

TJB-INC's On-Site Consultation/Assessment Rates

TJB-INC bases our rates on the travel time involved in getting to & from our office in Hamden, Connecticut to your location and the fuel costs associated with this travel. However, with the cost of fuel, these prices are subject to change without notice. All fees are to be paid at the time of the consultation. We accept cash & checks only.

Note: If you know exactly what you want and are just looking for a price/estimate, we do not need to send a professional expert. Often, we can provide a quote right over the phone. Many times, however we can find a cost-effective better solution that only a professional expert can give and for this money saving information, we do charge a fee.

Custom Water Feature/Fountainscaping: A set fee is charged based upon your location and length of travel. When a construction contract is accepted within 60 days from the consultation date, TJB-INC will deduct the fee from your final balance.

Natural (Earth Bottom) Pond/Lake Consultations: We offer an on-site consultation with our pond expert (Ted Greiner Ted@Pond.Expert) who has over 45+ years of experience in the field and can go over the different solutions including DIY (Do It Yourself) options if available. If the solution(s) are outside your DIY capabilities, TJB-INC will leave you a free written estimate for TJB-INC to complete the work. We charge \$165.00 for the on-site consultation to come up with a plan for New Haven County. Outside of this area, an additional charge is added to cover fuel and travel time.

Paver/Retaining Wall Consultations: We currently do not charge for an estimate, but we have a limited geographical area of service. We will travel for installations, but we must add in for current fuel & labor costs required to get to & from your location from our office in Hamden, CT.

Synthetic Putting Green/Turf Installation/Repair/Service: If you are local to surrounding towns to Hamden, there is no fee for the site review. If you are outside of this area, then a \$165.00 consultation charge will apply. When a contract is accepted within 60 days from the consultation date, then we will deduct the fee from your final balance.

Lawn Treatment Programs & Tick Control: No fee for estimate (South Central New Haven County only)

Lawn Maintenance/Renovation/Installation: No fee for estimate (South Central New Haven County only)

Snow Removal Services: No fee for estimate (Parts of Hamden, North Haven, & New Haven only)

HOURLY WITH A PRO - Landscape ID/Care/Education/Solutions

TJB-INC offers a unique on-site educational service, we call it " **An Hour with A Pro**". Our in-house Pro, Ted Greiner (Founder & CEO), has years' experience in all facets of landscape design &

construction. Areas of expertise include Drainage, Retaining Walls, Interlocking Pavers, Water Features, Turf, Planting Designs, Trees, Shrubs, and much more!

Instead of retiring, Ted continues sharing his wealth of knowledge with clientele eager to learn about their landscape and/or how to properly solve their outdoor issues without the added pressures of a sales pitch. Ted is not there to sell you anything. Just provide information you need from his years of training and field experiences.

You may ask any questions or express any concerns and in return, receive honest answers and/or plan of action. It is an informational session to help you solve problems or issues with the best methods possible whether they be DIY projects or require professional help.

Note: We strongly suggest that you have a pen & paper handy to take notes. We will give you a lot of helpful information. If we must write down everything that was suggested or talked about, you will be charged for this time.

Here are some of Ted Greiner's Credentials (Registrations, Certifications, & Licenses):

- CT Home Improvement Contractor (HIC) Registration #507853
- CT DEEP Business Registration #652
- CT DEEP "Turf & Ornamental Supervisory License-3A" (#S-1710)
- CT DEEP "Licensed Arborist-3D" (#S-1710)
- Northeast Organic Farmers Association (NOFA) "Certified Organic Landcare Professional"
- UConn "Certified Master Gardener"
- Interlocking Concrete Pavement Institute (ICPI) "Level 1 - Paver Installer"
- ICPI "Certified Installer - Permeable Pavement"
- Porous Pavement "Certified Installer"
- National Concrete Masonry Association (NCMA) "Certified Retaining Wall Contractor"
- NCMA "Silica Train-the Trainer"
- NicolockPro "Paver Contractor"
- Techo-BlocPro "Paver Contractor"
- IPSA "Master Pond Builder"
- Aquascape "Certified Master Aquascape Contractor"
- Aquascape "Top Frog Award" (for being #1 in 2014 & 2015 out of 89,000 worldwide dealers)
- Natural Lake Bio Sciences "Certified Aquatic Professional"
- Mauget "Certified Injector" (#90-58)
- NDS "Certified Drainage Professional"
- Bronx Botanical Gardens "Certificate in Perennial Gardening"
- Former WTNH News Channel 8 "Garden Guru" on Your Weekend Today
- Connecticut Grounds Keeper Association (CGKA) "Executive Board Member"
- Legal Compliance Officer for CGKA
- Toro University: "Irrigation & Low Voltage Lighting"
- 52+ years of in the field experience

We charge \$165.00 for the hour for New Haven area. Outside this area, an additional charge fee is added to cover fuel and travel time. If additional time is needed, it is pro-rated. The fee covers

transportation time as well as the (1) hour with the Pro. Payment is to be made directly to the Pro after the consultation. We accept cash and checks only for this service.

Note: If requested, Ted can also provide an estimate for work to be done if it is in an area that TJB-INC services. (We do not charge for the time to write up the estimate).

Please read our on-line reviews to see what others have discovered from this unique service to know if it would be a good fit for you!

Drainage Consultations

Thank you for contacting **TJB-INC Landscape & Drainage Contractor** for your drainage issues.

If you can send over some photos of the area(s) effected and a description of the drainage problems, that would be helpful, so **TJB-INC Landscape & Drainage Contractor** can get an idea of what is involved and start engineering some preliminary solutions for you.

We offer an on-site consultation with our in-house drainage expert (Ted Greiner Ted@Drainage.Expert) who has over 45+ years' experience in the field and is also a NDS "Certified Drainage Contractor". He can go over the different solutions including DIY (Do It Yourself) options if available. If the solution(s) are outside your DIY capabilities, then he can leave you a written estimate for **TJB-INC Landscape & Drainage Contractor** to implement the solutions. You can also use the final solutions to shop other contractors in your area.

We charge \$165.00 for the hour for New Haven area. Outside this area, an additional charge fee is added to cover fuel and travel time. If additional time is needed, it is pro-rated. The fee covers transportation time as well as the (1) hour with the Pro. Payment is to be made directly to the Pro after the consultation. We accept cash and checks only for this service.

NOTE: Correcting drainage issues outside a structure can save you thousands of dollars that you will have to spend for a specialty company to come into your house and install a basement water collection system.

Please read our on-line reviews to see what others have discovered from this unique service to know if it would be a good fit for you!

Mr. Greiner is available by appointment Monday – Saturday from 9 am – dusk. What works best for your schedule?

TJB-INC Landscape & Drainage Contractor
12 Crestway
Hamden, CT 06514

203-287-0636

Ted@Drainage.Expert

www.TJB-INC.com

***** BELOW ARE SOME SOLUTIONS THAT MAY HELP YOUR SITUATION *****

Water has 3 main characteristics. Understanding these will help you in solving most if not all drainage/water issues on your property.

1. **Water will move from wet to dry. This is called wicking or capillary action.**
2. **Water follows topography and will want to move from a higher elevation to a lower elevation especially when the soil is saturated or frozen.**
3. **Water likes to follow the easiest path of resistance. (IE: It is easier to move through a properly installed drainage pipe than the soil profile).**

WET YARD - Solving Common Drainage Problems

If your yard dries out within a day or two after a rainstorm, that is considered normal. A yard with a wetness problem has puddles or soggy areas that persist for several days after storms or are always present.

If you have heavy flows of stormwater passing over your property during storms, but not persistent soggy areas afterwards, a flow re-direction plan is in order. The water can be collected and then piped to a suitable discharge area, or the yard can be graded to channel the excess water within the channel area only. The base of the channel can be healthy plantings or stone to prevent erosion.

When the ground is frozen or totally saturated, surface water will flow over the top of the soil moving from higher to lower elevation. This situation can be corrected by creating swales or installing sub-surface drainage to collect and re-direct the overland water. TJB-INC can create several solutions that can correct these issues. Go to www.TJB-INC.com for more information.

MY YARD IS WET FOR SEVERAL DAYS AFTER RAIN OR SNOW

Wet areas that persist for several days after rain or snow are commonly caused by poor infiltration of water into the soil or improper grading (low spots or depressions) that have created "bowls" that hold water.

- Grading problems on your property will prevent water from quickly flowing away into a storm drain or another outlet. Areas around the foundation should always slope away from the foundation walls;

swales or other flow diversions between neighboring houses should be properly graded so that runoff does not stagnate on your property.

- Poor infiltration (also known as percolation) can be caused by compacted soils, soils with high clay content or soils with a shallow depth to bedrock. Water can perch on top of these materials, either at the ground surface or slightly below it, causing sogginess. In addition to the solutions below, consider amending the soil.

In wet areas after storms, poor grading prevents stormwater from flowing off the yard. Instead, stormwater is held in small to large, well-defined depressions (bowls) until evaporation or infiltration into the soil eliminates the wetness. If the areas stay wet for much longer, then one of the suggestions below would be recommended.

A practical and environmentally beneficial option is to replant the wet area with water-tolerant plant species, preferably native. If you wish to eliminate the soggy depression, you can do so by filling or re-grading the depression (bowl).

Widespread sogginess near landscaping that is too large or difficult to simply fill in, re-grade or replant, there are other solutions. Runoff can be redirected or captured to minimize water accumulation. (See Redirect Runoff below)

Redirecting runoff safely takes it to a suitable area. This can be done using swales, French drains, catch basins, downspout extensions, or combinations of all the above.

1. REPLANT WITH WATER-TOLERANT SPECIES

A soggy spot can be improved by replanting with water-tolerant plants. Not Grass! These plants will aesthetically improve the soggy spot, soak up the remaining water (during the growing season), attract beneficial pollinators, and they can also slowly improve drainage by loosening the soil with their roots and organic matter. Adding nightcrawler earthworms to the soggy areas can help add natural percolation as the worms create passageways through the soil that can absorb and drain water.

2. FILL IN THE DEPRESSION (BOWL)

To eliminate wetness in depressions, the depression can be filled in and graded. Here is how:

- A. Remove all leaves, plants (including grass) and other loose material from the depression.
- B. Fill the depression with topsoil (or if near the foundation of the house, with fill soil) and compact using a tamper or a similar device. Use soil with relatively high clay content.
- C. Grade the filled-in depression so that water will not stagnate. Soil should be graded so that water flows away from the foundation walls to prevent any water damage.
- D. Cover the depression with sod, grass seeds or other vegetation. If sod is used, make sure the final elevation does not cause water to collect on the up-slope side. (Note: Sod will only survive if it gets at least 8 hours of sunlight.) If grass seeds are used, consider protecting the seeds with a thin layer of topsoil (approximately ¼ of an inch) followed by a thin layer of straw. This thin layer of soil and straw will help protect the seeds from birds and enhance germination by retaining some surface moisture.

3. CREATE UNDERGROUND VOIDS TO STORE EXCESS WATER

- A. When the soil profile allows, underground rechargers are installed to create open void space in the soil where water is stored and allowed to slowly filter back into the soil. These rechargers are structural in design to create a void that will not collapse. They are made from concrete boxes with

holes or re-enforced plastic tubes that are backfilled with gravel to increase the amount of storage. The visible area on top can be stone, grass, pavers, asphalt, or any other useable surface.

B. Capturing and storing excess runoff helps protect streams and rivers and reuses the water. This can be done using rain barrels, cisterns, dry wells, soil amendment or rain gardens. **TJB-INC** installs Rainwater Harvesting systems from 30 gallons to 30,000 + gallons

4. INSTALL A DRAIN AT THE BOTTOM TO REMOVE THE WATER

A. Installing a surface drain(s) in low spots can collect all the standing water and relocate it through a system of buried pipes to another suitable area. This could be a lower elevation, storm drain, stream, or an underground recharger system. If there is no lower elevation, an electric sump pump in a basin can be installed to move the water to another location.

MY YARD IS WET FOR MONTHS AT A TIME OR ALL THE TIME

Wet areas that last for months or are always present are commonly caused by leaks from damaged water pipes & other sources or naturally occurring high groundwater.

A. Groundwater that is naturally close to the surface can also cause wet conditions. High groundwater is generally found in low lying parts of the landscape, especially in floodplains next to perennial streams, and water seepage can also be found on slopes from natural springs. Wetness and puddles in this scenario may not be as closely associated with rainfall. Groundwater is closest to the surface in colder months, but wetness can occur throughout the year.

B. Poor soil conditions can happen when the property was first developed. Extra fill may have been brought in to raise the natural soil levels. Many times, this extra fill is heavy in clay which does not percolate as well as other soil types. This causes the topsoil layer to become mushy after heavy rains because the water has nowhere to go. **TJB-INC** has found that sometimes, drilling down vertically in the soil through this fill layer, there may be permeable soil found underneath. If there is, then we install pipes vertically from the surface down to the permeable soil layer allowing the surface water to drain away naturally.

C. Leaky water pipes, lawn sprinkler systems, outdoor faucets, water supply lines or valves, ponds, pools, fountains, or other damaged water-related features can be a cause for yards that are always wet. Be aware that the actual source of the wetness may not be at the same place where you see wetness on the surface. You may need to investigate carefully to find the true source of your wetness problem.

D. Is it a wetland or Resource Protection Area? You must follow all laws, rules, and guidelines. Inland wetlands areas are controlled by the local, state, & federal government. In the USA, you may own the land, but the government owns the water and controls what can be done on and near the wetland's areas. These areas are called buffer zones and can vary from 10' – 100' depending upon the town or district. Check with local authorities before commencing any work.

REDIRECT RUNOFF

Intercepting and redirecting runoff provides an opportunity to safely discharge the volume to a place beyond the problem area. This can be done using swales, French drains, catch basins or downspout and sump pump extensions. These methods of rerouting can be combined with capture and storage practices (see below).

Whenever you are redirecting runoff, you must send it to a suitable outlet. Discharging runoff to an unsuitable area will just move the problems downhill. Be aware that redirecting runoff without soaking it into the soil can negatively impact neighboring properties. Most towns & cities **do not allow** discharge directly on to sidewalks or roadways because of safety concerns. They also do not allow you to bring a pipe to daylight at the property line. Check with your local town engineer to see what is allowed in your situation. Failure to do so can result in fines and civil penalties that can get very expensive!

1" of rain = 0.623 gallons of water per sqft. When most people install dry wells without doing the calculation of exactly how much water will need to be collected, the result is system failure and flooding. When the ground is frozen or saturated, surface water follows topography, high to low. When constructing a drainage system, one must include the uphill square footage that drains on to the property as well as the total roof and lawn area to be collected. Only then can a proper system be designed.

For super rain events that overwhelm normal drainage systems, the only surefire way is to install a mechanical barrier that can divert the water away from the property. Unfortunately, this usually means redirecting it to an abutting neighbor's property. This barrier can be made from soil, wood, or stone.

I AM GETTING WATER IN MY BASEMENT

First step is to determine where the water is coming from. Is it come up through cracks in the floor? Is it coming in between the base of the wall and the floor? Is it coming through a crack or hole in the basement wall? Is the water coming in from a basement window? Is it coming from where a pipe goes through the wall? Once the location(s) of the water infiltration are determined, then a plan of action can be

Getting water out of your basement and fixing the underlying problems are two of the most important things you can do to protect the value of your home and health of your family.

Not only does a wet basement feel and smell nasty, but it also poses a great risk to your home's value. Left unchecked, basement moisture can ruin floors and walls, encourage mold, even damage roofing.

Some wet basements are easy to cure simply by clearing the gutters and by diverting gutter water away from the foundation. But if the problem comes from other sources—water flowing toward the house on the surface, seeping in from underground, or backing up through municipal storm drains—you must take more aggressive action.

Here are eight strategies to keep water out of your basement.

1. Add Gutter Extensions

If downspouts are dumping water less than 5 feet away from your house, you can guide water farther out by adding plastic or metal gutter extensions.

But extensions are not the neatest or most effective long-term solution, especially if you are likely to trip over them or run over them with a lawn mower. Permanent, underground drainpipe is invisible and capable of moving large quantities of gutter runoff much farther from your house.

For about \$25 - \$30 a foot, a landscaper or waterproofing contractor will dig a sloping trench and install 4" pipe to carry the water safely away. The addition of a pop-up emitter on the outflow side will complete the installation, keep ankles safe and animals out of the pipe.

2. Plug Gaps

If you see water dribbling into the basement through cracks or gaps around plumbing pipes, you can plug the openings yourself with hydraulic cement or polyurethane caulk for less than \$50. Make sure to acid wash the concrete first open microscopic pores in the concrete so the plug will be able to grip and hold into the wall. Just like painting a wall. The paint will only secure to a clean surface. Acid washing is how you clean concrete.

Plugs work when the problem is simply a hole that water oozes through, either from surface runoff or from wet soil. But if the water is coming up through the floor, or at the joint where floor and walls meet, the problem is groundwater, and plugs will not do the trick. Sometimes, these cracks or seam leaks can be repaired by acid washing the area and using a special sealing caulk or 2-part epoxy that is made to resist hydrostatic pressure from the water.

3. Restore the Crown of the Garden Beds

If the gutters are working and you have plugged obvious holes, but water still dribbles into your basement or crawl space from high off the foundation walls, then surface water is not draining away from the house as it should.

Your house should sit on a "crown" of soil that slopes at least 6 inches over the first 10 feet in all directions.

Over time, the soil around the foundation settles. You can build it back with a shovel and dirt. One cubic yard of a water-shedding clay-loam mix from a landscape supply house costs around \$40 (plus delivery & spreading) and is enough for a 2-foot-wide, 3-inch-deep layer along 50 feet of foundation.

4. Reshape the Landscape

Since your home's siding slightly overlaps its foundation, building up the crown could bring soil--and rot and termites--too close to siding for comfort: 6 inches is the minimum safe distance. In that case, create a berm (a mound of dirt) or a swale (a wide, shallow ditch), landscape features that redirect water long before it reaches your house.

In small areas, berms are easy; a landscape contractor can build one for a few hundred dollars. On bigger projects, berms make less sense because you will have to truck in too much soil. In that case, dig a swale (about \$1,000). Once landscaping grows in, berms and swales can be attractive features in your yard.

5. Repair Footing Drains

If water is leaking into your basement low on the walls or at the seams where walls meet the floor, your problem is hydrostatic pressure pushing water up from the ground because of a high-water table.

First, check whether you have footing drains, underground pipes installed when the house was built to carry water away from the foundation. (Look for a manhole or drain in the basement floor or a cleanout pipe capped a few inches above the floor.)

If the drains are clogged, open the cleanout, and flush the pipes with a garden hose and a shop-vac. If that does not work, a drain cleaning augur can do the job.

6. Install a Curtain Drain

If you do not have working footing drains, install a curtain drain to divert water that is traveling underground toward your house.

A type of French drain, a curtain drain is a shallow trench--2 feet deep and 1.5 feet across--sometimes filled with gravel and perforated piping that intercepts water uphill of your house and carries it down the slope a safe distance away.

If the drain passes through an area with trees or shrubs, consider switching to solid pipe to reduce the risk of roots growing into the piping and clogging it. Cost: \$20-25 per linear foot installed.

7. Pump the Water

If you cannot keep subsurface water out, you will have to channel it from the inside.

To create an interior drain system, saw a channel around the perimeter of the floor, chip out the concrete, and lay perforated pipe in the hole. The pipe drains to a collection tank at the basement's low spot, where a sump pump shoots it out of the house.

Starting at about \$6,000 +, an interior system is the best and least disruptive option in an unfinished basement with easy access. It is also a good choice if your yard is filled with mature landscaping that digging an exterior drainage system would destroy.

NOTE: Another option is to dig a hole along the outside of the foundation down below the base of the floor and install an exterior sump pump to remove the excess water causing the hydrostatic pressure. Water moves to the point of least resistance so the water under the foundation will naturally flow toward the sump chamber where the sump pump takes it out away from the foundation.

8. Waterproof the Walls

Installing an interior drainage system gets the water out but does not waterproof the walls. For that, you need an exterior system: a French drain to relieve hydrostatic pressure and exterior waterproofing to protect the foundation.

It is a big job that requires excavating around the house, but it may be the best solution if you have a foundation with numerous gaps. It also keeps the mess and water outside, which may be the best choice if you do not want to tear up a finished basement.

The downside, besides a price tag that can reach \$20,000, is that your yard takes a beating, and you may need to remove decks or walkways.

I HAVE DRAINAGE PIPES BUT DO NOT KNOW WHERE THEY GO?

A simple way to locate where a drainage pipe discharges to is to add a colorant to the beginning of the pipe, then add water. This colorant can be plumbers' dye, food coloring, or even dairy products (milk, half & half, cream) that will color the water so it can be seen wherever it exits to ground level. If you find an output but want to know if multiple drains are connected, use blue dye in one pipe and red dye in another. If the output is purple, then you know the pipes are connected.

A more complicated way is to have a contractor use a long camera inspection system that allows viewing of the inside of the pipes but also has a special tip that can be located above ground using a special matching detector. This is mainly used to discover the location of breaks or clogs in a pipe.

GLOSSARY

1. SWALE

A swale is a wide, shallow ditch in which water can flow to a suitable outlet. The channel should be protected with grass or other vegetation. It also can be lined with appropriately sized stone to prevent erosion within the swale.

Stone is preferable in swales in which grass does not grow well due to shade or that are too steep or long for grass to prevent erosion. A swale lined with stone is sometimes called a dry creek bed. Stones used can be of varying sizes, with larger ones acting as stabilizers and smaller ones as fillers. Generally, the heavier the flows the larger the stones should be. Tightly woven landscape fabric should be placed below the stone lining.

2. FRENCH DRAIN

A French drain is an underground drainage device. It consists of a perforated pipe sometimes surrounded by gravel and lined with sturdy landscape fabric. A French drain conveys runoff underground to a suitable outlet. Downspout pipes and sump pump pipes can be connected to it, and a catch basin can be combined with it to help remove standing water. Deeper French drains can also be used to drain groundwater. Water in the pipe flow to a lower elevation and discharges.

Tips for building a French drain. Pre-assembled French drain options (such as NDS EZ-Drain) can save time and effort in installation.

A. Dig out a ditch where your French drain will go. A standard French drain ditch is about 1.5 feet deep and 10-12 inches wide, varying based on the size of the pipe chosen (usually 4-6 inches) and the desired depth.

B. If needed, line the ditch on all sides with landscape fabric to prevent soil erosion.

C. Place a layer of gravel at the bottom of the ditch to make flat bottom for pipe.

D. A perforated plastic pipe is laid on top of the gravel and surrounded by gravel on the sides and top. If there are 2 rows of holes, make sure they are facing down at the 5 & 7 o'clock position. This will prevent debris from entering the pipe and creating a buildup that can cause a clog down the road.

E. If topsoil and sod will be used to cover the French drain, the landscape fabric should be pulled over the top of the gravel before adding the topsoil to prevent the topsoil from eroding through the gravel and into the pipe.

F. If the gravel will be left exposed at the ground surface, the landscape fabric does not need to be pulled over the top of the gravel, but the edges should be protected to prevent sediment from entering the French drain system.

3. CATCH BASIN

A catch basin is a collection box with a slotted drain at the top and a drainage outlet at the bottom or along the sides if it has a debris sump. Surface runoff enters the inlet, passes through the collection box, and exits through the outlet into a buried drainpipe. The catch basin should be placed at a low spot on the property so that water naturally runs to it (a grassy swale can be built to direct runoff to the basin). The buried drainpipe should discharge to a suitable outlet.

4. SPLASH BLOCKS AND DOWNSPOUT EXTENSIONS

Splash blocks/diffusers and corrugated plastic pipe also can be used to direct roof runoff from downspouts or sump pumps away from foundation walls to a suitable area. These are available at all hardware and big box stores near you.

5. POP-UP EMITTER

In most towns it is illegal to daylight a drainpipe onto a neighbor's property, on to a public sidewalk, or into a public roadway. One solution is to install a pop-up emitter at the end of a drainpipe near the edge of the property. The emitter blends very nicely into lawns. The top of the emitter is green colored, sits on the surface of the ground and is around 6" in diameter. If the drainpipe is carrying excessive amounts of water (like during a downpouring rain), the center of the emitter will pop up allowing the excess water to flow out on to the land where it will follow elevation downhill.

6. BERM

A berm is an easy way to redirect surface water from flowing into unwanted areas. They add interest and height to the landscape, especially in dull, flat lawn areas. Berms are simply mounded hills of dirt constructed for many reasons such as blocking out unwanted or unsightly views, directing or redirecting foot traffic or drainage, creating subtle and natural-looking privacy, adding raised elements to the garden, or simply emphasizing an area or focal point. They can be planted with grass or other plants, then covered in mulch or stone to prevent erosion.

Creating a Berm Creating a berm is not that difficult. Berms are often constructed using some type of fill, such as sand, plant debris, rubble or asphalt, and soil. Use the fill material for the bulk of the berm, if desired. Recycled objects can also be used in place of fill if the material can retain stability without deteriorating. Simply use the soil to form the berm around the object, firmly tamping as you go. You can use the soil taken when you dug out holes, but for more vigorous plant growth, the soil should also be amended with compost.

There are no special rules to creating berms; however, there are a few simple guidelines to follow that might make this endeavor easier. Before you begin construction of the berm, plan accordingly. Always consider drainage within the area surrounding the proposed berm as it may affect drainage patterns by redirecting runoff to other areas or if done incorrectly, encourage pooling after heavy rains by trapping water. Berms should observe the 1:4 rule. For every 1' you build up, the total width should be no less than 4' wide. This will make the berm blend into the landscape versus looking like a volcano.

FUN FACTS

1" of rain falling on 1 acre of ground is equal to about 27,154 gallons and weighs about 113 tons.

To calculate the runoff from any given rainfall:

1. Take the dimensions of the footprint of your roof/yard and convert them to inches. For our example: a 50' x 20' roof/yard is 600" x 240" = 144,000 inches
2. Multiply the roof dimensions by the number of inches of rainfall.
3. Next, divide by 231 to get the number of gallons (because 1 gallon = 231 cubic inches).
4. There is 623 gallons of water that will be produced from our example roof on a 1" rainfall event.
5. This is important to calculate because it dictates the volume of water that a "dry well" or "Recharger System" must be able to store or redirected if not to a recharger system.
6. Therefore, a buried single 50-gallon container will fail. Not enough volume of storage space.

Another cool Fact:

If you dig a hole large enough to hold 1,000 gallons of water, but then fill the hole with crushed stone, the stone displaces 85% of the volume leaving storage room for only 150 gallons of water. Therefore “drywells” or “Recharger” systems use re-enforced boxes, ½ pipes, or AquaBlox to create larger structural void spaces with lower displacement rates which can hold larger volumes of water in the same 1,000-gallon hole.

Go to <https://www.youtube.com/watch?v=9ipkEmwxT5k> to get a great visual of how much water comes from the sky.

Last Cool Fact:

To calculate what size pipe to use for your drainage system, use the information below for maximum gravity flow rates. (ID = Inside Diameter of the pipe GPH = Gallons Per Hour)

2" ID = 3,300 GPH 3" ID = 8,400 GPH 4" ID = 14,400 GPH 6" ID = 33,000 GPH