

Reformatory Branch Trail Tree Loss Has Quantifiable Carbon Impact

We can calculate how much total and annual carbon is sequestered in the trees along the Reformatory Branch Trail (RBT). Because of the carbon impact of clearing 4.34 acres of trees to build the Minuteman Bikeway Extension, I urge you to vote no on article 10 at Town Meeting on November 14/15th.

i-Tree Canopy analysis shows the 4.34 acres of trees sequester the CO₂ equivalent of 55,441 miles of gasoline per year. Further, i-Tree Canopy determines the trees themselves hold the CO₂ equivalent of 1,391,645 car miles.

i-Tree is “a state-of-the-art, peer-reviewed software suite from the USDA Forest Service that provides urban and rural forestry analysis and benefits assessment tools.”ⁱ It includes i-Tree Canopy, which classifies “land and tree cover across a given area using random sampling of aerial imagery. [It determines] tree canopy benefits in terms of **carbon dioxide**, **air pollution**, and **stormwater** impacts.”ⁱⁱ

Here, i-Tree Canopy’s analysis will be limited to carbon benefits of the 4.34 acres on the RBT:ⁱⁱⁱ

Carbon Benefits				
Description	Carbon Rate (Tons/acre/yr)	x 4.34 acres+ along RBT now	CO ₂ Equiv. Rate (Tons/acre/yr)	x 4.34 acres+ along RBT now
Sequestered annually in trees	1.37*	5.92	5.01	21.72
Stored in trees (Note: this benefit is not an annual rate)	34.28	148.78	125.70	545.52

*i-Tree Canopy brings all calculations out to three decimal places. I have rounded to two.

+ i-Tree Canopy renders per acre results only. The multiplication of each value by 4.34 acres is mine.

Note that carbon is calculated first, and i-Tree derives CO₂ equivalents.

i-Tree Canopy shows **21.72** tons of CO₂ equivalent are sequestered annually by the 4.34 acres that would be removed for the Extension. How many gallons of gasoline does that represent? First, we convert tons to pounds:

$$21.72 \text{ tons of CO}_2 \times 2,000 \text{ lbs/ton} = 43,443.40 \text{ lbs of CO}_2.$$

The EPA states “Every gallon of gasoline burned creates about 8,887 grams of CO₂.”^{iv} This is 19.59lbs of CO₂ per gallon of gasoline:

$$8,887 \text{ g of CO}_2 \text{ per gal. of gas divided by } 453.59 \text{ g per lb} = 19.59 \text{ lbs of CO}_2 \text{ per gal. of gas}$$

We divide the pounds of CO₂ equivalent sequestered annually in the 4.34 acres by the pounds of CO₂ generated by one gallon of gasoline:

$$43,443.40 \text{ lbs of CO}_2 \text{ divided by } 19.59 \text{ lbs of CO}_2 \text{ per gal. of gas} = 2,217.63 \text{ gal. of gas}$$

Assuming the bicycle commuter will replace a car that gets 25 miles to the gallon, 2,217.63 gallons drives the car 55,441 miles. This means 2,217 additional bicycle commuter trips of 25 miles round trip *per* *year* would be required to offset the annual carbon capture performed by the 4.34 acres.

There is another massive carbon sink here. i-Tree Canopy shows that the trees as a whole currently sequester **545.52** tons of CO2 equivalent, locked right now in the 4.34 acres that would come down. Using our same assumptions and calculations, this works out to 1,391,645.36 car miles, or, 55,665.81 additional 25-mile bicycle commuter trips.

Road Miles Equivalence Summary

Description	lbs CO2 sequestered (tons x 2000)	gallons of gas (CO2 lbs / 19.59)	driving miles at 25/mpg
Sequestered annually in trees	43,443.40	2,217.63	55,440.79
Stored in trees (Note: this benefit is not an annual rate)	1,091,049.96	55,665.81	1,391,645.36

The RBT is used by commuters today. How many? There is no use study.

- When would new bicycle commuter usage offset the 1,391,645.36 miles’ worth of carbon currently sequestered in the 4.34 of trees that would be removed?
- Would paving alone induce cyclists to commute 2,217 additional 25-mile trips each year?
- What exactly are the current barriers on the RBT for any bicycle commuter to take even one more 25-mile ride?
- Does “getting just one car off the road justify all the trees" removed, as asserted publicly by members of the Select Board?

The 4.34 acres analyzed is only one part of the full tree removal plan for the Extension; ^v our discussion is limited to carbon. i-Tree Canopy also provides data for the benefit that trees provide for water filtration, runoff prevention, and filtration of air pollutants.

Trees are only a small part of a carbon offset calculation, which was not done for the Extension. Other factors must be considered, such 1.7 miles of asphalt, and associated heat trap. We’ve all seen the Depot Park lots on weekends, packed with visitors who drive from points distant to use the Minuteman Bikeway for recreation. Their trips must be reckoned as a climate change accelerator.

How can this project be seen as a climate win?

ⁱ <https://www.itreetools.org/about>

ⁱⁱ <https://canopy.itreetools.org/>

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https://www.bedfordma.gov/sites/g/files/vyhlf6866/f/uploads/mmbw_extension_tree_removal_cover_memo.pdf.

^{iv} <https://www.epa.gov/greenvehicles/greenhouse-gas-emissions-typical-passenger-vehicle#:~:text=Every%20gallon%20of%20gasoline%20burned%20creates%20about%208%2C887%20grams%20of%20CO2>

^v For a discussion of the undisclosed areas and measurements of trees that will be cleared on private land for the Bikeway Extension, see my elaboration on Ms. Howell’s Letter to the Editor in the Bedford Citizen:

<https://www.thebedfordcitizen.org/2022/10/letter-to-the-editor-priority-should-be-a-safe-connection-from-reformatory-trail-to-minuteman-bikeway/#comment-28258>