TOWN OF EATONVILLE
PLANNING COMMISSION AGENDA
Monday, May 21, 2018 – 7:00 P.M.
COMMUNITY CENTER
305 CENTER STREET WEST

Call to Order

Roll Call: Adams __Justice __ Marcellino __ Miller __

Town Staff Present: Mayor Schaub, Abby Gribi, Scott Clark, and Kerri Murphy

Pledge of Allegiance:

Approval of the Agenda:

Approval of Minutes: April 16, 2018

Communications and Announcements:

From Public:

From Commissioners:

New Business:

Old Business:

1) Design Standards Preliminary Draft Amendment

Staff / Commissioner Comments:

Next Meeting: TBD

Town of Eatonville
PLANNING COMMISSION MINUTES
Monday, April 16, 2018
COMMUNITY CENTER
305 CENTER STREET WEST

CALL TO ORDER - Co-Chairperson Justice called the meeting to order at 7:00 p.m.

ROLL CALL - Present: **Commissioners** Adams, Justice and Marcellino.
Commissioner Adams motion to excuse Commissioners Miller and Knick. Seconded by Marcellino. AIF

STAFF PRESENT: Mayor Schaub, Abby Gribi and Kerri Murphy.

OPENING CEREMONIES - Commissioner Adams led the Pledge of Allegiance.

APPROVAL OF AGENDA - Commissioner Adams motion to approve the agenda. Seconded by **Commissioner Marcellino. AIF.**

APPROVAL OF MINUTES - Motion by **Commissioner Adams** motion to approve March 5, 2018 minutes. Seconded by **Commissioner Marcellino. AIF.**

There were no communications or announcements.

NEW BUSINESS:

C-2 zoning requirements: Motion by **Commissioner Marcellino** to approve the change of C-2 site coverage from 40% to 65%. Seconded by **Commissioner Adams. AIF.**

Stormwater Manual Reference Amendment: Motion by **Commissioner Adams** to approve the amendment to the Stormwater Manual. Seconded by **Commissoner Marcellino. AIF**

Design Guidelines
Commissioner Adams felt that the commissioners needed more information. Motion by **Commissioner Adams** to continue to the next meeting. Seconded by **Commissioner Justice. AIF**

Comments from staff and commissioners:

Commissioner Adams thanked everyone for participating in the process.

Next meeting to be announced.

Chairperson Justice adjourned the meeting at 7:53 p.m.

Chairperson Justice **Daniel Adams - Secretary**

ATTEST:

Kerri Murphy, Recording Secretary

Chapter 18.05
OFF-STREET PARKING AND LOADING REQUIREMENTS

18.05.090 Overhang exception, landscaping, paving, wheel stops, drainage, lighting and curbing.

A. Landscaping Generally. The landscaping requirements of Chapter 18.07 EMC and Table 18.05.2 following this chapter shall apply with respect to off-street parking facilities.

B. Landscape Islands. Landscape islands with a minimum size of 100 square feet shall be located in the following areas to protect vehicles and to enhance the appearance of parking areas:

1. At the ends of all parking rows;
2. Where loading doors or maneuvering areas are in close proximity to parking areas or stalls.

C. Paving. All vehicular maneuvering areas, including but not limited to off-street parking areas, driveways, truck and mobile equipment loading, unloading, storage and maneuvering areas, and related access to and from public right-of-way shall be paved with asphalt, concrete or brick pavers etc. Single family or two family driveways located on the private property may include either standard or Hollywood driveway designs (AKA ribbon driveways). The use of alternative ~~equivalent~~ maneuvering area materials~~, to~~ may be utilized if approved by the ~~p~~Public ~~w~~Works ~~d~~Director (Director). Approval of alternative materials shall be at the sole discretion of the Director, provided the applicant has adequately demonstrated: A) why the proposed alternative material(s) is warranted at the proposed site; B) the effectiveness of an alternative material(s) will adequately serve the intended and/or potential future use; C) the use of an alternative material(s) will meet or exceed all other applicable regulations and requirements; and, D) the use of an alternative material(s) is found to equally serve or better serve the publics use and interest. An approved alternative material(s) may include conditions of approval, which shall be documented and/or recorded in a method determined adequate by the Director. The approval of a particular alternative material shall not be considered a precedent for the use of the same material on another site; each request for use of an alternative material shall be reviewed by the Director on a site by site basis.

D. Wheel Stops. Wheel stops, a minimum of two feet from any obstruction or the end of the parking stall, shall be required in the following locations:

1. Where the parking stall abuts a building or where vehicles may overhang a property line;
2. Where the parking stall abuts a pedestrian walkway of less than six feet in width, or a walkway which is not raised creating its own barrier;
3. Where a parking stall abuts any physical object which may be impacted (i.e., light standards, fire hydrants, fences, power vaults, utility poles, etc.);
4. Where a hazardous grade difference exists between the parking area and the abutting property;
5. Where other hazardous situations may exist as determined by the public works director.

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4. Where a hazardous grade difference exists between the parking area and the abutting property;
5. Where other hazardous situations may exist as determined by the public works director.

Orchard Avenue Rain Gardens

Partners & Sponsors: Homeowners of 115, 119, 197, 218 Orchard Ave N and 570 State Route 161 S, Eatonville High School, Medical Billing Services, Eatonville Library, Nisqually Trust, Charitable Trust, National Fish & Wildlife Foundation's Community Salmon Fund, Town of Eatonville, Stewardship Partners, Washington State University Extension, LeMay Incorporated, Pierce County Library System, Eatonville School District, Nisqually Stream Stewards, IBIO, Key Bank, Arrow Lumber, TT Meats, Eatonville Eagles, Truly Scrumptious Bakery, Mountain Community Co-op, The Four Hours, Gypsy Wagon Coffee, CNH Electric, Tall Timbers, PostNet, Subway, Mid Village Motel, and South Pierce County Historical Society

Nisqually Indian Tribe | Town of Eatonville | Stewardship Partners | Washington State University Extension | LeMay

What is a Rain Garden?

A rain garden is a shallow depression in a yard planted with a variety of flowers, shrubs and grasses that "don't mind getting their feet wet." Rain gardens help soak up rainwater from downspouts, driveways, and sidewalks, while protecting our local waterways. When planted with the right types of plants, rain gardens also attract birds, butterflies and bees.

Benefits

- Absorbs runoff from impervious surfaces to reduce flooding
- Filters oil, grease, and toxic materials
- Helps recharge the aquifer
- Provides beneficial wildlife habitat

1 Stormwater collects pollutants from the roof and driveway

Native plants or other hardy plants

2 Rain garden absorbs and filters runoff through amended soil layers and deep native plant roots

ponding depth 6" to 12"

The Alternative

With no rain garden, this polluted stormwater would drain into the Mashel River.

3 Rain gardens help our fish and other wildlife enjoy cleaner water

12,000 RAIN GARDEN in Puget So

www.12000raingardens.org

Stormwater Friendly Driveways: Plastic Grid Systems

Prefered option.

Plastic grid systems are made up of honeycomb-like grids of closed plastic cells, and are filled with gravel or sand/soil mix and grass after they are installed. These grid systems are primarily constructed from recycled plastic, and they help guard against soil compaction and rutting—thus also protecting water quality.

Installation of a plastic grid system begins with a base of existing or "native" soil (see schematic drawing on the next page). A crushed gravel subbase may be spread over the soil base to provide a reservoir that holds runoff, so that more can soak into the ground. Incorporating a gravel subbase increases the stormwater management benefits of using a plastic grid system, particularly in areas with poorly drained soils. A drainage layer of clean stone and a bedding course are then placed and lightly compacted. The grid is laid on the bedding course and filled with clean sand or sand/soil mix to the depth called for in the manufacturer's specifications. The cells are then filled with stone or seeded.

WATER QUALITY AND EROSION PREVENTION: The plastic grids hold gravel and turf in place, prevent erosion, allow water to infiltrate, and provide some stormwater filtration.

Schematic of the Invisible Structures Grasspave2 plastic grid system (invisiblestructures.com)

QUICKER SNOWMELT AND DRAINAGE: Increased drainage and surface texture mean snow melts more quickly and drains away, instead of re-freezing and creating slippery conditions. Plastic grid systems are compatible with snow shoveling and snow blowing since the grass roots are protected below the plastic grid.

FLEXIBLE SITE DESIGN: The flexibility of the plastic grid makes it better suited to uneven terrain than solid or turf pavers. Plastic grids can can be cut to fit any shape or area. The interlocking panels are quick and easy to install.

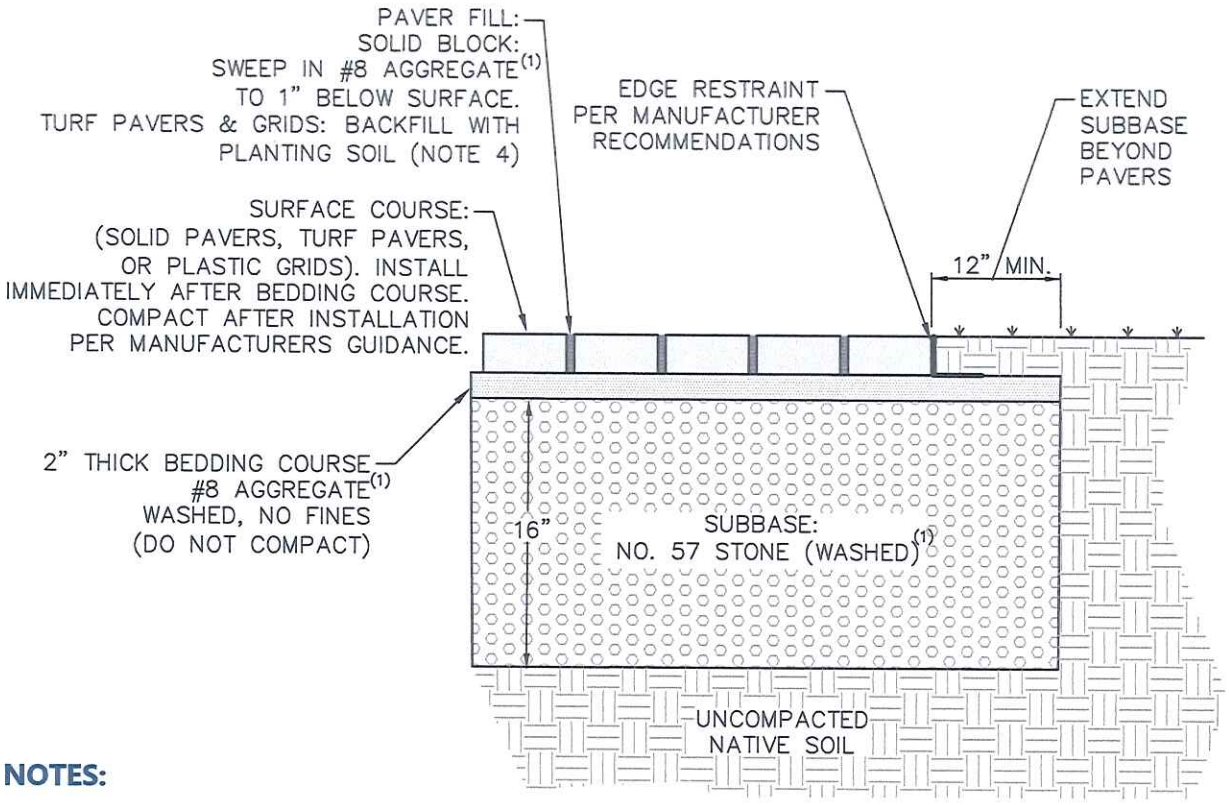
Installation of a plastic grid system with gravel fill (groundprotection.co.uk)

DURABILITY: Minimal maintenance is needed to ensure that the plastic cells stay properly filled with media and maintain their shape and stability.

CONSIDERATIONS: Plastic grid systems are not intended for high-traffic surfaces, or frequent use by heavy weight vehicles where the grids may become worn down or over-compacted. Mowing and otherwise maintaining the turf in your grid system is important to ensure continued high function. Care should be taken when applying deicers in the winter to avoid killing grasses.

BURLINGTON, VT Stormwater PUBLIC WORKS

Plastic Grid Systems: Schematic Drawing (not to scale)



NOTES:

(1) Refer to the companion Local Vendors List for locally available products.

(2) Compact the subbase layer in minimum 6" lifts.

(3) All aggregates must be washed angular crushed stone. Do not use rounded stone.

(4) Planting soil mix for turf grassed grid systems to be 60:40 concrete sand/soil, or 70:30 concrete sand/compost (blend prior to placement).

(5) Subbase thickness dimension "D" is 10" for sandy, well drained soils, and 16" othersiwe. This subbase thickness is for residential driveways only. Locations that experience heavy vehicle loads or have soft soils will require subbase design by an engineer. Maximum driveway slope should not exceed 5%.

ESTIMATED INSTALLATION COSTS:

Plastic grid system installation costs start at $15 per square foot. This cost includes subbase installation, but not demolition of the existing driveway. Costs vary based on soil conditions, size of driveway, and contractor availability.

The typical cross sections provided herein are conceptual only and are not intended for use as construction documents. Refer to manufacturer for installation and maintenance requirements for all products. Modifications to the typical sections may be necessary based upon soil conditions and site suitability. Contact a qualified professional to verify suitability for each application.

BURLINGTON, VT
Stormwater
PUBLIC WORKS

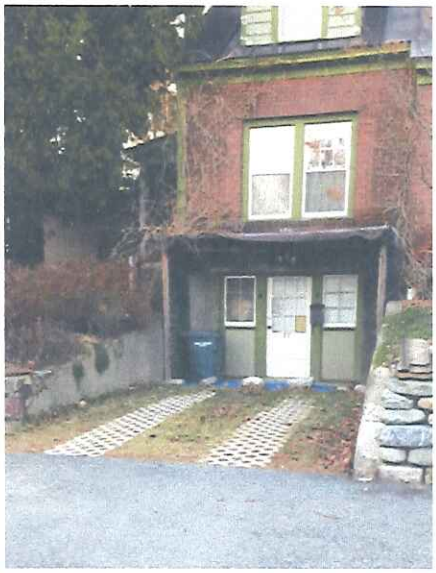
Stormwater Friendly Driveways: Ribbon Driveways

Ribbon or "Hollywood" driveways became popular in the 1920s and consist of two parallel strips of concrete, mortar-set stone or brick, or solid or turf pavers with an open, unpaved space in between. The strips in a ribbon driveway should be at least two feet wide and located so they are separated five feet on center (see schematic on the following page). The space between the ribbons may be planted with grass or another ground cover, or filled with landscaping rocks or gravel. Ribbon designs are best suited to shorter, straight driveways, and can become impractical where driveways are long or curved.

A concrete ribbon driveway in Burlington.

LOWER COST: Ribbon driveways require far less material and installation time than fully paved driveways. Ribbon driveways can be contoured and designed to fit most any space.

CURB APPEAL: Ribbon driveways provide great opportunities for landscaping, with many design and pattern options. Ribbon driveways can be combined with porous pavement, permeable pavers, bricks, or turf pavers. Ribbon driveways can be incorporated into historical restoration or used to add quaint charm and character to your home.



A concrete paver ribbon driveway in Burlington.

WATER QUALITY: Ribbon driveways typically contain 60-70% less impervious surface than a full width driveway, allowing more water to drain into the ground below and reducing runoff.

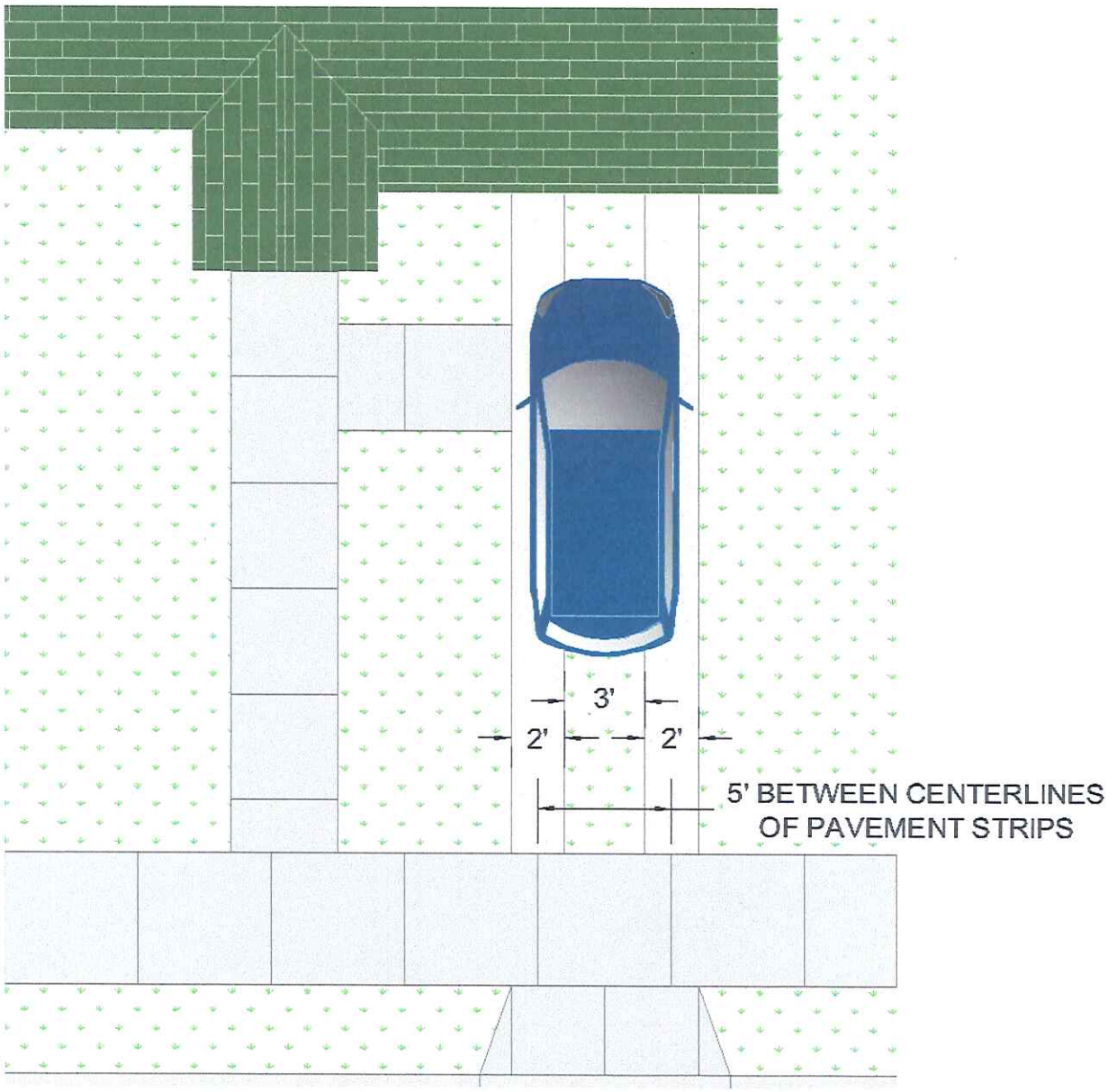
DURABILITY: Ribbon driveways are able to respond more dynamically to frost and thaw cycles than fully paved driveways and are less prone to cracking. If needed, replacement of ribbon driveways is easier, quicker, and less costly.

CONSIDERATIONS: Ensure that the ground doesn't become compacted when tires miss the strips—consider placing small markers to avoid driving off the paved areas. The center open ribbon may need annual maintenance to top off gravel, or keep vegetation healthy after each winter snowplowing season. If ground cover or grass is selected for the open ribbon, parked vehicles must be moved periodically so that a single location is not continuously shaded. Snow-blowers work well with ribbon driveways.

As of December 2013, ribbon driveways are the only layout that receives coverage credit under the zoning regulations, as only the paved strip portion (beyond the required 38 feet of parking space) is counted in calculating lot coverage.

BURLINGTON, VT Stormwater PUBLIC WORKS

Ribbon Driveways: Schematic Drawing (not to scale)



NOTES:

(1) Refer to the companion Local Vendors List for locally available products.

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BURLINGTON, VT
Stormwater
PUBLIC WORKS

Stormwater Friendly Driveways: Problem Prevention

Coal-Tar Based Sealants

When asphalt driveways crack, sealants are often touted as a cheap and easy fix. Traditionally, sealants have been made with coal tar, which contains high levels of polycylic aromatic hydrocarbons (PAHs) that can wash off and pollute air, soil, and water. PAHs are toxic to mammals (including humans), birds, fish, amphibians, and plants—and PAH levels can be 60-80 times higher in particles washed off of coal-tar sealed surfaces as compared to unsealed surfaces.

Asphalt-based seal coats present an option with much lower PAH concentrations (up to 1000 times less) than coal-tar sealants. A 2012 survey found that asphalt-based sealants cost an average of $20 per five-gallon bucket, about 20% more than coal tar-based sealants. There are other environmentally friendly sealant products available on the market, including Gilsonite-based and acrylic-based products, but they can be much more expensive ($40+ per five-gallon bucket). Finally, utilizing pavers, a plastic grid system, or other permeable driveway options eliminates the need for sealants.

Coal-Tar Sealant Alternatives

- ENVIROSEAL LAS-320™ asphalt sealer is not petroleum based, and is EPA approved
- AFM DynoSeal Driveway/ Asphalt Sealer
- INTEGRA-SEAL by UNIQUE Paving Materials, asphalt-based, zero VOCs, no PAHs
- Eco-Seal Brand Sealer
- Latex-ite® Blacktop Driveway Sealers
- Black Jack® Asphalt Sealers

Gravel Driveways

While gravel driveways may start off permeable, compaction eventually makes them just as impermeable as regular asphalt. Many driveways slope down to the street, so gravel can migrate into the roadway during significant rain events. When this happens, the homeowner has to replace the gravel, and it can cause problems for bicyclists and other vehicles using the street, stormwater infrastructure, and Lake Champlain.

A Burlington gravel driveway without proper slope and drainage. Gravel and oils are washing into the street.

A Burlington gravel driveway with clean gravel and no wash-out.

In some cases the negative impacts of gravel driveways can be mitigated by shaping or crowning the driveway to get water and sediment to shed to the sides. However, the City of Burlington Stormwater Management Program recommends that gravel **not** be used as a driveway surface on slopes greater than 2%. Driveways that discharge sediment to the right-of-way may be cited for violation of the City's Chapter 26 Ordinance on Wastewater, Stormwater, and Pollution Control [26-112(b)(1-2)]. Homeowners with steeper driveways should actively look for alternatives to gravel.

BURLINGTON, VT Stormwater PUBLIC WORKS

Stormwater Friendly Driveways: List of Local Vendors for Materials

Plastic Grids

Products : NDS Tufftrack, Bodpave 40 & 85

Local Vendor (NDS TuffTrack only): Ferguson Waterworks
429 Troy Avenue
Colchester, VT 05446
Phone : 802-655-3505

Solid Pavers, Turf Pavers

Product Lines: Unilock, Belgard, Technobloc

Local Vendor: Trowel Trades Supply
206 Hegeman Ave.
Colchester, VT 05446
Phone: 802-655-3166

Aggregates: #57 stone, #8 stone, and Concrete Sand (ASTM C33 sand)

Whitcomb Quarry (substitute Standard 3/8" stone for #8 stone, request washing, order 10% extra)
61 Whitcomb Street
Colchester, VT 05446
Phone: 802-655-1270

Shelburne Limestone Corporation (substitute 1/8" filler stone for #8 stone, #57 or sand not available)
688 Quarry Road
Shelburne, VT 05482
Phone: 802-985-2334

Hinesburg Sand & Gravel (all products available, specify crushed product)
14818 Route 116
Hinesburg, VT 05461
Phone: 802-482-2342

Paving Contractors

Porous Asphalt:
S.T. Paving
PO Box 567
Waterbury VT 05676
Phone: 802-244-7861

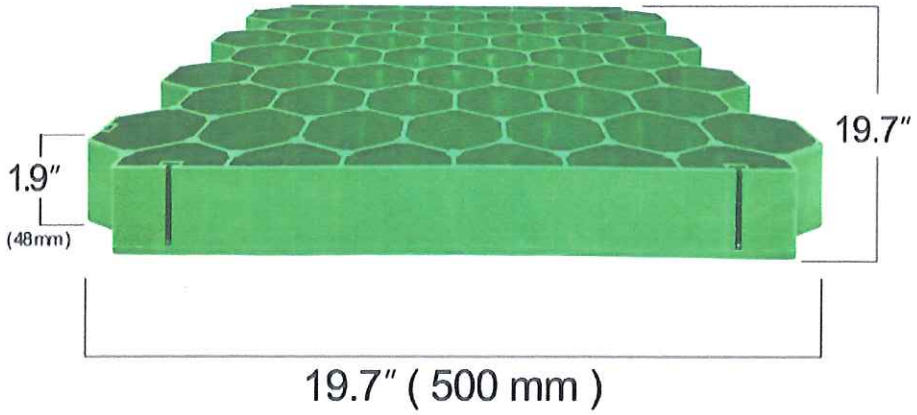
Porous Concrete:
SD Ireland Companies
193 Industrial Avenue
Williston, VT 05495
Phone: 802-863-6222

Porous Concrete Panels (Precast):
Product Name: *Stormcrete*
Porous Technologies, LLC
8 Blue Moon Drive
North Yarmouth, ME 04097
Phone: 877-271-9055

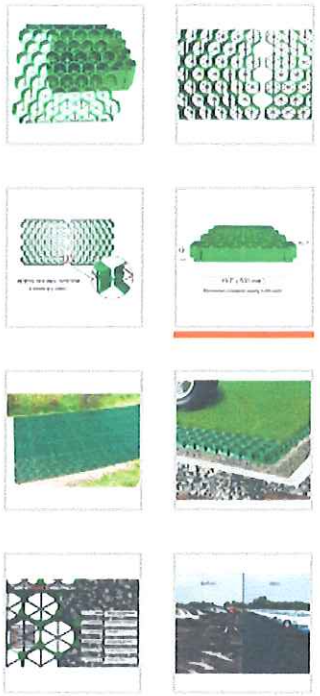
BURLINGTON, VT Stormwater PUBLIC WORKS

Techno Earth

19.7 in. x 19.7 in. x 1.9 in. Green Permeable Plastic Grass Pavers for Parking Lots, Driveways (4 Pieces/11 sq.ft.)



The maximum compression capacity is 200 tons/m²



Why Should You Consider a Stormwater Friendly Driveway?

Driveways are an integral part of our residential properties. They afford better access and allow us to park off the street. Stormwater friendly driveways also allow water to soak away into the ground below, where it is filtered by the soil and can recharge groundwater, keep pollutants out of Lake Champlain, and reduce flooding risks. These driveways help conscientious homeowners reduce their individual contributions to the City's stormwater runoff challenges.

Unfortunately, our traditional driveways are often direct conduits for polluted runoff to drain quickly from properties into the street. Rain falling on impermeable, paved surfaces collects oil, deicing salts, fertilizers, and gasoline residue as it runs down the driveway to the street. Driveways also often capture runoff from adjacent rooftops, directing an even larger volume of water out to the road than what falls on the driveway. Runoff from sloped gravel or dirt driveways typically carries a significant amount of sediment. Much of this material stays on our streets, creating hazards for cyclists, while the rest of it clogs up stormwater infrastructure and pollutes Lake Champlain – not to mention the money that property owners pay over and over again to replace their lost driveway material.

Benefits

- Help improve Lake Champlain water quality by managing rain where it falls and reducing runoff from storms
- Solve or prevent erosion problems on your property, prevent puddles and the nuisance they create, reduce your use of sand and salt or other deicing chemicals, and keep gravel, sediment, and other pollutants out of your street, storm sewers, and Lake Champlain
- Increase the value of your home by beautifying your landscape, while benefiting plants and gardens by recharging the water table on your property

Stormwater friendly driveways like this one in Burlington, where an open concrete paver system was planted with grass, offer multiple benefits for homeowners, local infrastructure, and Lake Champlain.

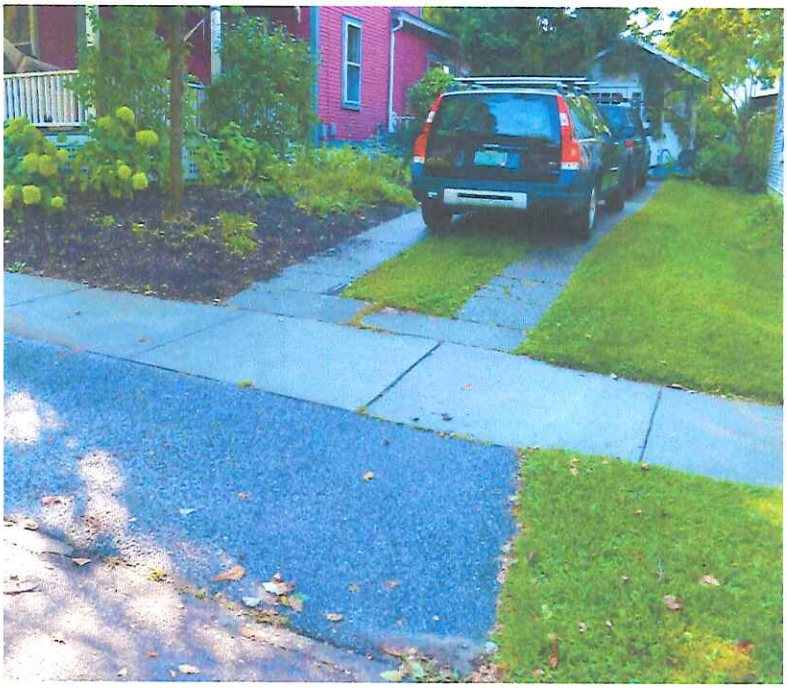
Please visit http://bit.ly/1hyYgIC for links to all the stormwater driveway fact sheets.

BURLINGTON, VT Stormwater PUBLIC WORKS

Why Should You Consider a Stormwater Friendly Driveway? (cont.)

The cumulative effect of rapid run-off from our homes and driveways can cause localized flooding, or overwhelm the sewer system and cause sewage to backup into basements. Once it gets to a storm drain, runoff is typically discharged to the lake with little or no treatment. Vermont has over a dozen stormwater impaired watersheds, all of which ultimately drain to Lake Champlain. The impact of urban stormwater runoff on the lake's health, aquatic species, and our enjoyment and use is significant.

For these reasons and more, the City of Burlington Stormwater Management Program encourages the implementation of stormwater friendly driveways.



A ribbon or "Hollywood" driveway, like this one in Burlington, is another stormwater-friendly driveway option.

Stormwater friendly driveways are attractive and durable. Most types require minimal maintenance, last longer than traditional concrete or asphalt, and allow snow and ice to melt and drain away faster. If you are already planning to replace your driveway, consider making a better long-term choice for your home, your neighborhood, and the Lake.

Zoning restrictions and open space requirements often limit what you can build on your property, depending on the amount and type of manmade surfaces already in place. Choosing a stormwater friendly driveway, however, can reduce the amount of coverage calculated for zoning permit purposes and thus may allow you to construct additional building space elsewhere on your lot. Currently "strip driveways" provide this benefit, but soon other stormwater driveway types may provide up to 50% credit if proposed amendments to zoning regulations are approved in early 2014.

Although the information in this document has been funded wholly or in part by the United States Environmental Protection agency under agreement LC-96162901-0 to NEIWPCC, it has not undergone the Agency's publications review process and therefore, may not necessarily reflect the views of the Agency and no official endorsement should be inferred. The viewpoints expressed here do not necessarily represent those of NEIWPCC, the LCBP Steering Committee or U.S. EPA, nor does mention of trade names, commercial products, or causes constitute endorsement or recommendation for use.

Visit http://bit.ly/1hzity2 for available grant opportunities that may help you implement your own stormwater friendly driveway.

BURLINGTON, VT Stormwater PUBLIC WORKS

Stormwater Friendly Driveways: Porous Concrete and Asphalt

Porous concrete and asphalt – also called permeable or pervious – are alternative pavement surfaces that contain the same large aggregate material as traditional concrete or asphalt, but little or no sand or other fine fill material. This leaves a system of holes or voids that water can drain through quickly, while maintaining the general appearance and hardness of typical pavement. Porous pavement is installed over a drainage layer of clean, crushed stone and supporting subbase (see the schematic drawing on the next page) that acts as a reservoir to hold, drain, and infiltrate stormwater. Porous pavement surfaces tend to be more textured, providing better traction for vehicles and pedestrians, and both poured-in-place and pre-cast options are available.

QUICKER SNOWMELT AND DRAINAGE: The air flow and drainage provided at the surface of the driveway allows snow and ice to melt and drain quickly, reducing the risk of re-freezing and slippery surfaces. Less deicer is needed, lowering winter maintenance costs while keeping chlorides from leaching into ground and surface waters.

LOW LIFE-CYCLE COST: While installation costs are typically slightly higher, properly constructed porous pavement is durable, low maintenance, and has a low life cycle cost.

WATER QUALITY: Contaminants such as oils can be caught in the void spaces of the porous pavement where they are broken down into smaller and less harmful compounds, and are kept out of your yard, storm drains, and natural waterways. Porous pavement also does not require sealing with potentially toxic sealants.

WATER QUANTITY: Porous pavement is typically designed to treat stormwater that falls on the actual paved surface, but it can often accept clean runoff from adjacent impervious areas like rooftops.

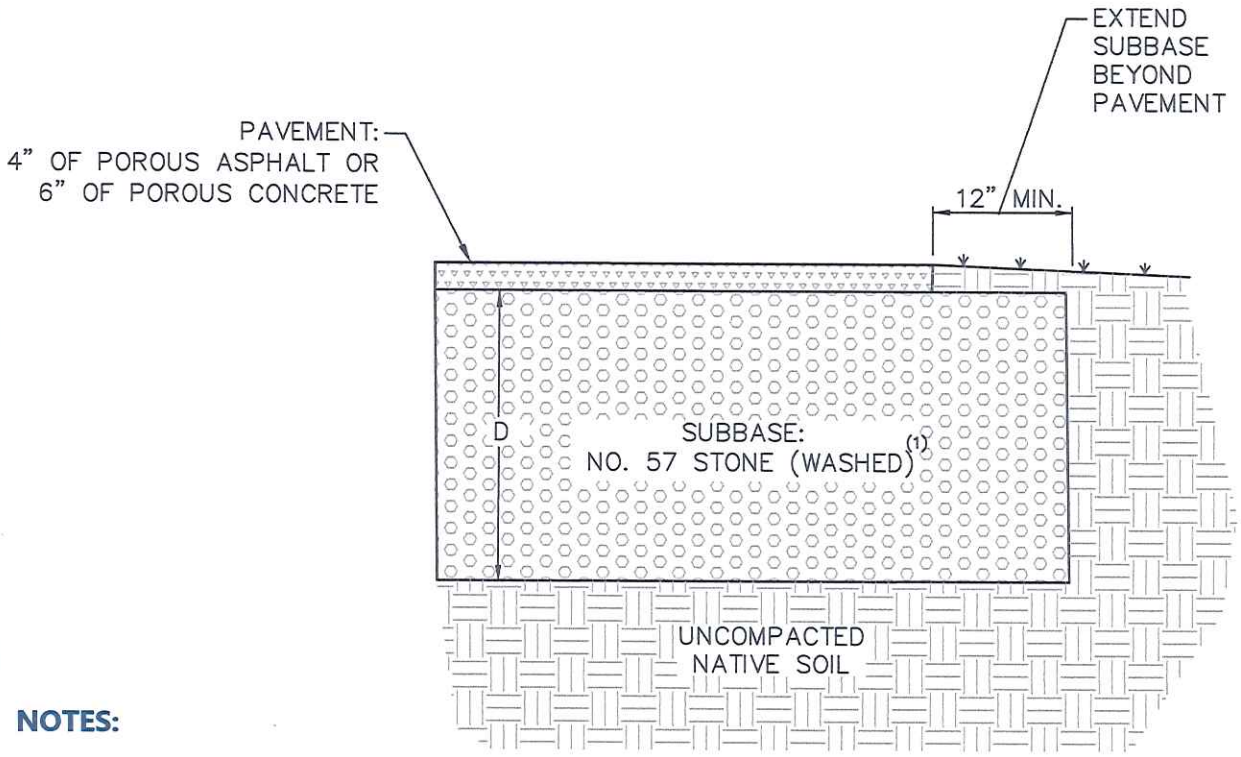
The line between porous and non-porous asphalt. Photo credit: vtwaterquality.org.

CONSIDERATIONS: Porous pavement has more void space and is prone to settling under heavy weight, though this should not be an issue in residential applications. Proper installation is critical, so a certified installer or an experienced contractor should be selected. Pavement should be kept clean with regular sweeping, typically once in spring after snowmelt, once in fall after the leaves fall, or occasional vacuuming to keep void spaces clear. Careful sediment control is needed for any uphill areas to avoid clogging pavement. Care should be taken when using deicers—over-application of chlorides can increase raveling of pervious concrete. Consider use of pre-cast permeable concrete slabs to minimize this material's susceptibility to deicers.

A pre-cast permeable concrete parking lot being laid on the UVM campus in Burlington. Photo credit: University of Vermont.

BURLINGTON, VT Stormwater PUBLIC WORKS

Porous Concrete and Asphalt: Schematic Drawing (not to scale)



NOTES:

(1) Refer to the companion Local Vendors List for locally available products.

(2) Compact the subbase layer in minimum 6" lifts.

(3) All aggregates must be washed angular crushed stone. Do not use rounded stone.

(4) For porous concrete: Allow 28-day cure prior to exposure to freezing, and no deicer use within first 12 months.

(5) Subbase thickness dimension "D" is 12 inches for sandy, well drained soils, and 16" otherwise. This subbase thickness is for residential driveways only. Locations that experience heavy vehicle loads or have clay soils will require subbase design by a qualified professional. Maximum driveway slope should not exceed 5%.

ESTIMATED INSTALLATION COSTS:

Porous asphalt and concrete costs start at $20 per square foot. This cost includes subbase installation, but not demolition of the existing driveway. Costs vary based on soil conditions, size of driveway, and contractor availability.

The typical cross sections provided herein are conceptual only and are not intended for use as construction documents. Refer to manufacturer for installation and maintenance requirements for all products. Modifications to the typical sections may be necessary based upon soil conditions and site suitability. Contact a qualified professional to verify suitability for each application.

BURLINGTON, VT Stormwater PUBLIC WORKS

Stormwater Friendly Driveways: Solid Pavers and Turf Pavers

Pavers are interlocking blocks of stone, brick, or concrete that can be installed instead of conventional impervious paving. There are two main types of paver systems: impervious block systems that incorporate spaces between to allow infiltration, or systems with larger spaces within blocks filled with clean washed stone, or grass or other suitable vegetation.

Installation of pavers begins with a level base of existing or "native" soil (see schematic drawing on the next page). A washed gravel subbase (e.g., No. 57 stone) may be spread over the soil base to provide a reservoir for holding runoff prior to infiltration. Incorporating a gravel subbase increases the stormwater management benefits of using pavers, and is especially important on less well-drained or clay soils. A bedding course is then placed, leveled, and compacted. The bedding course accommodates minor differences in the pavers and allows the pavers to seat firmly so that they won't rock and crack. The pavers are laid on the bedding course, and are filled with bedding course or sand/soil material according to the paver manufacturer's specifications. Open space pavers can be either filled with stone or seeded.

CURB APPEAL: Many colors, styles, and patterns are available and pavers have great aesthetic value. Pavers have much the same look as brick driveways, but offer greater water quality benefits. To minimize installation costs, consider using solid pavers and turf pavers together in a ribbon driveway layout (see companion sheet) if suitable for your site.

A concrete paver walkway in Burlington.

EROSION PREVENTION: Replacing gravel surfaces with pavers can reduce erosion and contaminant transport to storm drains, and can help reduce localized flooding and pooling during storm events.

WATER QUALITY: Paver systems filter water as it passes through, and help recharge local groundwater.

Concrete paver driveway planted with turf.

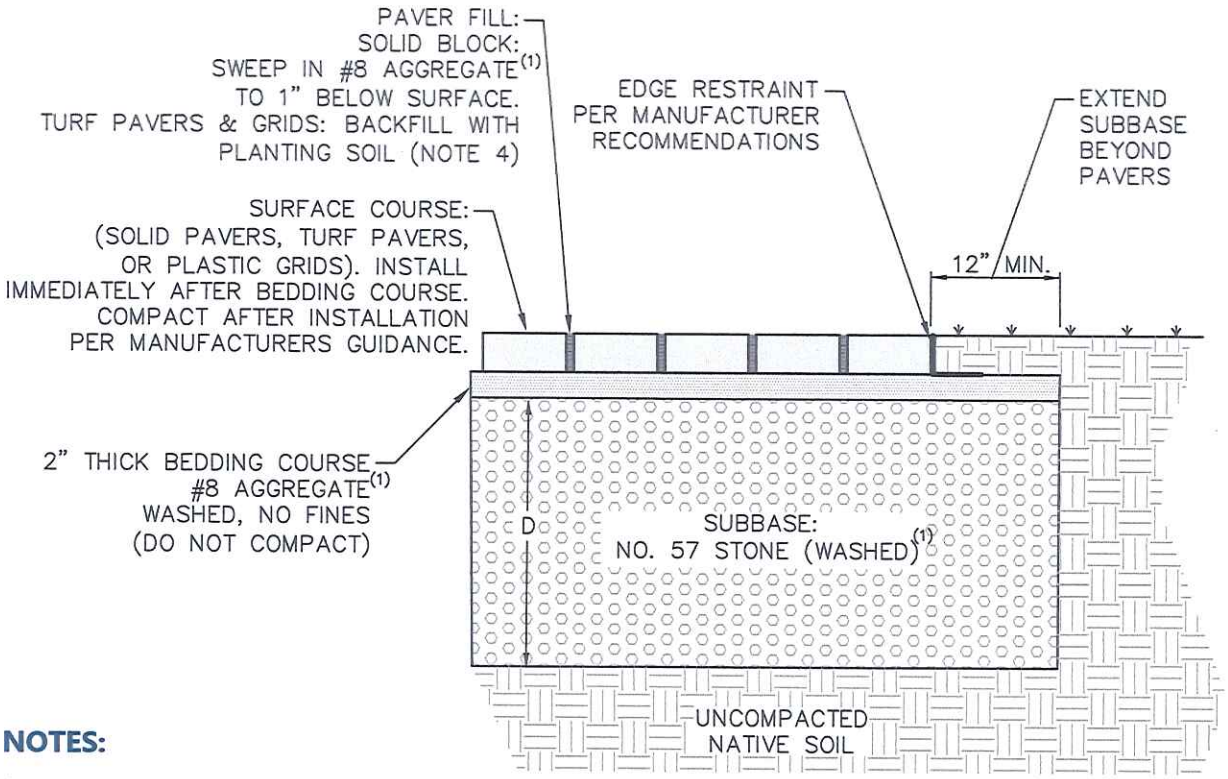
QUICKER SNOWMELT AND DRAINAGE: Increased drainage and air flow mean snow melts more quickly and drains away, instead of re-freezing and creating slippery conditions. Less deicer is needed, lowering winter maintenance costs while keeping chlorides from leaching into ground and surface waters.

DURABILITY: Pavers are better able to move with the freeze-thaw cycle, rather than cracking like typical pavement. Individual pavers can easily be replaced as needed.

CONSIDERATIONS: Some site preparation, such as clearing and leveling, is necessary to ensure that the pavers are installed evenly and correctly and won't "pop". Care should be taken when applying deicers to vegetated pavers in the winter.

BURLINGTON, VT Stormwater PUBLIC WORKS

Solid Pavers and Turf Pavers: Schematic Drawing (not to scale)



NOTES:

(1) Refer to the companion Local Vendors List for locally available products.

(2) Compact subbase material in minimum 6" lifts.

(3) All aggregates must be washed angular crushed stone. Do not use rounded stone.

(4) Planting soil mix for turf pavers to be 60:40 concrete sand/soil, or 70:30 concrete sand/compost (blend prior to placement).

(5) Do not use stone dust or stone screenings within the paving system.

(6) Subbase thickness dimension "D" is 10" for sandy, well drained soils, and 16" othersiwe. This subbase thickness is for residential driveways only. Locations that experience heavy vehicle loads or have clay soils will require subbase design by qualified professinal. Maximum driveway slope should not exceed 5%.

ESTIMATED INSTALLATION COSTS:

Solid and turf paver costs start at $20 per square foot. This cost includes subbase installation, but not demolition of the existing driveway. Costs vary based on soil conditions, driveway size, and contractor availability.

The typical cross sections provided herein are conceptual only and are not intended for use as construction documents. Refer to manufacturer for installation and maintenance requirements for all products. Modifications to the typical sections may be necessary based upon soil conditions and site suitability. Contact a qualified professional to verify suitability for each application.

BURLINGTON, VT
Stormwater
PUBLIC WORKS

The Tahoma View

Pierce Conservation District Mission: Pierce Conservation District promotes resource conservation through innovation and cooperation.

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CONSERVATION ACROSS PIERCE COUNTY

Inside...

Depave: From Parking Lots to Paradise

On March 16, the Pierce Conservation District, Depave, Stewardship Partners, River Network, City of Tacoma, and funded by a grant from the Russell Family Foundation, literally broke ground at the intersection of Sprague and 6th Ave. in Tacoma on what was the first ever depave project in the Puget Sound area. To depave is exactly what it sounds like—to remove unnecessary pavement. But the work doesn't end once the pavement is gone; the Depave program also works to return the newly created open space to a more natural state. Depave sites can be made into rain gardens, community gardens, community orchards, play areas, or even just a place for some shady trees; the decision is up to the landowner and/or the surrounding community. The original depaving organization, Depave, located in Portland, Oregon, is a young but highly active group, having already removed more than 94,000 square feet of pavement since 2007. We here at the district are excited to be the new local organizing body for the Depave program in Pierce County.

With a successful depave project, the benefits spread out into the environment and community, far beyond the depave site itself. A few of the environmental impacts are obvious—less pavement means more plants, providing cleaner air, increased shade, and improved wildlife habitat. Depaving also has a less obvious but equally important impact on the larger water system around the site. Cement and asphalt, the two materials removed in depave projects, are impermeable (sometimes called impervious) surfaces, meaning they do not allow fluid to pass through them. In a natural area, when rain lands on open soil, it sinks into the ground and recharges the groundwater system (for more information, see the groundwater article on page 12). When an area is paved over, the rainwater that historically seeped into the groundwater system is blocked, depleting groundwater. In turn, the rainwater that hits the pavement flows off into storm drains, carrying any pollutants it encounters along the way. Oil, pesticides, trash, and dog poo are all carried down the drain and out to the closest body of water. By depaving, the soil is allowed to return to its historic function, absorbing water and preventing

(continued on page 13)

Forty volunteers from the community came out for the district's first ever depave project on March 16 in Tacoma.

Many threats face groundwater. Contamination of groundwater has been a serious concern since the early 1800s, when global pandemics of cholera spread through groundwater and into wells. Today in the US, chemicals and waste pose the largest threat. Pesticides, fertilizers, toxic chemicals, road salt, gasoline, oil, and other substances can leach through the soil and seep into groundwater. Underground storage tanks, of which there are estimated to be 10 million in the country, can crack and develop leaks, contaminating groundwater with gasoline and oil. Improperly designed or placed septic systems can leak bacteria, viruses, and a wide variety of other contaminants. Landfills with a damaged or absent protective layer can allow battery acid, paint, and household cleaners to reach groundwater. The list goes on and on.

Another concern is the depletion of groundwater. When groundwater levels drop below the depth of a well, it will run dry. This can happen through natural causes, like drought. Human use can exacerbate the problem; after all, it is during a drought that we are more dependent on groundwater. Impermeable pavement (asphalt and cement that water cannot seep through), buildings, and even grass lawns obstruct water from seeping into the ground, causing it to instead run off into streams and rivers. Therefore, in highly developed areas, less water seeps into the ground to become groundwater and the water level can drop. The US Geological Survey (USGS) monitors wells across the country to monitor groundwater levels to track this problem.

Here in Pierce County, the USGS, Pierce Conservation District, local water purveyors, Pierce County Surface Water Management, and other partners are involved in a project to describe the groundwater-surface water interaction in the Chambers-Clover watershed. A similar project is now underway in the Puyallup watershed. The information from both projects is being used to construct models of groundwater flow in both watersheds. The models will be able to simulate a variety of watershed conditions to see how streams and groundwater levels change based on a variety of factors. This information will greatly benefit water resource planning and long-term watershed management decisions.

We all play a role in protecting our precious groundwater resources. Government and heavy industry are responsible for keeping facilities up to code. We can help protect groundwater by being mindful of where chemicals are used and stored on our property and by properly maintaining our wells and septic systems. Using permeable pavement where it is feasible and planting gardens or maintaining natural areas instead of a lawn are good ways to allow rainwater to seep into the ground and recharge groundwater, which will keep Pierce County's streams flowing all summer long.

Look for an article on stormwater in the next newsletter. For more information on groundwater, we invite you to visit the USGS's website, especially their groundwater resources at water.usgs.gov/ogw/.□

How Groundwater Feeds Our Streams

by AmeriCorps Intern Lizy Newswanger

In the last newsletter, we talked about glacial melt contributing to Pierce County streams. Now we're going to tackle another water source, particularly in watersheds not fed by glaciers on Mt. Rainier: groundwater. When we learned about the water cycle in school, we learned that rain falls to the ground and flows into streams and rivers, but have you ever wondered how there is water in streams even after a few days without rain? The answer is huge stores of water underground called groundwater. Surface water: streams, lakes, oceans, etc., flow down into soil pore spaces and in rock crevices. When surface water flows into the groundwater system, it is said to "recharge" the groundwater. Eventually the water hits a point where the ground becomes saturated. The top of this saturated zone is called the water table. Heavy rain can cause the water table to rise until it is above ground level, which in turn causes flooding. Typically, the water table remains underground, though it can be anywhere from just below the surface to hundreds of feet down.

Groundwater moves through aquifers, underground layers of rock, or other materials such as sand that have enough spaces, and crevices for the water to move through. Materials that water can move through in this way are called "permeable". Aquifers allow groundwater to move both laterally and vertically; discharge areas, where aquifers bring groundwater back to the surface through springs, wetlands, lakes, and rivers, return groundwater to the surface water. In a single stream, there can be both gaining reaches (areas where groundwater is flowing into the stream) and losing reaches (areas where the stream is losing water to groundwater). In watersheds like the Chambers-Clover watershed that are not fed by glacial melt from Mt. Rainier, groundwater provides much of the summer flow in streams, which is a necessity for the salmon returning to spawn. This process is especially important during drier summer months, where it can then be evaporated and continue through the water cycle again. However, while some groundwater moves quite actively, some is virtually immobile; soil moisture, permafrost, and immobile water deep in permeable bedrock, are all also included as groundwater.

It's hard to imagine that water buried beneath the ground could have much effect on our lives, but consider these numbers: of all the water on earth, only 1%, is readily usable by humans, and of that usable water, 99% is in groundwater. In the United States, half of all drinking water comes from groundwater and rural areas depend almost entirely on groundwater. In most cases of human use in the US, groundwater is pumped to the surface, where it is primarily used to water crops and provide drinking water. Whether the water is pumped or naturally discharged, it ultimately rejoins the surface water system and can then evaporate to begin the water cycle again. Groundwater can take years to reach the surface, but the water is still considered a part of the water cycle.

This USGS diagram shows the water cycle, particularly the role of groundwater. (Sidebar photo) A photo of Chambers Creek. The Chambers-Clover watershed is largely fed by groundwater.

("Depave: From Parking Lots to Paradise" continued from page 1)

polluted runoff. But depaving has another function beyond environmental assistance, depave sites also serve to build community.

District staff work with community members and local jurisdictions to engage each stakeholder in the design of the future open space, keeping in mind each site may look and function differently. After designs are approved and permits secured, staff work on the site ahead of time, slicing the asphalt. Most depave projects involve asphalt because it can be cut into manageable chunks. Since cement must be smashed, it does not lend itself to volunteer depave work parties, and a big part of the depave program model that the district is adopting is that volunteers do much of the pavement removal work. Community volunteers use pry bars to lift up the slabs of asphalt and smash them on the ground, where the asphalt breaks into even smaller pieces that can be loaded into wheelbarrows and carted to a dumpster and then transported to a recycling facility. This seemingly Herculean effort isn't exactly easy, but it's incredibly satisfying to watch the asphalt peel away, piece by piece, freeing the soil trapped underneath.

At the depave project in Tacoma, volunteers were amazed by how quickly and relatively easily the asphalt came away. All 40 volunteers were community members, from Trinity Presbyterian Church, Mt. Tahoma Seventh Day Adventist Church, Jason Lee Middle School, the 6th Avenue Business District, and the general community. One short week later, another 40 volunteers came to the site to plant over 800 trees and shrubs in the depave site and an adjacent City of Tacoma rain garden. Thanks to their hard work, planting was completed in under two hours!

Jason Lee Middle School, Trinity Presbyterian, and Mt. Tahoma Seventh Day Adventist Church have committed to caring for the site for the next three years, at which point the plants will be established enough to be self-sustaining. Depave projects not only create community spaces, they create community, allowing neighbors to interact and work together to improve their environment and shared space. All the volunteers at the Sprague and 6th depave site can look with pride at the new street trees and rain garden, knowing that they helped tear up the pavement and install plants with their own hands. We here at the district are excited to expand this opportunity all across Pierce County. If you would like to nominate a site in your community to depave, contact Melissa at (253) 845-9770 x109 or melissab@piercecountycd.org.□