
TO: CHRISTINE SAMUELSON, CHAIRMAN PUBLIC SAFETY & TRANSPORTATION
COMMITTEE ; PUBLIC SAFETY & TRANSPORTATION COMMITTEE MEMBERS

CC: MIKE KRUSE, DIRECTOR OF PLANNING AND DEVELOPMENT

DAVID G. KOSES, TRANSPORTATION PLANNER

FROM: WILLIAM F. LYONS JR., P.E., P.T.O.E., A.I.C.P.

VICE PRESIDENT/PRINCIPAL

SUBJECT: JACKSON STREET AT DANIEL STREET – RECOMMENDED IMPROVEMENTS

DATE: SEPTEMBER 16, 2005

PROBLEM STATEMENT

Congestion on Route 9 causes motorists to seek alternate routes to reduce travel times and minimize delays. The intersection of Route 9 at Langley Road becomes severely congested in both peak hours. Without appropriate alternate routes, motorists rely on local neighborhood streets as a bypass to Route 9 at Langley Road during peak hour congestion.

In addition, the intersection of Route 9 at Langley Road does not permit left turns from Route 9 eastbound to Langley Road. Motorists trying to reach Newton Center destinations via Langley Road from Route 9 eastbound are forced to take an alternate route. This configuration of Route 9 at Langley Road precludes the use of one route to some Newton Centre destinations.

Two public meetings were held to solicit input on the problem and potential solutions. A meeting was held at the beginning of the study on June 2, 2005 at City Hall. The purpose of this meeting was to allow the residents the opportunity to present their views and concerns. Potential solutions were not presented at this meeting.

A second meeting was held on June 28, 2005. At this meeting, recommendations were presented to address the problems identified in the earlier phase of the study. Most of the recommendations were greeted favorably. In particular, there was consensus that Alternative 1 (discussed on Page 4) was best suited to the desires of the neighborhood.

SYMPTOMS

Motorists avoiding peak hour congestion detour off of Route 9. The Jackson Street by-pass results in an acute cut-through problem, which is directional in the peak hours. The peak commuter travel direction on Route 9 results in a directional cut through in the same direction on Jackson Street.

In the morning peak hour, motorists heading eastbound on Route 9 divert at Parker Street and travel northbound. They turn right onto Daniel Street, turn slight left onto Jackson Street, and travel parallel to Route 9 on Jackson Street until they reach Langley Road. At Langley Road, the cut through traffic either turns left to destinations in Newton Centre or right to rejoin Route 9 eastbound.

In the evening peak hour, motorists heading westbound exit Route 9 at Langley Road and travel on Jackson Street, parallel to Route 9, then turn slight right onto Daniel Street. At the intersection of Daniel Street and Parker Street, motorists turn left to rejoin Route 9 westbound or turn right to get to Newton Centre.

The cut through traffic using Jackson Street results in a relatively high traffic volume. Although the traffic volumes are not exceptionally high, in the context of neighborhood expectations these volumes are unacceptably elevated. Compared to similar streets in the immediate vicinity, Jackson Street and Daniel Street do experience higher traffic volumes.

Moreover, due to the nature of by-pass traffic, the cut through volumes are traveling at slightly higher speeds than would be anticipated on residential streets. The motorists using the Jackson Street by-pass are traveling at higher speeds precisely because they are trying to reduce travel time as compared to remaining on Route 9. The elevated speeds and volumes on Jackson Street pose safety concerns for neighbors and area residents.

DISCUSSION OF POTENTIAL SOLUTIONS

One possible long-term solution to this problem would require a significant overhaul of the Route 9 corridor, particularly at the intersection of Route 9 and Langley Road. The capital costs associated with long-term and short-term improvements range widely, providing a menu of options available to the City to provide some relief to the neighborhood.

Long Term Solutions

As indicated above, the fundamental problem causing the cut through traffic is peak hour congestion along Route 9, together with the geometry of the intersection of Route 9 at Langley Road. In order to address this problem, improvements to traffic capacity would be necessary. A long-term study of the Route 9 corridor would be required in concert with the Massachusetts Highway Department, the Boston Metropolitan Planning Organization, and the City of Newton to identify the scope of improvements needed at this intersection.

Short Term Solutions

Three short-term solutions have been developed to address cut through traffic traveling through the intersection of Jackson Street and Daniel Street. Figure 1 illustrates the existing conditions at this intersection. The three alternatives address varying levels of investment and varying degrees of improvement. The objectives of the alternatives are to reduce cut-through traffic volumes and reduce vehicle speeds.

Reducing traffic volumes and vehicular speeds is an iterative process. Typically, one measure is implemented and the results are measured to determine the affect on both volumes and speeds. If the desired reductions are not achieved, additional measures may be implemented to further reduce volumes and speeds. Accordingly, we have provided some additional measures for consideration by the City to address cut through traffic.

It should be noted that a key element of an iterative approach to reducing traffic volumes and vehicle speeds is a monitoring program. Reliable empirical data should be collected prior to implementation of each improvement to determine its effectiveness in achieving the desired results. It is strongly recommended that traffic volumes and vehicle speeds be collected immediately prior to implementation and at regular intervals after implementation (3 months, 6 months, and 12 months). If after a predetermined period of time the desired results have not been achieved, another improvement can be implemented to address remaining concerns.

A key point in this iterative process is for the City to select in advance the goals to be achieved through the implementation of the improvements. For instance, the City should set as a goal the reduction of vehicle volumes by 10% and/or reduce 85 percentile vehicle speeds by 5 miles per hour. These benchmarks are necessary to determine the successfulness of specific elements of the plan.

The principal method to reduce vehicle volumes is to introduce roadway elements that increase travel time on the cut-through route. If the travel-time associated with the cut through route is increased to a level of parity with the preferred route, motorists will be less likely to use the cut through route. Ultimately, the policy objective is to keep “the right traffic on the right road” and get the “wrong traffic off the wrong road.” In this case, commuter traffic belongs on Route 9, not Jackson Street.

The objective of reducing vehicle speeds is likewise accomplished by introducing roadway elements to increase travel time. By increasing travel time, vehicle speeds are proportionally reduced. As a result, both objectives of the short-term solutions are accomplished.

Alternative 1

Alternative 1 consists of a mini-roundabout at the intersection of Jackson Street at Daniel Street. The mini-roundabout would control all legs of the intersection placing them under yield control. This design includes significant geometric and traffic control alterations, with changes to the curb lines, new pedestrian crossings, and new sidewalks. The design would provide for better definition of the roadway; properly channelize vehicular traffic and reduce driver uncertainty; reduce overall pavement; and improve driver understanding by clarifying vehicular right-of-way.

The overall benefit to this plan is that it will introduce roadway elements that will increase travel time for all vehicles using the Daniel Street and Jackson Street bypasses. The significant deflection created by the roundabout will require vehicles to reduce speeds on all approaches in order to successfully negotiate the intersection. In addition, driver expectations will be less likely to be violated due to clearer right-of-way assignments. Environmentally, there will be less pavement, more green space, and improved pedestrian accessibility.

In contrast to Alternative 2, this plan will address evening peak hour cut through traffic using Jackson Street as a cut through in the westbound direction. The roundabout will increase vehicular travel times in all directions and will not disproportionately burden any streets parallel to Daniel Street. For this reason, the roundabout is the preferred option.

Range of Capital Costs: \$25,000-\$100,000

Alternative 2

Alternative 2 consists of creating a typical "T" intersection between Daniel and Jackson Streets. Daniel Street would remain under stop control and Jackson Street would remain uncontrolled. Significant geometric improvements would be implemented, including curb extensions, a new pedestrian crossing, and new sidewalks. The realignment of Jackson Street would provide for better definition of the roadway; properly channelize vehicular traffic and reduce driver uncertainty; reduce overall pavement; and improve driver understanding by clarifying vehicular right-of-way.

The overall benefit to this plan is that it will introduce roadway elements that will increase travel time for vehicles using the Daniel Street to Jackson Street by-pass. The 90° intersection will require all vehicles turning to or from Daniel Street to reduce speeds to safely make a turn. In addition, driver expectations will be less likely to be violated due to clearer right-of-way assignments. Environmentally, there will be less pavement, more green space, and improved pedestrian accessibility.

However, this plan does not address cut through traffic (particularly evening peak hour traffic) that will use Jackson Street as a cut through in the westbound direction. This plan does not include any roadway elements to increase travel time for traffic remaining on Jackson Street from Langley Road to Route 9. We do not anticipate that this plan would mitigate this particular cut through problem.

Range of Capital Costs: \$15,000-\$75,000

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Alternative 3

Alternative 3 consists of an all-way stop intersection without any significant geometric improvements. This design includes traffic control alterations including the installation of two new stop signs and new pavement markings. The design would provide for slightly better definition of the roadway; channelize vehicular traffic and reduce driver uncertainty; and improve driver understanding by clarifying vehicular right-of-way.

Recent amendments to the *Manual on Uniform Traffic Control Devices (MUTCD)* have softened restrictions on the use of multi-way stops. However, a significant body of research indicates that the improper use of multi-way stops will actually reduce compliance for all stop signs and decrease safety, rather than increase safety. With that said, a sensible discussion of all way stops as applied to this intersection is appropriate in this discussion.

The *MUTCD* offers as *guidance* that STOP signs should not be used for speed control. In addition, STOP signs should be used in a manner that minimizes the number of vehicles having to stop. The *MUTCD* suggests that STOP signs should not be used to control a major street unless an engineering study indicates that it is warranted based on considerations such as school crossings and sight distance constraints.¹

The *MUTCD* also suggests that multiway stop signs control may be appropriate in situations where unexpected conflicts may occur, such as conflicts between pedestrians and vehicles. In addition, multiway stops may be appropriate where the right-of-way for vehicles can be confusing, leading to violated driver expectations. Again, the *MUTCD* offers as *guidance* that the installation of multiway stop control should only be considered after an engineering study is completed and concludes that the multiway stop is justified.²

In addition to the typical warrant criteria traditionally considered when analyzing whether or not multiway stops are appropriate, the *MUTCD* now offers other optional considerations. The *MUTCD* explicitly permits the consideration of such factors as vehicle/pedestrian conflicts and sight distance constraints.³ Furthermore, the *MUTCD* now contains the following optional factors to be considered when analyzing the appropriateness of multiway stop sign control.

“An intersection of two residential neighborhood collector (through) streets of similar design and operating characteristics where multiway stop control would improve traffic operational characteristics of the intersection.”⁴

On balance, the *MUTCD* strongly discourages multiway stop applications as traffic calming measures. However, it does acknowledge that there are circumstances where substandard geometric conditions and unexpected conflicts arise, multiway stop control may be appropriate. The more fundamental issue here is that the *MUTCD* does not prohibit the use of multiway stops at this intersection if the City finds that the specific conditions at this intersection satisfy the guidance in the *MUTCD*.

Based on our review of the conditions at this intersection, we believe that the guidance contained in the *MUTCD* regarding the installation of multiway stops signs is satisfied. We believe that the current substandard geometry, unexpected conflicts, and pedestrian demand meet the criteria. In addition, the fact that the two streets are of “similar design and operating characteristics” supports the installation of multiway stop control at this intersection.

The overall benefit to this plan is that it will introduce roadway elements that will increase travel time for all vehicles using the Daniel Street and Jackson Street bypasses. Properly enforced, all-way stop sign control will require vehicles to reduce speeds on all approaches in order to successfully negotiate the intersection. In addition, driver expectations will be less likely to be violated due to clearer right-of-way assignments.

In contrast to Alternative 2, this plan will address evening peak hour cut through traffic using Jackson Street as a cut through in the westbound direction. The all-way stop control will increase vehicular travel times in all directions and will not disproportionately burden any streets parallel to Daniel Street. However, this plan relies heavily on enforcement and does not deliver the environmental benefits of Alternatives 1 and 2.

Range of Capital Costs: \$500-\$1,000

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Additional Options

Initially, we recommend that the City select one of the options described above for implementation. After a suitable post-installation observation period, the City should determine if its goals have been achieved by the project. If they have not been achieved, additional options could be considered.

Additional measures, which could be considered, are:

- Chicanes on Daniel Street and/or Jackson Street
- Multiway Stop Control at Duxbury Road, Cypress Street, and/or Dudley Road
- One-Way Pairing of Daniel Street and Walter Street
- Raised Crosswalk/Intersection at Jackson Street and Cypress Street

These measures offer additional travel time delays. In particular, the multiway stop and raised crosswalk measures would be significant improvements if justified. They have the added benefit of enhancing pedestrian crossings related to children attending the Bowen School. However, these measures should not be implemented without further traffic engineering study.

SUMMARY

Short term and long-term approaches are necessary to address the problems and the symptoms related to congestion at the intersection of Route 9 at Langley Road. Long-term improvements should be advanced by the City for construction by the Massachusetts Highway Department utilizing state and federal funding within the Transportation Improvement Program. However, these improvements will require significant amounts of time and fiscal resources before being available to relieve the conditions on Jackson Street and Daniel Street.

In the short term, we have identified three potential alternatives for implementation by the City to address cut-through traffic on Jackson Street and Daniel Street. Of the three, the roundabout option addresses most of the issues raised by the neighborhood. Accordingly, the recommended alternative is to implement a roundabout at the intersection of Jackson and Daniel Streets.

If the roundabout does not result in the City achieving its objectives for this neighborhood after a suitable post-implementation monitoring program, other options may be considered to further address cut-through traffic. These additional measures may further increase alternative route travel time, resulting in a shift of traffic back to Route 9. However, these measures should not be undertaken without further traffic engineering study.

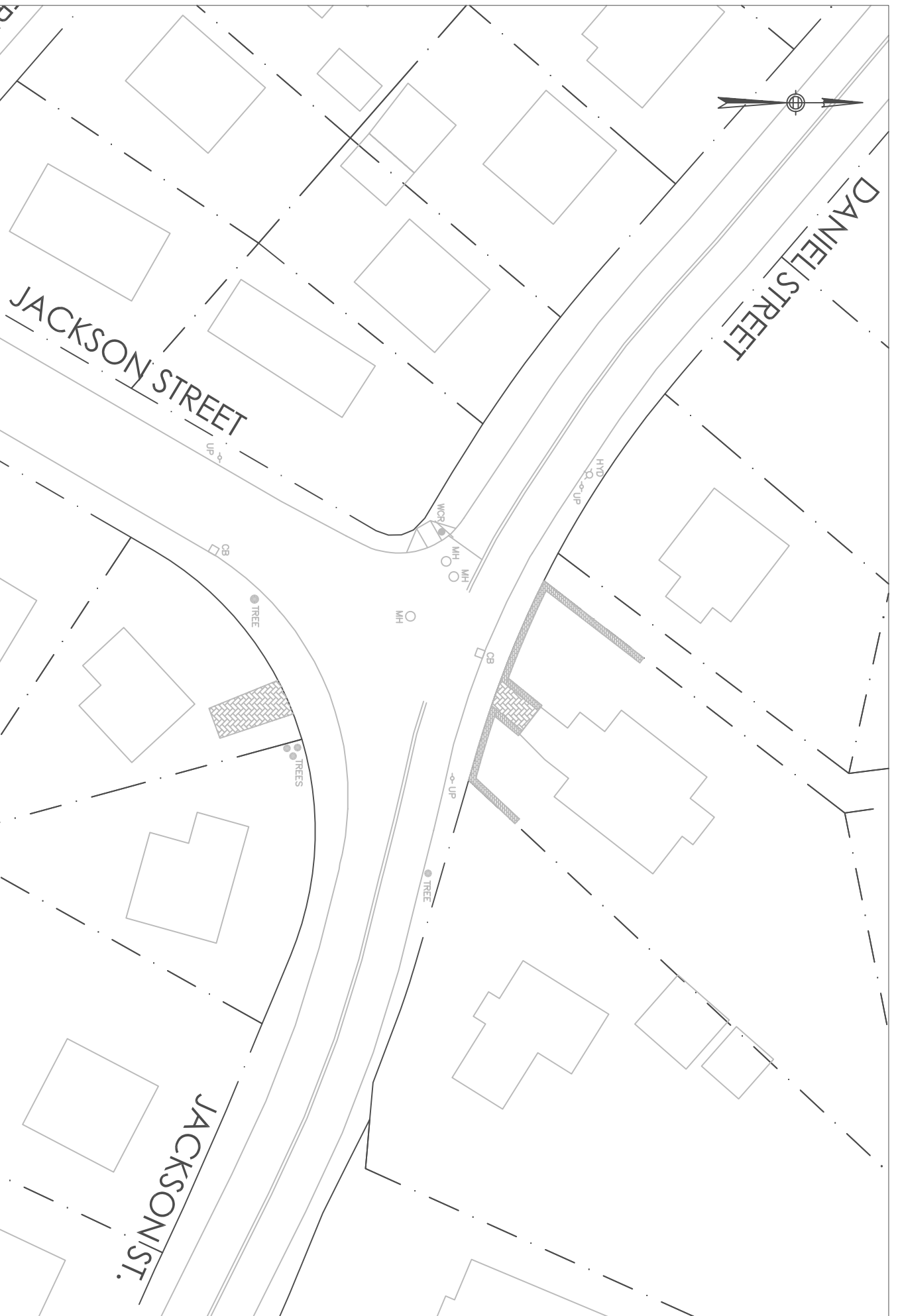
Footnotes:

¹ *Manual on Uniform Traffic Control Devices (MUTCD)*, 2003 Edition, Section 2B.05

² *MUTCD*, 2B.07, Guidance

³ *MUTCD*, 2B.07, Option B and C

⁴ *MUTCD*, 2B.07, Option D



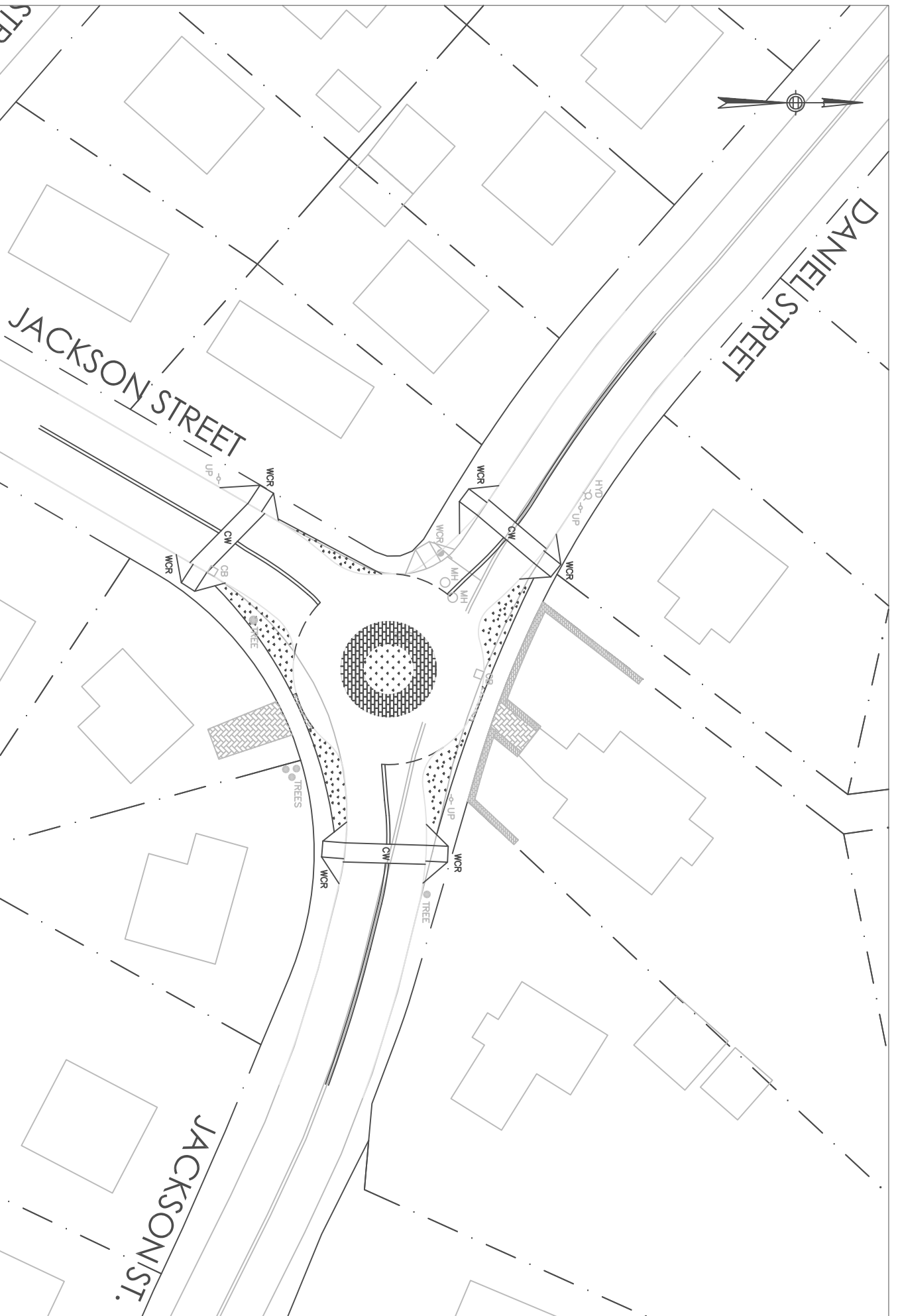
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 Planning, Permitting, & Design
 385 Concord Avenue, Suite 203
 Belmont, Massachusetts 02458-3327

FIGURE 1
 EXISTING
 CONDITIONS

PROJECT:
 DANIEL STREET AT JACKSON STREET
 NEWTON, MASSACHUSETTS

PREPARED FOR:
CITY OF NEWTON
 DEPARTMENT OF PLANNING AND DEVELOPMENT
 1000 Commonwealth Avenue
 Newton, Massachusetts 02459

DESIGN BY	—
DRAWN BY	TMB
CHECK BY	WFL
DATE	6/23/05
SCALE	N.T.S.
DRAWING NO.	1 OF 1



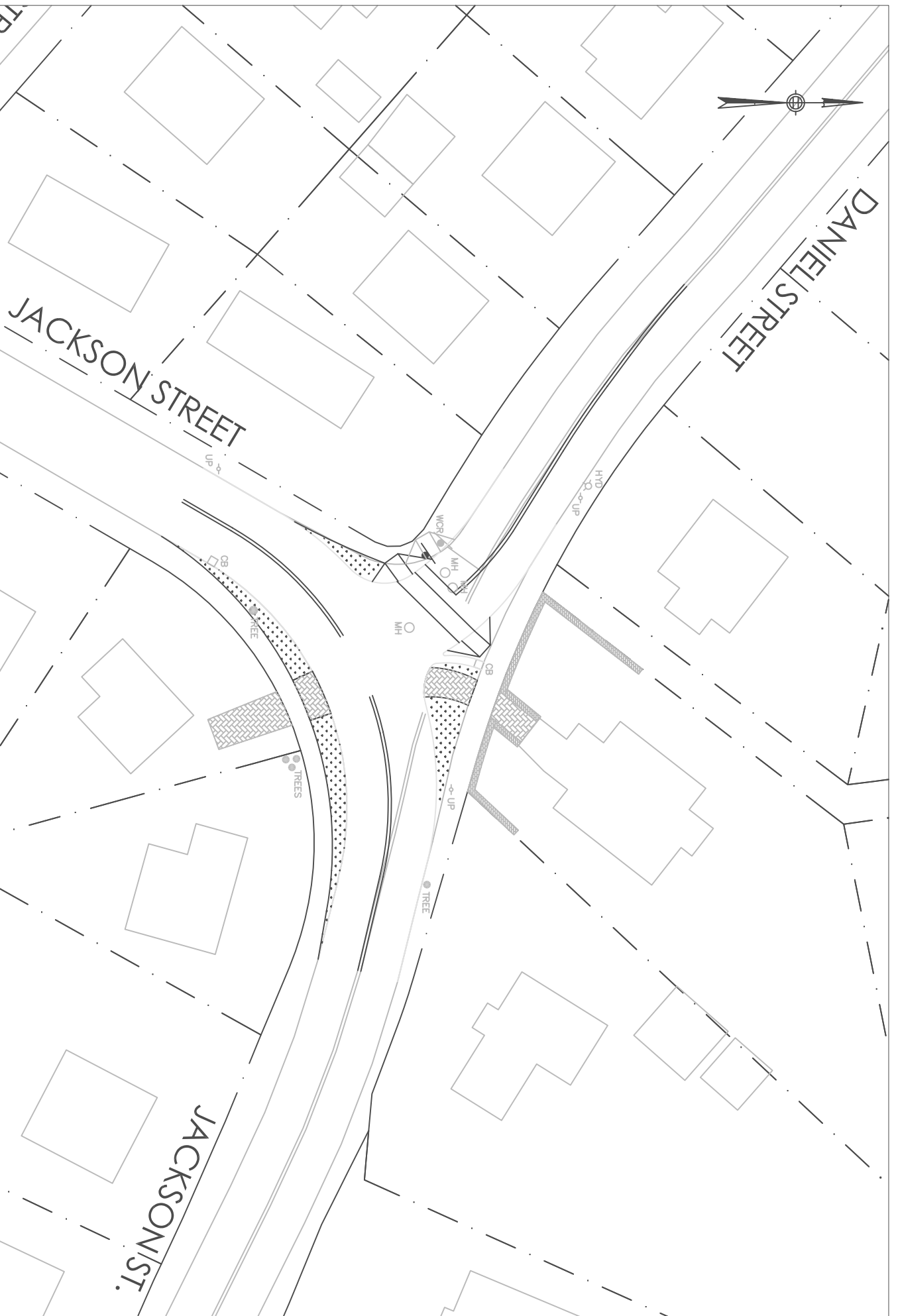
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 Belmont, Massachusetts 02458-3837

FIGURE 2
 PROPOSED ALTERNATIVE 1
 MINIROUND-A-BOUT

PROJECT:
 DANIEL STREET AT JACKSON STREET
 NEWTON, MASSACHUSETTS

PREPARED FOR:
CITY OF NEWTON
 DEPARTMENT OF PLANNING AND DEVELOPMENT
 1000 Commonwealth Avenue
 Newton, Massachusetts 02459

DESIGN BY	—
DRAWN BY	TMB
CHECK BY	WFL
DATE	6/27/05
SCALE	N.T.S.
DRAWING NO.	1 OF 1



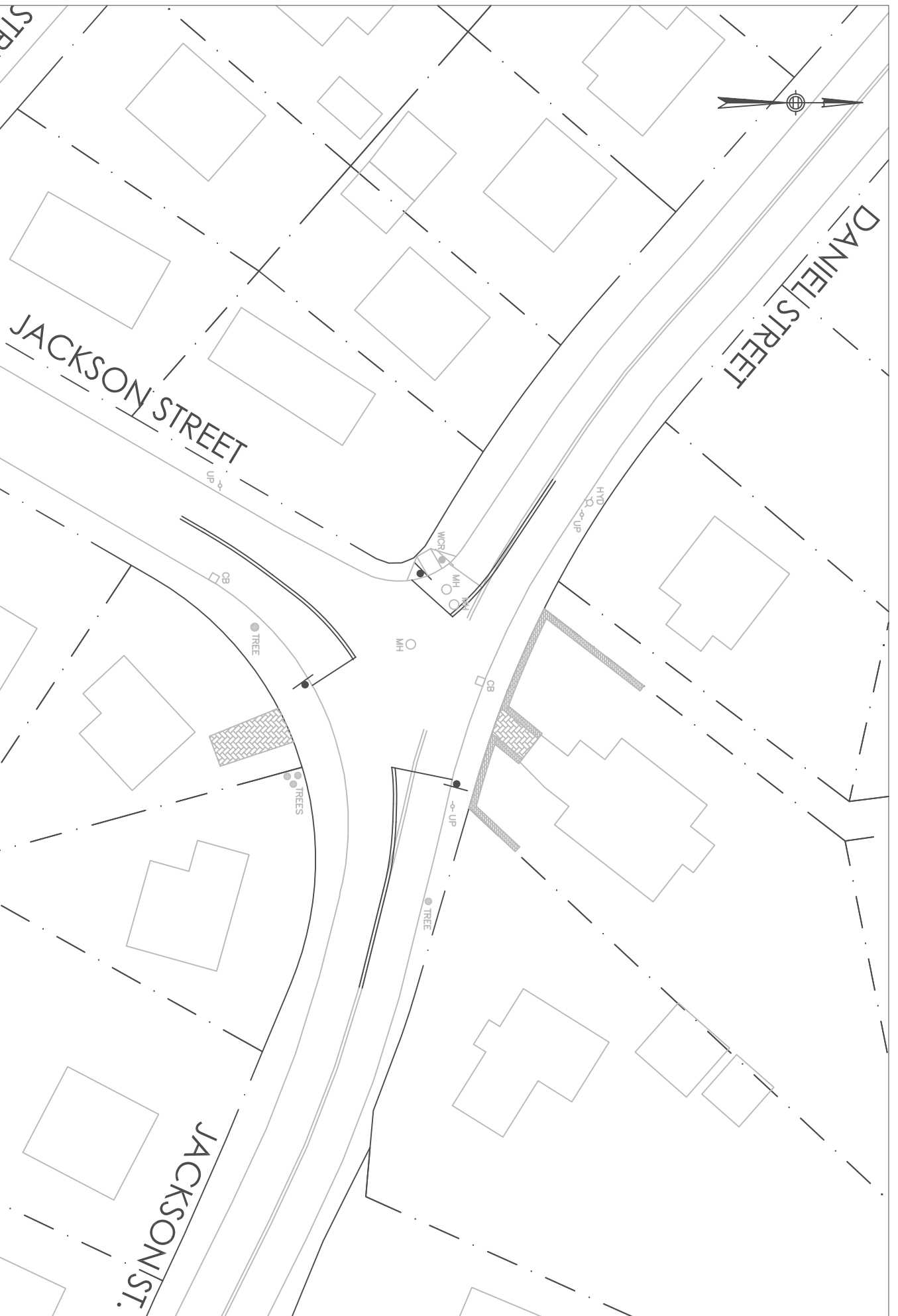
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FIGURE 3
 PROPOSED ALTERNATIVE 2
 "T" INTERSECTION DESIGN

PROJECT:
 DANIEL STREET AT JACKSON STREET
 NEWTON, MASSACHUSETTS

PREPARED FOR:
CITY OF NEWTON
 DEPARTMENT OF PLANNING AND DEVELOPMENT
 1000 Commonwealth Avenue
 Newton, Massachusetts 02459

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FIGURE 4
 PROPOSED ALTERNATIVE 3
 ALL-WAY STOP DESIGN

PROJECT:
 DANIEL STREET AT JACKSON STREET
 NEWTON, MASSACHUSETTS

PREPARED FOR:
CITY OF NEWTON
 DEPARTMENT OF PLANNING AND DEVELOPMENT
 1000 Commonwealth Avenue
 Newton, Massachusetts 02459

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DATE	6/23/05
SCALE	N.T.S.
DRAWING NO.	1 OF 1