



Contractor Skill-Building Webinar: Design Challenges - How do you make it work?

Fortalecimiento de capacidades para contratistas: Como superar los retos que se presentan en el diseño?



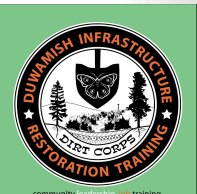
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Agenda



1. RainWise Program Overview
 2. Designing a RainWise Installation
 3. Using the Rebate Calculator and Determining Budget
 4. Design Challenges
-

Working Together to Reduce Polluted Runoff with Green Stormwater Infrastructure



Juntos utilizamos infraestructura verde para reducir la escorrentía de agua pluviales contaminada

Infraestructura Verde en Propiedad Privada

Techo Verde

Cisterna

Alcantarilla desconectada

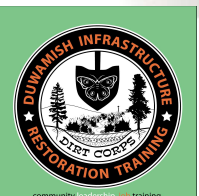
Jardín de Agua Pluviales

Infraestructura Verde en el espacio público

Arboles de la Via Publica

Jardines Pluviales en la carretera

Pavimento Permeable



Rainwise Goal

Meta de RainWise

Designed to prevent sewage overflow

Disminuir la sobrecapacidad de los desagües

Methods

Métodos

1. Cistern storage, with slow release

Cisterna de almacenamiento, con liberación lenta

2. Rain garden infiltration

Infiltración de jardines Pluviales

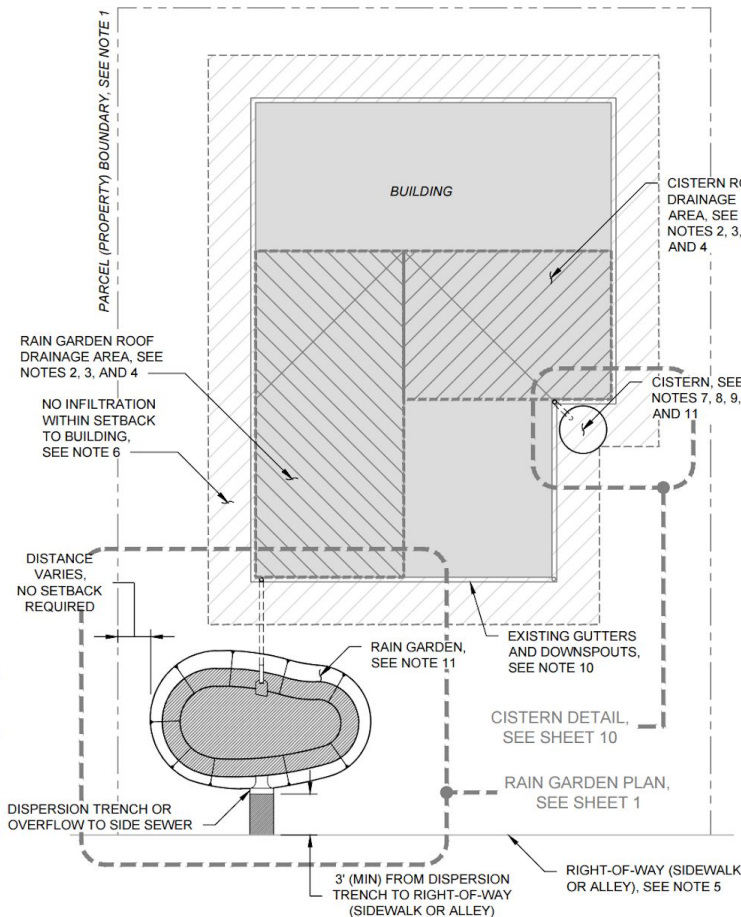


Design Details for Rain Gardens and Cisterns

Detalles de Diseños para Jardines Pluviales y Cisternas

RAINWISE SITE REQUIREMENTS

REFERENCE SHEET **C**
RAINWISE DETAILS
12/22/2014



RAINWISE SITE REQUIREMENTS:

1. SUBJECT PARCEL MUST BE IN A QUALIFYING CSO BASIN.
2. A MINIMUM OF 400 SQUARE FEET OF ROOF DRAINAGE AREA MUST BE COLLECTED AND CONVEYED TO RAIN GARDEN OR CISTERN TO QUALIFY FOR REBATE.
3. ROOF DRAINAGE GREATER THAN 2,000 SQUARE FEET **REQUIRES CONSULTATION WITH RAINWISE INSPECTOR.**
4. PROJECTS INFILTRATING MORE THAN 2,000 SQUARE FEET OF IMPERVIOUS SURFACE MUST ADHERE TO THE SEATTLE STORMWATER MANUAL.
5. NO MORE THAN 1,000 SQUARE FEET OF CONTRIBUTING IMPERVIOUS SURFACE MAY OVERFLOW TO CITY SIDEWALK AT A SINGLE LOCATION. SYSTEMS IN EXCESS OF 1,000 SQUARE FEET SHALL HAVE TWO OR MORE OVERFLOWS (AS NECESSARY), EACH SEPARATED BY A DISTANCE OF 10 FEET OR MORE.
6. INFILTRATION PROHIBITED WITHIN 5 FEET OF FOUNDATION WALL FOR DWELLING WITHOUT BASEMENT AND WITHIN 10 FEET OF FOUNDATION WALL FOR DWELLING WITH BASEMENT UP TO 5 FEET DEEP. FOR BASEMENTS DEEPER THAN 5 FEET, INFILTRATION PROHIBITED WITHIN A DISTANCE OF 2 TIMES THE BASEMENT DEPTH MEASURED FROM FOUNDATION WALL. CONVEYANCE WITHIN THIS SETBACK MUST BE IMPERVIOUS (I.E., LINED OR PIPED).
7. QUALIFYING CISTERNS MUST BE A MINIMUM OF 200 GALLONS, HAVE A 1/4 INCH DIAMETER LOW FLOW ORIFICE, AND A MINIMUM HEAD OF 3.0 FEET.
8. ROUTE CISTERN OVERFLOWS TO RAIN GARDEN, RIGHT-OF-WAY, OR SANITARY SEWER.
9. CISTERN SITING SHALL CONFORM TO SETBACK AND YARD REQUIREMENTS SET FORTH IN SEATTLE LAND USE CODE. FOR SINGLE FAMILY RESIDENTIAL APPLICATIONS, SEE SECTION 23.44.014: YARDS.
10. REMOVE DOWNSPOUT PIPING AND PLUG AND SEAL GUTTER INLETS AT ALL ABANDONED DOWNSPOUT LOCATIONS.
11. FOR RAIN GARDEN AND CISTERN SIZING, REFER TO RAINWISE SIZING TABLES.

REFERENCE MATERIALS:

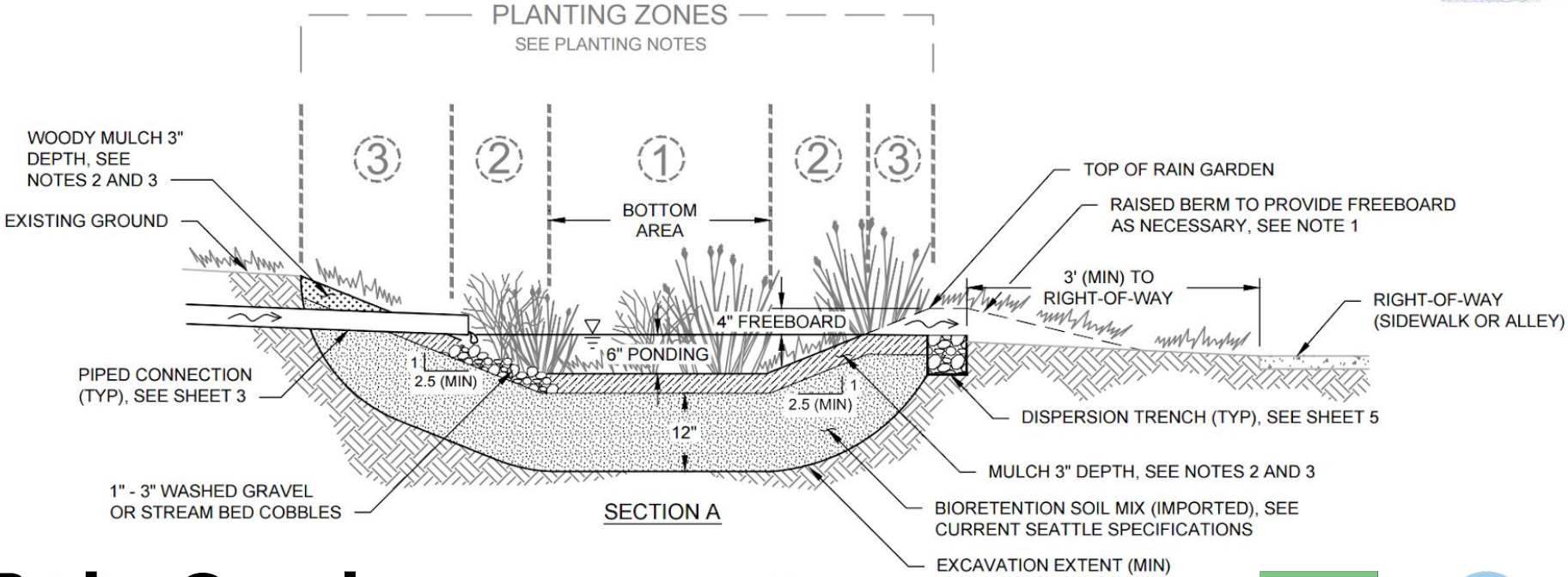
- RAINWISE SIZING AND REBATE TABLES AND CISTERN REBATE CALCULATOR
https://rainwise.seattle.gov/city/seattle/contractor_corner
- SEATTLE LAND USE CODE
<http://www.seattle.gov/dpd/codesrules/codes/landuse/>



<https://www.700milliongallons.org/rainwise/contractor-resources/>

RAIN GARDEN SECTION

SHEET **2**
RAINWISE DETAILS
12/22/2014



Rain Gardens

Jardines Pluviales

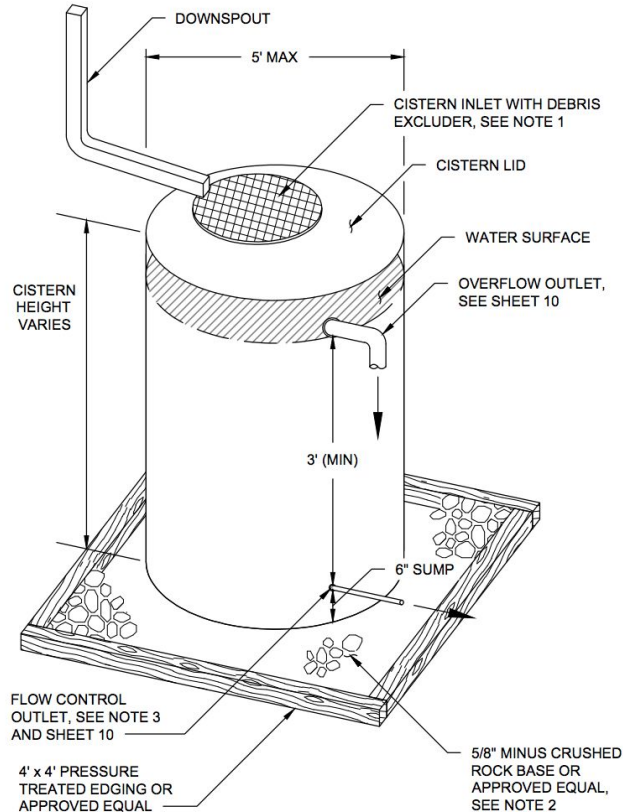


Cisterns

Cisternas

CISTERN SECTION

SHEET **9**
RAINWISE DETAILS
12/22/2014



NOTES:

1. PROVIDE DEBRIS EXCLUDER WITH 1/16 INCH MINIMUM SCREEN CAPACITY AT CISTERN INLET.
2. CRUSHED ROCK BASE SHALL BE COMPACTED WITH 12 POUND HAND TAMPER TO FORM LEVEL, NON-YIELDING BASE FOR CISTERN. EXTEND BASE BEYOND EDGE OF CISTERN. BASE DIMENSIONS WILL VARY BY CISTERN.
3. FLOW CONTROL OUTLET SHALL INCLUDE A UNIFORM 1/4 INCH DIAMETER INSPECTABLE AND CLEANABLE ORIFICE. NO ADDITIONAL VALVES OR FLOW RESTRICTOR PERMITTED DOWNSTREAM OF FLOW CONTROL OUTLET. SEE SHEET 13 FOR AN EXAMPLE CONFIGURATION.

GENERAL NOTES:

- A. ALL ENTRIES MUST BE SECURED AS TO BE CHILD PROOF.
- B. CISTERNS WITH HIGH TIPPING POTENTIAL SHALL BE RESTRAINED TO PREVENT OVERTURNING.
- C. SYSTEM MUST BE DESIGNED TO PROVIDE ACCESS AND EGRESS TO CISTERN AND CISTERN FITTINGS FOR CLEANING AND REMOVAL OF SEDIMENT AND ALGAE. ACCESS SHALL BE THROUGH REMOVABLE LID OR 6 INCH (MINIMUM) INSPECTION PORT. CLEANOUT SHALL BE PROVIDED AT BOTTOM OF TANK (VIA BOTTOM BULKHEAD FITTING).
- D. CISTERNS OVER 6.5 FEET TALL OR WITH STORAGE CAPACITY GREATER THAN 1,100 GALLONS REQUIRE CONSULTATION WITH RAINWISE INSPECTOR.
- E. ALL CISTERN PIPING MATERIALS SHALL BE RIGID. 12 LINEAR INCHES OF 2 INCH (MAXIMUM) DIAMETER FLEXIBLE PIPE MAY BE USED TO CONNECT TERMINUS OF FLOW CONTROL OUTLET TO OVERFLOW PIPING.
- F. OVERFLOW AND LOW FLOW PIPE CONFIGURATIONS (FITTINGS AND PIPE LENGTH) MAY VARY BY CISTERN. PIPE SUPPORT TO BE PROVIDED WITHIN 2 FEET OF UNIONS AND AT LEAST EVERY 4 FEET OF PIPE RUN. SEE SHEET 10.
- G. PLASTIC CISTERNS MUST BE U.V. STABILIZED. ALL CISTERNS MUST BE NON-COLLAPSABLE, WATERTIGHT, AND OF DURABLE MATERIAL TO PROVIDE A LONG SERVICE LIFE.
- H. TO PREVENT FREEZING DAMAGE, ALL EXPOSED PIPE MUST BE FREE DRAINING.
- I. PROVIDE WATER TIGHT FITTINGS AT ALL CISTERN CONNECTIONS.
- J. LOCATE CISTERNS TO AVOID OBSTRUCTION OF UTILITIES, WINDOWS, OR OTHER SITE FEATURES THAT REQUIRE REGULAR ACCESS.
- K. SEE REFERENCE SHEET C FOR CISTERN SETBACK REQUIREMENTS.
- L. SEE SHEET 11 FOR DESIGN REQUIREMENTS FOR CISTERNS IN SERIES.





Questions

¿Preguntas?



www.rainwise.seattle.gov

Considerations in designing a Rainwise installation

Consideraciones para el diseño e instalación de RainWise

- Current roof drainage pattern
Drenaje actualizado del techo
- Site opportunities and constrictions
Oportunidades y constricciones del sitio
- Rainwise Specifications
Especificaciones de RainWise
- Homeowner goals and preferences
Preferencias y metas del cliente
- Aesthetic choices
Elecciones de estética
- Budget
Presupuesto



Gather Site Information

Recopile información del sitio

Check Rainwise eligibility:

700milliongallons.org/rainwise-testing/eligibility-map/

King County Imap:

kingcounty.gov/services/gis/Maps/imap.aspx

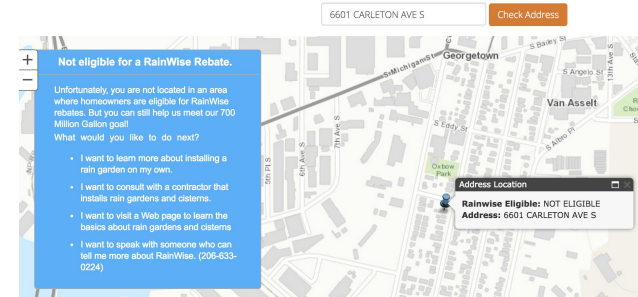
Side Sewer Card:

web6.seattle.gov/dpd/sidesewercardsv2/default.aspx

Google Earth

<https://www.google.com/earth/>

Site Visit & Homeowner Meeting



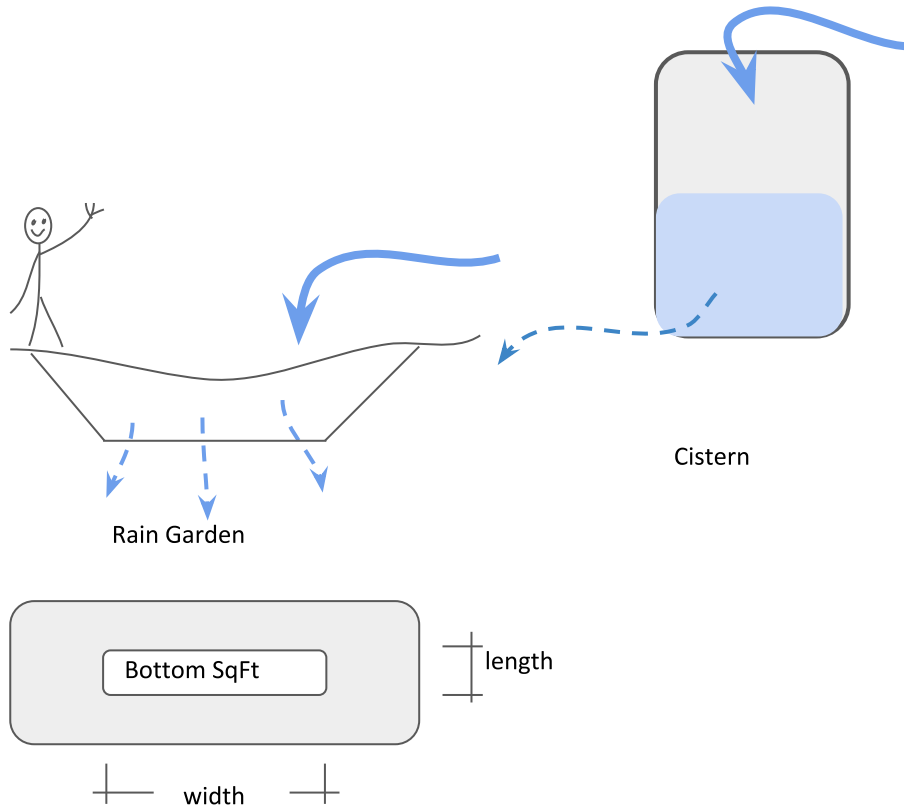


Questions

¿Preguntas?



www.rainwise.seattle.gov



Rain Garden

- Bottom square feet
- Length X width

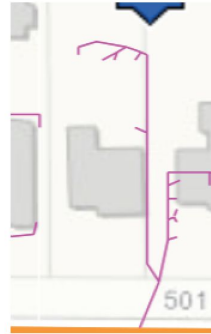
Cistern

- Gallon capacity
- $\frac{1}{4}$ " low-flow orifice
- ($\frac{3}{8}$ and $\frac{1}{2}$)

Sizing Calculations

calculo de tamano





Total Roof Area:

Estimated Capture:

Estimated Rebate:

ROOF AREA

Area de techo

Square feet A: 703 sf

Square Feet B: 624 sf

Total roof: 1327sf

Different options yield
Different rebate amounts!

*Diferentes opciones permitieron
diferentes cantidades de
reembolso!*

Rain gardens = \$4.00 Sf

Cisterns = Sf/efficiency

Aster Rosa Ecology
Seattle, WA
Draft design
December 15, 2018



DETAIL

1.0

Using the Rebate Calculator

Usando la calculadora de reembolso





Rebate Calculator

Calculadora de Reembolso



Budget

Presupuesto

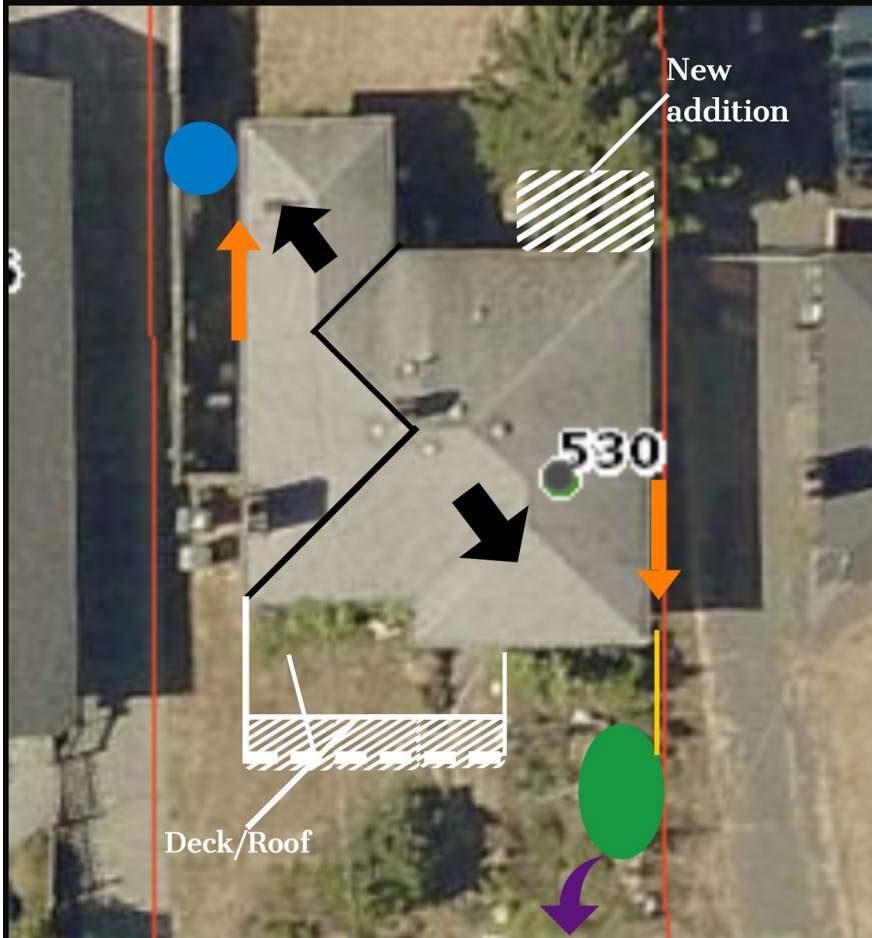


Bushman Cisterns - Conservation Corps		our cost	customer price (+ 25%)
delivery fee	up to 3	\$100.00	\$125.00
5-6 wk large size	1	\$50.00	
Fitting kits	1 each	\$75.00	
205 gal (5' tall x 2'11" wide)		\$310.00	\$387.00
265 Slimline (5'4" tall x 2'1" wide x 4'11 long)		\$500.00	\$635.00
420 gal (5'4" tall x 3'9" wide)		\$475.00	\$594.00
530 Slimline (6'6" tall x 2'1" wide x 7'2" long)		\$750.00	\$937.00
660 R (4' tall x 5'11 wide)		\$650.00	\$812.00
865 RTall (6'3" tall x 5'1 wide)		\$850.00	\$1,062.00
1110 R (7'0" tall x 4'8" wide)		\$950.00	\$1,187.50
1320 R (6'0" tall x 6'10" wide)		\$1,110.00	\$1,387.00
2825 R (7'8" tall x 8'6" wide)		\$1,800.00	\$2,175.00



Materials *Materiales*

Labor *Mano de Obra*



Total Roof Area: 1,283 sf

Estimated capture: 1,283 sf

407 sf to 530 cistern

outflow to sidesewer

83% (\$3.31/sf) = \$1347.17






1,600 gal annually

876 sf to raingarden (>1"/hr)

outflow to sidewalk

100% (\$4.00/sf) = \$3,504

12,500 gal annually

-  Raingarden location
-  Cistern Location
-  Roof connection
-  Gutter Redirect
-  Outflow

Aster Rosa Ecology
Seattle, WA
August 15, 2019

Student draft
As-built



DETAIL

1.0



Questions

¿Preguntas?



www.rainwise.seattle.gov

Outlet Higher than the Inlet

Salida más Alta que la Entrada

- Could cause rain garden to flood in a torrential downpour

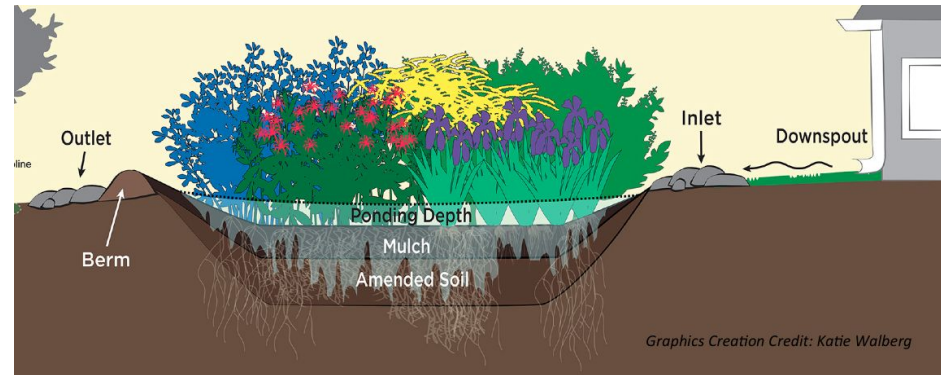
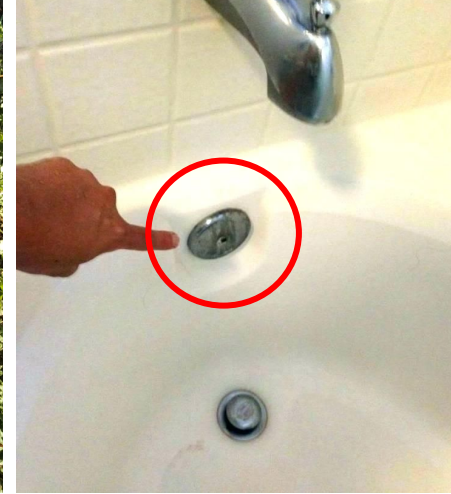
Podría causar la inundación del jardín pluvial en un aguacero torrencial

- Digout outlet, reinforce with cobble

Al cavar la salida, refuerce con piedras/guijarros

- When building a rain garden, always make sure the outlet is according to RainWise specifications

Cuando construya un jardín pluvial, asegúrese de que la salida siempre esté de acuerdo con las especificaciones de RainWise



Graphics Creation Credit: Katie Walberg

Buried or Blocked Inlet / Side Sewer

Entrada Enterrada o Bloqueada

- Possibility of water backing up and flooding
- When building the rain garden, make sure inlet is plenty exposed and reinforced with cobble

Posibilidad de que el agua se regrese o cause inundación

Al construir el jardín pluvial, asegúrese de que la entrada esté bien expuesta y reforzada con piedras/guijarros

- Educate homeowners on maintenance

Educar a los propietarios sobre el mantenimiento





Site opportunities: St. Luke's Episcopal Church



Questions

¿Preguntas?



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Thank You!



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