

Do-It-Yourself Guide for Best Management Practices (BMPs)



Thank you for contacting the Tahoe Resource Conservation District (TRCD) for assistance with your BMPs. Best management practices are methods that prevent sediment and nutrients from entering the waters of the Tahoe Basin, and ultimately help prevent the degradation of Lake Tahoe's beautiful clarity.

This packet provides information for homeowners to critically look at what BMPs may be needed on their properties and how to begin the BMP installation process. Due to the high demand for our BMP evaluation services, if you would like to have a full evaluation, please contact TRCD so we can put you on our waiting list and we will visit your site as soon as possible. It is our hope this 'Do-It-Yourself Guide' will empower and motivate homeowners to start their BMPs.

TRCD staff is always available to answer questions about BMP treatments, sizing, or installations. We are also able to meet with you or your contractor to offer assistance regarding your BMP designs and installations. In addition to the BMP Program, TRCD has many other programs that are part of our larger Backyard Conservation Program (BCP). These include programs for invasive weed identification and removal, fire defensible space, water conservation, fertilizer management, and wildlife habitat enhancement. Please call our BCP Hotline (530-543-1501 extension 113) at any time with questions.

Please Read:

This packet provides information associated with the Tahoe Regional Planning Agency (TRPA) BMP Retrofit Ordinance (Chapter 25). No site visit was made to your property to assess site conditions and constraints. The Tahoe Basin Soil Survey is used to determine the size of your BMPs; however, your soil type is not included in this packet. Contact TRCD to determine your soil type. This packet is NOT INTENDED to provide information on:

- *Establishing land coverage verification or capability*
- *Property boundaries (BMP systems must be installed within property boundary limits)*
- *Engineered drainage design to control existing flooding or water damage to structures*

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TAHOE RESOURCE CONSERVATION DISTRICT
870 Emerald Bay Road, Suite 108
South Lake Tahoe, CA 96150
530-543-1501 extension 113
www.tahoercd.org



The Tahoe Resource Conservation District's Best Management Practices Retrofit and Backyard Conservation Programs

TRCD Mission: *"Promote the conservation and improvement of the Lake Tahoe Basin's soil, water and related natural resources, by providing leadership, information, programs and technical assistance to all land managers, owners, organizations and residents."*

The Tahoe Resource Conservation District (TRCD) is one of nearly 3000 conservation districts across the country helping people to protect land, water, forests, wildlife, and related natural resources. Created in 1974 by the California Legislature with only two employees, TRCD now has 10 full-time staff and a handful of seasonal employees. Although the scope of programs has expanded greatly over the past 30 years, one of the biggest tasks is still TRCD's original goal of controlling erosion in the Tahoe Basin. TRCD is a grant-funded and non-regulatory agency that works with homeowners, residents, and professionals on the California side of Lake Tahoe to promote natural resource conservation through education and technical assistance.

The **Best Management Practices (BMP) Retrofit Program** at TRCD assists homeowners and community members with the local regulatory erosion-control ordinance in the Tahoe Basin. All Tahoe land owners are required to revegetate disturbed or bare soil areas with native or adapted plants and mulch, and to capture and infiltrate runoff from impervious surfaces, such as driveways, roofs, and decks, on their own properties. The goal of this ordinance is to reduce the amount of sediment and nutrients flowing into Lake Tahoe, and thereby halt the decline in lake clarity (to learn more, visit www.trpa.org).



Another program at TRCD is the **Invasive Weed Program (IWP)**. The IWP is coordinating a comprehensive Basin-wide weed management strategy to reduce the impact of non-native terrestrial and aquatic invasive plants in the Tahoe Basin. Invasive weeds have many detrimental effects, such as out-competing native species, degrading wildlife habitat, and causing large amounts of erosion.

The BMP and Invasive Weed Programs at TRCD are part of the larger **Backyard Conservation Program (BCP)**. The Backyard Conservation Program is a joint effort of the Wildlife Habitat Council, the National Association of Conservation Districts, and the Natural Resources Conservation Service. The BCP is designed to educate private homeowners about simple, inexpensive conservation measures they can put to work in their own backyards. TRCD works with partner agencies to obtain grant funding and integrate all aspects of backyard conservation into its programs, including water conservation, erosion control, invasive weed identification and removal, fire defensible space, fertilizer management, and wildlife habitat enhancement. TRCD is recognized throughout the country for its progressive BCP. If you have questions about or would like assistance with either of these programs, visit our website at www.tahoercd.org or call 530-543-1501 extension 113.

BMP Self Checklist

Are there areas of bare soil present on your property? **Yes No**

All areas of bare soil on your property must be vegetated and/or mulched in order to prevent erosion. (Section A - Soil Treatments)

Do the areas below your eaves contain bare soil or signs of erosion? **Yes No**

If there is bare soil under your drip lines (the areas below your eaves), the area(s) need to be stabilized with drain rock (or vegetation) in order to prevent the movement of sediment into local waterways. (Section B - Drip Line Treatments)

Is your driveway/parking area paved? **Yes No**

TRPA requires every single-family residential property owner within the Tahoe Basin to pave a minimum of two off-street parking spaces and to infiltrate this runoff within their property boundary. (Section C - Driveway Systems)

Does runoff from your driveway flow towards the street or roadside ditch? **Yes No**

Runoff from your driveway needs to be conveyed to an infiltration system on your property to prevent any movement of sediment and/or nutrients into the local streams and waterways which eventually lead to Lake Tahoe. (Section C-Driveway Systems)

Do you have areas of bare soil that have been compacted by vehicular traffic, or are you currently parking any vehicles on bare soil? **Yes No**

If you are parking on bare soil, this area will need to be restored to the point where it can sustain vegetation or will need to be paved according to local jurisdiction regulations. (Section C -Driveway Systems)

Do you have bare soil below your elevated deck, stairs, or walkways? **Yes No**

Bare soil below elevated decks, stairs, and walkways needs to be stabilized with a surface-layer of drain rock underneath the entire footprint of the structures. Decks, stairs, and walkways that are inaccessible underneath but with bare soil around their perimeters need some type of soil stabilization in this area, typically drain rock. (Section D - Elevated Structures)

Do you have eroding slopes or slopes where re-vegetation techniques may need to be applied? **Yes No**

Eroding slopes are often stabilized with vegetation, mulch, rip rap, or terraces, depending on the steepness of the slope. It is recommended to contact TRCD or a licensed engineer if you have issues with eroding slopes on your property. Structures utilized in slope stabilization often require engineering assistance. (Section E - Slope Stabilization)

Are there any invasive weeds on your property? **Yes No**

Invasive weeds out-compete native plants and cause soil erosion. Use weed-identification information available on the TRCD website (www.tahoercd.org) or at our office to help identify and remove invasive weeds on your property.

Evaluating Your Own Property

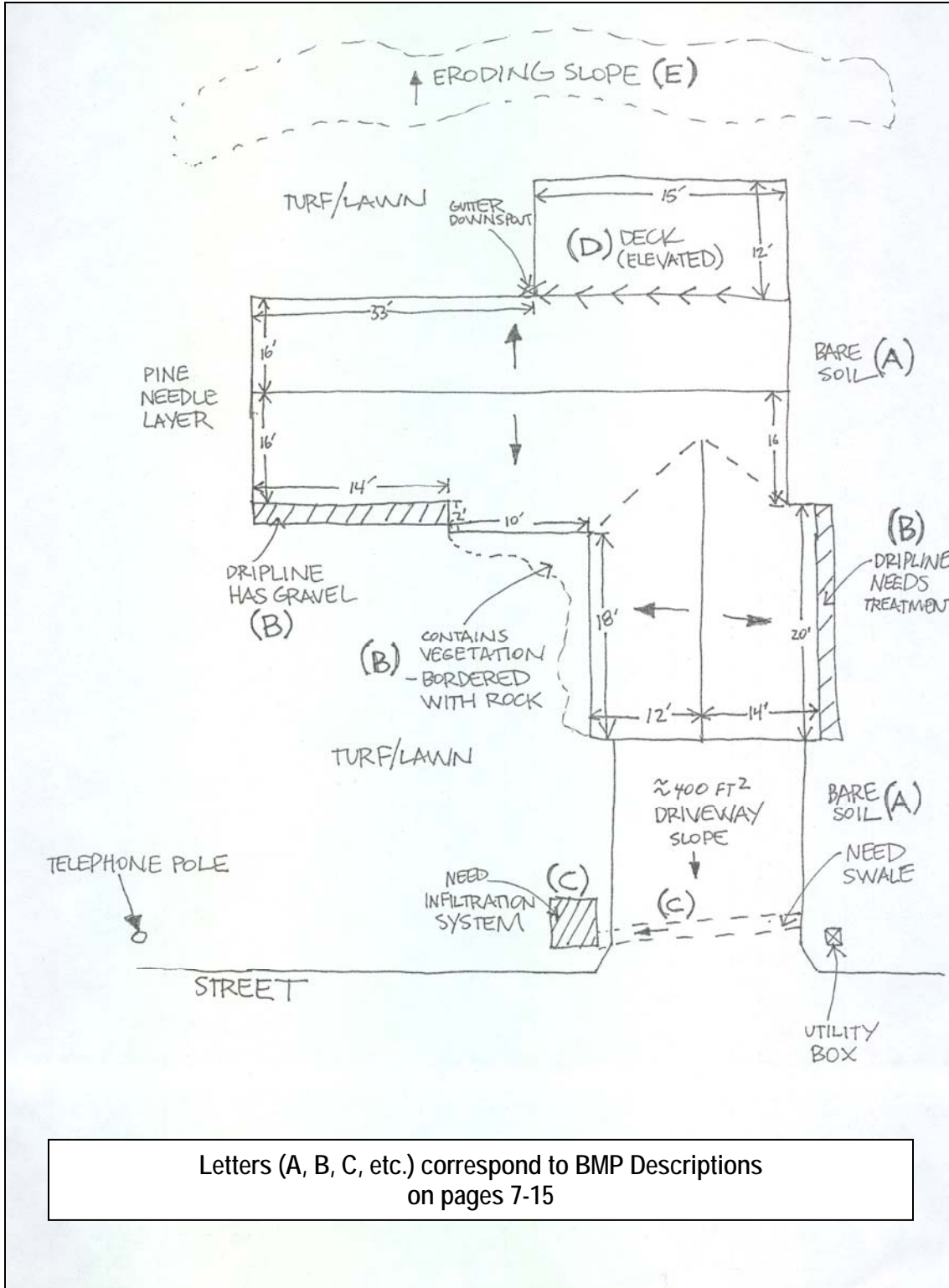
The following steps will help you prepare for BMP installation(s). This is intended to facilitate effective communication between you and our staff so that you can get the most from our services. In this step you will:

- Investigate your property to determine what types of BMPs you will likely need.
- Create a plan for your BMPs.
- **Contact TRCD for soil type and treatment sizing.**

Evaluation Procedure: (Refer to Example Homeowner Drawing, Page 6)

1. Draw an outline of all hard structures on your property from a ‘birds-eye’ view, including roofs and roof peaks, driveway, permanent shed structures, etc. Draw arrows to indicate the direction of water flow off of each hard surface. Run a hose across the width of your paved driveway to determine flow direction.
2. Measure the width (on the ground) from roof eaves to roof peaks and the length of drip lines for each roof area for each hard structure on your property.
3. Use the **BMP Self Checklist** (page 4) to determine where BMP treatments are needed on your property and mark these areas on your drawing (drip lines, driveway systems/paving, bare soil areas, under decks, etc.).
4. Be aware of any obstructions and constraints that may interfere with the implementation of BMPs, such as large trees, rocks, high groundwater, and utilities. Try to work around them as much as possible (see **Difficult Sites and Site Constraints** on pages 15-16). Mark these areas on your plan and document with photos if possible.
5. If you have a digital camera, take photos of your house and landscape, including the areas where you plan to install BMP treatments. Photos are useful if you have specific questions for TRCD staff or need help designing treatments.
6. After you have drawn and measured your home, contact TRCD for assistance in determining the sizes of your BMP systems. TRCD will size systems for you so you can be sure your BMPs will meet the ordinance. Also, feel free to contact TRCD at any point during the self-evaluation process if you have questions about your BMP designs.
7. Determine the types of BMP materials you want on your property and the look or aesthetic you want to achieve. Consider fire defensible space when choosing BMP materials near the structure of your home (see ‘**How do I maintain fire defensible space?**’ on page 21). Recycled materials and materials found on your property can also be used to construct your BMPs and can often save money. You can obtain a materials list at <http://www.tahoebmp.org/documents.aspx>.
8. Decide if you want to install your own BMPs or if you prefer to hire a contractor to do the work. Consider your experience level, resources you will need such as tools and equipment, and the amount of time you have available. TRCD has a list of contractors available on our website (<http://www.tahoercd.org/documents.php>).
9. If you choose to install your own BMPs, keep in mind that the grading (excavation) season in the Tahoe Basin is between May 1 and October 15. Stabilize any soil piles or excavated materials during construction to prevent erosion. Excavations of more than seven cubic yards require a permit from your local jurisdiction. Also, be sure to locate all underground utilities before digging (USA Digs, 1-800-227-2600).

Example Homeowner Drawing



BMP Descriptions (Sections A-E)

This section explains different best management practice treatment options including some installation guidelines. Included are treatments for bare soil, drip lines, driveways, elevated structures, and eroding slopes.

A. Soil Treatments

There may be areas around your yard that need to be vegetated or mulched to cover bare soil. If these areas have been compacted by vehicles or foot traffic, the soil should be covered with two inches of compost and then tilled to a depth of six to eight inches. Be aware that compost is different from mulch. Compost is decomposed organic matter that contains available nutrients to enhance soil fertility and structure for successful re-vegetation. Compost is typically tilled into the soil. Mulch is an organic (pine needles, bark, woodchips) or inorganic (rock) matter applied as a top dressing over the soil. A combination of native or adapted vegetation and organic mulch creates a low maintenance landscape that is highly effective at preventing erosion. There are many native and adapted grasses, plants, shrubs, and trees that can be utilized in the process of establishing a vegetative cover. Please contact TRCD or refer to the *Home Landscaping Guide* for a list of native and adapted plants for the Tahoe Basin.



Mulching is a simple and beneficial conservation practice you can use in your yard. Mulching protects soil from erosion, reduces compaction from the impact of heavy rains, and conserves moisture. Mulches also maintain more even soil temperatures, prevent weed growth, and provide a finished look to your yard. Possible mulches include pine needles, woodchips, redwood or cedar bark, and drain rock.

One easy mulching method is to let pine needles accumulate on your property. Maintaining pine needles at a maximum depth of one to two inches is recommended to minimize the potential for soil erosion and does not pose a wildfire threat. For more information on protecting your home from a wildfire, see 'How do I maintain fire defensible space?' on page 21. If your property has adequate established vegetation and/or mulch, TRCD recommends you maintain these conditions to remain in compliance with the BMP Retrofit Ordinance.



Bare soil on a homeowner's property may lead to the movement of sediment and nutrients into local waterways and eventually into Lake Tahoe. This contributes to the loss of clarity in the Lake.



You can establish many different types of vegetation on your property to attract a wide variety of wildlife such as butterflies and birds. Refer to the *Home Landscaping Guide* or contact TRCD to determine what types of vegetation will work best for your property.

B. Drip Line Treatments

Drain rock treatments:

The Tahoe Resource Conservation District recommends the use of three-quarter inch to one and a half inch washed drain rock; however, you can use any kind of rock you would like to achieve desired aesthetic characteristics on your property and to infiltrate storm water. If available, consider using existing rock found on your property to create a more natural look and to reduce the cost of your BMP installations.

TRCD strongly recommends bordering all drain rock installations and installing filter fabric surrounding systems to reduce maintenance and increase their effectiveness. The most economical borders utilize consist of lumber, logs, or cobble sized rock found on your property. You can also use pressure treated wood, landscape edging, or one of the many recycled composite products available.

Option 1: Install drain rock armoring under drip line(s)

Runoff coming from roof structures onto bare soil can lead to the movement of sediment and/or nutrients into nearby streams and rivers and eventually into Lake Tahoe. **For rapidly draining soils**, armoring the soil below your drip lines with a surface layer of drain rock will stabilize the soil, reduce the erosive impact of your roof runoff, and allow this runoff to infiltrate, or soak, into the soil. **Contact TRCD to find out if your soil is rapid-draining and if armoring therefore will be sufficient for your drip lines.**



Erosion under drip line

All drip line installations must extend a minimum of six inches inside of the drip line and a minimum of twelve inches beyond the drip line of a single story roof, eighteen inches beyond the drip line of a two-story roof, and twenty-four inches beyond the drip line of a three-story roof. Drip line treatments should extend one foot past each eave end where space allows. *For example, if your drip line is measured at 25 feet long then the drip line treatment should be 27 feet long.*



Drip line treatment



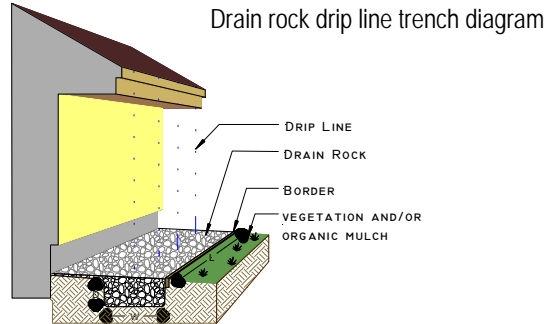
Steep slopes under drip lines may require terraced or baffled treatments. Contact TRCD for assistance.



Borders reduce maintenance and increase effectiveness of systems.

Option 2: Install drain rock trench under drip line(s)

If you have bare soil underneath your drip lines and your soil is not rapid-draining, you may need to install drain rock infiltration trenches to capture and infiltrate your roof runoff on your property and comply with the BMP Retrofit Ordinance. Drain rock infiltration trenches can also be installed underneath gutter outfalls and downspouts to infiltrate roof runoff. The sizes of infiltration trenches depend on your soil type and the amount of roof runoff flowing into the systems. **It is very important these trenches are installed correctly so as not to damage your foundation. Please contact TRCD for assistance after you have measured your roof areas.**

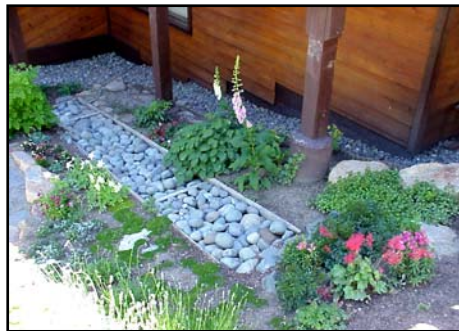


Option 3: Maintain existing vegetation/turf under drip line(s)

Adequate vegetation under your drip lines prevents erosion and promotes the infiltration of storm water into the ground. If you have existing vegetation (such as turf or a bordered planter bed) under your drip lines, simply maintain these areas. If these conditions change, alternate treatments may need to be established. Be aware that some vegetation is highly flammable. For information on protecting your home from wildfires, visit <http://www.livingwithfire.info/>.

Examples of adequate drip line vegetation include:

- Healthy grass or turf that has been established directly up to the foundation of your home
- Plants, shrubs, or flower beds that are completely bordered by wood, rock, or turf with mulch between vegetation



Vegetation must be well maintained under drip lines. Drain rock/cobble can also be combined with vegetation, as in the center photo, creating a nice aesthetic.



C. Driveway Treatments

Paved Driveways

If your driveway is paved and slopes toward the street, it is likely you will need to install both a conveyance device and an infiltration system. These will act together to capture and infiltrate your driveway runoff before it reaches the right-of-way. If your driveway is sloped away from the street, you may not need conveyance, but you still may need to install appropriate armoring or an infiltration system to meet the BMP Retrofit Ordinance.



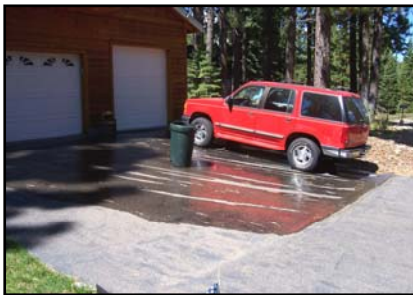
This paving stone driveway slopes onto the property and also has an infiltration system.

It can be difficult to design driveway systems; therefore, most properties require a site visit from TRCD staff for design assistance. To install your driveway systems, TRCD recommends hiring a licensed contractor who has attended our BMP workshops and is familiar with the installation of driveway BMPs. If you feel you are capable, you may, however, do your own installations. Please be aware you will need to apply for the appropriate permits for any work undertaken in the jurisdictional right-of-way. Prior to implementing an infiltration system for your driveway, please contact TRCD with your driveway dimensions for the appropriate sizing of this treatment and to discuss options for infiltrating the runoff from your driveway.

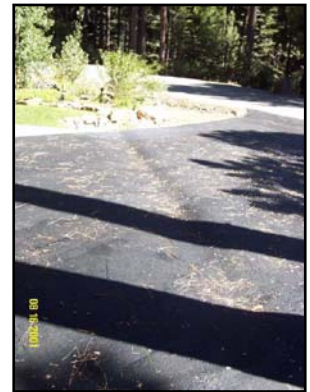
CONVEYANCE SYSTEMS

Option 1: Install asphalt swale

One option to capture and convey your driveway runoff on your property is to install an asphalt swale (depression) across the width of your driveway. This should be installed near the public right-of-way boundary, but still within your property boundary. A swale is the most economical option to capture and convey driveway runoff and is generally installed on driveways with less than five percent slopes.



This swale is successfully capturing and conveying driveway runoff.



Asphalt Swale Example

Option 2: Install slotted channel drain

Another driveway conveyance option is the installation of a slotted channel drain across the width of your driveway. A slotted channel drain is a metal-grated conveyance structure that transports water underground to a sediment trap and infiltration system. Slotted channel drains are installed flush with the driveway surface, a feature which makes these conveyance devices more appealing for aesthetic reasons and ease of snow removal. Although slotted channel drains may be installed on any driveway, they are recommended for driveways with slopes greater than five percent.



Two slotted channel drain examples. The one on the left conveys to an underground infiltration system, and the one on the right to a drain rock infiltration system.



INFILTRATION SYSTEMS

There are multiple options for infiltration systems to capture and infiltrate your driveway runoff. The most common designs are drain rock and prefabricated systems. You must know your soil type (contact TRCD) and the volume of runoff flowing into the system in order to design any driveway infiltration system.

Option 1: Install prefabricated infiltration system

Prefabricated systems can require less excavation and have a greater holding capacity than drain rock systems. They frequently are used on sites with slower draining soils and excavation depth restraints (high groundwater, bedrock), but can also be a good option for most sites. Prefabricated systems are easier to maintain than drain rock systems but much more expensive. There are various options for prefabricated systems. Refer to www.tahoercd.org for more information and follow manufacturer specifications when installing.

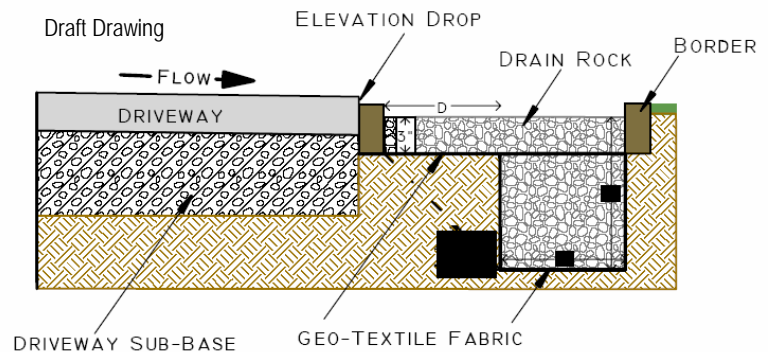


In the above photo, rainstores, one type of prefabricated system, are being installed.

Option 2: Install drain rock infiltration system

Drain rock systems are more common than prefabricated systems. They are often less expensive but require more excavation. As with all infiltration systems, you must know your soil type and the volume of runoff flowing into the system to be able to size the system. If you choose to install your own system, follow the instructions below:

- Excavate a hole to the required dimensions, line it on all sides with filter fabric, and backfill with drain rock. Do not excavate immediately adjacent to your driveway so as not to undermine your driveway's sub-base.
- Before installing the last three inches of drain rock, cover the top of the rock with a single layer of filter fabric and place the last three inches of rock over the fabric.



Cross-Section of a Driveway Drain Rock Infiltration System

Option 3: Install drain rock infiltration trench along driveway edge

Installing a drain rock infiltration trench along the edge of your driveway is most efficient if *all* of your driveway runoff is flowing into this area. This treatment sometimes works combined with other treatments and also works well if you are installing a new driveway and are able to grade it so the runoff will sheet flow into this infiltration system. If the entirety of your driveway runoff does not flow to the side, and a portion flows toward the street, it is likely you will need to install a driveway conveyance device.

Follow the installation instructions below to install a driveway infiltration trench, after determining the size of the system based on your soil type and the size of your driveway:

- Follow the same excavation and installation instructions for a drain rock infiltration system (above). The bottom of the infiltration trench must be installed level to ensure even water spreading throughout the infiltration area.
- On the outside edge of the trench, border the drain rock to retain the material and prevent adjacent soil from clogging up the system. If you install a border along the driveway edge (to protect the asphalt) or if a border is already installed along the driveway edge, ensure that it is slightly below the surface of the driveway to allow runoff to flow into the infiltration system.
- Within the first one to two feet from the edge of the pavement, this trench should be no deeper than three inches to avoid destabilizing the driveway's sub-base. Another way to address this situation is to create a gentle slope in the area between your driveway and the infiltration system over a distance that is equal to the depth of the infiltration trench.



The runoff from the driveway above flows into the infiltration trench along the driveway edge.

Option 4: Install rock-lined or vegetated infiltration basin

Rock-lined or vegetated infiltration basins are other options to capture and infiltrate your driveway runoff and also are aesthetically pleasing landscape features. They are, however, difficult to design and install correctly. If this is a preferred treatment option, please contact TRCD or a licensed contractor for assistance.



Rock-Lined Basin

Unpaved Driveways



Driving on an unpaved surface causes soil compaction, making the surface nearly impermeable. This results in soil erosion and contaminated storm water runoff. For this reason, all property owners are required to pave or restore all compacted areas that are used for parking on their properties. The BMP Retrofit Ordinance requires homeowners to pave a minimum of two off-street parking spaces on their properties. If you currently have an unpaved driveway on your property, contact your local jurisdiction for information on required permits and local regulations: City of South Lake Tahoe, 530-542-6027; El Dorado County, 530-573-3330 x 0; Placer

County, 530-581-6227. In addition to paving your driveway, conveyance and infiltration systems will need to be installed to capture runoff generated by the newly paved area(s).

Acceptable Paving Products:

There are many options for products that can be used to pave driveways. These include, in order from least to most expensive, asphalt, concrete, paving stones, and some permeable paving products. Please contact TRCD or a licensed contractor for more information about different driveway surface options.



Compacted Bare Soil Areas

If you currently have a paved driveway and also have areas of bare soil that have been compacted by vehicle use, you will need to either restore or pave those areas.

Option 1: Restore the compacted area to the point where it is able to sustain vegetation

To do this successfully, you will need to aerate (till), amend (compost), and seed or plant the area. In order to prevent future soil degradation, parking barriers should be installed along the edge of the existing driveway. Parking barriers can be made from a variety of materials such as split rail fencing, boulders, wood posts, or shrubs. *Please be aware that if you decide to restore the area, you may lose established coverage credits if you do not obtain a Site Assessment or Verification of Existing Land Coverage prior to restoration. You may need to document this area before any work is completed to prove that the coverage existed before you removed it. Contact the Tahoe Regional Planning Agency (775-588-4547) for more information about coverage issues.*



For compost or amendment to work properly, it must be thoroughly mixed into the soil. Amendment improves the soil's water retention, permeability, and water infiltration capacity.



Option 2: Pave the compacted area

Contact your local jurisdiction for information on paving permits and regulations. Also refer to the *Paving Residential Dirt Driveways* handout available on the TRCD website (<http://www.tahoercd.org/documents.php>). If you wish to pave more than two off-street parking spaces, you will need to get a Site Assessment to determine your parcel's coverage limits. Go to <http://www.trpa.org/default.aspx?tabindex=6&tabid=187> for coverage information and the Site Assessment application form.

Erosion is evident beneath this elevated deck without a treatment.

D. Elevated Structures

To protect the soil under elevated decks, stairs, and walkways from water and wind erosion, install a three-inch layer of drain rock under the entire footprint of the structure and extend one foot past its edge. If you have structures on your property that are low to the ground and are inaccessible underneath, install a three-inch layer of rock armor approximately twelve inches wide around the outside perimeters of the structures. This treatment will dissipate runoff velocity and prevent erosion. It is only necessary to install drain rock under and around decks, stairs, and walkways if there is not adequate vegetation established in these areas.



The drain rock underneath the elevated deck above is nicely contained by a wood border, which helps to contain the rock and prevent sediment from moving into the system. The two photos on the right illustrate both turf and cobble treatment options for low elevated structures.

E. Slope Stabilization

Eroding slopes must be stabilized to prevent erosion. Depending on the steepness of the slope, soil type, and aesthetic preference, there are multiple options for stabilization. Gentle slopes can be stabilized with vegetation, mulch, and/or erosion control blankets. Steep slopes may require the use of terracing, rip rap, or retaining walls constructed from boulders, rocks, concrete blocks, or wood products. A building permit and engineering expertise are required to build retaining walls that are over four feet in height measured from the bottom of the footing to the top of the wall.

If you have issues with eroding slopes on your property, please contact TRCD or a licensed contractor for assistance with treatment designs.



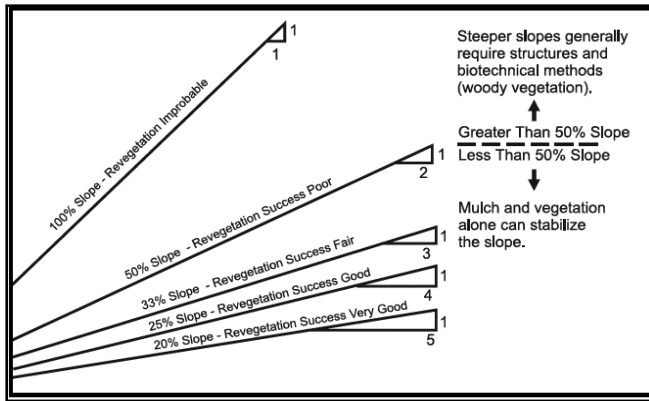
Terraces



Rock Retaining Wall



Wood Retaining Walls



Slope stabilization techniques depend on the steepness of the slope.



Vegetative Slope Stabilization



Rip Rap

Difficult Sites and Site Constraints

Sometimes site conditions make it difficult to complete all BMPs on your property. For example, your home may be located in a wet area with a high water table or there may be retaining walls on both sides of your driveway inhibiting the installation of an infiltration system. You can always contact TRCD to assist you in developing solutions to these and other situations. The following are conditions you should be aware of when designing and installing your BMPs:

1) Property located in an area with a seasonal high water table or in a Stream Environment Zone

Is your property located in an area of high groundwater according to USDA Natural Resources Conservation Service soil survey maps?

Some signs that could point to high groundwater: willows or other wet-loving natural vegetation growing in your yard, physical low points that have standing water from spring into the summer, or a flowing stream or creek nearby. However, there might be NO above ground signs at all. TRCD staff can help determine if there is high groundwater or a Stream Environment Zone on your property. State and federal water quality standards prohibit excavation in Stream Environment Zones. TRCD does **NOT** recommend excavating for the installation of BMPs if there is evidence of high groundwater on your property or if the NRCS Soil Survey indicates that the soil is wet with drainage issues. Please contact TRCD for assistance.

2) Pre-existing drainage problems

Does your property have pre-existing drainage problems?

Some pre-existing drainage problems may impact structures during storm runoff events or spring snow melt. These include issues with run-on from other properties and any situation where your foundation is being damaged by runoff/run-on. You may need to take care of these issues BEFORE you begin to implement your BMPs. A qualified civil engineer could be needed to look at your property to determine the best way to safely prevent further or future damage to structures.

3) Property located in an area with bedrock at or near the surface

Does your yard have large boulders and rocky outcrops?

Boulders and bedrock can limit BMP excavation depth. It may not be possible to dig very far before hitting solid rock, which limits water infiltration.

4) Infiltration area restricted due to utility placement

Where are the pipes and lines located that connect to utilities such as water, sewer, and gas?

Be sure to locate your utilities before you excavate. Call USA Digs (1-800-227-2600) at least two full working days before you dig. You may have to move your BMPs to a different location away from utility lines.

5) Infiltration area restricted due to retaining structures

Does your driveway have retaining walls on both sides?

Sometimes retaining walls on the sides of your driveway inhibit the installation of driveway BMPs. You may need an engineer to design your driveway BMPs in this situation or simply wait until the TRPA or your local jurisdiction develops an alternative solution.



6) Infiltration area restricted due to steep cut-and-fill slopes

Is there a steep dropoff on one or both sides of your driveway or in another area where BMPs may be installed?

Contact TRCD staff for possible solutions.

7) Infiltration area restricted due to property/right-of-way boundaries

Does your house sit close to the property line of your lot?



On some properties, there is not space to install BMPs without entering the right-of-way or adjacent property. You *always* need to obtain permission from the local jurisdiction to install BMPs in the right-of-way area. Contact TRCD for assistance before any installation in the right-of-way.

The driveway in the photo on the left sits against the adjacent property boundaries on the left and right sides (the fences indicate the property lines). This leaves no area to infiltrate driveway runoff, resulting in a site constraint.

Important TIPS for Installing BMPs:

- Avoid infiltrating water too close to building foundations, especially where the land slopes toward your house (*this runoff might need to be conveyed to a different location*).
- Do not infiltrate in the public right-of-way without permission from the local jurisdiction.
- Avoid underground service lines and utilities when installing BMPs.
- Be aware of tree roots or existing vegetation when excavating for BMP treatments.

Final Inspection

If you believe all BMPs have been completed on your property, please contact TRCD to schedule a final inspection. *There usually is no waiting list for final inspections.* If you pass your inspection, we will request your BMP Certificate of Completion from the TRPA.



*Thank you for doing your part to help conserve
Lake Tahoe!*

QUESTIONS??

*Tahoe Resource Conservation District
870 Emerald Bay Road, Suite 108
South Lake Tahoe, CA 96150
530-543-1501 extension 113
www.tahoercd.org*

BMP Maintenance

Over time, BMP infiltration systems fill in with sediment and fail to work properly; therefore, maintenance is required. Maintenance may include installing borders around infiltration systems or removing accumulated debris (such as pine needles) that can interfere with conveyance and infiltration.

Your TRPA Certificate of Completion is valid only if your BMPs are maintained and functioning properly. There are several installation techniques that can reduce maintenance time and effort.



Un-maintained and dirty drip line treatment

Maintenance Methods

- Periodically remove sediment and debris from systems to prevent clogging.
- To clean drain rock systems:
 - Construct a frame with 2 x 4s that will sit on the rim of your wheelbarrow or trash can.
 - Cut a piece of mesh to fit over the 2 x 4 frame.
 - Set the frame over your wheelbarrow or trash can and load it with a shovel full of the rock to be cleaned.
 - Rinse the rock with water and set it aside for reinstallation.
 - Discard dirty water and sediment in a contained area on your property such as a planter bed or low point. Extra sediment must be appropriately stabilized following the techniques described on page 21 (“What do I do with my excavated soil?”).
- Maintain vegetated areas so they have healthy plants with new growth and established root systems.
- Use borders around your BMPs to keep soil from moving into the systems and hold BMP materials (such as rock) in place.
- Install a layer of filter fabric surrounding infiltration systems with three inches of rock on top to help prevent clogging from fine sediment.
 - In even one season, enough sediment can collect to clog the top layer of a system forcing water to run over the surface instead of infiltrate.
- Document the maintenance you perform for future reference.



Maintenance Intervals

- Visually check BMPs after major storms, before winter, and in the spring.
 - Run a garden hose on the impervious surface to be tested and confirm that the runoff is being captured by the associated BMP.
- Beware of potential snow removal damage to BMPs after the winter season.

Frequently Asked Questions

What are BMPs?

Best Management Practices (BMPs) are actions, required by law, to keep soil and other pollutants out of streams and lakes. BMPs are designed to protect water quality and prevent new pollution. In the Tahoe Basin, BMPs are required on all developed properties, with the goal of reducing the amount of sediment, nitrogen, and phosphorus that flows into Lake Tahoe and causes a decline in water clarity and ecosystem health.

Some common BMPs:

- Vegetating or mulching bare, disturbed soils
- Infiltrating storm water runoff from impervious surfaces
- Paving dirt driveways
- Stabilizing steep, eroding slopes

Why are BMPs necessary?

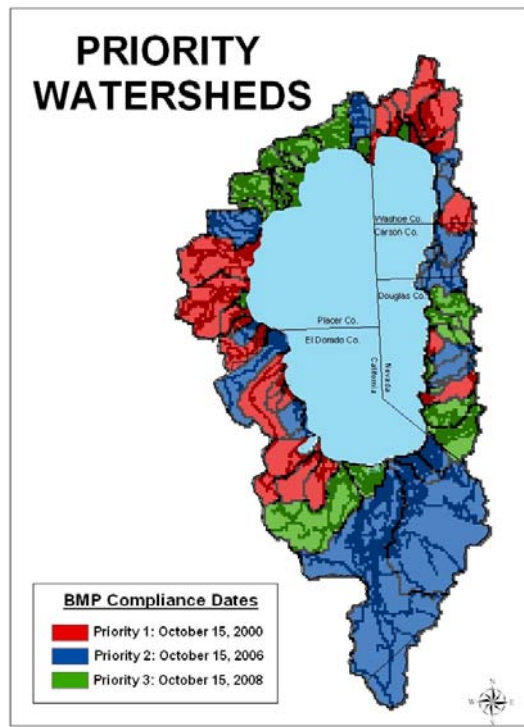
Researchers have found that the exceptional clarity of Lake Tahoe is declining at a rate of one foot per year! This is happening due to inputs of fine sediment particles, which get suspended in the lake, and nutrients such as nitrogen and phosphorus, which promote unnatural levels of algae growth. The Tahoe Regional Planning Agency (TRPA) adopted the Best Management Practices (BMP) Retrofit Ordinance in 1992 to reverse this downward trend in water quality.

What is the BMP Retrofit Ordinance?

The Tahoe Regional Planning Agency's Best Management Practice Retrofit Ordinance requires all property owners in the Tahoe Basin to capture and infiltrate all storm water runoff on-site. Infiltration systems must be designed to accommodate the volume of runoff from a twenty-year/one-hour storm event (approximately one inch of precipitation in one hour). The BMP Ordinance also requires all bare soil to be stabilized and driveways be paved with appropriate infiltration systems installed to capture the associated runoff.

What is the deadline for installing my BMPs?

Every property in the Lake Tahoe Basin is responsible for implementing BMPs through a priority watershed system. This system was developed using various factors, including soil type, slope, ratio of development to undisturbed land, and relative inputs of nutrients and sediment to the watershed. Watersheds were determined to be Priority 1, 2, or 3, with installation deadlines of October 15, 2000, 2006, and 2008 respectively. To determine your priority watershed, go to www.tahoebmp.org or call TRCD at 530-543-1501 extension 113.



What are the penalties if I don't get my BMPs completed by the deadline?

The TRPA cannot start enforcement action for each priority watershed until a one year grace period beyond each compliance date has past. Initial fines for single family residences begin at one thousand dollars. For more information on TRPA's enforcement program, visit their website at http://www.tahoebmp.org/bmp_pdfs/BMP_Enforcement_Program.pdf.

What is TRCD's role in the BMP Retrofit Ordinance?

TRCD is a non-regulatory, grant-funded organization that has a Memorandum of Understanding with the TRPA to assist single-family homeowners with the design and installation of BMPs. Working with TRCD is completely voluntary. TRCD is bound by law to work with you in strict confidentiality; we cannot share your BMP information with any interested party or the TRPA without your authorization. You can obtain a Release Authorization Form (RAF) at our office on Emerald Bay Road or on our website.

Has my property already had a BMP site evaluation? Has a BMP Certificate of Completion been issued for my property?

To find out the status of your property, go to <http://www.tiims.org:8089/searchBMP.asp> and enter your property address. If you do not have access to the internet, you can call TRCD and one of our staff will look up your property status for you.

How much will my BMPs cost?

The cost of BMPs is specific to each individual property. Getting an evaluation from TRCD is currently free of charge, but installing BMPs is not. The most economical option is to install your own BMPs and use as many recycled materials as possible. TRCD tries to make simple BMP recommendations and provide installation guidelines to better assist homeowners with their own installations. Our staff can meet with you to help ensure a successful installation. There are also a number of contractors in the Lake Tahoe area that specialize in BMP design and installation, but hiring a contractor is often a more expensive option. Visit <http://www.tahoercd.org/documents.php> for a BMP Contractor's List.

How do I get a BMP evaluation from TRCD?

TRCD performs BMP evaluations for California single family residences. Contact us and we will add you to our waiting list. Due to the fact that our waiting list usually has over a thousand people on it, it is likely you will have to wait at least one field season for your evaluation. As an agency, we are grant funded, which limits our resources and program staff. Use this packet as a resource to start your BMPs on your own. TRCD is also available for technical assistance (smaller amounts of BMP assistance) throughout each field season depending on the schedules of each staff member.

Why do I need to implement BMPs on my property when it appears that nobody else is doing theirs?

The BMP Retrofit Ordinance is a Basin-wide ordinance; therefore, all property owners within the Basin must implement BMPs on their properties. This includes not only private property owners but commercial properties and the local jurisdictions (roadways) as well. BMPs to infiltrate runoff from public roadways and control erosion are being designed and implemented through an Environmental Improvement Program (EIP) throughout the Basin. The implementation schedule of these projects depends on jurisdictional funding allotments. For information about EIP projects in your area, contact your local jurisdiction or TRCD.

What is a BMP final inspection?

During a BMP final inspection, a TRCD staff member will visit your property and confirm that all required BMPs are installed and meet all requirements of the Tahoe Regional Planning Agency BMP Retrofit Ordinance. TRCD will then request a BMP Certificate of Completion from the TRPA for your property. To be able to release your BMP information to the TRPA and request this certificate, you must sign a Release Authorization Form (RAF). The TRPA will mail you a paper copy of your certificate which usually takes at least one month. You can check the status of your certificate at <http://www.tiims.org:8089/searchBMP.asp>. Your Certificate of Completion will only remain valid if all of your BMPs are maintained and functional. To request a final inspection for your property, call 530-543-1501 extension 113.

Do I have to install the BMPs exactly as they are recommended on my evaluation?

If you install the recommended BMPs on your evaluation, your property will be in compliance with the BMP Retrofit Ordinance (in most situations). If you aren't happy with a recommended treatment or would like a different design, it is recommended that you contact TRCD for assistance with alternative designs to ensure that you remain in compliance with the ordinance.

What do I do with my excavated soil?

There are multiple options for disposing of excess soil left over from your BMP installations. One option is to use the soil to fill in any low areas that may be present on your property. This will then need to be stabilized with vegetation and mulch similar to any other bare soil area on your property. You can also use the soil to augment existing planter beds or to install additional beds. The soil needs to be fully contained and stabilized to prevent any movement of sediment. A third option is to ask your neighbors or friends if they might be able to utilize the excess soil on their properties. A final option is to pay to dispose of the soil. ***REMEMBER, if excavating more than seven cubic yards of soil, you will need to obtain the appropriate permits from the TRPA.***

How do I maintain fire defensible space?

TRCD works with local fire districts to educate homeowners about maintaining fire defensible space around their homes. Installing BMPs often helps to create a more fire safe landscape. Fire districts recommend maintaining a non-combustible area five feet out from your home. This

is the same area used to treat roof runoff using drain rock or vegetation. Be aware that many types of vegetation are highly flammable. It is also important to remove ladder fuels around your property such as dead and down wood and vegetation. For a complete discussion regarding fire defensible space in Lake Tahoe, obtain a copy of “Living with Fire: A Guide for the Homeowner”. Copies are available at your local fire district or pick one up for free at the TRCD office. Also check out <http://www.livingwithfire.info/>.

Where can I find web resources to do BMP research on my own?

<http://www.tahoercd.org> - TRCD website with tip sheets and BMP information

<http://www.tahoebmp.org> - TRPA BMP Website

<http://www.unce.unr.edu/publications/EBPubs/EB0403.pdf> - How to Install Best Management Practices in the Lake Tahoe Basin (Contractor’s Manual for Installing BMPs)

<http://www.unce.unr.edu/publications/EBPubs/EB0201.pdf> - Home Landscaping Guide for Lake Tahoe and Vicinity

<http://www.epa.gov/OWOW/NPS/> - U.S. Environmental Protection Agency Polluted Runoff page (for a national perspective on storm water runoff and pollution control)



Glossary of Terms

- **Best Management Practices (BMPs)**: Practices determined to be the most effective, practical means of preventing or reducing erosion and water pollution from nonpoint sources.
- **Erosion**: Detachment and movement of rocks and soil particles by gravity, wind, and water.
- **Impervious**: Resistant to water infiltration and/or penetration by plant roots.
- **Infiltration**: Entry or absorption of water from precipitation, irrigation, or runoff into soil.
- **Land coverage**: Man-made structure, improvement, or covering that prevents normal precipitation from directly reaching the surface of the underlying land. Such structures include roofs, decks, and surfaces that are paved with asphalt, concrete, or stone (roads, streets, sidewalks, driveways, patios, etc.). Also, lands compacted by repeated parking of cars and heavy and repeated pedestrian traffic preventing substantial infiltration are considered coverage. A surface is not considered coverage if it permits at least 75 percent of normal precipitation to directly reach and infiltrate into the ground and permits the growth of vegetation.
- **Mulch**: Loose, usually organic, material placed over the soil such as bark chips, pine needles, or leaves. *Mulching* is the process of applying these materials. Mulch reduces the loss of moisture from the soil, reduces or prevents weed growth, adds nutrients to the soil, and insulates from extreme or rapid changes in temperature.
- **Nonpoint source pollution**: Entry of pollutants into a water body from widespread or diffuse sources with no definite point of entry. The source is not a readily discernible point, such as a discharge pipe.
- **Runoff**: The portion of rain or irrigation water failing to infiltrate into the soil.
- **Sediment**: Any particulate matter (often soil material) that can be transported by wind, water, or ice.
- **Soil amendment**: Organic matter added to the soil to improve texture, aeration, drainage, nutrient content, and moisture retention (for example, compost).
- **Stream Environment Zone (SEZ)**: Land area adjacent to a stream, river, wetland, or lake that is influenced by flowing water or has saturated soil for at least a week during the growing season each year. SEZs protect Lake Tahoe's water quality and their boundaries must be delineated by TRPA staff before construction is allowed near them. No excavation is allowed within SEZs.
- **Soil Permeability**: Ease with which water moves through soil which is often expressed as a rate (for example, inches per hour).
- **Watershed**: The area of land bounded by ridges or "divides" which captures precipitation and conveys it to a specified body of water. This area is often referred to as a drainage basin. The Lake Tahoe Basin is comprised of the 67 watersheds for each of the Lake's tributaries, such as the Upper Truckee River and Ward Creek Watersheds.

Reference:

Cobourn, J, Carlos, B, Christopherson, J, et al. *Home Landscaping Guide for Lake Tahoe and Vicinity*. Incline Village, NV: University of Nevada Cooperative Extension; 2001.