

To: Durham Planning Board

Date: 1/6/22

Subject: Comments/suggestions/questions on landscape plan for Mill Plaza development

From: John Parry, 5 Denbow Rd., Durham, NH

Urban Forester, U.S. Forest Service (retired)

Dear Planning Board.

Like many in Durham I do have concerns about the increase in parking and student housing proposed at Mill Plaza, and the impact this will have on the environment and community. I know many others have commented on this, so I will focus my comments, questions and suggestions I have on the landscape plan, since this is more related to my area of expertise.

MAIN COMMENTS AND QUESTIONS ARE LISTED BRIEFLY BELOW – I PROVIDE MORE DETAIL ON EACH OF THESE ON PAGE 2.

- 1. Clarify what existing trees will be protected and how.** Make sure tree root systems are adequately protected. Details in the plan are not clear.
- 2. Improve/clarify design of parking lot islands for tree planting.** 5 feet is not an adequate width for rooting space to grow larger trees. A loam or other suitable soil to a depth of 3 feet is most desirable. Investigate poor drainage and compaction of existing soil underneath the soil added.
- 3. Use of “engineered” soil (structural soil?) could be helpful if used appropriately.** Define what this is. Engineered soil under pavement would be useful, but I don’t understand the value of using it the islands? Replacing it with loam or other soil to a depth of 3 feet may be more beneficial to the trees.
- 4. A number of trees will be planted around the buildings - I don’t see any specs. for the design and size of these tree boxes.** These can become larger trees and need adequate rooting space.
- 5. Tree planting figure shows the root balls in Islands are planted high,** about ¼ of the root ball is above the soil. I feel this is inappropriate. If soil settling is a concern, trees can be planted slightly high (1 – 2 inches high). The ANSI standard for tree planting (ISA Tree Planting BMPs – Companion Publication to ANSI A 300 Part 6).
- 6. A significant watering* program is critical** to maintain tree health and growth. Extra attention to watering for first 2 years after planting should be planned to make sure these young trees get established. Given that parking lots are hotter, dryer sites (and especially if an engineered soil is used) there should be a solid maintenance plan to water trees permanently during the growing season.

7. It is good to **diversify tree species** in case there is a insect, disease or other problem in the future that affects a certain species in the area.
There are a large number (24) of Armstrong maple and Redbud (24) planned. I suggest planting no more than 12 of each of these species and substituting other appropriate species to add diversity.

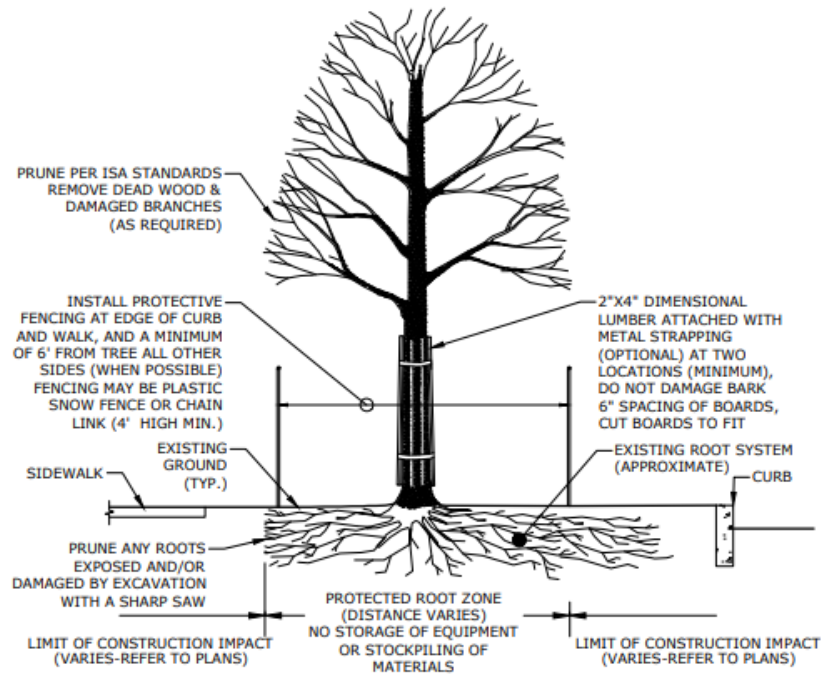
ADDITION DETAIL

Protecting Existing Trees (see figures below)

- Landscape Note 17. on the plan states; *EXISTING TREES AND SHRUBS SHOWN ON THE PLAN ARE TO REMAIN UNDISTURBED. ALL EXISTING TREES AND SHRUBS SHOWN TO REMAIN ARE TO BE PROTECTED WITH A 4-FOOT SNOW FENCE PLACED AT THE DRIP LINE OF THE BRANCHES OR AT 8 FEET MINIMUM FROM THE TREE TRUNK. ANY EXISTING TREE OR SHRUB SHOWN TO REMAIN, WHICH IS REMOVED DURING CONSTRUCTION, SHALL BE REPLACED BY A TREE OF COMPARABLE SIZE AND SPECIES.*

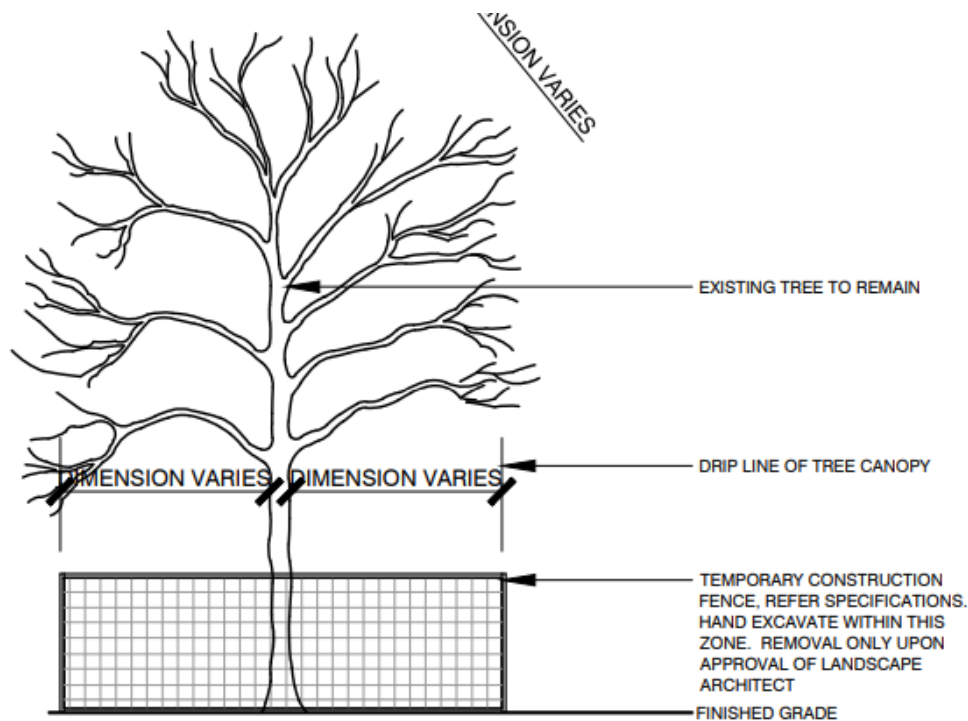
It is difficult to see on the plan which trees are identified for protection? I believe some are along Mill Rd. There could also be some in the College Brook area and along the north boundary of the property. Ideally the **Town Tree Warden should identify and flag trees to protect in the planning stage.** Can we **ID on the plan which trees will be protected and how?**

- Protecting root zone around the tree is critical. Fencing at the drip line is an accepted industry standard* (There are also other accepted methods for determining the root area to protect). The wording in 17. above “or at an **8 foot minimum**” is **contradictory and not adequate** for larger trees over 8” in diameter.
- There are **two different diagrams in the plans** showing different levels of tree protection (see below). The first figure below (from Sheet C508) shows fencing at 6 feet. The **protection standards for existing trees are confusing and need to be clarified.**



NOTE:
 1. CONTRACTOR SHALL WALK THE PERIMETER OF THE SITE WITH OWNER PRIOR TO CONSTRUCTION TO IDENTIFY TREES TO BE PROTECTED DURING CONSTRUCTION.

TREE PROTECTION FOR EXISTING TREE
 NO SCALE



NOTE:

1. DO NOT STORE ANY MACHINERY OR MATERIALS WITHIN FENCED AREAS UNLESS OTHERWISE NOTED IN THE CONTRACT DOCUMENTS

SECTION

1 PROTECTION FOR EXISTING TREES

Scale: Not To Scale

- Any **setbacks or otherwise protected areas should be protected from all construction activities.** In many past projects, building was not allowed on wetland and shoreland setback areas, but developers were allowed to store supplies, park vehicles, pile soil, etc. in those areas, and this “temporary use” did significant damage/compaction in those areas. Also, **sites where new tree planting will occur should be protected from soil compaction.**
- Some **deer protection may be needed around new trees planted in/near natural areas by College Brook.**

Design for Tree Planting in Parking Lot Islands (see figures below)

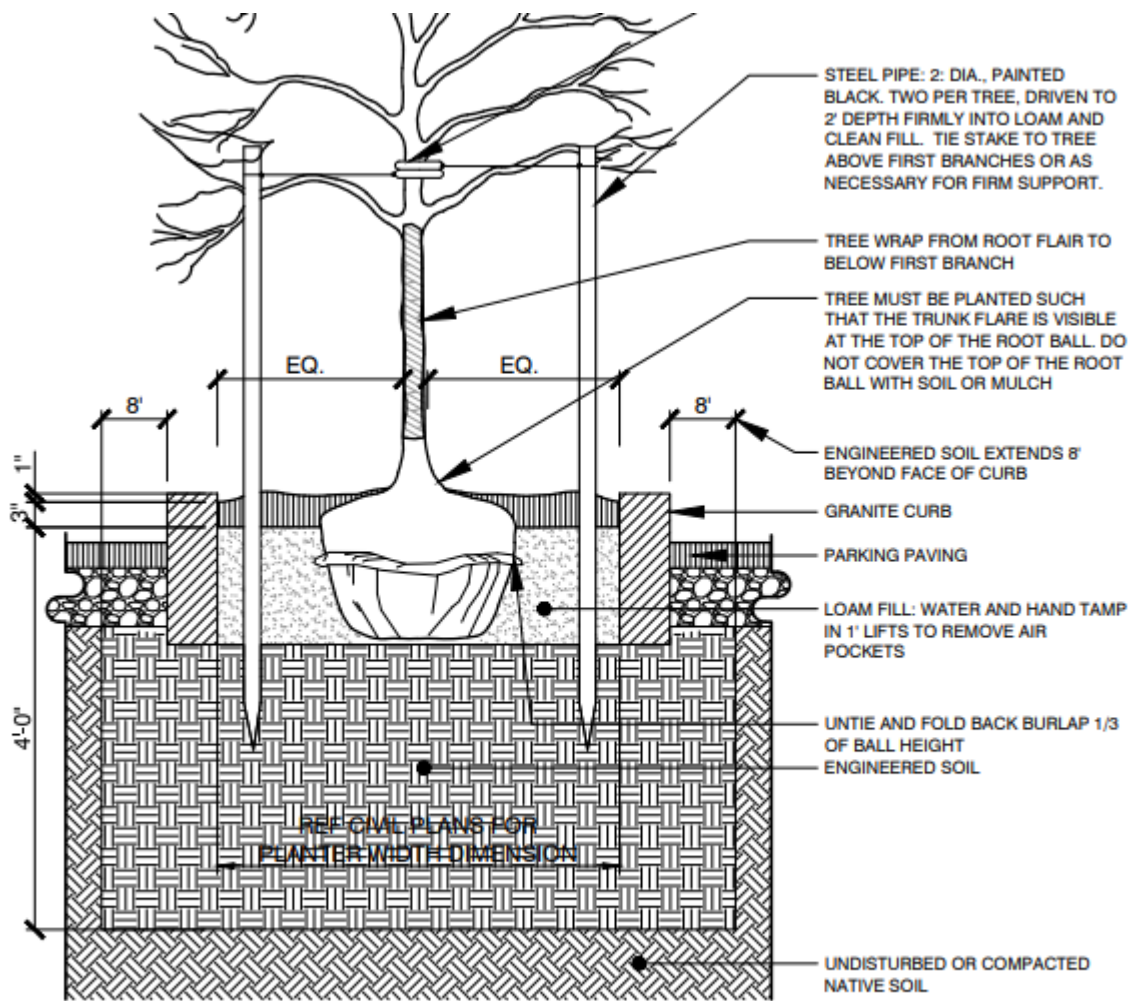
- The islands are 6 feet wide. My understanding is that measurement is to the outside of the curb, so the curbs will take up about 12+ inches of the island space. That **leaves just 5 feet or less of soil width for tree rooting** within the islands. Most tree roots naturally grow horizontally from the root ball. The species selected can grow to a larger size at maturity if adequate rooting space is available. Trees in the existing lot, and on main street are examples of what happens long term without adequate rooting space – they grow slowly, stay small, have poor health, are short lived and must be replaced regularly. I am glad to see species were selected that will have a larger size at maturity, but I feel **the width of the Islands should have been increased (to 8 feet or more) to allow adequate rooting space.** As an example, the picture below shows a parking median at Targets in Greenfield with a 10 foot width and healthy trees growing at a good rate. Wider islands might also allow planting one or two additional trees in each island.

- The crown spread of some of these trees at maturity shows as up to 30' plus. **Need to plan adequate spacing in the parking lot islands to avoid branch conflicts with pedestrians, vehicles, delivery trucks, snowplows**, etc. Branches can be pruned up over time*, but trees must be allowed to gain height before too much lower branch pruning can be done. Good species selection can help. Also, when ordering trees from nursery, contract wording can specify the height to which trees should be free of branching.
- Landscape Note 14. on the plan states; PARKING AREA PLANTED ISLANDS TO HAVE MINIMUM OF 1'-0" TOPSOIL PLACED TO WITHIN 3 INCHES OF THE TOP OF CURB ELEVATION. REMOVE ALL CONSTRUCTION DEBRIS BEFORE PLACING.
Ideally loam should be as deep as the tree root balls (approx. 24"?). Might also consider replacing the engineered soil under the trees with loam soil (see comment below under engineered soil).
- A concern I have is that **any existing, compacted undersoil (underneath the islands) will impede water drainage from the islands**, especially if the old, compacted soil from previous construction is still present. If water drainage is a concern, it would be helpful to break up or till compacted soil, to a depth of 4 feet or more for the whole length of the islands. Engineered soil under the trees may help with drainage, especially if the engineered soil (or an appropriate soil mix) ran the full length of the islands to a depth of 3 - 4 feet. **Another option is to install drainage tile the length of the islands, especially if an outlet can be provided. This could be a cheaper alternative to other remedies.**

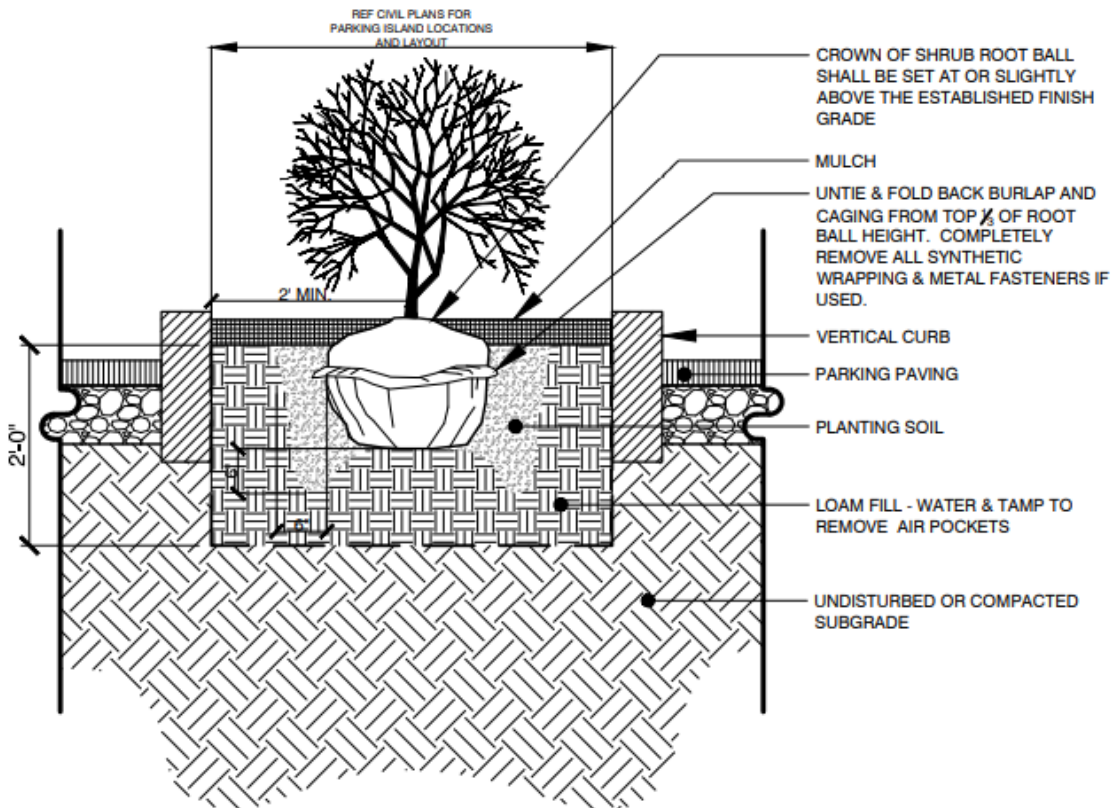
Engineered Soils (ES): I don't have much direct experience in using engineered soils, but questions/comments I have are;

- The newest plans show that an "engineered" soil (ES) will be used and extends 8 feet beyond the curb, underneath the pavement. I assume this is similar to a structural soil which will allow tree root growth, and also support pavement or concrete above? **This ES should be defined or described in the plans.**
- Glad you are considering using ES, since this can help increase rooting space for trees when used correctly. It should be noted that because of the large volume of stone in **ES, it is less productive for tree growth than a good loam or topsoil** (some estimates suggest that you need 4 or more cubic feet of engineered soil to replace 1 cubic foot of good soil).
- The main benefit of using a structural soil or ES is that it supports concrete or pavement above, while also allowing root growth. The plan shows using ES directly under the trees (and 1' of loam) from a 1' depth down to 4'. **Since there is no pavement or concrete to support in the islands, why not just use a good soil** (at least 3 feet deep) in the islands instead?
- Most tree roots grow laterally from the root ball, and stay in the top 2 - 3 feet of soil*. Your diagram below shows that the island curbs will be at the same level as the root ball, forcing the roots to grow down and under the curb to get to the ES under the pavement. Roots will likely do this, but perhaps to a lesser extent (especially at a 4 foot depth). **Is there a design change that could improve lateral growth of the roots into the ES under the pavement?**
- There is **no engineered soil shown under the planned shrubs in the island, so that implies that the engineered soil does not run the full length of the island** and is only near the trees? **It would be useful to know how far the engineered soil extends on either side of the trees.**
- It will be helpful that the roots can run down the length of the islands. **However, in calculating the usable soil volume for rooting**, it should be considered that this may be a diminishing return.

There will be less root growth as you get farther from the tree, and there will be some competition for water and nutrients from shrubs and other plant material in those areas. Also, it appears the engineered soil does not run the full length of the islands, so in between the trees the rooting depth is more limited (2' deep) and the soil below the loam there may be compacted.



4 DECIDUOUS TREE PLANTING: CENTER PARKING ISLAND
 Scale: Not To Scale



3 **SHRUB PLANTING: PARKING ISLAND**
Scale: Not To Scale

General Tree Planting Specs

- The tree planting figure above shows the root ball planted high, about $\frac{1}{4}$ of the root ball is above the soil. **I feel this is inappropriate. Trees should be planted so that the root flare is established at or near ground level.** If soil settling is a concern, trees can be planted slightly high (no more than 1 – 2 inches high). The **ANSI standard for tree planting** (ISA Tree Planting BMPs – Companion Publication to ANSI A 300 Part 6) states that “B&B root balls should have the trunk flare correctly located at the surface – the planting hole can be 1 -2 inches shallower than the root ball depth in anticipation of minor settling and flattening of the root ball”*.
- Will there be no **new trees planted along Mill Rd.?** This seems like a good site for planting and a good buffer should be provided here.
- The plan indicates **tree boxes (tree pits) near the buildings** (such as in the sidewalk in front of building A and around B)? I did not see detail in the plans on the design for these tree boxes. **What is the size and how is underground rooting space designed for these tree boxes?** Armstrong maple are planned for most of these spots and it is not a small tree. Needs adequate rooting space.

Tree Species Selected

- It is good **to diversify species** in case there is a insect, disease or other problem in the future that affects trees in the area.

- There are a large number (24) of Armstrong maple (*Acer x fremanii*) planned. **I suggest planting no more than 12 Armstrong and substitute 12 other appropriate species.**
- There are a large number (25) of redbud (*cercis canadensis*) planned. These are not a bad choice, but are close to their northern range and do better with some shade. **I suggest planting no more than 12 Redbud and substitute 12 other appropriate species.**

Watering

- Landscape Note 16. on the plan states; *ALL PLANTS SHALL BE WATERED THOROUGHLY TWICE DURING THE FIRST 24 HOUR PERIOD AFTER PLANTING. ALL PLANTS SHALL BE WATERED WEEKLY, OR MORE OFTEN, IF NECESSARY, DURING THE FIRST GROWING SEASON. LANDSCAPE CONTRACTOR SHALL COORDINATE WATERING SCHEDULE WITH OWNER DURING THE ONE (1) YEAR Guarantee period.*
Landscape Note 19. on the plan states; *UPON EXPIRATION OF THE CONTRACTOR'S ONE YEAR GUARANTEE PERIOD, THE OWNER SHALL BE RESPONSIBLE FOR LANDSCAPE MAINTENANCE INCLUDING WATERING DURING PERIODS of drought.*
A significant watering* program for at least 2 years after planting is critical and should be planned.
It takes that long for new trees to become established. Also, if engineered soil is used, it may need regular irrigation on a long-term basis.

*There are ANSI Standards developed for many tree planting, care and protection issues. The International Society of Arboriculture (ISA) have developed Best Management Practice booklets developed as companion publications to each ANSI Standard and these provide a very good summary of recommended industry standards. Topics related to new development, and of interest to the PB and other Town Committees and Depts. are ; Tree Planting, Tree Protection During Construction, Soil & Root Management, Tree Pruning, Utility Pruning of Trees and Integrated Vegetation Management.

The Planning Board should acquire a set of these ANSI Standards and BMP Booklets for future reference. These can be purchased at the website below. <https://www.isa-arbor.com/store/category/117/>

I also have copies of these available if needed.

Photo Caption: Parking lot at Greenland Target store with 10 foot islands.

