Hamden East-West Transportation Study

Spring Glen and Whitneyville Neighborhoods

Hamden, CT

April 2012

South Central Regional Council of Governments

Fitzgerald & Halliday Inc.

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Introduction

Introduction

Hamden's transportation system consists of primarily north-south routes for connections within the Town as well as to adjacent communities such as Cheshire and New Haven. Due to Hamden's geographical boundaries and orientation, east-west connectivity is limited to a few major arterials and a number of local residential streets. The roadway system is strongly influenced by the Wilbur Cross Parkway and the Route 5 and Route 10 regional transportation corridors, which convey approximately 94,000 to 119,000 vehicles per day (2006 CTDOT average daily traffic counts) through Hamden.

Traffic is reportedly increasing on the east-west routes as drivers look to avoid congestion on the north-south routes. Many of these roads are minor arterials and collectors that serve neighborhoods, schools, and businesses; which residents believe are being negatively impacted by heavy traffic volume, truck traffic, and speeding vehicles. The purpose of this study is to confirm issues along Hamden's east-west street network, and recommend strategies to mitigate the negative consequences of increased traffic.

This study will address transportation system opportunities for improving safety, increasing accessibility, maximizing travel by all modes, and enhancing the quality of life within the community. Since the east-west routes are primarily local routes, with the exception of the Wilbur Cross Parkway, both conventional and innovative approaches will be considered.

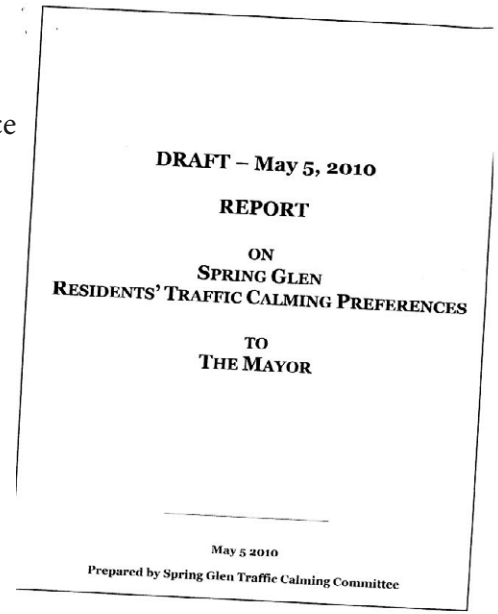
The Town has received numerous requests for traffic calming in the Spring Glen and Whitneyville areas of Hamden. The neighborhood associations that represent these areas have been active in collecting feedback from residents and planning for traffic calming and transportation improvements. This study will build upon those efforts to develop and actionable transportation and traffic calming plan for the neighborhoods.

Spring Glen and Whitneyville Civic Association Reports

In 2010, the Spring Glen and Whitneyville Civic Associations submitted reports to the Mayor's office outlining traffic calming preferences and recommendations.

The Spring Glen report was limited to a survey of resident preferences. The preferred traffic calming treatments included: speedhumps, bike lanes, and on-street parking. Preferences were identified for each street in the neighborhood and include Ardmore, Elgin, and Haverford Streets.

The Whitneyville report, which was more comprehensive and included documentation of issues and proposed solutions, identified several streets that are included in this study. These streets include Mather Street, Treadwell Street, Putnam Avenue and Augur Street. Recommendations varied and included: speed humps, traffic circles, raised crosswalks, bike lanes, and sidewalks.



DRAFT – May 5, 2010

REPORT

ON

SPRING GLEN

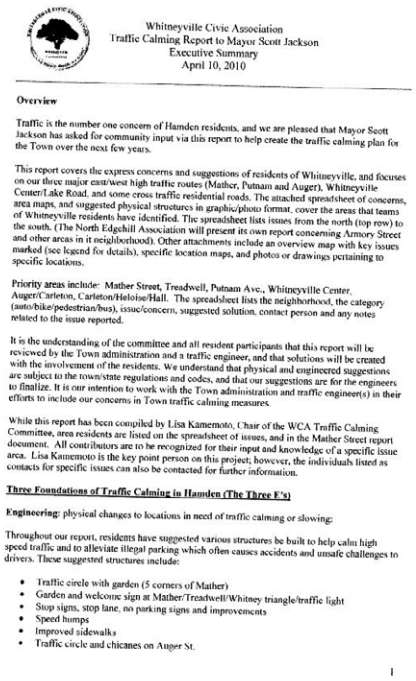
RESIDENTS' TRAFFIC CALMING PREFERENCES

TO

THE MAYOR

May 5 2010

Prepared by Spring Glen Traffic Calming Committee



Whitneyville Civic Association
Traffic Calming Report to Mayor Scott Jackson
Executive Summary
April 10, 2010

Overview

Traffic is the number one concern of Hamden residents, and we are pleased that Mayor Scott Jackson has asked for community input via this report to help create the traffic calming plan for the Town over the next few years.

This report covers the express concerns and suggestions of residents of Whitneyville, and focuses on our three major east/west high traffic routes (Mather, Putnam and Auger), Whitneyville Center/Lake Road, and some cross traffic residential roads. The attached spreadsheet of concerns, area maps, and suggested physical structures in graphic/photo format, cover the areas that teams of Whitneyville residents have identified. The spreadsheet lists issues from the north (top row) to the south. (The North Edgehill Association will present its own report concerning Armory Street and other areas in it neighborhood). Other attachments include an overview map with key issues marked (see legend for details), specific location maps, and photos or drawings pertaining to specific locations.

Priority areas include: Mather Street, Treadwell, Putnam Ave., Whitneyville Center, Auger/Carleton, Carleton/Heloise/Hall. The spreadsheet lists the neighborhood, the category (auto/bike/pedestrian/bus), issue/concern, suggested solution, contact person and any notes related to the issue reported.

It is the understanding of the committee and all resident participants that this report will be reviewed by the Town administration and a traffic engineer, and that solutions will be created with the involvement of the residents. We understand that physical and engineered suggestions are subject to the town/state regulations and codes, and that our suggestions are for the engineers to finalize. It is our intention to work with the Town administration and traffic engineer(s) in their efforts to include our concerns in Town traffic calming measures.

While this report has been compiled by Lisa Kanemoto, Chair of the WCA Traffic Calming Committee, area residents are listed on the spreadsheet of issues, and in the Mather Street report document. All contributors are to be recognized for their input and knowledge of a specific issue area. Lisa Kanemoto is the key point person on this project; however, the individuals listed as contacts for specific issues can also be contacted for further information.

Three Foundations of Traffic Calming in Hamden (The Three E's)

Engineering: physical changes to locations in need of traffic calming or slowing:

Throughout our report, residents have suggested various structures be built to help calm high speed traffic and to alleviate illegal parking which often causes accidents and unsafe challenges to drivers. These suggested structures include:

- Traffic circle with garden (5 corners of Mather)
- Garden and welcome sign at Mather/Treadwell/Whitney triangle/traffic light
- Stop signs, stop lane, no parking signs and improvements
- Speed humps
- Improved sidewalks
- Traffic circle and chicanes on Auger St.

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Steering Committee Workshop

On September 27th, 2011 Hamden traffic calming steering committee members and neighborhood representatives from Spring Glen and Whitneyville gathered for a workshop to identify traffic issues and recommend traffic calming and safety improvements for the neighborhoods.

The issues discussed were similar to those that had been previously identified within neighborhood association reports and steering committee meetings. The streets that were presented for inclusion into this transportation study include:

- Ardmore Street
- Armory Street
- Augur Street
- Elgin Street
- Connolly Parkway
- Haverford Street
- Mather Street
- Mill Rock Rd
- Putnam Avenue
- Treadwell Street
- Waite Street

Concerns in the Spring Glen neighborhood centered around traffic speed and volume and pedestrian conflicts due to inadequate crossings and incomplete sidewalk networks. Discussion was focused on the Connolly/Elgin/Ardmore corridor and Waite Street. Traffic circles, additional sidewalks, and speedhumps were discussed as potential solutions to various traffic issues.

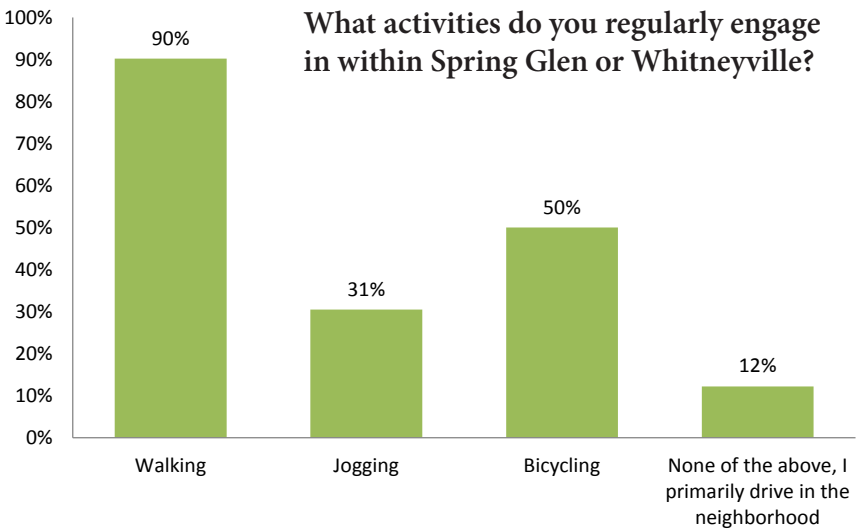
The issues identified by Whitneyville residents included pedestrian crossing issues, access to the Farmington Canal Trail, stop sign running, truck traffic, on-street parking, sidewalk gaps, and speeding. The solutions discussed varied from improved crosswalks and more sidewalks to chicanes and intersection redesigns.

Online Survey

In October 2011 an online traffic calming survey was posted and a link was distributed to the neighborhood associations and residents. The response period was extended through December 2011 at the request of residents. Over 190 responses were collected from residents on 53 different streets. The streets with the most respondents include: Blake Road, Mather Street, Whitney Avenue, Treadwell Street, Ralston Avenue, Armory Street, Carleton Street, Haverford Street, King Street, Wilkins Street and Putnam Avenue. Survey respondents ranked traffic study corridor streets in terms of their traffic safety concerns in the following order:

1. Mather Street	7. Connolly Parkway
2. Putnam Avenue	8. Ardmore Street
3. Treadwell Street	9. Mill Rock Road
4. Waite Street	10. Haverford Street
5. Augur Street	11. Elgin Street
6. Armory Street	

When asked what activities that respondents regularly engaged in within the neighborhood, 90% of respondents reported that they walk in the neighborhood on a regular basis and 50% of respondents bicycle on a regular basis. Only 12% of those surveyed responded that they primarily drive in the neighborhood.



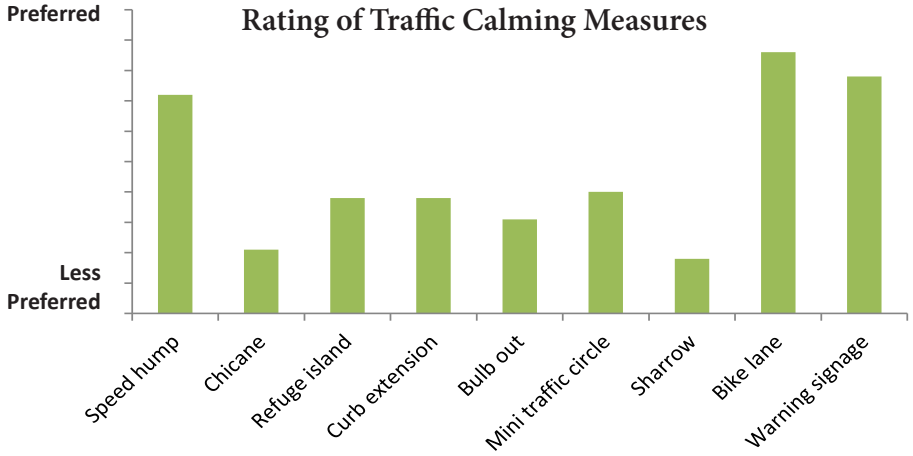
The most significant issues identified by respondents included speeding, unsafe intersections and reckless driving. The percentage of respondents who identified the following items as traffic safety concerns in the neighborhoods are as follows:

Speeding	80%	Maintenance	39%
Reckless driving	58%	Lack of bicycle facilities	32%
Unsafe intersection	57%	Lack of sidewalks	28%
Cut-through traffic	54%	On-street parking	18%
Difficulty crossing roadways	47%	Bicyclist behavior	11%
Traffic volume	43%		

When asked if they could improve only one street in each neighborhood, 65% of respondents identified Waite Street in Spring Glen while 37% of respondents identified Mather Street and 35% identified Putnam Avenue as the streets they would improve in Whitneyville.

Respondents were likewise asked to identify one intersection that they would improve in each neighborhood. The Waite Street/Whitney Avenue intersection in Spring Glen was overwhelmingly identified by respondents with the Putnam/Whitney intersection followed by the Belmont/Mather intersection of Whitneyville being identified as priorities.

Of the traffic calming and pedestrian safety measures presented to survey respondents; bike lanes, speed humps, warning signs and traffic circles were identified as the most familiar and were correspondingly rated as the most desirable measures.



Presentation of Findings

On November 30th, 2011 the intial findings and recommendations from this study was presented to the public at the Miller Center in Hamden. Approximately 60 people attended the meeting. In attendance were representatives from the Town of Hamden, SCRCOG, Spring Glen, Whitneyville, and the general public.

The presentation was open to comments and questions. Discussion and comments received included:

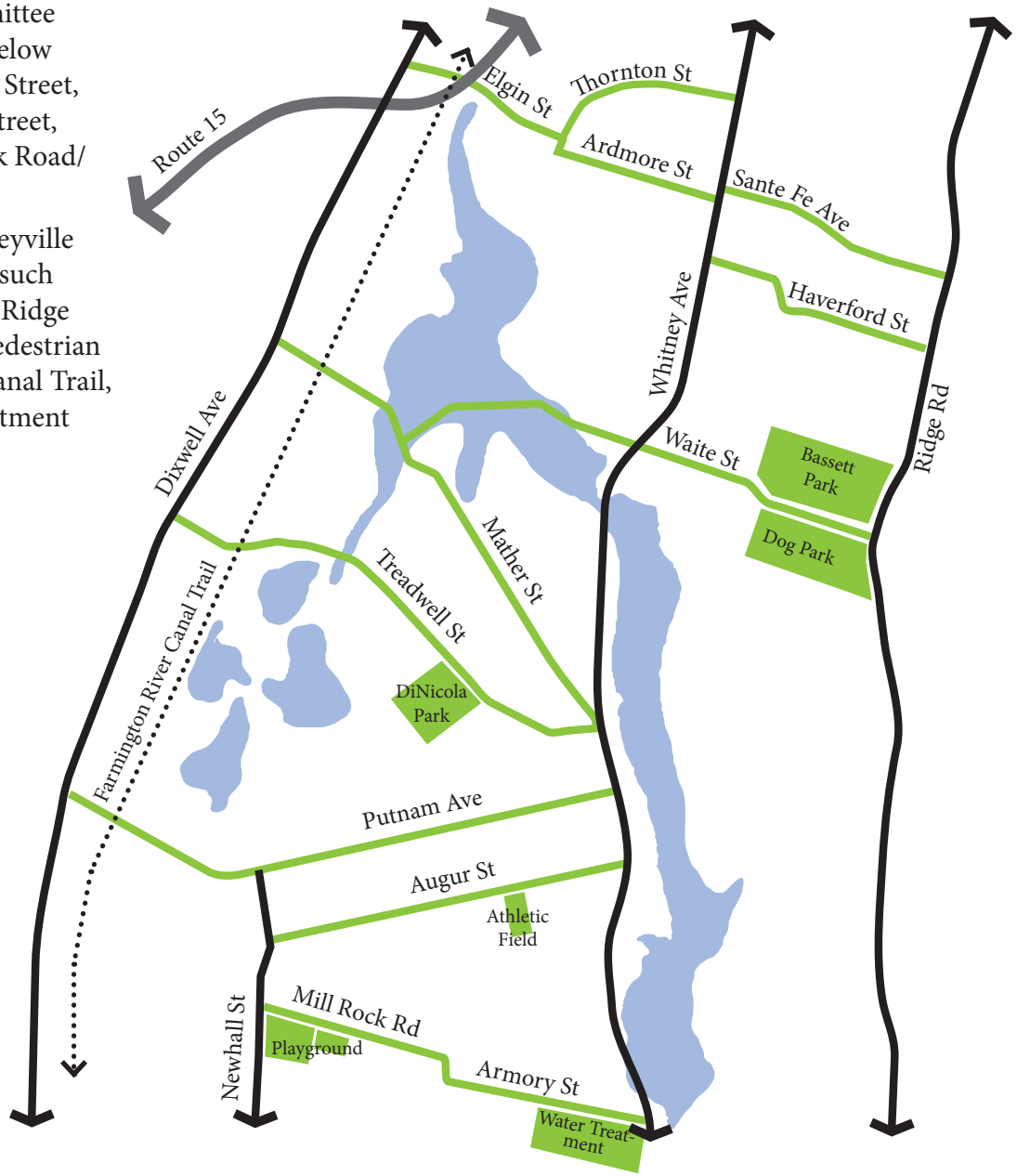
- *Armory Street needs traffic enforcement*
- *Traffic on Mather Street is too fast, additional traffic calming measures are desired.*
- *A connection to the Farmington Canal Trail from Mather Street is needed, Bob Brinton (Public Works) informed that an easement had been negotiated with a property owner.*
- *Additional measures are desired at Prospect Street and Mill Rock Road*
- *A resident of Prospect Street (north-south corridor) expressed the desire for a study of and improvements to that roadway*
- *Attendees expressed interest in staying informed via email or the project website*
- *Curt Leng (Mayor's office) commented that some of the improvements, such as sidewalks, have already been programmed*
- *Thornton Street should have been added as a corridor. Visibility around the curve is limited. Thornton has a traffic light so it is the major cut-through rough since cars can easily take a left onto Whitney Avenue.*
- *Residents were concerned that the study favored Whitneyville in terms of corridors studied and solutions proposed.*
- *A resident expressed concern about Ridge Road (north/south corridor) – high speeds coupled with bicyclists and pedestrians*
- *Several residents had not been aware of the on-line survey and were interested in participating*
- *See if the Town can host material on their website*
- *Bob Brinton (Engineering) informed that the property owner on the south side of Mather St. offered to donate an easement to the town as part of the development of the property.*

In response to feedback, this study was expanded to include Thornton Street and Santa Fe Avenue, both in Spring Glen.

Study Area

This study will recommend improvements for eight east/west corridors in the Spring Glen and Whitneyville areas of Hamden. These corridors have been chosen due to initial traffic assessment, neighborhood association reports, and the steering committee workshop. These corridors are identified in the graphic below and include Connolly Parkway/Elgin/Ardmore/Thornton Street, Haverford Street/Santa Fe Avenue, Waite Street, Mather Street, Treadwell Street, Putnam Avenue, Augur Street, Mill Rock Road/ Armory Street.

These roadways connect both the Spring Glen and Whitneyville neighborhoods to one another and to north/south routes such as Dixwell Avenue, Whitney Avenue, Newhall Street, and Ridge Road. These roadways also serve as critical bicycle and pedestrian connections to resources such as the Farmington River Canal Trail, Lake Whitney, Bassett Park, DiNicola Park, the water treatment plant gardens, playgrounds and athletic fields.



Corridor Attributes and Issues

The following table provides a summary of the study corridors attributes and documented issues. The corridors are comprised of local, collector and arterial roadways with traffic volumes that range from 1,500 vehicles per day on Ardmore Street to 11,900 vehicles per day on Putnam Avenue. Roadway width varies slightly across the corridors with Augur Street being the narrowest roadway at 22-24' wide and Mill Rock Road being the widest roadway at 30-34' wide.

Speed limits are 25mph on all corridors with the exception of Putnam Avenue which is posted at 30mph. While there are sidewalks on every corridor in the study area, there are significant sidewalk gaps on several roadways including Waite Street, Mather Street, Treadwell Street, Putnam Avenue, Augur Street, Mill Rock Road and Armory Street. Speeding has been identified as a concern on all corridors.

Corridor	Street Type	Volume (ADT)	Width	Speed Limit	Attributes	Issues
Connolly Pkwy/ Elgin St/Ardmore St/Thornton St	Local	6800/3100/ 1500/na	30'	25	Continuous sidewalks, no pavement markings or intersections within corridor, residential land use	Speeding, traffic rolls through stop signs
Haverford Street/ Santa Fe Avenue	Local	not available/ 950	30'	25	Continuous sidewalks, 2 all-way stops within corridor, residential land use	Limited sight lines due to curve, speeding, steep grades approaching Ridge Road
Waite Street	Arterial	3000	24-28'	25	Limited sidewalks. Pedestrian and bicyclist demand for access to Lake Whitney and Bassett Park. One traffic light and one all-way stop controlled intersection within corridor	Sidewalk gaps, complex intersections, speeding
Mather Street	Arterial	4200	26-30'	25	Limited sidewalks, uninterrupted traffic flow between Dixwell and Whitney Avenue.	Complex intersections at Whitney Ave and Waite Street, significant sidewalk gap at Lake Whitney, misdirected cut-thru traffic, pedestrian conflicts
Treadwell Street	Collector	3900	24-30'	25	Sidewalk gap at northern end, high pedestrian activity at southern end, one traffic signal and two all-way stops within corridor at southern end	Significant sidewalk gap between Dixwell Ave and Leeder Hill Dr. Complex intersection at Whitney Ave and Mather Street, speeding.
Putnam Avenue	Arterial	11,900	30-32'	30	Continuous sidewalks throughout much of corridor, on-street parking on south side, 3 traffic light controlled intersections within corridor, bus line	Sidewalk gaps, pedestrian crossing concerns, heavy traffic, speeding
Augur Street	Local	not available	22-24'	25	One-way westbound, parking on south side of road, continuous sidewalks, dense residential development, two all-way stops within corridor	Stop sign running, sidewalk gaps, speeding
Mill Rock Road/ Armory Street	Local	3400/2900	30-34'/ 28-30'	25	Park activity and parking on south side at western end of Mill Rock Road, sidewalk gaps, two all-way stop intersections within corridor	Speeding and failure to stop at Mill Rock Rd/ Prospect St/Armory Street intersection. High pedestrian activity and parking demand near park

Existing Conditions

Connolly Parkway/Elgin Street/Ardmore Street/Thornton Street: Existing Conditions

This corridor is used as a cut-through for traffic between Dixwell and Whitney Avenues. The posted speed limit through this corridor is 25 mph, but observed traffic speeds appear to be higher. Roadway width varies between 28' to 30' and is relatively uniform. Connolly Parkway is the only road with a yellow centerline, pavement markings are otherwise sparse. While sidewalks are present on both sides of the street throughout this corridor, the only marked crosswalks are located at Whitney Avenue intersections. Additionally, there are no stop-bar pavement markings at stop sign locations.

Traffic volumes are moderate to low with a majority of traffic (6800 ADT) being carried by Connolly Parkway with Elgin and Ardmore Streets carrying an average of 3100 and 1500 vehicles per day respectively. The progression of these volumes from east to west reveals of funneling of traffic towards and away from both Elgin Street and Connolly Parkway.

Notable features along this corridor include the Farmington Canal Trail which has a trail head off Connolly Parkway just west of the Route 15 overpass.

Haverford Street/Santa Fe Avenue: Existing Conditions

Haverford Street and Santa Fe Avenue are local roadways that carry traffic between Whitney Avenue and Ridge Road. These roadways are 28-29 feet wide and unstriped. Santa Fe Avenue carries approximately 950 vehicles per day. Field observations for Haverford Street noted a low volume of traffic on that roadway as well. Both corridors have a posted speed limit of 25 mph. Both roadways have steep grades approaching Ridge Road that result in fast acceleration in the westbound direction descending from Ridge Road.

Stop controlled intersections within the corridors include the Broadfield Road intersection of Santa Fe Avenue and the intersection of Lansdowne Avenue and Haverford Street. Stop bars were absent from both of these intersections.

Haverford Street at Lansdowne Avenue: View west

Waite Street: Existing Conditions

Waite Street is an arterial roadway that spans Lake Whitney and connects Mather Street to Whitney Avenue and Ridge Road. Waite Street has an average daily traffic volume of 3000 vehicles and ranges in width from 24 to 28 feet. Sidewalks are present on Waite Street although not continuous. Significant sidewalk gaps exist from Mather Street across Lake Whitney and between Ford Street and Barrett Street. The speed limit on Waite Street is 25mph although reported speeds are much higher.

Pavement markings on Waite Street include a yellow centerline and marked crosswalks and stop bars at Whitney Avenue and Ridge Road.

A primary concern of residents is the segment of Waite Street that crosses Lake Whitney. This segment lacks sidewalks despite demand for walking and jogging along this scenic area. The intersection of Waite and Mather Street is also a concern and is described as confusing and potentially dangerous. This intersection is also home to swans which attract on-lookers despite the lack of sidewalks near the intersection.

Waite Street combined with Mather Street has the potential to form a strong pedestrian and bicycle connection between Dixwell Avenue, Whitney Avenue and Ridge Road.

Waite Street at Lake Whitney

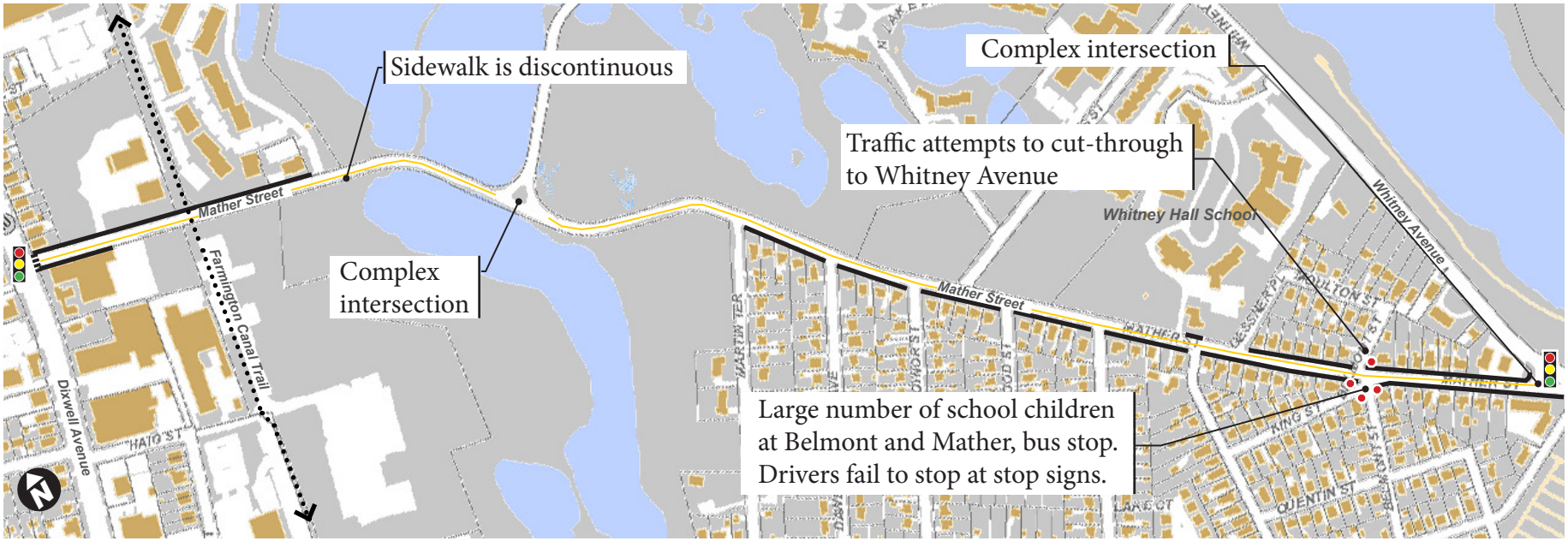
Mather Street: Existing Conditions

Mather Street is an arterial roadway that connects Dixwell Avenue to Whitney Avenue. Mather Street has an average daily traffic volume of 4200 vehicles and ranges in width from 26 to 30 feet. Sidewalks are present on Mather Street although not continuous. The speed limit on Mather Street is 25 mph, although the neighborhood association reports that speeding is a significant issue on this street. Pavement markings on Mather Street include a yellow centerline and marked crosswalks and stop bars at Mather Street's intersection with Dixwell and Whitney Avenues.

Mather Street is comprised of two distinct segments. The northern segment is abutted by commercial development at Dixwell Avenue and naturalized areas adjacent to Lake Whitney. Less than half of this segment has sidewalks and there are few driveways or intersections. The southern segment of Mather Street is primarily residential in nature, is punctuated by several cross streets and driveways and has continuous sidewalks on the western side.

The southeast end of Mather Street particularly between Clifford Street and Whitney Avenue has a relatively high number of pedestrians and a demand for on-street parking. The intersection of Mather and Belmont Street is a gathering spot for children who wait for the bus at this location. Southbound traffic often turns onto Gessner Place or east on Belmont in search of Whitney Avenue only to find that these roads do not continue through.

Mather Street at Belmont Street: View east

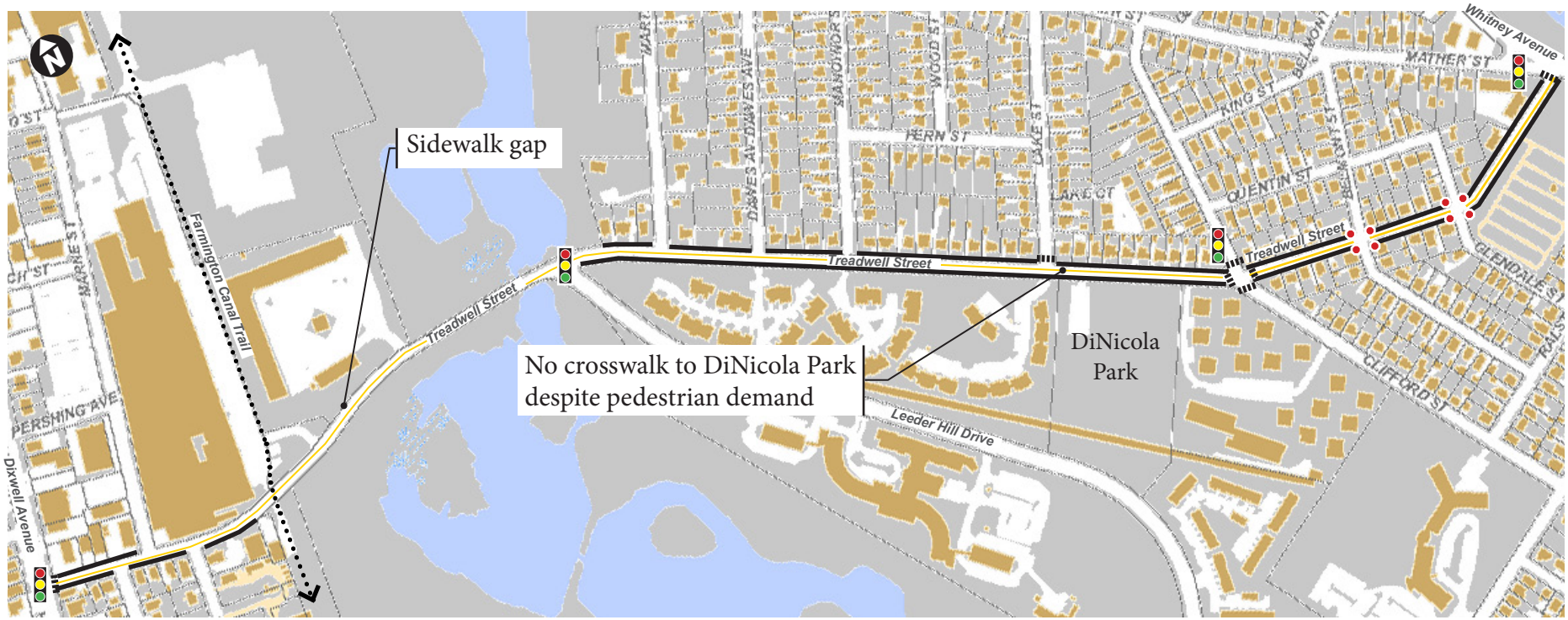


Treadwell Street: Existing Conditions

Treadwell Street is a collector roadway that, like Mather Street, connects Dixwell Avenue to Whitney Avenue. Treadwell Street has an average daily traffic volume of 3900 vehicles and ranges in width from 26 to 30 feet. Sidewalks are present on both sides of the street south of Leeder Hill Drive. The speed limit on Treadwell Street is posted 25 mph east of Clifford Street, although the neighborhood association reports that speeding is a significant issue on this street. Pavement markings on Treadwell Street include a yellow centerline and marked crosswalks and stop bars at Treadwell Street's intersection with Dixwell Avenue, Clifford Street, and Whitney Avenue. Connecticut Transit Route O to New Haven travels on this corridor between Whitney Avenue and Treadwell Street.

Like Mather Street, the southeast end of Treadwell Street between Clifford Street and Whitney Avenue has a relatively high number of pedestrians. Like both Waite and Mather Street, the sidewalk network is incomplete through the Lake Whitney area.

Of significant concern to residents is the intersection of Treadwell Street, Mather Street and Whitney Avenue. This intersection is difficult for pedestrians to cross and complex for drivers to negotiate. An additional concern noted by several residents was the volume of truck traffic on Treadwell Street. Much of this traffic is contributed to construction activities on Leeder Hill Drive and Newhall Street and is not expected to be a long term issue.



Putnam Avenue: Existing Conditions

Putnam Avenue is an arterial roadway that connects Dixwell Avenue to Whitney Avenue. Putnam Avenue has an average daily traffic volume of 11,900 vehicles and ranges in width from 30 to 32 feet. Sidewalks are continuous on both sides of Putnam Avenue with the exception of a gap on the north side between Leeder Hill Drive and Winnet Street. The speed limit on Putnam Avenue is 30 mph, although the neighborhood association reports that speeding is a significant issue on this street. Pavement markings on Putnam Avenue include a yellow centerline and marked crosswalks at Dixwell Avenue Leeder Hill Drive, Clifford Street, Glendale Street, Whitney Avenue. Sharrow markings, as recommended in this plan, have were installed on the roadway in October of 2011.

Putnam Avenue is an active street with a relatively high volume of traffic, on-street parking, bus stops, and a high level of pedestrian activity. CT Transit Route O to New Haven travels through this corridor. Additionally, the eastern segment of the street is signed as a school zone and there are retail establishments at the intersection of Putnam and Whitney Avenue.

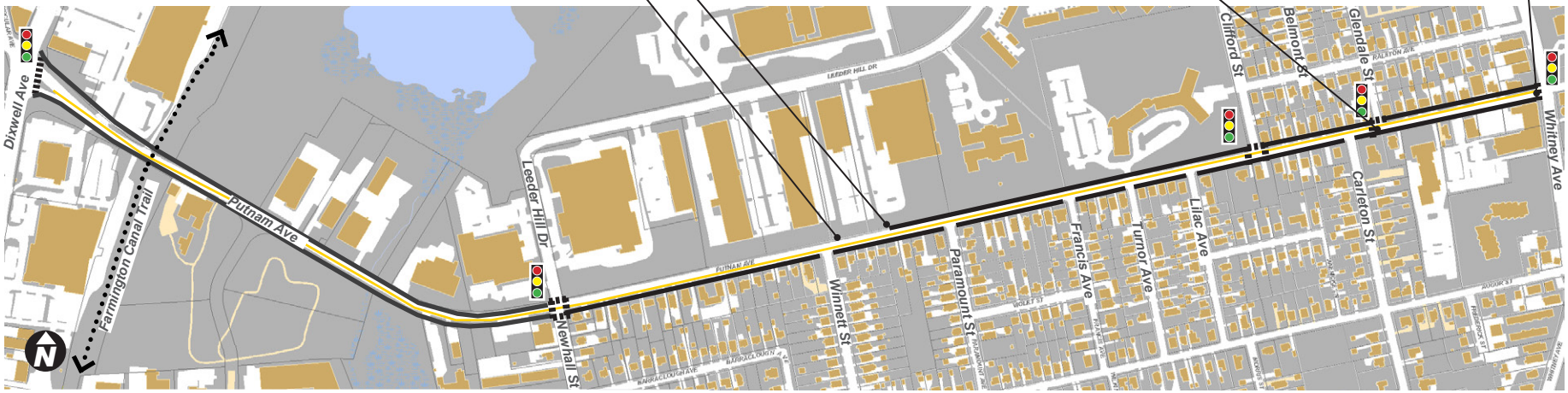
Putnam Avenue: View west

Sidewalk terminates midblock

Pedestrian crossing safety concerns between sidewalk to Leeder Hill Drive and sidewalk on south side of Putnam Ave

Deli parking obstructs sidewalk and intersection

Traffic on Putnam queues too close to intersection and blocks turning truck and bus traffic from Whitney



Augur Street: Existing Conditions

Augur Street is a narrow (22'-24' wide) local roadway that connects Newhall Street to Whitney Avenue. Augur Street is one-way westbound from Frederick Street to Newhall Street. On-street parking is permitted and heavily used on the south side of the street. There are no pavement markings with the exception of marked crosswalks at Newhall Street and Whitney Avenue. Sidewalks are found on both sides of the roadway throughout the corridor with the exception of a gap on the south side between Farnsworth and Giles Street.

The primary concern of residents is speeding and stop sign running. Long, straight interrupted segments of roadway and one-way traffic flow contribute to speeding. Posted speed limit is 25 mph but reported speeds are higher. Augur Street acts as a bypass of Putnam Avenue for drivers traveling northbound on Whitney Avenue connecting to Newhall or Dixwell Avenues. The lack of signalization on Augur Street may act as an attractive alternative to Putnam Avenue.

Augur Street: View west

Mill Rock Road & Armory Street: Existing Conditions

Mill Rock Road and Armory Street are local residential streets that carry traffic from Newhall Street to Whitney Avenue. The roadway width varies from 28 feet to 34 feet wide. Traffic volume on Mill Rock Road is 3,400 vehicles per day and 2,900 vehicles per day on Armory Street. These two distinct segments of roadway are connected by a short segment of Prospect Street. The posted speed limit is 25 mph, but residents are concerned about speeding.

Pavement markings on these streets are limited to yellow centerline and marked crosswalks at Newhall Street and Whitney Avenue. On-street parking is found on the south side of Mill Rock Road particularly at the playground and athletic fields on the corner of Newhall Street.

Local residents expressed concern about speeding on Armory Street, children crossing to the playground on Mill Rock Road, and accidents at the intersection of Mill Rock Road and Prospect Street.

Prospect Street at Mill Rock Road: View north

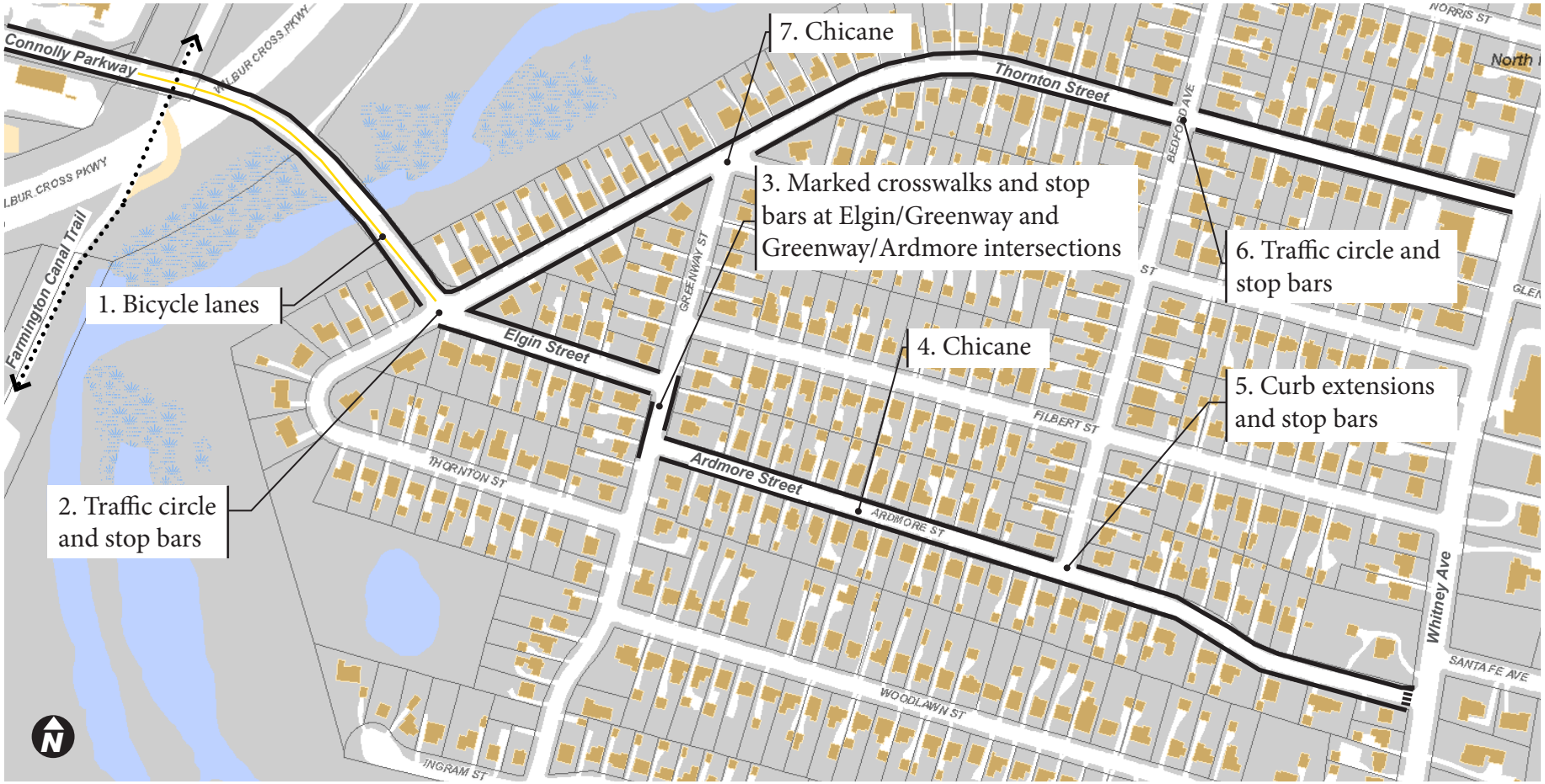
Recommendations

Connolly Parkway/Elgin Street/Ardmore Street/Thornton Street: Recommendations

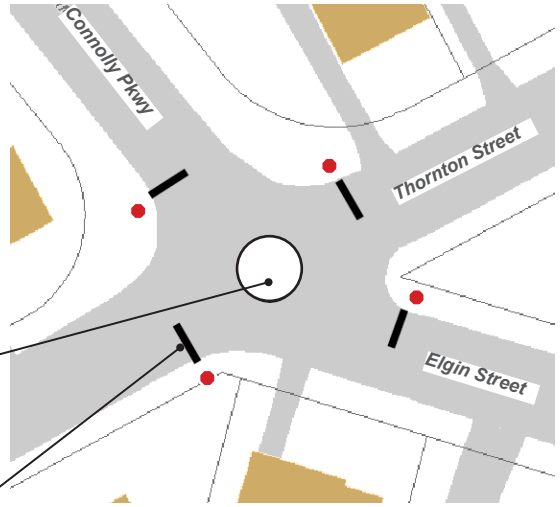
The improvements for this corridor focus on calming traffic as it enters Spring Glen from Connolly Parkway and managing traffic speed along this corridor. Recommendations include the use of traffic circles, stop bar markings, crosswalk markings, chicanes and curb extensions. The goal of these measures is to improve driver conformity to traffic laws and reduce traffic speeds without shifting traffic to parallel corridors.

Bicycle lanes are also recommended for Connolly Parkway as a means of improving access to the Farmington Canal Trail which has a trailhead on Connolly Parkway.

Prior to the installation of chicanes on Ardmore Street, speed data should be collected to confirm that speeding is an issue. If the 85th percentile speed (speed at which 85% of traffic is traveling at or below) is in excess of 5 mph above the posted speed limit, temporary devices should be installed and monitored. If the temporary devices are proven effective in reducing traffic speed and are agreeable to residents, permanent devices should be considered for installation.



3. Paint stop bars, yellow centerlines, and crosswalks at intersection of Elgin Street and Greenway Street and Greenway and Ardmore Street. This measure will make stop signs more visible and encourage full stops before the intersection and thereby slowing vehicle speeds on Greenway between Elgin Street and Ardmore Street.



2. Install mini-traffic circle at intersection of Connolly Parkway, Thornton and Elgin Street. Traffic circle will prevent stop sign running and will accommodate bus and emergency vehicle traffic.

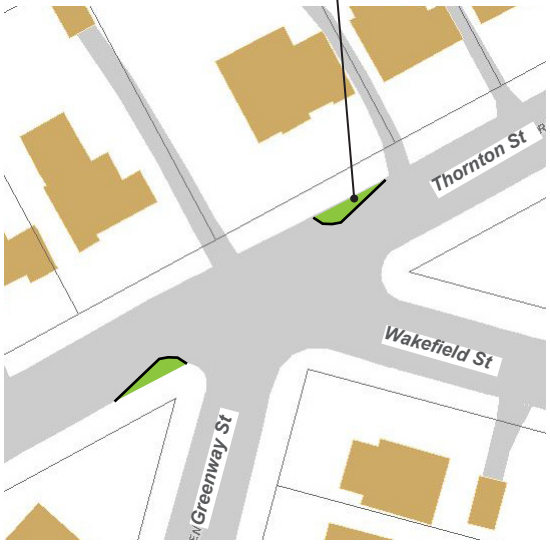
2.1 Paint marked stop bars at each approach.

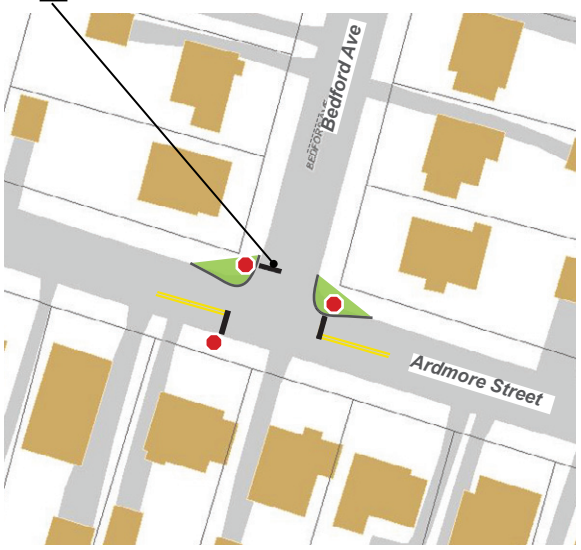
5. Install curb extensions and new curb ramps at Bedford Avenue intersection to slow turning traffic and shift and slow thru-traffic.

5.1 Paint stop bars at each leg of intersection, install 50 lf of yellow centerline on each leg of Ardmore Street

7. Install chicanes on Thornton Street at the intersection of Greenway and Wakefield Street so as to slow traffic through the intersection

4. Install chicanes on Ardmore Street half-way between Greenway Street and Bedford Ave so as to slow traffic.



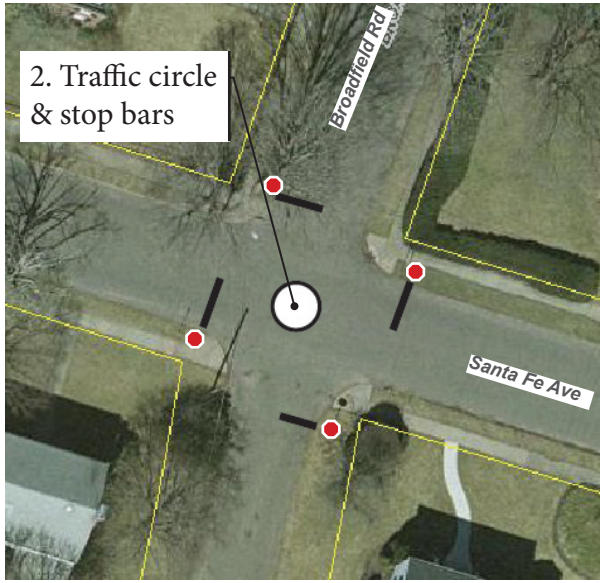


Haverford Street and Santa Fe Avenue: Recommendations

The goal of these improvements is to slow vehicles as they enter and exit the curved portion of Haverford Street and the intersection of Santa Fe Avenue and Broadfield Road.

Speed humps are recommended on both sides of the curve on Haverford Street as they are the most effective device for acutely lowering speeds. A third location on the east end of Haverford Street may be considered for placement of a speedhump if the two proposed locations prove ineffective at lowering speeds throughout the corridor. Discretion should be used in the number of these devices applied to one roadway as the placement of too many devices may cause traffic to shift to another residential street. The topography of Haverford Street also limits the use and location of speed humps as they require relatively flat grades in the area of their placement. The proposed locations are suitable in terms of grade and sight distance.

A traffic circle is recommended at the intersection of Santa Fe Avenue and Broadfield Road as a means of slowing vehicle speeds through that segment of the roadway and increasing compliance to the stop controlled intersection.



Waite Street: Recommendations

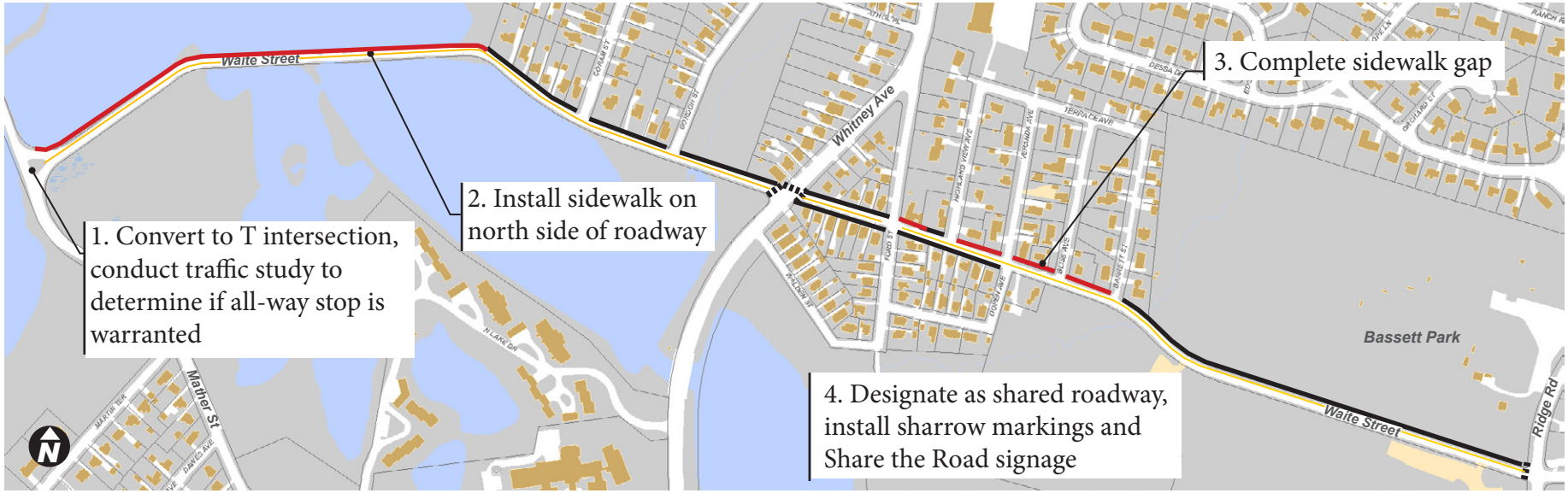
The Waite Street improvements seek to provide safer pedestrian access across Lake Whitney, improve the safety of the Waite Street/ Mather Street intersection, improve pedestrian connections to Bassett Park, and provide accommodations for bicyclists.

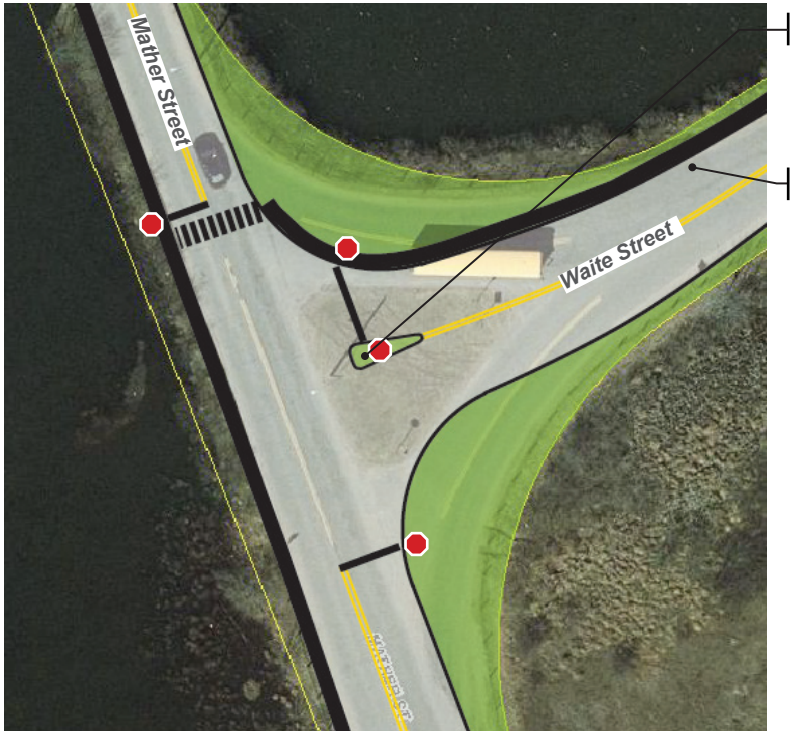
In achieving these aims, the intersection of Waite and Mather Street should be converted to a T intersection so as to simplify the intersection, reduce vehicle turning speeds through the intersection and provide additional space for sidewalks. Additionally, a traffic study should be conducted to determine if an all-way stop is warranted for this location. To accommodate pedestrian demand on Waite Street, a sidewalk should be constructed on the north side of the roadway connecting the existing sidewalk to the east of Lake Whitney to the sidewalk on the north side of the bridge and to the Mather Street intersection.

These recommendations to the west end of Waite Street were made in a 2000 report by the TPA Group. Two options for the sidewalk were presented and should be considered going forward. The first option was a raised sidewalk and curb and the second option was an at-grade sidewalk separated by a post and cable guardrail. Either option would address pedestrian needs. The recommendations herein differ in that the TPA report had recommended the sidewalk be constructed on the south side of the roadway. It is recommended that the sidewalk be located on the north side so as to connect with the existing sidewalk on the bridge and at the east of the lake.

In addition to improvements at the west end of Waite Street, the sidewalk gap on the north side of Waite Street between Ford Street and Bassett Park should be completed to as to provide pedestrian access to Bassett Park.

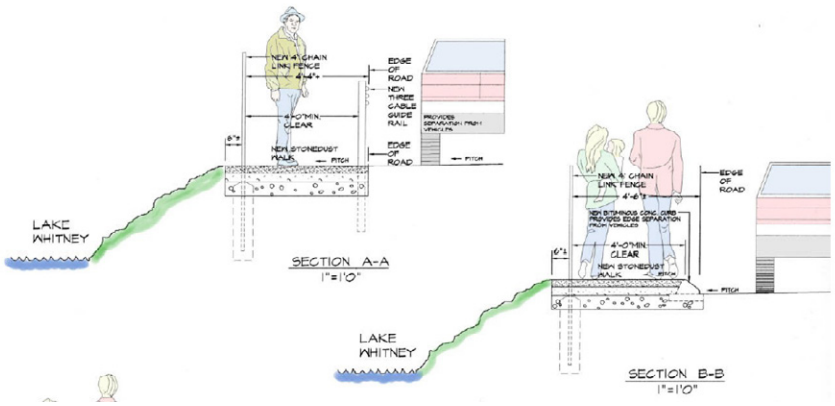
Bicyclist demand for facilities could be satisfied via the provision of shared lane designation. This designation is provided by the installation of "sharrow" pavement markings and "Share the Road" signage.



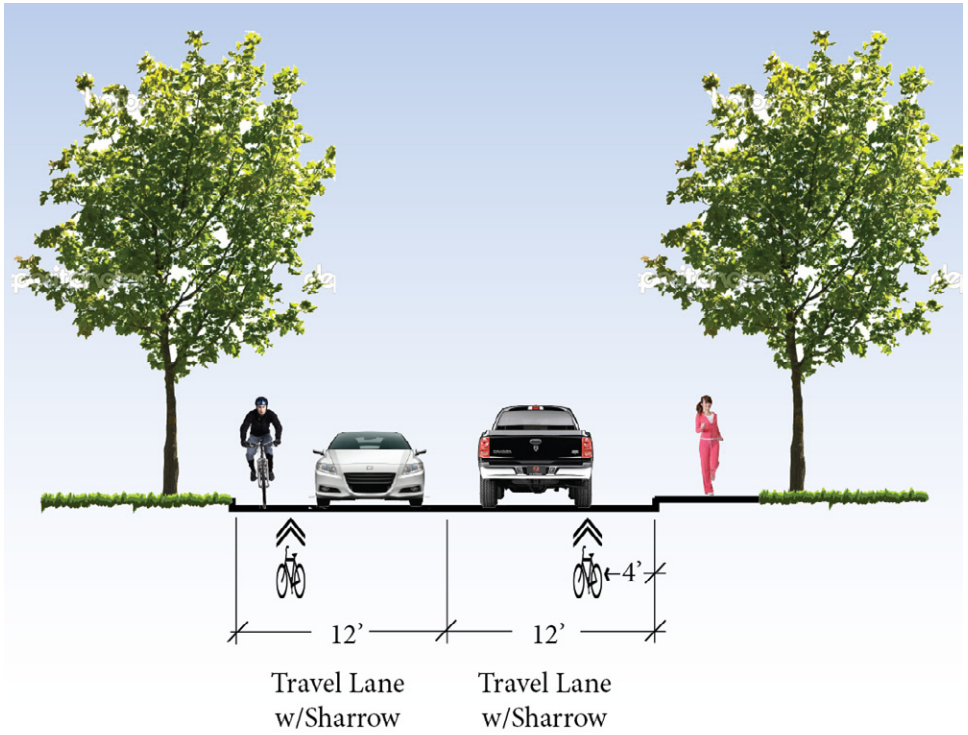


1. Convert Waite/Mather Street intersection to “T” intersection. Install island for traffic separation and sign placement. Convert to all-way stop if warranted.

2. Install sidewalk on the north side of Waite Street. Install curb-ramp and crosswalk connecting to proposed sidewalk on south side of Mather Street.



2. Sidewalk improvements to Waite Street. Drawings from TPA Group.



4. Shared lane designation on Waite Street “Sharrow”

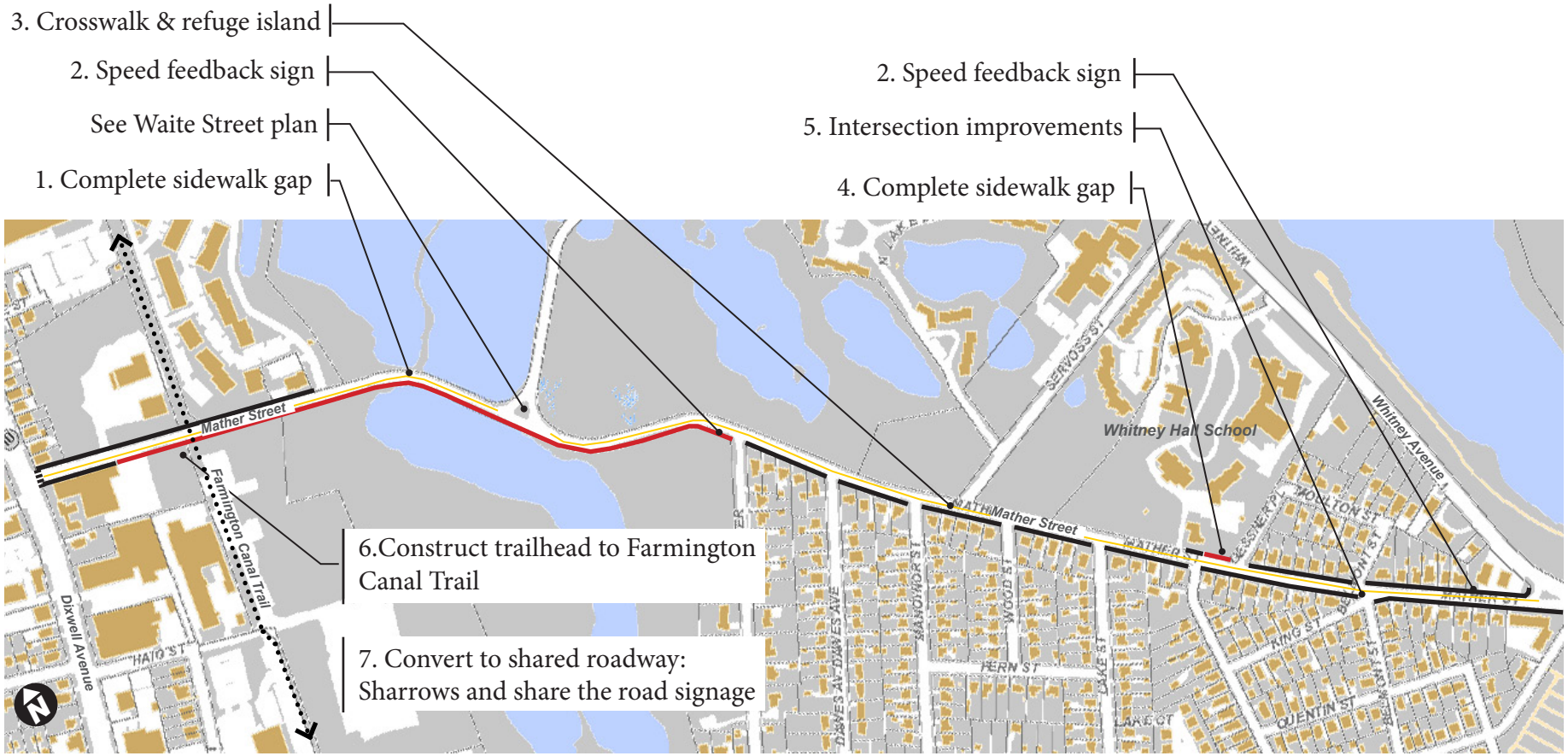
Mather Street: Recommendations

The recommended improvements to Mather Street are focused upon improving pedestrian and bicycle movement through the corridor. There are two distinct areas of Mather Street that would benefit from sidewalk improvements. The largest segment extends from the end of the existing sidewalk on the west end of Mather Street to Waite to Martin Terrace; and the second location is a small segment west of Gessner Place. The construction of these sidewalks would provide a continuous pedestrian corridor through the length of Mather Street.

In addition to the need for sidewalks along the corridor, there is a demand for opportunities to cross Mather Street, as there are no marked crosswalks on Mather Street between Dixwell Avenue and Whitney Avenue. Marked crosswalks across Mather Street should be installed at two locations; at Servoss Street and Belmont Street.

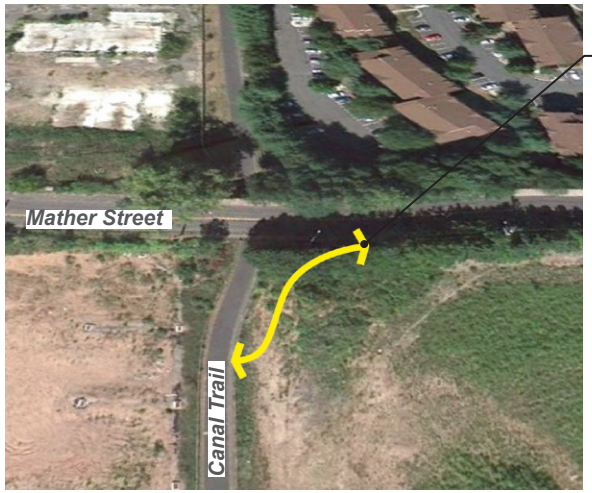
Intersection improvements are recommended for the Waite Street intersection (see Waite Street plan) and Belmont Street intersection where the realignment of a curb on the south side of Mather Street would calm traffic through the intersection. Several crosswalks should be marked at the Mather Street intersection to improve pedestrian circulation.

Bicycles can be accommodated on the roadway through designation of a shared road which includes sharrow pavement markings and share the road signage.

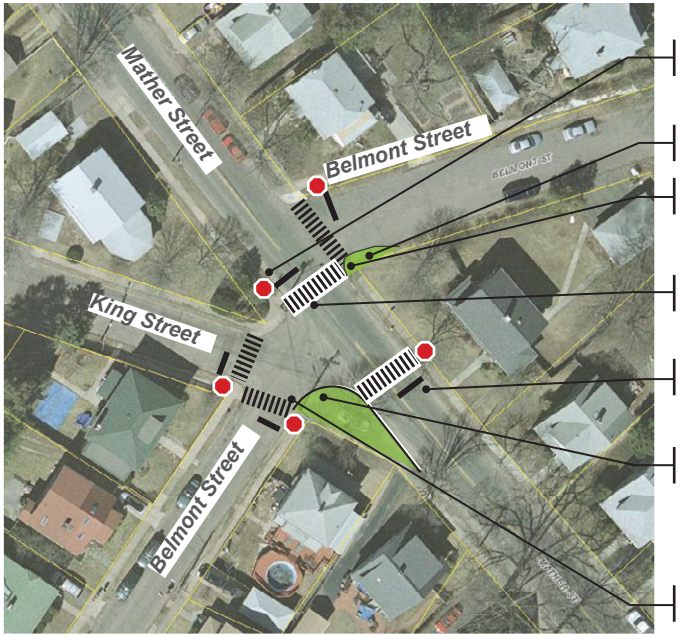


3. Install crosswalk, crosswalk signage, refuge island, and curb ramps

4. Complete sidewalk gap



6. Construct trailhead access to Farmington Canal Trail at 380 Mather Street



5.1 Translucent stop sign

5.2 "No Outlet" sign

5.3 Extend curb and install curb ramp

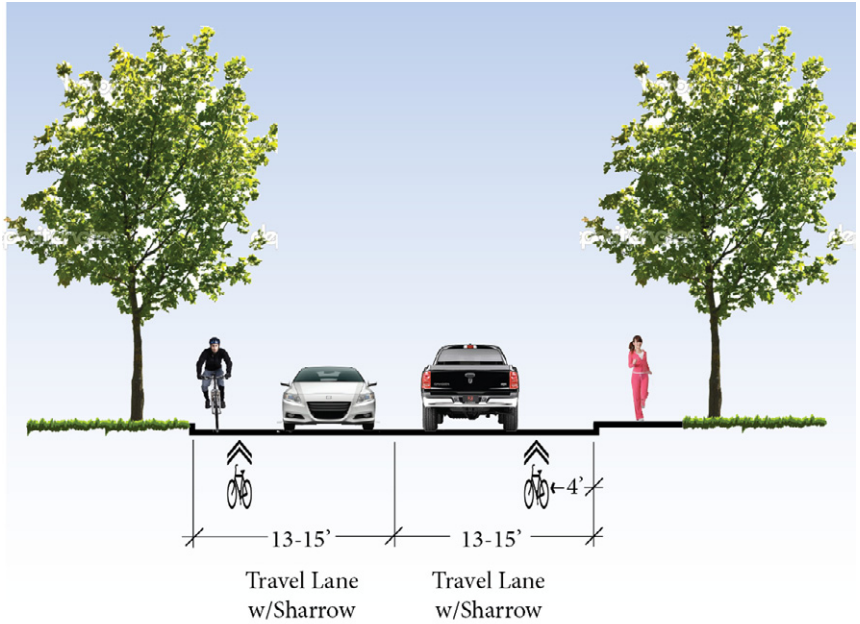
5.4 Install raised crosswalks

5.5 Relocate stop sign & bar

5.6 Extend curb

5.7 Paint crosswalks

5. Mather-Belmont Improvements



7. Shared lane markings

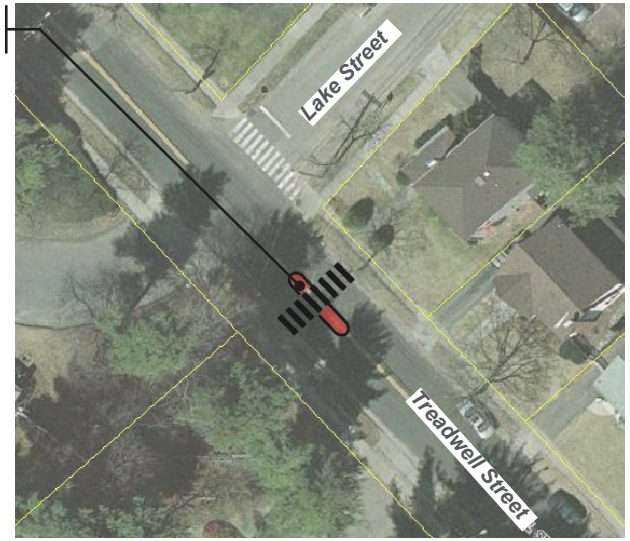
Treadwell Street: Recommendations

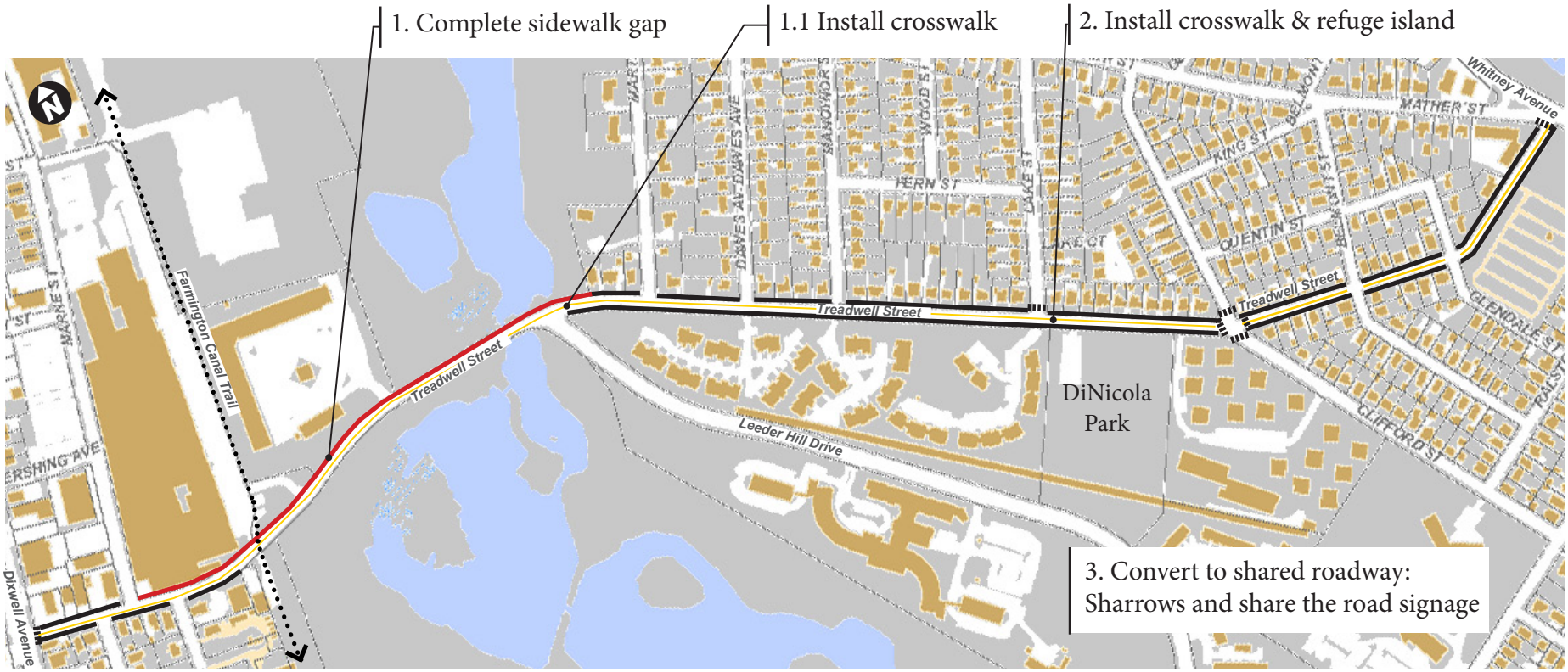
Improvements to Treadwell Street are focused on improving bicycle and pedestrian movement and crossings through the corridor. The recommended pedestrian improvements to Treadwell Street include a sidewalk from Marine Street to Leeder Hill Drive, a crosswalk at Leeder Hill Drive (upon construction of the sidewalk) and a new crosswalk and pedestrian refuge island at Lake Street.

Treadwell Street should also be designated as a shared roadway with sharrow markings and share the road signage. These improvements would minimize conflict between pedestrians, bicyclists, and motor vehicle traffic. Designation as a shared roadway will also improve bicycle connectivity to the Farmington Canal Trail.

While there are no stand-alone traffic calming measures recommended for the roadway, share the road signage and pavement markings increase the awareness of drivers and encourage more responsible driving.

2. Install crosswalk, crosswalk signage, and refuge island



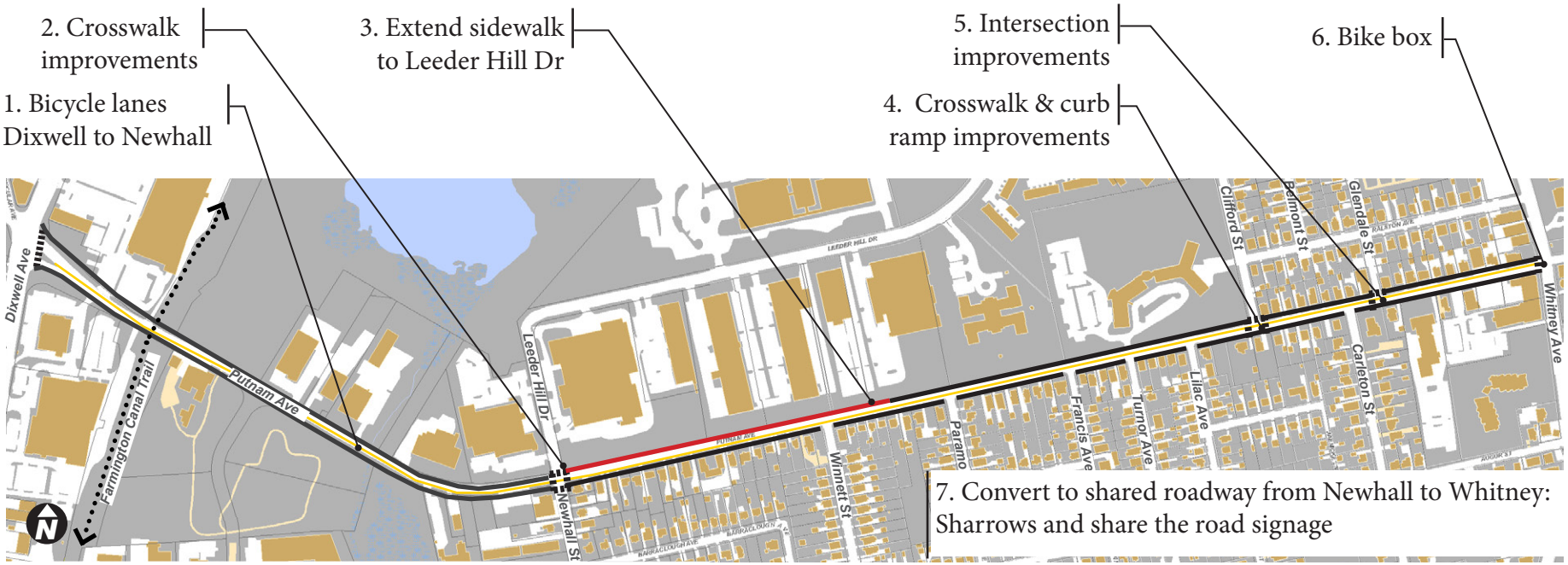


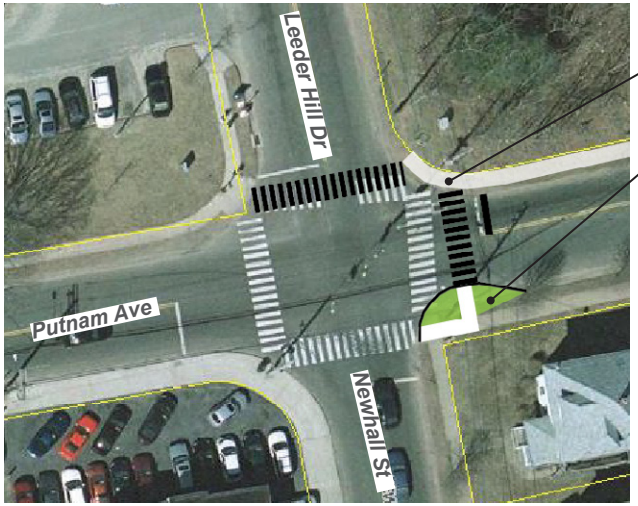
Putnam Avenue: Recommendations

The recommended improvements for Putnam Avenue are focused upon improving pedestrian crossings, accommodating bicycles, and managing parking. Recommended bicycle improvements include the installation of bicycle lanes from Dixwell Avenue to Newhall Drive, where the roadway width and lack of on-street parking allows for such designation. Shared lane markings (sharrows) and share the road signage is recommended between Newhall Street and Whitney Avenue. A painted "bike box" is recommended at the intersection of Putnam Avenue and Whitney Avenue to accommodate bicyclists that are waiting to turn left. The marking of this space is primarily aimed at discouraging drivers from creeping past the marked stop bar and queuing near the crosswalk where they obstruct turning bus and truck traffic.

Recommended pedestrian improvements include improved curb ramps, bulbouts, and the extension of a sidewalk. The sidewalk extension is planned for the north side of the roadway between Winnett and Paramount Street where the existing sidewalk terminates abruptly. This sidewalk should be extended to Leeder Hill Drive. A crosswalk and pedestrian refuge island should be installed between Winnett Street and Paramount Street to accommodate mid-block crossing demand. Additionally, new curb ramps are needed at the Clifford Street intersection where curb ramps on the north side are not ADA compliant and there are no curb ramps on the south side.

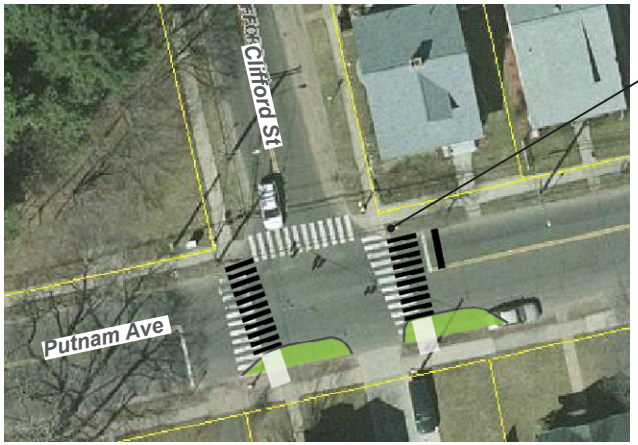
Intersection improvements are needed at the intersection of Glendale Street, Putnam Avenue, and Carleton Street where patrons of a deli park illegally on the sidewalk and in the intersection. These improvements include reconstruction of the curb on the north side of Putnam Avenue at Glendale Street to prevent parking on the sidewalk, angled striping of the shoulder on the south side of the street within the intersection and additional no parking signage.





3. New curb ramp and sidewalk

2. Bulbout curb and install new curb ramps and crosswalk



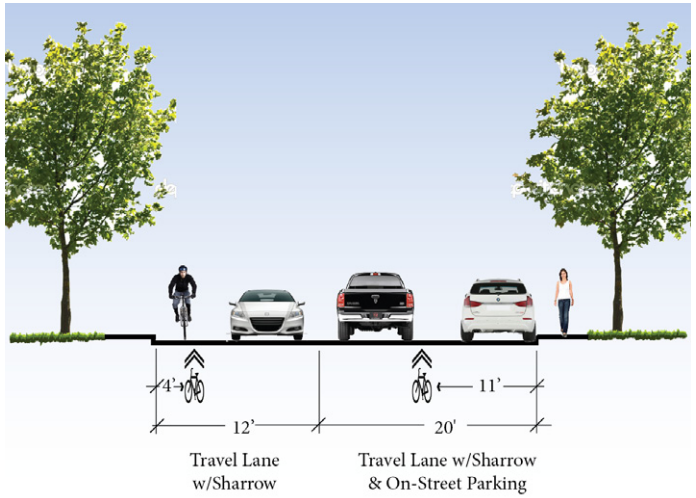
4. Upgrade curb ramps on north side of intersection, install curb ramps on south side at both crosswalks

5. Replace curb and install new 6" high curb to prevent parking on sidewalk. Install "no parking" signage

5.1 Bump-out curb to shorten crossing distance and improve visibility beyond parked cars

5.2 Install angled pavement markings at intersections to designate no parking areas

6. Paint bike box marking to accommodate left turning bikes and discourage queuing too close to intersection. Paint "Wait Here" marking in advance of the stop bar.



7. Shared lane designation on Putnam Avenue

Augur Street: Recommendations

A chicane strategy is the primary recommended improvement for Augur Street. This strategy would be effective in interrupting the long interrupted segments of roadway that are conducive to speeding. This strategy can be implemented by shifting parking to the north side of Augur Street at three locations: between Pacific Street and Barraclough Avenue, between Paramount Avenue and Francis Avenue, and between Morris Street and Carleton Avenue. This parking reassignment should be accompanied by the installation of pavement markings to designate parking lanes as well as parking signage.

Improvements should also be made to the two all-way stop intersections on Augur Street at Barraclough Avenue and Carleton Avenue. The recommended improvements include painting marked stop bars at each leg of the intersection and installing vertical reflective strips on the sign posts. These measures would improve the visibility of the stop signs and combined with slower speeds created by the chicanes would improve conformity to the stop signs.

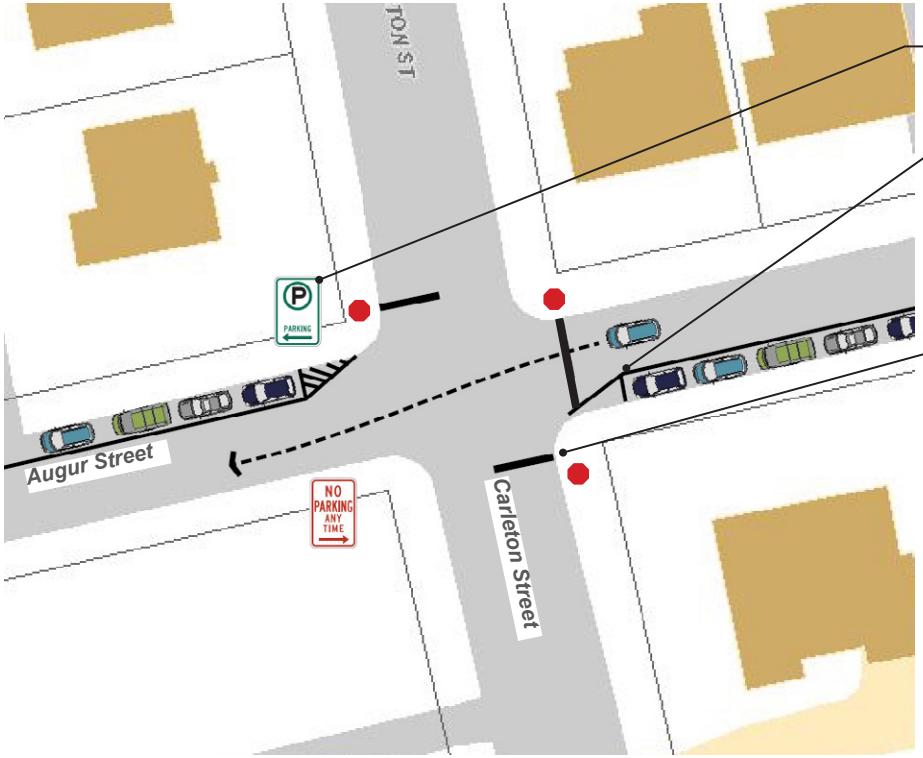
Additionally, a sidewalk gap on the south side of Augur Street between Farnsworth and Giles Street should be completed so that pedestrians don't walk in the roadway through this area.

1. Chicane traffic by alternating parking to north side of street

2. Complete sidewalk

3. Stop bars & signage improvements

4. Stop bars & signage improvements



1.1 Install new parking and "no parking" signage

1. Stripe 8' wide parking bays on alternating north and south sides of road

4. Paint stop bars and add vertical reflective strips to stop sign posts

2. Install sidewalk on south side of Augur Street west side of Farnsworth Street to east of Rolfe Road

Mill Rock Road & Armory Street: Recommendations

Recommended improvements to Mill Rock Road and Armory Street are focused on slowing traffic at the corridor and improving safety at two locations: at the playground and at the intersection of Mill Rock Road and Prospect Street.

Safety improvements at the playground include the installation of playground warning signage on the east and west approach to the playground and the installation of a raised crosswalk and bulbout connecting the end of the sidewalk on the north side of Mill Rock Road to the playground.

The recommended intersection improvements at Mill Rock Road include: lighting improvements, signage and pavement marking improvements, and the installation of an island that would slow turning speeds and allow for the placement of an additional stop sign on the left side of the travel lane on Prospect Street approaching Mill Rock Road.

An additional location that requires improvement is the marked crosswalk from Mill Rock Road to the south side of Armory Street. Crosswalk warning signage is recommended for both the east and west approaches on Armory Street and a curb ramp is recommended for the south side of the Armory Street.

Speedhumps are recommended at two locations on Amory Street as a means of calming traffic along that road. Speed data should be collected prior to the installation of temporary devices. Collection of speed data is critical in confirming that speeds are high enough to warrant the placement of speed humps.

2.1 Install curb ramp, connect to existing sidewalk

2.2 Install raised crosswalk and crosswalk warning signage

2.3 Curb extension and curb ramp

2. Crosswalk at playground

3.1 Install W1-6R warning sign

3.2 Paint crosswalk and stop bar

3.3 Island with additional STOP sign

3.4 Add vertical reflective strips to stop sign and stop ahead posts

3.5 Trim vegetation as needed

3. Intersection improvements to Prospect Street at Mill Rock Road

Cost Estimate and Implementation Schedule

The total cost of improvements within the study area is approximately $1 million. This cost estimate reflects typical construction and installation costs of the recommended measures in this plan. This estimate represents 2012 construction costs and is intended for planning purposes only. An itemized cost estimate is available on page 49 of this report.

Cost per Corridor	
Connolly Pkwy/Elgin/Ardmore/Thornton St:	$102,900
Haverford Street/Santa Fe Avenue:	$25,000
Waite Street:	$314,200
Mather Street:	$282,000
Treadwell Street:	$175,700
Putnam Avenue:	$77,600
Augur Street:	$62,200
Mill Rock Road/Armory Street:	$37,600
Total Cost:	**$1,077,200**

Cost per Improvement Type	
Bicycle facilities:	$57,100
Crosswalk and curb ramp improvements:	$115,600
Trail access	$50,000
Sidewalk improvements:	$606,800
Sign and pavement marking upgrades:	$27,700
Traffic calming devices:	$120,000
Intersection reconstruction:	$100,000
Total Cost:	**$1,077,200**

Improvements should be phased in a five-year period to allow for the budgeting of capital improvement funds. Low cost improvements items should be considered for short term improvements, with more capital intensive improvements scheduled for the long term. A proposed five year phasing plan is included here.

All chicane and speed hump recommendations are subject to traffic speed data collection prior to implementation. Collected data must confirm that speeding is an issue as reported (85th percentile speeds must exceed the posted speed limit by 5 mph). Upon documentation of speeding, temporary chicane and speed hump devices should be deployed. If these devices prove effective at lowering speeds, and are agreeable to residents, permanent devices should be considered for implementation.

Year 1 — $86,800

- Bicycle facilities improvements
- Sign and pavement marking upgrades
- Crosswalk markings (at locations not requiring infrastructure upgrades)
- Traffic speed data collection
- Install and test temporary traffic calming devices

Year 2 — $237,500

- Install permanent traffic calming devices
- Install pedestrian refuge islands, curb extensions
- Crosswalk and curb ramp improvements
- Putnam Avenue sidewalk extension

Year 3 — $250,000

- Reconstruction of Waite/Mather St. intersection
- Construction of Waite Street sidewalk at Lake Whitney

Year 4 — $265,000

- Costruction of Mather Street sidewalks
- Construction of Mather Street trail access to Canal Trail
- Construction of Waite Street sidewalk approaching Bassett Park

Year 5 — $237,900

- Construction of Treadwell Street sidewalk
- Construction of Augur Street sidewalk

Toolbox

Marked Crosswalks

Marked crosswalks are a critical component of the pedestrian network. They guide the pedestrian to the safest crossing of the roadway and alert drivers to the expected presence of pedestrians. The "piano key" style crosswalk, which consists of multiple white bars aligned perpendicular to the walking path, is currently in use in Norwalk and should be used for crosswalk locations identified in this plan.

> *"Crosswalk markings provide guidance for pedestrians crossing the roadway by defining and delineating the most appropriate crossing path. Crosswalk markings also alert road users to a pedestrian crossing point not controlled by traffic signals or stop signs. At non-intersection locations, these markings legally establish the crosswalk." –Institute for Transportation Engineers - Traffic Safety Toolbox*

> *"In general, crosswalk markings at unsignalized intersections appear to have several positive effects and no observed negative effects. Specifically, drivers appear to be aware that pedestrians are in a marked crosswalk and drive slightly slower. Crosswalks also have the positive benefit of channeling pedestrians to the intersection. Also, there appears to be no evidence to support the contention that pedestrians feel protected in marked crosswalks and act more carelessly. In conclusion, it appears that marking pedestrian crosswalks at relatively narrow, low-speed, unsignalized intersections is a desirable practice."-Federal Highway Administration -RD-00-103*

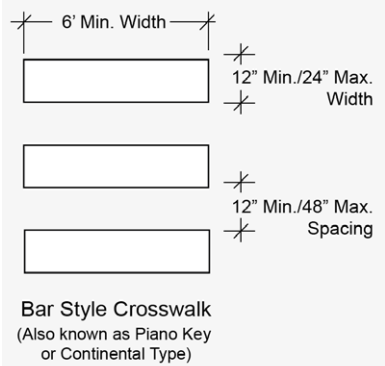
> *"Crosswalks can be raised or can be designed in conjunction with speed tables, medians, crossing islands, curb extensions, and other supplemental measures. With these measures, unsignalized crossings may be feasible at additional location types." –Institute for Transportation Engineers - Traffic Safety Toolbox*

Benefits

- Encourages pedestrians to cross the street at regular locations.
- Improves visibility of pedestrians, alerts drivers to the presence of pedestrian traffic.

Application

- Crosswalk locations should be located approximately 300 feet apart. Increased distances decrease pedestrian conformity, decreased distances may decrease driver conformity.
- Crosswalks should be a minimum 6 feet wide to 10 feet wide or width of sidewalk if greater.
- Curb ramps, if present, should be aligned with crosswalk.
- Crosswalks are most effective when crossing roadway at a right angle.
- Crosswalks should be accompanied by signage or signalization where conditions warrant.



Crosswalk Signage

Crosswalk signage should be used at all crosswalks where traffic is not controlled by a traffic light or stop sign. This signage may also be used to supplement crosswalks at locations where sight-lines are an issue or where drivers fail to yield to pedestrians despite stop signs or traffic lights. The most common application of this sign would be a mid-block crosswalk. When located within a school zone, the school crossing sign should be used in lieu of the pedestrian crossing sign. The Manual for Uniform Traffic Control Devices (MUTCD) provides the following guidance:

> *Non-Vehicular Warning (W11-2) signs may be used to alert road users in advance of locations where unexpected entries into the roadway might occur or where shared use of the roadway by pedestrians might occur. These conflicts might be relatively confined, or might occur randomly over a segment of roadway.*
>
> *If used in advance of a pedestrian crossing, the W11-2 signs should be supplemented with plaques with the legend AHEAD or XX FEET to inform road users that they are approaching a point where crossing activity might occur.*
>
> *The W11-2 and W11-9 signs and their related supplemental plaques may have a fluorescent yellow-green background with a black legend and border.*
>
> *When a fluorescent yellow-green background is used, a systematic approach featuring one background color within a zone or area should be used. The mixing of standard yellow and fluorescent yellow-green backgrounds within a selected site area should be avoided. Crossing signs should be used only at locations where the crossing activity is unexpected or at locations not readily apparent. - Pedestrian relevant excerpts from MUTCD Section 2C.5*

Benefits

- Increases driver awareness
- Assists pedestrians in locating crosswalks

Application

- Signage typically used at mid-block crossing locations
- Signage must not interfere with sidewalk function
- School crossing sign should be used when crosswalk is located within a school zone or has a high number of students in route to school

School Crossing Sign
S1-1 sign with W16-7P arrow

Pedestrian Crossing Sign
W11-2 sign with W16-7P arrow

Curb Ramps

Curb ramps are required by the American Disabilities Act at intersections and marked crosswalks. Any roadway that undergoes reconstruction is required, by federal law, to include these facilities. Curb ramps are integral to the pedestrian network and are a critical link between crosswalks and sidewalks.

According to the Connecticut Highway Design Manual, when determining the need for a curb ramp, the designer should consider the following:

1. If at least one curb will be disturbed by construction at an existing intersection, then curb ramps shall be constructed at all crosswalks which extend from a paved sidewalk in that intersection.
2. For all projects, curb ramps will be constructed at all crosswalks which provide pedestrian access in that intersection and will be provided on all corners. At T-intersections, the designer must ensure that curb ramps are located on the side opposite the minor intersecting road.
3. Opposing ramps must always be provided on adjacent legs of an intersection even if outside project limits.
4. Curb ramps shall be positioned so as not to cause a safety hazard for blind pedestrians.
5. Curb ramps shall be located or protected to prevent their obstruction by parked vehicles.
6. Curb ramps at marked crossings shall be wholly contained within the markings, excluding any flared sides.
7. A diagonal curb ramp shall be wholly contained within the painted markings, including any flared sides. There shall be at least 610 mm of full-height curb within the crosswalk. In addition, there shall be at least 1220 mm between the gutter line and the corner of the two intersecting crosswalks.
8. The function of the curb ramp must not be compromised by other highway features (e.g., guide rail, catch basins, utility poles, signs).
9. Curb ramps are required at all curbed intersections with sidewalks or along all accessible routes.
10. The location of the curb ramp must be consistent with the operation of pedestrian-actuated traffic signals, if present. In addition, a pedestrian push-button must be located so it can be reached by wheelchair-bound individuals.
11. The designer will provide the Division of Traffic Engineering with a set of plans at the preliminary design stage and before the preliminary design review. The Division of Traffic Engineering, in its review, will determine the need and location of mid-block curb ramps.

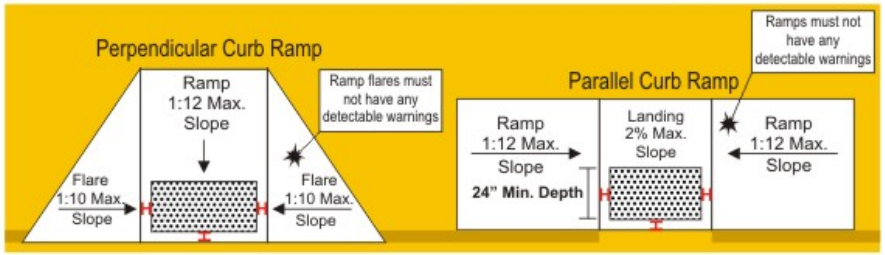
Benefits

- Improves accessibility for people with mobility aids.
- Improves the mobility of people with carriages, strollers, carts, and children on bicycles.
- Encourages pedestrians to cross roadway at a fixed point.

Application

- Ramp perpendicular to curbline
- 1:12 maximum running slope
- 1:48 (2%) maximum cross slope
- 36 inch minimum width
- Level landing at top
- Landing 36 inch long if toe room available
- Landing 48 inch long if constrained
- Ramp within crosswalk at foot
- No exposure to moving traffic lane
- Flush (no lip) connection at street

Curb Ramps in the Public Right-of-Way
Surface Texture/Contrast (Detectable Warnings)



H = Max. 4" border allowed on all sides to frame paver inserts, Per TM 99-02
Detectable Warnings must extend the full width and have a minimum depth of 24 inches.
At Parallel Curb Ramps, ONLY the landing must have detectable warnings.
Note: At diagonal curb ramps, the detectable warnings may be on the ramp or the landing.

Sidewalks and Pathways

Sidewalks and footpaths are the core of the pedestrian network and also the most capital intensive infrastructure component of the network. Sidewalks are typically concrete construction and a minimum of five feet wide (this width allows two adults to walk comfortably side by side). Footpaths (being somewhat unique to Norwalk) are typically asphalt construction and range from three to four feet wide. Footpaths are less expensive and intrusive than concrete sidewalks, but are a less permanent facility.

"Sidewalks used for pedestrian access to schools, parks, shopping areas, and transit stops and placed along all streets in commercial areas should be provided along both sides of the street. In residential areas, sidewalks are desirable on both sides of the street but need to be provided on at least one side of all local streets." – American Association of State and Highway Transportation Officials (AASHTO)

"Sidewalks and walkways separate pedestrians from the roadway and provide places for children to walk, run, skate, ride their bikes, and play. Sidewalks have been found to be associated with significant reductions in pedestrian collisions with motor vehicles. Such facilities improve mobility for pedestrians and should be provided for all types of pedestrian travel: to or from home, work, parks, schools, shopping areas, transit stops, etc. Walkways should be part of every new and renovated facility and every effort should be made to retrofit streets that currently do not have sidewalks or walkways." -Institute for Transportation Engineers - Traffic Safety Toolbox

Benefits

- Minimizes pedestrian exposure to vehicles by providing walking space off of roadway.
- Encourages walking trips

Application

- Minimum sidewalk width of 5 feet is necessary for two adults to comfortably walk side-by-side.
- Sidewalk most effective when separated from curb by a buffer space.
- Buffer provides space for street trees, utilities, & snow storage.
- Buffer most effective at 6 feet wide, thus allowing the placement of an accessible curb ramp between curb line and sidewalk.
- Maximum 2% cross-slope
- Sidewalk zone should be kept clear of obstructions, providing a minimum clear width of 32 inches at spot locations and 36 inches for the length of the walk.
- A protected zone of 27 inches to 80 inches in height must be kept clear of vegetation, signage, and other structures.

Pedestrian Refuge Islands

Refuge islands are a highly effective tool for assisting pedestrians in crossing wide roadways, heavily trafficked roads, or at midblock locations. These islands can be as narrow as four feet and give the pedestrian a safe place to stop if they are unable to cross the road in one attempt. In addition to assisting pedestrians in crossing, these devices provide a location for the placement of pedestrian crossing signs and can slow the speed of traffic at crosswalks.

> *Cross islands, also known as center islands, refuge islands, or median slow points, are raised islands placed in the center of the street at intersection or midblock locations that help to protect pedestrians from motor vehicles. Crossing islands allow pedestrians to be concerned with only one direction of the street and wait for an adequate gap in traffic before crossing the second half of the street. Where midblock or intersection crosswalks are to be installed at uncontrolled locations (i.e., where no traffic signals or stop signs exist), crossing islands should be strongly considered as a supplement to the crosswalk. If there is sufficient width, crossing islands and curb extensions can be used together to create a highly improved pedestrian crossing.*
> *-Institute of Transportation Engineers - Traffic Safety Toolbox*

Pedestrian refuge island and mid-block crosswalk

Benefits

- Reduces vehicle speeds
- Decreases pedestrian crossing distance
- Increases visibility of crossing

Application

- For use at intersections or mid-block
- Use only on streets with speed limit below 45 mph unless signalization is provided
- Mid-block island crossing should be located at least 300 feet from nearest crossings
- Appropriate signage required
- Adequate lighting required
- Minimum width of 4 feet

Curb Extension

Curb extensions are used to shorten the crossing distance for pedestrians. These devices have the added benefit of improving the visibility for and of pedestrians when crossing and can slow traffic. These devices take many forms and are often referred to as bulbouts.

Curb extensions, also known as bulbouts or neckdowns, involve extending the sidewalk or curb line into the street, reducing the effective width. Curb extensions significantly improve pedestrian crossings by reducing pedestrian crossing distance, improving the ability of pedestrians and motorist to see each other, and reducing the time that pedestrians are in the street. Curb extensions that are placed at an intersection essentially prevent motorists from parking in a crosswalk or blocking a curb ramp. Motor vehicles parked at corners present a serious threat to pedestrian safety because they block sight lines, hide pedestrians, and other vehicles, and make turning particularly difficult for emergency vehicles and trucks. Motorists are encouraged to travel more slowly at intersections or midblock locations with curb extensions, because the restricted street width sends them a visual cue. Turning speeds at intersections are reduced with curb extensions (curb radii should be as tight as practicable). Curb extensions are appropriate only where there is an on-street parking lane (curb extensions must not extend into travel lanes, bicycle lanes, or shoulders). -Institute for Transportation Engineers - Traffic Safety Toolbox

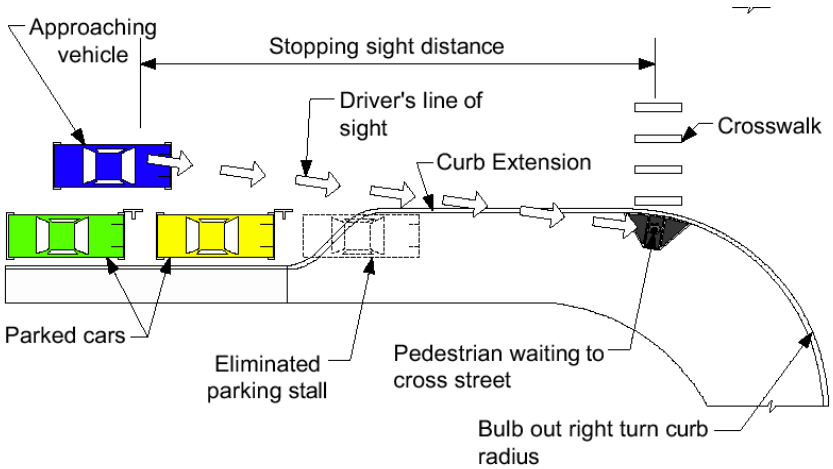
Benefits

- Encourages pedestrian conformity to marked crosswalks
- Shortens crossing distance for pedestrians
- Provides additional space for curb ramps
- Improves pedestrian visibility by extending past parked vehicles
- Improves driver's visibility of pedestrians
- Slows turning vehicles
- Prevents parking at corner

Application

- For use where wide curb lanes, shoulders, or on-street parking result in wide pavement widths.
- Curb extension should not extend beyond 6 feet of existing curb line and should not obstruct bike or travel lane.
- Adequate vehicle turning radii must be maintained when used at intersections.

Mid-block curb extension and crosswalk



Improved line of sight with curb extension

Mini-Traffic Circles

"Mini circles are raised circular islands that are constructed in the center of residential street intersections to reduce vehicle speeds. They are sometimes used instead of stop signs. They force motorists to maneuver around them and have been found to reduce motor vehicle crashes. Drivers making left turns are directed to go on the far side of the circle (not the near side) before making the turn. Signs may be installed within the circle to direct motorists to proceed to the right of the circle before passing through or making a left turn." *-Institute for Transportation Engineers - Traffic Safety Toolbox*

Traffic Circle

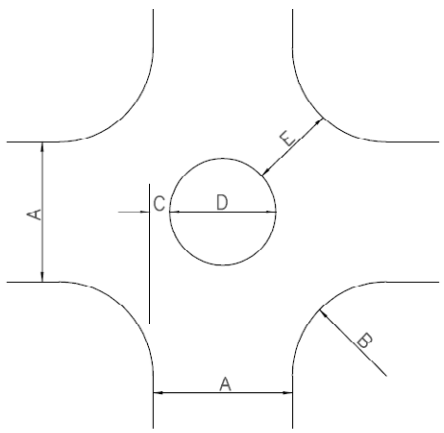
Benefits

- Prevents red-light or stop sign running
- Slows vehicle speeds through intersection

Application

- For use on local streets and low volume collector streets
- Replaces four-way stop or low volume signalized intersection
- Landscaping cannot interfere with driver visibility, can be maintained by residents

GEOMETRY



NOTES:

1. USE DIMENSION SCHEDULE AS A DESIGN GUIDE. FINAL DIMENSIONS TO BE DETERMINED BY THE ENGINEER.
2. FOR PLANTER ISLAND SPECIFICATIONS SEE TRAFFIC CIRCLE DETAIL TE–27.

OPTIMUM CRITERIA

OFFSET DISTANCE (C)	OPENING WIDTH (E)
5.5' MAX.	16' MIN.
5.0'	17' ±
4.5'	18' ±
4.0'	19' ±
3.5' OR LESS	20' ±

DIMENSIONS

A STREET WIDTH	B CURB RETURN RADIUS	C OFFSET DISTANCE	D CIRCLE DIAMETER	E OPENING WIDTH
20'	<15'	RECONSTRUCT CURBS		
	15'	5.5'	9'	16'+
	18'	5.0'	10'	17'+
	20'	4.5'	11'	18'
	25'	4.0'	12'	19'+
24'	<12'	RECONSTRUCT CURBS		
	12'	5.5'	13'	16'
	15'	5.0'	14'	17'–
	20'	4.5'	15'	18'+
	25'	3.5'	17'	20'–
25'	<12'	RECONSTRUCT CURBS		
	12'	5.5'	14'	16'+
	15'	5.0'	15'	17'–
	18'	4.5'	16'	18'
	20'	4.5'	16'	18'+
	25'	3.5'	18'	20'–
30'	10'	5.5'	19'	16'+
	12'	5.0'	20'	17'–
	15'	5.0'	20'	17'+
	18'	4.5'	21'	18'+
	20'	4.0'	22'	19'+
	25'	3.0'	24'	20'
32'	10'	5.5'	21'	16'+
	12'	5.0'	22'	17'–
	15'	4.5'	23'	18'–
	18'	4.0'	24'	19'–
	20'	4.0'	24'	19'+
	25'	2.5'	27'	20'
36'	10'	5.0'	26'	17'–
	12'	5.0'	26'	17'+
	15'	4.5'	27'	18'+
	18'	4.0'	28'	19'+
	20'	3.5'	29'	20'–
	25'	1.5'	33'	20'
40'	10'	5.0'	30'	17'+
	12'	4.5'	31'	18'+
	15'	4.0'	32'	19'–
	18'	3.5'	33'	20'–
	20'	3.0'	34'	20'
	25'	1.0'	38'	20'

Speed Humps

"Speed humps are paved (generally asphalt), approximately three to four inches high at their center, and extend the full width of the street. There are several designs for speed humps. The traditional 12-ft. hump has a design speed of 15 to 20 mph. The 14-ft. hump has a design speed of a few mph higher. A 22ft. table has a design speed of 25 to 30 mph. The longer humps are gentler for larger vehicles." *-Institute for Transportation Engineers - Traffic Safety Toolbox*

"A speed table is an elongated speed hump or a flat topped speed hump. At the top of the flat version, a pedestrian crossing (sometimes with a marked crosswalk) is often provided for people to walk across the road." *-Institute for Transportation Engineers - Traffic Safety Toolbox*

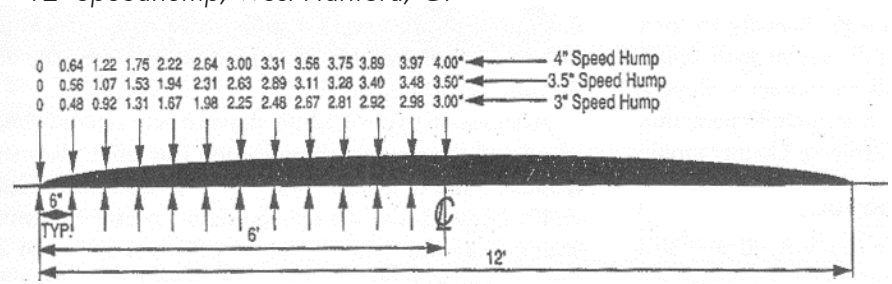
Benefits

- Slows vehicle speeds
- Table provides crossing area for pedestrians
- Table discourages parking in crosswalk

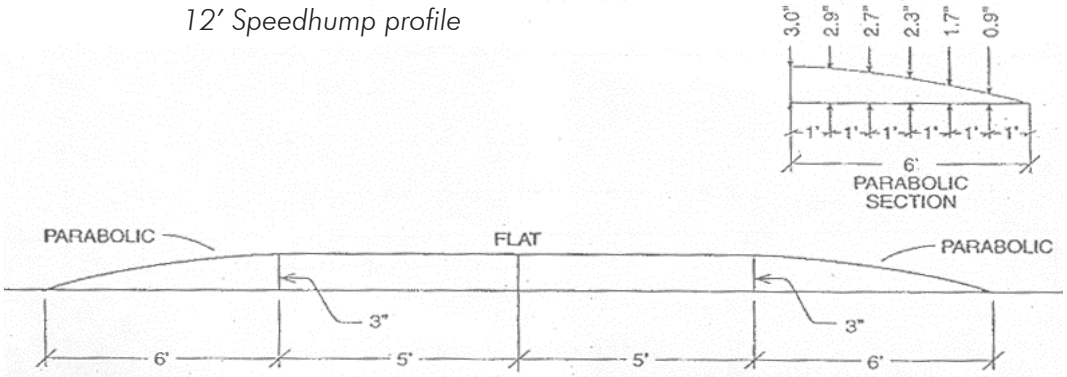
Application

- No more than two travel lanes or 40-foot pavement width
- Horizontal curve of 300-foot radius or more
- Vertical curve with adequate stopping sight distance
- Grade of 8 percent or less
- Posted speed limit of 30 mph or less
- No more than 5 percent long-wheelbase vehicles
- Not a primary emergency response route or bus route
- Spacing: 150' - 600' apart
- Use 22' humps on high volume streets

12' Speedhump, West Hartford, CT



12' Speedhump profile



22' Speedhump profile

Chokers & Chicanes

Chokers and Chicanes use small islands placed near the curb to slow traffic. Chokers use two islands, placed opposite one another in order to create a narrow opening that constricts traffic. When placed twelve feet apart, these islands only allow one vehicle through at a time, thereby stopping traffic in the opposite direction. Chicanes, however, typically allow traffic to continue moving in both directions. This is accomplished via staggered islands that create lateral shifts in the roadway, thus slowing drivers

Chokers are more effective on streets where opposing traffic is more frequent. This includes streets that experience significant peak traffic times. Vehicle speeds at other times will be minimally impacted as vehicles are allowed to travel straight through the choker without being forced to yield to oncoming traffic.

Chicanes create a horizontal diversion of traffic and can be gentler or more restrictive, depending on the design. Shifting of a travel lane will affect speeds as long as the taper is not so gradual that motorists can maintain speeds, the aim of traditional highway design. Shifts in travelways can be created by moving parking from one side to the other (if there is space for only one side of parking) or by building landscaped islands (islands can also effectively supplement the parking shift).

Diversion of the path of travel plus restriction of lanes is usually accomplished through a series of bulbouts or curb extensions that narrow the street to two narrow lanes or one lane at selected points, forcing motorists to slow down to maneuver between them. Such treatments are intended for use only on residential streets with low traffic volumes.

If there is no restrictions (i.e., the number of lanes is maintained), chicanes can be created on streets with higher volumes, such as collectors or minor arterials. -Institute for Transportation Engineers - Traffic Safety Toolbox

Benefits

- Reduces vehicle speed
- Can be used in conjunction with on-street parking
- Chokers may be used with a mid-block crosswalk

Application

- Residential streets and low volume collector and arterial roadways
- A minimum straight pathway 12' wide must be preserved for emergency vehicles
- Islands can be placed 1– 2' from curb line so as not to obstruct drainage

Chicane

Sharrows

Shared lane pavement markings (or "sharrows") are bicycle symbols carefully placed to guide bicyclists to the best place to ride on the road, avoid car doors, and remind drivers to share the road with cyclists. Unlike bicycle lanes, sharrows do not designate a particular part of the street for the exclusive use of bicyclists. They are simply a marking to guide bicyclists to the best place to ride and help motorists expect to see and share the lane with bicyclists. These facilities are used where roadways are to narrow for dedicated bicycle lanes and when traffic speeds and volumes allow bicyclists to safely mix with traffic.

Benefits

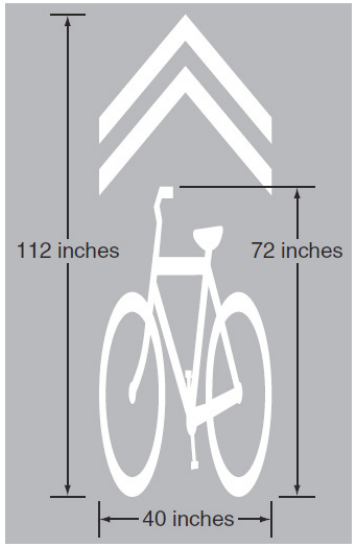
• Assist bicyclists with lateral positioning in a shared lane with on-street parallel parking in order to reduce the chance of a bicyclist's impacting the open door of a parked vehicle
• Assist bicyclists with lateral positioning in lanes that are too narrow for a motor vehicle and a bicycle to travel side by side within the same traffic lane
• Alert road users of the lateral location bicyclists are likely to occupy within the traveled way
• Encourage safe passing of bicyclists by motorists
• Reduce the incidence of wrong-way bicycling

Application

• The sharrow should not be placed on roadways that have a speed limit above 35 mph.
• Sharrows shall not be used on shoulders or in designated bicycle lanes.
• If used in a shared lane with on-street parallel parking, sharrows should be placed so that the centers of the markings are at least 11 feet from the face of the curb, or from the edge of the pavement where there is no curb.
• If used on a street without on-street parking that has an outside travel lane that is less than 14 feet wide, the centers of the sharrows should be at least 4 feet from the face of the curb, or from the edge of the pavement where there is no curb.
• The sharrow should be placed immediately after an intersection and spaced at intervals not greater than 250 feet thereafter.
• "Share the Road" signage should be placed at the beginning of a shared roadway and proceeding major intersections within that roadway.

Shared lane roadway

Share the road signage



Sharrow pavement marking

Bicycle Lanes

Dedicated bicycle lanes are the preferred facility for most bicyclists. These lanes are often found at the edge of the roadway and would otherwise appear to be a roadway shoulder. They are marked by a white edgeline separating the bicycle lane from the traffic lane and by bicycle pavement markings within the lane. Signage is typically used at the beginning of the corridor and intermittently to inform drivers and bicyclists of the presence of the bicycle lane.

Bicycle Lane Safety Benefits - City of Cambridge, MA

Bike lanes help define road space, decrease the stress level of bicyclists riding in traffic, encourage bicyclists to ride in the correct direction of travel, and signal motorists that cyclists have a right to the road. Bike lanes help to better organize the flow of traffic and reduce the chance that motorists will stray into cyclists' path of travel. Bicyclists have stated their preference for marked on-street bicycle lanes in numerous surveys. In addition, several real-time studies (where cyclists of varying abilities and backgrounds ride and assess actual routes and street conditions) have found that cyclists are more comfortable and assess a street as having a better level of service for them where there are marked bike lanes present.

The Purpose of Bicycle Lanes - Connecticut Statewide Bicycle and Pedestrian Plan

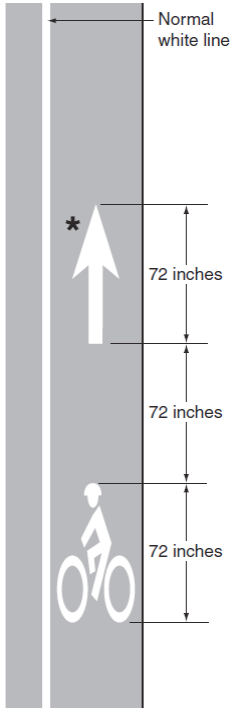
- *Create on-street separated travel facilities for bicyclists.*
- *Provide space for vehicles to safely overtake bicyclists.*
- *Reduce or prevent problems associated with bicyclists overtaking vehicles in congested or narrow streets.*
- *To encourage lower motor vehicle speed by narrowing available lanes.*

Application

- For use on collector and arterial roadways, or local streets in urban areas where bicyclists cannot safely ride with traffic.
- Bike lanes should be one way facilities carrying bicyclists in the same direction as adjacent traffic and located on the right side of the travel lane.
- Bike lanes generally should be installed in both directions of the roadway. Bike lanes installed on only one side of the roadway may encourage riding in the wrong direction.
- In some instances, on one-way roads, the bike lane may be installed on the left side of the travel lane if this provides better safety to the bicyclist.
- 4 feet wide minimum
- 5 feet wide if vehicle speeds exceed 50 mph or the lane is adjacent to a guardrail or tall barrier
- When placed adjacent to on-street parking, the left hand lane stripe (the stripe that separates the bicycle lane from the travel lane) should be no less than 12 feet from the curb. If parking volumes are substantial or turnover is high, such as downtown locations or streets with metered parking, this width should be increased to 14 feet so as to avoid collisions in the door zone of parked cars.
- Bike symbol pavement marking should be spaced every 500 feet and can be used more frequently in dense urban setting.
- Bicycle lane signage should be used at the beginning at the lane and spaced every mile or at significant intersections.

Bike Lane

Bike Lane Sign



Pavement Marking

Bike Box

Bike boxes are used in conjunction with bicycle lanes at intersections that are controlled by traffic signals. The bike box provides bicycles with space to wait at the intersection to make a left turn or safely wait to continue straight ahead of right turning traffic. These boxes are reserved for use at intersections with high traffic or high bicyclist volume.

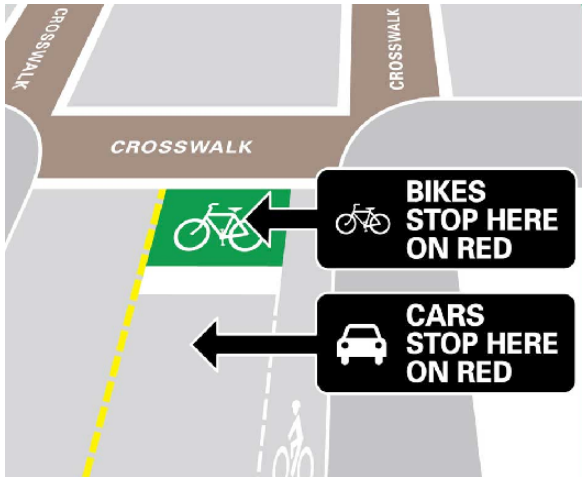
Benefits

- Allows bicyclists to safely negotiate a left turn at intersections.
- Provides storage space for cyclists traveling straight past a right turn lane.

Application

- Locate between crosswalk and stop bar.
- Bike box should have a minimum depth of 8 feet.
- Bike boxes should only be used when traditional intersection treatments do not adequately address bicycle safety or mobility.
- Bike boxes have been used at intersections with high left turn and right turn crash rates.
- Bike boxes may be used in conjunction with bicycle signals to give bicyclists preference on a given roadway.
- Colored bike boxes have been used for extra visibility. Green markings may be used, however maintenance needs must be considered. Blue bike box pavement markings are not recommended for use, as this color is reserved for public safety use.

Bike Box



Stop and Yield Lines

Stop and yield pavement markings let drivers know where they are expected to stop for an intersection or crosswalk. While these markings are not mandatory on local residential roads, they should be applied where vehicles fail to stop at the proper location or fail to yield to pedestrians.

Benefits:

- Improve visibility of intersections.
- Guides drivers to the proper place to stop or yield

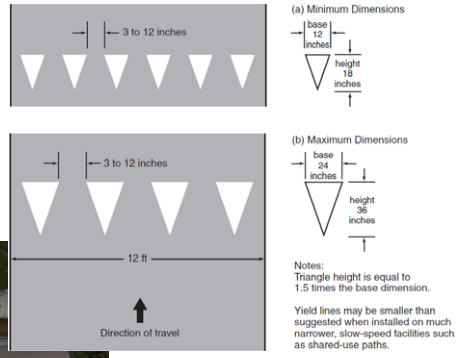
Stop Line Application

- Stop lines should be used to indicate the point behind which vehicles are required to stop in compliance with a traffic control signal.
- Stop lines may be used to indicate the point behind which vehicles are required to stop in compliance with a STOP (R1-1) sign, a Stop Here For Pedestrians (R1-5b or R1-5c) sign, or some other traffic control device that requires vehicles to stop, except YIELD signs that are not associated with passive grade crossings.
- If used, stop and yield lines should be placed a minimum of 4 feet in advance of the nearest crosswalk line at controlled intersections, except for yield lines at midblock crosswalks. In the absence of a marked crosswalk, the stop line or yield line should be placed at the desired stopping or yielding point, but should not be placed more than 30 feet or less than 4 feet from the nearest edge of the intersecting traveled way.
- Stop lines at midblock signalized locations should be placed at least 40 feet in advance of the nearest signal indication.
- Stop lines shall consist of solid white lines extending across approach lanes to indicate the point at which the stop is intended or required to be made.
- Stop lines should be 12 to 24 inches wide.
- If yield or stop lines are used at a crosswalk that crosses an uncontrolled multi-lane approach, the yield lines or stop lines should be placed 20 to 50 feet in advance of the nearest crosswalk line, and parking should be prohibited in the area between the yield or stop line and the crosswalk.
- Stop lines shall not be used at locations where drivers are required to yield in compliance with a YIELD (R1-2) sign or a Yield Here To Pedestrians (R1-5 or R1-5a) sign or at locations on uncontrolled approaches where drivers are required by State law to yield to pedestrians.

Yield Line Application

- Yield lines may be used to indicate the point behind which vehicles are required to yield in compliance with a YIELD (R1-2) sign or a Yield Here To Pedestrians (R1-5 or R1-5a) sign.
- Yield lines shall not be used at locations where drivers are required to stop in compliance with a STOP (R1-1) sign, a Stop Here For Pedestrians (R1-5b or R1-5c) sign, a traffic control signal, or some other traffic control device.
- Yield lines shall consist of a row of solid white isosceles triangles pointing toward approaching vehicles extending across approach lanes to indicate the point at which the yield is intended or required to be made.
- The individual triangles comprising the yield line should have a base of 12 to 24 inches wide and a height equal to 1.5 times the base. The space between the triangles should be 3 to 12 inches.
- If yield (stop) lines are used at a crosswalk that crosses an uncontrolled multi-lane approach, Yield Here To (Stop Here For) Pedestrians (R1-5 series) signs shall be used.
- When drivers yield or stop too close to crosswalks that cross uncontrolled multi-lane approaches, they place pedestrians at risk by blocking other drivers' views of pedestrians and by blocking pedestrians' views of vehicles approaching in the other lanes.

Stop line



Yield line

Cost Estimate

Itemized Cost Estimate

ID	Connolly Parkway/Elgin Street/Ardmore Street/Thornton Street Location	Improvement	Improvement Items	Cost
1	Connolly Parkway	Bicycle lanes	2700 lf striping, 6 bike lane pavement markings, 2 bike lane signs	$ 4,500
2	Connolly Parkway/Elgin Street intersection	Traffic circle	1 Traffic circle and regulatory signage	$ 15,000
2.1	Connolly Parkway/Elgin Street intersection	Stop bars	4 stop bar pavement markings	$ 800
3	Elgin St/Greenway Street/Ardmore Street	Pavement markings	2 crosswalks, 2 stop bars, 100 lf yellow centerline markings	$ 1,600
4	Ardmore Street	Chicanes	2 landscaped chicanes and regulatory signage	$ 20,000
5	Ardmore Street at Bedford Avenue	Curb extensions	2 curb extensions, 2 ADA compliant curb ramps and extension of sidewalks	$ 25,000
5.1	Ardmore Street at Bedford Avenue	Stop bars	3 stop bars, 100 lf yellow centerline markings	$ 1,000
6	Thornton Street at Bedford Avenue	Traffic circle	1 Traffic circle and regulatory signage	$ 15,000
7	Thornton Street at Greenway Street	Chicanes	2 landscaped chicanes and regulatory signage	$ 20,000
				$ 102,900

ID	Haverford Street/Santa Fe Avenue Location	Improvement	Improvement Items	Cost
1	Haverford Street	Speed humps	2 speed humps and regulatory signage	$ 10,000
2	Santa Fe Avenue at Broadfield Road	Traffic circle	1 Traffic circle and regulatory signage	$ 15,000
				$ 25,000

ID	Waite Street Location	Improvement	Improvement Items	Cost
1	Waite Street/Mather Street intersection	Convert to "T" intersection	Reconstruction of intersection, new signage and pavement markings, 200 lf of sidewalk, guardrail and fencing within intersection area	$ 100,000
2	Waite Street at Lake Whitney	Sidewalk	1500 lf 4' wide asphalt sidewalk or stone dust pathway, 1400 lf 3 cable guardrail and fence	$ 150,000
3	Waite Street east of Whitney Avenue	Sidewalk	550 lf 4-5' wide concrete sidewalk	$ 55,000
4	Waite Street	Shared lane markings	40 sharrow pavement markings, 4 "Share the Road" signs	$ 9,200
				$ 314,200

ID	Mather Street Location	Improvement	Improvement Items	Cost
1	Mather Street, south side	Sidewalk	2300 lf 4' wide asphalt sidewalk or stone dust pathway, fence and guardrail improvements	$ 160,000
2	Mather Street	Speed feedback sign	2 signs	$ 10,000
3	Mather Street at Servoss Street	Crosswalk improvements	1 pedestrian refuge island, 1 marked crosswalk, 4 pedestrian crosswalk signs	$ 10,000
4	Mather Street west of Gessner Place	Sidewalk	150 lf 4-5' wide concrete sidewalk	$ 15,000
5.1	Mather Street at King Street	Stop sign upgrades	1 translucent stop sign	$ 200
5.2	Mather Street at Belmont Street	"No outlet" signage	1 freestanding sign, 1 street sign mounted placard	$ 400
5.3	NE corner of Mather Street at Belmont St	Curb ramp	1 ADA accessible curb ramp and curb extension	$ 5,000
5.4	Mather Street at Belmont Street	Raised crosswalks	2 raised crosswalks	$ 10,000
5.5	Mather Street at Belmont Street	Stop bar	Relocate 1 stop bar	$ 400
5.6	SE corner of Mather Street at Belmont Street	Curb extension	1 landscaped curb extension	$ 10,000
5.7	Belmont and King Street	Crosswalks	Install 2 marked crosswalks	$ 1,000
6	Mather Street at Farmington Canal Trail	Trail access	Approximately 200 lf 8' wide asphalt pavement	$ 50,000
7	Mather Street	Shared lane markings	44 sharrow pavement markings, 4 "Share the Road" signs	$ 10,000
				$ 282,000

ID	Treadwell Street Location	Improvement	Improvement Items	Cost
1	Treadwell Street west of Leeder Hill Drive	Sidewalk	1550 lf 4-5' wide concrete sidewalk	$ 155,000
1.1	Treadwell Street at Leeder Hill Drive	Crosswalk	1 marked crosswalk	$ 500
2	Treadwell Street at Lake Street	Crosswalk improvements	1 marked crosswalk, pedestrian refuge island, 4 crosswalk warning signs	$ 10,000
3	Treadwell Street	Shared lane markings	42 sharrow pavement markings, 6 "Share the Road" signs	$ 10,200
				$ 175,700

ID	Putnam Avenue Location	Improvement	Improvement Items	Cost
1	Putnam Avenue Dixwell Avenue to Newhall Street	Bicycle lanes	4000 lf lane striping, 8 bike lane pavement markings, 2 bike lane signs	$ 6,800
2	Putnam Avenue at Newhall Street	Curb extension	1 bulbout curb extension, 1 marked crosswalk	$ 10,000
3	Putnam Avenue east of Winnett Street	Sidewalk	150 lf 4-5' wide concrete sidewalk	$ 15,000
4	Putnam Avenue at Clifford Street	Crosswalk improvements	4 ADA accessible curb ramps, 2 curb extensions, remark existing crosswalks	$ 20,000
5	Putnam Avenue at Glendale Street	Curb and sidewalk improvements	30 lf new concrete or granite curb and concrete sidewalk, 1 new curb ramp, 1 no parking sign	$ 6,800
5.1	Putnam Avenue at Glendale Street	Curb extension	Extend curb and install new curb ramp	$ 10,000
5.2	Putnam Avenue at Carleton Street	Pavement markings	Apply angled pavement markings at intersection corners to designate no parking area	$ 1,000
6	Putnam Avenue at Whitney Ave	Bike Box	1 painted bike box, "Stop Here" markings	$ 1,000
7	Putnam Avenue east of Newhall Street	Shared lane markings	32 sharrow pavement markings, 2 "Share the Road" signs	$ 7,000
				$ 77,600

ID	Augur Street Location	Improvement	Improvement Items	Cost
1	Augur Street	Parking lane markings	3500 lf parking lane markings	$ 3,500
1.1	Augur Street	Parking signage	28 no parking signs, 8 parking signs	$ 7,200
2	Augur Street, Farnsworth to Rolfe	Sidewalk	500 lf 4-5' wide concrete sidewalk	$ 50,000
3	Augur Street at Barraclough Ave	Stop bar markings, stop sign upgrades	2 stop bar pavement markings, 2 vertical reflective strips for stop signs	$ 600
4	Augur Street at Carleton Ave	Stop bar markings, stop sign upgrades	3 stop bar pavement markings, 3 vertical reflective strips for stop signs	$ 900
				$ 62,200

ID	Mill Rock Road/Armory Street Location	Improvement	Improvement Items	Cost
1	Mill Rock Road at Playground	Playground warning signs	2 playground warning signs	$ 600
2	Mill Rock Road at Playground	Crosswalk improvements	1 raised crosswalk, 1 curb extension, 2 crosswalk warning signs	$ 10,000
3.1	Mill Rock Road at Prospect Street	Warning sign	1 W1-6R warning sign	$ 300
3.2	Mill Rock Road at Prospect Street	Pavement markings	1 stop bar, 1 marked crosswalk	$ 500
3.3	Mill Rock Road at Prospect Street	Traffic island	1 four foot wide island, 1 stop sign	$ 5,000
3.4	Mill Rock Road at Prospect Street	Stop sign upgrades	2 vertical reflective strips	$ 200
3.5	Mill Rock Road at Prospect Street	Trim vegetation	As needed	NA
4	Armory Street	Speedhumps	2 speed humps and regulatory signage	$ 10,000
5	Armory Street at Mill Rock Road	Curb ramp	1 ADA accessible curb ramp, 2 crosswalk warning signs	$ 2,600
6	Mill Rock Road and Armory Street	Shared lane markings	36 sharrow pavement markings, 4 "Share the Road" signs	$ 8,400
				$ 37,600