Technical Memo

WEST Consultants, Inc.
2601 25th St. SE
Suite 450
Salem, OR 97302-1286
(503) 485 5490
(503) 485-5491 Fax
www.westconsultants.com

To: Denise Kai
Assistant Parks and Recreation Director

Company: City of Oregon City

Date: December 4, 2015

Cc: Jeff Smith, P.E., Oregon State Marine Board
Raymond Lanham, P.E., Oregon State Marine Board
Curt Vanderzanden, P.E., KPFF

From: Hans R. Hadley, P.E., CFM
Senior Hydraulic Engineer

Subject: Clackamette Park Boat Ramp Replacement Design Alternatives

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Introduction and Background

As part of the Clackamette Park Boat Ramp Hydrology Evaluation, WEST Consultants, Inc. (WEST) and KPFF Consulting Engineers, Inc. (KPFF) were tasked with developing a long-term solution to the on-going erosion issues at the boat ramp. A boat ramp has been at the Clackamette Park site since the 1970's. The current ramp was built in 1998 to bring the ramp into compliance with current design standards. A follow up repair to correct faulty construction was conducted in 2001 which also included the installation of pile supported docks. The docks were reconfigured several times and eventually removed all together as a result of repeated damages by debris during high flows.

In 2011, the lower two precast planks experienced minor separation, likely the result of erosion near the toe of the ramp. In December 2013, the ramp experienced significant erosion of the surrounding bed material, displacement of riprap, further displacement of the lower precast planks located on the upstream side of the ramp, and undermining of multiple precast planks along the downstream side of the ramp. The displaced planks were put back into position and additional riprap was added in an effort to prevent further erosion. However, the undermined

portion of the planks was not repaired and two of the planks along the upstream side of the ramp are currently displaced. This condition was observed during a recent site visit by me and Mr. Vanderzanden (KPFF) and during subsequent underwater video inspection.

Review of historic aerial photography, observation of current morphologic conditions in the channel, and results of 2-dimensional hydraulic modeling indicate that the river is likely to continue to migrate southward toward the existing ramp. The gravel bar located directly across from the ramp, along the north side of the channel, is continuing to enlarge and is therefore likely to continue to direct the river's main flow toward the south, directly at the existing ramp. This condition not only increases the potential for future damage but also increases the difficulty for boaters while using the ramp.

Designs for the repair of the existing ramp are nearly complete. The repair work includes the removal and resetting of the existing undamaged planks, replacement of missing compacted gravel fill, the replacement of damaged planks with new precast planks, a cast-in-place reinforced concrete closure pour, and additional riprap protection. The repair is expected to last for at least 5 years while the design for the permanent repair/replacement is conducted. During the kickoff meeting site visit which included me, yourself, Mr. Smith (OSMB), Mr. Lanham (OSMB), Mr. Vanderzanden (KPFF), and Mr. Milkowski (KPFF) it was agreed that the permanent solution should be a replacement ramp located approximately 350 ft +/- downstream from the existing ramp. This proposed location appears to be located sufficiently downstream of the gravel bar to be beyond its hydraulic influence. Further, this portion of the south bank is protected by a rock riprap revetment that should help prevent the southward migration of the channel. Locating the ramp further downstream would increase its exposure to large woody debris that is carried by the Willamette River during high flow events and further separate the ramp from the parking lot.

Concept Level Design Options

Two initial design options were presented to the City and Oregon State Marine Board. Option 1 includes a 40-ft wide ramp that is angled downstream approximate 30 degrees from perpendicular. Option 2 includes a 40-ft wide ramp that is oriented perpendicular to the bank. Both options include pile supported boarding floats located along the upstream side of the ramp, a two-way two-lane road to allow vehicular traffic to access the ramp, a new ready area, and new handicap trailer-length parking stalls. The tie-down area is retained in its current location and the existing parking lot incurs minor associated modifications. The existing ramp will be removed under both options. Conceptual designs for Options 1 and 2 are included in **Appendix A**.

Following review by the Oregon State Marine Board, a third and fourth option were developed. Option 3 includes a 46.5-ft wide 2-lane ramp with pile supported boarding floats located along the centerline of the ramp. The design of the access road and related amenities is similar to those shown in Option 1. Option 4 includes the same 46.5-ft wide 2-lane ramp and pile supported boarding float configuration but utilizes a one-way access loop road that incorporates a new ready area, new handicap trailer-length parking stalls, and a new tie-down area. This option was recommended by the Oregon State Marine Board to improve traffic flow and reduce congestion

both at the ramp and in the existing parking lot. Both options include minor associated modifications to the existing parking lot and removal of the existing ramp. Conceptual designs for Options 3 and 4 are included in **Appendix A**.

Concept Level Cost Estimates

Estimated concept level costs for Options 1-4 are summarized in Table 1.

Table 1. Concept-Level Estimated Construction Costs

Design Alternative	Construction Cost
Option 1	$878,200
Option 2	$877,300
Option 3	$922,700
Option 4	$964,700

Detailed estimates are provided in **Appendix B**. As seen in Appendix B, the estimated costs include a $50,000 credit for reuse of the riprap from the existing ramp that will be used to help protect the proposed ramp.

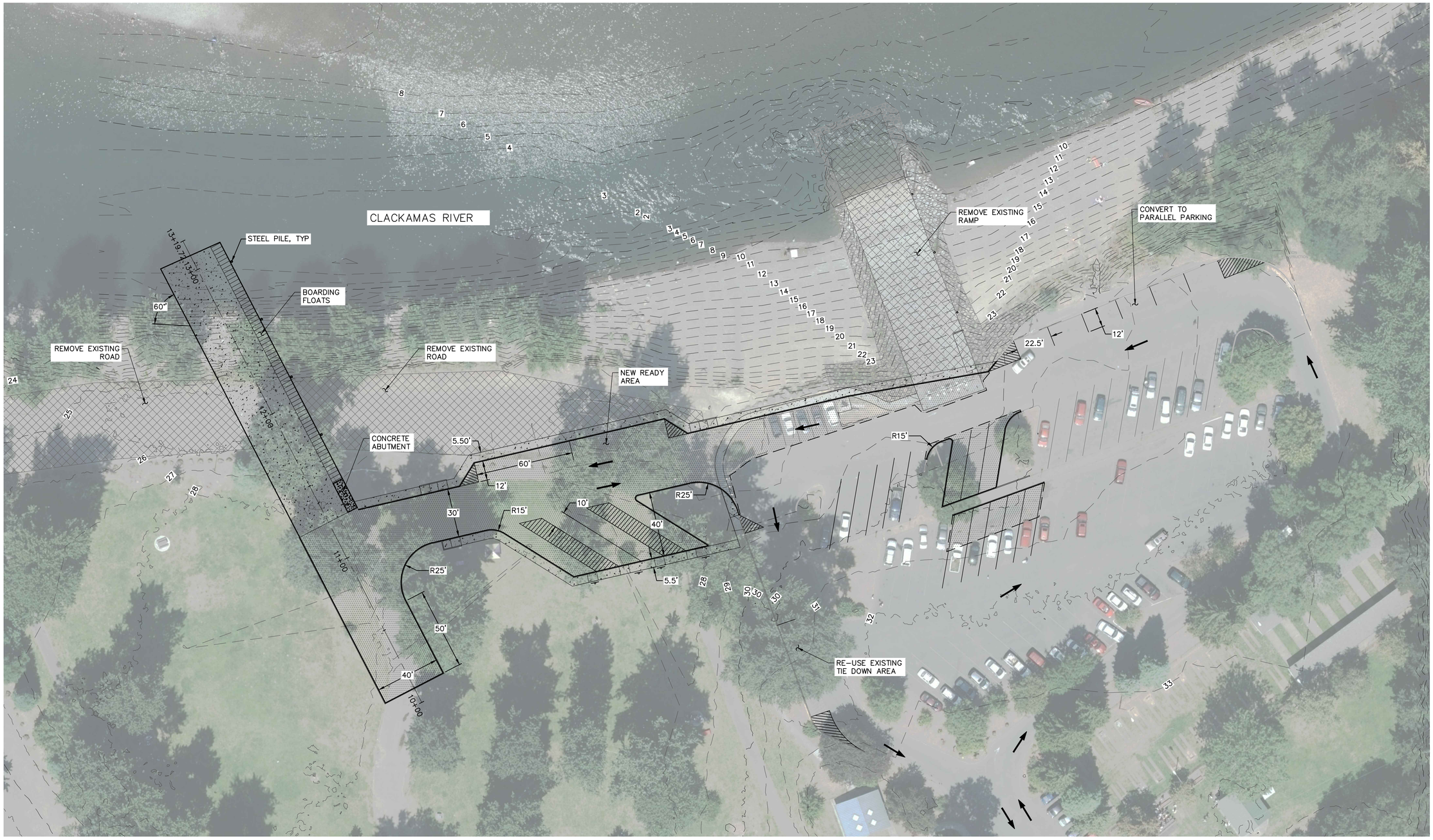
Recommendations

Although it has the highest cost, Option 4 is recommended for the replacement ramp. It provides a two-lane ramp with central docks that can reduce wait times during peak usage periods and a one-way loop access road that will help reduce congestion both at the ramp and in the existing parking lot.

I look forward to your decision on the preferred option for the replacement ramp so that we may develop the requested 30-percent level design and cost estimate.

If you have any questions, please do not hesitate to contact me at 503-485-5490.

APPENDIX A
Concept-Level Designs



SHEET LEGEND

- REMOVALS
- STANDARD ASPHALT PAVEMENT
- CONCRETE
- CONCRETE RAMP ABUTMENT
- SAWCUT

SCALE 1 INCH = 30 FEET
30 0 30 60

kpff
111 SW Fifth Ave., Suite 2500
Portland, OR 97204
O: 503.227.3251
F: 503.274.4681
www.kpff.com

REVISIONS	BY
DATE	

FILE PATH:
FILE NAME:

APPROVED: BOATING FACILITIES MANAGER
FINAL CHECK BY: CV
DESIGNED BY: RM
DRAWN BY: TK
DATE: 10/19/2015
ENGINEER

PRELIMINARY NOT FOR CONSTRUCTION

OREGON CITY

FUTURE RAMP SITE - OPTION 1
AT CLACKAMETTE PARK, CLACKAMAS RIVER MILE 0.2
FOR THE CITY OF OREGON CITY

CITY OF OREGON CITY

1 SHEET | 4 OF

EXH-1
DRAWING NO.

File: N:\c\p\2015\315171-Clackamette-Park-Boat-Ramp\CAD\PLOT\Exhibits\5171-EXH-RAMP.dwg TAB:EXH-1
Plotted: 11/12/15 at 9:30am By: dfraley
XREFs: 5171xsv 5171xtb 5171xst - future

CLACKAMAS RIVER

2+93.82

BOARDING FLOATS

REMOVE EXISTING ROAD

REMOVE EXISTING ROAD

PROPOSED READY AREA

REMOVE EXISTING RAMP

CONVERT TO PARALLEL PARKING

STEEL PILE, TYP

CONCRETE ABUTMENT

R25'

R15'

60'

12'

12'

30'

10'

40'

5.5'

12+00

11+00

10+00

50'

40'

RE-USE EXISTING TIE DOWN AREA

SHEET LEGEND

- REMOVALS
- STANDARD ASPHALT PAVEMENT
- CONCRETE
- CONCRETE RAMP ABUTMENT
- SAWCUT

SCALE 1 INCH = 30 FEET

30 0 30 60

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FINAL CHECK BY: CV

DESIGNED BY: RM

DRAWN BY: TK

DATE: 10/19/2015

PRELIMINARY NOT FOR CONSTRUCTION

ENGINEER

OREGON CITY

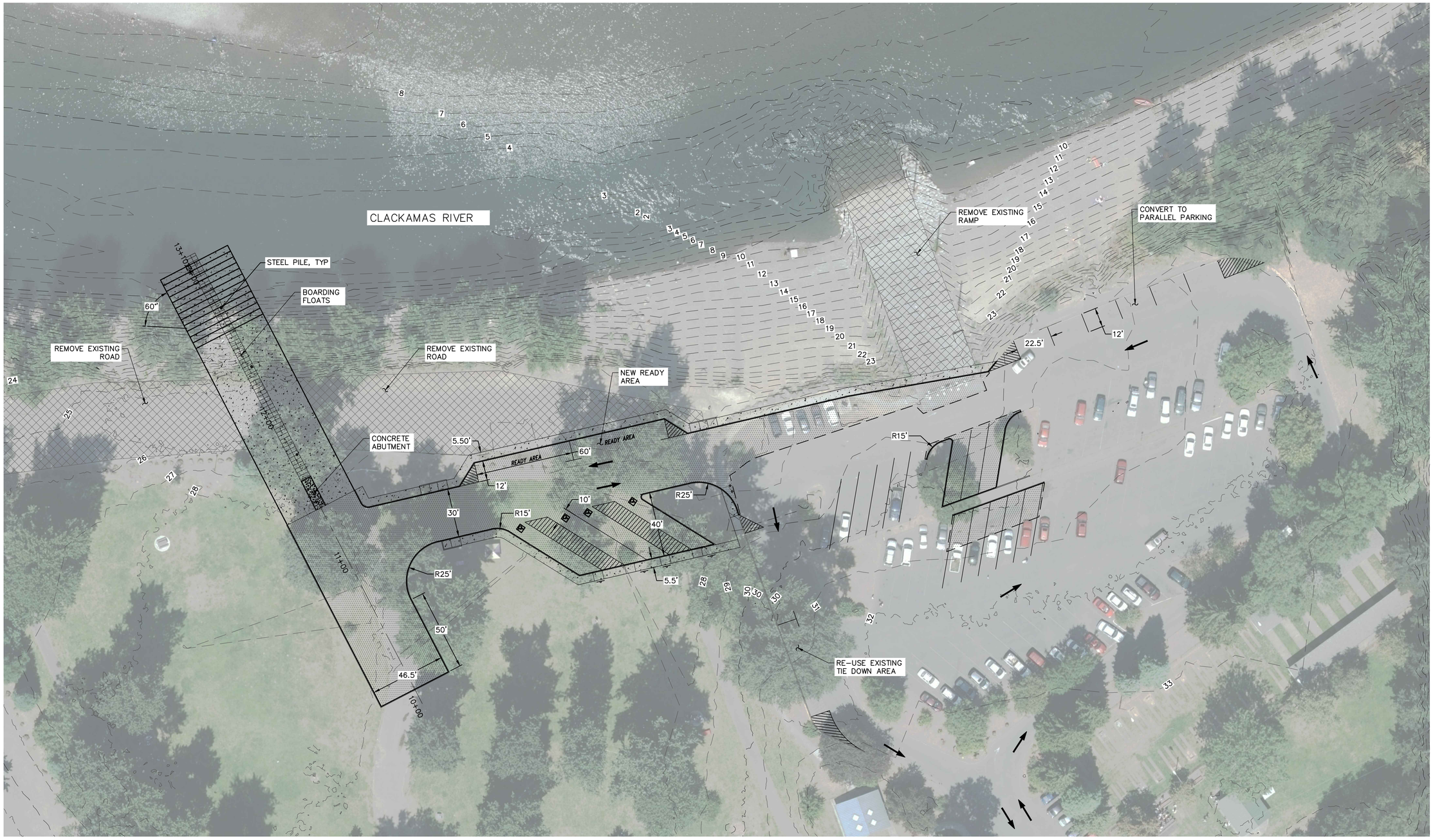
FUTURE RAMP SITE - OPTION 2
AT CLACKAMETTE PARK, CLACKAMAS RIVER MILE 0.2
FOR THE CITY OF OREGON CITY

CITY OF OREGON CITY

SHEET	OF
3	4

EXH-3
DRAWING NO.

File: N:\c\p\2015\315171-Clackamette-Park-Boat-Ramp\CAD\PLOT\Exhibits\5171-EXH-RAMP.dwg TAB:EXH-3
Plotted: 11/12/15 at 9:32am By: dfraley
XREFs: 5171xsv 5171xtb 5171xst - future



SHEET LEGEND

- REMOVALS
- STANDARD ASPHALT PAVEMENT
- CONCRETE
- CONCRETE RAMP ABUTMENT
- SAWCUT

SCALE 1 INCH = 30 FEET
30 0 30 60

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APPROVED: BOATING FACILITIES MANAGER
FINAL CHECK BY: CV
DESIGNED BY: RM
DRAWN BY: TK
DATE: 12/02/2015

PRELIMINARY NOT FOR CONSTRUCTION
ENGINEER

OREGON CITY

FUTURE RAMP SITE - OPTION 3
AT CLACKAMETTE PARK, CLACKAMAS RIVER MILE 0.2
FOR THE CITY OF OREGON CITY

CITY OF OREGON CITY

1 SHEET | 3 OF

EXH-1
DRAWING NO.

File: N:\c\p\2015\315171-Clackamette-Park-Boat-Ramp\CAD\PLOT\Exhibits\5171-EXH-RAMP.dwg TAB:EXH-1
Plotted: 12/3/15 at 9:11am By: ryanm
XREFs: 5177xsv 5171xtb 5177xst - future

CLACKAMAS RIVER

BOARDING FLOATS

REMOVE EXISTING ROAD

REMOVE EXISTING ROAD

PROPOSED READY AREA

STEEL PILE, TYP

CONCRETE ABUTMENT

13+10 BEND

12'-00"

46.5'

R20'

R5'

29'

50'

10'

46.5'

10'-00"

TIE-DOWN AREA

R90'

PROPOSED TIE DOWN AREA

60'

TIE-DOWN AREA

20'

READY AREA

5.5'

12'

60'

READY AREA

20'

R15'

REMOVE EXISTING RAMP

CONVERT TO PARALLEL PARKING

REMOVE EXISTING TIE DOWN AREA

R5'

R20'

20'

SHEET LEGEND

- REMOVALS
- STANDARD ASPHALT PAVEMENT
- CONCRETE
- CONCRETE RAMP ABUTMENT
- SAWCUT

SCALE 1 INCH = 30 FEET

30 0 30 60

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BY					
REVISIONS					
DATE					

FILE PATH:
FILE NAME:

APPROVED: BOATING FACILITIES MANAGER

FINAL CHECK BY: CV

DESIGNED BY: RM

DRAWN BY: TK

DATE: 12/02/2015

PRELIMINARY NOT FOR CONSTRUCTION

ENGINEER

OREGON CITY

FUTURE RAMP SITE - OPTION 4
AT CLACKAMETTE PARK, CLACKAMAS RIVER MILE 0.2
FOR THE CITY OF OREGON CITY

CITY OF OREGON CITY

SHEET	OF
2	3

EXH-2
DRAWING NO.

File: N:\c\p\2015\315171-Clackamette-Park-Boat-Ramp\CAD\PLOT\Exhibits\5171-EXH-RAMP.dwg TAB:EXH-2
Plotted: 12/3/15 at 9:13am By: ryanm
XREFs: 5171xsv 5171xtb 5177xst - future

DRAFT

APPENDIX B
Concept-Level Construction Cost Estimates

Boat Launch Ramp Concept Project
Probable Construction Cost - Option 1
13/11/2015

Base Bid

Item	Quantity	Unit	Unit Cost	Total Cost
Mobilization (10%)	1	LS	$ 71,400.00	$ 71,400.00
Project Survey & Layout	1	LS	$ 4,000.00	$ 4,000.00
Erosion Control - Land Side	1	LS	$ 5,000.00	$ 5,000.00
Erosion Control - Silt Curtain	250	LF	$ 10.00	$ 2,500.00
Clearing and Grubbing	1	LS	$ 5,000.00	$ 5,000.00
Removal of Existing Structures	1	LS	$ 15,000.00	$ 15,000.00
Excavation	4100	CY	$ 20.00	$ 82,000.00
Subbase Geotextile Fabric	7400	SF	$ 0.35	$ 2,590.00
Riprap Geotextile Fabric	9670	SF	$ 0.55	$ 5,318.50
6"-0" Aggregate Subbase (Ramp)	530	Tons	$ 40.00	$ 21,200.00
1-1/2"-0" Aggregate Base (Ramp)	270	Tons	$ 40.00	$ 10,800.00
3/4"-0 Aggregate Base (Pavement)	1050	Tons	$ 20.00	$ 21,000.00
Class 700 Riprap	720	CY	$ 85.00	$ 61,200.00
Concrete Abutment	130	SF	$ 55.00	$ 7,150.00
Concrete Sidewalk	3090	SF	$ 15.00	$ 46,350.00
Concrete Curb	1250	LF	$ 20.00	$ 25,000.00
Cast-In-Place Concrete Ramp	5640	SF	$ 15.00	$ 84,600.00
Precast Concrete Planks	1760	SF	$ 30.00	$ 52,800.00
Steel Rail System for Planks	1	LS	$ 35,000.00	$ 35,000.00
12" Steel Pile	4	EA	$ 3,000.00	$ 12,000.00
Wood Boarding Floats	1070	SF	$ 65.00	$ 69,550.00
Asphaltic Concrete	440	Tons	$ 100.00	$ 44,000.00
Landscape Restoration	1	LS	$ 5,000.00	$ 5,000.00
Stormwater Mitigation	1	LS	$ 20,000.00	$ 20,000.00
Striping	1	LS	$ 3,500.00	$ 3,500.00
Boat Ramp Signage	1	LS	$ 1,000.00	$ 1,000.00
ADA Signage	2	EA	$ 500.00	$ 1,000.00
		Subtotal		**$ 713,960.00**

Contingency (30%)	$	214,188.00
Total Estimated Costruction Cost	**$**	**928,200.00**
Riprap Salvage/Reuse	$	(50,000.00)
	$	878,200.00

Boat Launch Ramp Concept Project
Probable Construction Cost - Option 2
13/11/2015

Base Bid

Item	Quantity	Unit	Unit Cost	Total Cost
Mobilization (10%)	1	LS	$ 71,400.00	$ 71,400.00
Project Survey & Layout	1	LS	$ 4,000.00	$ 4,000.00
Erosion Control - Land Side	1	LS	$ 5,000.00	$ 5,000.00
Erosion Control - Silt Curtain	200	LF	$ 10.00	$ 2,000.00
Clearing and Grubbing	1	LS	$ 5,000.00	$ 5,000.00
Removal of Existing Structures	1	LS	$ 15,000.00	$ 15,000.00
Excavation	4600	CY	$ 20.00	$ 92,000.00
Subbase Geotextile Fabric	6960	SF	$ 0.35	$ 2,436.00
Riprap Geotextile Fabric	10020	SF	$ 0.55	$ 5,511.00
6"-0" Aggregate Subbase (Ramp)	490	Tons	$ 40.00	$ 19,600.00
1-1/2"-0" Aggregate Base (Ramp)	250	Tons	$ 40.00	$ 10,000.00
3/4"-0 Aggregate Base (Pavement)	1050	Tons	$ 20.00	$ 21,000.00
Class 700 Riprap	760	CY	$ 85.00	$ 64,600.00
Concrete Abutment	130	SF	$ 55.00	$ 7,150.00
Concrete Sidewalk	3310	SF	$ 15.00	$ 49,650.00
Concrete Curb	1300	LF	$ 20.00	$ 26,000.00
Cast-In-Place Concrete Ramp	5360	SF	$ 15.00	$ 80,400.00
Precast Concrete Planks	1600	SF	$ 30.00	$ 48,000.00
Steel Rail System for Planks	1	LS	$ 35,000.00	$ 35,000.00
12" Steel Pile	3	EA	$ 3,000.00	$ 9,000.00
Wood Boarding Floats	1000	SF	$ 65.00	$ 65,000.00
Asphaltic Concrete	450	Tons	$ 100.00	$ 45,000.00
Landscape Restoration	1	LS	$ 5,000.00	$ 5,000.00
Stormwater Mitigation	1	LS	$ 20,000.00	$ 20,000.00
Striping	1	LS	$ 3,500.00	$ 3,500.00
Boat Ramp Signage	1	LS	$ 1,000.00	$ 1,000.00
ADA Signage	2	EA	$ 500.00	$ 1,000.00
		Subtotal		**$ 713,250.00**

Contingency (30%)	$ 213,975.00
Total Estimated Costruction Cost	**$ 927,300.00**
Riprap Salvage/Reuse	$ (50,000.00)
	$ 877,300.00

Boat Launch Ramp Concept Project
Probable Construction Cost - Option 3
24/11/2015

Base Bid

Item	Quantity	Unit	Unit Cost	Total Cost
Mobilization (10%)	1	LS	$ 74,900.00	$ 74,900.00
Project Survey & Layout	1	LS	$ 4,000.00	$ 4,000.00
Erosion Control - Land Side	1	LS	$ 5,000.00	$ 5,000.00
Erosion Control - Silt Curtain	250	LF	$ 10.00	$ 2,500.00
Clearing and Grubbing	1	LS	$ 5,000.00	$ 5,000.00
Removal of Existing Structures	1	LS	$ 15,000.00	$ 15,000.00
Excavation	4650	CY	$ 20.00	$ 93,000.00
Subbase Geotextile Fabric	7680	SF	$ 0.35	$ 2,688.00
Riprap Geotextile Fabric	9940	SF	$ 0.55	$ 5,467.00
6"-0" Aggregate Subbase (Ramp)	540	Tons	$ 40.00	$ 21,600.00
1-1/2"-0" Aggregate Base (Ramp)	270	Tons	$ 40.00	$ 10,800.00
3/4"-0 Aggregate Base (Pavement)	1110	Tons	$ 20.00	$ 22,200.00
Class 700 Riprap	820	CY	$ 85.00	$ 69,700.00
Concrete Abutment	130	SF	$ 55.00	$ 7,150.00
Concrete Sidewalk	3110	SF	$ 15.00	$ 46,650.00
Concrete Curb	1300	LF	$ 20.00	$ 26,000.00
Cast-In-Place Concrete Ramp	5441	SF	$ 15.00	$ 81,615.00
Precast Concrete Planks	2232	SF	$ 25.00	$ 55,800.00
Steel Rail System for Planks	1	LS	$ 35,000.00	$ 35,000.00
12" Steel Pile	4	EA	$ 3,000.00	$ 12,000.00
Wood Boarding Floats	1010	SF	$ 65.00	$ 65,650.00
Asphaltic Concrete	460	Tons	$ 100.00	$ 46,000.00
Landscape Restoration	1	LS	$ 5,000.00	$ 5,000.00
Stormwater Mitigation	1	LS	$ 30,000.00	$ 30,000.00
Striping	1	LS	$ 3,500.00	$ 3,500.00
Boat Ramp Signage	1	LS	$ 1,000.00	$ 1,000.00
ADA Signage	2	EA	$ 500.00	$ 1,000.00
		Subtotal		**$ 748,220.00**

Contingency (30%)	$	224,466.00
Total Estimated Costruction Cost	**$**	**972,700.00**
Riprap Salvage/Reuse	$	(50,000.00)
	$	922,700.00

Boat Launch Ramp Concept Project
Probable Construction Cost - Option 4
24/11/2015

Base Bid

Item	Quantity	Unit	Unit Cost	Total Cost
Mobilization (10%)	1	LS	$ 78,100.00	$ 78,100.00
Project Survey & Layout	1	LS	$ 4,000.00	$ 4,000.00
Erosion Control - Land Side	1	LS	$ 5,000.00	$ 5,000.00
Erosion Control - Silt Curtain	250	LF	$ 10.00	$ 2,500.00
Clearing and Grubbing	1	LS	$ 5,000.00	$ 5,000.00
Removal of Existing Structures	1	LS	$ 15,000.00	$ 15,000.00
Excavation	4600	CY	$ 20.00	$ 92,000.00
Subbase Geotextile Fabric	7680	SF	$ 0.35	$ 2,688.00
Riprap Geotextile Fabric	10210	SF	$ 0.55	$ 5,615.50
6"-0" Aggregate Subbase (Ramp)	540	Tons	$ 40.00	$ 21,600.00
1-1/2"-0" Aggregate Base (Ramp)	270	Tons	$ 40.00	$ 10,800.00
3/4"-0 Aggregate Base (Pavement)	1120	Tons	$ 20.00	$ 22,400.00
Class 700 Riprap	820	CY	$ 85.00	$ 69,700.00
Concrete Abutment	130	SF	$ 55.00	$ 7,150.00
Concrete Sidewalk	4430	SF	$ 15.00	$ 66,450.00
Concrete Curb	1770	LF	$ 20.00	$ 35,400.00
Cast-In-Place Concrete Ramp	5441	SF	$ 15.00	$ 81,607.50
Precast Concrete Planks	2232	SF	$ 25.00	$ 55,800.00
Steel Rail System for Planks	1	LS	$ 35,000.00	$ 35,000.00
12" Steel Pile	4	EA	$ 3,000.00	$ 12,000.00
Wood Boarding Floats	1010	SF	$ 65.00	$ 65,650.00
Asphaltic Concrete	470	Tons	$ 100.00	$ 47,000.00
Landscape Restoration	1	LS	$ 5,000.00	$ 5,000.00
Stormwater Mitigation	1	LS	$ 30,000.00	$ 30,000.00
Striping	1	LS	$ 3,500.00	$ 3,500.00
Boat Ramp Signage	1	LS	$ 1,000.00	$ 1,000.00
ADA Signage	1	EA	$ 500.00	$ 500.00
		Subtotal		**$ 780,470.00**

Contingency (30%)	$ 234,141.00
Total Estimated Costruction Cost	**$ 1,014,700.00**
Riprap Salvage/Reuse	$ (50,000.00)
	$ 964,700.00