PROPOSAL

Stream Restoration of Goodman and Brickelmaier Parks Using Large Wood Added through the "Chop and Drop" Method

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Description:

"Chop and drop" is a stream restoration technique using wood additions where trees near, but not directly on, the stream bank are directionally felled to land within the stream channel, adding hydraulic roughness and structure to the stream with many associated geomorphic and ecological benefits. Trees are generally felled in groups, or clusters, to form log jams, thus maximizing their geomorphic impact while minimizing the risk of log transport out of the stream reach. Trees are felled with chainsaws to fall in a chosen orientation, so the trunk and branches of the tree will become secured against adjacent trees and boulders or interlocked with other felled logs. This treatment does not require any heavy machinery or associated haul roads and, as a result, minimizes disturbance to riparian vegetation. As the logs are not typically anchored with cable, some transport of logs can be expected over time, where they often consolidate into stable channel-spanning log jams. Chop and drop is best applied along streams with ample, mature riparian trees where tree height is greater than channel width such that movement of the felled trees is minimal. Given the presence of culverts at the downstream end of Goodman and Brickelmaier Parks the felled trees could be anchored with steel cable to standing trees as extra insurance against impacts to infrastructure.

Benefits of the Chop and Drop Approach:

- Restore impaired stream reaches with minimal in-stream wood
- Sediment storage within area of restoration decreases sediment loading downstream
- Storage of organic material to increase ecological productivity
- Increased complexity of instream and riparian habitat
- Increased floodplain and side channel connection (where such features are present)
- Flow attenuation (decreased peak flow, increased base flow, and reduced flow velocities)
- Channel infilling and narrowing overtime decreases bank instability and erosion
- Improved aquatic habitat by scouring pools, creation of cover, and oxygenation of flows

Monitoring Recommendations:

- Tag and track individual logs
- Repeat in-stream cross-sectional and longitudinal surveys
- Identify trapped wood and organics
- Pool counts and cover habitat mapping
- Repeat oriented ground photographs

Site-Specific Data & Analysis Needs:

- Channel width
- Tree diameter and species

Construction Synopsis:

The chop and drop method can be implemented any time of year. The sequencing of tree felling shall proceed from downstream to upstream with trees felled up to 30 feet from the stream banks as long as they are able to fall into the channel. Trees shall be felled in clusters (as opposed to equally spaced along the reach) to promote an interlocking and stabilizing effect (see attached design drawings and photographs of previous projects). An experienced forester and chainsaw operator shall be present to guide the selection of trees and the placement of felled trees. Additionally, oversight by a person with experience in wood and river dynamics is essential for proper placement of felled trees. Depending on site conditions, 2 larger trees (~12-14-inch diameter) and 2 smaller trees (~6-8-inch diameter) will generally be felled at each location where a log jam is desired with installation sites spaced approximately every 100 feet along the stream. A come-along or grip-hoist can be employed to better position and interlock felled trees to reduce the likelihood of mobility. In addition to the use of steel cable for anchoring, strainer structures can be installed at the downstream end of the added wood to catch any logs that may be mobilized and prevent impacts to downstream infrastructure.

Materials Specifications:

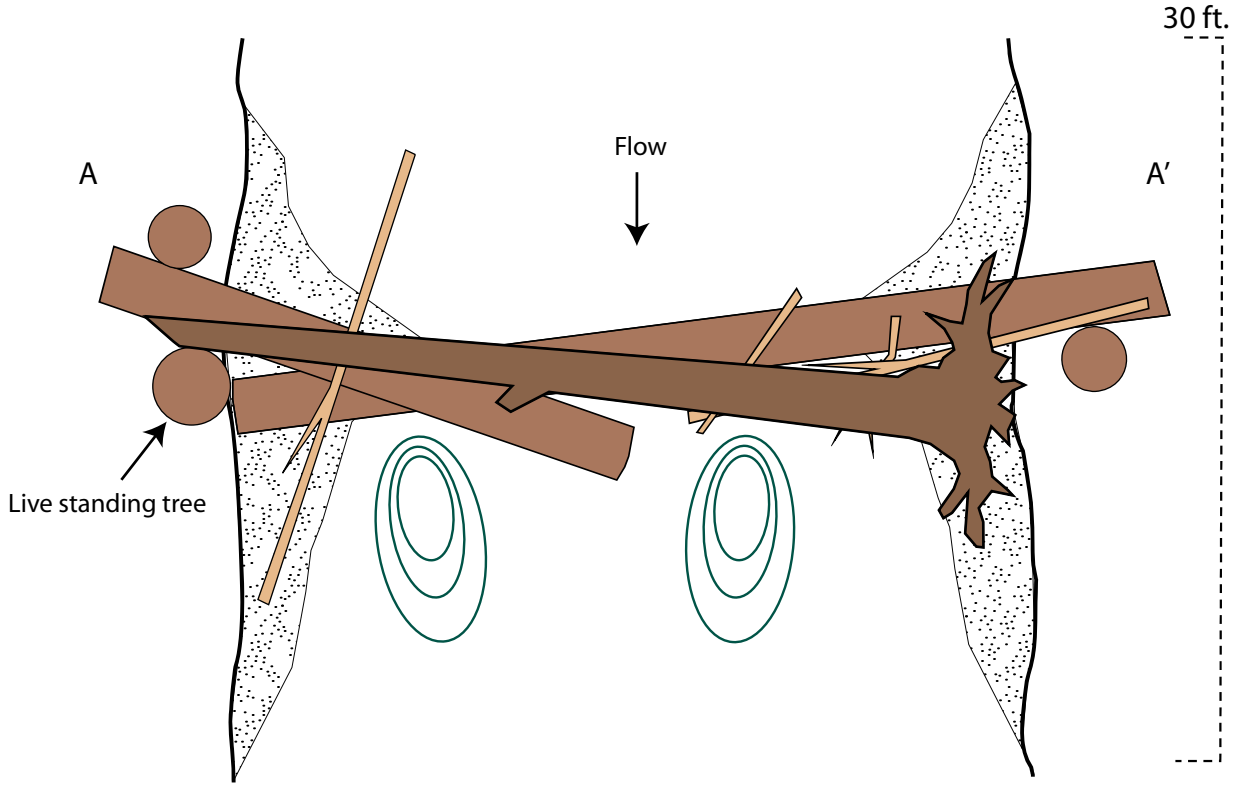
Trees selected for felling shall be living trees, free from rot and decay. Tree height shall be greater than the bankfull channel width and tree diameters shall be mixed with approximately 50 percent ranging from 6 to 12 inches in diameter and 50 percent greater than 12 inches in diameter. A mix of tree species is preferred, with strategic cutting employed to promote forest stand health.

Implementation in Goodman and Brickelmaier Parks in Hollin Hills:

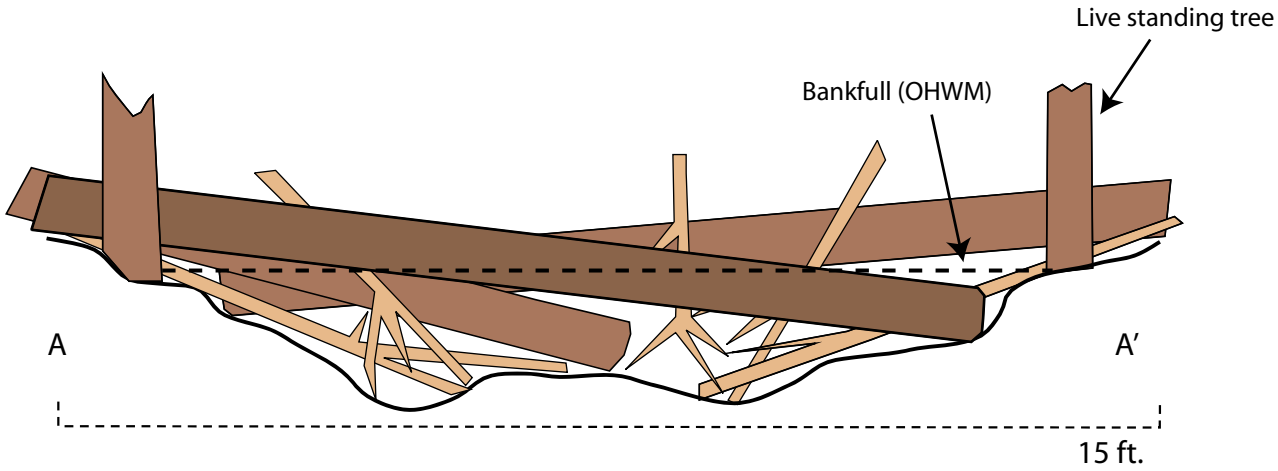
Chop and drop wood additions are proposed for Goodman and Brickelmaier Parks in the historic Hollin Hills neighborhood of Alexandria, VA. Chop and drop wood additions will be restricted to the confined portions of both parks where some bank erosion is ongoing in limited portions of these confined reaches that extend for approximately 600 feet in each park . If log strainers (created from felled and cabled trees fully crossing the channel) are deemed necessary to prevent wood movement from reaching the culverts passing under Paul Spring Road, these should be placed just downstream of the confined portions of the streams. A walk through prior to construction should be conducted with the Contractor, CAHH, HHPP, and other interested stakeholders to select, in advance, the trees to be felled to ensure the largest sentinel trees remain untouched and to reassure residents that the existing

viewshed will remain largely unchanged by the felling of no more than two dozen trees in each park (and no more than one dozen trees with a diameter greater than 12-inches in diameter). The largest trees creating the canopy shading the parks will remain untouched and the trees to be felled will be spaced over a distance of 600 feet in each park, so the work, once complete, will hardly be noticeable and will blend seamlessly with the existing aesthetic. A decision can also be made at the time of the walk through regarding the need for the log strainers once the Contractor determines and explains the likelihood of trees moving beyond the confined portions of the streams.

Plan view



Cross section view



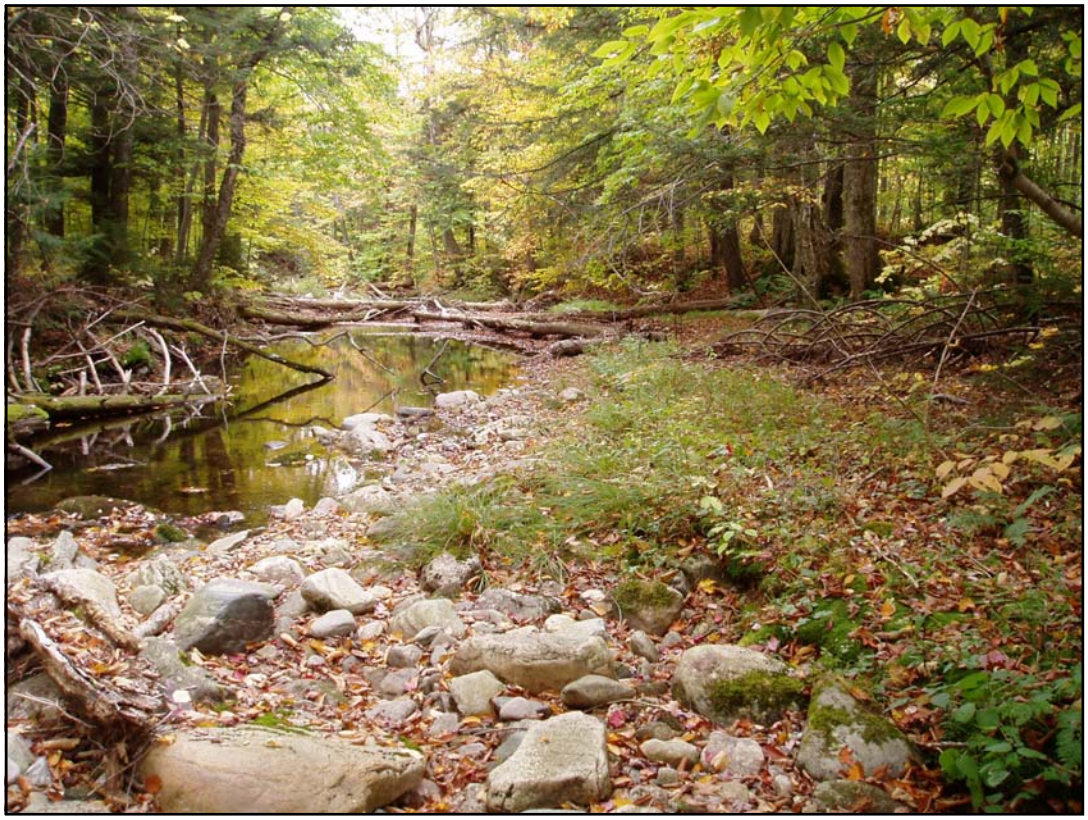
Expected deposition

Expected scour

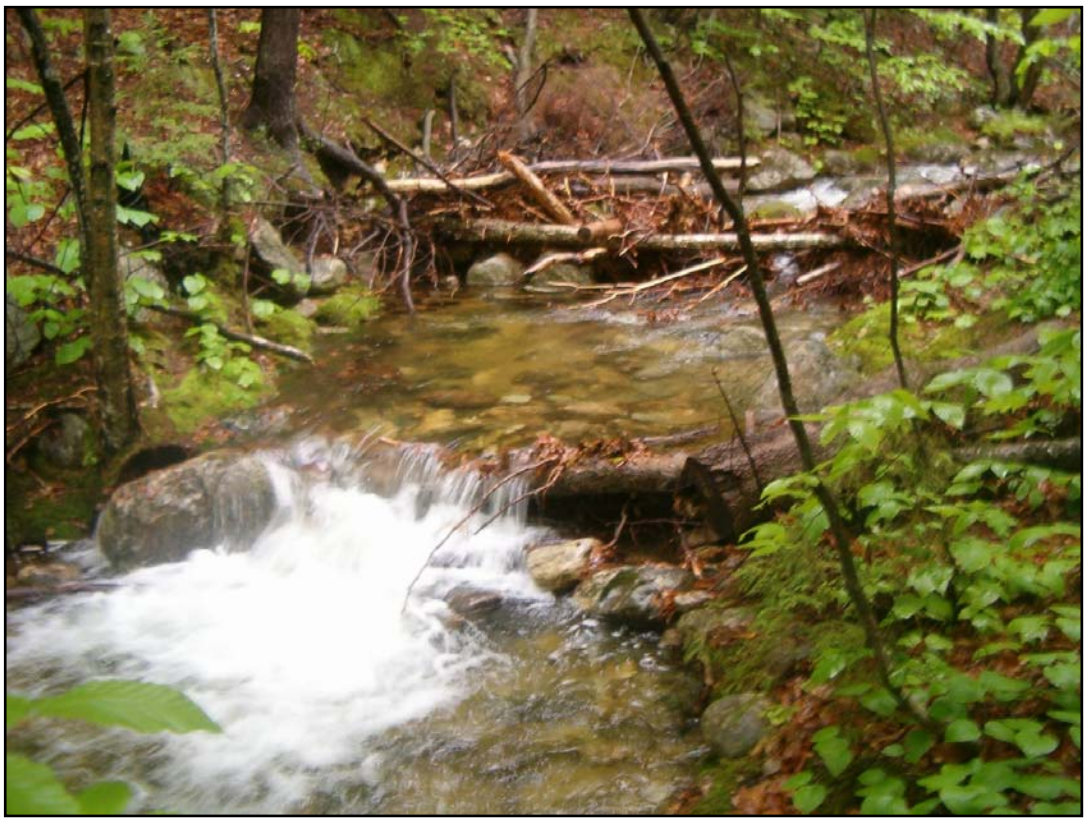
*Illustration adapted from Trout Unlimited

Chop and drop design typical.

After a decade, wood added to channel in Vermont using chop and drop method is still functioning.



Deposition after chop and drop in Vermont has created an emerging floodplain to right of photo.



Chop and drop projects create great habitat: forming pools, providing cover, sorting sediment, and increasing flow complexity.

After 20 years, this chop and drop project in Vermont has significantly narrowed the channel and reduced bank erosion.

Chop and drop projects trap organic matter and increase ecosystem productivity.

Chop and drop projects trap great volumes of sediment in just 1 or 2 years, reducing sedimentation downstream in impaired waterways and reduce the growth of bars in valley bottom streams (such as Paul Spring Branch) that drives bank erosion and threatens infrastructure.

Opinion of probable construction costs
Goodman and Brickelmaier Parks - Hollin Hills neighborhood, Alexandria, VA

Treatment/Item	Unit	Quantity	Unit Cost	Task Cost
Chop and drop implementation Includes all labor and materials (pre-selection of trees, oversight of felling, chainsaw and comealong labor, saw operating costs, travel expenses, etc.)	Flat rate	1	$ 25,000.00	$ 25,000.00
Project total				$ 25,000.00

Price quote provided by Caribou Springs Watershed Solutions of Gilead, ME who have successfully completed more than 20 miles of chop and drop projects in New England. The quoted cost is valid through March 2022.