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Overview Information

April-May 2023

We believe Needham has untapped potential to continue improving its safety, quality of life, and economy for everyone.



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To realize this potential, we support continued investments that bring Needham further into the 21st century.



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Safer Quieter Needham

advocates for installing more safety measures at commuter rail crossings that will eliminate non-emergency train horns.

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- Safety
- Quality of Life
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Why?

- **Safety**

- Needham's collision risk index is 33% less safe than the national average

- **Economic Development**

- Nearby property becomes more valuable and more possibilities are created
- New and re-developments can redirect \$\$\$ away from noise reduction and toward community benefits

- **Quality of Life**

- Over 4,700 homes, businesses, and non-profits within 1/2-mile of commuter rail crossings experience blaring train horns from before 5am till after midnight

- **Prudent Investment**

- Making these safety upgrades is a one-time major investment that pays for itself
 - Minor regular maintenance required

Why?

- **Transit Access is Vitally Important Long Term**

- As the Greater Boston region continues to grow long term, access to transit is a vital resource linking Needham to the region by multiple travel modes
- We do not want to lose full commuter rail service
 - Convenience, options, less congestion, helps environment
- **AND** there are things we can do to make full transit access more compatible with the 4,700+ homes and businesses that are close to our rail crossings

How?

- **In 2005, the Federal Railroad Administration (FRA) created the “Train Horn Rule”**
 - Towns like Needham can create a Quiet Zone
 - Within a Quiet Zone, non-emergency train horns at public roadway crossings are banned

How?

- **Creating a Quiet Zone**
 - Formal, defined process with specific action steps
 - Defined menu of supplemental safety measures (SSMs)
 - SSMs must be installed at every public road crossing
 - MBTA and Keolis participate in planning process
 - Cannot prevent or veto

It is up to Needham

How?

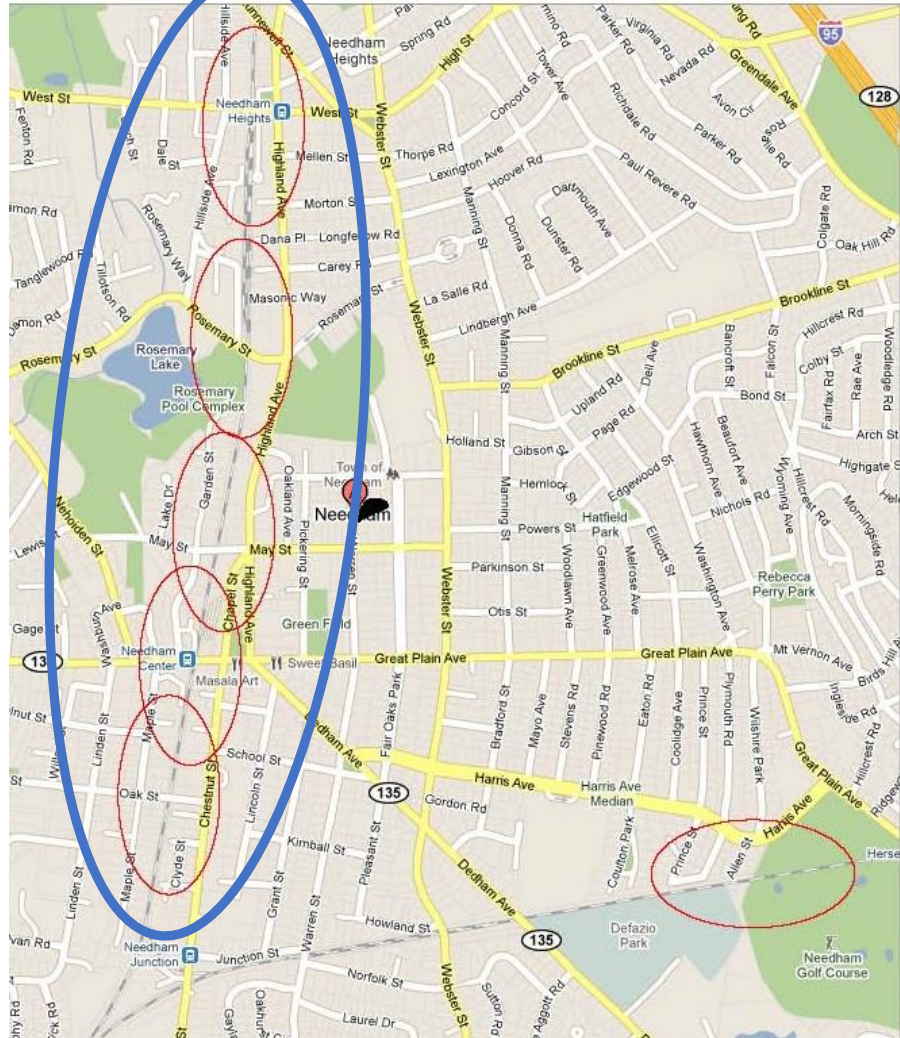
Quiet Zone Crossings

- West St
- Rosemary St
- May Street
- Great Plain Ave
- Oak St

Separate Agreement Crossing

- Golf course cart crossing

Needham Quiet Zone



What's Involved?

- **3 Categories of SSMs**

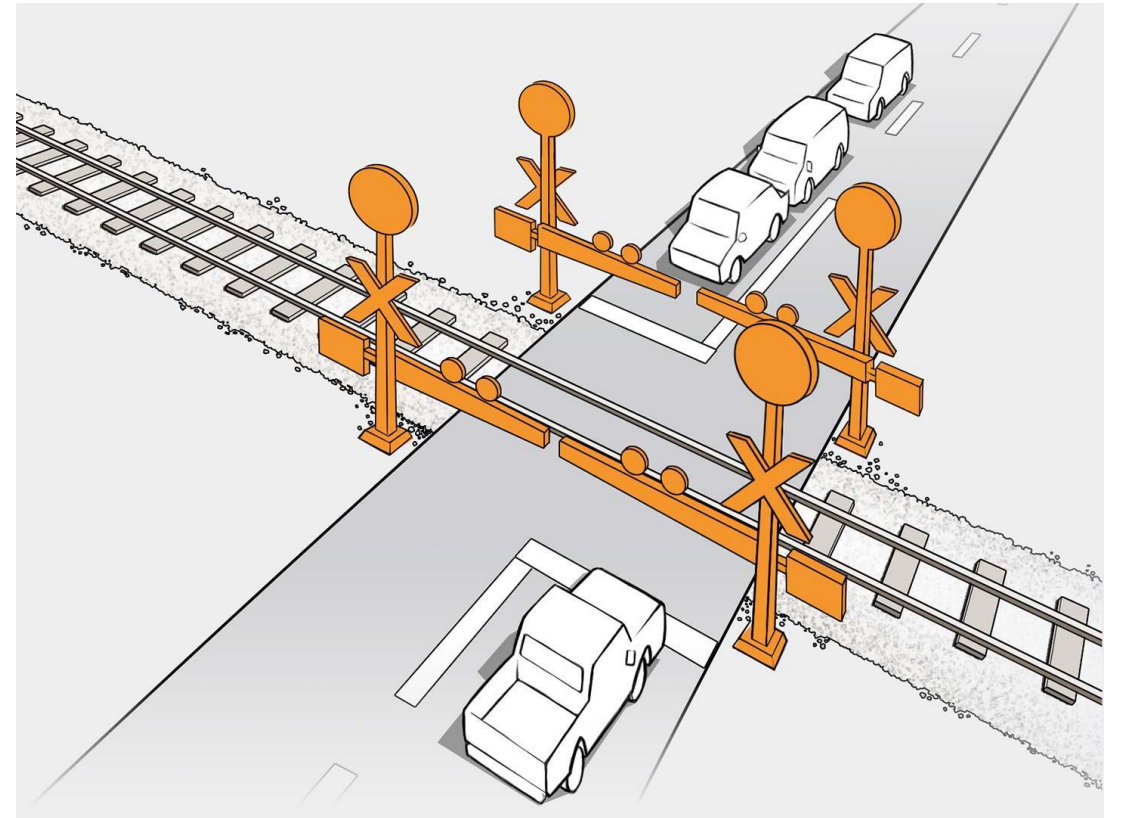
- 1. Unrealistic for Needham:** Includes options such as closing streets, elevating the train or road, or making streets one-way
- 2. Impracticable for Needham:** Install medians (center islands) in streets approaching crossings
- 3. Practicable for Needham:** Four-quadrant gates

Why Not Medians?

- **Medians are Impracticable for Us Because:**
 1. Except *maybe* Rosemary Street, minimum length requirements cannot be satisfied without closing off existing commercial driveways
 2. In several cases, road widths are not sufficient to accept medians without harming traffic operations
 3. Difficulties with drainage, snow removal, and maintenance costs
 4. Lower up-front but potentially higher lifetime costs

The Solution for Needham

- **Four-Quad Gates:**
 1. Gates from all four corners of an intersection
 2. Typically includes vehicle presence detection
 3. Integrated with train operations



Safety

According to the FRA, with current conditions at our rail crossings and using train horns as is done today,

Needham's risk index is **33% less safe**

than the national average (called the Nationwide Significant Risk Threshold, or NSRT).

Needham's risk index and the NSRT are based on the FRA's severity-weighted prediction formulas that include variables such as train speed, train and traffic volumes, and crossing conditions

Source: Federal Railroad Administration Quiet Zone Calculator, February 2023



Safety

By implementing four-quad gates, Needham's risk index will be

62% more safe than current conditions with train horns ...

... and 49% more safe than the national average.

Source: Federal Railroad Administration Quiet Zone Calculator, February 2023

Supplemental Safety Measures

Supplemental Safety Measure (SSM)	SSM Code	Nationwide Significant Risk Threshold (NSRT)	Risk Index with Horns (Current Conditions)	Quiet Zone Risk Index with Each SSM	Qualifies for Quiet Zone	Risk Index Improvement vs. Current Conditions	Risk Index vs. National Average (the NSRT)
CURRENT CONDITIONS - Two-Quadrant Gates with no medians and using train horns	0	15,488	20,644	34,435	NO	N/A	-33%
Temporary Closure of a Public Highway-Rail Grade Crossing - UNREALISTIC / NOT CONSIDERED	1	N/A	N/A	N/A	N/A	N/A	N/A
Permanent Closure of a Public Highway-Rail Grade Crossing - UNREALISTIC / NOT CONSIDERED	2	N/A	N/A	N/A	N/A	N/A	N/A
Grade Separation of Public Highway-Rail Grade Crossing - UNREALISTIC / NOT CONSIDERED	3	N/A	N/A	N/A	N/A	N/A	N/A
Four-Quadrant Gates Upgrade from Two Quadrant Gates, [with no medians and] No Vehicle Presence Detection	4	15,488	20,644	6,198	YES	70%	60%
Four-Quadrant Gates Upgrade from Two Quadrant Gates, with medians and no Vehicle Presence Detection	5	15,488	20,644	2,755	YES	87%	82%
Four-Quadrant Gates Upgrade from Two Quadrant Gates, [with no medians and] with Vehicle Presence Detection	6	15,488	20,644	7,920	YES	62%	49%
Four-Quadrant Gates Upgrade from Two Quadrant Gates, with medians and Vehicle Presence Detection	7	15,488	20,644	2,755	YES	87%	82%
Four-Quadrant Gates New Installation, [with no medians and] No Vehicle Presence Detection	8	15,488	20,644	6,198	YES	70%	60%
Four-Quadrant Gates New Installation with medians and no Vehicle Presence Detection	9	15,488	20,644	2,755	YES	87%	82%
Four-Quadrant Gates New Installation [with no medians and] with Vehicle Presence Detection	10	15,488	20,644	7,920	YES	62%	49%
Four-Quadrant Gates New Installation with medians and Vehicle Presence Detection	11	15,488	20,644	2,755	YES	87%	82%
[Two-Quadrant Gates with] Mountable medians with Reflective Traffic Channelization Devices	12	15,488	20,644	8,609	YES	58%	44%
[Two-Quadrant Gates with] Non-Traversable Curb Medians with or without Channelization Devices	13	15,488	20,644	6,887	YES	67%	56%
One-Way Streets with Gates - UNREALISTIC / NOT CONSIDERED	14	N/A	N/A	N/A	N/A	N/A	N/A

Source: Federal Railroad Administration Quiet Zone Calculator, February 2023

SSMs In Action

Tremendous Safety Improvement with Quiet Zone Safety Measures

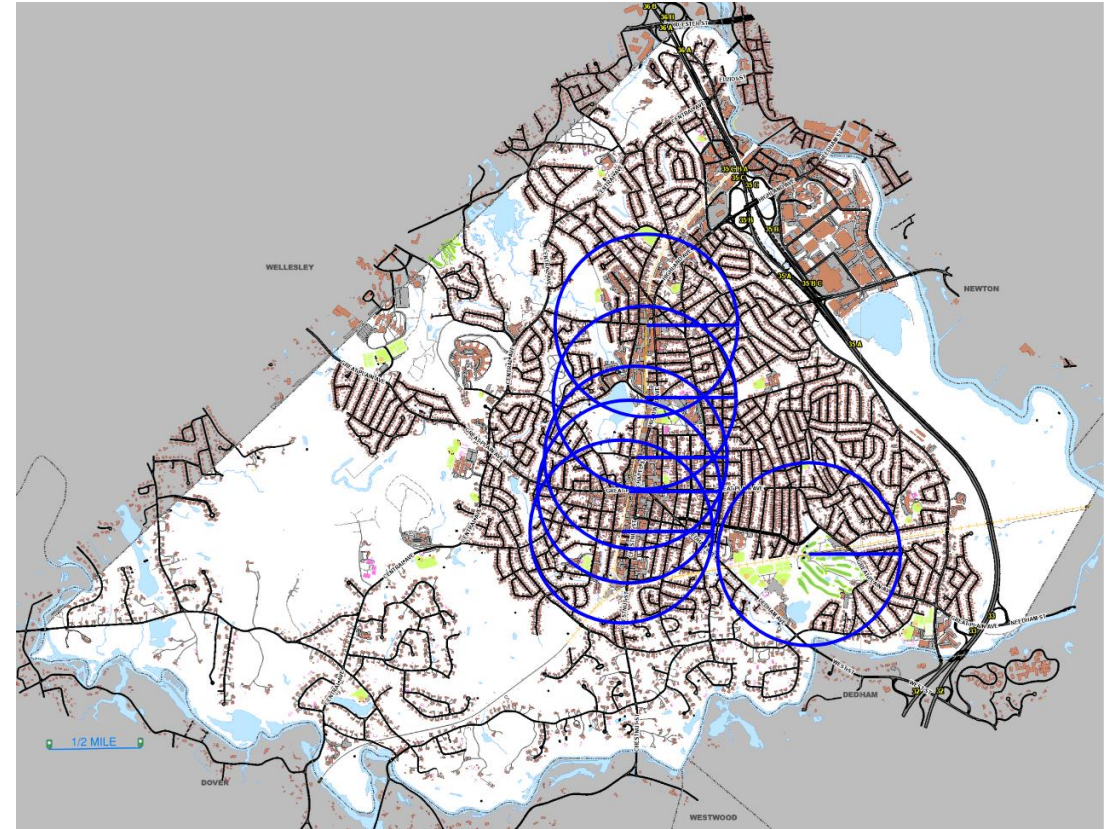


SSMs In Action

No Quiet Zone (current condition)	With Quiet Zone
Gate and post red lights flash	Gate and post red lights flash
Ground-mounted intersection bells ring	Ground-mounted intersection bells ring
Approach-side only gates at only 2 corners plus pedestrian gates at all 4 corners	Approach-side and egress-side gates at all 4 corners plus pedestrian gates at all 4 corners
Train-mounted bells ring	Train-mounted bells ring
<p>Routine train horns (96-110 decibels, 15-20 secs. of blasts) Before 5 AM to after 12 Midnight</p>	<p>No train horn (except emergencies, see below)</p>
Emergency train horns whenever needed in the judgement of train engineer	Emergency train horns whenever needed in the judgement of train engineer

Quality of Life

- Over 4,700 residential, commercial, and non-profit properties within ½-mile of the crossings in Needham
- Equals roughly 13,000 residents (2.76 occupants per home^[1]), ~40% of Needham's population^[1]
 - [1]: US Census QuickFacts



Quality of Life

FRA "Train Horn Rule" Regulations (if not Quiet Zone):

- Trains required to sound horns at all level crossings
- Duration: 15 (minimum) to 20 (maximum) seconds
- Pattern: 2 long, 1 short, 1 long
- Volume: 96-110 decibels
 - NOTE: At 90-95 dB, sustained exposure can result in hearing loss

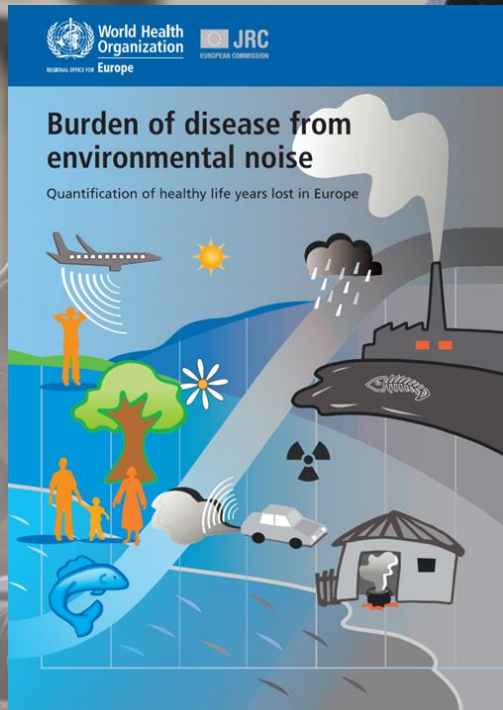
In Needham:

- Trains operate from before 5 AM until after Midnight



Quality of Life

- Many obvious impacts of train horns
- Others less obvious:
 - Disturbed sleep patterns, affecting energy, health, mood, & wellness
 - May lead to high blood pressure and cardiovascular disease
 - Impairment to child cognitive development
 - May have a lifelong effect on educational attainment and overall health



Quality of Life

Environmental Benefits

- ~40% of Needham residents live within ½-mile of a train station
- Due to train horns, it is unbearable for many to open windows during warmer months
- Instead, air conditioning use extends beyond peak summer heat times
- Majority of the electrical grid is powered by fossil fuels
- ~2/3 of electricity produced in MA in 2020 was fueled by natural gas
- Natural gas is major source of emissions like carbon dioxide and methane
- More residents using more air conditioning = more greenhouse gases
- Also, A/C units use hydrofluorocarbons (HFCs), industrial chemicals
- HFCs absorb 150 to 5,000 times more sun energy than carbon dioxide



Providing thousands of residents the option to open windows will help Needham meet its climate goals and do a small part to combat the ongoing climate crisis.



Economic Development

- Nearby properties become more attractive places to live, work, shop, and dine, thereby increasing values, assessments and tax revenues
- More development and redevelopment possibilities are unlocked, providing a one-time jump in values while also expanding services and offerings to Needham residents, businesses, and customers
- Development / redevelopment \$\$\$ can be redirected from noise reduction (which only benefits users of that building) to **community benefits** (which benefits everyone)

Economic Development

Needham's FY2024
Proposed Budget
shows that the
assessed value of
the Average
Single-Family
Home in FY2023
was **\$1,093,405**

Economic Development

Leading studies on train horns & property values

- **Bellinger**, "The Economic Value of Train Horn Noise: A US Case Study" (2006)
- **Walker**, "Silence is Golden: Railroad Noise Pollution and Property Values" (2016)



Economic Development

Findings:

- **Bellinger:** 4.1% increase in value for every 10 decibels (dB) of reduced noise exposure
- **Walker:** 14-18% increase in value for residential properties no longer exposed to noise greater than 65 decibels (dB)



What is the Cost?

- There are two phases:
 - Phase 1: Design & Engineering ← **Article 28 of 2023 Town Mtg**
 - Phase 2: Construction
- It is impossible to know the costs with certainty before Phase 1
 - Why is it impossible?
 - Unique existing conditions at each crossing requires detailed study & planning
 - Formal Quiet Zone process involves many federal, state, and local stakeholders
 - The scope and requirements to satisfy all is unknowable until they have all the facts
 - Design, engineer, & build while maintaining safe, active rails, roads, & sidewalks
- What about an updated feasibility study?
 - Will only tell us what prior studies told us: 4-quad gates for Needham

What is the Cost?

- Three Indications of Potential Total Cost
 - City of Chelsea Costs to Date ("Chelsea Costs")
 - Source: <https://chelsearecord.com/2022/05/19/city-manager-seeking-funds-for-restoration-of-railroad-quiet-zone/>
 - Needham FY2024-2028 Capital Improvement Plan ("FY2024 CIP")
 - Source: <https://www.needhamma.gov/4716/FY2020-FY2024-Capital-Improvement-Plan>
 - Memo from Needham DPW to Finance Committee ("4/19 Memo")
 - Source: Needham DPW
- Does not consider potential for partial federal and state funds
 - Consolidated Rail Infrastructure and Safety Improvements ("CRISI") grants
 - Chelsea received \$1.13 million
 - Potential state-level funds: \$170k from MA included in 4/19 Memo

What is the Cost?

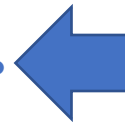
	Chelsea Costs	FY2024 CIP	4/19 Memo	4/19 Memo
Cost Estimate	\$4,174,165	\$4,115,000	\$5,465,000	\$6,925,000
Estimate Type	Hard Bid Costs After Design & Engineering Complete	Capital Planning Budget Estimate	Not-to-Exceed-Limit Estimate	Not-to-Exceed-Limit Estimate
# of Crossings	5	5 (excludes Great Plain Ave., covered by Ch. 90 funds)	5 (excludes Great Plain Ave., covered by Ch. 90 funds)	6
Cost per Crossing	\$834,833	\$823,000	\$1,093,000	\$1,154,167
Normalized Cost for 6 Crossings	\$5,008,998	\$5,207,000 (assumes a 33% cost premium for Great Plain Ave., consistent with 4/19 Memo)	\$6,925,000 (based on 4/19 Memo)	\$6,925,000

But these are anecdotal ... we cannot know for certain what our costs will be until we have completed Phase 1: Design & Engineering

Economic Development

Property value increases ***substantially less*** than cited in Bellinger and Walker are needed to justify the investment

Total Budget for Needham QZ per 4/19 Memo w/No External Sources of Funds (Most Conservative)	6,925,000
Estimated Payback Period (years)	10
Annualized Cost of Project	692,500
FY2023 Mill Rate	13.04
Property Value Increase Needed to Support Investment	53,105,828
Properties within 1/2-mile of Crossings	4,783
Average Assessed Value of Single Family Homes	1,093,405
Estimated Value of Property within 1/2-mile of Crossings	5,229,756,115
Property Value Increase within 1/2-Mile Needed as a % of Average FY2023 Values	1.02%
Implied Average Property Value Increase Needed	11,103
Implied Average Assessment Increase per Year	144.78
per Month	12.07
per Day	0.40



Accretive to Needham after the payback period

Economic Development

- In another study, ***all*** single-family homes in a jurisdiction were evaluated
 - Hough, “Investing in Quiet: A Self-Funding Approach to Mitigating Noise Emissions from Train Horn Use at Grade Crossings” (2021)
- The study found the average value increase for all single-family properties due to a Quiet Zone was 0.69%
- By comparison, if using all single-family properties in Needham, to justify the investment the average value increase required town-wide is only **0.41%**, over 40% less than the Hough study found

Conclusion

- Maintaining commuter rail is vital to Needham's long-term future
- Needham's current rail crossing safety is below average
 - 33% worse than the national average
- We can **improve safety, improve quality of life, and increase economic development** at the same time
- This is a prudent, reasonable investment for tremendous safety, quality of life, and economic benefits for Needham

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Thank you

Visit us at SaferQuieterNeedham.com to get involved!