

ECOROOF WITH DRAINAGE CHANNELS

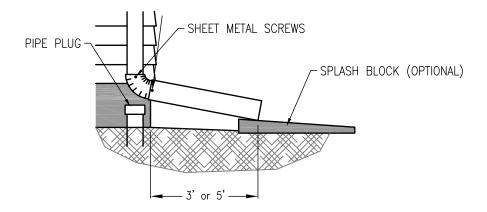
CITY OF GRESHAM

ECOROOF

DRAWN DRO

DATE APR 2018

APPR.



- Site Suitability: Downspout extensions are suitable for single family residential sites that have well draining soils, >2" per hour, and have an overall slope of 10% or less.
- Sizing: Area of discharge must be 10% of the contributing roof area. A maximum of 500 sf of roof area is allowed to drain to each downspout.
- 3. Downspouts must drain at least 5 feet from basement walls and at least 3 feet from crawl spaces and concrete slabs.
- The end of the downspout must be at least 5 feet from the property line, and possibly more if the landscape slopes toward the neighbor's property.
- Do not discharge onto driveways, hardscape or other impervious areas including public sidewalks and streets.
- Using a splash block at the end of the extension is optional, but it will help prevent soil erosion.

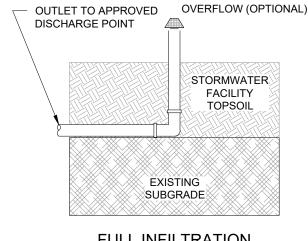
CITY OF GRESHAM

DOWNSPOUT EXTENSION

DRAWN DRO

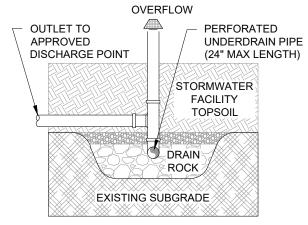
DATE APR 2018

APPR.



FULL INFILTRATION

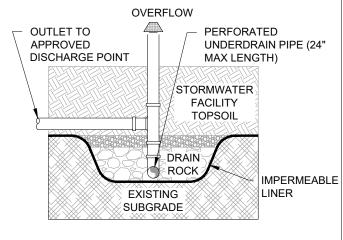
TYPE A AND B SOILS OVERFLOW IS OPTIONAL



PARTIAL INFILTRATION

TYPE C & D SOILS

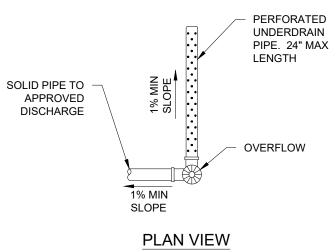
DRAIN ROCK OPTIONAL FOR TYPE C SOILS OVERFLOW AND UNDERDRAIN REQUIRED FOR TYPE D SOILS SET UNDERDRAIN TOWARD TOP OF DRAIN **ROCK**



LINED/FILTRATION

STEEP SLOPES, CONTAMINATED SOILS, UNCONSOLIDATED FILL

OVERFLOW AND UNDERDRAIN REQUIRED. SET UNDERDRAIN AT BASE OF DRAIN ROCK.



PIPE W/ UNDERDRAIN & DISCHARGE POINT

- DRAIN ROCK NOT REQUIRED IN TYPE A AND B SOILS. IT MAY BE USED FOR STORAGE IN TYPE C SOILS. AN OVERFLOW IS REQUIRED FOR TYPE C SOILS.
- TYPE D SOILS REQUIRE DRAIN ROCK AND AN UNDERDRAIN LOCATED AT THE TOP OF THE ROCK. PERFORATED UNDERDRAIN PIPE SHALL BE A MAXIMUM OF 36" LONG AND LOCATED AT OPPOSITE END OF FACILITY FROM INLET.
- SITES WITH CONTAMINATED SOILS, STEEP SLOPES (WITHIN HILLSIDE CONSTRAINT DISTRICT), OR ON UNCONSOLIDATED FILL MUST BE LINED AND HAVE DRAIN ROCK WITH AN UNDERDRAIN.
- FACILITIES WITH AN UNDERDRAIN MAY HAVE THE OUTLET PIPE TEE INTO THE OVERFLOW STANDPIPE AT AN ELEVATION ABOVE THE TOP OF THE UNDERDRAIN.

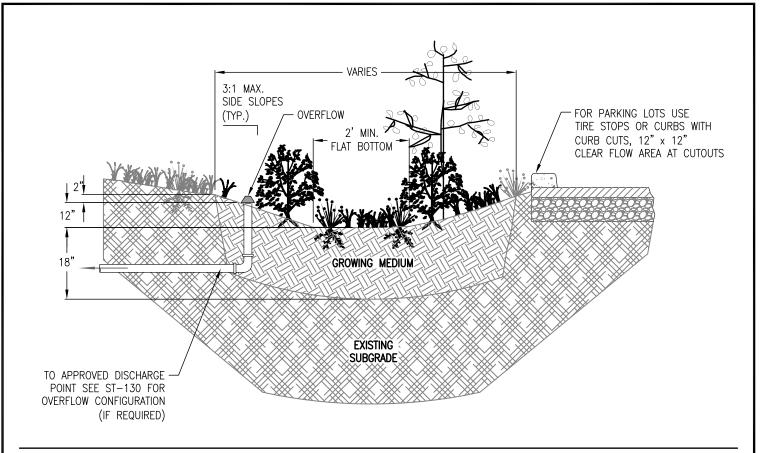
- DRAWING NOT TO SCALE -ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

CITY OF GRESHAM

FACILITY OVERFLOW CONFIGURATION

DRAWN	DRO								
REV. JULY 2024									
APPR.									
DETAIL	NO. ST-130								

PUBLISHED: JAN 2023



 Provide protection from all vehicle traffic and equipment staging in proposed infiltration areas prior to, during, and after construction.

2. Dimensions:

Width and length vary. Dimensions to be specified on plans based on sizing form.

Depth (from top of growing medium to overflow elevation): 12". Flat bottom width: 2' minimum.

Side slopes: 3:1 maximum.

3. Setbacks:

Facility should be 10^{\prime} away from foundations and 5^{\prime} away from property lines.

4. Overflow:

Facility must connect to approved discharge point per detail ST-130.

Overflow elevation must allow for 2" of freeboard, minimum. Protect from debris and sediment with strainer or grate.

 Piping must be cast iron, ABS or PVC. 3" pipe required for facilities draining up to 1500 s.f., otherwise 4" minimum pipe. Oregon Plumbing Specialty Code also applies.

6. Growing Medium:

18" minimum depth. Use sand/loam/compost 3-way mix, or approved mix that will support healthy plants.

 Vegetation: Follow landscape plans otherwise refer to plant list in Appendix G. Minimum container size is #1. # of plantings per 100sf of facility area:

Zone A (wet): 80 herbaceous plants OR 72 herbaceous plants and 4 small shrubs.

Zone B (moderate to dry): 7 large or small shrubs AND 70 groundcover plants.

The delineation between Zone A and B must be either at the outlet elevation or the check dam elevation, whichever is lowest.

If facility area is over 200sf consider adding a tree.

- 8. Splash Block: Install 4-6" washed river rock or splash pad for erosion control at inlets and downspout.
- 9. Rain garden can be elongated to create a swale for larger developments. Slope should be 6% or less.

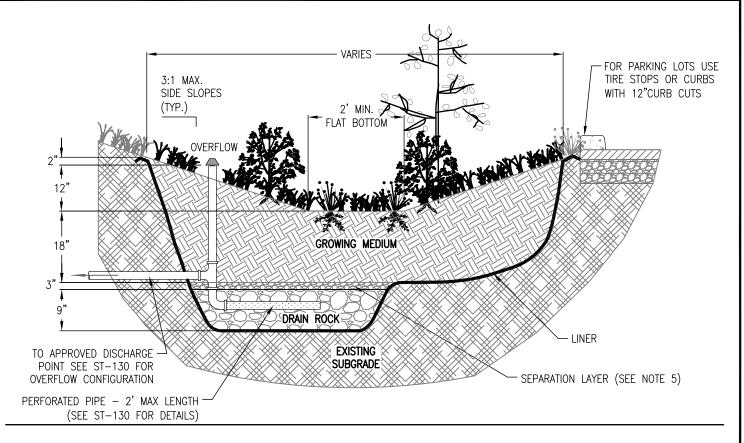
- DRAWING NOT TO SCALE - ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

CITY OF GRESHAM

INFILTRATION RAIN GARDEN/SWALE

DATE OCT 2019

APPR.



Dimensions:

Width and length vary. Dimensions to be specified on plans based on sizing form.

Depth (from top of growing medium to overflow elevation): 12".
Flat bottom width: 2' recommended.
Side slopes of swale: 3:1 maximum.

- Setbacks: None required for lined facilities. Partial infiltration facilities should be 10' from foundations and 5' from property lines..
- Overflow:

Facility must connect to approved discharge point per detail ST-130. Overflow elevation must allow for 2" of freeboard, minimum. Protect from debris and sediment with strainer or grate. Overflow must have a 6"-12" upturn prior to discharge.

- Piping must be cast iron, ABS or PVC. 3" pipe required for facilities draining up to 1500 s.f., otherwise 4" minimum pipe. Oregon Plumbing Specialty Code also applies.
- 5. Drain Layer:

Not allowed for type A and B soils (unless lined facility). Optional for type C soils, and required for type D soils. 34"-1 ½" washed round rock. Depth: 9".

Separation between drain rock and growing medium:

 χ " - #10 rock, 2 to 3 inches deep.

- 6. Growing Medium:
 - 18" minimum depth. Use sand/loam/compost 3-way mix, or approved mix that will support healthy plants.
- Vegetation: Follow landscape plans otherwise refer to plant list in Appendix G. Minimum container size is #1. # of plantings per 100sf of facility area:

Zone \acute{A} (wet): 80 herbaceous plants OR 72 herbaceous plants and 4 small shrubs.

Zone B (moderate to dry): 7 large or small shrubs AND 70 groundcover plants.

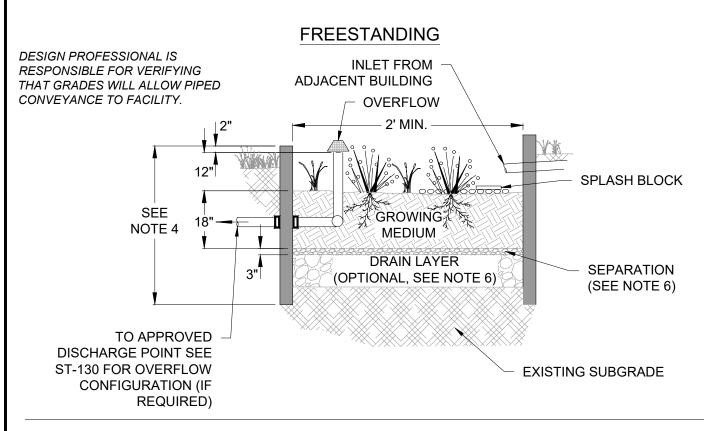
The delineation between Zone A and B must be either at the outlet elevation or the check dam elevation, whichever is lowest. If facility area is over 200sf consider adding a tree.

- Waterproof Liner: 30 mil EPDM, HDPE or approved equivalent required for lined/filtration facilities per SWMM section 1.2.2.
- Splash Block: Install 4-6" washed river rock or splash pad for erosion control at inlets and downspout.
- Rain garden can be elongated to create a swale for larger developments. Slope should be 6% or less.

- DRAWING NOT TO SCALE - ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

CITY OF GRESHAM

PARTIAL INFILTRATION - LINED/FILTRATION RAIN GARDEN/SWALE



 PROVIDE PROTECTION FROM ALL VEHICLE TRAFFIC AND EQUIPMENT STAGING IN PROPOSED INFILTRATION AREAS PRIOR TO, DURING, AND AFTER CONSTRUCTION.

DIMENSIONS:

WIDTH OF PLANTER: 24" MINIMUM.
DEPTH OF PLANTER (FROM TOP OF GROWING MEDIUM TO
OVERFLOW ELEVATION): 12".
LONGITUDINAL SLOPE OF PLANTER: 0.5% OR LESS.

3. SETBACKS:

INFILTRATION PLANTERS SHOULD BE LOCATED 5-FEET FROM PROPERTY LINE AND 10-FEET FROM BUILDING FOUNDATIONS.

4. PLANTER WALLS:

MATERIAL MUST BE CONCRETE, UNLESS OTHERWISE APPROVED. WALLS MUST BE INCLUDED ON FOUNDATION PLANS.

HEIGHT: 44" MINIMUM WITH DRAIN ROCK, 32" MINIMUM WITHOUT DRAIN ROCK.

- PIPING MUST BE CAST IRON, ABS OR PVC. 3" PIPE REQUIRED FOR FACILITIES DRAINING UP TO 1500 S.F., OTHERWISE 4" MINIMUM PIPE. OREGON PLUMBING SPECIALTY CODE ALSO APPLIES.
- 6. DRAIN LAYER:

NOT ALLOWED FOR TYPE A AND B SOILS, OPTIONAL FOR TYPE C SOILS, AND REQUIRED FOR TYPE D SOILS. 3/4" - 1 ½" WASHED.

DEPTH: 9".

SEPARATION BETWEEN DRAIN ROCK AND GROWING MEDIUM: $\frac{1}{4}$ " - #10 ROCK, 2 TO 3 INCHES DEEP.

- DRAWING NOT TO SCALE -

7. OVERFLOW:

PLANTERS MUST CONNECT TO APPROVED DISCHARGE POINT PER DETAIL ST-130.

OVERFLOW ELEVATION MUST ALLOW FOR 2"OF FREEBOARD, MINIMUM.

PROTECT FROM DEBRIS AND SEDIMENT WITH STRAINER OR GRATE.

8. GROWING MEDIUM:

18" MINIMUM DEPTH. USE SAND/LOAM/COMPOST 3-WAY MIX, OR APPROVED MIX THAT WILL SUPPORT HEALTHY PLANTS.

- VEGETATION: REFER TO PLANT LIST IN APPENDIX G. MINIMUM CONTAINER SIZE IS #1. # OF PLANTINGS PER 100SF OF FACILITY ARFA.
 - 80 HERBACEOUS PLANTS OR;
 - 72 HERBACEOUS PLANTS AND 4 SMALL SHRUBS.
- 10. SPLASH BLOCK: INSTALL 4-6" WASHED RIVER ROCK OR SPLASH PAD FOR EROSION CONTROL AT INLETS AND DOWNSPOUT.
- 11. PERFORATED PIPE TO BE ADDED FOR FACILITIES IN POORLY INFILTRATING SOILS (TYPE D) PER ST-130.
- 12. LINED/FILTRATION PLANTER TO BE USED ON STEEP SLOPES OR WITHIN 10' OF BUILDINGS OR 5' OF PROPERTY LINES.
- 13. THIS DRAWING IS INTENDED FOR PRIVATE FACILITIES
 TREATING ROOF RUNOFF. FOR PLANTERS TREATING PRIVATE
 ROADWAYS, SEE THE GREEN STREETS DETAILS IN GRESHAM
 PUBLIC WORKS STANDARDS. FOR PRIVATE FACILITIES THE
 BEEHIVE OVERFLOW (GS-108) MAY BE REPLACED BY OTHER
 STRUCTURES THAT MEET OREGON PLUMBING SPECIALTY
 CODE.

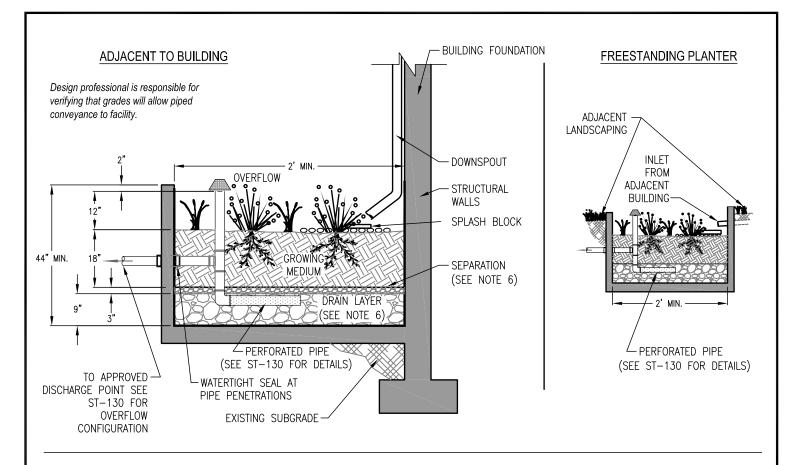
ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

CITY OF GRESHAM

INFILTRATION PLANTER

DRAWN DRO
REV. JULY 2024
APPR.
DETAIL NO. ST-150

PUBLISHED: JAN 2023



Dimensions:

Width of planter: 24" minimum.

Depth of planter (from top of growing medium to overflow elevation): 12". Longitudinal slope of planter: 0.5% or less.

2. Setbacks:

Planters must be less than 30" in height above finish grade if within 5—feet of property line.

3. Planter Walls:

Material must be monolithically poured concrete. Walls must be included on foundation plans.

4. Waterproofing

Monolithically poured planter, without joints is required. Check state structural requirements for foundations.

- Piping must be cast iron, ABS or PVC. 3" pipe required for facilities draining up to 1500 s.f., otherwise 4" minimum pipe. Oregon Plumbing Specialty Code also applies.
- 6. Drain Layer:

3/4" - 1 ½" washed round rock.

Depth: 9".

Separation between drain rock and growing medium:

 χ'' - #10 rock, 2 to 3 inches deep.

7. Overflow:

Planters must connect to approved discharge point per detail ST-130. Overflow elevation must allow for 2" of freeboard, minimum. Protect from debris and sediment with strainer or grate.

8. Growing Medium:

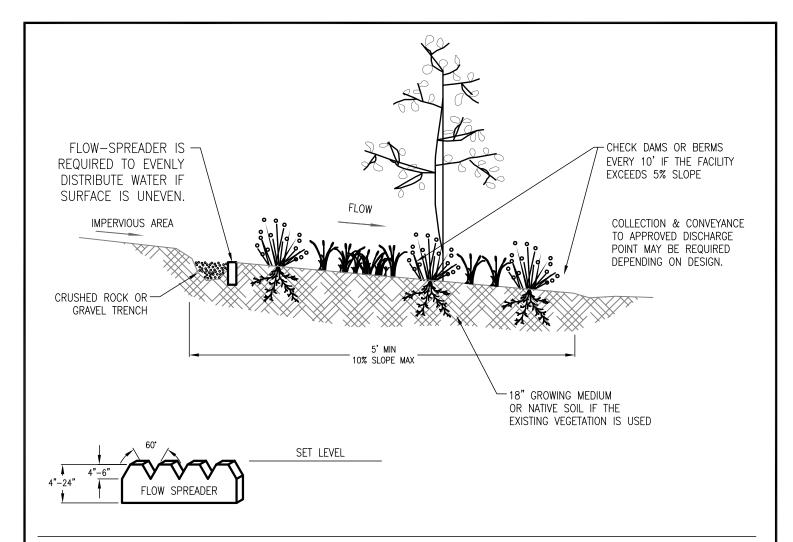
18" minimum depth. Use sand/loam/compost 3-way mix, or approved mix that will support healthy plants.

- 9. Vegetation: Refer to plant list in Appendix G. Minimum container size is #1. # of plantings per 100sf of facility area:
 - 80 herbaceous plants OR;
 - 72 herbaceous plants and 4 small shrubs.
- Splash Block: Install 4–6" washed river rock or splash pad for erosion control at inlets and downspout.

- DRAWING NOT TO SCALE - ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

CITY OF GRESHAM

FILTRATION PLANTER



- Provide protection from all vehicle traffic and equipment staging for proposed infiltration areas prior to and during construction.
- 2. Dimensions:
 - a. Flow line length: 5' minimum.
 - b. Slopes: 0.5 10%
- 3. Setbacks (from beginning of facility):
 - a. 5' from property line
 - b. 10ft from buildings
 - c. 50ft from wetlands, rivers, streams, and creeks where required.
- Overflow: Collection from filter strip shall be specified on plans to approved discharge point.
- 5. Growing Medium: Unless existing vegetated areas are used for the filter strip, growing medium shall be used within the top 18" (Use sand/loam/compost 3—way mix or approved mix that will support healthy plants).
- 6. Vegetation: The entire filter strip must have 100% coverage

- by native grasses, native wildflower blends, native ground covers, or any combination thereof.
- 7. Flow Spreaders: A grade board or sand/gravel trench may be required to disperse the runoff evenly across the filter strip to prevent a point of discharge. The top of the level spreader must be horizontal and at an appropriate height to provide sheetflow directly to the soil without scour. Level spreaders shall not hold a permanent volume of runoff. Grade boards can be made of any material that will withstand weather and solar degradation. Trenches used as level spreaders can be filled with washed crushed rock, pea gravel, or sand
- 8. Check Dams: shall be placed according to facility design otherwise:
 - a. 12" in length
 - b. Equal to the width of the filter
 - c. 3 to 5" in height
 - d. Every 10' where slope exceeds 5%.

- DRAWING NOT TO SCALE - ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

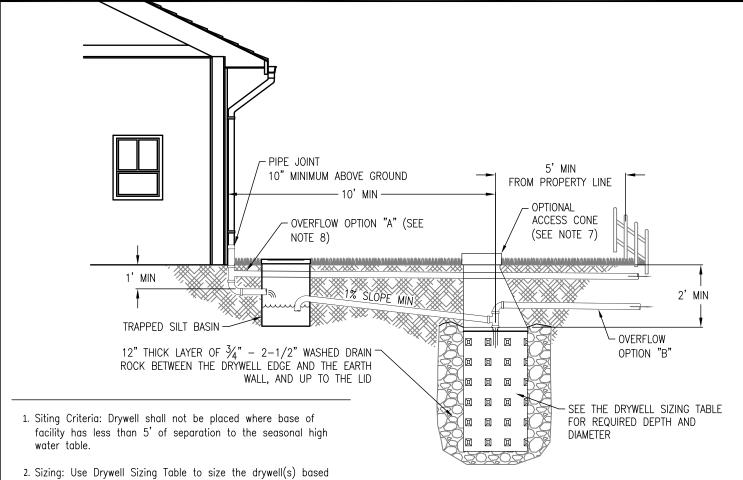
CITY OF GRESHAM

FILTER STRIP

DRAWN DRO

DATE APR 2018

APPR.



- Sizing: Use Drywell Sizing Table to size the drywell(s) based on impervious area.
- 3. Top of drywell must be below lowest finished floor.
- 4. Setbacks from center of drywell: Drywell must be 10' from foundations, 5' from property lines, and 20' from cesspools.
- Piping must be cast iron, ABS or PVC. 3" pipe required for facilities draining up to 1500 sf, otherwise 4" minimum pipe. Oregon Plumbing Specialty Code also applies.
- Silt Basin: Shall be included as pre—treatment for residential roofs. Silt basin shall be in accordance with design specifications for catch basin standards per Oregon Plumbing Specialty Code 1101.11.1—1101.11.5. Material may be plastic or metal. Lid must be solid.
- Add maintenance access manhole and cone for drywell installed in non-residential settings. Access is optional in residential settings but highly recommended.
- 8. Overflow: Not required for sites with infiltration rates ≥2"/hour. For areas with infiltration rates <2"/hour, install overflow pipe to approved discharge point. For flatter sites, option "A" may be used, where overlow is set 2"-6" higher than inlet to silt basin. For sloped sites, use overflow option "B" from top of drywell. Option "B" overflow pipe should be 4"-6" higher than pipe to drywell.</p>

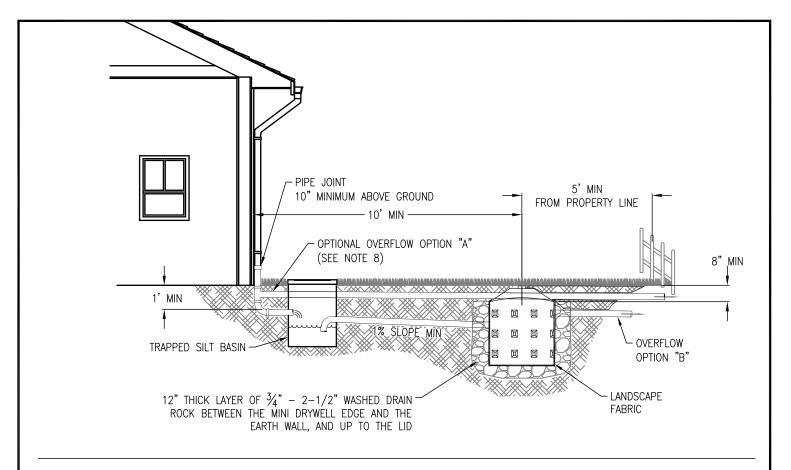
 Drywells receiving flow from anything other than single—family residential roofs must be registered with DEQ as an Underground Injection Control (UIC).

	Drywell Sizing Lable								
Once approval has been given by City of Gresham for onsite infiltration of stormwater, the following chart shall be used t the number and size of drywells. Gray boxes are acceptable.									
IMPERVIOUS	28" Diameter			48" Diameter					
Area				Drywell Depth					
(sq-ft)	10'	15'	20'	5'	10'	15'	20'		
1000									
2000									
3000									
4000									
5000									
6000									
7000									
8000									
9000									
10000									

- DRAWING NOT TO SCALE -ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

CITY OF GRESHAM

DRYWELL

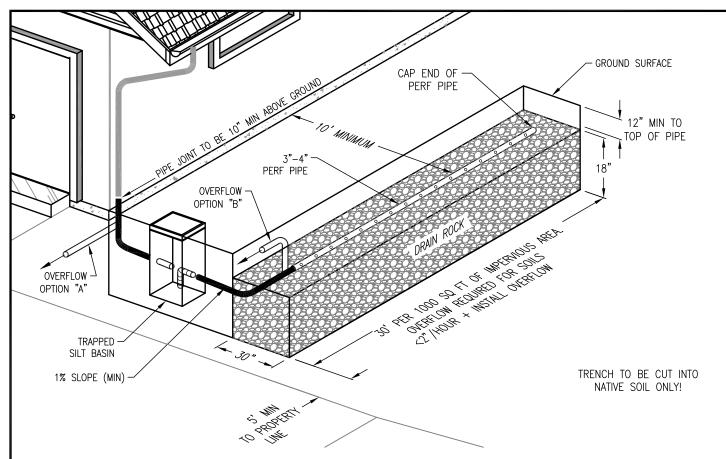


- 1. Siting Criteria: Mini drywell shall not be placed where base of facility has less than 5' of separation to the seasonal high water table.
- 2. Sizing: Only 500 sf of single family residential roof area may be connected to each mini drywell.
- 3. Top of mini drywell must be below lowest finished floor.
- 4. Wrap mini drywell with landscape fabric prior to backfilling with drain rock.
- 5. Setbacks from center of mini drywell: Mini drywell must be 10' from foundations, 5' from property lines, and 20' from cesspools.
- 6. Piping must be 3"cast iron, ABS or PVC. Oregon Plumbing Specialty Code also applies.
- 7. Silt Basin: Shall be included as pre—treatment for residential roofs. Silt basin shall be in accordance with design specifications for catch basin standards per Oregon Plumbing Specialty Code 1101.11.1—1101.11.5. Material may be plastic or metal. Lid must be solid.
- 8. Overflow: Not required for sites with infiltration rates ≥2"/hour. For areas with infiltration rates <2"/hour, install overflow pipe to approved discharge point. For flatter sites, option "A" may be used, where overflow is set 2"-6" higher than inlet to silt basin. For sloped sites, use overflow option "B" from top of mini drywell. Option "B" overflow pipe should be 4"-6" higher than pipe to mini drywell.
- 9. Mini drywells for single-family residential roofs do not need to be registered with DEQ as an Underground Injection Control (UIC).

- DRAWING NOT TO SCALE - ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

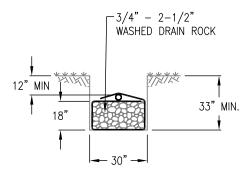
CITY OF GRESHAM

MINI DRYWELL



- 1. Provide protection from all vehicle traffic and equipment staging in proposed infiltration areas prior to, during and after construction.
- Siting Criteria: Soakage trench shall not be placed where base of facility has less than 5' of separation to the seasonal high water table.
- 3. Sizing: 30" wide x 18" tall x 30' long per 1000 square feet of impervious surface.
- 4. Setbacks: Soakage trench must be 10' from foundations, 5' from property lines, and 20' from cesspools.
- 5. Piping must be cast iron, ABS or PVC. 3" pipe required for facilities draining up to 1500 sf, otherwise 4" minimum pipe. Oregon Plumbing Specialty Code also applies.
- Silt Basin: Shall be included as pre-treatment for residential roofs.
 Silt basin shall be in accordance with design specifications for catch
 basin standards per Oregon Plumbing Specialty Code
 1101.11.1-1101.11.5. Material may be plastic or metal. Lid must be
 solid.
- 7. Overflow: Not required for sites with infiltration rates ≥ 2 "/hour. For areas with infiltration rates < 2"/hour, install overflow pipe to approved discharge point. For flatter sites, option "A" may be used, where overflow is set 2"-6" higher than inlet to silt basin. For sloped sites, use option "B" with Tee that is 4"-6" higher than pipe in trench.
- 8. Soakage trenches receiving flow from anything other than single—family residential roof runoff must be registered with DEQ as a (UIC).

SOAKAGE TRENCH CONSTRUCTION



FILTER FABRIC TO BE PLACED ON SIDES AND ENDS OF TRENCH. ADD DRAIN ROCK AND FOLD ONE SIDE OF FABRIC OVER ROCK. PLACE PERFORATED PIPE IN CENTER AND THEN INSTALL GREEN TRACER WIRE ON PIPE. COVER ALL WITH REMAINING SIDE OF FABRIC PRIOR TO BACKFILL.

- DRAWING NOT TO SCALE - ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

CITY OF GRESHAM

SOAKAGE TRENCH

DRAWN DRO

DATE OCT 2019

APPR.

SILT BASIN: SHALL BE INCLUDED AS PRE-TREATMENT FOR RESIDENTIAL ROOFS. SILT BASIN SHALL BE IN ACCORDANCE WITH DESIGN SPECIFICATIONS FOR CATCH BASIN STANDARDS PER OREGON PLUMBING SPECIALITY CODE 1101.11.1-1101.11.5. MATERIAL MAY BE PLASTIC OR METAL. LID MUST BE SOLID.

OVERFLOW

OPTION "A"

TO APPROVED DISCHARGE POINT

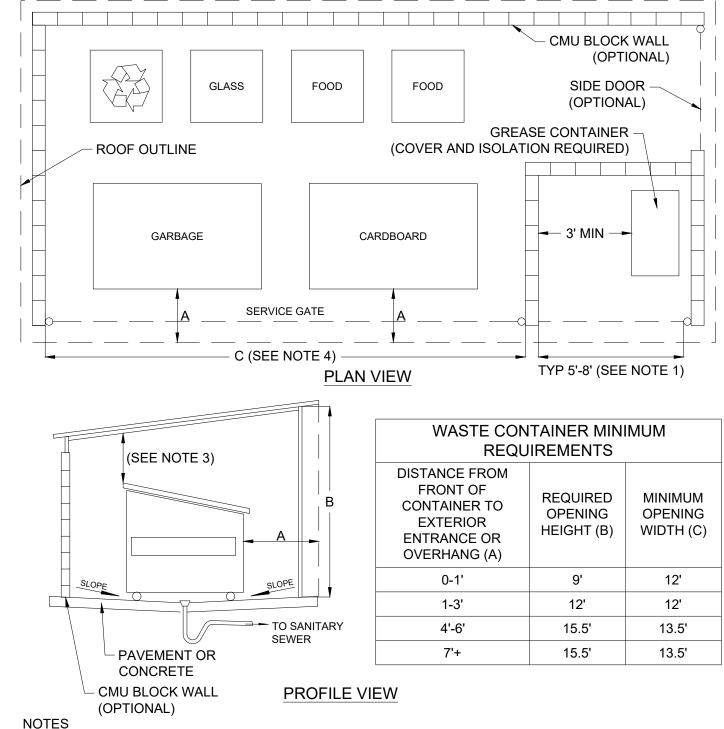
TO APPROVED DISCHARGE POINT

TO APPROVED

DISCHARGE POINT

- ROOFS MUST BE REGISTERED WITH DEQ AS AN UNDERGROUND INJECTION CONTROL DEVICE.
- OVERFLOW: NOT REQUIRED FOR SITES WITH SOIL INFILTRATION RATES >2"/HOUR. FOR AREAS WITH INFILTRATION RATES <2"/HOUR, INSTALL OVERFLOW PIPE TO APPROVED DISCHARGE POINT. FOR FLATTER SITES, USE OVERFLOW OPTION "A", WHERE OVERFLOW IS SET 2"-6" HIGHER THAN INLET TO SILT BASIN. FOR SLOPED SITES, USE OPTION "B".
- SETBACKS: 5' FROM PROPERTY LINES AND 10' FROM FOUNDATIONS.
- IF USING PROPRIETARY VAULT, FOLLOW SIZING AND INSTALLATION GUIDELINES FROM VAULT MANUFACTURER. - DRAWING NOT TO SCALE -

DRAWN **KRB** CITY OF GRESHAM **JULY 2024** DATE INFILTRATION VAULT APPR DETAIL NO. ST-190 PUBLISHED: JAN 2023



updates 2024/standard detail revisions/private storm details complete 2024-0726.dwg, Plotted 7/30/2024 9:56 AM, By: Teresa Huntsinger, ANSI FULL BLEED A (8.50 X 11.00 INCHES)

- FOOD INDUSTRY SITES MUST HAVE A SEPARATE AREA FOR OIL/GREASE COLLECTION. THIS CONTAINER MUST HAVE A COVER AND BE HYDRAULICALLY ISOLATED AND PLUMBED TO SANITARY.
- ROOFING MATERIALS AND ENCLOSURE DIMENSIONS ARE SHOWN FOR REFERENCE ONLY. WALLS ARE 2. OPTIONAL.
- INTERNAL LID OPENING FOR 4-YARD GARBAGE CONTAINER IS 10'-6". 6-YARD RECYCLING CONTAINER REQUIRES 11'-6".
- OPENING WIDTH FOR EXAMPLE PLAN VIEW SHOWN IS 20' WHICH ASSUMES A 7' WIDE GARBAGE, 7' WIDE CARDBOARD, AND 2' SPACING.

- DRAWING NOT TO SCALE -ORIGINAL DRAWING AND SPECIFICATIONS FROM PORTLAND BUREAU OF ENVIRONMENTAL SERVICES

CITY OF GRESHAM

WASTE CONTAINER ENCLOSURE

DRO DRAWN REV. **JULY 2024** DATE APPR. DETAIL NO. ST-210

PUBLISHED: JAN 2023