

TreeCycle

A brief guide to use for turning urban trees into lumber.
(draft, 4/8/2019)

Many urban trees are significant local and cultural landmarks due to their size, stature, and prominent location. When one of these trees dies, due to storm, disease, or development, it can be put to great use as lumber. This guide outlines the most fundamental steps to facilitate this process. It is important to note that every tree will present specific circumstances that can be difficult to predict ahead of time, and any step in this process may need to be altered for a variety of reasons. For example, sections of the tree may be discovered to be rotten, or the tree might be difficult to reach with large equipment or is near other sensitive infrastructure which dictates the removal process. Likewise, every log will produce a different type of lumber, and generally only the trunk and the largest limbs are milled.

Is this tree worth making into lumber?

In Piedmont North Carolina, there are many trees that can produce desirable lumber, from hardwood and softwood species alike. The following can be used as a general guide to determine if a tree is worth milling. There are certainly other reasons that would cause a tree to be significant enough to preserve, but if a tree is one of these sizes, it is a worthy candidate.

- Hardwoods (oak, maple, hickory, ash, walnut, etc)..... ~24” DBH
- Softwoods (pine, poplar, etc)..... ~36” DBH
- Understory Hardwoods (dogwood, hornbeam, sassafras, holly etc) ~12” DBH

Note: 1 Board-foot (bd.ft.) = 144 cubic inches (a piece of wood 12” x 12” x 1”)

COST to produce: \$1-5/ bd.ft. to produce (depending on milling and drying)

VALUE : \$3-30/bd.ft. market-value, hardwood (or more, with local significance)

1. FELLING:

The priority is to maintain the longest log sections possible. A 10' board cannot be sawn from an 8' log and preserving maximum log length at this stage allows for the most milling flexibility later. There are a variety of ways to accomplish this, and each tree will present its own challenges. The following assumes that the tree to be removed is still standing, and that there is some flexibility in the removal schedule. If a tree falls unexpectedly, safety or infrastructure concerns may be the top priority, but measures should regardless be taken to maximize preserved material from any large trees.

In all cases, it is important to remind the chainsaw operator to make the base cut as close to the ground as possible. Likewise, leave at least 24" of limb above the crotch and avoid cutting through the crotch. The best method of removal is to hire a crane operator that specializes in tree work. Under normal urban circumstances, a crane can arrive, set up, and lift trunks in their entirety onto a waiting trailer. There must also be some capacity to then receive the loaded trailer. The process is cheap given the value of the lumber to be produced. Using a crane can be more efficient than the more traditional method of felling the tree in pieces, using a climber or a bucket truck, and faster, minimizing any delays in an urban setting. Cranes may also produce less site damage, as they preclude the need for a skid-steer or any other heavy loader.

In lieu of a crane, arborists should follow the same crowning process, and then fell the crotch and trunk logs to the best of their ability, always with an eye towards maximum log length. Site conditions may prevent full-trunk fells. Where possible, equipment can be used to slowly lower logs as they are cut, preventing breakage or site damage. Mulch can be used to soften the site impacts of a falling log. When the logs are on the ground, they will require a heavy loader to lift, as well as a stout trailer to haul. Large logs can be significantly heavy. For example, a freshly cut white oak log at 100% water content and measuring 40" DBH x 192" will weigh roughly 9,000 pounds.

2. STORING:

As soon as the log is cut, its ends should be painted with a thick coat of paint. DO NOT USE TAR or any tar-like products that will ruin a blade when the log is milled. The goal of this step is to prevent cracking, or checking of the log ends, by slowing the rate of water loss through the exposed end grain of the log.

Logs should then be stored, preferably in a covered location, but at least off the ground, and so that water cannot pool or collect around them during a rain. They will remain this way for some number of months, depending on the species, the size, the season, and the current moisture content of the log. Generally, logs can and should be milled within a 4-6 months. If they are kept totally dry, they can air-dry this way for longer.

3. MILLING:

If possible, it is helpful to have some idea of the desired end-product before milling. Of course, this is not always possible, and so the log should be milled with some flexibility in mind. Less is more here because the boards cannot be put back together once cut but can always be re-sawn later to be smaller. The milling strategy should also be partially dictated by the log itself. There are only a few basic ways to initially mill a log, and a portable bandsaw mill should be enough for most logs (see graphic below). The widest logs may require specialty milling.

The cheapest, simplest, and easiest method of milling a log is to flat-saw it, also known as slabbing or live-sawing, which involves cutting equally thick slices lengthwise. This method is ideally suited when thick slabs are required, as thinner planks cut this way will break. Crotch logs are suited for this because they are not straight enough to cut into dimensional lumber, although any log can be slabbed. Large slabs are quite impressive and can be made into a variety of projects. Slabbed logs can be book-matched, where two subsequent slabs are jointed and joined along one edge to form a symmetrical grain for a large table top. Slabs may also be used to build benches to great effect. Similarly, large beams may be used architecturally, etc.

Plain sawing produces a more uniform set of boards, while still retaining large widths, but removing all the live-edge. This is a good approach when a project calls for the wide and reasonably stable boards. Plain sawing is the most common method of producing hardwood lumber, and many other materials can be made from the plain-sawn lumber, including flooring, trim, etc.

Quartersawing and rift-sawing produce the highest quality boards. Due to the orientation of the grain, the boards are stronger and less prone to movement than slabs or plain sawn wood. The medullary rays are exposed on the surface of the boards, which is particularly beautiful in oak species. Quartered or rift boards are also narrower overall than any of the other milling options and are always less than half the width of the log. Straight and relatively clear logs are most suited to quartersawing, and best used in furniture, panels, cabinetry, etc.

It should be noted that all lumber is always milled to a dimension larger than the desired final size. For example, if a 2" thick slab table top is called for, the slab should be milled to ~2.5" (10/4" or "ten-quarter") to accommodate for any twist, or uneven material that will be removed in a carpenter's shop. 4/4" material can be expected to finish out around 3/4 of an inch.

Likewise, any of the described milling styles can be accomplished at any thickness. Most millers charge by the board-footage that comes off the saw, others may charge by the hour.

4. DRYING

Once the lumber has been cut, it needs to dry. The drying process takes times and occurs in stages. Initially, the wood is stacked and stickered placed in a covered location that is open to the air. It is ideal to have a breeze blowing through the lumber stack but should not get rained on. The wood will air-dry like this for a variable amount of time. Hardwoods take longer than softwoods, oak takes longer than most. In general, slabbed material should air-dry for ~1 year / 1 inch of thickness. Dimensional material can be air-dried in less time.

For lumber to be used in projects indoors, the finished moisture content should be around 8-10%. Reaching this level requires kiln, a process that both removes the remaining water from the boards and sterilizes them – killing any bugs or fungi living on or in the wood. There are local shops that will kiln dry material by the board foot, and the process takes 4-12 weeks, depending on the kiln and the material.

If the finished project is to live outside, as a public bench for example, then the kilning step is less essential, but still preferable.

At this point, the wood is ready to use. Get it to a local woodworker !

Milling Examples:

