

## **Attachment B**

### **Final Recommended Projects**

Given that there were some constraints and limited budget to do more than one large project, the Zoo and BES agreed to construct the following recommended projects with the EPA Innovative Wet Weather Facilities grant monies.

The list of recommended projects is as follows:

1. Parking Lot Bioswales P2 B (Field evaluation on page 95)
2. Crossroads Options 170 A&D (Field evaluations on pages 62 & 65)
3. Elephant Kiosks Disconnect 190 B & C (Field evaluations on pages 68 & 69)
4. Ranger Basecamp 210 A (Field evaluation on page 70)
5. Samburu Crossing 220 B (Field evaluation on page 73)

### **Priorities, Costs and Assumptions**

Project 1 is a priority for BES as it significantly reduces the impact to the city's stormwater system, particularly relating to work on the Tanner Phase 3 stream separation project. It is assumed that at least \$100,000 (of the \$200,000 EPA Innovative Wet Weather Program monies) will be put toward the construction of the Parking Lot Bioswales. BES and the Oregon Zoo are pursuing additional funding in order to fully fund the design and construction of the Parking Lot Bioswale project as proposed on the following pages. Depending upon the results of the formal bid and if additional funding is secured, the proposed design for project 1 may be scaled back to reflect the available funding.

The total design and construction costs for projects 2 through 5 will also come from the \$200,000 EPA Innovative Wet Weather Program monies. However, the results of the formal bid process for these projects will determine whether all or some of projects 2 through 5 will be constructed. Once that decision is made, any additional money left over from the design and construction of these projects will go toward the design and construction of the Parking Lot Bioswales (project no. 1).

It should be noted that the costs developed for each of the recommended projects (located on the following pages) are at a conceptual level, since no design work has been developed for the projects. The conceptual cost estimates may therefore range plus or minus 30 percent in accuracy. Costs for each of the recommended projects were developed assuming each project would be constructed separately, and as a public bid. Cost savings could be achieved if projects were constructed simultaneously.

More detailed descriptions of each of the recommended projects can be found on the following pages.

## AFRICAFE STORMWATER FEATURE

For additional project information, see field evaluation worksheet on page 62

There are multiple options to address the drainage issues at the Crossroads area at the top of the Zoo amphitheater. The main issues to be addressed include a large expanse of walkway draining to this area, insufficient drainage capacity at the Africafe stairs, and desire to retain the existing space uses. A combination of two projects has been recommended for the Crossroads area that will address existing drainage issues and preserve current space uses, Project 170A and Project 170D. Project 170A uses a collector French drain and routes water into a series of cascading features in the existing vegetation planters. The water will over flow into the existing patio drain at the lowest terrace of Africafe.

## FACILITY SIZING

The sizes of existing planters are listed below.

Planter 1 (southern): approximately 370 sf

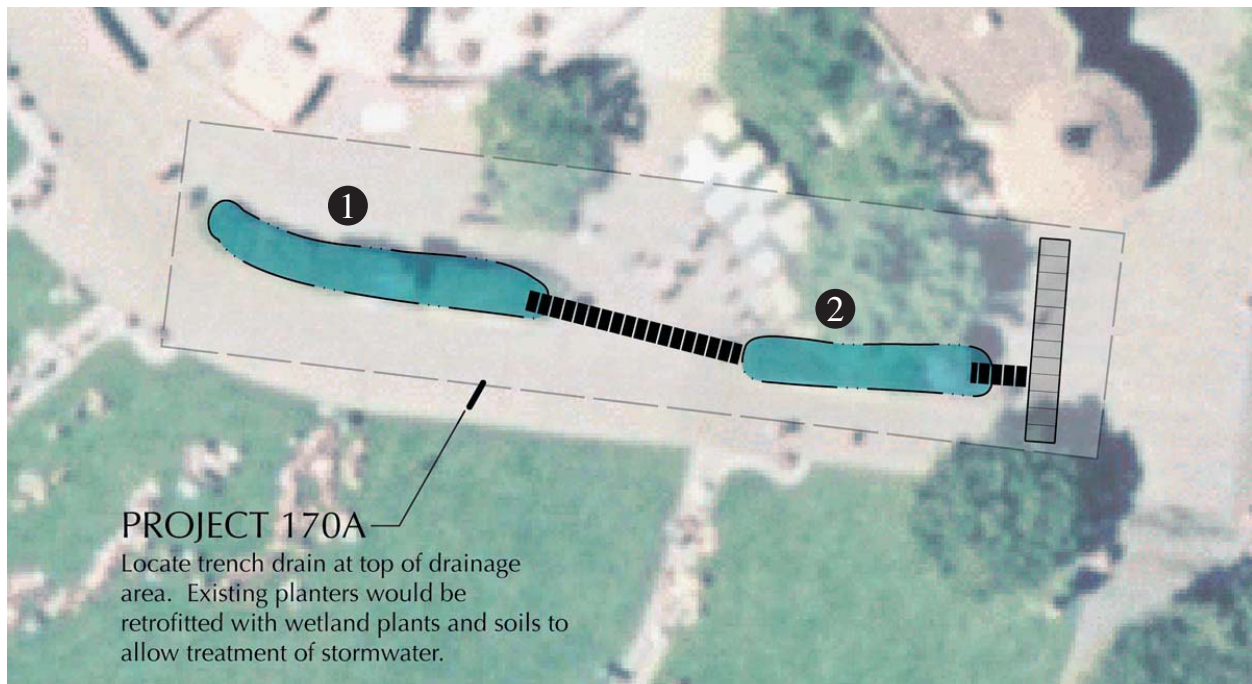
Planter 2 (northern): approximately 340 sf

Area treated (ac) ..... 0.24  
Sizing Factor\* ..... 0.06 (flow-through planters)  
Required Facility Surface Area (sf) ..... 628 (divided into 2 existing planters)

Total area of 710 sf exceeds necessary required facility area by approx. 1/8. Assume a french drain 20 feet long.

\* Sizing of stormwater facility is based on the City of Portland Stormwater Manual, Simplified Approach, September 2002

## FACILITY CONCEPT PLAN



## AFRICAFE STORMWATER FEATURE

For additional project information, see field evaluation worksheet on page 62

Basin  
**170**  
Project  
**A**



### CONCEPTUAL COST ESTIMATE

CSI Section	Item	Quantity	Unit	Unit Cost	Extended Cost	Remarks
<b>01000</b>	<b>MOBILIZATION</b>					
	Small Site	1	LS	1000	\$1,000	
<b>02200</b>	<b>SITE PREPARATION &amp; DEMOLITION</b>					
	Clearing and Grubbing	750	SF	\$1.00	\$750	
	Sawcut A/C	40	LF	\$0.95	\$500	\$500 minimum.
	Demo Existing Conc Paving	1	LS	\$500.00	\$500	
	Misc. Site Demo	1	LS	\$500.00	\$500	
	Excavation	50	CY	\$15.00	\$750	Remove 2ft. of existing soil.
<b>02300</b>	<b>EARTHWORK</b>					
	Finish Grading	1	LS	\$350.00	\$350	
<b>02600</b>	<b>DRAINAGE</b>					
	Trench Drain	20	LF	\$100.00	\$2,000	
	Drain Rock	12	CY	\$25.00	\$300	6" depth
	Perforated Pipe	250	LF	\$1.50	\$375	Connect to existing drainage system
<b>02810</b>	<b>IRRIGATION</b>					
	Fully Automatic Irrigation	750	SF	\$0.75	\$563	
<b>02900</b>	<b>SOIL PREPARATION AND PLANTING</b>					
	Topsoil - imported	26	CY	\$25.00	\$650	1' depth
	Compost	5	CY	\$25.00	\$125	3" depth
	Planting	750	SF	\$0.75	\$563	
<b>Subtotal - Project 170-A</b>					<b>\$8,925</b>	
<b>Subtotal - Project 170-D</b>					<b>\$4,611</b>	
	Design Contingency	15%			\$2,030	
	Construction Contingency	20%			\$2,707	
<b>Total Project Cost</b>					<b>\$18,274</b>	



**NEW STORMWATER BOG**

For additional project information, see field evaluation worksheet on page 65

This facility would use an existing vegetation area to the north of the pavement in conjunction with the proposed facility near the Africafe to manage stormwater in the Crossroads area. Modifying some of the landscaping would be required. Water would be routed by French drain or by speed bump into this vegetated area.

Area treated (ac) ..... 0.11

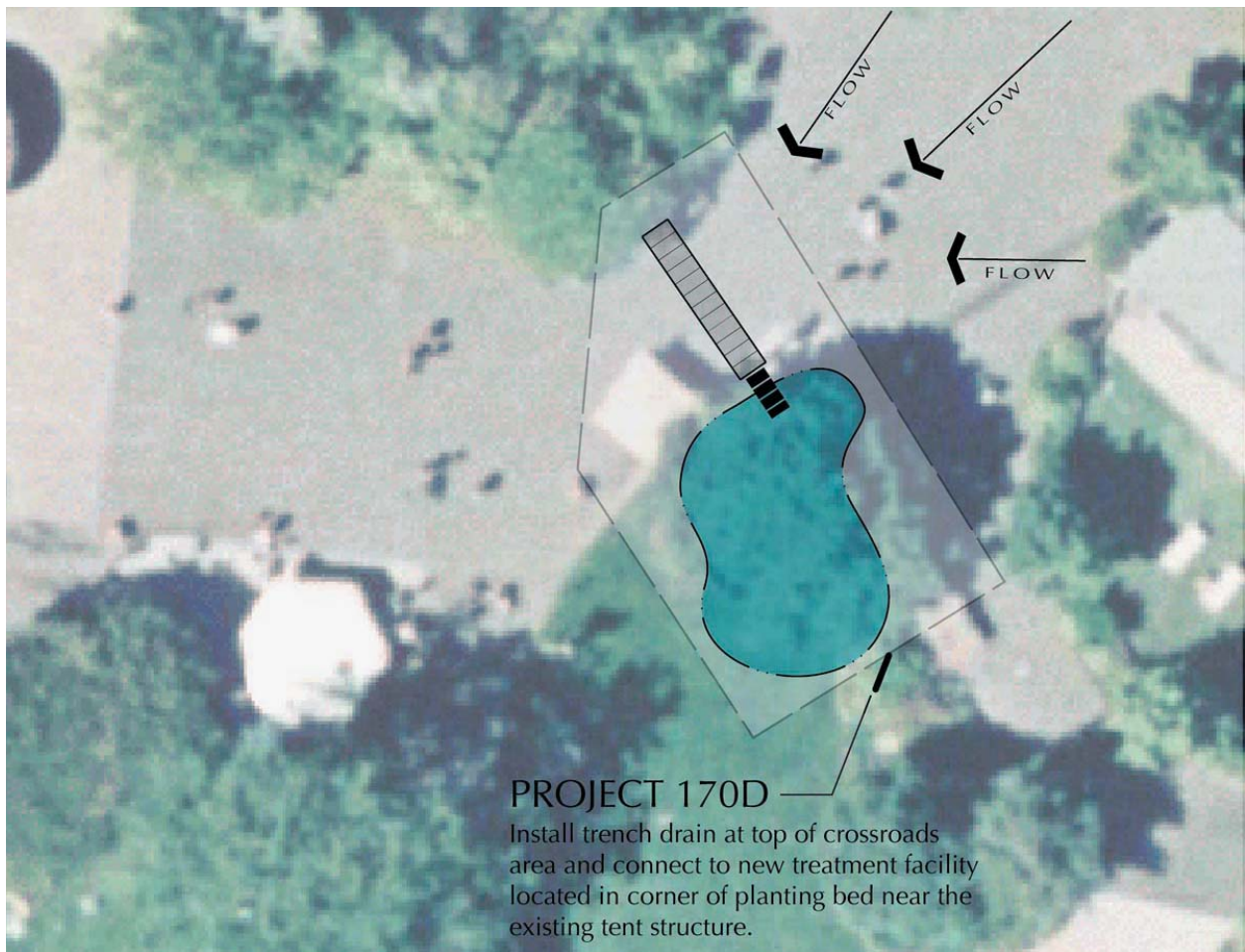
Sizing Factor\*..... 0.09

Required Facility Surface Area (sf) ..... 431

Assume a french drain of 30 feet.

\* Sizing of stormwater facility is based on the City of Portland Stormwater Manual, Simplified Approach, September 2002.

**FACILITY CONCEPT PLAN**



## NEW STORMWATER BOG

For additional project information, see field evaluation worksheet on page 65

Basin  
**170**  
Project  
**D**



### CONCEPTUAL COST ESTIMATE

CSI Section	Item	Quantity	Unit	Unit Cost	Extended Cost	Remarks
<b>02200</b>	<b>SITE PREPARATION &amp; DEMOLITION</b>					
	Clearing and Grubbing	450	SF	\$0.15	\$200	\$200 minimum
	Sawcut A/C	60	LF	\$0.95	\$300	\$300 minimum
	Demo Existing AC Paving	30	SF	\$5.00	\$150	\$250 minimum
	Misc. Site Demo	1	LS	\$500.00	\$500	
	Excavation	30	CY	\$15.00	\$450	Removal of 2 ft. of existing soil.
<b>02300</b>	<b>EARTHWORK</b>					
	Finish Grading for all disturbe	450	SF	\$0.25	\$200	\$200 minimum
<b>02600</b>	<b>DRAINAGE</b>					
	Trench Drain	30	LF	\$100.00	\$3,000	
<b>02810</b>	<b>IRRIGATION</b>					
	Irrigation Rennovation	250	SF	\$0.75	\$188	Rennovate existing system.
<b>02900</b>	<b>SOIL PREPARATION AND PLANTING</b>					
	Topsoil - imported	8	CY	\$25.00	\$200	
	Compost	4	CY	\$25.00	\$100	
	Planting	450	SF	\$0.75	\$338	
<b>Subtotal</b>					<b>\$5,625</b>	Total added to sheet 170-A.

**Assumptions:**

1. Prevailing Wage Labor Rates Apply
2. No donated materials or labor

**ELEPHANT KIOSKS**

For additional project information, see field evaluation worksheet on pages 68 & 69.

This project is a combination of 2 facilities disconnecting the two elephant viewing kiosks. Disconnected flows would run via chains or into rainbarrels before discharging to existing planting beds, with overflow into the elephant exhibit or into the public walkway where drains are located.

Assuming 400 square feet of roof drainage to be treated. Assuming these areas of disconnected to rainbarrels and eventually discharge to a vegetated filter strip.

Planter 1 thru 4: 10' x 10' = 400 total sf

Area treated (ac) ..... 0.01

Sizing Factor\*..... 0.20

Required Facility Surface Area (sf) ..... 80 (divided into 4 existing planters)

Total area of 400 sf exceeds necessary required facility area by 500%.

\* Sizing of stormwater facility is based on the City of Portland Stormwater Manual, Simplified Approach, September 2002.

**FACILITY CONCEPT PLAN**

## ELEPHANT KIOSKS

For additional project information, see field evaluation worksheet on pages 68 & 69.



## CONCEPTUAL COST ESTIMATE

CSI Section	Item	Quantity	Unit	Unit Cost	Extended Cost	Remarks
<b>01000</b>	<b>MOBILIZATION</b>					
	Small Site	1	LS	500	\$500	
<b>02200</b>	<b>SITE PREPARATION &amp; DEMOLITION</b>					
	Misc. Site Demo	1	LS	\$250.00	\$250	
	Excavation	15	CY	\$10.00	\$150	Remove 1ft of existing soil.
<b>02300</b>	<b>EARTHWORK</b>					
	Finish Grading for all disturbe	400	SF	\$0.25	\$100	
<b>02600</b>	<b>DRAINAGE</b>					
	Overflow	4	EA	\$200.00	\$800	Connect to existing drainage system
<b>02900</b>	<b>SOIL PREPARATION AND PLANTING</b>					
	Compost	7	CY	\$25.00	\$175	3" depth
	Planting	400	SF	\$1.25	\$500	
	<b>Subtotal</b>				<b>\$2,475</b>	
	Design Contingency	15%			\$371	
	Construction Contingency	20.0%			\$495	
	<b>Total Project Cost</b>				<b>\$3,341</b>	

### Assumptions:

1. Prevailing Wage Labor Rates Apply
2. No donated materials or labor



## RANGER BASE CAMP

For additional project information, see field evaluation worksheet on page 70

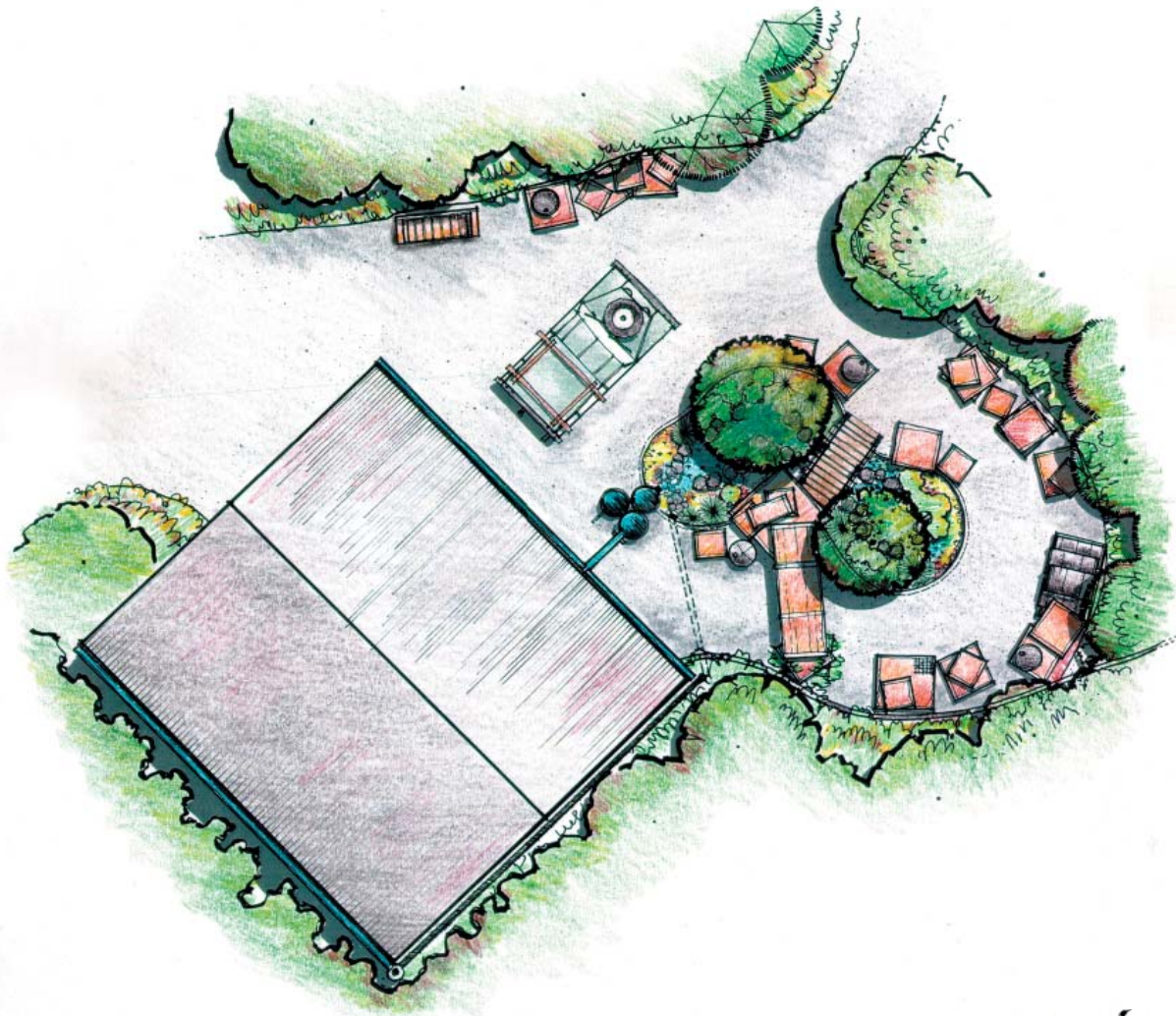
This facility is a downspout disconnection of the existing Ranger station building roof into a newly expanded landscape area to the south. The project could include replumbing of the northern downspout, and aerial gutter extensions with free falling water into the new vegetated facility. The existing vegetation bed would be expanded by at least 2 times its current size. The project would include interesting artistic opportunities for conveyance to the new vegetated area including use of rainbarrels and new vegetation.

Area treated (ac) .....	0.12
Sizing Factor* .....	0.09 (vegetated swale)
Required Facility Surface Area (sf) .....	471

For pavement removal assume existing bed is about 70 sq feet requiring 400 square feet of additional pavement to be removed.

\* Sizing of stormwater facility is based on the City of Portland Stormwater Manual, Simplified Approach, September 2002.

### FACILITY CONCEPT PLAN





## RANGER BASE CAMP

For additional project information, see field evaluation worksheet on page 70

Basin  
**210**  
Project  
**A**



### CONCEPTUAL COST ESTIMATE

CSI Section	Item	Quantity	Unit	Unit Cost	Extended Cost	Remarks
<b>01000</b>	<b>MOBILIZATION</b>					
	Small Site	1	LS	500	\$500	
<b>02200</b>	<b>SITE PREPARATION &amp; DEMOLITION</b>					
	Sawcut Concrete	250	LF	\$0.95	\$500	\$500 minimum
	Demo Existing AC Paving	400	SF	\$0.50	\$200	
	Concrete Repair	1	LS	\$2,000	\$2,000	
	Misc. Site Demo	1	LS	\$500.00	\$500	
	Excavation	7	CY	\$10.00	\$70	Remove 1ft of existing soil.
<b>02600</b>	<b>DRAINAGE</b>					
	Overflow	1	LS	\$500.00	\$500	Connect to existing drainage system
	Downspout Plumbing	1	LS	\$750.00	\$750	Connect to new stormwater facility.
	Rainbarrels	3	EA	\$100.00	\$300	
<b>02810</b>	<b>IRRIGATION</b>					
	Repair / Expansion	400	SF	\$0.75	\$300	
<b>02900</b>	<b>SOIL PREPARATION AND PLANTING</b>					
	Compost	2	CY	\$25.00	\$50	3" depth
	Planting	470	SF	\$5.00	\$2,350	
	<b>Subtotal</b>				<b>\$8,020</b>	
	Design Contingency	15%			\$1,203	
	Construction Contingency	20.0%			\$1,604	
	<b>Total Project Cost</b>				<b>\$10,827</b>	

#### Assumptions:

1. Prevailing Wage Labor Rates Apply
2. No donated materials or labor

## SAMBURU CROSSING

For additional project information, see field evaluation worksheet on page 73

This facility is a downspout disconnection of the existing Samburu building roof into a newly cut drainage trench channeled to the existing vegetated facility to the west. The project would include interesting artistic opportunities for conveyance across the public walkway. Some cover or grate system will be needed.

Area treated (ac) ..... 0.11

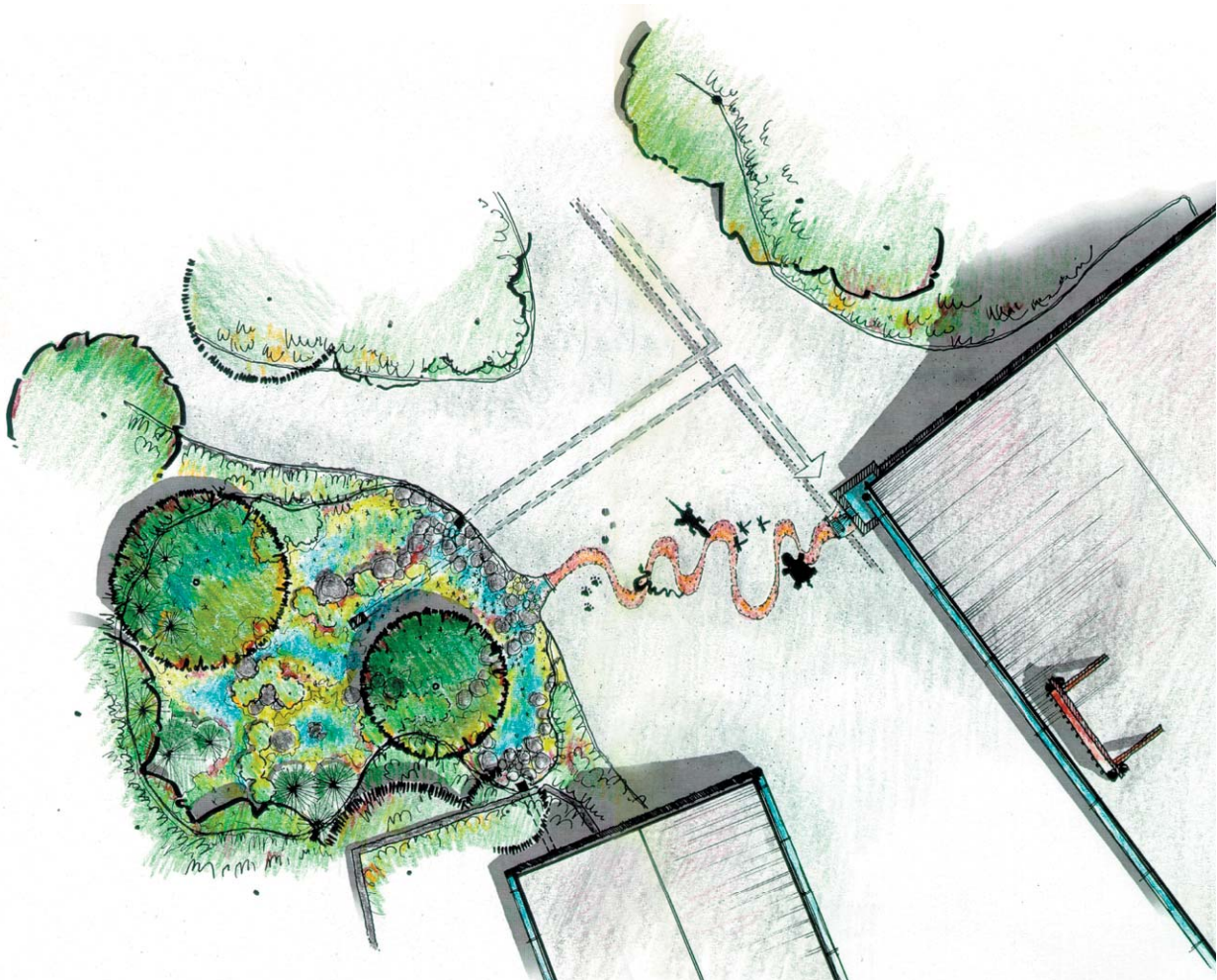
Sizing Factor\* ..... 0.09

Required Facility Surface Area (sf) ..... 432

Given the existing space is about 15 x 30 we have just enough space. For pavement removal assume a 1-foot wide by 30 foot across section or 30 sq feet.

\* Sizing of stormwater facility is based on the City of Portland Stormwater Manual, Simplified Approach, September 2002.

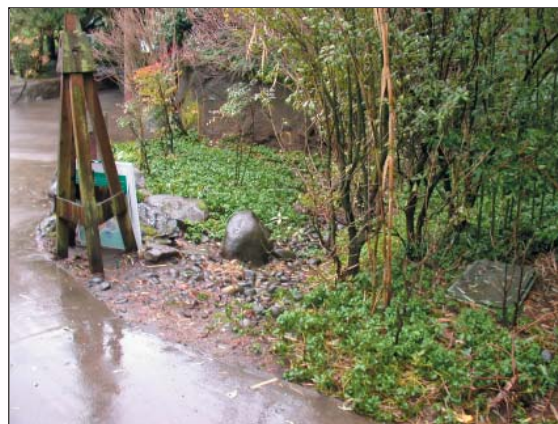
## FACILITY CONCEPT PLAN



# SAMBURU CROSSING

For additional project information, see field evaluation worksheet on page 73

Basin  
**220**  
Project  
**B**



## CONCEPTUAL COST ESTIMATE

CSI Section	Item	Quantity	Unit	Unit Cost	Extended Cost	Remarks
<b>01000</b>	<b>MOBILIZATION</b>					
	Small Site	1	LS	\$500.00	\$500	
<b>02200</b>	<b>SITE PREPARATION &amp; DEMOLITION</b>					
	Sawcut A/C	100	LF	\$0.95	\$95	
	Demo Existing AC Paving	60	SF	\$0.50	\$30	
	Misc. Site Demo	1	LS	\$500.00	\$500	
<b>02300</b>	<b>EARTHWORK</b>					
	Finish Grading for all disturbe	430	SF	\$0.25	\$108	
<b>02600</b>	<b>DRAINAGE</b>					
	Disconnect and Replumbing	1	LS	\$500.00	\$500	Connect to existing drainage system
	Field Drain	1	EA	\$150.00	\$150	
<b>02800</b>	<b>SITE IMPROVEMENTS</b>					
	Artwork	1	Allow	\$1,500	\$1,500	
<b>02810</b>	<b>IRRIGATION</b>					
	Repair / Renovation	200	SF	\$0.50	\$100	Renovation of existing system
<b>02900</b>	<b>SOIL PREPARATION AND PLANTING</b>					
	Planting	430	SF	\$0.75	\$323	
	<b>Subtotal</b>				<b>\$3,805</b>	
	Design Contingency	15%			\$571	
	Construction Contingency	20.0%			\$761	
	<b>Total Project Cost</b>				<b>\$5,137</b>	

### Assumptions:

1. Prevailing Wage Labor Rates Apply
2. No donated materials or labor



## PARKING LOT BIOSWALES

For additional project information, see field evaluation worksheet on page 95.

In partnership with the Oregon Zoo Parking Lot Operations Committee (PLOC) the Zoo will explore installation of some lined bioswales between every other parking row in the southern lot as budget allows. Currently there is approximately a 4 foot wide raised, curbed concrete walkway between the front ends of the parking vehicles. This project would remove this sidewalk and curbing and a foot of pavement from each stall length on each row to provide a 6-foot wide bioswale planting area. There is also a potential to remove a wider strip on the stall opposite the front entry to provide a pedestrian walkway between the car ends. This wider swale (10') would require removal of some of the aisle width in this section.

## FACILITY SIZING

Assume that we are to replace every other row of the southern portion of the Zoo parking lot. All rows will require approximately a 6-foot wide removal. Starting at the southern most planter the following sizes for removal are:

Planter 1 (southernmost):  $400 \times 6 + 3,300 = 5,700$  sq feet

Planter 3 (two above #1):  $550 \times 6 = 3,300$  sq feet

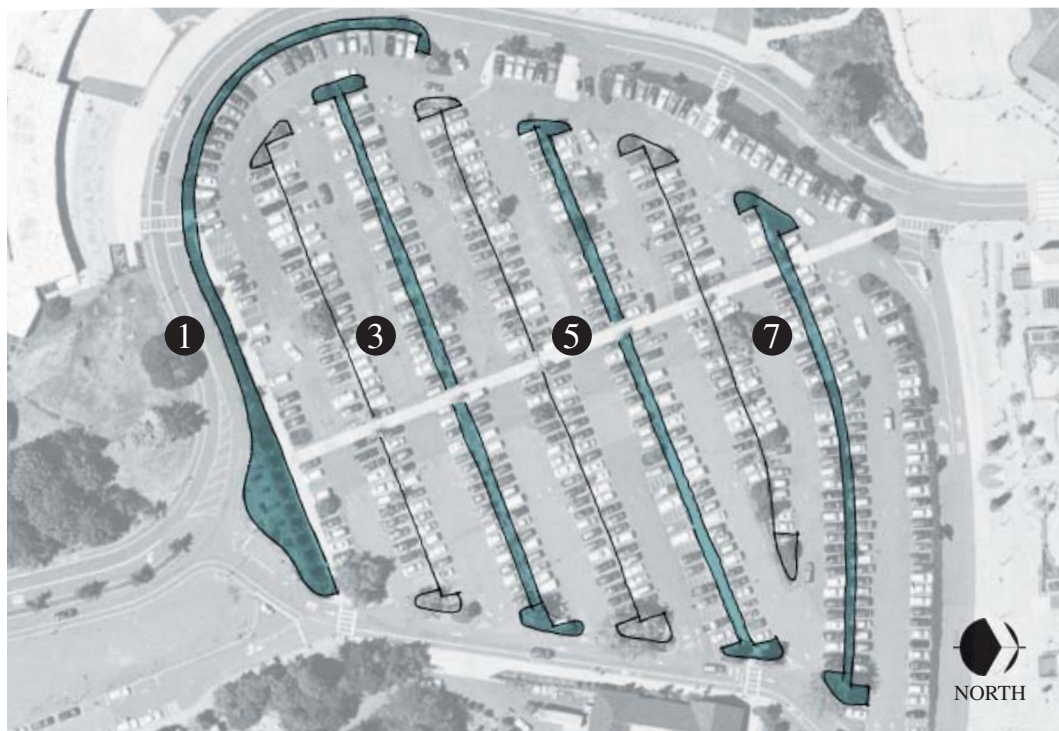
Planter 5 (four above #1 – across from Zoo entry gate):  $200 \times 6' + 250 \times 10' = 3,700$  sq feet

Planter 7 (second down from Tri-met):  $440 \times 6' = 2,640$  sq feet

Area treated (ac) .....	3.91
Sizing Factor* .....	0.09
Required Facility Surface Area (sf) .....	15,340

\* Sizing of stormwater facility is based on the City of Portland Stormwater Manual, Simplified Approach, September 2002

## FACILITY CONCEPT PLAN





## PARKING LOT BIOSWALES

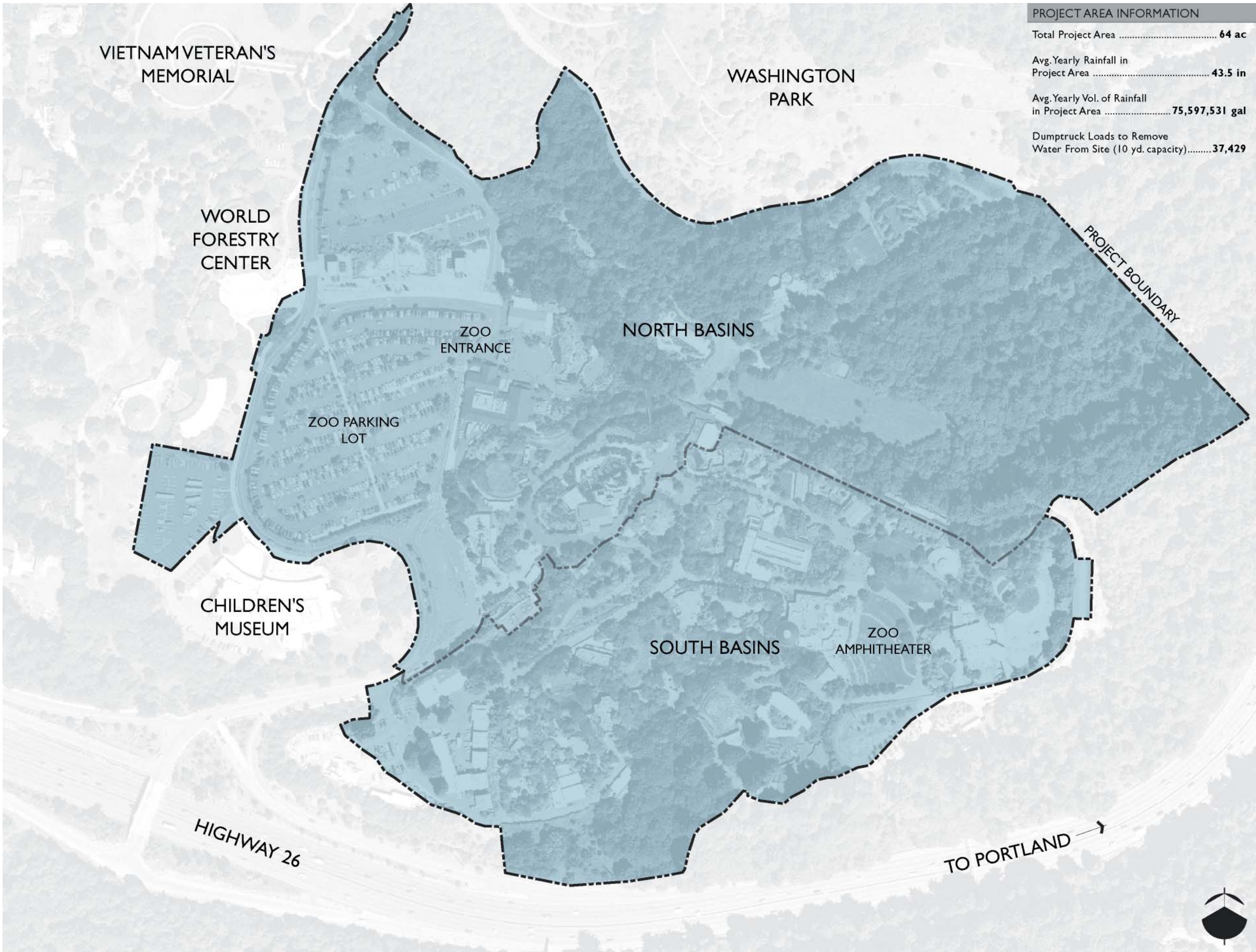
For additional project information, see field evaluation worksheet on page 95.



## CONCEPTUAL COST ESTIMATE

CSI Section	Item	Quantity	Unit	Unit Cost	Extended Cost	Remarks
<b>01000</b>	<b>MOBILIZATION</b>					
	Small Site	5%	LS	6444	\$6,444	
<b>02200</b>	<b>SITE PREPARATION &amp; DEMOLITION</b>					
	Sawcut A/C	5400	LF	\$0.95	\$5,130	
	Demo Existing AC Paving	16000	SF	\$1.00	\$16,000	
	Misc. Site Demo	1	LS	\$5,000	\$5,000	
	Excavation	1200	CY	\$15.00	\$18,000	Removal of 2 ft. depth.
<b>02300</b>	<b>EARTHWORK</b>					
	Finish Grading	16000	SF	\$0.25	\$4,000	
<b>02600</b>	<b>DRAINAGE</b>					
	Overflow	4	LS	\$2,500	\$10,000	Connect to existing drainage system
	Waterproof Liner	16000	SF	\$2.00	\$32,000	
<b>02700</b>	<b>PAVINGS</b>					
	Concrete Curb - 6"	5400	LF	\$10.00	\$54,000	6" x 18" Cast in place
<b>02810</b>	<b>IRRIGATION</b>					
	Fully Automatic Irrigation	16000	SF	\$0.75	\$12,000	
<b>02900</b>	<b>SOIL PREPARATION AND PLANTING</b>					
	Topsoil - imported	0	CY	\$25.00	\$0	
	Compost	150	CY	\$25.00	\$3,750	
	Planting	16000	SF	\$0.75	\$12,000	
	Trees	90	EA	\$200.00	\$18,000	Assume 1 tree @ 30' o.c., 1 1/2 cal.
	<b>Subtotal</b>				<b>\$196,324</b>	
	Design Contingency	15%			\$29,449	
	Construction Contingency	20.0%			\$39,265	
	<b>Total Project Cost</b>				<b>\$265,037</b>	





**PROJECT AREA INFORMATION**

Total Project Area .....	<b>64 ac</b>
Avg. Yearly Rainfall in Project Area .....	<b>43.5 in</b>
Avg. Yearly Vol. of Rainfall in Project Area .....	<b>75,597,531 gal</b>
Dumptruck Loads to Remove Water From Site (10 yd. capacity).....	<b>37,429</b>