ACTIVE RILLS OR GULLIES AND SOIL DEPOSITION AROUND PLANTS OR IN SMALL BASINS, SHOULD BE ABSENT OR SLIGHT AND LOCAL.

PRE-PROJECT ERODED AREAS SHOULD BE STABILIZED. PLANT MATERIAL, E.G., LEAVES, BRANCHES, ETC., SHOULD BE WELL DISTRIBUTED AND EFFECTIVE IN PROTECTING THE SOIL WITH FEW OR NO LITTER DAMS PRESENT. NATIVE WOODY AND HERBACEOUS VEGETATION, AS APPROPRIATE FOR THE SITE CONDITIONS, SHOULD BE PRESENT AND WELL DISTRIBUTED ACROSS THE SITE PER DRAWING 13.1. VEGETATION STRUCTURE SHOULD RESULT IN ROOTING THROUGHOUT THE AVAILABLE SOIL PROFILE. PLANTS SHOULD HAVE NORMAL, VIGOROUS GROWTH FORM, AND A HIGH PROBABILITY OF REMAINING VIGOROUS, HEALTHY AND DOMINANT OVER UNDESIRED COMPETING VEGETATION. STREAMBANKS SHALL HAVE LESS THAN 5% EXPOSED SOIL WITH MARGINS ANCHORED BY DEEPLY ROOTED VEGETATION OR COARSE-GRAINED ALLUVIAL MATERIAL.

TEMPORARY ACCESS ROUTES AND OTHER AREAS DISTURBED DURING CONSTRUCTION WILL BE REHABILITATED TO SIMILAR OR BETTER THAN PRE-WORK CONDITIONS. AT A MINIMUM SITE RECLAMATION ACTIVITIES SHALL RESULT IN PLANT DISTRIBUTION AND DENSITY THAT MATCH PRE-PROJECT CONDITIONS IN ACCORDANCE WITH DRAWING 13.1.

SHORT-TERM STABILIZATION MEASURES WILL BE IMPLEMENTED UNTIL PERMANENT EROSION CONTROL MEASURES (PLANT RESTORATION) ARE EFFECTIVE. RECLAMATION PLANTING PER DRAWING 13.1 SHALL BE COMPLETED NO LATER THAN SPRING PLANTING SEASON OF THE YEAR FOLLOWING COMPLETION OF CONSTRUCTION.



RESTORATION / REVEGETATION SCHEDULE

SITE	OBLITERATION OF TEMPORARY ACCESS ROADS	TREATED PROJECT AREA PER DWG 13.1
1	~950 FT OF ACCESS ROAD	~2.2 ACRES
2	~320 FT OF ACCESS ROAD	~0.3 ACRES
3	-	~0.1 ACRES
4	~1,060 FT OF ACCESS ROAD	~0.4 ACRES
6	~120 FT OF ACCESS ROAD	~0.2 ACRES
8	~350 FT OF ACCESS ROAD	~0.4 ACRES
10	~180' FT OF ACCESS ROAD	~0.3 ACRES
11	-	-
12	~240 FT OF ACCESS ROAD	~0.1 ACRES

1 SITE RESTORATION LAYOUT
1" = 400'

DRAFT
PERMIT DRAWINGS

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311 SW Jefferson Avenue
Corvallis, OR 97333
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5098 Hwy 93 South
Victor, MT 59827
406.862.4867

SITE RESTORATION & REVEGETATION

GEREN ISLAND FLOW MAINTENANCE PROJECT

NORTH SANTIAM RIVER, OREGON

NO.	DATE	BY	DESCRIPTION	CHK
-	12/09/13	RB	DRAFT PERMIT	SW

PROJECT NUMBER
RDG-13-042

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13.0

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REVEGETATION NOTES

GENERAL NOTES

1. ALL PLANT MATERIAL MUST BE CLASSIFIED AS NATIVE FROM THIS REGION AND NON-CLONAL IN ORIGIN. ALL NATIVE PLANT MATERIAL TO BE USED IN PLANTING AREAS TO ORIGINATE FROM PARENT SOURCES WITHIN 50 MILES OF SITE. SEED SOURCE MUST BE AS LOCAL AS POSSIBLE.
2. INSTALL TREE AND SHRUB SPECIES IN RANDOM GROUPINGS, AVOIDING LINEAR ROWS OR AS DIRECTED IN FIELD, WITHIN CLOSE PROXIMITY OF EXISTING PLANTINGS OR NEWLY PLANTED MATERIAL. THE INTENT IS TO REPLICATE NATURAL PLANT COMMUNITIES BY PROVIDING A LAYERED UNDERSTORY CANOPY WITH A MIXTURE OF TREES.
3. THE PLANTING AND SEEDING AREA IS TO COVERED WITH TOPSOIL. IF THIS TOPSOIL IS DEEMED BY PROJECT ENGINEER TO BE INADEQUATE, IMPORTED MATERIAL SHALL BE USED TO POCKET PLANT THE PLANTS IN UPLAND, RIPARIAN, EMERGENT, AND WETLAND SITES.
4. THOROUGHLY WATER ALL PLANTS IMMEDIATELY FOLLOWING INSTALLATION TO PROVIDE MAXIMUM SOIL CONTACT AND TO ELIMINATE AIR POCKETS. AFTER PLANTING EACH PLANT, PROVIDE A TWO (2) INCH LAYER OF MULCH AROUND DISTURBED AREA.

WILLOW STAKE PLANTING

1. WILLOW STAKES SHALL HAVE MINIMUM DIAMETER OF 1.5" AND MINIMUM LENGTH 4'. THE STAKES SHALL BE CUT FROM NEARBY PLANTS TO ENSURE COMPATIBILITY IF POSSIBLE, OR LOCAL 'ECOTYPES'. STAKES SHALL HAVE SIDE BRANCHES CLEANLY REMOVED WITH BARK INTACT, BASAL ENDS CUT AT AN ANGLE AND TOPS CUT SQUARE.
2. STAKES SHALL BE CUT AND INSTALLED ON THE SAME DAY.
3. STAKES SHALL BE INSTALLED WHILE IN THE DORMANT STAGE, NOVEMBER 1 TO FEBRUARY 15 IN THE ROGUE VALLEY, UNLESS IRRIGATION IS PROVIDED. STAKES SHOULD BE DEEP ENOUGH TO CONTACT THE LOW SUMMER WATER LEVEL.
4. STAKES SHALL BE INSTALLED ON 2' CENTERS WITH 80% OF THE STAKE LENGTH INSTALLED INTO THE GROUND WITH FIRM SOIL IN CONTACT WITH THE WILLOW STAKE. A PIECE OF REBAR SHOULD BE USED AS A PILOT HOLE FOR THE STAKE.
5. TAMP STAKES INTO GROUND WITH A DEAD BLOW HAMMER (HAMMER HEAD FILLED WITH SHOT OR SAND).
6. WILLOW CLUMPS ARE PREFERRED TO LIVE STAKES ON THE LOWER HALF OF THE STREAMBANK. INSTALL PER NRCS PLANT MATERIALS TECHNICAL NOTE 42.
7. ALTERNATE INSTALLATION PROCEDURES MAY BE USED UPON CONSULTATION WITH RIVER DESIGN GROUP PROJECT ENGINEER.

WILLOW CLUMP PLANTING

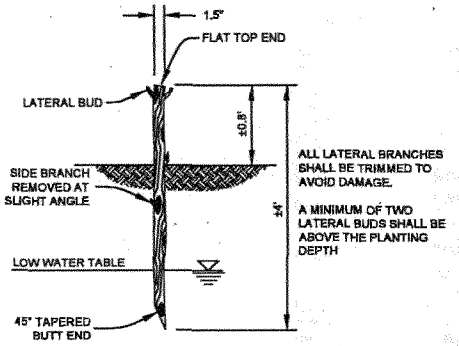
1. WILLOW CLUMPS SHALL BE SALVAGED FROM THE EXCAVATED CHANNEL AREA. FILL IN ANY HOLES WHERE DONOR CLUMPS ARE EXTRACTED IF OUTSIDE THE CHANNEL EXCAVATION LIMITS.
2. WILLOW CLUMP PLANTINGS SHALL FOLLOW THE NATURAL RESOURCE CONSERVATION SERVICE (NRCS) PLANT MATERIALS TECHNICAL NOTE 42 (2003).
3. LOCATE AND UTILIZE YOUNG AND VIGOROUS (8' - 20' TALL) WILLOW CLUMPS IN CONSULTATION WITH THE PROJECT ENGINEER. DIG THE WILLOW CLUMP UTILIZING A TRACKHOE BUCKET AND OBTAIN AT LEAST 75% OF THE ROOT MASS. DO NOT ALLOW CLUMPS TO SIT MORE THEN 1 HOUR OR DRY OUT. TRANSPORT CLUMPS TO PLANTING SITE.
4. DIG A HOLE UTILIZING THE TRACKHOE BUCKET TO THE SAME SIZE AND SHAPE OF THE CLUMP. HOLE SHALL BE TO A DEPTH JUST ABOVE THE STANDING WATER TABLE AND NOT INTO THE WATER TABLE. PACK THE SOIL FIRMLY IN THE EXCAVATED HOLE UPON INSTALLATION.
5. AFTER INSTALLATION, CUT OFF APPROXIMATELY 33%-50% OF THE WILLOW TOPS STRAIGHT ACROSS. WILLOW CLUMPS SHALL BE PLACED APPROXIMATELY 15 FEET APART.

SOD & SOIL SALVAGE

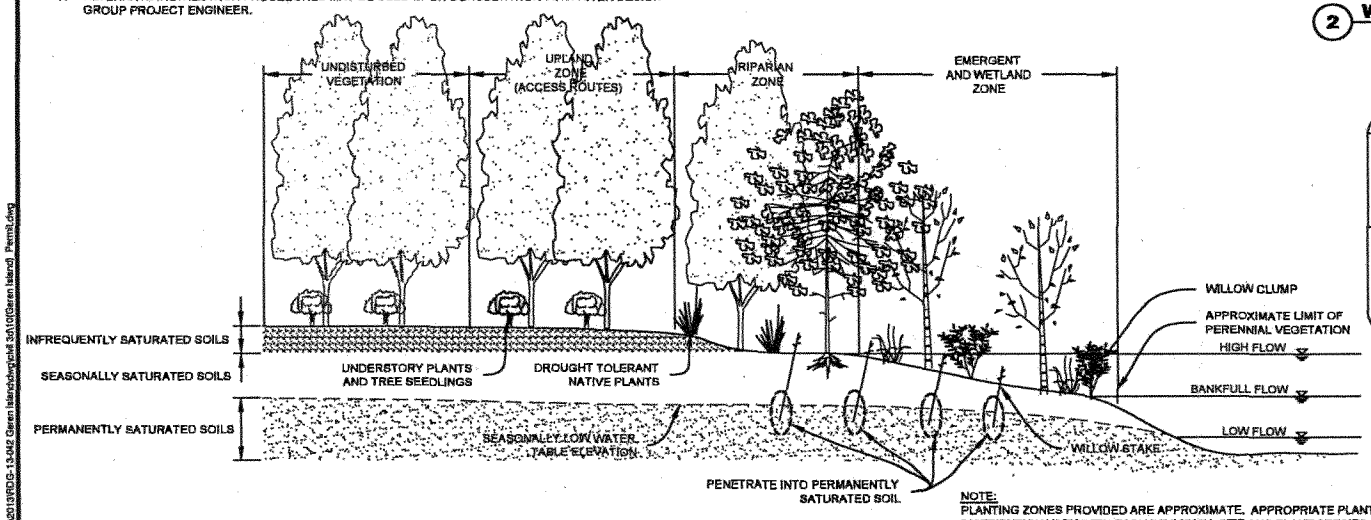
FLOODPLAIN SOD AND SOIL SHALL BE SALVAGED TO THE MAXIMUM EXTENT PRACTICABLE IN AREAS THAT ARE TO BE DISTURBED. SOD AND SOIL SHALL BE TRANSPORTED AND STOCKPILED AT A CONVENIENT LOCATION DETERMINED BY THE PROJECT ENGINEER AND CLEARLY FLAGGED. STOCKPILE SHALL BE IRRIGATED ON A REGULAR BASIS AS NECESSARY TO MAINTAIN MOISTURE IN THE SOD AND SOIL. THE SOD AND SOIL SHALL BE USED TO COVER DISTURBED AREAS OR AS DIRECTED BY THE FIELD ENGINEER TO PREPARE AREAS FOR PLANTING. TRANSPLANTED SOD AND SOIL SHALL BE TRACKED OVER WITH AN EXCAVATOR AND GAPS BETWEEN SOD STRIPS SHALL BE FILLED WITH NATIVE SOILS AND SEEDED WITH A NATIVE SEED MIX.

EROSION CONTROL SEEDING

ALL DISTURBED AREAS SHALL BE BROADCAST SEEDED WITH AN "EROSION CONTROL" SEED MIX AND COVERED WITH STERILE STRAW. AREAS SHALL BE BROADCAST SEEDED WITH A SEED MIX CONTAINING NATIVE SEED (SEE RIPARIAN REVEGETATION SCHEDULE THIS SHEET) AND STERILE CEREAL RYES. THIS SHALL BE ACCOMPLISHED WITH A HAND/BROADCAST SEEDING METHOD AND THE SEED SHALL BE RAKED ONE QUARTER (.25) INCH INTO THE SOIL AND COMPACTED WITH A 5,000 POUND OR LESS TRACKED VEHICLE AND THEN COVERED WITH STERILE STRAW. THE MINIMUM APPLICATION RATE WILL BE THE MANUFACTURER'S RATE OR 30 LBS PER ACRE. CONTRACTOR WILL PROVIDE SEED MIX CONSTITUENTS TO PROJECT INSPECTOR FOR APPROVAL.



2 **WILLOW STAKING DETAIL**
NOT TO SCALE



1 **PLANTING GUIDELINES**
NOT TO SCALE

NOTE:
PLANTING ZONES PROVIDED ARE APPROXIMATE. APPROPRIATE PLANT SPECIES AND DISTRIBUTION VARY WITH EACH INDIVIDUAL SITE AND PLANT SPECIES CHARACTERISTICS.

RIPARIAN REVEGETATION SCHEDULE

	COMMON NAME	SIZE	INSTALLATION
SHRUBS	RED-OSIER DOGWOOD	2 TO 5 GALLON	±60/ACRE
	SNOW BERRY	2 TO 5 GALLON	±60/ACRE
	ROSE	1 GALLON	±60/ACRE
NATIVE SEED	RED FESCUE	SEED	7 LBS/ACRE
	BLUE WILDRYE	SEED	15 LBS/ACRE

DRAFT
PERMIT DRAWINGS

RIVER DESIGN GROUP, INC.
5098 Hwy 99 South
White City, OR 97503
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REVEGETATION NOTES
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NORTH SANTIAM RIVER, OREGON

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