TAUNTON'S
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GRAPHIC GUIDE TO Site Construction

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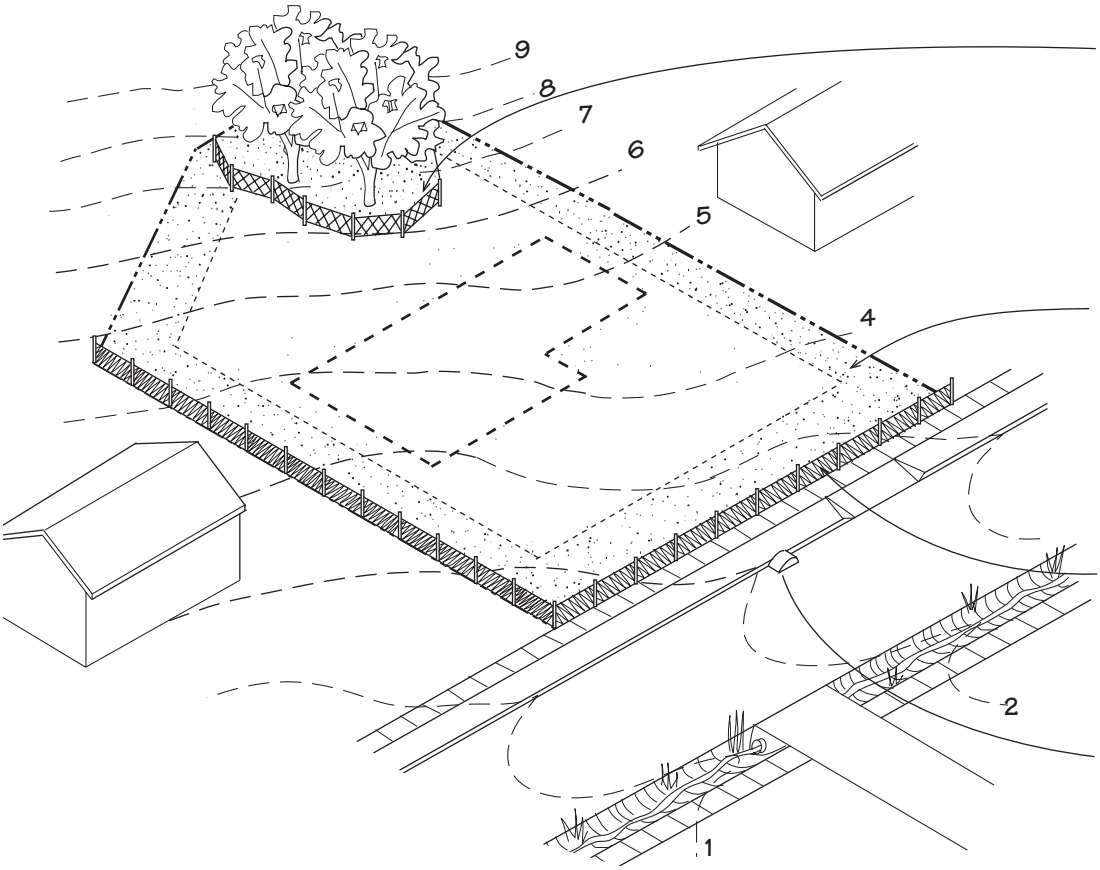
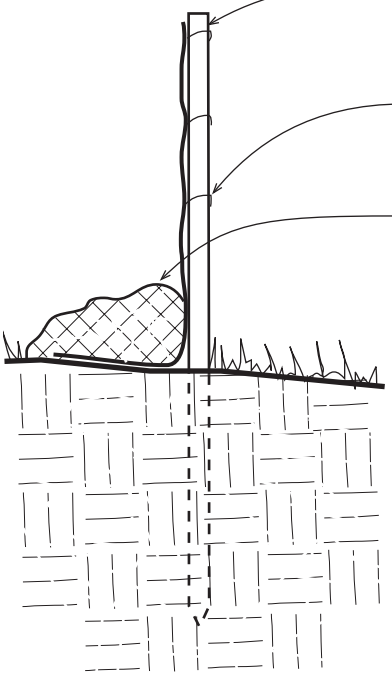


GRADING AND DRAINAGE PRINCIPLES

When shaping the land on a given site, there are several basic principles to keep in mind, regardless of how the landscape on your site is designed. While not an exhaustive list, these are critical items to keep in mind as your project progresses.

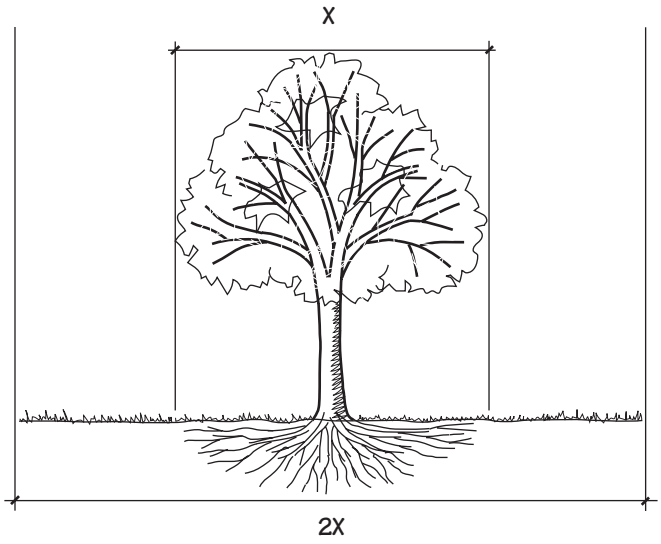
- **Erect preventive erosion-control measures prior to construction.** Legislation such as the Clean Water Act and other federal, state, and local policies are dictating that builders be much more careful about how their practices impact local streams and water quality on- and off-site. Therefore, prior to any construction activity on your site, take measures to prevent soil erosion. Typical steps could include erecting a perimeter barrier (either with fabric or with hay or straw bales) or installing "bio-bags" (mesh bags typically filled with wood chips or some other filtration material) to prevent soil from entering storm-sewer systems. Check with your local city permitting agency to determine what the local requirements are.



Ⓐ EROSION-CONTROL FENCING

- **Preserve existing grades around trees you wish to save.** Trees or other existing vegetation to be preserved should be fenced off with a temporary but sturdy fence (chain-link panels or a well-staked orange construction fence, for example) around drip lines prior to construction. This will prevent accidental soil compaction by workers and equipment under their canopies, and reinforce the need to maintain the preexisting grade around the area. Soil compaction is a primary culprit in the premature death of trees on construction sites because it decreases the soil's ability to allow air and water exchange in the root zone of the tree.

THE DRIP LINE OF A TREE, X, (OR THE BRANCHING PERIMETER) GENERALLY CORRESPONDS TO THE SPREAD OF ITS ROOTS



HOWEVER, MANY SPECIES HAVE A CRITICAL ROOT ZONE OF UP TO 200% OF THE DRIP LINE.

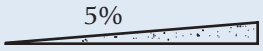
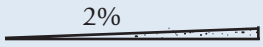
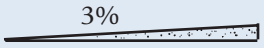
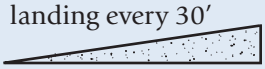
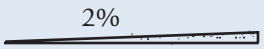
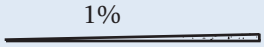
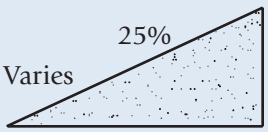
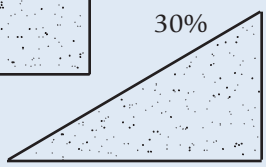
Similarly, altering the grade underneath a tree also can severely impact the ability of the roots to perform up to a level that a healthy plant requires. Current research has shown that preserving the existing grades and drainage patterns in an area roughly one-and-a-half to two times the diameter of the drip line of a tree provides the best opportunity for that tree to live and thrive beyond the period of construction. Changing the natural drainage pattern on a site, especially increasing or decreasing the amount of storm or irrigation runoff into the area around the drip line, can also damage a tree.

- **Drain water away from the house or structure.** The landscape surrounding a house or structure should have a minimum of 5 ft. of "positive," or downhill, drainage away from the base of the foundation if at all possible. In some instances, the use of drainage structures such as perforated pipe or catch basins might need to be used to help facilitate drainage in difficult situations. Maintaining positive drainage away from the foundation is critical to the health and longevity of the foundation itself, as well as to the structure.

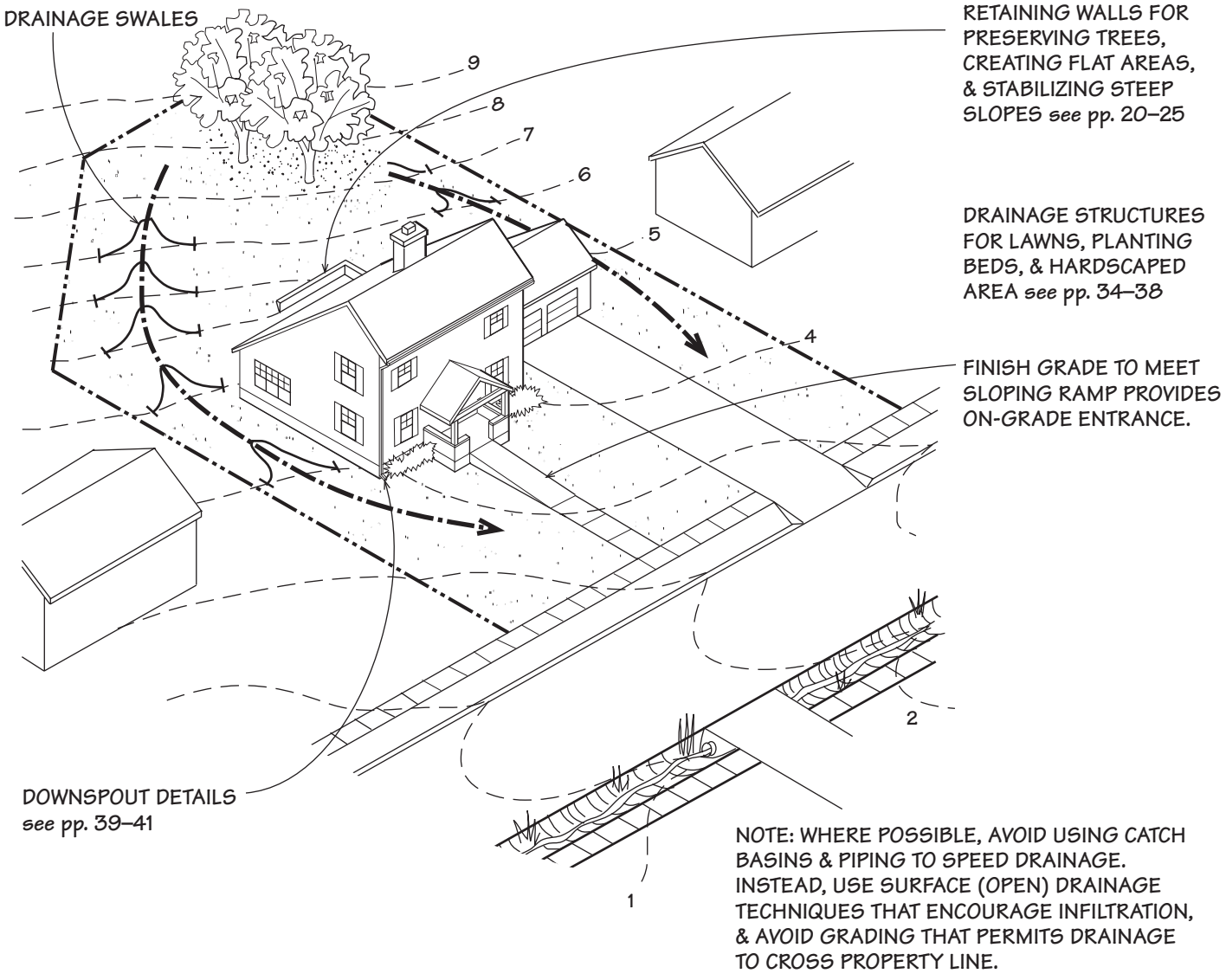
- **Avoid draining onto adjacent properties.** Nearly all jurisdictions place restrictions on how much (if any) water can drain from one property onto another. Generally, a good measure to work toward is maintaining or slightly decreasing the amount of water draining onto an adjacent property. Avoid concentrating flows of water near property lines, and where concentrated flows are created, disperse the concentration as much as possible prior to its leaving the site. Many cities and jurisdictions also will require a 5-ft. to 10-ft. "buffer zone" around the edge of a property that is set aside for the purposes of "merging" the landforms of the two adjacent pieces of property. There are exceptions in extreme conditions (such as building in very hilly topography) or in places where local jurisdictions will allow the construction of retaining walls along the property line.

- **Drain away from high use or traffic areas.** As the landscape takes form, take care to match the desired usage of the landscape with the drainage design for a site. High-activity areas, such as a lawn where soccer or other games will be played, should be very gently sloped, with no areas of concentrated water flow.

Similarly, paved areas where patio furniture is to be set up should be drained using a sheet flow, with slopes not exceeding 2 percent (1 ft. of fall for every 50 ft. of horizontal distance, or run; see chart below). Edges between lawns and planted areas can be good areas to direct water flow, and possibly even concentrate it into a swale that will channel water away from higher use zones. Drain away from areas where heavy pedestrian or vehicle traffic is anticipated.

Element	Max	Min	Preferred	Notes
Driveways				
Longitudinal	20%	0.5%	1–10% 	0.5% is minimum for all impervious surfaces (or 1/2 in. per 10 ft.)
(Direction of Travel) Cross Slope (Side to Side)	10%	0.5%	1–3% 	
Walks				
Longitudinal	10%	0.5%	1–5% 	ADA requirement is a maximum of 8% with a landing every 30′  (or 9 1/2 in. per 10 ft.)
Cross Slope	4%	1%	2% 	
Patios				
Concrete	2%	0.5%	1%	
Flagstone or Brick Pavers	2%	0.75%	1% 	
Greenspace				
Lawn Areas	25%	2%	Varies 	Difficult to mow slopes greater than 25%
Planted Slopes	30%	2%	Varies 	Varies with soil & plant type

Note: 1%= 1.25 in. per 10 ft. of horizontal surface



- **If possible, avoid using catch basins and piping to speed drainage.** Opt for surface, or open, drainage techniques instead. Using piped systems that involve catch basins and drains is necessary in many situations, but they are more costly than open surface techniques, such as sheet drainage or swales. Drains also can negatively impact local ecology, specifically the health of local streams, since they often outlet into local water bodies. Overland flow techniques slow runoff, allowing a significant amount of water to percolate into the subsurface soil, which mimics the way in which water naturally moves through a site prior to construction. Finally, subsurface drainage systems require more consistent monitoring and a higher level of maintenance in many cases compared with open drainage systems.

FUNCTION, AESTHETICS, AND COST

While deciding on what uses and contextual issues will drive the design of your landscape, it is important to consider the many grading and drainage options that are available to assist you in realizing your goal. When shaping the land, the primary, and in many cases, cheapest, element to consider is the on-site soil itself. Avoiding soil removal from the site, while attempting to use what exists without reliance on "built" elements (retaining walls, steps, and catch basins) can help keep costs down significantly.

There are, however, other kinds of costs associated with using slopes instead of walls, or swales instead of catch basins. These costs are most typically defined in terms of on-site landscape space dedicated to the