US Route 1

Greenwich/Stamford Operational Improvements Study

Volume Two: Public Involvement

May 2011

AECOM

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Introduction

1.1 Introduction

The overall purpose of this Operational Improvements Study is to develop a coordinated plan to improve traffic operations on Route 1, improve pedestrian safety, manage access, accommodate transit and enhance the corridor's economic potential. To achieve this goal, an active public involvement process was undertaken. Volume II of the US Route 1 Greenwich/Stamford Operational Improvements Study focuses on the public involvement process including early and continuing input from the community helping to shape the transportation improvements along the Route 1 corridor.

Public Involvement:

- *Actively involve stakeholders,*
- *Inform and educate public,*
- *Community input and support, and*
- *Develop a comprehensive plan.*

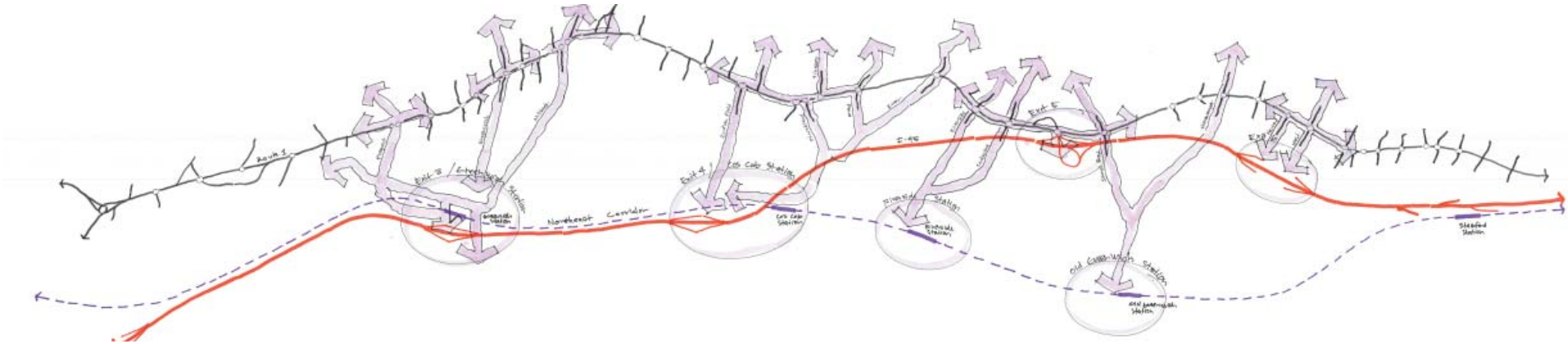
The first phase of the public involvement process was a Visioning Workshop (section 2.1) which occurred following completion of the Existing Conditions Analysis. The Visioning Workshop included stakeholder interviews and multi-day community meetings focusing on collectively forming a Corridor Framework Plan that guided the development of more detailed design concepts and transportation strategies. Key topics from the Visioning Workshop included community character areas, local community goals and objectives, land use, traffic mobility and multi-modal strategies.

The second phase of the public involvement process was a Design Workshop (Section 3.1) which focused on developing, designing and testing a range of potential projects and design concepts for the corridor which were consistent with the Corridor Framework Plan developed during the Visioning Workshop. The Design Workshop investigated a range of transportation improvement alternatives including intersection modifications, signage improvements, safety, access, multi-modal street design, roadway design, and land use. The goal of the Design Workshop was to develop a comprehensive plan that has input and support from the TAG and project stakeholders including the community.

Following the Design Workshop, TAG meetings and coordination meetings with CTDOT, the project team provided additional information regarding features of the design concepts as a Design Workshop follow up (Section 4.1). This follow up information included details on lane widths, two way left turn lanes, back-in angle parking, bicycle facility connectivity, roundabouts, pavement treatments, pedestrian phasing and road diets.

Appendix A includes the public notices for the Visioning Workshop and Design Workshop which were distributed to the public with information on meeting times, location, and how to participate. ***Appendix B*** includes the project newsletters which included project background and timeline, corridor facts, workshop updates and recaps, and design concepts and improvement alternatives.

Visioning Workshop Report



Visioning Workshop Report

US Route 1 Greenwich / Stamford Operational Improvements Study

South Western Regional Planning Agency

Urban Engineers
FHI, Inc.
AECOM

Final - November 2010

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1.0 Introduction

1.1 Purpose of this Study: The Many Roles of Route 1

Route 1, commonly known as The Post Road, serves a wide range of roles and functions as it connects from the New York State line into downtown Stamford, Connecticut. In Greenwich, it serves as a commercial and civic corridor for the community's office, retail and community institutions, connecting Downtown Greenwich and significant neighborhood centers such as Cos Cob. In Stamford, it is a neighborhood main street and commercial corridor accommodating big box commercial development, street-oriented retail, and urban housing. As a State-maintained highway, Route 1 serves a regional role as a commuter corridor and diversion route providing access to I-95 and commuter rail stations along the Metro-North's New Haven Line, and serves as a local alternative to I-95 and the Merritt Parkway.

These multiple and sometimes conflicting roles, as well as the varying land use character along Route 1, are at the core of this study. These multiple roles have, over time, contributed to increased congestion, decreasing safety, discouragement of alternative travel modes (walking, cycling, transit), and have had a deteriorating effect on community character. This study presents the opportunity to address these varied issues and to develop a coordinated plan for Route 1 which supports a collective community vision for its long-term development that balances traffic issues of access, flow, safety and multiple modes.

The purpose of this study is to develop a coordinated plan to adjust traffic operations along Route 1, to improve pedestrian safety, manage access, accommodate transit and enhance the corridor's economic potential and community character.

Purpose & Objectives

- Enhance operations of Route 1
- Improve safety for all users
- Support economic development
- Actively involve stakeholders
- Develop a short and long-term operational improvements plan

1.2 Overall Study Process

The overall study is divided into the following phases:

1. **Existing Conditions Analysis** – This is a background analysis that is intended to provide a through and clear understanding of the corridor including traffic operations, land use, safety, and multi-modal mobility. This provides the foundation for the rest of the project efforts.

2. **Visioning Workshop** – The Visioning Workshop was held June 14-17, 2010 and included a wide range of stakeholder interviews and community meetings designed to provide the opportunity for the community to help shape the direction of the plan.

3. **Design Workshop** – The Design Workshop will be conducted in the fall of 2010 and focused on developing, designing and testing a range of potential projects and design concepts for the corridor. The purpose of this workshop will be to establish a range of physical road design, land use, and the urban design approaches/solutions that are targeted to the key technical issues while meeting the overall "vision" for the corridor and each subarea or district.

4. **Implementation Plan and Final Report** - In the last phase of the project, Implementation Plan and Final Report, the project team will work to produce a final plan and supporting document that details the plan's recommendations and projects. This phase will begin in the fall following the Design Workshop and should be completed in early 2011.

Corridor Serves Many Roles…

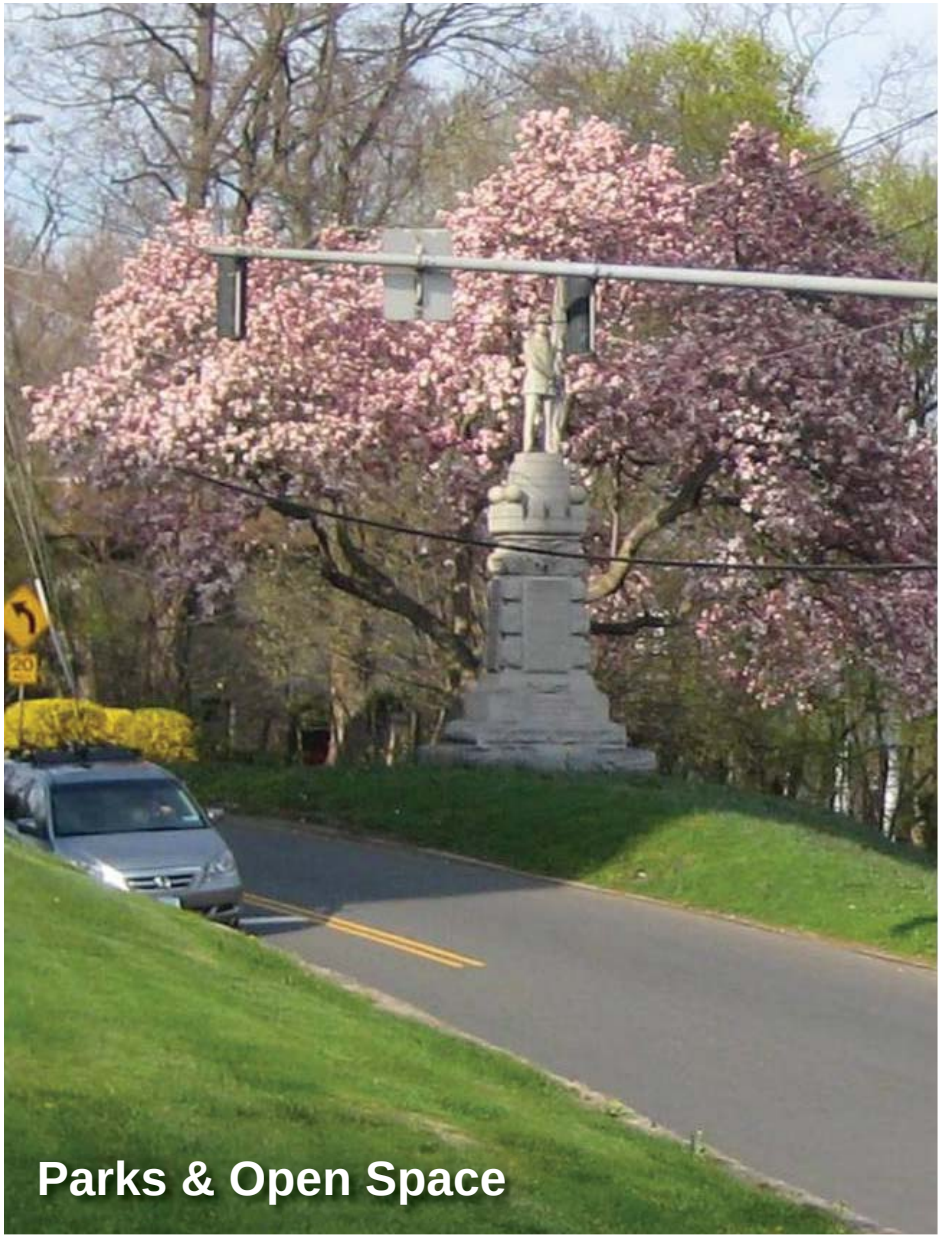
Corridor Serves Many Roles...

Corridor Serves Many Roles...

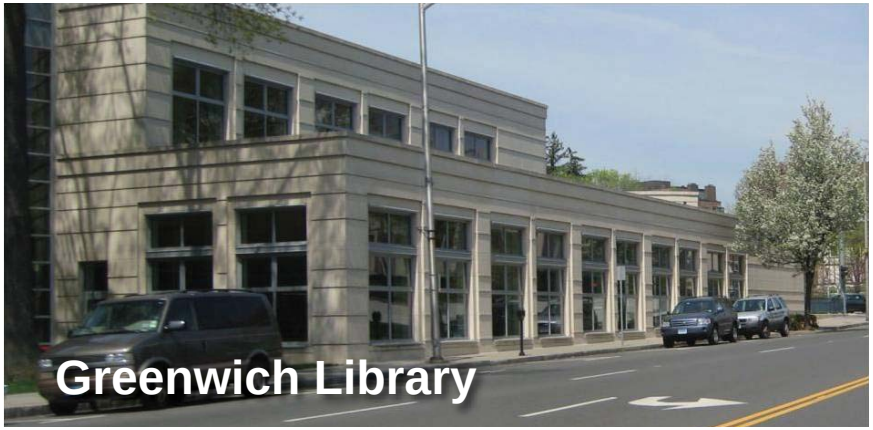
Neighborhood Schools

Neighborhood Businesses

Corridor Serves Many Roles...



Corridor Serves Many Roles...



Corridor Serves Many Roles...

Strip Commercial

Corridor Serves Many Roles...

Transit


On-street Parking


Children

Social Exchange

Pedestrians


Cyclists & Recreation

A Variety of Cross Sections

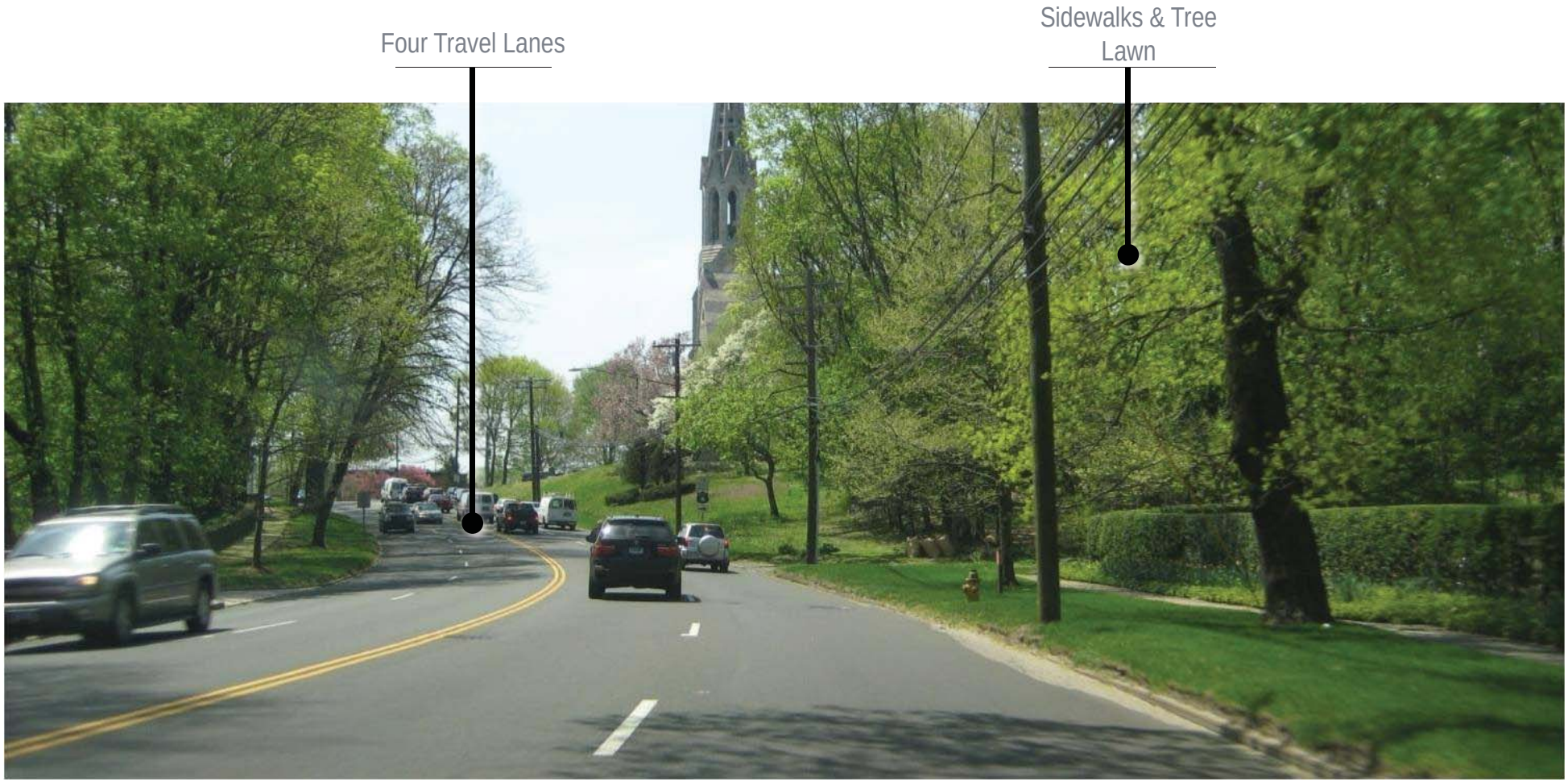
Street: 2 Lanes, on-street parking
Context: Urban Main Street - Stamford

A Variety of Cross Sections

Street: 5 Lanes

Context: Suburban Commercial Strip - Riverside/Stamford

A Variety of Cross Sections



Street: 4 Lanes

Context: Surburban Residential & Open Space - Greenwich

A Variety of Cross Sections

Street: 4 Lanes, On-street Parking

Context: Urban Main Street - Cos Cob / Greenwich

A Variety of Cross Sections

Street: 4 Lanes
Context: Surburban Commercial Strip

A Variety of Cross Sections

Street: 4 Lanes, Sidewalks on one side
Context: Suburban, Undeveloped

2.0 Visioning Workshop Process

2.1 Overview & Schedule

This Visioning Workshop Report outlines the activities and conclusions of the Visioning Workshop held June 14-17, 2010 in Greenwich, Connecticut. The workshop was held in a "studio" (at the Greenwich YWCA) where the project team conducted small stakeholder meetings, drew and tested initial concepts and ideas, toured the corridor, and facilitated larger public meetings. The purpose of the Workshop was to provide an early opportunity for the community to help shape the direction of the project, identify critical issues, and frame the development of detailed design concepts and transportation strategies. The Workshop was organized into a variety of activities that included individual stakeholder interviews, two public workshops, open-house team working sessions, corridor field investigations, and a Technical Advisory Group (TAG) debrief meeting.

2.2 Stakeholder Interviews

Pre-scheduled one-on-one stakeholder interviews were conducted by the project team. The interviews were conducted in the workshop studio to allow the full team to hear the discussions while testing ideas and concepts. The interviewees included a range of representatives from local jurisdictions, property owners, businesses, developers, neighborhood groups, and area agencies. They served to provide the team a diverse yet site specific understanding of the range of issues in the corridor.

Stakeholder Interviews

- Peter Berg – Greenwich RTM 8, Land Use Committee, Cos Cob Association
- Tom Bobkowski – Greenwich Board of Education
- Mike Bocchino – Byram Neighborhood Association
- James Boutelle – Transportation Association of Greenwich
- Ashley Braunthal – Greenwich Green and Clean Planning Committee, High School Intern
- Thomas Conelias – Chair, Greenwich RTM 3
- Don Conway - Greenwich RTM 2
- Vince DiMarco – Greenwich RTM 9, PGNA, Greenwich Safe Cycling
- Janice Domiziano – Greenwich Board of Education
- Fabiane Faria-Correa – Stamford West Side NRZ
- Glen Fenton – CTTransit – Stamford Division
- Mary Ferry – Chair, Greenwich RTM 5
- Diane Fox – Town of Greenwich, Planning and Zoning Dept.
- Margaret Freiberg – Greenwich RTM 7
- Betsy Frumin – Chair, Greenwich RTM 9
- Father Richard Futie – Sacred Heat Parish, Stamford West Side NRZ
- Suzanne Geiss Robbins – Chair, Greenwich RTM 2
- Tim Graham – Greenwich RTM 1, Public Works Committee
- Chip Haslun – Cos Cob Neighborhood Association
- Ben Heckscher – Area Resident
- Mary Hull – Greenwich Green and Clean Planning Committee

- Coleen Jenkins – Chair, Greenwich RTM 6
- Bob Kick – Greenwich Fire Department
- Mary Hope Lewis – Greenwich RTM 11
- Bob Lichtenfeld – Greenwich Board of Education
- Arline Lomazzo – Greenwich RTM 6
- Richard May – Therese Saint Clair
- Ralph McDermid – Greenwich RTM 7
- Bob McKnight – Chair, Greenwich RTM 4
- Laurel Meath – Area Resident
- Mary Ann Morrison – Greenwich Chamber of Commerce
- Sylvester Pecora, Sr. – Chickahominy Neighborhood Association
- David Rafferty – Old Greenwich Association
- Stu Reiver – Area Resident
- Larry Roberts – Greenwich Fire Department
- Fifi Sheridan – Chairwoman, Greenwich Historic District Commission
- Gary Silberberg – Greenwich Conservation Commission
- Sgt. John Slusarz – Greenwich Police Department
- Heidi Smith – POCD Downtown Committee
- Valerie Stauffer – Chair, Greenwich RTM 7
- Louisa Stone – Greenwich RTM 10, Former Planning & Zoning member
- Jim Syrotiak – Greenwich E.M.S.
- Leslie Tarkington – BET
- Peter Tesei – First Selectman, Town of Greenwich
- John Toner – Greenwich RTM 9, POCD Committee
- Bob Tuthill – Greenwich RTM 4
- Julia Wade – Stamford Partnership
- Kathleen Walsh – Stamford Partnership

2.3 Public Workshops

Two public visioning sessions were held during the workshop, one in Greenwich and one in Stamford. These public meetings were focused on gathering ideas and issues from the broader public in the corridor in order to form the vision and target the key areas of concern. These sessions included an educational presentation that covered the overall goals of the study, corridor issues, and the principles of multi-modal transportation and “complete streets”. This was followed by a broad visioning exercise to identify community “values”, and small group break-out sessions focused on identifying specific issues and opportunities.

2.4 TAG Debrief

On the final day of the workshop, the team debriefed the TAG on the work and ideas generated during the week. This meeting served to identify and refine the goals and objectives of the study based on the information gathered from the stakeholder interviews, public visioning session, and initial design concepts developed. The project team used this work session to confirm with the TAG the overall direction of the study and identify the remaining critical issues that need further investigation.

Technical Advisory Group (TAG)
Alex Karman – SWRPA
Sue Prosi – SWRPA
Floyd Lapp – SWRPA
Melissa Evans – Town of Greenwich
Amy Siebert – Town of Greenwich
Diane Fox – Town of Greenwich
Dave Thompson – Town of Greenwich
Mani S. Poola – City of Stamford
Todd Dumais – City of Stamford
Melanie Zimyeski – CTDOT Planning
Kate Rattan – CTDOT Planning

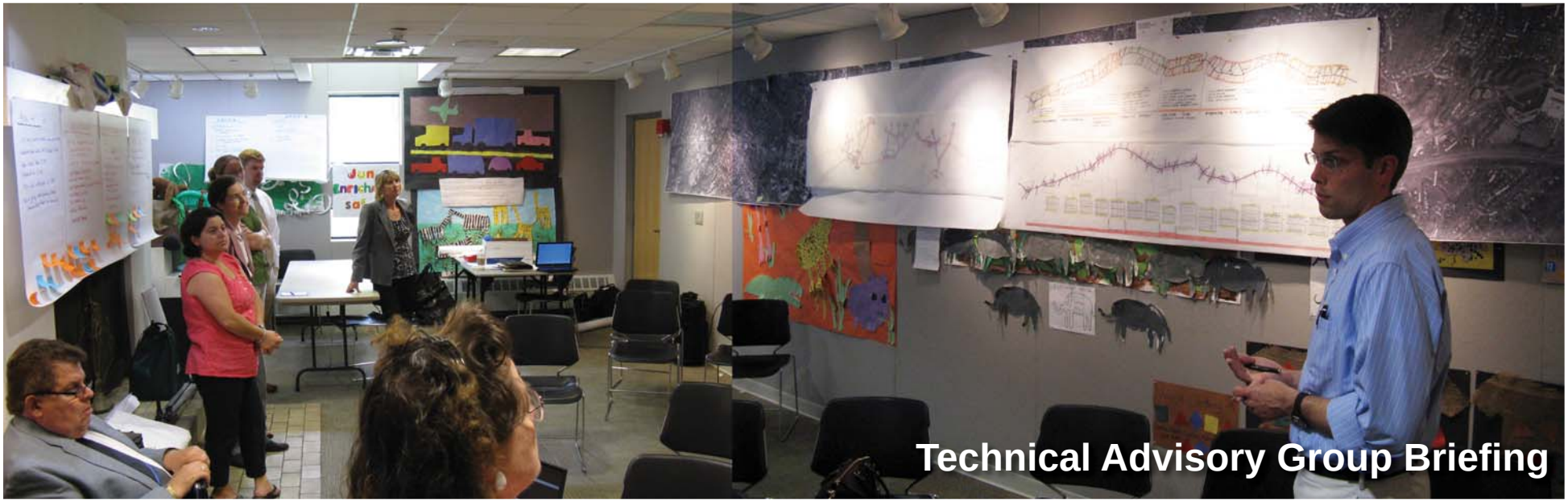
Stakeholder Interviews

Public Visioning - Greenwich

Public Visioning - Greenwich

Stakeholder Interviews

Public Visioning - Stamford



Technical Advisory Group Briefing

3.0 What We Heard

The following notes document the comments, ideas and visions gleaned from the public meetings and stakeholder interviews. During these meetings the public was asked to define what they "value" about the corridor, things that should be "protected", things that should be "changed", and what their "100 Year Vision" for the corridor might look like.

GROUP A:

100 Year Vision

1. Bike lanes
2. No Flooding
3. More residential mixed-use
4. More Street trees
5. More public transport (Bus/trolley)
6. Elect. Dock Station - for electric cars
7. Hotels - Small

MULTI-MODAL (4)

- Pedestrian Access
- Ample sidewalks for walkers
- Ample Public Transportation
- Bicycle Access

Community Character (9)

- Greenwich - feel
- Introduction to Greenwich
- Graceful Buildings (in Greenwich)
- Churches (Diamond Hill, St Cats, Christ Church, etc.)
- Greenwich H.S. Stadium
- Community feel
- Residential/commercial character: exciting/fun place to be
- Historic Character - Downtown Cos Cob
- No ugly parking lots

100 Year Vision

- Better Public Transportation
- More frequent buses
- Charter bus running along Rt 1. From Train Station, Alvord + Mall
- More streetscape & Beautification
- Gateway after Laddins Rock
- More Green/sidewalks/benches etc.

Mix of Use & Services (9)

- post office, good supermarkets (shop Rite)
  (keeps commercial area from spreading to quiet residential neighborhood)
- Cos Cob Village - post office, school, Library, Stores
- Central Greenwich - Library, stores
- Hyatt Hotel & common residential
- Local shopping / resources (Library, bank, drug store, etc
- Close Proximity to Services
- It's a Commercial Hub
- Business Infrastructure
- Commercial Benefits

Protect.

1. green O.S. / parks, Lawns circles (Hyatt, Lawn)
2. Historic Character
3. "Village" feel
4. Mix commercial/Res. / Inst. (YMCA, Lib, schools, churches)
5. Stone walls. / Monuments.
6. Street lamps (the two @ top of Ave.)

Changed

1. Access into B of A building on W. main & Wilson
   Turning lane in (left)
2. Roundabout at Jackie Robinson Park
3. West + Main - needs turn lanes (lefts)
4. People Run light @ harvard. Address Speed
   North between Greenwich + West
   South " West to Harvard
5. Crosswalk at Alvord and Harvard
6. Parking supply + enforcement < La Marq. Church
7. Timing of light at Hazel
8. Difficult to get out of Rose Park ~~Street~~
9. Consider One way pairs

3.1 Public Workshops

Stamford Community Values

Mix of Land Use (9)
- Residential able to walk to services
- Service Businesses
- Some residential
- Retail & shopping
- Near businesses
- Retail
- Retail and housing
- Business in walking distance
- Mixed neighborhoods

Traffic Mobility (7)
- I-95 alternative
- Wide road
- Alternate route to I-95
- Traffic movement
- Major road
- Easy Route to other side of Stamford
- Easy access

Quality of Life (4)
- Need to get people out of cars
- Quality of Life
- Important for future to have street life
- Great potential

Multi-Modal (4)
- Pedestrian Access
- Ample sidewalks for walkers
- Ample public transportation
- Bicycle access

Stamford Small Group Table Sessions

To Protect
- Character of neighborhood
- Parks and access
- Alvord and W.Main works well
- Protect Businesses
- Corner Park and Yearwood center

To Change
- Access into Bank of America building on W. Main and Wilson – need turning lane for lefts in
- Roundabout at Jackie Robinson Park
- West and Main needs left turn lanes
- People run light at Harvard – Address speed: (North between Greenwich Town line and West Avenue & South between West Avenue and Harvard)
- Crosswalk at Alvord and Harvard
- Parking supply at La Marqueta and the Church
- Timing of the light at Hazel
- Difficult to get out of Rose Park
- Consider one-way pairs
- Bump outs to prevent parked cars on corners

100 Year Vision
- Better public transportation
- More frequent buses
- Charter bus running along Route 1 from Train station to Alvord to Mall
- More streetscape and beautification
- Gateway after Laddins Rock
- More trees/sidewalks/benches, etc.

Greenwich Community Values

Community Character (9)
- Greenwich – feel
- Introduction to Greenwich
- Graceful buildings (in Greenwich)
- Churches (Diamond Hill, St Catherine's, Christ Church, etc)
- Greenwich H.S. Stadium
- Community feel
- Residential/Commercial character: exciting/ fun place to be
- Historic Character – downtown Cos Cob
- No ugly parking lots

Mix of use and services (9)
- Post Office, good supermarkets (shop rite), (Keeps commercial area from spreading to quiet residential neighborhood)
- Cos Cob Village – post office, school, library, stores
- Central Greenwich – library, stores
- Hyatt Hotel and common residential
- Local shopping/resources (Library, bank, drug store etc)
- Close proximity to services
- It's a commercial hub
- Business infrastructure
- Commercial benefits

Mobility (6)
- It's an arterial connector from east-west
- Alternative route when I-95 is delayed or closed
- Fewer trucks than I-95
- Alternative to I-95
- It's a local alternative to I-95

- Ease of going short/moderate distances (from one side of town to the other easily)

Green Space (5)
- Put's Hill Crocuses
- Treescape – most of the route
- Relatively good level of green space
- Wide sidewalks
- Green space between many buildings

Greenwich Small Group Table Sessions Group A:

To Protect
- Green open space/parks, lawns, churches (Hyatt, lawn)
- Historic Character
- "Village" feel
- Mix commercial/residential/institution (YMCA, Library, schools, churches)
- Stone walls/monuments
- Street lamps (the 2 at top of the Avenue)

To Change
- Reduce number of car dealers and banks
- Fewer office building (large, ugly) more store/brick
- Access of side streets (Edgewood, Deerfield, bad angles etc)
- Streetscape in strip centers (put parking behind the buildings)
- Egress/access to Exit 5
- Reduce curb cuts in Cos Cob (Splashes car wash)
- Add bus shelters
- Redesign Millbank/Maple intersection
- Want bulbouts (Lafayette and Church)
- Add bike lanes

Missing
- Add bus shelters
- Roundabout in Cos Cob at the hub
- Sidewalks/crosswalks in Port Chester – near Western Jr. Highway
- Grocery Store in Cos Cob
- Better Drainage
- Accessible public parking (central Greenwich)
- Bike Parking – all corridor
- Solar docking station (electric cars)
- Trees
- Streetscape
- Bike lanes
- New Public spaces

100 Year Vision
- Bike Lanes
- No flooding
- more residential mixed use
- more street trees
- more public transportation (bus/trolley)
- electric docking station for electric cars
- small hotels

Greenwich Small Group Table Sessions Group B:

To Protect
- Trees
- Green spaces
- Bikeable
- pocket parks

To Change
- Maple/Millbank intersection
- Eliminate the left turn on Maple
- Roundabout entering Port Chester (redesign existing circle)
- Exit 5
- Mason/Church Intersection backs up and blocks driveways
- Top of Greenwich Avenue – roundabout? Too many signals
- Right turn lane (WB onto Hillside at the High School)
- Library (Deerfield intersection) – hill gives poor visibility
- A&P/Stop n/ Shop – can't get into the shopping center
- At the Hyatt Hotel it is difficult to turn left onto Putnam
- Exit 5 to St Catherine's – need sidewalks. There are too many curb cuts

3.2 Stakeholder Interviews

Corridor-Wide

- Need to do something about left turns in and out of driveways
- Residents plan routes to allow for all right turns
- Lane shifting causes safety problem
- Better access to school for children is needed
- More green space and trees
- Coordinate construction projects – particularly drainage projects
- Need something to tie communities together
- Too much Strip Development
- Need development standards, and targeted areas
- Red Light running
- School drop off areas need to be addressed
- There are too many curb cuts
- Need someone to take care of landscaping
- Need a common look for aesthetics
- Better access management is needed
- Site distance issues at intersections
- Connect traffic signals between Greenwich and Stamford for EMS
- Widening will make things worse

Multi-Modal

- Complete “missing” sidewalks
- More crosswalks are needed – particularly between Holly Hill and Prospect
- Pedestrian waiting on corners feel unsafe due to cars cutting corners
- Provide Bicycle accommodations throughout
- Need bicycle accommodations and signs
- Sewer grates are not bike friendly
- Improve Bus pull off areas and shelters
- Bus locations need to be better defined
- School buses are not “cool” and are too early
- Improve bus connections between corridor and bus stations
- Use AVL system to provide real time information at all bus stops
- Install far side stops with sufficient space to pull in
- Trolley the entire length like in Savannah
- Exit 5 is miserable for pedestrians
- Use bike boxes at intersections

Problem Locations

- A&P and Stop n’ Shop
- Whole Foods
- Maple/Maher/Millbank intersection is confusing
- Prospect/Edgewood
- Left turns at Rt 1 and Mason/Church
- Exit 5
- Dearfield/Field Point
- Neil Way/McDonalds/Riverside Shopping plaza – confusion and blocking
- Old Post #6 and Route 1 – width and curvature of road is problem
- Queuing at Strickland/Cross/Sinoway
- Orchard/Mead – queuing/safety/left turns
- Indian Field – site distance issue – out of towners don’t know to use jug – need signs
- Mid block crossing at Chicken Joe area for kids
- Byram Circle is a problem

Cos Cob

- Trucks on Strickland
- Pedestrian Travel is important
- Focus on safety
- Speed table at Orchard and Kent

Stamford West

- Would like to see Stillwater become commercial
- Try to separate heavy commercial and residential
- Green space and trees
- Cytec building should be preserved
- Needs to become a more friendly place for people to go
- More landscaping and lighting
- Pedestrian safety issues at several intersections in Stamford
- Congestion is a problem
- Stopped buses block traffic
- Accommodate pedestrians – create pedestrian connections
- Accessibility is important
- Examining one-way pair between West Avenue and Harvard Avenue

Miscellaneous Issues

- Cut back shrubs at Route 1 and Dearfield/ Field point
- Tree branches blocking view of traffic signal at Route1 and River Road as you travel north
- Police have a traffic count on Palmer Hill bridge
- Will be speed enforcement on corridor in July. Previous speeds as high as 80 recorded
- Curve just south of Lockwood is a design problem
- Analysis for High school auditorium is flawed
- Missing site plan for “the hole”
- Site plan for Bank at Orchard/Mead

3.3 Public Input Summary

The following charts organize all of the input and comments from the public meetings and stakeholder interviews into a set of broad themes or goals discerned as the community's top values for the corridor. These goals include; Community Character, Mix of Land Use, Traffic Mobility, and Multi-Modal. Under each of these goals the comments, ideas and visions documented from the public have been sorted into three categories; To Protect, To Change, and the "100 Year Vision". These charts provide a clear summary of the community concerns and long-term goals for the corridor and will serve as a checklist and touchstone for the development of the Plan's recommendations.

Value & Protect

Community Character

Need to get people out of cars
Quality of life
Important for future to have street life
Great potential
Greenwich – feel
Introduction to Greenwich
Graceful buildings (in Greenwich)
Churches (Diamond Hill, St Catherine's, Christ Church, etc)
Greenwich H.S. Stadium
Community feel
Residential/commercial character: exciting/fun place to be
Historic character – downtown Cos Cob
Put's Hill crocuses
Treescape – most of the route
Relatively good level of green space
Green space between many buildings
Green space and trees
Character of neighborhood
Parks and access
Historic character
"Village" feel
Stone walls/monuments
Street lamps (the 2 at top of the Avenue)
Trees

Mix of Land Use

Residential able to walk to services
Service businesses
Some residential
Retail & shopping
Near businesses
Retail
Retail and housing
Business in walking distance
Mixed neighborhoods
Post office, good supermarkets (shop rite), (Keeps commercial area from spreading to quiet residential neighborhood)
Cos Cob Village – post office, school, library, stores
Central Greenwich – library, stores
Hyatt hotel and common residential
Local shopping/resources (library, bank, drug store etc)
Close proximity to services
It's a commercial hub
Business infrastructure
Commercial benefits
Protect businesses
Mix commercial/residential/institution (YMCA, library, schools, churches)
Green spaces
pocket parks
Green open space/parks, lawns, churches (Hyatt, lawn)
Corner Park and Yerwood center
Cytec building should be preserved

Traffic Mobility

I-95 alternative
Wide road
Alternate route to I-95
Traffic movement
Major road
Easy Route to other side of Stamford
Easy access
It's an arterial connector from east-west
Alternative route when I-95 is delayed or closed
Fewer trucks than I-95
Alternative to I-95
It's a local alternative to I-95
Ease of going short/moderate distances (from one side of town to the other easily)
Alvord and W.Main works well
Focus on safety

Multi-Modal

Pedestrian access
Ample sidewalks for walkers
Ample public transportation
Bicycle access
Accessibility is important
Bikeable
Pedestrian travel is important

Change

Community Character

Streetscape in strip centers (put parking behind the buildings)

Want bulbouts (Lafayette and Church)

Better drainage

Trees

Streetscape

New public spaces

More landscaping and lighting

Needs to become a more friendly place for people to go

Cut back shrubs at Route 1 and Dearfield/ Field point

Tree branches blocking view of traffic signal at Route1 and River Road as you travel north

Mix of Land Use

Parking supply at La Marqueta and the Church

Fewer office building (large, ugly) more store/ brick

Accessible public parking (central Greenwich)

Too much strip development

Would like to see Stillwater become commercial

Try to separate heavy commercial and residential

Bump outs to prevent parked cars on corners

A&P/Stop n/ Shop – can't get into the shopping center

There are too many curb cuts

A&P and Stop n' Shop traffic access

Whole Foods traffic access

Neil Way/McDonalds/Riverside Shopping plaza – confusion and blocking

Access into Bank of America building on W. Main and Wilson – need turning lane for lefts in

Reduce curb cuts in Cos Cob (Splashes car wash)

Traffic Mobility

West and Main needs left turn lanes

People run light at Harvard – address speed: (North between Greenwich Town line and West Avenue & South between West Avenue and Harvard)

Difficult to get out of Rose Park

Egress/access to Exit 5

Redesign Millbank/Maple intersection

Access of side streets (Edgewood, Deerfield, bad angles etc)

Maple/Millbank intersection

Eliminate the left turn on Maple

Mason/Church Intersection backs up and blocks driveways

Right turn lane (WB onto Hillside at the High School)

Library (Deerfield intersection) – hill gives poor visibility

At the Hyatt Hotel it is difficult to turn left onto Putnam

Need to do something about left turns in and out of driveways

Lane shifting causes safety problem

Maple/Maher/Millbank intersection is confusing

Prospect/Edgewood

Left turns at Route 1 and Mason/Church

Curve just south of Lockwood is a design problem

Dearfield/Field Point

Old Post #6 and Route 1 – width and curvature of road is problem

Queuing at Strickland/Cross/Sinoway

Orchard/Mead – queuing/safety/left turns

Indian Field – site distance issue – out of towners don't know to use jug – need signs

Byram Circle is a problem

Multi-Modal

Crosswalk at Alvord and Harvard

Add bus shelters

Add bike lanes

Add bus shelters

Sidewalks/crosswalks in Port Chester – near Western Jr. Highway

Bike lanes

Bike parking – all corridor

Solar docking station (electric cars)

Better access to school for children is needed

Connect traffic signals between Greenwich and Stamford for EMS

School drop off areas need to be addressed

Exit 5 is miserable for pedestrians

Pedestrian waiting on corners feel unsafe due to cars cutting corners

Provide bicycle accommodations throughout

Need bicycle accommodations and signs

Sewer grates are not bike friendly

Improve bus pull off areas and shelters

Bus locations need to be better defined

School buses are not "cool" and are too early

Improve bus connections between corridor and bus stations

Stopped buses block traffic

Accommodate pedestrians – create pedestrian connections

Pedestrian safety issues at several intersections in Stamford

Exit 5 to St Catherine's – need sidewalks.

There are too many curb cuts

Mid block crossing at Chicken Joe area for kids

100 Year Vision

Community Character

More streetscape and beautification

Gateway after Laddins Rock

More trees/sidewalks/benches, etc.

No flooding

more street trees

Need something to tie communities together

Need someone to take care of landscaping

Need a common look for aesthetics

No ugly parking lots

Wide sidewalks

Mix of Land Use

small hotels

more residential mixed use

More green space and trees

Need development standards, and targeted areas

Grocery Store in Cos Cob

Reduce number of car dealers and banks

Traffic Mobility

Better access management is needed

Widening will make things worse

Coordinate construction projects – particularly drainage projects

Examining one-way pair between West Avenue and Harvard Avenue

Top of Greenwich Avenue – roundabout? Too many signals

Consider one-way pairs

Roundabout entering Port Chester (redesign existing circle)

Roundabout in Cos Cob at the hub

Roundabout at Jackie Robinson Park

Speed table at Orchard and Kent

Multi-Modal

Better public transportation

More frequent buses

Charter bus running along Route 1 from Train station to Alvord to Mall

Bike Lanes

more public transportation (bus/trolley)

electric docking station for electric cars

Complete “missing” sidewalks

More crosswalks are needed – particularly between Holly Hill and Prospect

Use AVL system to provide real time information at all bus stops

Install far side stops with sufficient space to pull in

Trolley the entire length like in Savannah

Use bike boxes at intersections

4.0 Design Framework Analysis

Since the 1600s, Route 1 has been known as the Boston Post Road, or Post Road, initially serving as the mail delivery route between New York City and Boston. Over time it evolved into one of the first highways in the United States and in Connecticut became a vital transportation link between the cities and towns along the Connecticut coast.

This study focuses on Route 1 between Stamford and Greenwich Connecticut. The historic role of Route 1 has changed over time as technology and growth have urbanized the area along the corridor and Route 1 is no longer the only transportation corridor in the area.

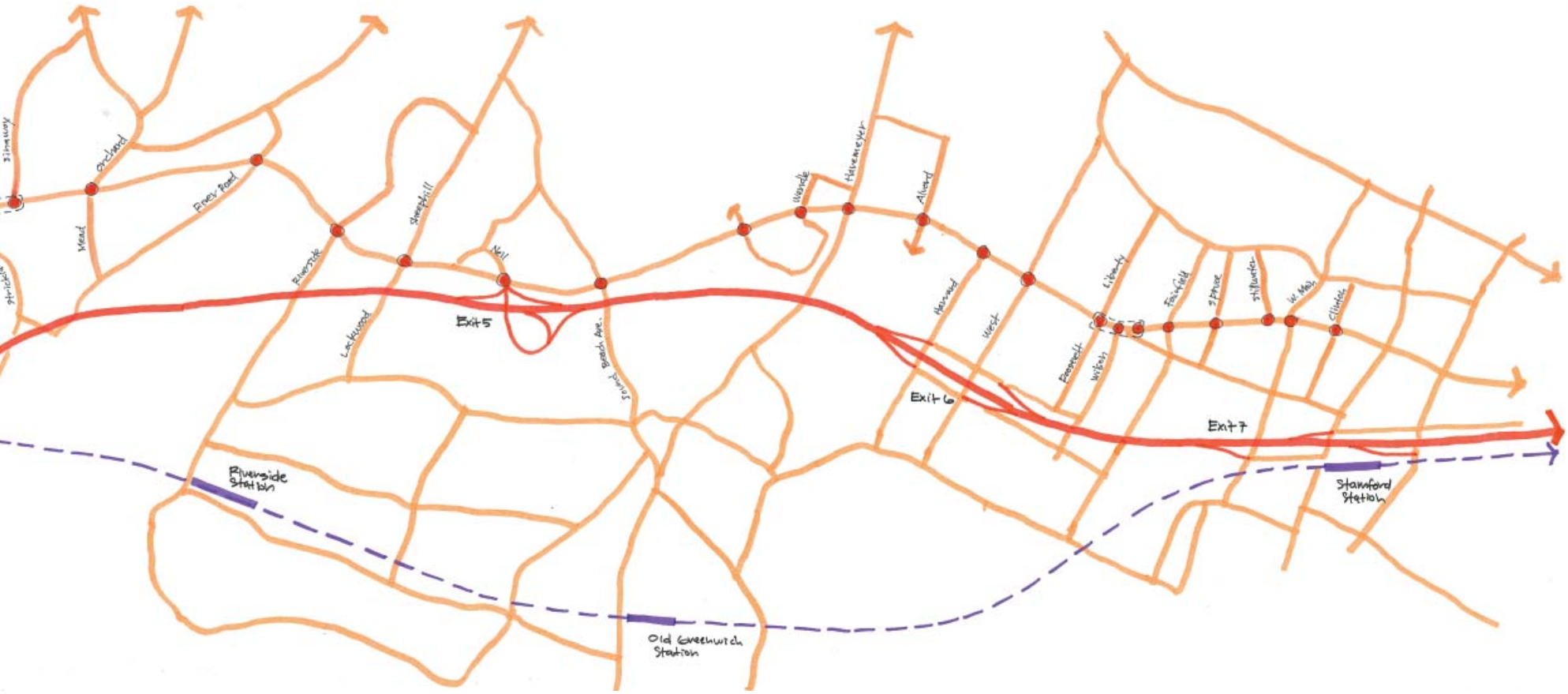
Today, Interstate 95 runs parallel to Route 1 and functions as the primary regional transportation corridor. Additionally, the Merritt Parkway to the north provides another parallel highway connecting New York State and Connecticut. Metro-North's New Haven Line, with five stations in the study area, provides an important transit connection to the New York area, serving as an alternative to vehicular travel in the corridor.

The evolving role of Route 1 is the core issue of this study. Its historic role and importance positioned it as the catalyst for urban development and growth. On Route 1 the Town of Greenwich and the City of Stamford have grown, reshaping the corridor as a neighborhood main street, a downtown commercial district, a village cross roads, a civic and institutional address, and a suburban commercial strip. Yet, in many ways Route 1 still functions like a highway and new development continues to struggle with the competing needs of vehicles, pedestrians, cyclists, and transit.

This Design Framework Analysis focuses on the physical context of the corridor in order to define a "framework" to structure the public input and technical analysis into a set of corridor design concepts and operational recommendations.

4.1 Three Corridors

Route 1 operates within the context of three parallel corridors; Route 1, Interstate 95, and Metro-North's New Haven Line. Together these corridors represent the primary transportation routes and/or alternatives in the area for regional mobility. While each corridor is different and serves a particular role, all three are interrelated.



Metro-North's New Haven Line

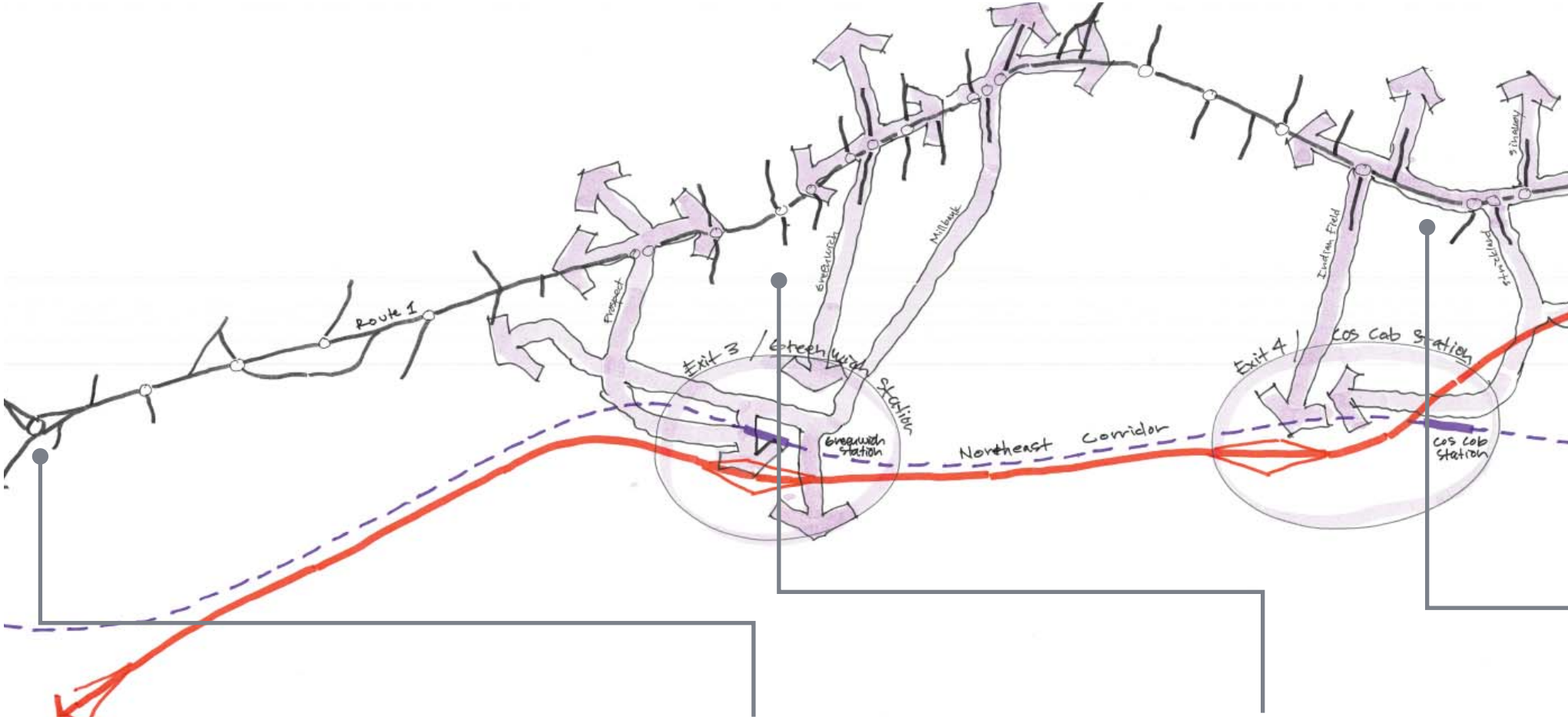
Metro-North's New Haven Line provides a commuter transit connection between New York City and Connecticut. In the study area there are five stations; Greenwich, Cos Cob, Riverside, Old Greenwich and Stamford. While this transit corridor provides an important and needed alternative to both Route 1 and I-95, it also represents a significant vehicular destination for park-n-ride and drop-off transit riders, impacting peak hour access and operations on both corridors.

Interstate 95

I-95 represents a relatively recent transportation addition to the area (1950s) and is the primary regional facility for vehicular travel. In the study area there are six exits (Exits 2-7) that connect the interstate to the local street network. With little land (and therefore development) south, between I-95 and the Long Island Sound, traffic to and from these exits is generally coming from or going to the north, crossing or utilizing Route 1. In extreme cases such as Exit 5, I-95 exits right onto Route 1, concentrating a significant regional traffic flow in a very constrained location.

Route 1

Route 1 weaves along the coast line and is supported by a limited network of local roads. This local network is constrained by topography and a series of rivers and inlets that lead to the Long Island Sound. These waterways, in particular Cos Cob Harbor, limit regional connectivity, making Route 1 and I-95 as the only "east-west" options. The local road network is a result of the historic pattern of rural farm roads. They connect to Route 1 at a wide range of odd angles and off-sets that further complicate "modern" mobility and create very few local routing options that do not require the use of at least some portion of Route 1.



4.2 Corridor Confluence

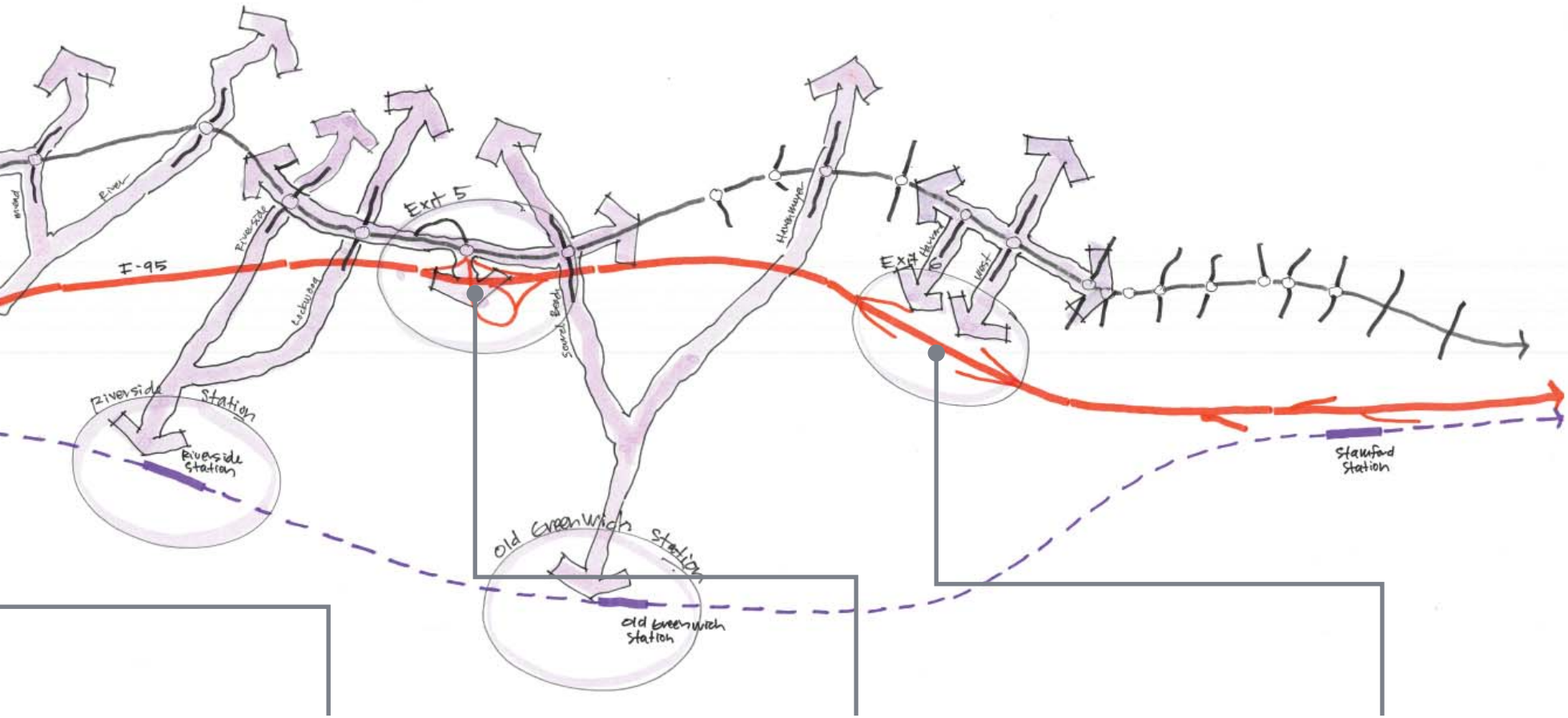
The physical and functional interrelationship between these three corridors has created several areas of "confluence" where the users of each overlap, concentrating vehicular traffic. These areas of confluence have a unique and negative impact on Route 1 because its range of uses (businesses, schools, churches, neighborhoods, etc.) and users (pedestrians, transit riders, cyclists, and drivers).

Port Chester/Byram Circle

This traffic circle at the New York/Connecticut state line brings together a number of key routes and local roads at the crossing of the Byram River. The number of connecting roads and range of entering speeds result in a confusing and inconsistent intersection with high crash rates.

Milbank to Prospect

The close proximity of I-95 Exit 3 and the Greenwich Train Station place pressure on the several key roads that provide access from Route 1. The Milbank intersection at Route 1 in particular is problematic given the close spacing of the Maher, Milbank and Maple intersections and the use of Milbank as a direct route to I-95 and the commuter rail station.



Indian Field to Strickland

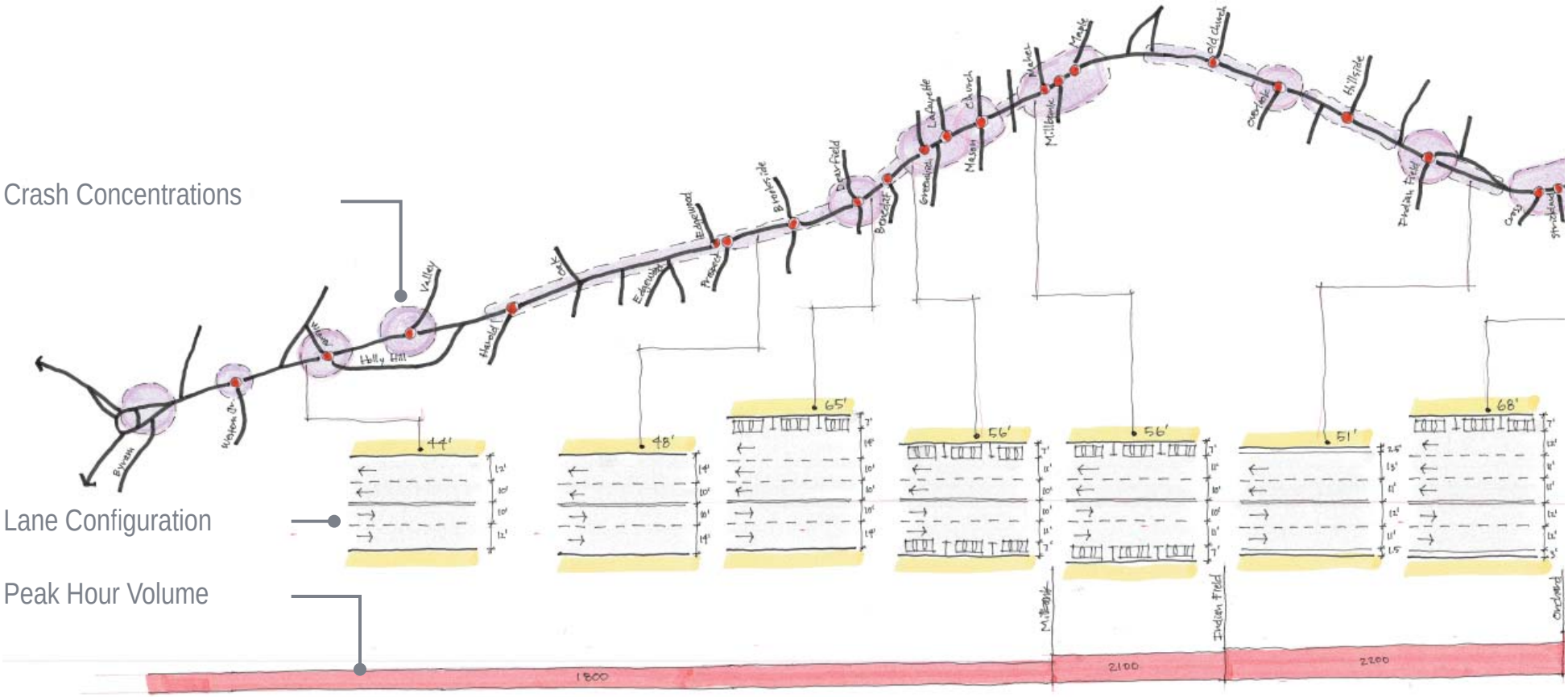
These are key routes to both I-95 Exit 4 and the Cos Cob Train Station. The Indian Field intersection employs a "jug handle" approach for south-bound left turns to I-95 to accommodate the volume of left turns. The one-way operation of Cross Lane northbound reflects the desire to protect alternatives to Indian Field from high volume use. The Strickland intersection is at the heart of the Cos Cob commercial "hub" and is one of three closely spaced "T" intersections in this active commercial node.

Exit 5

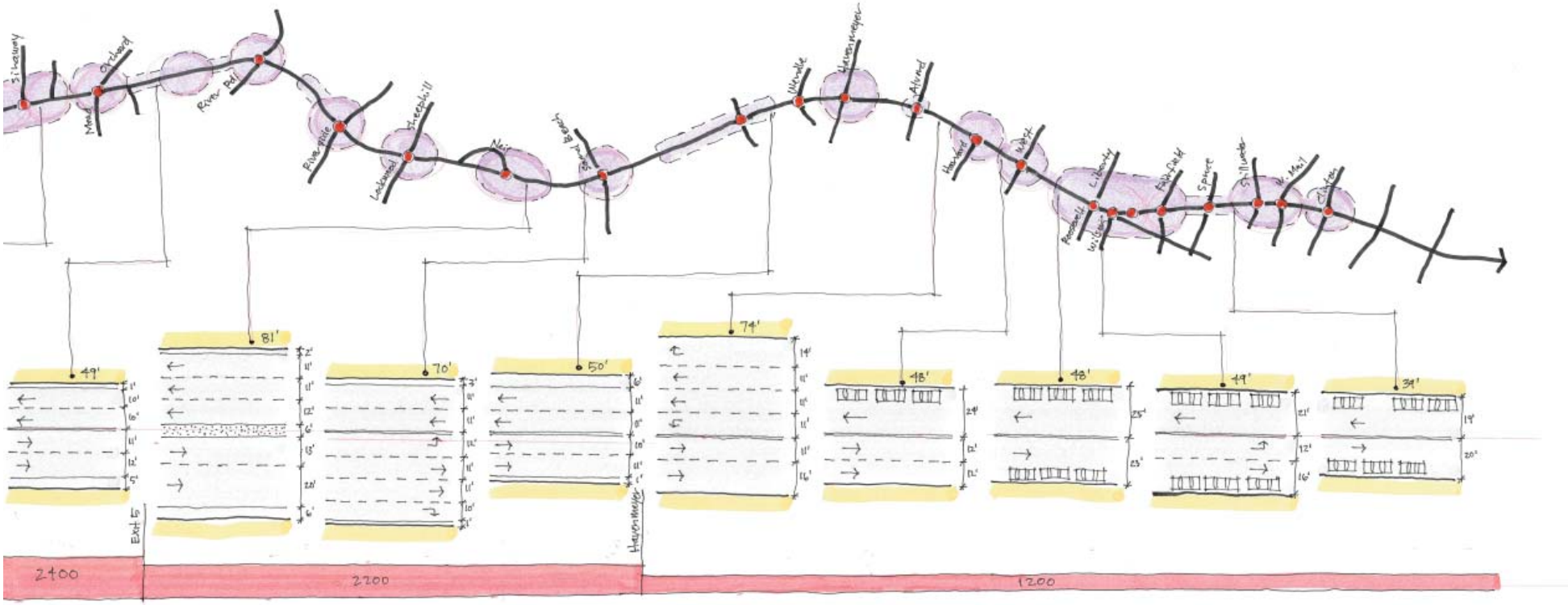
Exit 5 is a notorious location known for its congestion, impacted business access, and pedestrian hostility. It sits between the Riverside and Old Greenwich Stations with key roads to these stations such as Sound Beach and Lockwood "bookending" the exit north and south on Route 1. Exit 5 sit directly adjacent to Route 1 concentrating all I-95-bound traffic in one location with limited redesign alternatives.

Harvard to West

These two roads connect Route 1 (Main Street in the West Side Neighborhood) to I-95 Exit 6 and Stamford Hospital. West Avenue serves as an important north-south connection in west Stamford.



4.3 Corridor Operational Comparison



Crashes

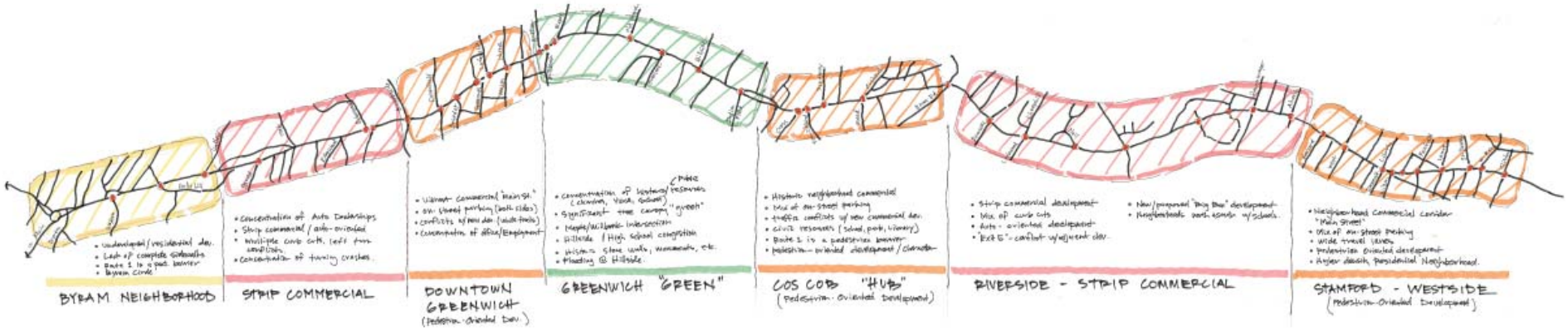
The purple areas represent the relative occurrence of vehicle crashes along the corridor. The obvious concentrations are occurring at the key intersections corresponding with the "areas of confluence'. In addition there are several lengths of the corridor with higher crash occurrence which may be a result of the lack of left turn lanes and multiple curb cuts for commercial development.

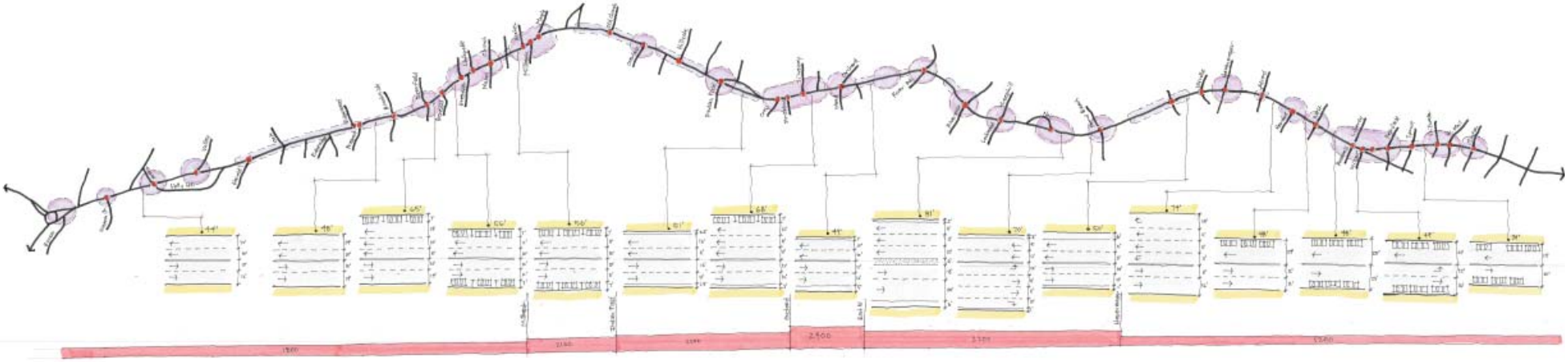
Lane Configuration

Within the study area Route 1 exhibits a wide range of lane configuration and roadway width ranging from 81 feet (at Exit 5) to 39 feet (Main Street in Stamford). This range of configuration gives a mixed message to drivers; sometimes Route 1 is a main street with on-street parking and pedestrian activity requiring slower speeds, at other times Route 1 is a highway with as many as six travel lanes accommodating higher speeds. The transitions between these areas lacks appropriate "cues" to the driver that the character of the road and surrounding land use is changing, this encourages higher speeds in "slow speed" areas.

Peak Hour Volume

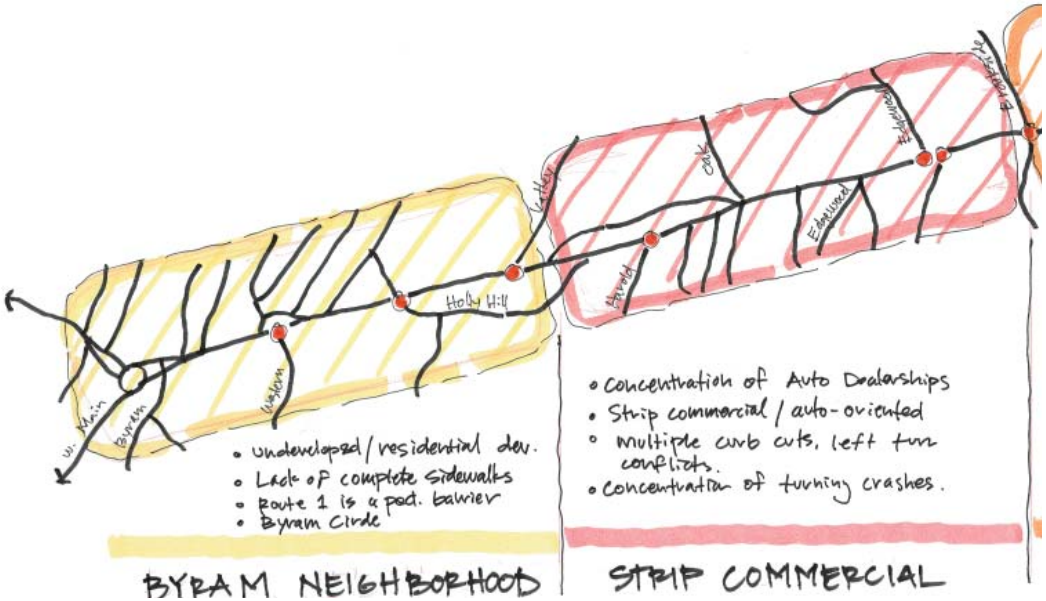
Just as the lane configuration varies so does the corridor volume. The peak hour volume ranges from 1200 to 2400 vehicles depending on location. Comparing these volumes against the lane configuration suggests that there are significant portions of the corridor that have more lane capacity than what is needed for the corridor's volume. In particular there are segments on the east and west ends of the corridor that have four-lanes of capacity with relatively low volumes. In these areas it might be possible to reconfigure those lanes to eliminate extra through travel lanes and repurpose them as left turns and/or bicycle lanes.

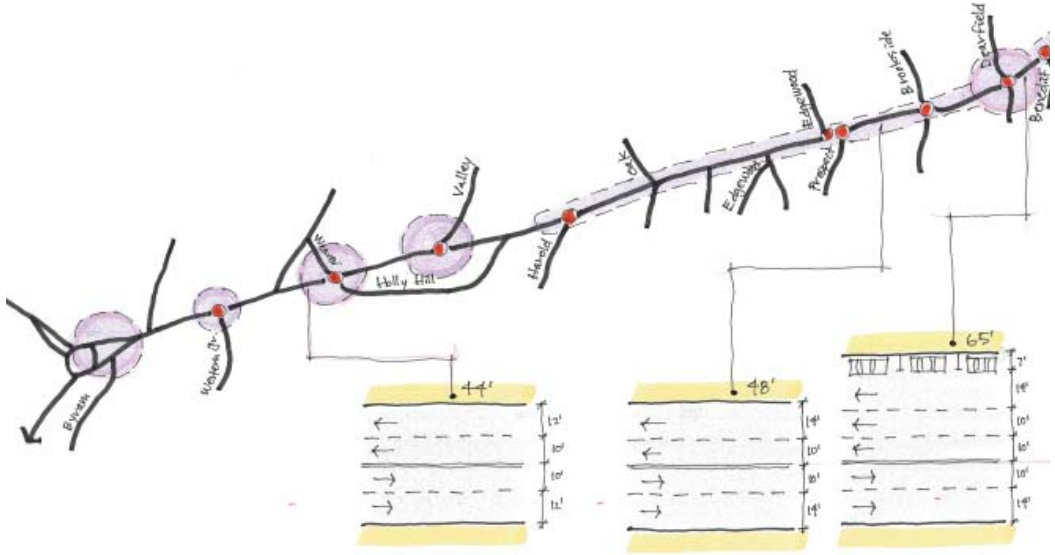




4.4 Corridor Framework

The Route 1 corridor is not a singular place but a series of places with unique characteristics. This Corridor Framework diagram identifies, maps and describes these “places” in order to recognize the broader context in which Route 1 exists and establish a “framework” for guiding decisions about the design and operation of Route 1.



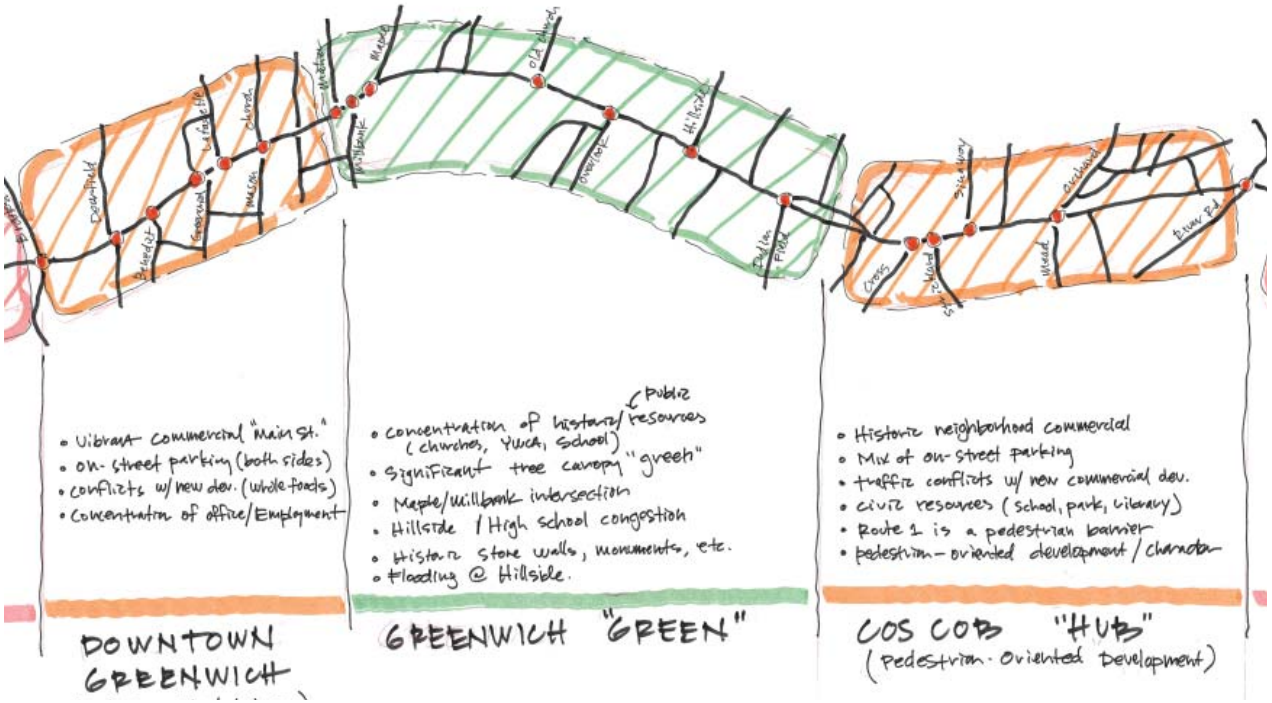


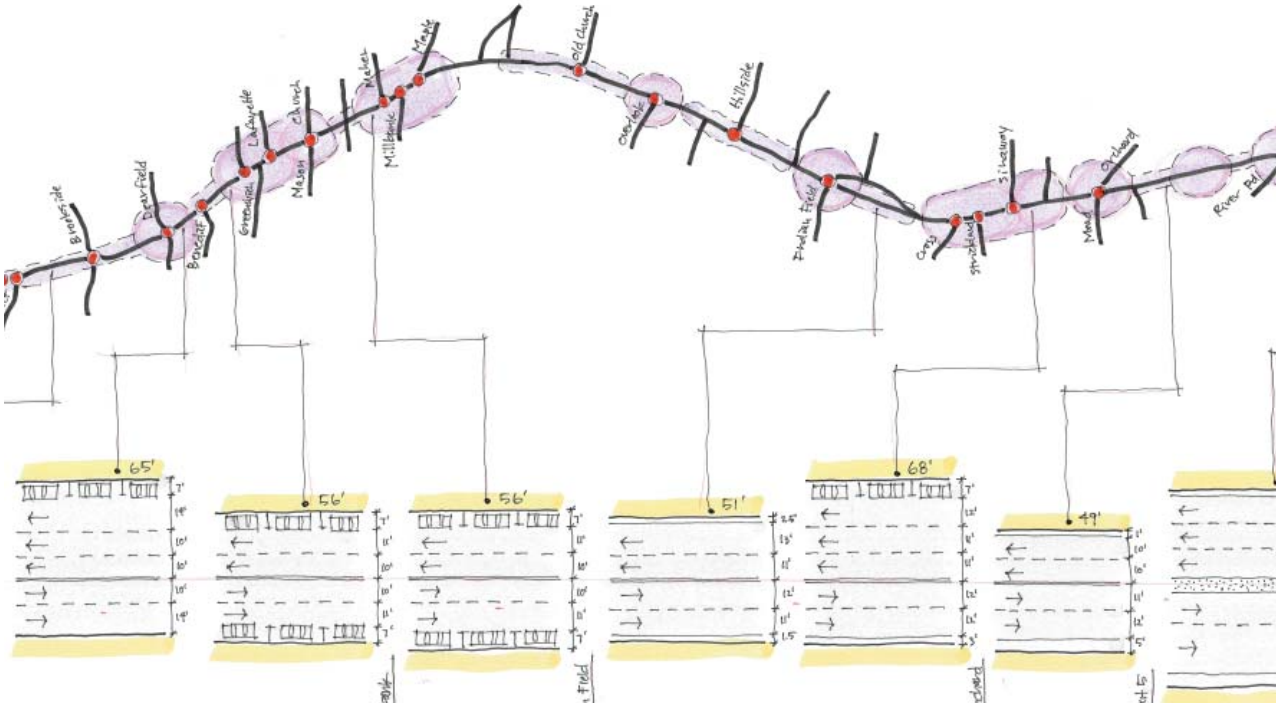
Byram Neighborhood

This is the westernmost neighborhood in Greenwich. Here Route 1 runs through the Byram Neighborhood with local schools on both sides separated by Route 1. Along the corridor is a mix of undeveloped land and strip commercial uses. The four-lane cross section is auto-oriented and lacks a complete sidewalk system on both sides. The Byram Circle sits at the New York/Connecticut state line and is a locally notorious traffic issue with its numerous connections and high traffic speeds.

Strip Commercial – Greenwich

Between Byram and Downtown Greenwich is a section of strip commercial from Valley to Brookside. This section includes a concentration of auto dealerships and auto-oriented commercial uses with multiple curb cuts. The four-lane cross section coupled with the number of left turns into various driveways has resulted in a high number of turning crashes. Solutions may include converting the four-lane cross section into a three-lane section (one lane in each direction and a dedicated left turn lane) providing additional space for bicycle lanes and/ or sidewalks.





Downtown Greenwich

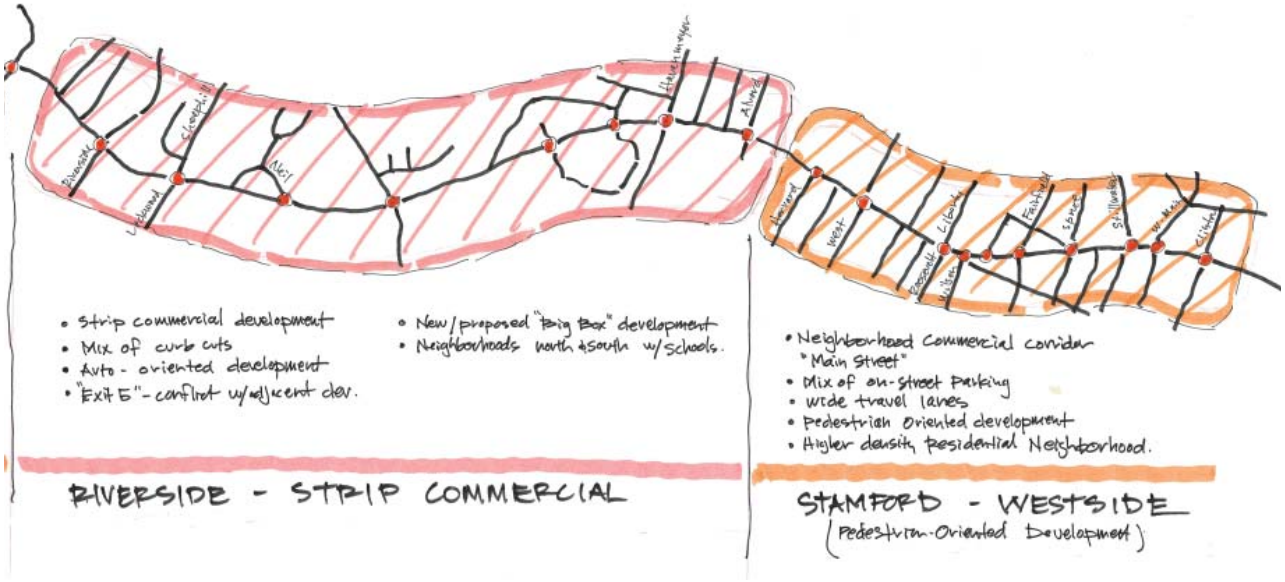
Downtown Greenwich is a vibrant commercial "main street" and has the highest concentration of development along the corridor with a range of retail, office, and civic uses oriented to the corridor in an urban main street form (buildings close to the street, parking behind, wide sidewalks and street trees). Recent developments (i.e Whole Foods) with new driveways violate the existing block structure resulting in growing access conflicts and turning movements on and off of Route 1.

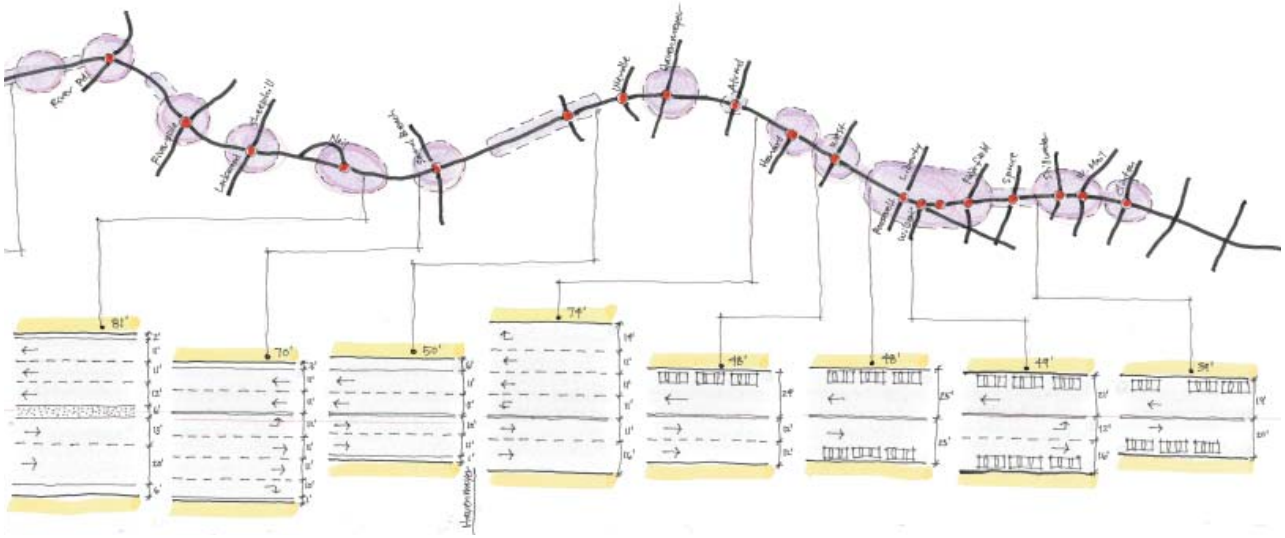
Greenwich "Green"

The segment from Milbank to Indian Field includes the corridor's highest concentration of civic and historic resources including; Greenwich High School, Christ Church, YWCA, Temple Sholom, Second Congregational Church, etc. The unique character of this segment includes a significant canopy of trees, lawns, stone walls, monuments and historic architecture. Traffic issues include the Maple/Milbank intersection, the Hillside intersection (Greenwich High School), and reoccurring flooding at the creek near Hillside.

Cos Cob "Hub"

Between the Orchard and Strickland intersections is the Cos Cob "Hub", a historic neighborhood commercial center. This street-oriented commercial district includes the Cos Cob Elementary School, Cos Cob Library, U.S. Post Office, Fire Station and a park. With a mix of on-street parking, five lanes of traffic, and multiple curb cuts, Route 1 acts as a pedestrian barrier. This should be a traffic calmed and pedestrian-oriented district that supports street-oriented infill, reuse and redevelopment.





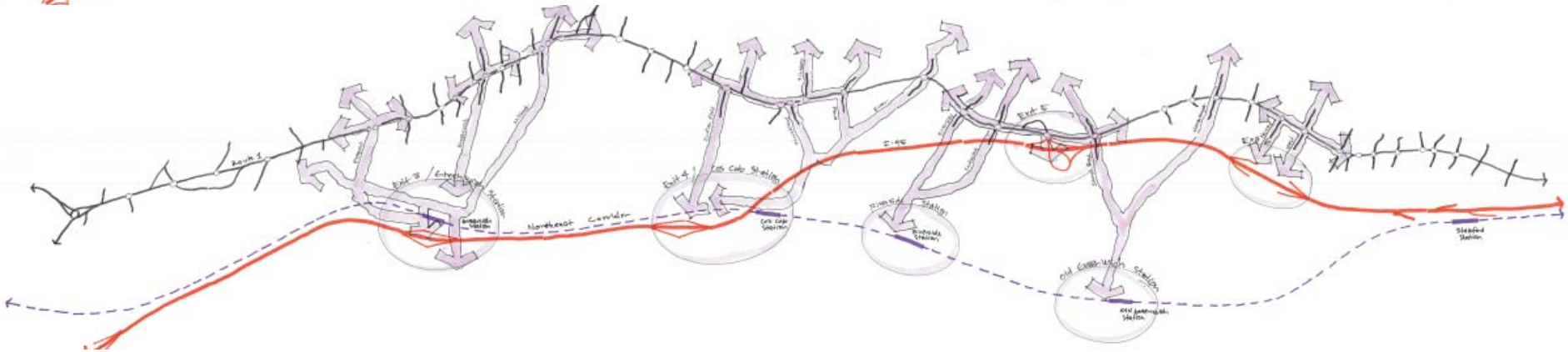
Riverside to Stamford – Strip Commercial

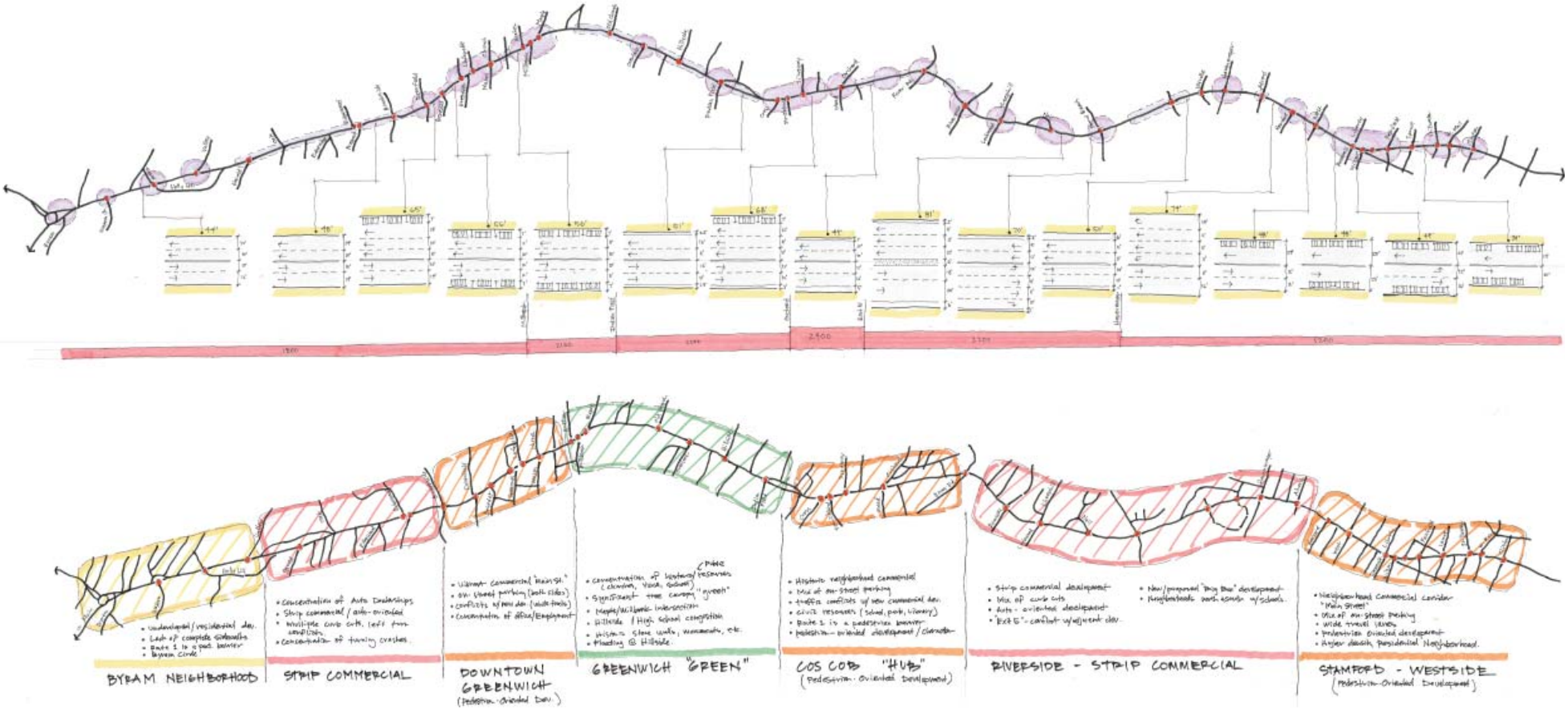
Route 1 from Riverside to Harvard is another segment characterized primarily by strip commercial transitioning from Greenwich to Stamford. The Riverside neighborhood extends north and south of the corridor and is divided by auto-oriented development and the "highway" character of Route 1. It is here that Route 1 and I-95 are the closest with Exit 5 connecting directly to Route 1 resulting in a concentration of traffic and suburban commercial development.

Stamford – West Side

Route 1 from Harvard into downtown Stamford transforms back into a commercial and neighborhood "main street" that is the center of the Stamford West Side Neighborhood. The street includes a mix of on-street parking and wide travel lanes. Development along this segment includes a mix of residential, street-oriented retail and civic uses creating a vibrant neighborhood center. Solutions should look to better define the street, repurposing extra space for bicycle lanes, bulb-outs and/or wider sidewalks.

4.5 Corridor Graphic Comparison




BYRAM NEIGHBORHOOD
• Undeveloped / residential dev.
• Lack of complete sidewalks
• Route 1 is a ped. barrier
• Byram Circle
STRIP COMMERCIAL
• Concentration of Auto Dealerships
• Strip commercial / auto-oriented
• Multiple curb cuts, left turn conflicts
• Concentration of turning crashes
DOWNTOWN GREENWICH
(Pedestrian-Oriented Dev.)
• Ultimate commercial "main st."
• On-street parking (both sides)
• Conflicts w/ new dev. (visit-trails)
• Concentration of office/Employment
GREENWICH "GREEN"
• Concentration of historic/public resources (churches, town, school)
• Significant tree canopy "green"
• Maple/Milbank intersection
• Hillside / High School congestion
• Historic stone walls, monuments, etc.
• Flooding @ Hillside
COS COB "HUB"
(Pedestrian-Oriented Development)
• Historic neighborhood commercial
• Mix of on-street parking
• traffic conflicts w/ new commercial dev.
• civic resources (school, park, library)
• Route 1 is a pedestrian barrier
• pedestrian-oriented development / character
RIVERSIDE - STRIP COMMERCIAL
• Strip commercial development
• Mix of curb cuts
• Auto-oriented development
• "Exit 5" - conflict w/ event dev.
• New/proposed "big box" development
• Neighborhoods walk-scale w/ schools
STAMFORD - WESTSIDE
(Pedestrian-Oriented Development)
• Neighborhood Commercial corridor "Main Street"
• Mix of on-street parking
• wide travel lanes
• Pedestrian oriented development
• Higher density residential Neighborhood.

Design Workshop Summary Report

US Route 1 Greenwich/Stamford Operational Improvements Study

Design Workshop Summary Report

South Western Regional Planning Agency

March 21, 2011

Urban Engineers
FHI
AECOM

Final Draft- March 2011

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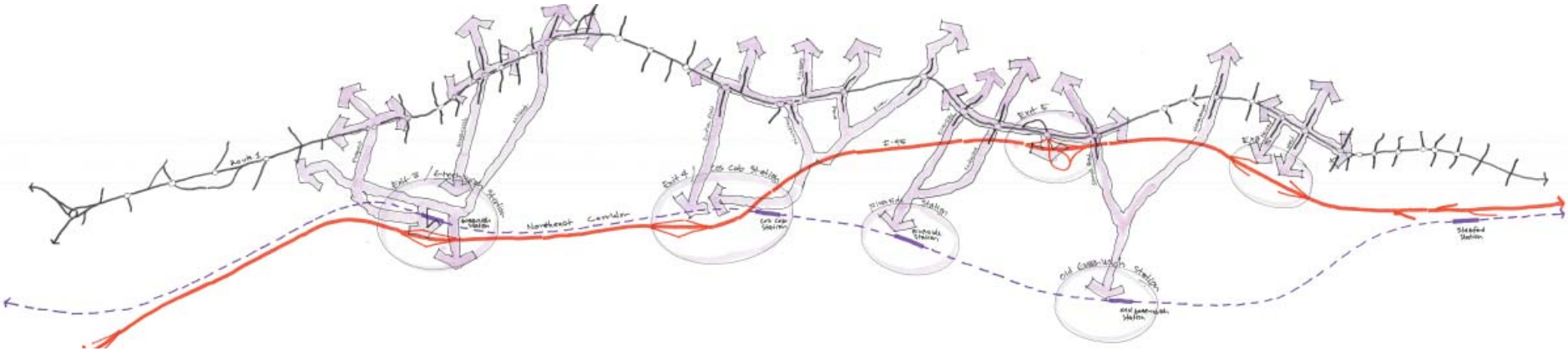


1.0 Introduction

1.0 Introduction

1.1 Purpose of this Study: The Many Roles of Route 1

Route 1, commonly known as The Post Road, serves a wide range of roles and functions as it connects from the New York State line into downtown Stamford, CT. In Greenwich, it serves as a commercial and civic corridor for the community's office, retail and civic institutions, connecting Downtown Greenwich and significant neighborhood centers such as Cos Cob. In Stamford, it is a neighborhood main street and commercial corridor accommodating big box commercial development, street-oriented retail, and urban housing. As a State-maintained highway, Route 1 serves a regional role as a commuter corridor providing access to I-95 and commuter rail stations along the Northeast Transit Line, and serves as a local alternative to I-95 and the Merritt Parkway.

These multiple and sometimes conflicting roles, as well as the varying land use character along Route 1, are at the core of this study. These multiple roles have, over time, contributed to increased congestion, decreasing safety, discouragement of alternative travel modes (walking, cycling, transit), and a deteriorating community character. This study presents the opportunity to address these varied issues and to develop a coordinated plan for Route 1 which supports a collective community vision for its long-term development that balances traffic issues of access, flow, safety and multiple modes.

The purpose of this study is to develop a coordinated plan to adjust traffic operations along Route 1, to improve pedestrian safety, manage access, accommodate transit and enhance the corridor's economic potential and community character.

Purpose & Objectives

- Enhance operations of Route 1
- Improve safety for all users
- Support economic development
- Actively involve stakeholders
- Develop a short and long-term operational improvements plan

1.2 Overall Study Process

The overall study is divided into the following phases:

1. **Existing Conditions Analysis –** This is a background analysis that is intended to provide a through and clear understanding of the corridor including traffic operations, land use, safety, and multi-modal mobility. This provides the foundation for the rest of the project efforts.

2. **Visioning Workshop –** The Visioning Workshop was held June 14-17, 2010 and included a wide range of stakeholder interviews and community meetings designed to provide the opportunity for the community to help shape the direction of the plan.

3. **Design Workshop –** The Design Workshop was held October 26-28, 2010 and focused on developing, designing and testing a range of potential projects and design concepts for the corridor. This workshop established a range of physical road design, land use, and the urban design approaches/solutions that are targeted to the key technical issues while meeting the overall "vision" for the corridor and each subarea or district.

4. **Implementation Plan and Final Report -** In the last phase of the project, Implementation Plan and Final Report, the project team will work to produce a final plan with supporting document that details the plan's recommendations and projects. As part of this phase, the project team will work with CTDOT and the community's to refine the concepts developed during the design workshop. This phase will begin in early 2011 and should be completed in the spring of 2011.

Next Steps

This Design Workbook serves as completion of the third phase of the project and is intended to provide the basis for the development of an Implementation Plan and Final Report. Previously, the project team has prepared reports for the other phases of the project: Phase 1: Existing Conditions and Phase 2: Visioning Workshop.

In the last phase of the project, Implementation Plan and Final Report, the project team will work to refine the concepts developed during the workshops into more definitive plans addressing previously identified design issues/details as well as new design issues that develop during the refinement process. Ultimately the goal of this last phase is the development of an implementation plan that contains short-term, mid-term and long-term projects that when combined will produce a Route 1 that improves safety and is consistent with the community's vision.

The last phase will begin in early 2011 and should be completed during the spring of 2011.


Office


Office


Main Street Retail


Main Street Retail
innovation

Corridor Serves Many Roles...


Places to Live - Single Family

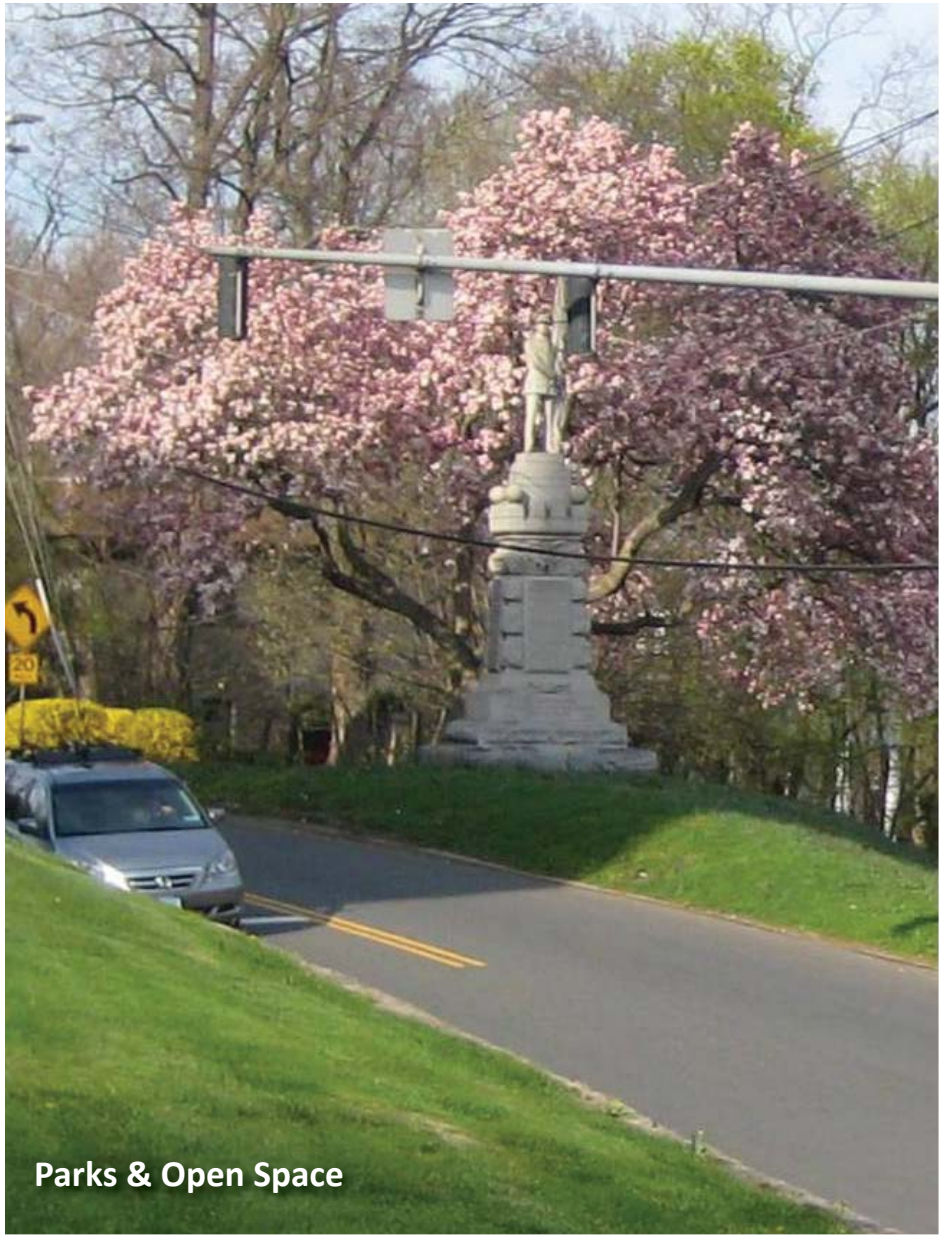

Places to Live - Multi Family

Places to Live - Multi Family

Neighborhood Schools

Neighborhood Businesses

Corridor Serves Many Roles...




Greenwich Library


YMCA

Corridor Serves Many Roles...

Strip Commercial

Strip Commercial

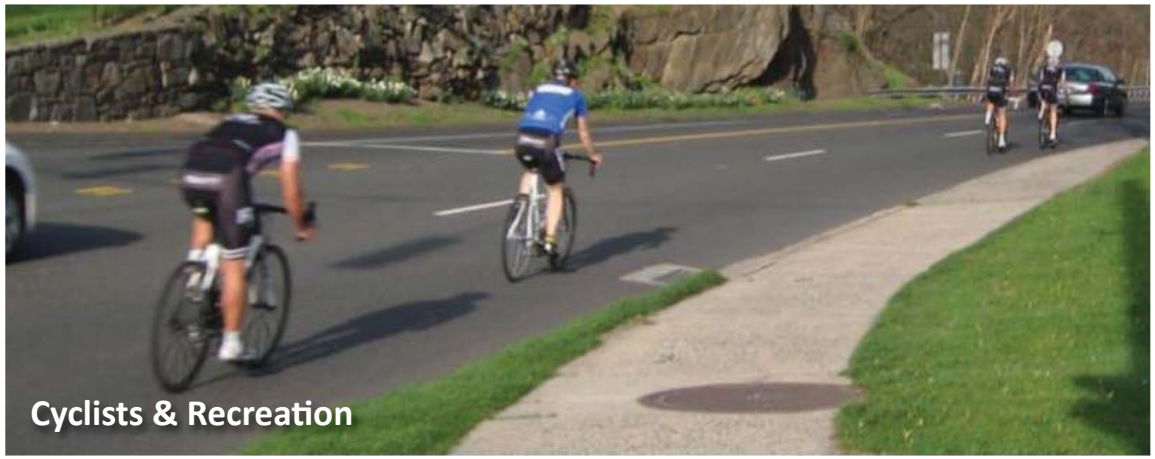
Transit


On-street Parking


Children

Social Exchange

Pedestrians


Cyclists & Recreation

A Variety of Cross Sections

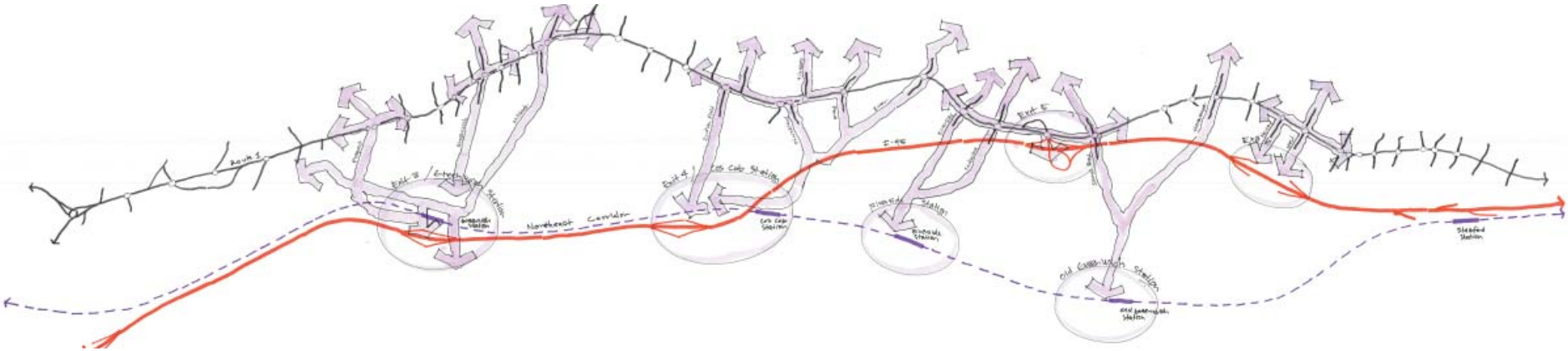
Street: 4 Lanes
Context: Suburban Residential & Open Space - Greenwich

Street: 4 Lanes, On-Street Parking
Context: Urban Main Street - Cos Cob /Greenwich

A Variety of Cross Sections

Street: 4 Lanes
Context: Suburban Commercial Strip

Street: 4 Lanes, Sidewalks on one side
Context: Suburban, Undeveloped



2.0 Design Workshop Process

2.0 Design Workshop Process

2.1 Overview & Schedule

This Design Workshop Report outlines the activities and conclusions of the Design Workshop held October 26-28, 2010 in Greenwich, Connecticut. The workshop was held at the Eastern Greenwich Civic Center where residents, business owners, land owners, and commuters participated in design workshops by sharing thoughts and concerns regarding the preliminary design concepts and recommendations for the final plan developed by the project team. The purpose of the Workshop was to provide an opportunity for the community to review the developing ideas, identify critical outstanding issues, and frame the development of final plans for the corridor reshaping. The Workshop was completed with a Public Meeting where the study team reported their progress and presented the improvement concepts developed during the workshop.

The Workshop included a three day open-house forum, one-on-one meetings with participants, team working sessions, coordination meeting with the Town of Greenwich and SWRPA, a Public Meeting on the final day, and a Technical Advisory Group (TAG) debrief meeting.

2.2 Public Input

- Pedestrian safety was a key concern of many of the people visiting the workshop. The recent fatality in the vicinity of the Byram Circle was referred to many times, and the need to address pedestrian safety throughout the corridor was emphasized.
- The desire to address traffic congestion and safety at the intersection of Route 1 with Exit 5 from I-95 was noted on several occasions, both by members of the general public, as well as town representatives.
- Many attendees asked if the project would address the issues/problems with the Byram Circle citing that all previous attempts to address the issues there had been in vain.
- Issues related to the congestion around the Whole Foods supermarket was mentioned several times
- The need for a pedestrian crosswalk at the intersection of Route 1 and Maple Avenue was noted
- The safety concerns regarding the intersection of Route 1 and West Avenue, as well as other Stamford intersections were noted by several attendees as well as recent congestion problems at the West Main - Greenwich Ave intersection
- There were numerous attendees who responded positively to the concepts developed during the workshop both during the workshop and at the public meeting

2.3 TAG Debrief

On the final day of the workshop, the team debriefed the TAG on the work and ideas generated during the week as well as the feedback received from the public during the course of the workshop and at the public presentation. The meeting also served as an opportunity for the project team to receive initial thoughts on the concepts and items/ideas that need to be further investigated or refined. It was decided at the end of the meeting that the next steps would include the project team developing the design workshop summary (this document) and then meeting with CTDOT to discuss design issues.

Technical Advisory Group (TAG)

Alex Karman – SWRPA
Sue Prosi – SWRPA
Floyd Lapp – SWRPA
Melissa Evans – Town of Greenwich
Amy Siebert – Town of Greenwich
Diane Fox – Town of Greenwich
Kate Rattan – CTDOT Planning
Dave Thompson – Town of Greenwich
Robin Stein – City of Stamford
Mani Poola – City of Stamford

2.4 Public Input Summary

The following charts organize all of the input and comments from the public meetings and stakeholder interviews of both the Visioning and Design Workshops into a set of broad themes or goals discerned as the community's top values for the corridor. These goals include; Community Character, Mix of Land Use, Traffic Mobility, and Multi-Modal. Under each of these goals the comments, ideas and visions documented from the public have been sorted into three categories; To Protect, To Change, and the "100 Year Vision". These charts provide a clear summary of the community concerns and long-term goals for the corridor and will serve as a checklist and touchstone for the development of the Plan's recommendations.

Value & Protect

Community Character

Need to get people out of cars
Quality of life
Important for future to have street life
Great potential
Greenwich – feel
Introduction to Greenwich
Graceful buildings (in Greenwich)
Churches (Diamond Hill, St Catherine's, Christ Church, etc)
Greenwich H.S. Stadium
Community feel
Residential/commercial character: exciting/fun place to be
Historic character – downtown Cos Cob
Put's Hill crocuses
Treescape – most of the route
Relatively good level of green space
Green space between many buildings
Green space and trees
Character of neighborhood
Parks and access
Historic character
"Village" feel
Stone walls/monuments
Street lamps (the 2 at top of the Avenue)
Trees

Mix of Land Use

Residential able to walk to services
Service businesses
Some residential
Retail & shopping
Near businesses
Retail
Retail and housing
Business in walking distance
Mixed neighborhoods
Post office, good supermarkets (shop rite), (Keeps commercial area from spreading to quiet residential neighborhood)
Cos Cob Village – post office, school, library, stores
Central Greenwich – library, stores
Hyatt hotel and common residential
Local shopping/resources (library, bank, drug store etc)
Close proximity to services
It's a commercial hub
Business infrastructure
Commercial benefits
Protect businesses
Mix commercial/residential/institution (YMCA, library, schools, churches)
Green spaces
Pocket parks
Green open space/parks, lawns, churches (Hyatt, lawn)
Corner Park and Yerwood center
Cytec building should be preserved

Traffic Mobility

I-95 alternative
Wide road
Alternate route to I-95
Traffic movement
Major road
Easy Route to other side of Stamford
Easy access
It's an arterial connector from east-west
Alternative route when I-95 is delayed or closed
Fewer trucks than I-95
Alternative to I-95
It's a local alternative to I-95
Ease of going short/moderate distances (from one side of town to the other easily)
Alvord and W. Main works well
Focus on safety

Multi-Modal

Pedestrian access
Ample sidewalks for walkers
Ample public transportation
Bicycle access
Accessibility is important
Bikeable
Pedestrian travel is important

Change

Community Character

Streetscape in strip centers (put parking behind the buildings)

Want bulbouts (Lafayette and Church)

Better drainage

Trees

Streetscape

New public spaces

More landscaping and lighting

Needs to become a more friendly place for people to go

Cut back shrubs at Route 1 and Dearfield/ Field point

Tree branches blocking view of traffic signal at Route 1 and River Road as you travel north

Mix of Land Use

Parking supply at La Marqueta and the Church

Fewer office building (large, ugly) more store/ brick

Accessible public parking (central Greenwich)

Too much strip development

Would like to see Stillwater become commercial

Try to separate heavy commercial and residential

Bump outs to prevent parked cars on corners

A&P/Stop n/ Shop – can't get into the shopping center

There are too many curb cuts

A&P and Stop n' Shop traffic access

Whole Foods traffic access

Neil Way/McDonalds/Riverside Shopping plaza – confusion and blocking

Access into Bank of America building on W. Main and Wilson – need turning lane for lefts in

Reduce curb cuts in Cos Cob (Splashes car wash)

Traffic Mobility

West and Main needs left turn lanes

People run light at Harvard – address speed: (North between Greenwich Town line and West Avenue & South between West Avenue and Harvard)

Difficult to get out of Rose Park

Egress/access to Exit 5

Redesign Millbank/Maple intersection

Access of side streets (Edgewood, Deerfield, bad angles etc)

Maple/Millbank intersection

Eliminate the left turn on Maple

Mason/Church Intersection backs up and blocks driveways

Right turn lane (WB onto Hillside at the High School)

Library (Deerfield intersection) – hill gives poor visibility

At the Hyatt Hotel it is difficult to turn left onto Putnam

Need to do something about left turns in and out of driveways

Lane shifting causes safety problem

Maple/Maher/Millbank intersection is confusing

Prospect/Edgewood

Left turns at Route 1 and Mason/Church

Curve just south of Lockwood is a design problem

Dearfield/Field Point

Old Post #6 and Route 1 – width and curvature of road is problem

Queuing at Strickland/Cross/Sinoway

Orchard/Mead – queuing/safety/left turns

Indian Field – site distance issue – out of towners don't know to use jug – need signs

Byram Circle is a problem

Multi-Modal

Crosswalk at Alvord and Harvard

Add bus shelters

Add bike lanes

Add bus shelters

Sidewalks/crosswalks in Port Chester – near Western Jr. Highway

Bike lanes

Bike parking – all corridor

Solar docking station (electric cars)

Better access to school for children is needed

Connect traffic signals between Greenwich and Stamford for EMS

School drop off areas need to be addressed

Exit 5 is miserable for pedestrians

Pedestrian waiting on corners feel unsafe due to cars cutting corners

Provide bicycle accommodations throughout

Need bicycle accommodations and signs

Sewer grates are not bike friendly

Improve bus pull off areas and shelters

Bus locations need to be better defined

School buses are not "cool" and are too early

Improve bus connections between corridor and bus stations

Stopped buses block traffic

Accommodate pedestrians – create pedestrian connections

Pedestrian safety issues at several intersections in Stamford

Exit 5 to St Catherine's – need sidewalks.

There are too many curb cuts

Mid block crossing at Chicken Joe area for kids

100 Year Vision

Community Character

More streetscape and beautification

Gateway after Laddins Rock

More trees/sidewalks/benches, etc.

No flooding

More street trees

Need something to tie communities together

Need someone to take care of landscaping

Need a common look for aesthetics

No ugly parking lots

Wide sidewalks

Mix of Land Use

Small hotels

More residential mixed use

More green space and trees

Need development standards, and targeted areas

Grocery Store in Cos Cob

Reduce number of car dealers and banks

Traffic Mobility

Better access management is needed

Widening will make things worse

Coordinate construction projects – particularly drainage projects

Examining one-way pair between West Avenue and Harvard Avenue

Top of Greenwich Avenue – roundabout? Too many signals

Consider one-way pairs

Roundabout entering Port Chester (redesign existing circle)

Roundabout in Cos Cob at the hub

Roundabout at Jackie Robinson Park

Speed table at Orchard and Kent

Multi-Modal

Better public transportation

More frequent buses

Charter bus running along Route 1 from Train station to Alvord to Mall

Bike Lanes

More public transportation (bus/trolley)

Electric docking station for electric cars

Complete “missing” sidewalks

More crosswalks are needed – particularly between Holly Hill and Prospect

Use AVL system to provide real time information at all bus stops

Install far side stops with sufficient space to pull in

Trolley the entire length like in Savannah

Use bike boxes at intersections

Community Vision

Through the public visioning and design process a common vision has emerged for Route 1 that serves as the guiding direction for the design alternatives. A series of themes or goals were uncovered that structure this vision and include; Community Character, Mix of Land Use, Traffic Mobility, and Multi-modal Function. These themes reflect the many roles that Route 1 plays within the communities that it connects – vehicular mobility is just one of many. The vision articulates a future corridor that balances these many roles to support a vibrant and growing community.

Change is necessary. The corridor as it exists today does not match the vision or the full range of community needs. It is in too many places a barrier, pedestrian hostile, auto-oriented, unsafe, and unsupportive of economic development. This change will require a new attitude about the corridor's function, an attitude that prioritizes a broader range of functions in addition to vehicular mobility.


Stakeholder Interview


Community Workshop


Stakeholder Interview


Community Workshop


Community Workshop

	Character	Mix of Use	Traffic	Multi-modal
Value	Street Life Historic Character "Village" Feel	Shopping Housing Walking to Businesses Parks	Alternative to I-95 Local Route	Pedestrian Access Public Transportation Bicycle Access
Change	Streetscape New Public Spaces Street Trees	Too much Strip Commercial More Mixed Use More Housing	Too Many Curb-cuts Exit 5 Byram Circle Maple/Millbank	Crosswalks Missing Sidewalks Bike Facilities Bus Shelters

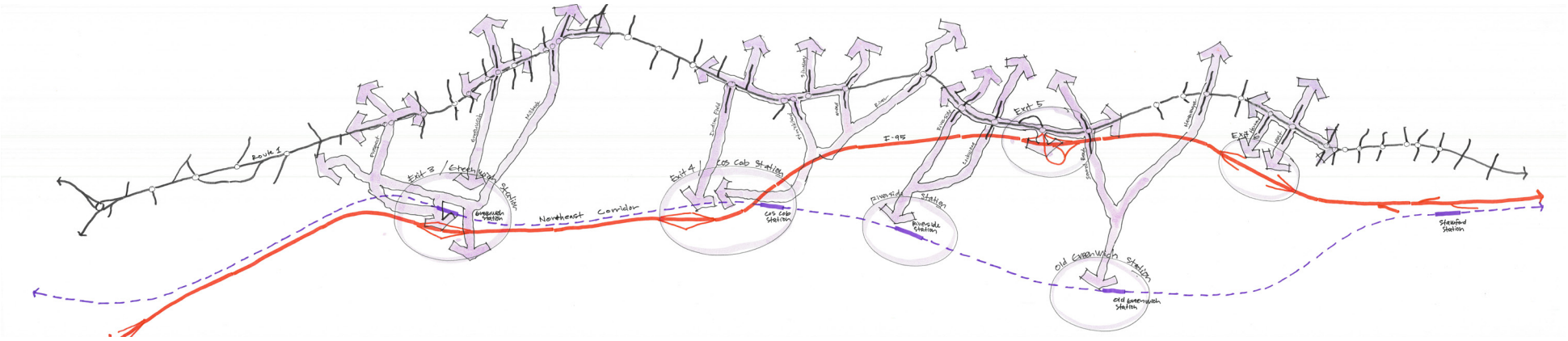
VISION

Character & Streetscape that Ties Communities Together

Walkable Mixed-Use Corridor Where People Live, Shop & Work

Managed Access & Traffic that is Calmed, Supporting Adjacent Land Uses

Complete Streets that Accommodate Pedestrians, Transit, Bikes and Cars



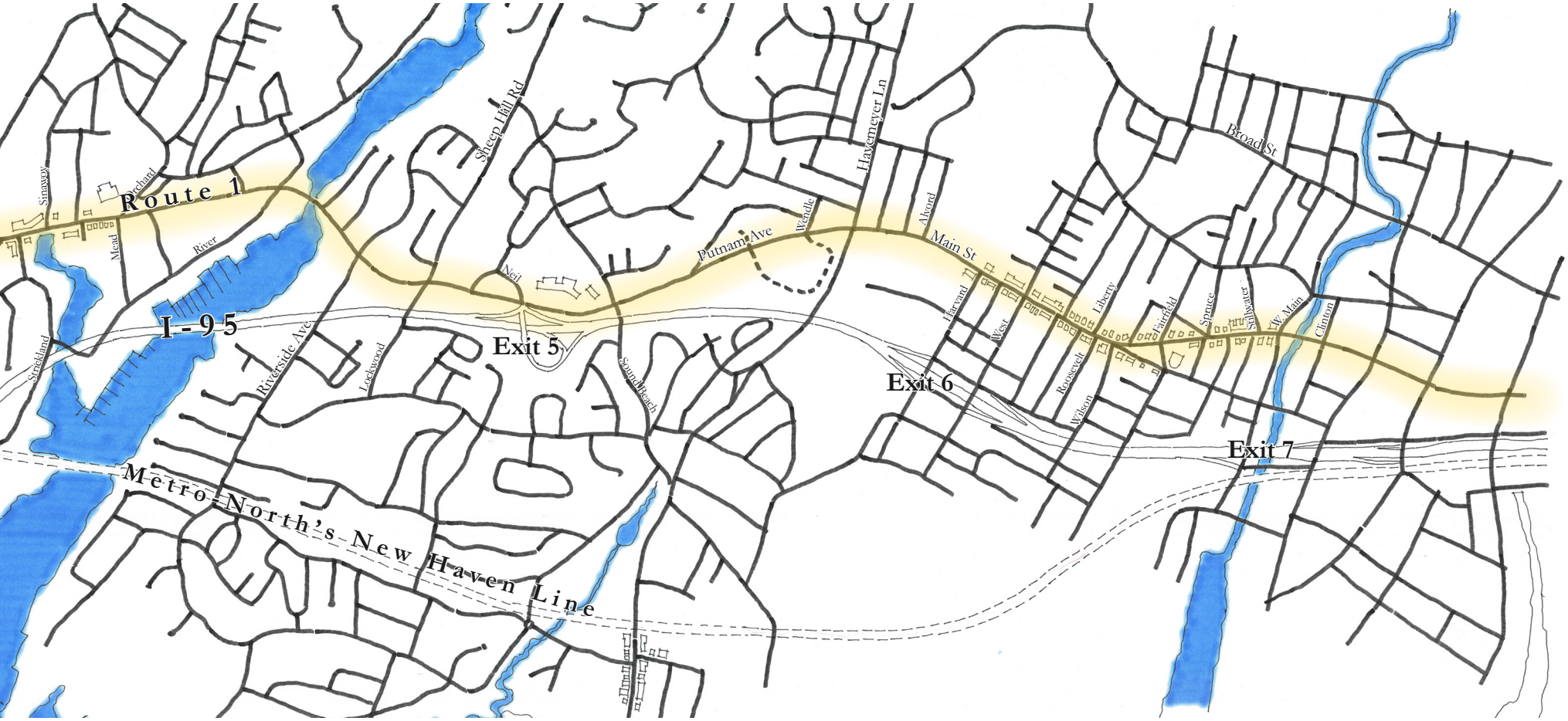
3.0 Overview of Corridor-Wide Issues

3.1 Design Framework Analysis

Since the 1600s, Route 1 has been known as the Boston Post Road, or Post Road, initially serving as the mail delivery route between New York City and Boston. Over time it evolved into one of the first highways in the United States and in Connecticut became a vital transportation link between the cities and towns along the Connecticut coast.

This study focuses on Route 1 between Stamford and Greenwich Connecticut. The historic role of Route 1 has changed over time as technology and growth have urbanized the area along the corridor and Route 1 is no longer the only transportation corridor in the area.

Today, Interstate 95 runs parallel to Route 1 and functions as the primary regional transportation corridor. Additionally, the Merritt Parkway to the north provides another parallel highway connecting New York State and Connecticut. Metro-North's New Haven Line, with five stations in the study area, provides an important transit connection to the New York area, serving as an alternative to vehicular travel in the corridor.



The evolving role of Route 1 is the core issue of this study. Its historic role and importance positioned it as the catalyst for urban development and growth. On Route 1 the Town of Greenwich and the City of Stamford have grown, reshaping the corridor as a neighborhood main street, a downtown commercial district, a village cross roads, a civic and institutional address, and a suburban commercial strip. Yet, in many ways Route 1 still functions like a highway and new development continues to struggle with the competing needs of vehicles, pedestrians, cyclists, and transit.

This Design Framework Analysis focuses on the physical context of the corridor in order to define a "framework" to structure the public input and technical analysis into a set of corridor design concepts and operational recommendations.

3.2 Three Corridors

Route 1 operates within the context of three parallel corridors; Route 1, Interstate 95, and Metro-North's New Haven Line. Together these corridors represent the primary transportation routes and/or alternatives in the area for regional mobility. While each corridor is different and serves a particular role, all three are interrelated.

Metro-North's New Haven Line

Metro-North's New Haven Line provides a commuter transit connection between New York City and Connecticut. In the study area there are five stations; Greenwich, Cos Cob, Riverside, Old Greenwich and Stamford. While this transit corridor provides an important and needed alternative to both Route 1 and I-95, it also represents a significant vehicular destination for park-n-ride and drop-off transit riders, impacting peak hour access and operations on both corridors.

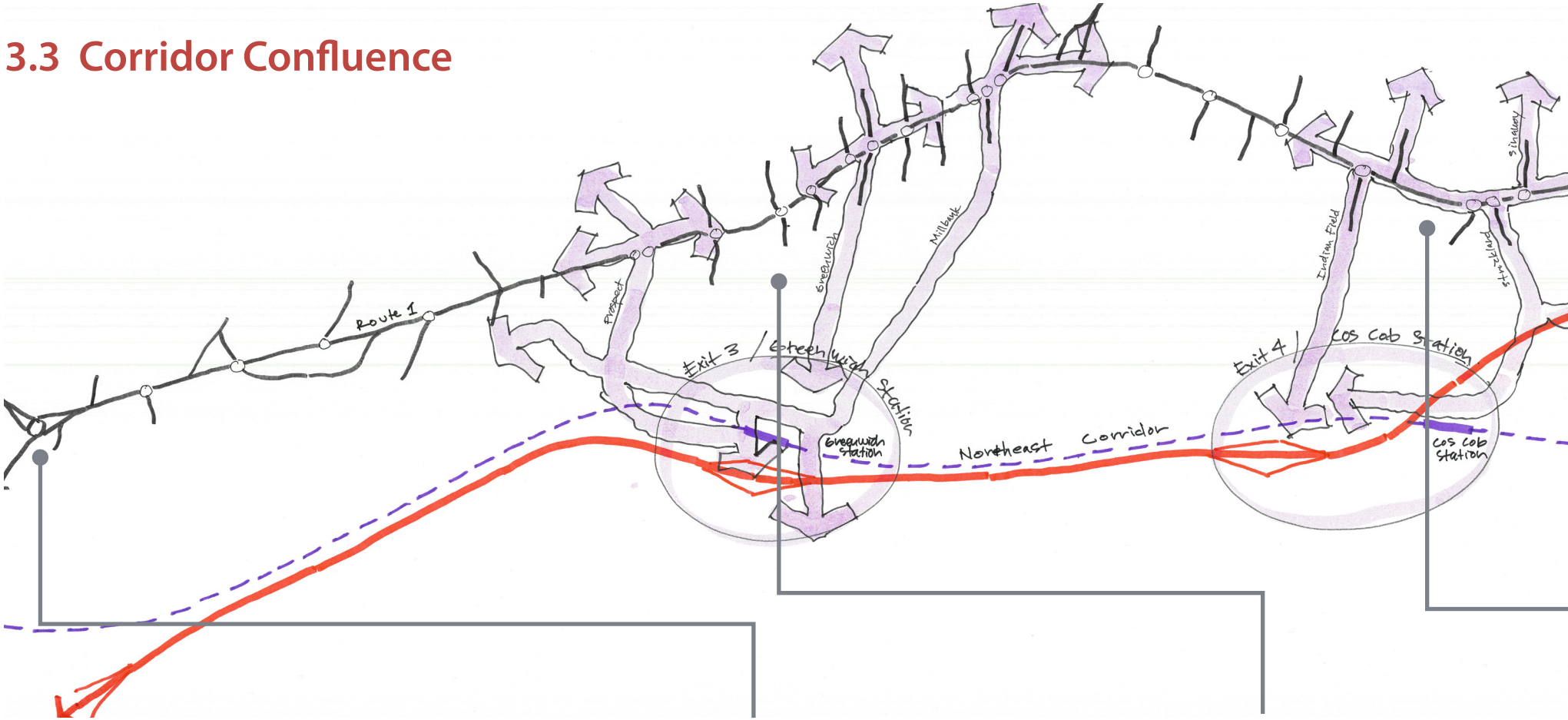
Interstate 95

I-95 represents a relatively recent transportation addition to the area (1950s) and is the primary regional facility for vehicular travel. In the study area there are six exits (Exits 2-7) that connect the interstate to the local street network. With little land (and therefore development) between I-95 and the Long Island Sound, traffic to and from these exits is generally coming from or going to the north, crossing or utilizing Route 1. In extreme cases such as Exit 5, I-95 exits right onto Route 1, concentrating a significant regional traffic flow in a very constrained location.

Route 1

Route 1 weaves along the coast line and is supported by a limited network of local roads. This local network is constrained by topography and a series of rivers and inlets that lead to the Long Island Sound. These waterways, in particular Cos Cob Harbor, limit regional connectivity, making Route 1 and I-95 as the only "east-west" options. The local road network is a result of the historic pattern of rural farm roads. They connect to Route 1 at a wide range of odd angles and off-sets that further complicate "modern" mobility and create very few local routing options that do not require the use of at least some portion of Route 1.

3.3 Corridor Confluence



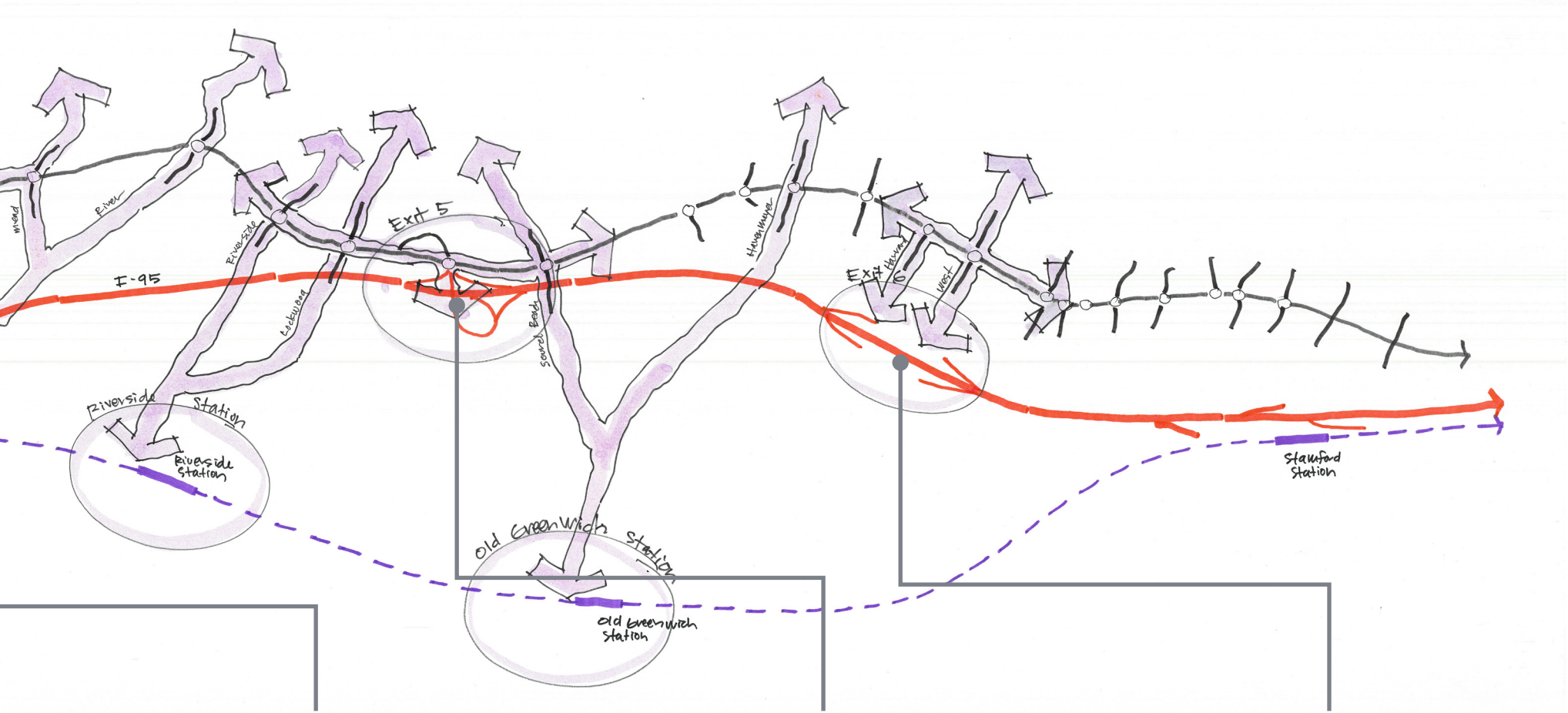
The physical and functional interrelationship between these three corridors has created several areas of "confluence" where the users of each overlap, concentrating vehicular traffic. These areas of confluence have a unique and negative impact on Route 1 because its range of uses (businesses, schools, churches, neighborhoods, etc.) and users (pedestrians, transit riders, cyclists, and drivers).

Port Chester/Byram Circle

This traffic circle at the New York/Connecticut state line brings together a number of key routes and local roads at the crossing of the Byram River. The number of connecting roads and range of entering speeds result in a confusing and inconsistent intersection with high crash rates.

Milbank to Prospect

The close proximity of I-95 Exit 3 and the Greenwich Train Station place pressure on the several key roads that provide access from Route 1. The Milbank intersection at Route 1 in particular is problematic given the close spacing of the Maher, Milbank and Maple intersections and the use of Milbank as a direct route to I-95 and the commuter rail station.



Indian Field to Strickland

These are key routes to both I-95 Exit 4 and the Cos Cob Train Station. The Indian Field intersection employs a "jug handle" approach for south-bound left turns to I-95 to accommodate the volume of left turns. The one-way operation of Cross Lane north-bound reflects the desire to protect alternatives to Indian Field from high volume use. The Strickland intersection is at the heart of the Cos Cob commercial "hub" and is one of three closely spaced "T" intersections in this active commercial node.

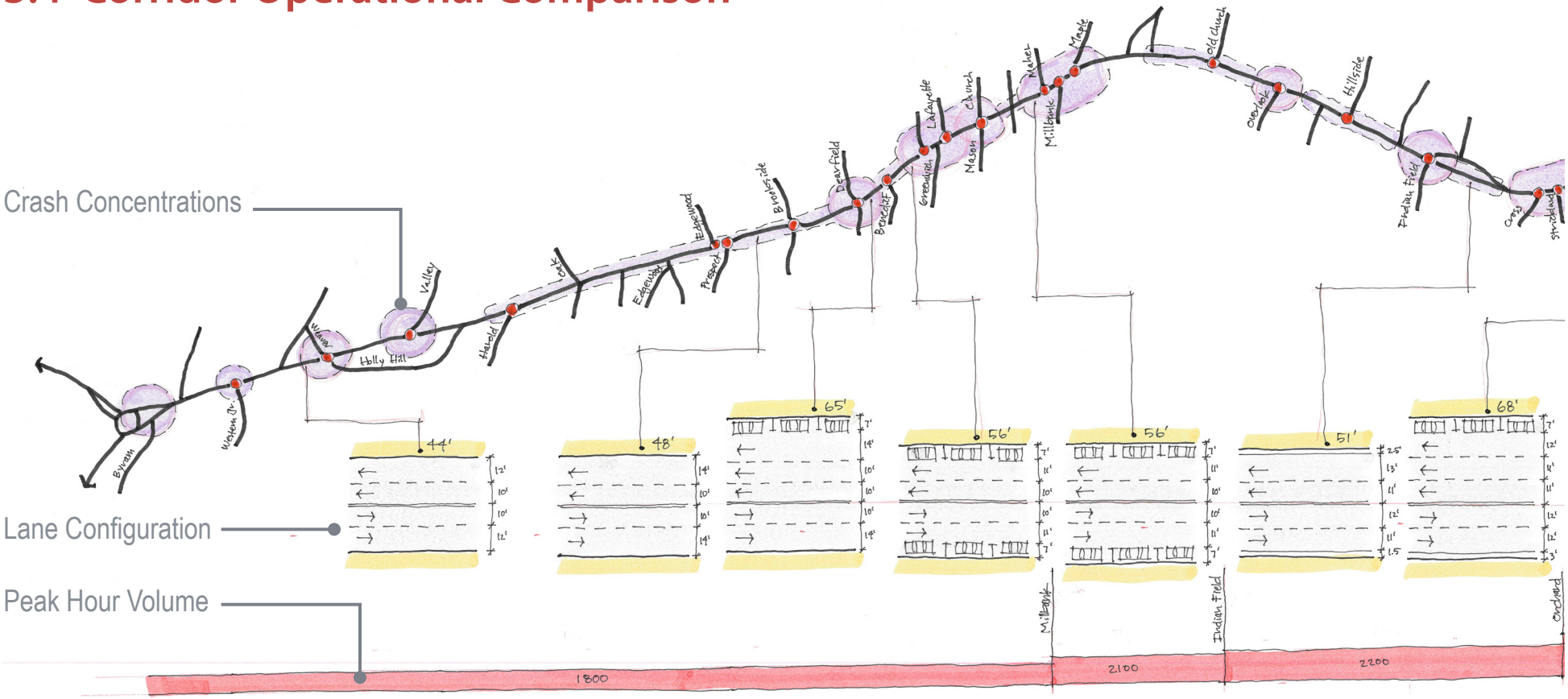
Exit 5

Exit 5 is a notorious location known for its congestion, impacted business access, and pedestrian hostility. It sits between the Riverside and Old Greenwich Stations with key roads to these stations such as Sound Beach and Lockwood "bookending" the exit north and south on Route 1. Exit 5 sit directly adjacent to Route 1 concentrating all I-95-bound traffic in one location with limited redesign alternatives.

Harvard to West

These two roads connect Route 1 (Main Street in the West Side Neighborhood) to I-95 Exit 6 and Stamford Hospital. West Avenue serves as an important north-south connection in west Stamford.

3.4 Corridor Operational Comparison



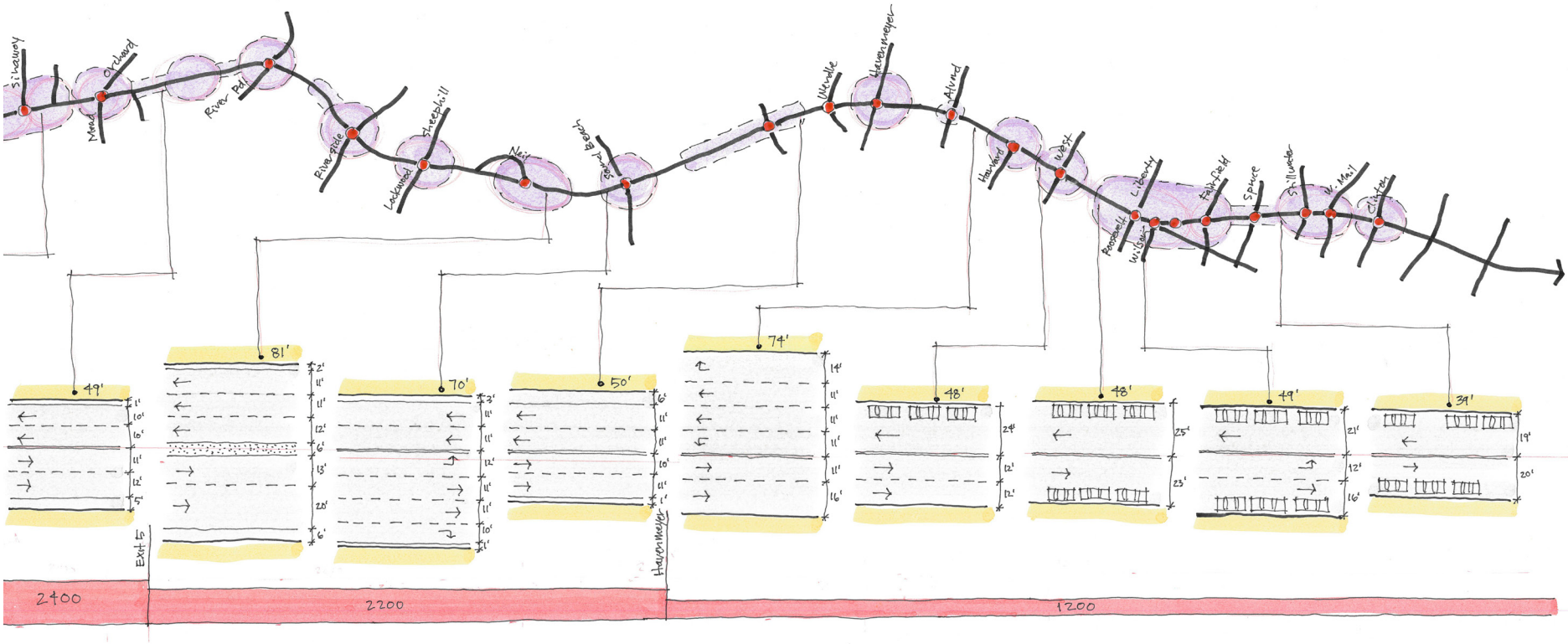
Crashes

The purple areas represent the relative occurrence of vehicle crashes along the corridor. The obvious concentrations are occurring at the key intersections corresponding with the "areas of confluence'. In addition there are several lengths of the corridor with higher crash occurrence which may be a result of the lack of left turn lanes and multiple curb cuts for commercial development.

Lane Configuration

Within the study area Route 1 exhibits a wide range of lane configuration and roadway width ranging from 81 feet (at Exit 5) to 39 feet (Main Street in Stamford). This range of configuration gives a mixed message to drivers; sometimes Route 1 is a main street with on-street parking and pedestrian activity requiring slower speeds, at other times Route 1 is a highway with as many as six travel lanes accommodating higher speeds.

The transitions between these areas lacks appropriate "cues" to the driver that the character of the road and surrounding land use is changing, this encourages higher speeds in "slow speed" areas.

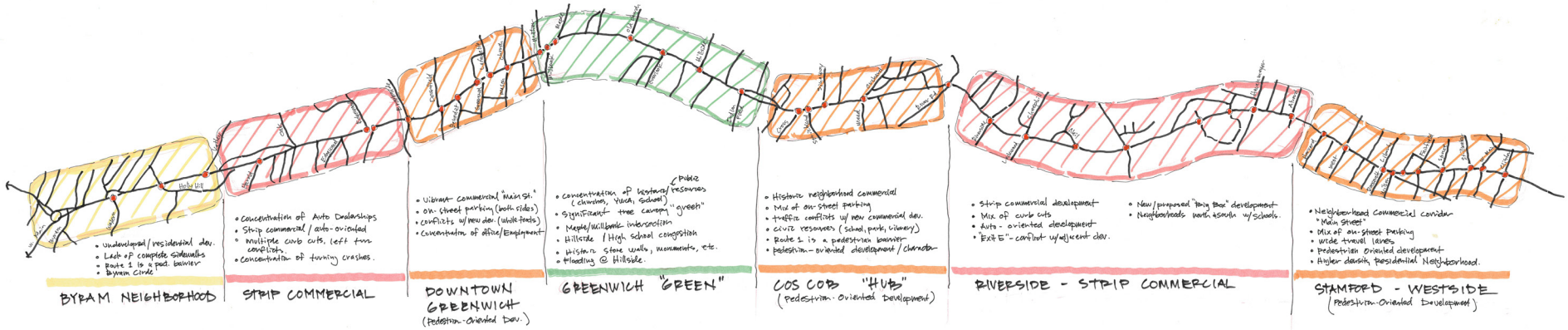


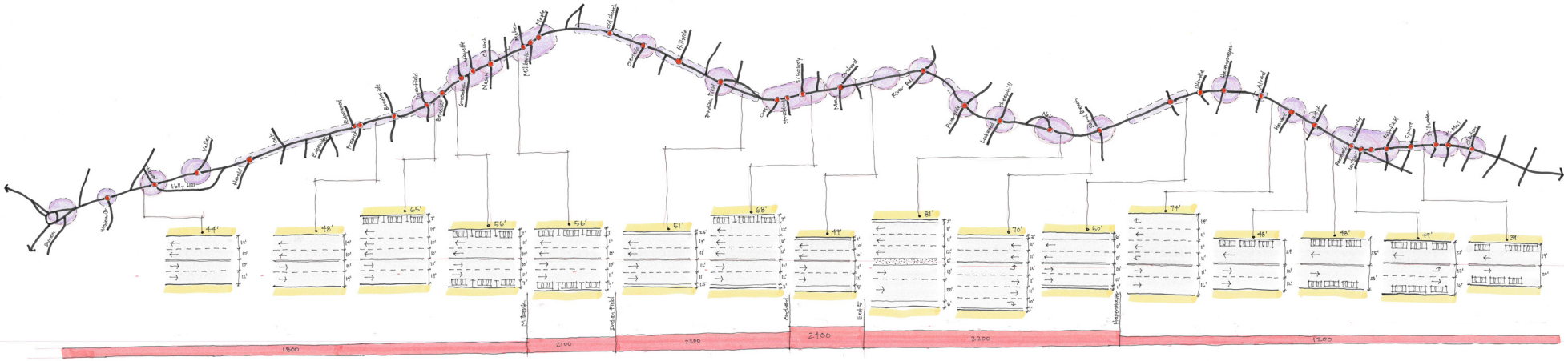
Peak Hour Volume

Just as the lane configuration varies so does the corridor volume. The peak hour volume ranges from 1200 to 2400 vehicles depending on location. Comparing these volumes against the lane configuration suggests that there are significant portions of the corridor that have more lane capacity than what is needed for the corridor's volume.

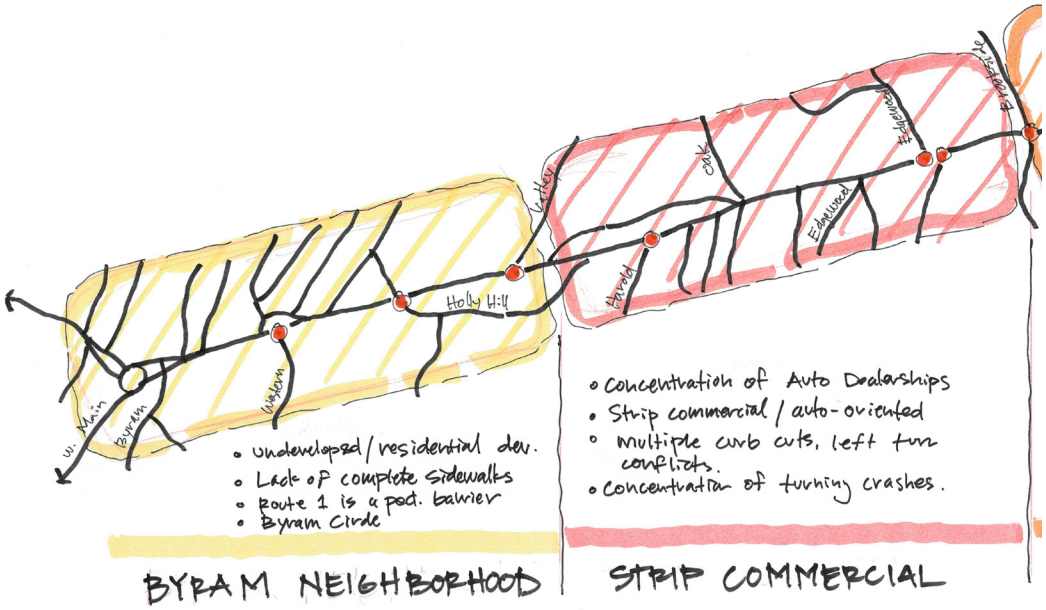
In particular there are segments on the east and west ends of the corridor that have four-lanes of capacity with relatively low volumes. In these areas it might be possible to reconfigure those lanes to eliminate extra through travel lanes and repurpose them as left turns and/or bicycle lanes.

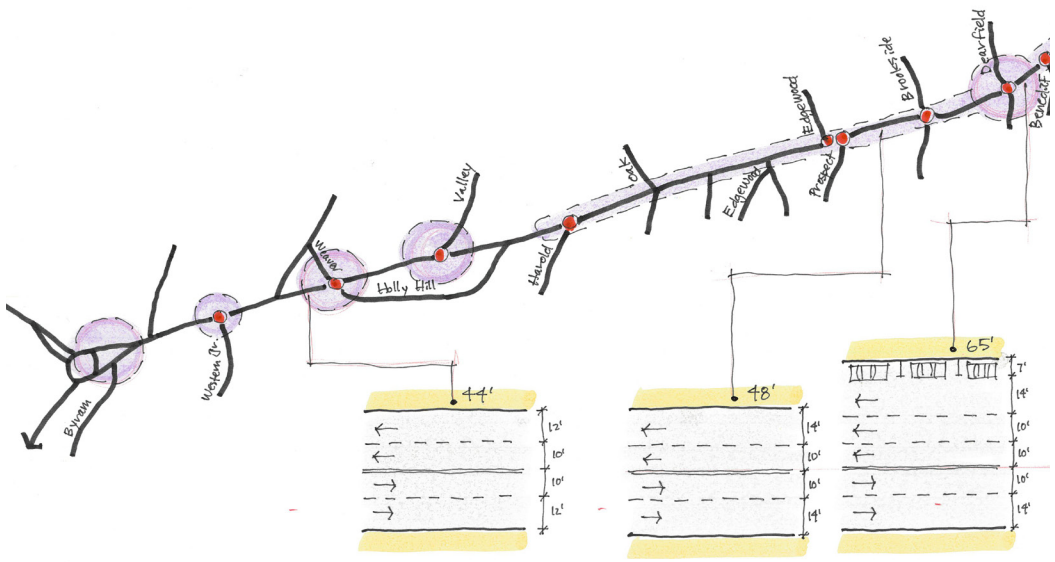
3.5 Corridor Districts





The Route 1 corridor is not a singular place but a series of places with unique characteristics. This Corridor Framework diagram identifies, maps and describes these "places" in order to recognize the broader context in which Route 1 exists and establish a "framework" for guiding decisions about the design and operation of Route 1.



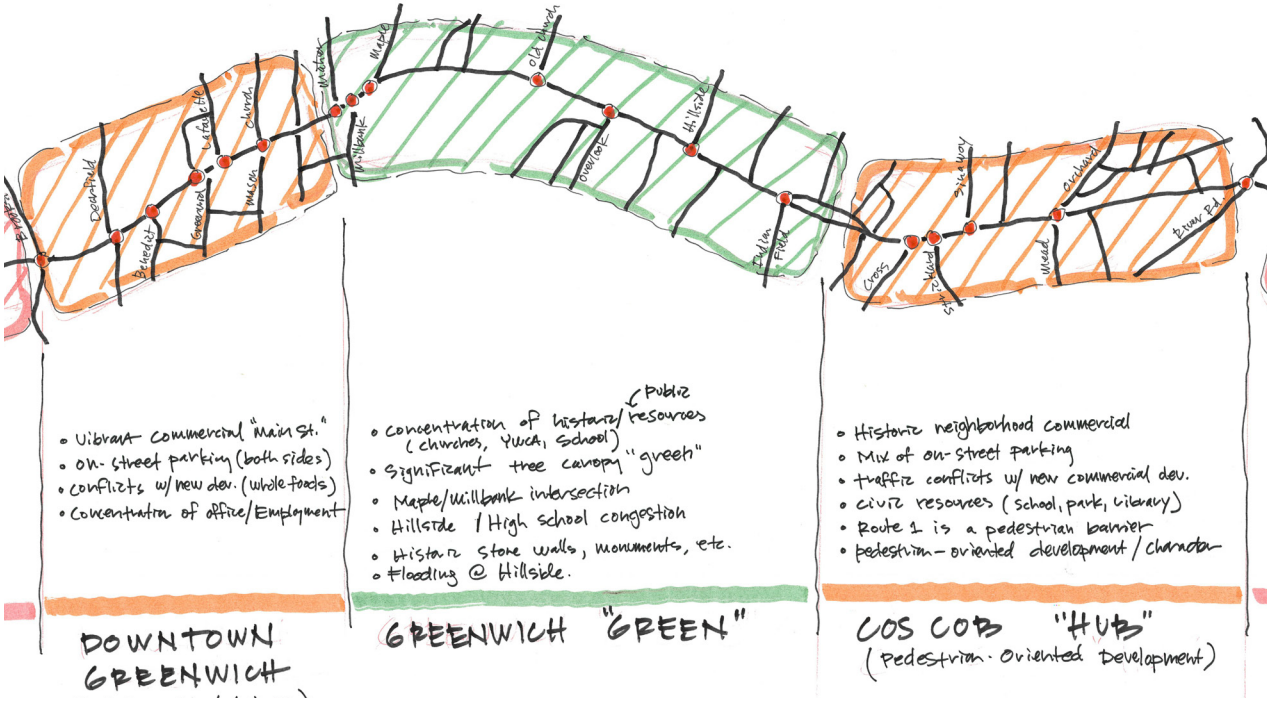


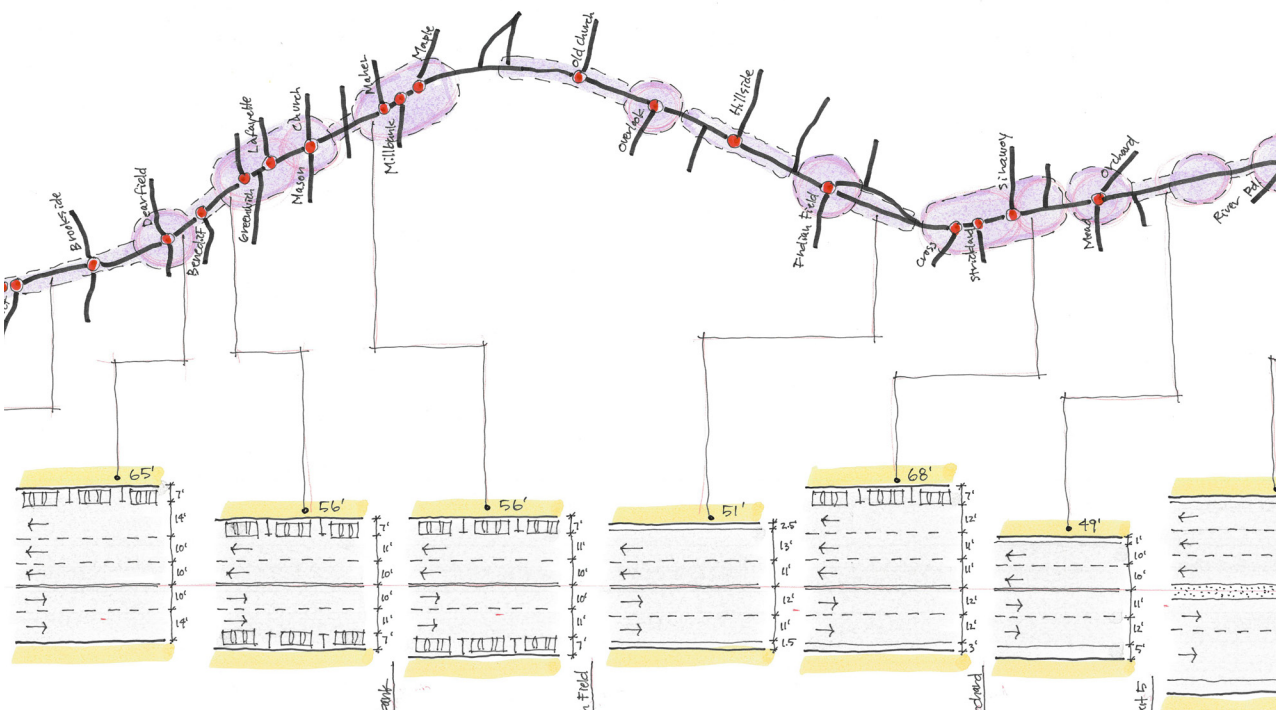
Byram Neighborhood

This is the westernmost neighborhood in Greenwich. Here Route 1 runs through the Byram Neighborhood with local schools on both sides separated by Route 1. Along the corridor is a mix of undeveloped land and strip commercial uses. The four-lane cross section is auto-oriented and lacks a complete sidewalk system on both sides. The Byram Circle sits at the New York/Connecticut state line and is a locally notorious traffic issue with its numerous connections and high traffic speeds.

Strip Commercial – Greenwich

Between Byram and Downtown Greenwich is a section of strip commercial from Valley to Brookside. This section includes a concentration of auto dealerships and auto-oriented commercial uses with multiple curb cuts. The four-lane cross section coupled with the number of left turns into various driveways has resulted in a high number of turning crashes. Solutions may include converting the four-lane cross section into a three-lane section (one lane in each direction and a dedicated left turn lane) providing additional space for bicycle lanes and/or sidewalks.





Downtown Greenwich

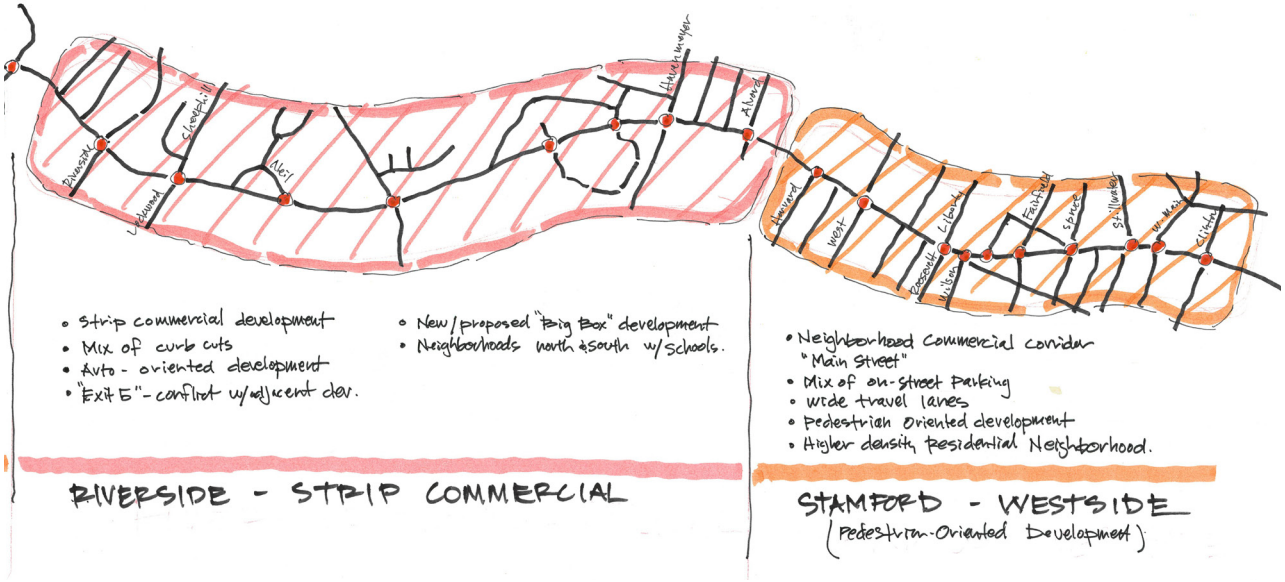
Downtown Greenwich is a vibrant commercial "main street" and has the highest concentration of development along the corridor with a range of retail, office, and civic uses oriented to the corridor in an urban main street form (buildings close to the street, parking behind, wide sidewalks and street trees). Recent developments (i.e. Whole Foods) with new driveways violate the existing block structure resulting in growing access conflicts and turning movements on and off of Route 1.

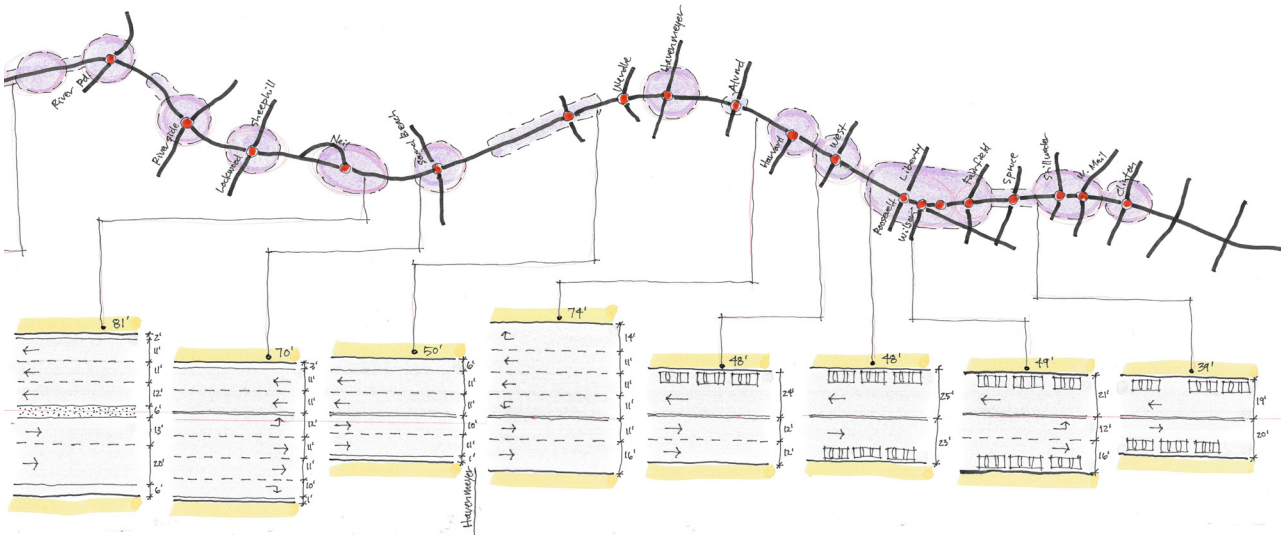
Greenwich "Green"

The segment from Milbank to Indian Field includes the corridor's highest concentration of civic and historic resources including; Greenwich High School, Christ Church, YWCA, Temple Sholom, the General Israel Putnam Cottage "Knapp's Tavern", and the Second Congregational Church. The unique character of this segment includes a significant canopy of trees, lawns, stone walls, monuments and historic architecture. Traffic issues include the Maple/Milbank intersection, the Hillside intersection (Greenwich High School), and reoccurring flooding at the creek near Hillside.

Cos Cob "Hub"

Between the Orchard and Strickland intersections is the Cos Cob "Hub", a historic neighborhood commercial center. This street-oriented commercial district includes the Cos Cob Elementary School, Cos Cob Library, U.S. Post Office, Fire Station and a park. With a mix of on-street parking, five lanes of traffic, and multiple curb cuts, Route 1 acts as a pedestrian barrier. This should be a traffic calmed and pedestrian-oriented district that supports street-oriented infill, reuse and redevelopment.





Riverside to Stamford – Strip Commercial

Route 1 from Riverside to Harvard is another segment characterized primarily by strip commercial transitioning from Greenwich to Stamford. The Riverside neighborhood extends north and south of the corridor and is divided by auto-oriented development and the "highway" character of Route 1. It is here that Route 1 and I-95 are the closest with Exit 5 connecting directly to Route 1 resulting in a concentration of traffic and suburban commercial development.

Stamford – West Side

Route 1 from Harvard into downtown Stamford transforms back into a commercial and neighborhood "main street" that is the center of the Stamford West Side Neighborhood. The street includes a mix of on-street parking and wide travel lanes. Development along this segment includes a mix of residential, street-oriented retail and civic uses creating a vibrant neighborhood center. Solutions should look to better define the street, repurposing extra space for bicycle lanes, bulb-outs and/or wider sidewalks.

3.6 Overview of Corridor-wide Issues

There are a number of corridor-wide issues that need to be addressed in order to fundamentally change the character of the corridor to achieve the intended vision.

Districts

The corridor does not have a singular character but is made up of a series of places or districts with unique characteristics and needs. Route 1 runs through pedestrian-oriented neighborhood retail centers, urban neighborhoods, mixed-use downtowns, and auto-oriented commercial strips. It is an address for retail, office, civic institutions, and residential neighborhoods. Each district has its own needs and issues that influence the operation and behavior of traffic.

The design alternatives are guided by a "context sensitive" approach that seeks to create solutions that fit the context and needs of each district. The result is an integrated corridor approach that accommodates the unique characteristics of each area.

The corridor runs through different "districts"

Driveways & Curb Cuts

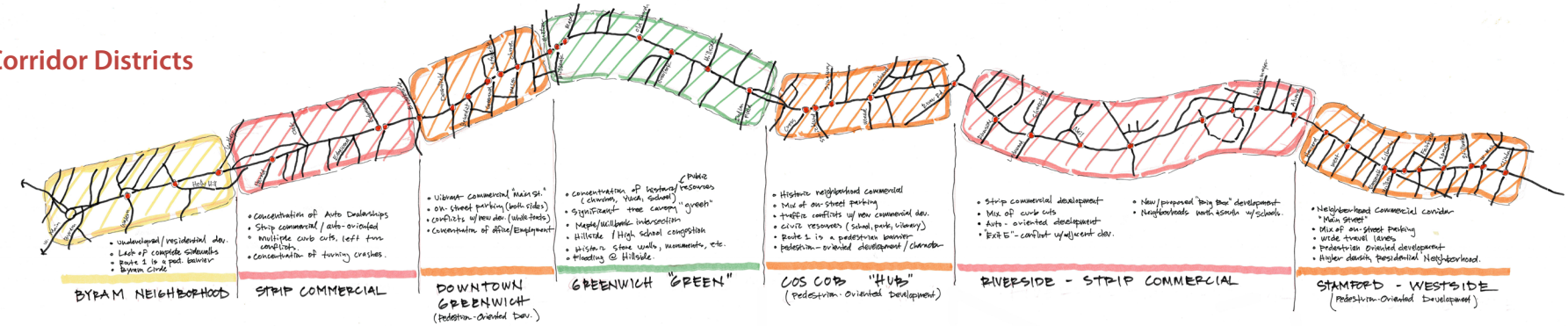
Development along the corridor includes significant portions of auto-oriented, strip commercial that is organized with large parking lots fronting the corridor and multiple driveways and curb cuts for each parcel. This pattern, in contrast to a block pattern where access is organized on regularly spaced streets that form blocks, creates an unattractive and unsafe pedestrian environment and multiples the conflict points for turning vehicles on and off the corridor. The resulting uncontrolled access contributes to the high crash rate along the corridor.

The design alternatives suggest opportunities to consolidate driveways and curb cuts, introduce new street connections and provide shared access where possible.

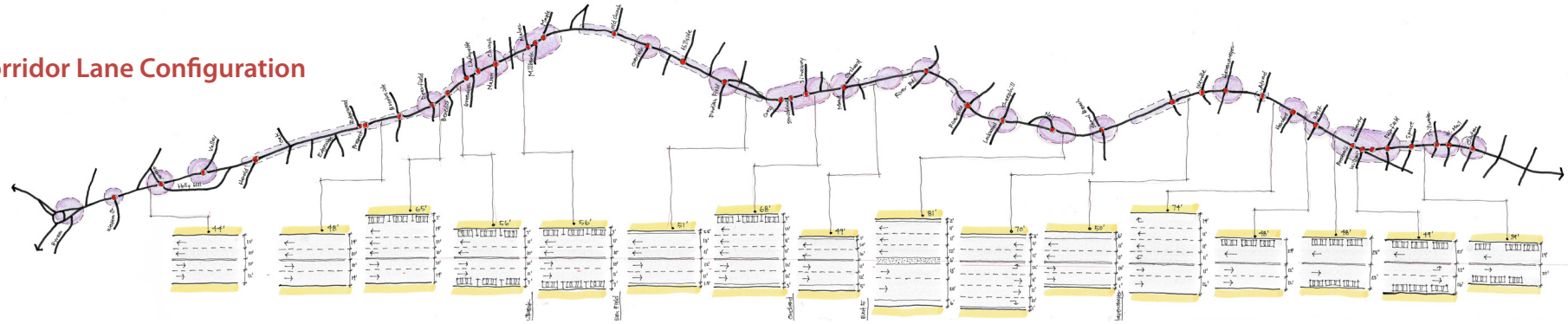
Driveway access and parking vary throughout the corridor

Corridor Context

Corridor Districts



Corridor Lane Configuration



Lane Configuration and Width

The number and width of travel lanes in the corridor varies dramatically. The curb to curb roadway dimensions range from 39 feet to 81 feet with lane widths ranging from 10 to 16 feet. The number of lanes varies from 2 to 7. This range of configuration and width sends mixed messages to drivers; sometimes a pedestrian-oriented main street and other times a commercial highway. This ambiguous physical design encourages high speed vehicle behavior throughout the corridor conflicting directly in areas that are intended to be pedestrian-friendly, business-supportive, and community-oriented.

The design alternatives explore reallocating the existing curb to curb roadway configuration to more clearly define the vehicular function of the road while incorporating other necessary functions such as bicycle lanes and on-street parking. ConnDOT policy on lane dimensions establishes an 11-foot minimum width for travel lanes and a 14-foot minimum width for center turn lanes. These state-wide policy standards will need to be evaluated within the constrained context of this corridor to balance the competing desire to incorporate other modes of travel and make it more pedestrian and development-friendly.

The corridor includes a range of lane configurations

Safety

Between 2006 and 2008 ConnDOT's Traffic Accident Viewing System reported a total of 1,803 crashes along the study corridor, a rate on average of 2 crashes per day. During this period there were 25 crashes involving pedestrians and just recently a pedestrian fatality occurred near the Byram Circle. The highest crashes by type include; 37% rear-end, 31% involving turning vehicles, 17% sideswipes, 4% angle. The prevalence of these types of crashes is consistent with the vehicle behavior found on a four lane corridor without dedicated left turn lanes, resulting in higher speeds, excessive vehicle weaving and overtaking, queuing in the center lane, and blind turning movements.

The design alternatives explore a "road diet" concept that in some segments of the corridor reduce the lane configuration from four lanes (two travel lanes in each direction) to three lanes (one travel lane in each direction and a dedicated center turn lane). This reconfiguration provides a dedicated lane for turning, reduces vehicle speeds and crashes, and opens up the gained pavement space for bike lanes, on-street parking, or wider sidewalks. Studies on comparable road diet projects from around the country illustrate and quantify the reduction in vehicle crashes.


The corridor's design affects safety

Pedestrian Environment

The width of the corridor, high-speed vehicle behavior, number of curb cuts, and inconsistent sidewalk conditions all add up to create a pedestrian-hostile environment. This is in direct conflict with many areas of the corridor that have street-oriented businesses, community institutions, schools, and parks directly along it. In the Town of Greenwich exclusive pedestrian only signal phases are provided at all signalized intersections. This guarantees pedestrian access across the corridor but is an "operational" response to a "design" problem. The design of the road remains fundamentally pedestrian-hostile. An unintended consequence is added vehicular delay at these intersections where anywhere from 17 to 25 seconds of each signal phase is dedicated exclusively to the pedestrian, significantly reducing the available vehicular green time.

The design alternatives take a "design" approach to this problem, exploring ways to reduce the width of the road through bulb-outs and/or vehicle lane removal to create shorter pedestrian crossings, wider sidewalks and encourage reduce vehicle speeds. The need and benefits of the exclusive pedestrian phases will be evaluated on a case-by-case basis to determine where it may be appropriate to replace exclusive phases with concurrent pedestrian phases.

The corridor has inconsistent pedestrian amenities

Bicycle Facilities

There are no bicycle facilities in the corridor. There is bicycle activity in the corridor and a number of active bicycle groups in the area. Cyclists currently share travel lanes with vehicles on Route 1. Given the high speed behavior of vehicles in the corridor, this shared use is an option for only the most experienced cyclists, doing little to more broadly encourage cycling in the corridor. This is an important bicycle route given that there are few parallel alternatives along the corridor and none extend the full length of the area.

The design alternatives explore incorporating specific bicycle facilities either through striped bicycle lanes or through wider, shared travel lanes, depending on the physical dimensions of the roadway. ConnDOT policy on bicycle lanes establishes a 5-foot minimum lane width.

Cyclists are using the corridor

Transit

Transit service in the corridor is provided by the CT Transit Route 11 that connects from downtown Stamford to Port Chester and Route 14 that connects from downtown Stamford to the shopping center at Alvord Lane. CT Transit and ConnDOT are currently in the process of replacing most of the bus fleet that serves Route 11. These new articulated buses will be equipped with AVL/CAD, and ITS based information systems, allowing for the transmission of real time bus location and arrival information to message boards at appropriately equipped transit stops.

Current plans do not include placing information displays at bus stops along Route 1 initially, but the long-term opportunity will be to provide these displays at key locations along the corridor to enhance transit service and convenience. Additional transit stop enhancements may include moving bus stops to the "far side" of intersections where feasible. Far side bus stops reduce the impact a bus stop has on traffic flow, and is also considered safer for passengers, as they are not attempting to cross the street in front of the bus.

Transit service is an important corridor function

On-Street Parking

On-street parking exists in the business districts of Downtown Greenwich, Cos Cob, and the West Side neighborhood. On-street parking is vital to these local businesses and is an important component of the pedestrian friendliness of these commercial districts. On-street parking provides a buffer between the roadway and sidewalk and signals to drivers that they are in a pedestrian-oriented area. In several areas the distinction between the travel lane and the on-street parking is not clearly defined, creating the perception of an extra-wide travel lane and resulting in increased vehicle speeds.

The design alternatives explore defining areas of on-street parking more clearly through striping, landscaped bulb-outs, and in unique situations, potential for "back-in" angle parking. Existing on-street parking in the corridor ranges from 7 to 8 feet in width. ConnDOT policy on on-street parking establishes an 8-foot minimum space width.


On-street parking is a vital function to support businesses

3.7 Potential New Design Concepts

Road Diets

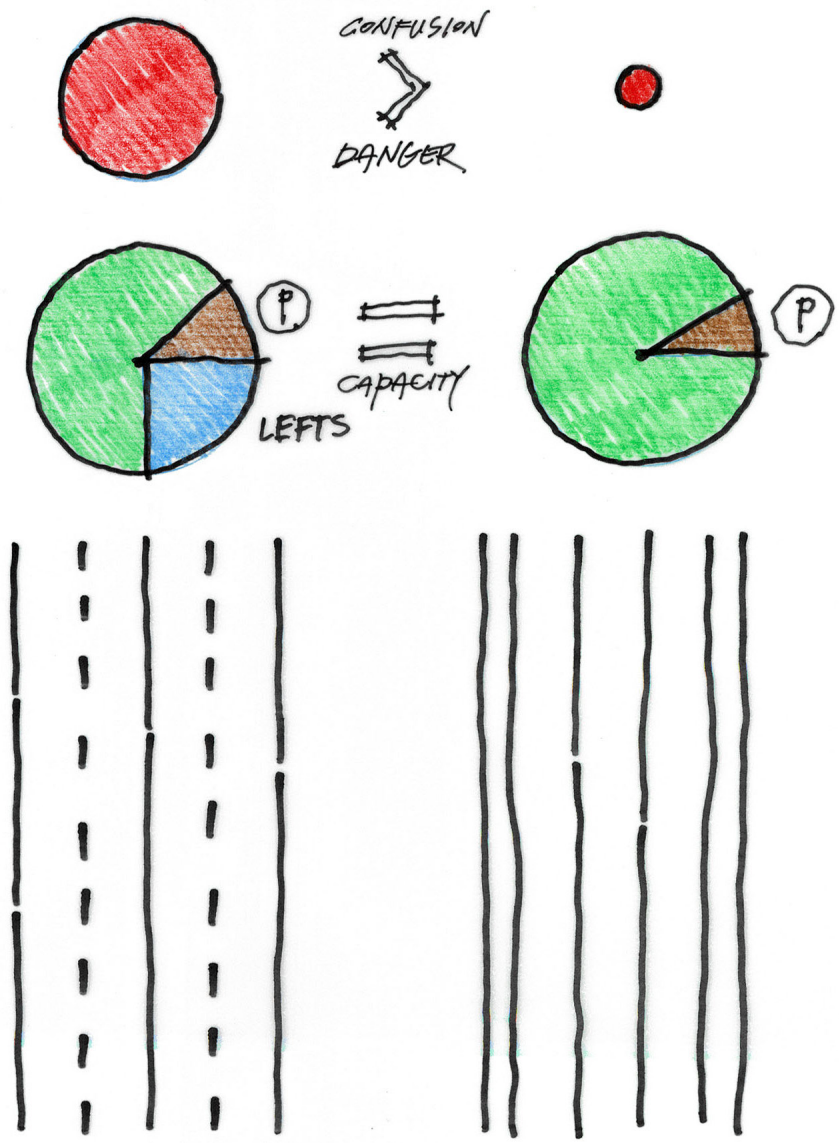
A "road diet" is a category of traffic calming for arterial roads that involves narrowing and/or eliminating travel lanes. The most typical road diet involves reconfiguring a four lane roadway (such as Route 1) to three lanes, creating a dedicated center turn lane and one travel lane in each direction. The reclaimed space is then used for other purposes such as landscaping, wider sidewalks, bicycle lanes, on-street parking, etc.

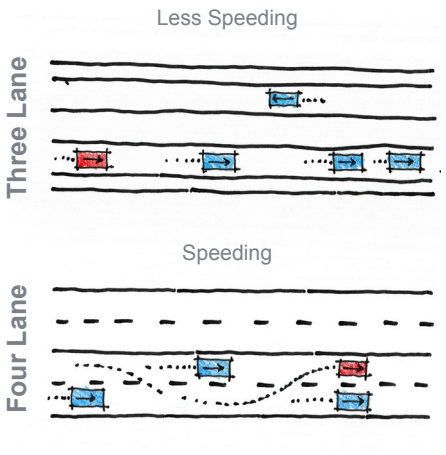
The intent of a road diet is to match the role of the street to its existing or desired context. Typically, other traffic calming measures are employed at the same time as the road diet, such as raised intersections, bulb-outs, on-street parking, street trees, pedestrian-scaled lighting, textured surfaces such as using brick to pave the street, etc. Road diets are used in urban and suburban contexts on retail, residential, and mixed use streets. Retail land uses typically experience better and sustained levels of business after a road diet.

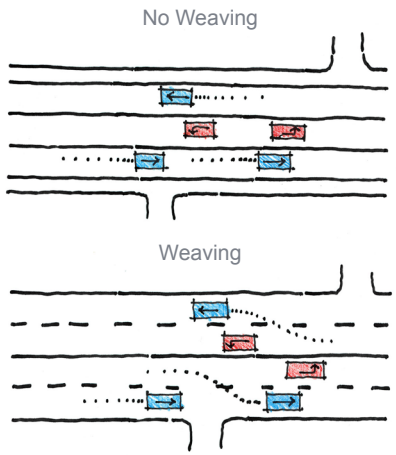
The Benefits of a Road Diet

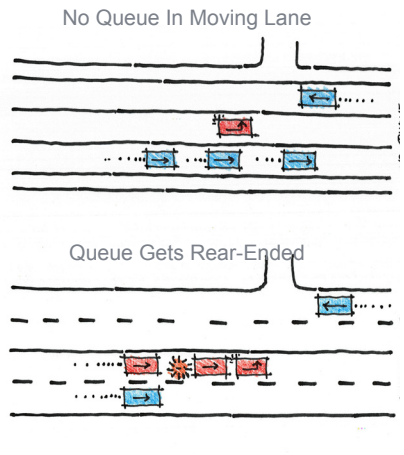
Four lane to three lane road diets can be accomplished with limited impact on roadway capacity and have been implemented on roadways carrying as much as 25,000 AADT (Route 1 carries between 12,000 to 24,000 AADT). The reason stems from the limited vehicle capacity of the inside travel lanes of a four lane section which really function as left turn lanes, making a four lane section operate with a capacity closer to a two lane section.

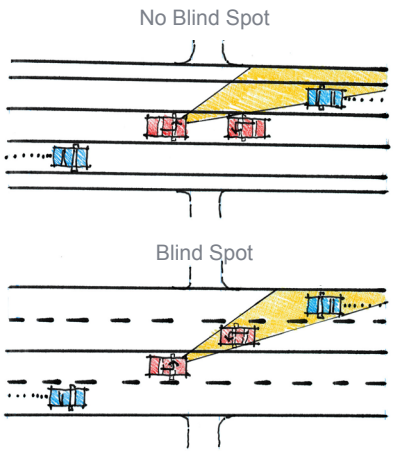
Road diets that convert four lanes to three lanes have proven to result in fewer collisions, safer speeds, better pedestrian accommodation, increased bicycle accommodation, reduced environmental impacts, increased neighborhood cohesion, and increased property values. This is because a three lane section with a dedicated left turn lane eliminates a number of negative characteristics inherent in a four lane section.











Speeding

A four lane section promotes lane changing behavior and speeding as more aggressive drivers utilize the second travel lane to pass slower moving vehicles and travel through the corridor faster. The three lane section eliminates the second lane and regulates overall vehicle speed to the slowest moving vehicle.

Left Turn Weaving

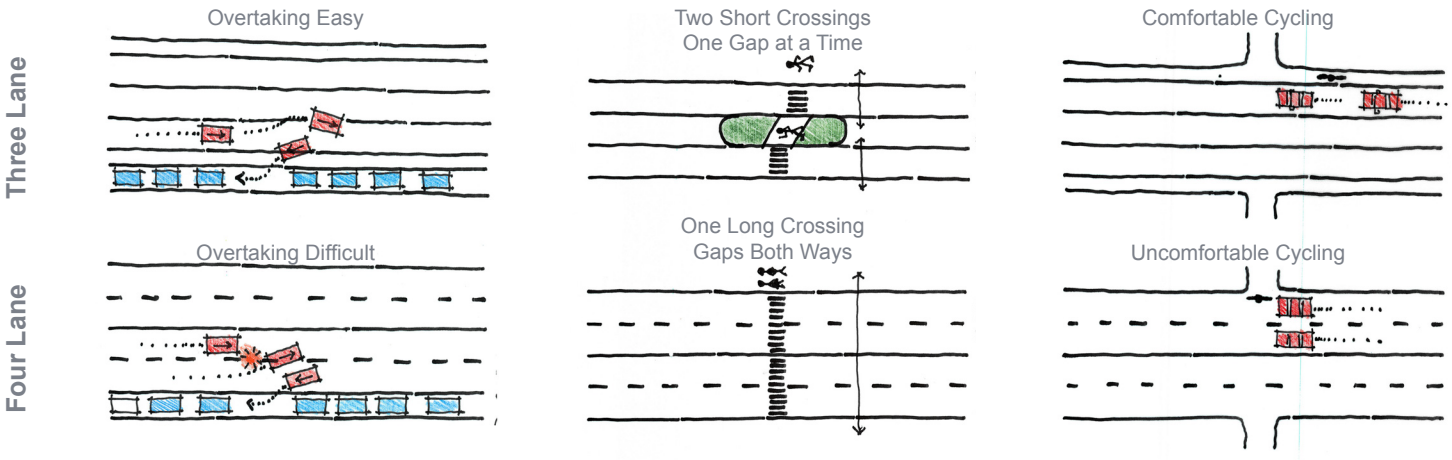
In a four lane section, vehicles waiting to turn left cause approaching vehicles to spontaneously and unpredictably weave and change lanes, increasing the potential for sideswipe crashes (17% of reported crashes between 2006 and 2008 involved sideswipes). Providing a dedicated center turn lanes removes the left turning vehicle from the traffic flow and eliminates lane changing.

Left Turn Queue

Stopped vehicles in the center lane waiting to turn left create vehicle queues in a travel lane at unpredictable times and places. Vehicles approaching this queue do not always anticipate the stopped traffic resulting in rear-end crashes (37% of reported crashes between 2006 and 2008 involved rear-end collisions). A separated left turn lane removes this situation.

Visibility

In a four lane section, the visibility of vehicles waiting to turn left is blocked by oncoming vehicles or left turning vehicles in the adjacent opposite lane. This creates a blind spot preventing the driver turning left from seeing oncoming traffic and safely turning across traffic. The center turn lane eliminates this blind spot and allows the driver to directly see the oncoming traffic



Parking/Transit Accommodation

Vehicles changing lanes to go around parallel parkers can sideswipe other vehicles (3% of reported crashes between 2006 and 2008 involved parking vehicles). A center turn lane provides the room to maneuver around a parking car or stopped transit vehicle safely.

Pedestrian Accommodation

Four lanes of free flowing traffic require a crossing pedestrian to search for a gap in all four travel lanes (traveling in two directions) to safely cross. The center turn lane provides a safe refuge that can be specifically designed as a pedestrian island, allowing the pedestrian to cross looking for a safe gap in traffic, one lane at a time.

Cycling Accommodation

In four lane sections without dedicated bicycle lanes, such as Route 1, cyclists share the outside travel lane with vehicles creating an uncomfortable accommodation that is typically utilized by only the most experienced and confident cyclist. In a three lane conversion, the extra roadway space can be reclaimed for dedicated bicycle lanes to create a clearer, comfortable and safer bicycle facility that encourages broader use.

Roundabouts

A modern roundabout is a circular intersection that uses "horizontal deflection" on entry and exit to bring vehicle speeds down to a safe 15-20 mph and accommodates through and turning vehicles without the need for a traffic signal. Motorists entering the roundabout yield to vehicles already in the roundabout. Because traffic moves continuously through a roundabout, it is more efficient at moving traffic than a typical signalized intersection. Furthermore, roundabouts are safer than signalized intersections (i.e., fewer collisions and far fewer injuries and fatalities). Roundabouts slow driving speeds, allow pedestrians to safely cross the street, correct intersection configurations, and improve aesthetics.

Pedestrian and Bicycle Friendly

Roundabouts are pedestrian and bicycle-friendly and safe. A "splitter island" on each approach to the roundabout provides a refuge for pedestrians as they cross the street. This greatly simplifies crossings by allowing pedestrians to deal with traffic approaching from one direction at a time. The slow speeds make roundabouts bicycle-friendly as well.

Vehicle Accommodation

Roundabouts are designed to accommodate emergency vehicles, school busses, and delivery vehicles. The center island in the roundabout employs a "mountable ring" around its circumference that is designed to accept the rear, left, wheels of very large vehicles in order to eliminate any damage to the island's landscaping.

The benefits of roundabouts over signalized intersections include:

Safety:

- Lower vehicle speeds: At typical signalized intersections motorists are usually speeding up, especially if they expect the signal to change. As motorists approach roundabouts, they are forced to slow down.
- Fewer points of conflict: At a typical two-lane, four-approach intersection there are 32 vehicle-to-vehicle and 24 vehicle-to-pedestrian points of conflict; at a roundabout, points of conflict are reduced to eight for both vehicles and pedestrians.
- Simplified operation: Left-turning movements are eliminated. Every turn in and out of a roundabout is a right turn.

Traffic Capacity and Efficiency:

- 20% increase in traffic capacity over signalized intersections due to the elimination of stopped movements, all traffic moves continuously, yielding only at entry (Kansas State University Study).

Sustainable & Cost Effective:

- After initial construction, no signal equipment to install, repair or operate.
- Reduced vehicle emissions and fuel consumption due to reduced intersection delay and idling

Urban Design:

- Reduced amount of pavement dedicated to vehicles (eliminates left and right turn lanes) can be repurposed to landscaping or pedestrian space.
- Center island creates a prominent civic landscape design opportunity that can include landscaping and/or civic art.

Why roundabouts? For a number of reasons:

- Roundabouts experience 35% fewer crashes than signalized intersections
- Severe injuries and fatalities are reduced up to 89%
- They result in 75% fewer injuries than signalized intersections
- Pedestrians are 50% less likely to be hit in a roundabout than at a signalized crosswalk
- Serve as a traffic calming device, keeping vehicles moving but at a safe (15 mph) speed.

Source: 2010 FHWA Roundabout Technical Summary

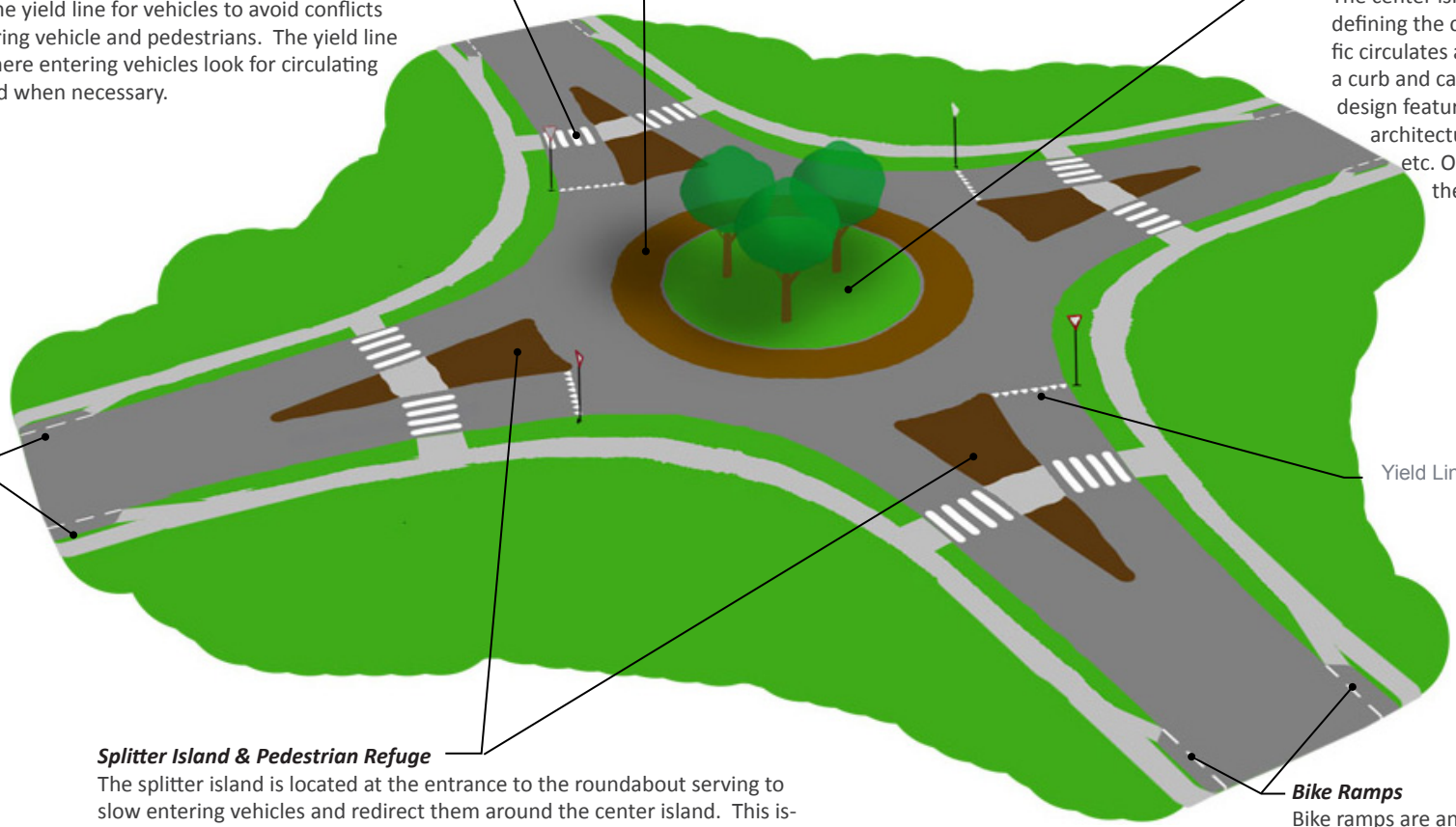
The Basic Anatomy of a Roundabout

While all roundabouts are specifically designed for individual intersections, there are a number of basic components that all roundabouts include.

Mountable Ring
Part of the center island design is a mountable ring which serves as the extension of the center island and narrows the circulating travel lane. This ring is specifically designed to be mountable so that the "swept path" of a large vehicle or truck turning through the roundabout can easily maneuver.

Pedestrian Crossing & Yield Line
The pedestrian crossing is located back from the intersection so that there is a one-car length space between the crossing and the yield line for vehicles to avoid conflicts between entering vehicle and pedestrians. The yield line is the place where entering vehicles look for circulating traffic and yield when necessary.

Center Island
The center island is the key component, defining the center feature which all traffic circulates around. This island includes a curb and can include a wide range of design features including landscaping, architectural monuments, fountains, etc. One of its functions is to break the field of view down the road so that drivers naturally slow down.



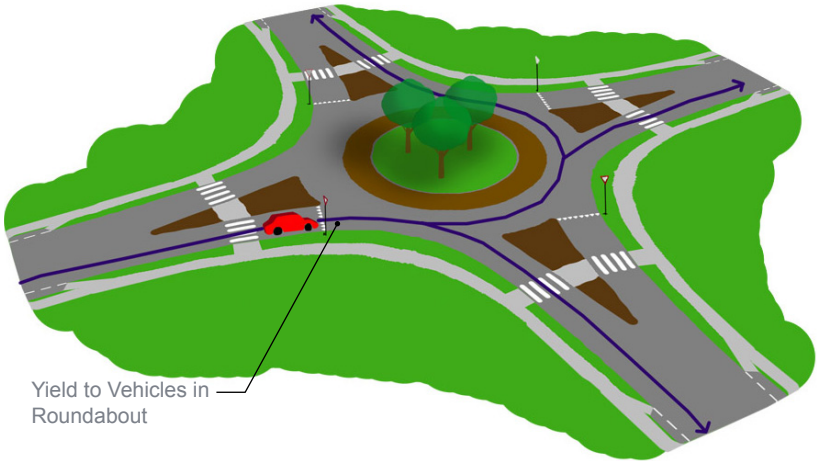
Bike Lane

Yield Line

Splitter Island & Pedestrian Refuge
The splitter island is located at the entrance to the roundabout serving to slow entering vehicles and redirect them around the center island. This island also serves as a pedestrian refuge, allowing crossing pedestrians a safe location to stop and look for vehicles before crossing the road.

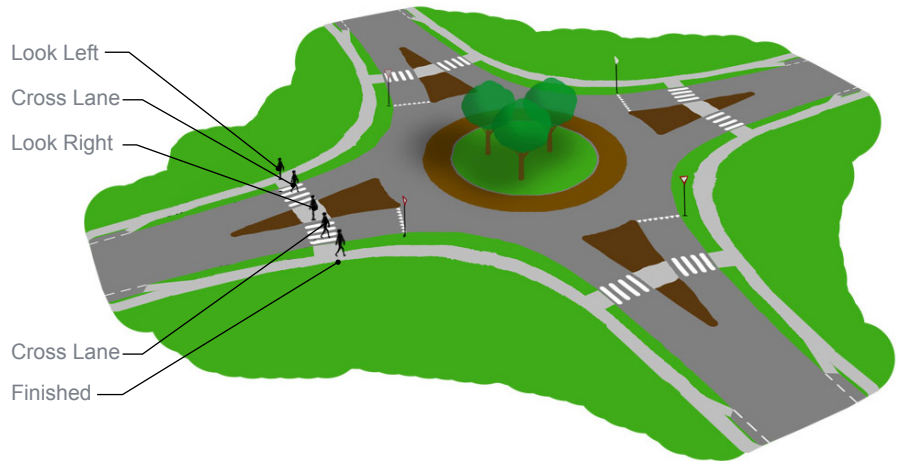
Bike Ramps
Bike ramps are an option for roads with dedicated bike lanes. These ramps provide a location for cyclists to utilize the sidewalk as an alternative to traveling through the roundabout to the desired street.

Roundabout Movements



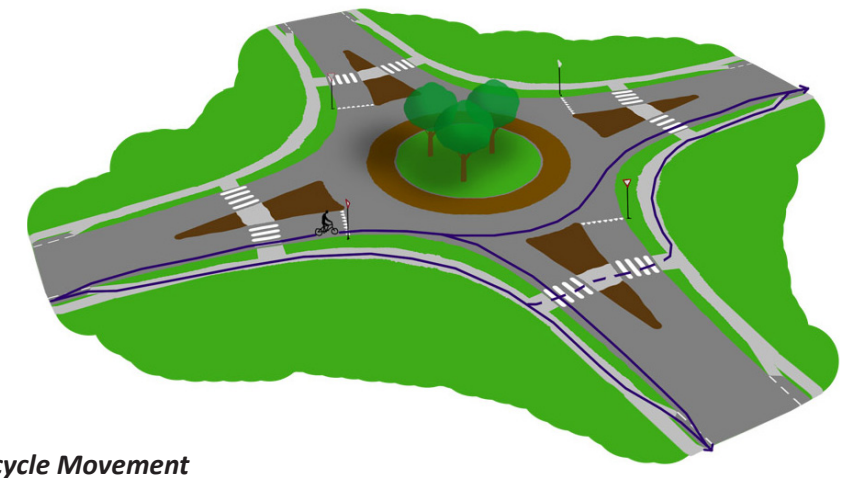
Vehicular Movement

Vehicles entering roundabouts yield at the end of the splitter island to vehicles in the roundabout, then enter the roundabout and circulate around to desired street.



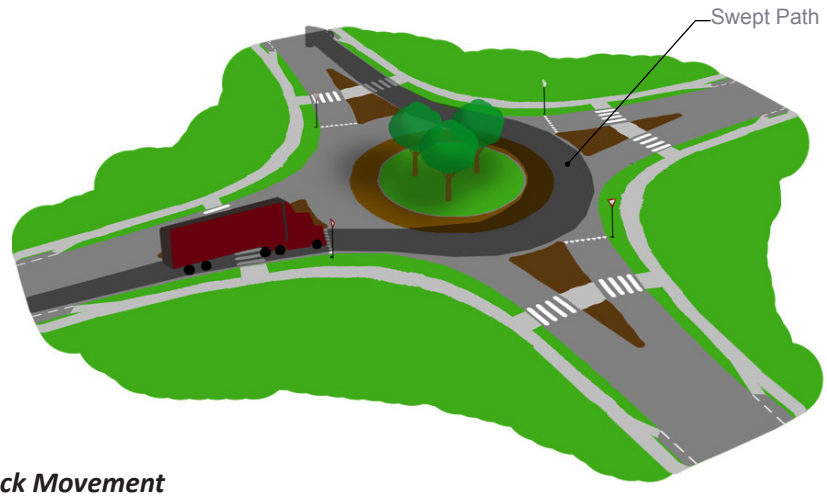
Pedestrian Movement

Pedestrians cross each leg of a roundabout at the splitter island. This island allows pedestrians to cross one lane of traffic at a time with a refuge in the middle allowing to safely look for on-coming traffic in just one direction.



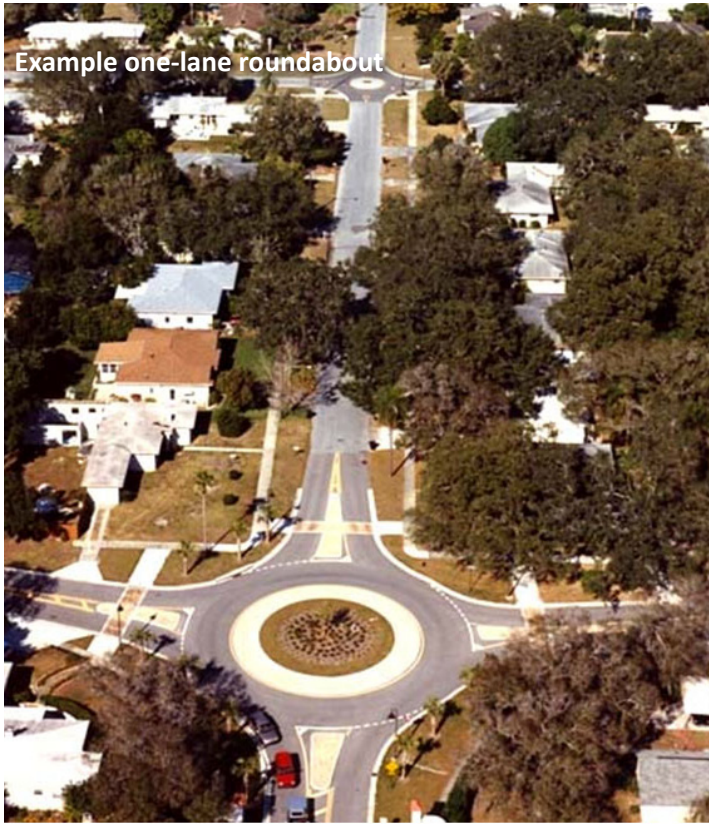
Bicycle Movement

Bicycles can ride through roundabouts in the same way vehicles do, yielding to traffic before entering and then sharing the travel lane. As an alternative when dedicated bicycle lanes exist, bicycle ramps to the sidewalks allow cyclists to exit the travel lane and then utilize the sidewalk and crossing at the splitter island.



Truck Movement

Trucks utilize roundabouts the same way vehicles do but, due to their larger turning radius, employ the mountable ring in their swept path to safely circulate through the roundabout.


Example one-lane roundabout


Roundabouts can accommodate large vehicles


Roundabouts can be attractive


Roundabouts are pedestrian friendly


Roundabouts safely accommodate cyclists

Back-in Angled Parking

Back-in angled parking is a growing approach to on-street parking that combines the increased supply of head-in angle parking with an easier and safer parking maneuver than parallel parking. The basic concept reverses typical head-in angled parking so that vehicles "back-in" to the space rather than "head-in". Back-in angled parking has proven to be favorable in many aspects compared to parallel parking and head-in angled parking, particularly with respect to increased safety. Some of the key advantages of back-in angled parking include:

Easier access:

- Compared to parallel parking, drivers maneuver into a back-in space in about half the time and it is easier to do. Thus, the travel lane is blocked for a shorter time period.

Better visibility:

- Back-in angled parking allows for better visibility while leaving the parking stall because the driver is located towards the front of the vehicle, facing forward, and can easily see past other parked cars. On the other hand, with head-in angled parking, drivers pull into the travel lane blindly.


Example back-in angle parking in a main street

Process is easy


Puts loading away from travel lane

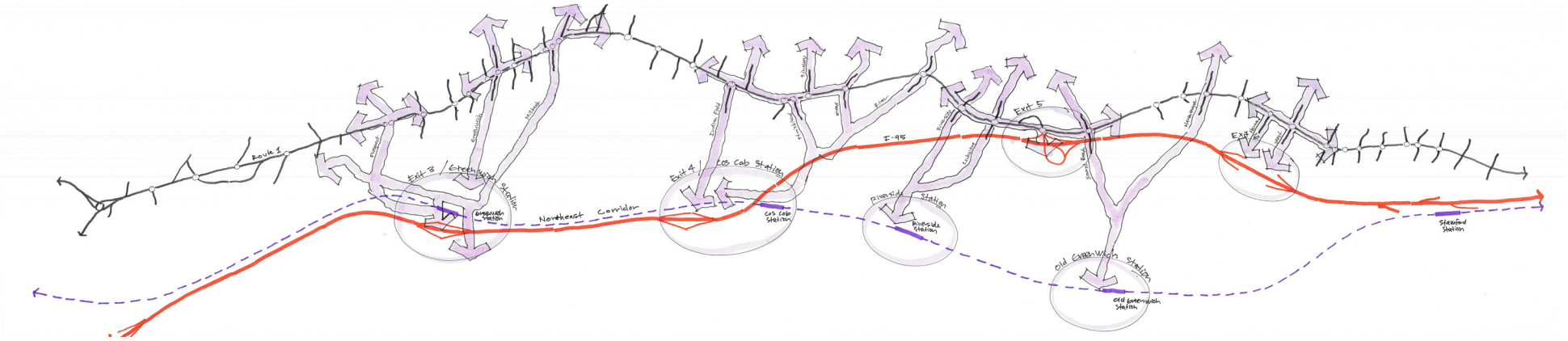

Makes traffic and cyclists more visible

Safer for users:

- Back-in angled parking allows for safer loading and unloading of a vehicle because the trunk is by the sidewalk, not the travel lane and not between parked cars.
- When exiting the car, the car doors open and physically block the route to the travel lane and direct occupants toward the safety of the sidewalk. This is especially helpful when young children are involved.
- Back-in parking eliminates the risk of "dooring" a bicyclist from a car that is parallel parked. Also, back-in angled parking allows for better visibility of bicyclists compared to head-in angled parking.

Increased Parking Supply:

- Back-in angled parking doubles the parking supply, compared to parallel parking. While resulting in an easier to use and safer utilization.



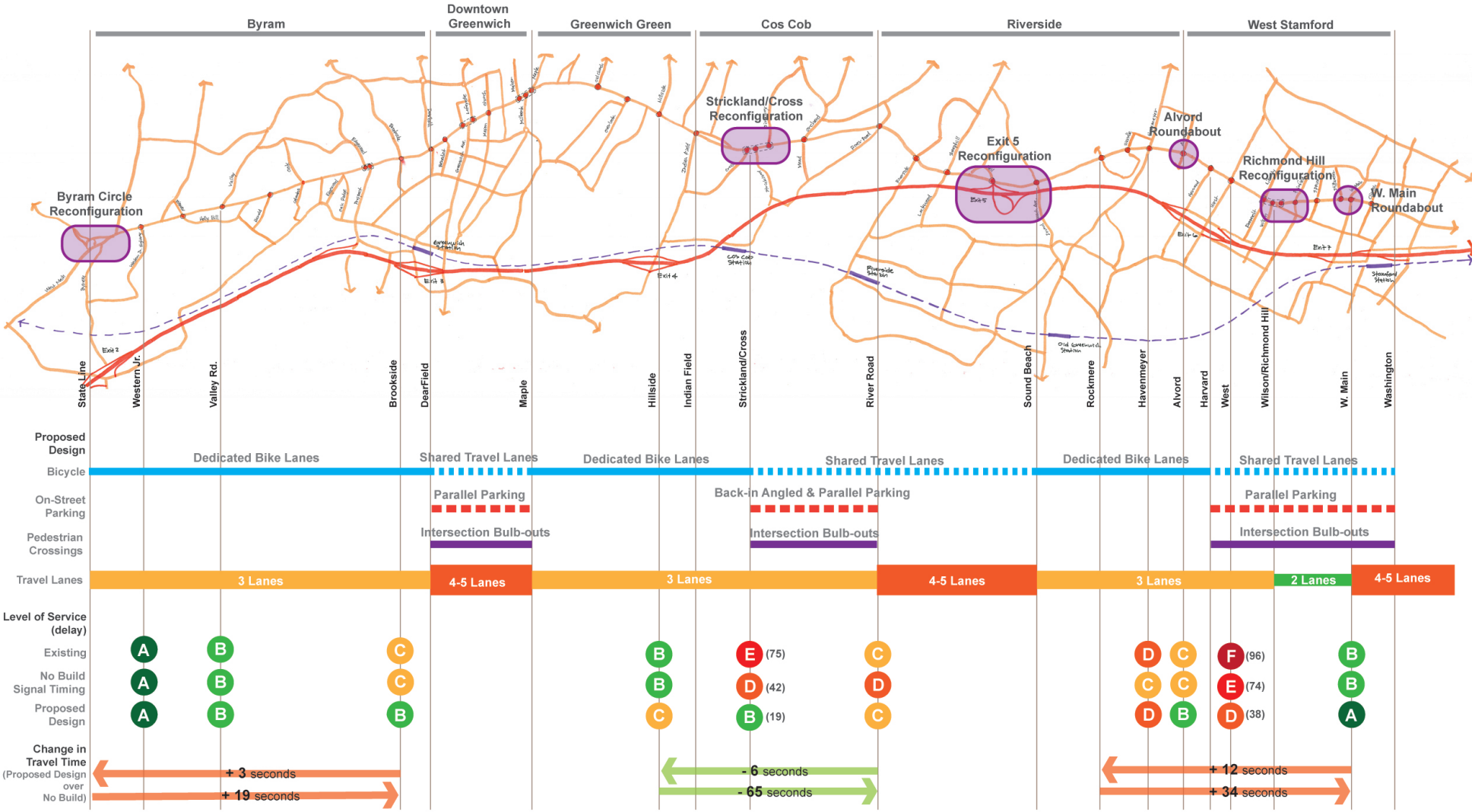
4.0 Corridor Alternatives

4.1 Corridor Design Summary

The resulting design alternatives for the corridor reflect a "district" approach that responds to the varied traffic operations, physical cross section, and land use context of each segment of the corridor.

This approach maintains the overall traffic function of the corridor while allowing the road to adapt to a range of contexts, accommodating and balancing additional community roles.

The Corridor Summary Chart maps the range of "districts" and their proposed roadway characteristics, and highlights the traffic operational results of the proposed roadway design alternatives.



Lane Configuration

With the exception of Downtown Greenwich, the Exit 5 area, and the existing two-lane cross section in Stamford, the lane configuration of the corridor is proposed to be reduced from four lanes to three lanes to accommodate bicycle lanes, on-street parking, and achieve safer and more pedestrian-friendly vehicle behavior.

Bicycle Facilities

Bicycle lanes have been incorporated in all of the three lane sections, utilizing the space gained by eliminating one travel lane. Shared travel/bicycle lanes are utilized in segments of the corridor where the road diet was not possible and in commercial districts (such as Cos Cob and Stamford's West Side) where the need for on-street parking and pedestrian bulb-outs took priority.

On-Street Parking

The commercial districts of Downtown Greenwich, Cos Cob, and Stamford's West Side currently include a range of on-street parking supporting these active street-oriented retail and business districts. The design alternatives seek to formalize this parking into the proposed lane reconfiguration. In some cases incorporating back-in angled parking where space allows (Cos Cob and parts of West Stamford) or more clearly defining the parking lane with striping and bulb-outs.

Pedestrian Crossings

Wherever on-street parking exists, the pedestrian crossing width of intersections can be reduced by incorporating bulb-outs. The bulb-outs utilize the space of the on-street parking at the intersections as an alternative to simple striping or right turn lanes. This effectively reduces the width of a street crossing by as much as 16 feet, making a more comfortable crossing and reducing the time allocated for pedestrian crossing in the traffic signal operation.

Key Projects

In addition to the proposed cross section alternatives there are a number of site specific intersection reconfiguration and redesign projects targeted to identified locations of safety and congestion issues. These projects include the Byram Circle, the Strickland/Cross intersection, Exit 5, the Alvord intersection, the Richmond Hill intersection, and the West Main - Greenwich Ave. intersection. Detailed design concepts for these locations are illustrated in Section 4.0.

Resulting Traffic Operations

Preliminary traffic operational results for the proposed four to three lane road diet indicate minimal change in intersection delay and some actual reduction in delay (Cos Cob). These results support the field observations of the existing four lane section operating much like a three lane road where the center lanes are avoided by through traffic because of their use for left turns. The overall travel time of the three lane section increases slightly (with the exception of Cos Cob) presenting a modest traffic impact compared to list of benefits including; increased safety, inclusion of bicycle facilities, narrowing of the road, reducing vehicular speeds, and overall pedestrian friendliness.

Traffic Analysis Methodology

For the purposes of testing and evaluating the design concepts and alternatives, traffic operations analysis was performed during the Design Workshop using the microsimulation programs Synchro/SimTraffic for signalized intersections and VISSIM for roundabouts. The analysis produced comparative impact results for three scenarios: Existing Conditions, No Build, and Proposed Build.

The Existing Conditions represents current operations, derived from traffic counts and travel time information collected in April 2010. The full analysis is reported in the Existing Conditions Report.

Existing traffic volumes were grown by up to 20% to reflect traffic volumes recorded by ConnDOT prior to the recent economic downturn. Anticipated traffic volumes related to planned developments along the corridor was also added to create the corridor Design Volumes.

The No Build scenario represents only signal timing modifications tested using the design volumes.

The Proposed Build scenario represents the design concepts developed during the Design Workshop and outlined in this report using the design volumes.

4.2 Stamford District

Corridor Alternatives

Context-Theme-Vision

Route 1 in the Stamford Westside neighborhood is a vibrant community main street that includes a mix of residential, street-oriented retail and civic uses creating an active neighborhood center. The adjacent urban neighborhoods make this a walkable location for neighborhood-serving uses resulting in a high level of pedestrian activity. The street is poorly defined with wide expanses of undefined pavement, and is unattractive and auto-oriented. Design solutions will look to redefine the street, repurposing extra pavement for on-street parking, bulb-outs, and center turn lanes.

Route 1 in the Stamford Westside Neighborhood

West Main Street/Greenwich Avenue Roundabout

At the West Main Street/Greenwich Avenue intersection Route 1 transitions from a seven lane road (in downtown Stamford) to a two lane road in the Westside Neighborhood. This transition occurs at the intersection resulting in an overly wide intersection with three lanes merging to one lane southbound into the neighborhood and one lane expanding to three lanes northbound into downtown Stamford.

The proposed concept is to build upon the reduction of Route 1 north of West Main Street from seven lanes to five lanes, currently under construction, by repurposing the two outside lanes as on-street parking. This road diet will then make the West Main intersection a good candidate for a roundabout, allowing a clearer way to transition from the five lane section to the two lane section of Route 1.

A modified single lane roundabout is proposed which provides additional turn lanes at the northbound, southbound and westbound approaches. All exits from the roundabout would remain as single lanes. The traffic operational results show the roundabout operating at LOS B, comparable to its current operation but with the added benefit of safety, shorter pedestrian crossings and clearer design transition from downtown to the Westside Neighborhood.

Perspective view of West Main/Greenwich roundabout

Plan view of West Main/Greenwich roundabout

Existing Street Cross Section (north of Richmond Hill)

The cross section of Route 1 south of West Main Street and north of Richmond Hill Avenue is one travel lane in each direction with on-street parking. The curb to curb dimension is 39 feet and lacks clear definition of lanes or existing parking. This lack of lane definition contributes to driver confusion, passing, and speeding along this section of the corridor and at signalized intersections.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.

Proposed Street Cross Section (north of Richmond Hill)

By simply defining the on-street parking through bulb-outs at intersections and in mid-block locations, the roadway becomes more clearly defined and visually narrowed. At intersections, the bulb-outs reduce the intersection width making safer and shorter pedestrian crossings. At mid-block locations, the bulb-outs can be landscaped with street trees adding needed shade and pedestrian comfort while adding to the visual enclosure of the roadway, and/or designed to accommodate storm-water runoff in small rain gardens that detain it before entering the drainage system.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.

Richmond Hill Intersection & Jackie Robinson Park

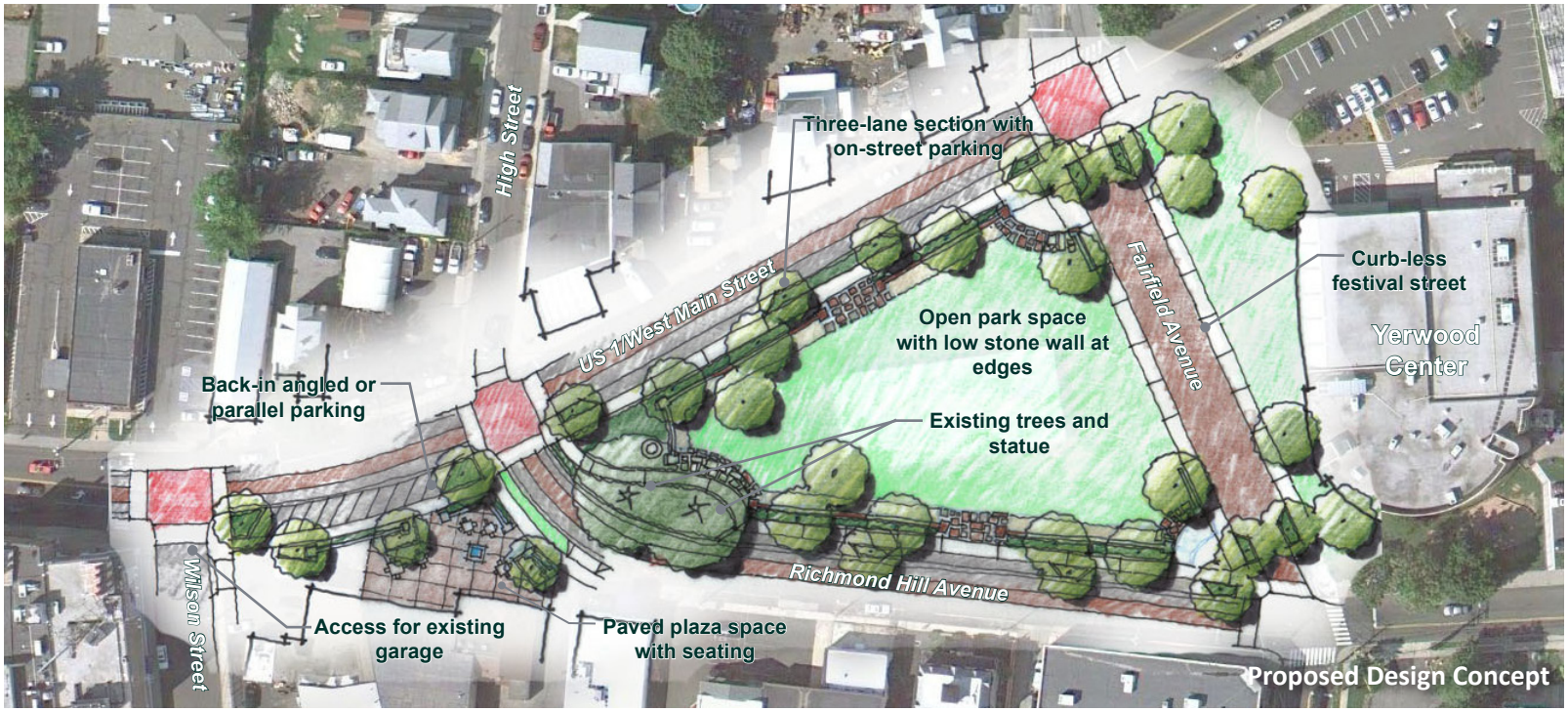
The intersection of Route 1 and Richmond Hill Avenue involves four roads (Route 1 Richmond Hill, Wilson, and High) intersecting at various angles and locations. The result is a confusing traffic pattern, unnecessary extra pavement and limited/missing pedestrian crossings. This is an important community focal point in Westside Neighborhood anchored by Jackie Robinson Park and the Yerwood Youth and Community Center, and is in the center of an active pedestrian-oriented business district.

The proposed reconfiguration of this intersection includes:

- Realigning Richmond Hill to intersect Route 1 at a perpendicular angle, lining up with High Street. This design impacts southernmost point of the park but results in a dramatically shorter pedestrian crossing to the park and creates a new public space/plaza on the southeast corner of the intersection.

- The intersection redesign would improve safety and traffic operations due to the simplified intersection configuration, defined travel lanes and separate left turn lanes, resulting in better traffic flow and more efficient use of green time at the traffic signals.

- The feasibility of replacing the signalized intersection at Route 1 and Richmond Hill with a roundabout was examined. Several variations of a roundabout were checked for the location, and while a roundabout here could handle the anticipated traffic volume, the physical dimensions of a roundabout at this location would have a significant impact on adjacent properties and Jackie Robinson Park.

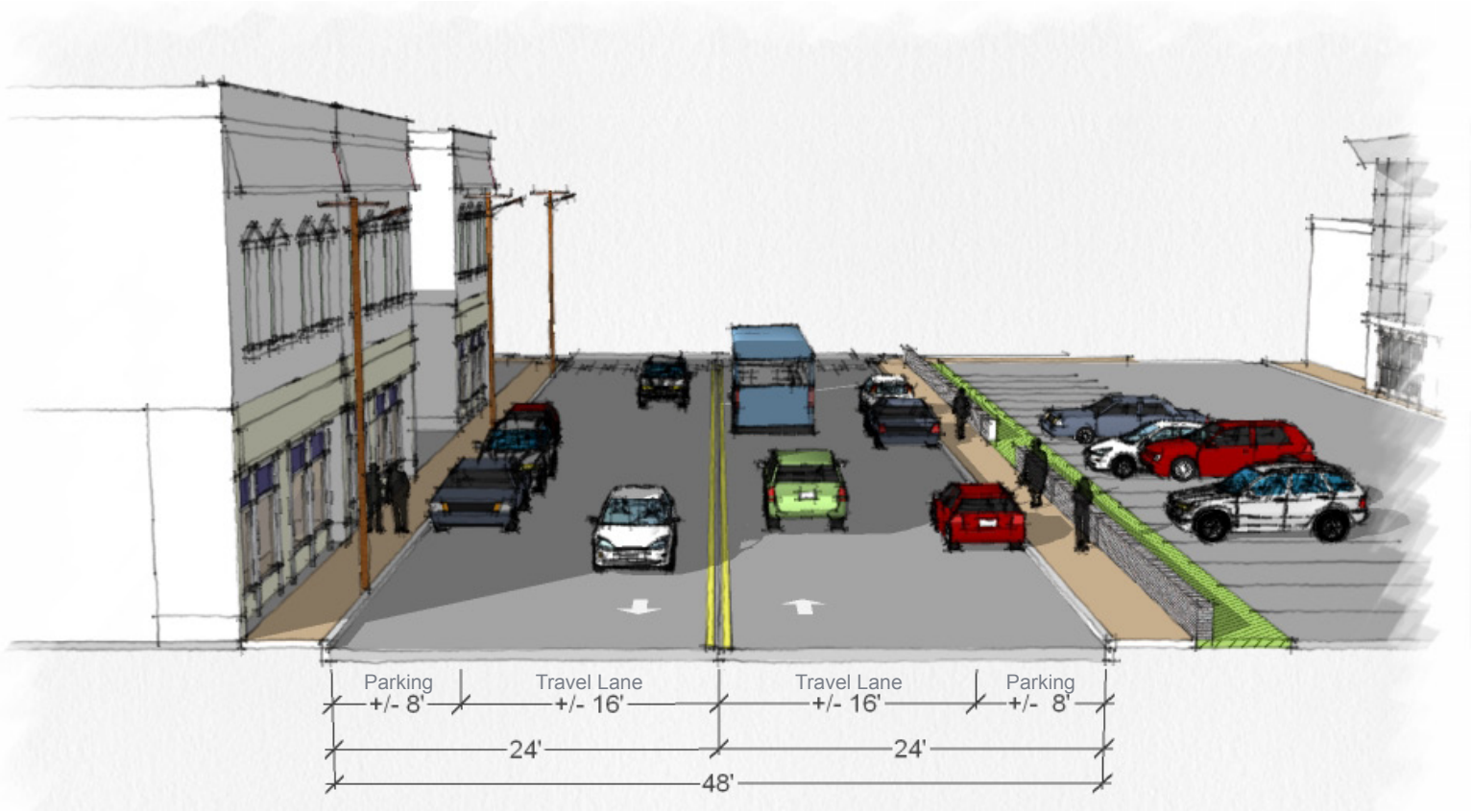


- The resulting realignment provides space for new on-street parking on the block between Wilson Street and Richmond Hill, proposed as back-in angle parking adjacent to the new plaza space.

- Route 1 and Richmond Hill Avenue are redesigned as a three lane sections with a center turn lane and on-street, parallel parking. The intersections include bulb-outs to enclose/define the on-street parking and create shorter pedestrian crossings.

- Fairfield Avenue is redesigned as a curb-less "festival street" allowing it to become a flexible extension of Jackie Robinson Park that could connect to the Yerwood Center. This street design is raised to be curb-less, allowing it to be a seamless "plaza" that could be closed for park events or festivals. During regular times it functions as a typical street with on-street parking. The design could incorporate special materials such as brick or pavers to emphasize its unique function and pedestrian orientation.

- The boundary of Jackie Robinson Park is designed with a low stone wall to define the edge of the park, providing convenient seating and an unobtrusive barrier to keep children and activities in the park and out of the street.



Existing Street Cross Section (south of Richmond Hill)

The cross section of Route 1 south Richmond Hill Avenue is one travel lane in each direction with on-street parking. The curb to curb dimension is 48 feet and lacks clear definition of lanes or existing parking. The result is a 24 foot span of pavement in each direction to accommodate one travel lane and on-street parking. This lack of lane definition contributes to driver confusion, passing, and speeding along this section of the corridor and at signalized intersections.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.

Proposed Street Cross Section (south of Richmond Hill)

The proposed design redefines the pavement space into a three-lane section with on-street parking. The on-street parking is further defined through bulb-outs at intersections and in mid-block locations, helping to visually narrow the roadway. At intersections, the bulb-outs reduce the intersection width making safer and shorter pedestrian crossings. At mid-block locations, the bulb-outs can be landscaped with street trees adding needed shade and pedestrian comfort while adding to the visual enclosure of the roadway.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.

View of Route 1 at Victory Street

Before: This view of Route 1 looking north at Victory Street illustrates the expansive pavement and its visual impact on the corridor, leaving no room for landscape and resulting in ambiguous vehicular markings and land definition.

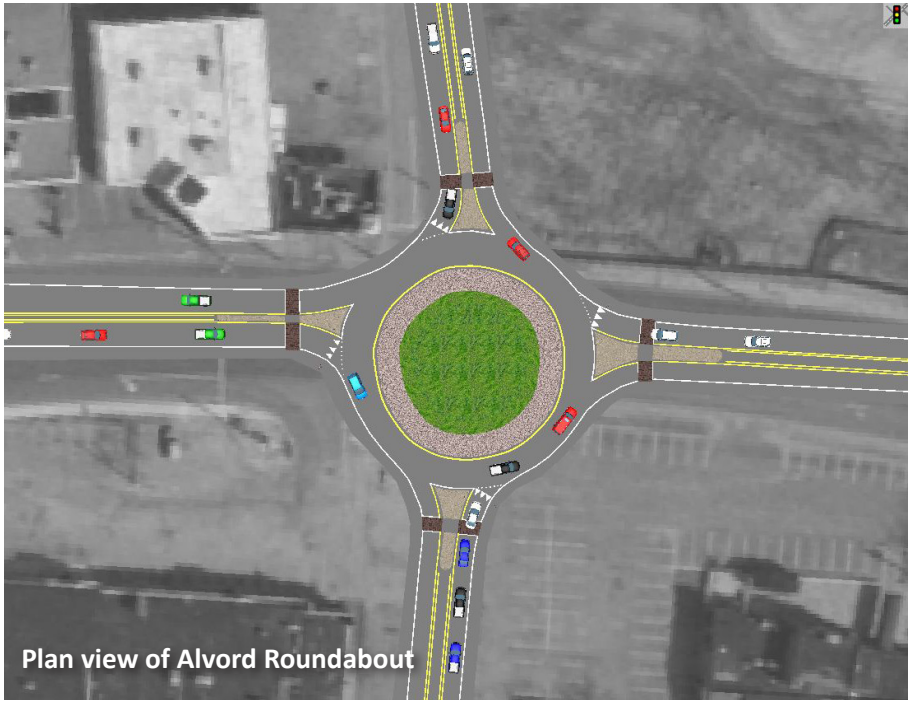
After: The proposed redesign of the street stripes a three-lane section with one travel lane in each direction and a center lane for left turns. This center lane could potentially be designed with alternative materials (such as brick pavers) to create a visual contrast to the travel lanes, slow turning traffic and visually narrow the roadway. Bulb-outs define the parking lanes and provide opportunities for street trees and landscaping.

Alvord Lane Roundabout

South of Harvard Avenue, with little increase in traffic volume, Route 1 widens to four lanes and 60+ feet of roadway width. The widest point occurs at the Alvord Lane intersection where additional left and right turn lanes create a pedestrian crossing of 6 lanes and over 70 feet. A three–lane road diet in this section would allow for the inclusion of dedicated bicycle lanes and the reconfiguration of the Alvord intersection.

The Alvord intersection has an off-set alignment with the commercial driveway to the south resulting in a wide crossing distance and irregular vehicle turning movements. The proposed design tested the feasibility of a roundabout at this intersection which eliminates the additional turning lanes and allows for a realignment of the intersection approaches.

The proposed design is a single lane roundabout. The traffic operations analysis for the Alvord Lane roundabout was performed using the microsimulation program VISSIM. The results for the PM peak hour show a reduction in delay (LOS C to LOS B) with the roundabout over the existing intersection or a "no-build" scenario with adjusting signal timing. These results indicate that a single lane roundabout would improve overall intersection operations, while providing for easier pedestrian and bicyclist movements.



Plan view of Alvord Roundabout

Perspective view of Alvord Roundabout

Traffic Analysis

The overall traffic analysis for the West Stamford District indicate that the three-lane redesign of the street and proposed roundabouts will reduce signal delay at several key intersections and would result in negligible travel time increases.

Existing West Avenue Intersection

The signalized intersection of Route 1 with West Avenue is probably the most congested intersection in this section of the corridor. The lack of lane definition and the sudden loss of the northbound lane immediately after the intersection contribute to both existing safety issues (the higher number of crashes at the intersection) and the congestion and inefficient use of the traffic signals green time resulting in peak period queuing extending along all four approaches to the intersection.

Proposed West Avenue Intersection

The proposed cross section defines a dedicated left turn lane for each approach of Route 1 to the intersection and removes the confusing lane drop which should help both safety and traffic operations. The traffic analysis results indicated the proposed intersection configuration with adjusted signal timings would improve today's failing Level of Service to LOS D or better for the proposed conditions.

Additional Alternatives Considered: Harvard/West One-Way Pair

The desire to convert Harvard and West to a one way pair was expressed on several occasions both by residents and by the Westside Project Team. During the design workshop the Route 1 project team used the SimTraffic model to evaluate the ability of this alternative to improve traffic operations.

The project team's review of the concept revealed some potential traffic operation issues. Specifically, the amount of westbound traffic using Harvard that would need to turn right onto Route 1 followed by a left-turn onto West Avenue created large traffic impacts on Route 1 with queuing and traffic operations noticeably worse than existing and no-build conditions. The project team has provided the traffic model and traffic volumes to the Westside project team to determine if there are other viable one-way options or variations of the original option that would make the concept feasible.

	STAMFORD		
	Level of Service (delay)		
Intersection	**Existing**	***No Build**	**Build**
Rockmere Ave	A (9)	A (7)	A (7)
Wendle Place	A (8)	A (7)	A (8)
Havemeyer Lane / Laddins Rock Road	D (43)	C (30)	D (37)
Alvord Lane	C (26)	C (20)	B (15)
Harvard Lane	B (17)	B (15)	C (26)
West Avenue	F (96)	E (74)	D (38)
Virgil Street / Diaz Street	C (16)	B (10)	
Wilson Street / Richmond Hill Avenue	A (5)	A (5)	A (4)
High Street/ Richmond Hill Avenue	A (5)	A (6)	A (2)
Stillwater Avenue	B (18)	B (16)	C (30)
West Main Street / Greenwich Avenue	B (17)	B (15)	A (10)

* No Build analysis conducted using design traffic volumes, and assumes improved signal timings are implemented.

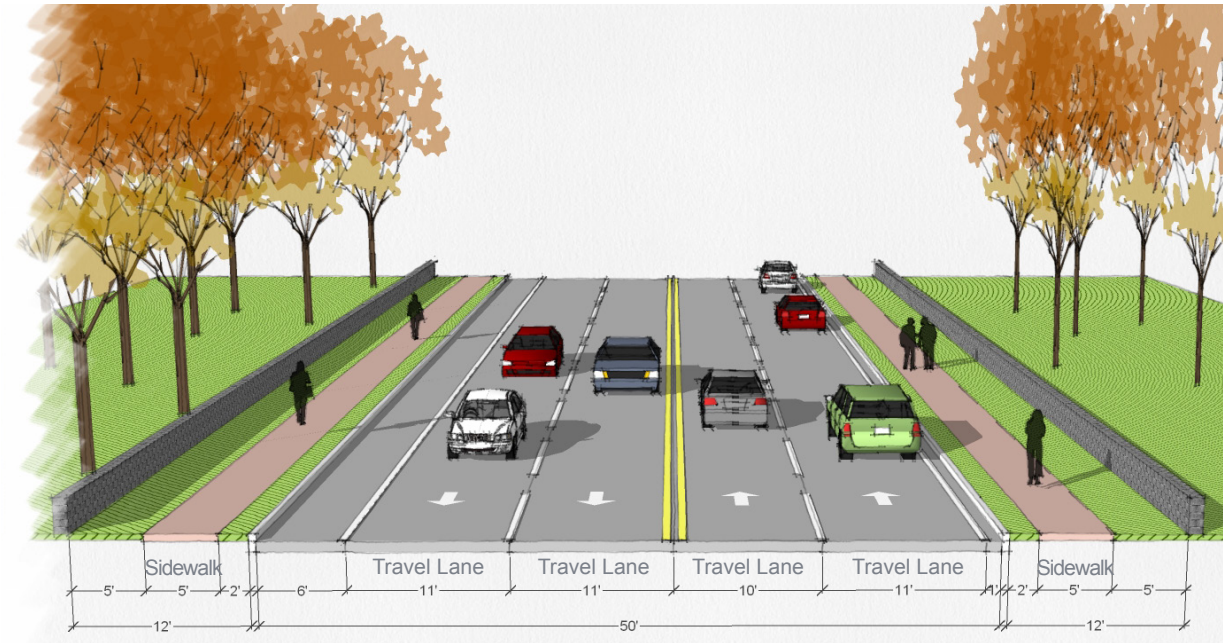
4.3 Riverside District

Corridor Alternatives

Context-Theme-Vision

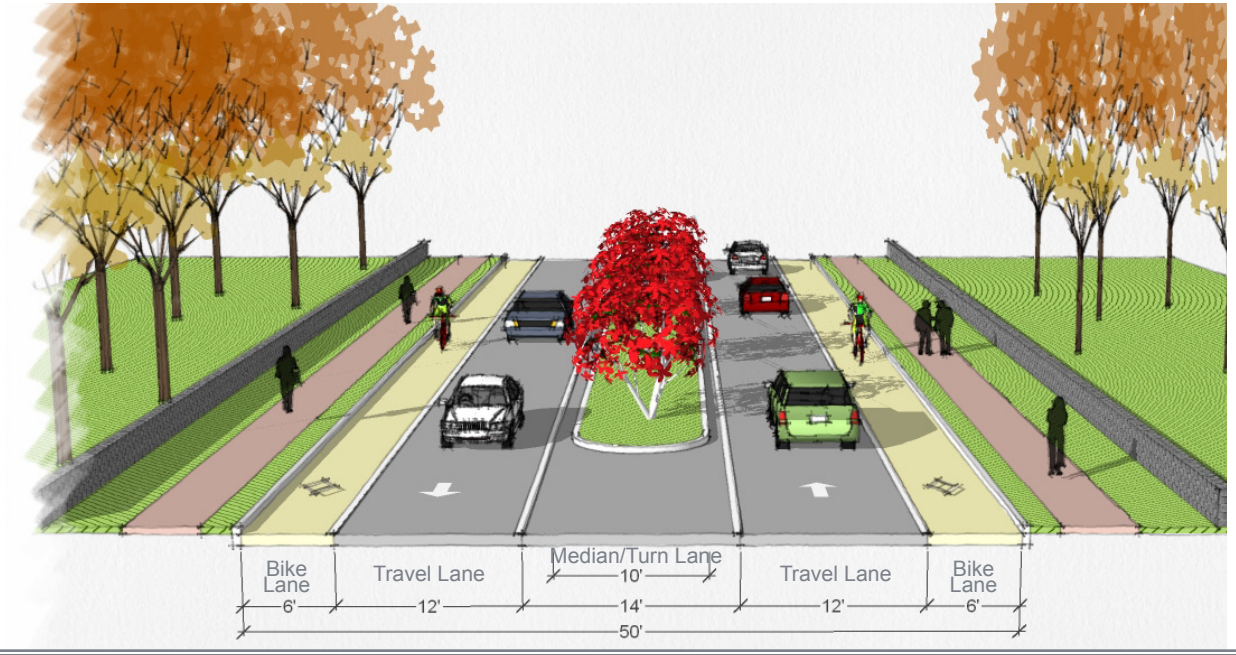
The Riverside District is characterized by a mix of strip commercial, suburban office, and residential development. The corridor is wider here, resulting in a four to five lane section that operates more like a suburban arterial roadway than a pedestrian main street. The Riverside neighborhood extends north and south of the corridor and is divided by the "highway" character of the roadway. It is here that Route 1 and I-95 are the closest, highlighted by Exit 5 connecting directly to Route 1 resulting in a concentration of traffic and suburban commercial development. Design solutions will look to calm the corridor's "highway" behavior and insert needed bicycle lanes by reshaping the roadway from four to three lanes in some segments. Potential solutions to Exit 5 will look at adding new network to distribute traffic and redesigning signalized intersections into roundabouts as a safer, pedestrian-friendly alternative.

Route 1 in Riverside



Existing Cross Section: (Havemeyer to Sound Beach)

The cross section of Route 1 from Havemeyer to River Road is four travel lanes (two in each direction) with a varied striped shoulder and left turn lanes at key intersections. The curb to curb dimension varies from 50 feet to +/- 60 feet, leaving some segments without enough room for a dedicated left turn lane.

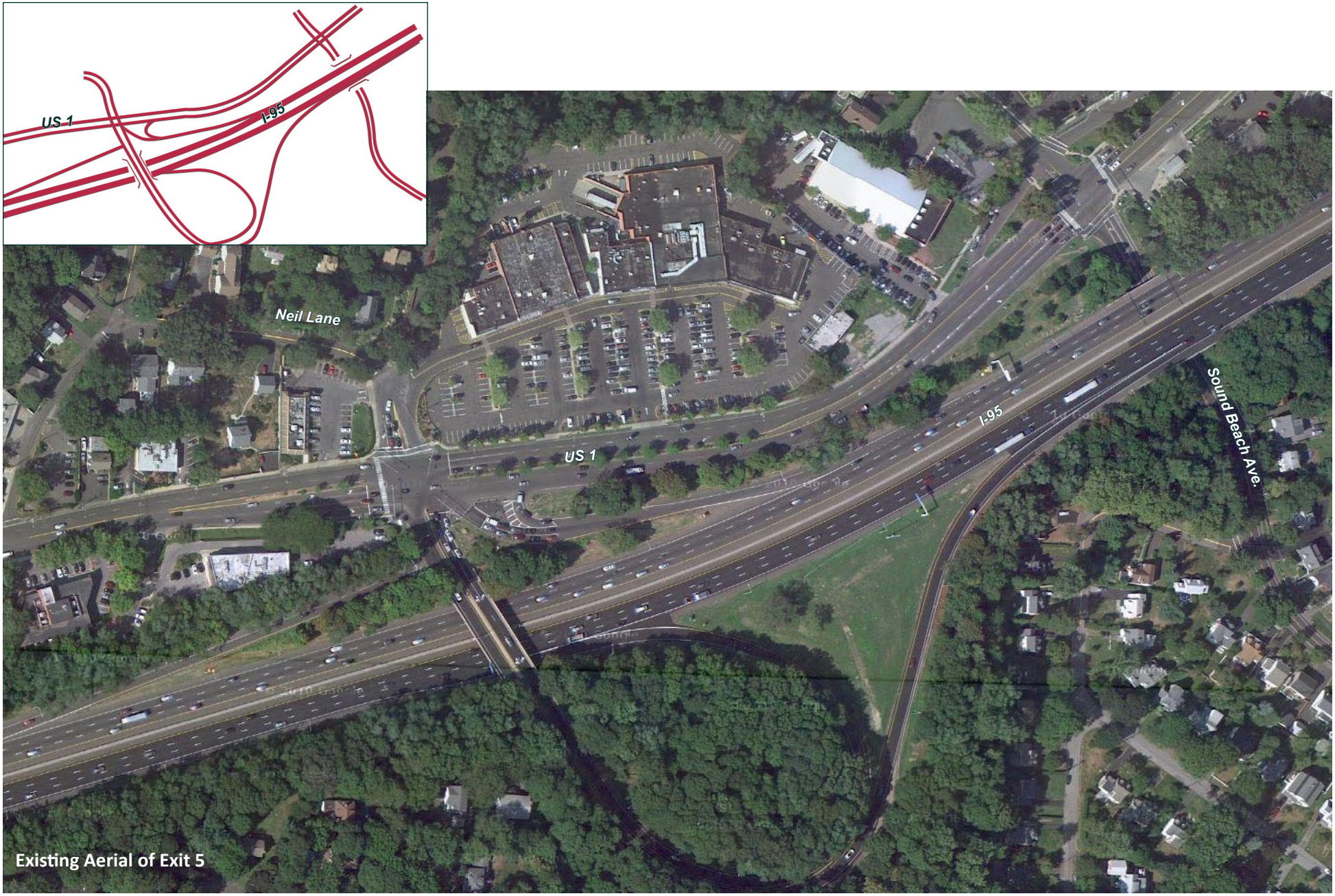


Existing Cross Section: (Havemeyer to Sound Beach)

The proposed section restripes the roadway into a three-lane section.

- Allows for the addition of bicycle lanes.
- Provides a dedicated left turn lane throughout, providing for safer left turns at intersections and various driveways and curb cuts along the corridor.
- Some sections of the corridor with limited driveways could include landscaped islands in place of the center left turn lane. This design feature would help visually narrow the road and provided attractive visual enhancements to the roadway.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.



Existing Aerial of Exit 5

Existing Condition: Exit 5

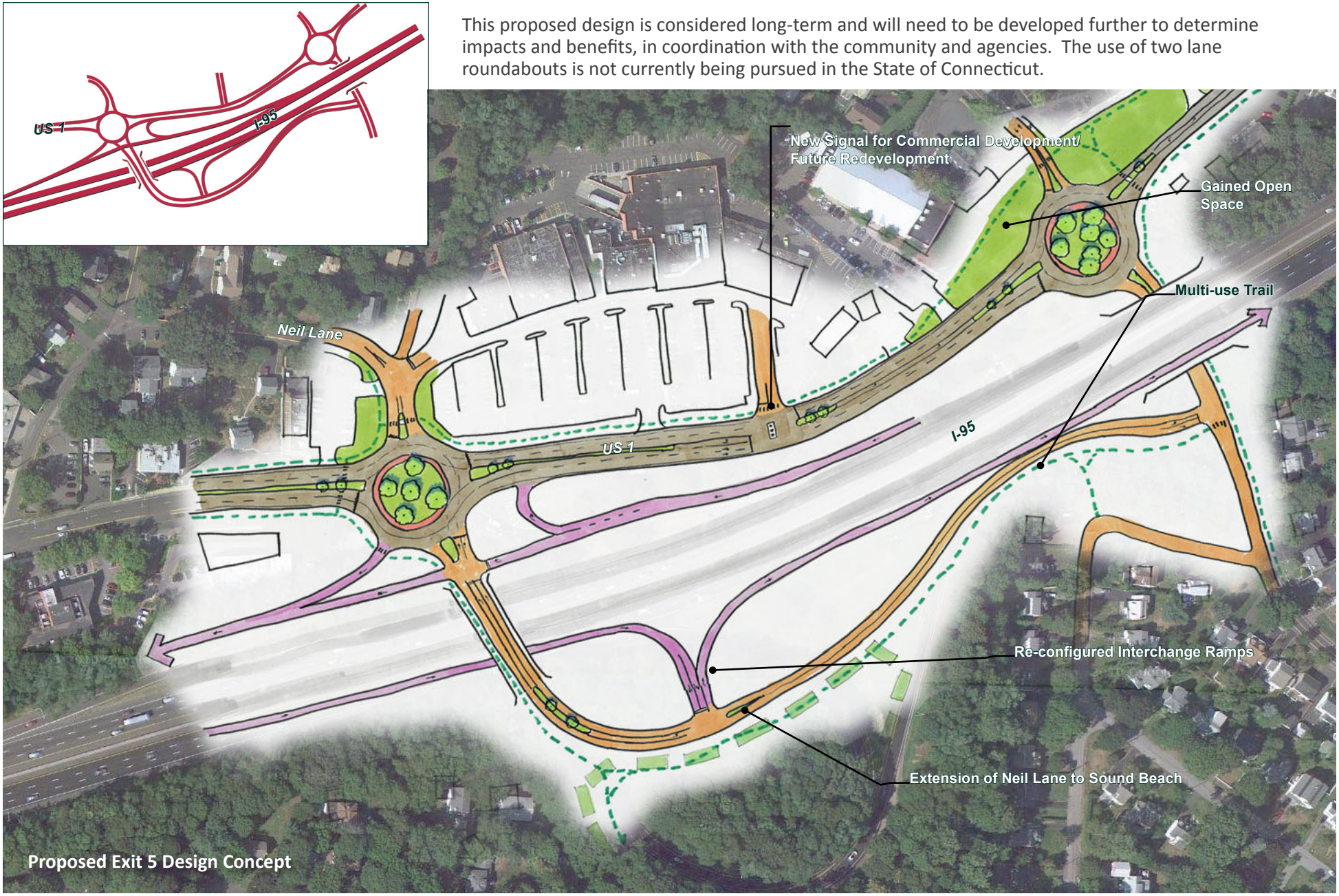
Exit 5's fundamental challenges stem from the physical closeness of Route 1 and I-95, and the one-sided design that brings all the ramps together on the north side of I-95 to avoid the neighborhood. Because so many efforts have been made to make the interchange work better for motorists, speeding is an issue and the accommodation of pedestrians and cyclists is poor. The result is an unorthodox interchange that concentrates all traffic in one signalized intersection on Route 1. This intersection is unattractive, pedestrian hostile, congested, and confusing (which has resulted in a proliferation of signs).

- The Neil Lane approach to the north is a short segment that is essentially a driveway for the adjacent McDonald's and commercial strip shopping center, with limited connection to adjacent network, further focusing traffic in one congested location.
- The trumpet-styled ramps, on the south side of the interchange, use an enormous amount of land, some of which may well be used for higher and better purposes, if it were available.
- Sound Beach Avenue, a perpendicular street to the east of Exit 5, provides access to Route 1 and Exit 5 for a large population, located south the I-95. The problem is that every trip, between I-95 and this southern population, has to travel to the north side of I-95 and then use Route 1 to access Exit 5. This bogs down the intersection of Route 1 and Sound Beach Avenue, the interchange, and Route 1 between South Beach Avenue and the interchange.

View of Exit 5 ramp intersection with Route 1

Exit 5 intersection lacks pedestrian amenities

This proposed design is considered long-term and will need to be developed further to determine impacts and benefits, in coordination with the community and agencies. The use of two lane roundabouts is not currently being pursued in the State of Connecticut.



Proposed Exit 5 Design Concept

Proposed Exit 5 Design Concept:

Extend Neil Lane

Connecting Neil Lane across the bridge to Sound Beach Avenue will add needed network and results in several benefits including:

- The unorthodox interchange becomes more "normal", legible, and less confusing because, like with most interchanges, there is a road that is perpendicular to I-95 for the ramps to connect to on both sides of I-95.
- Many trips to and from the south on Sound Beach can get access to the interchange without using Route 1.
- The intersection of Route 1 and Sound Beach Avenue is relieved, as are the parts of interchange north of I-95, which helps the east-west motorists.
- There is a redundancy added to the I-95 crossing which would help in case of a collision or maintenance on part of the interchange or the intersection of Route 1 and Sound Beach Avenue.
- Opens up a variety of ramp configurations south of I-95, illustrated here is just one.
- All of the changes for the extension can occur within the existing footprint of the interchange ramps.
- The redesigned ramps south of the I-95 are further away from people's homes.
- A multi-use trail could be built from Sound Beach Avenue along Neil Lane to allow better and more direct pedestrian and bicycle access over I-95. This supports the *Greenwich Bicycle Master Plan* which recommended a "I-95 Path".

Replace Signalized Intersections with Roundabouts

Replace the Neil Lane/Exit 5 and Sound Beach intersections with roundabouts. The idea is to help slow the speeding and reckless driving in the areas, reduce collisions, and reduce the delays associated with the signals.

- The roundabouts would improve the aesthetics of the area dramatically and provide safe crossing locations for pedestrians.
- Because the turn lanes would no longer be needed, road space would be available, and US 1 could become a "complete street"; that is one that accommodates bicycles in bike lanes, pedestrians, and motorists.
- The remnant of the old highway near Sound Beach Avenue could become an open space, greatly reducing impervious surface in the area, beautifying the area, and reducing the confusion associated with the current proliferation of intersections in that area.
- Both roundabouts fit within the existing right-of-way, except for the southeast part of the roundabout at Exit 5, which impacts the end of a surface parking lot.
- Initial traffic analysis of the Exit 5 two-lane roundabout showed that it can operate with some queuing issues on the southbound and northbound I-95 exit ramp approaches as well as on Neil Lane (the exit from the shopping center and McDonald's). Detailed traffic analysis will need to be conducted for this roundabout that incorporates the network benefits of the design concept (extension of Neil Lane) in order to fully evaluate.

Provide New Shopping Center Access

The final feature of the concept is the economic development potential that is created to the north of Route 1 for the existing commercial shopping center. The roundabouts provide an opportunity for a new signalized intersection half way between the two roundabouts. The benefits of this new intersection are:

- It will maximize access to this valuable commercial site by processing many of the turns in and out of the retail area and further relieve the existing intersections;
- It can help break up the "superblock" and provide the beginnings of future street network that can organize and shape future redevelopment of the shopping center.

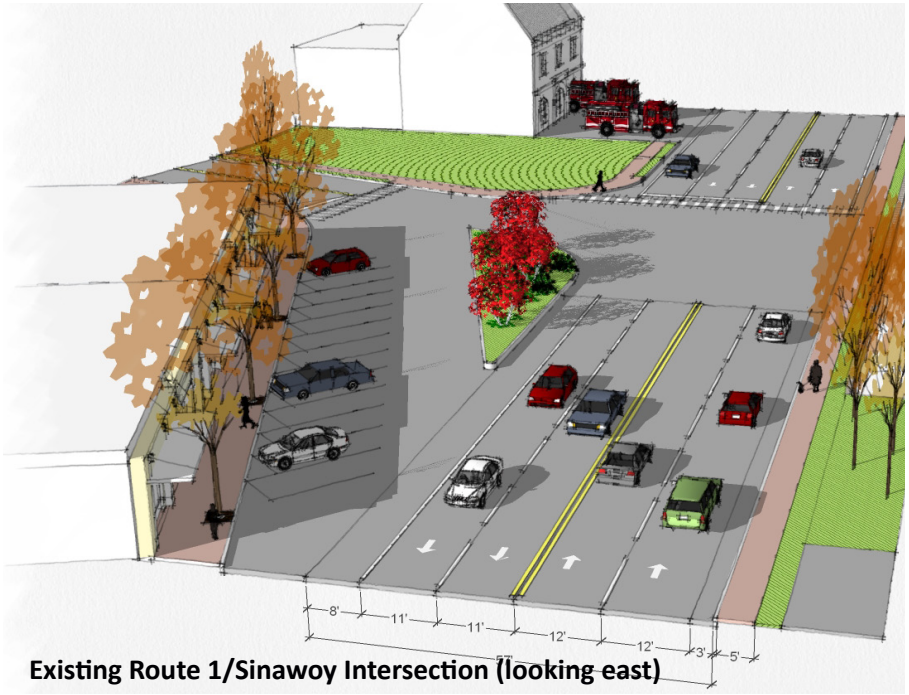
4.4 Cos Cob District

Corridor Alternatives

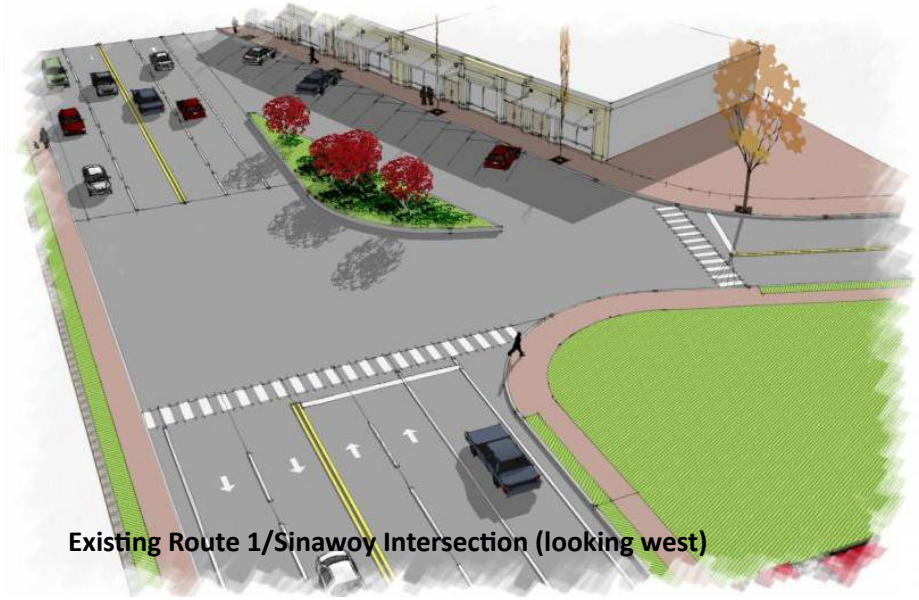
Context-Theme-Vision

The Cos Cob "Hub" is a historic neighborhood commercial center with street-oriented commercial and civic uses such as the Cos Cob Elementary School, Library, U.S. Post Office and Fire Station. The wide cross section serves as a pedestrian barrier separating neighborhoods and a vibrant business district. This should be a traffic calmed and pedestrian-oriented district that supports street-oriented infill, reuse and redevelopment. Design solutions will look to redefine the street, repurposing extra pavement for on-street parking, bulb-outs, and center turn lanes.

Route 1 in Cos Cob Business District



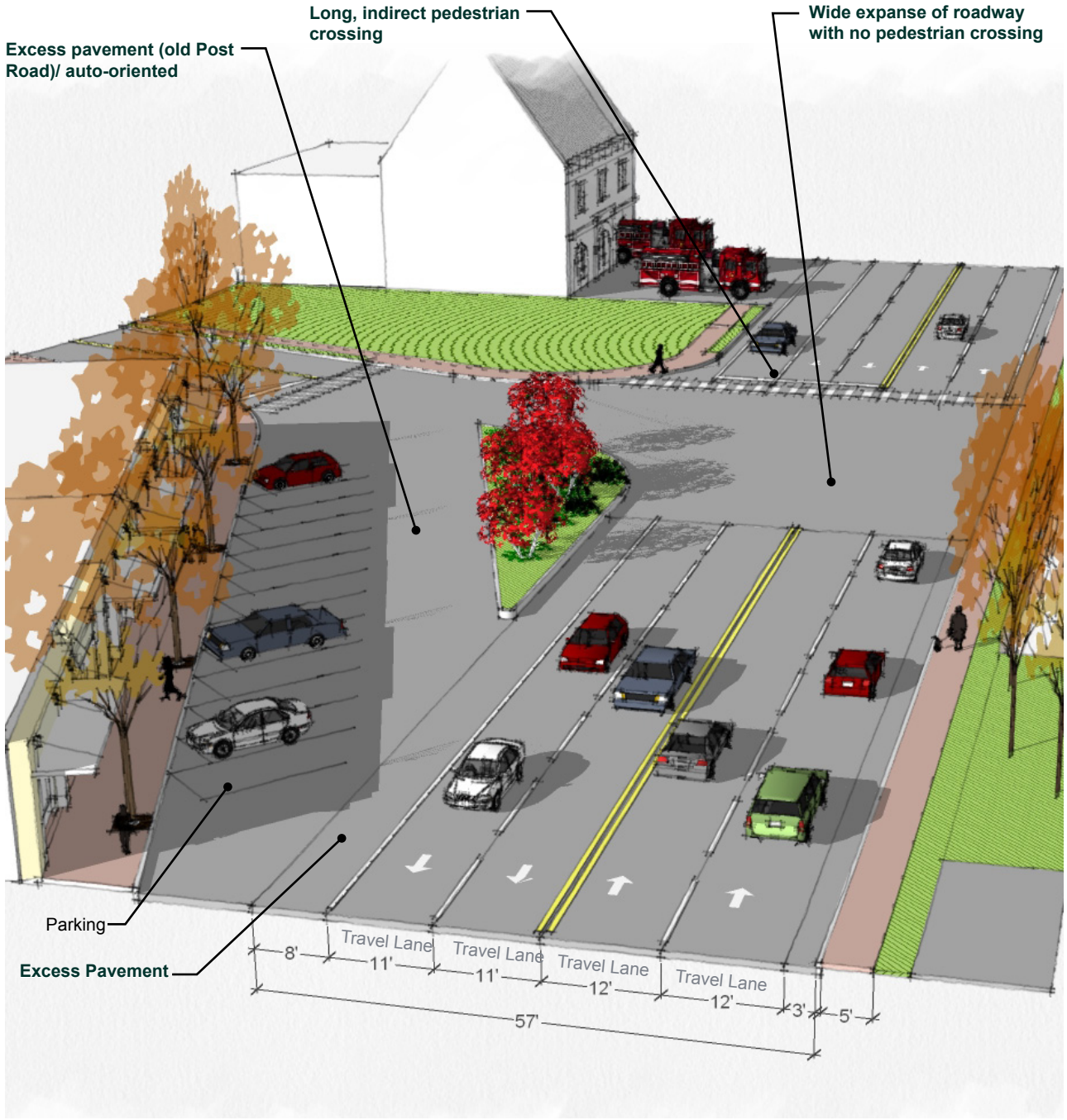
Existing Route 1/Sinawoy Intersection (looking east)


Existing Route 1/Sinawoy Intersection (looking west)

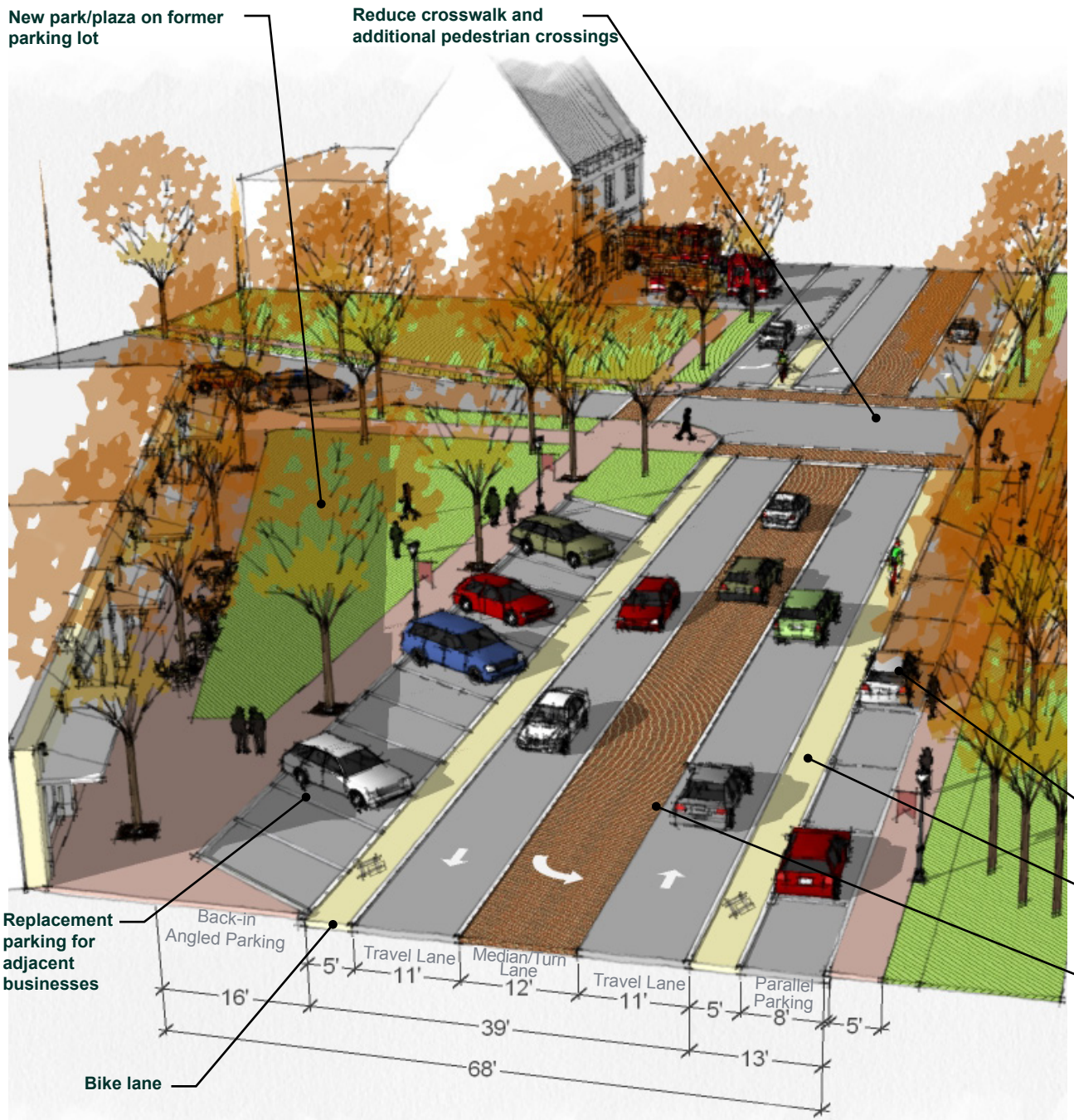
Existing Cross Section: Strickland Road/Sinawoy Road

The existing intersection at Sinawoy Road is an expanse of pavement. Here a remnant of the Old Post Road is being utilized as angled parking in front of a block of street-oriented retail buildings, serving as a small parking lot but leaving a wide area of pavement and open access to the adjacent streets. Route 1 is a wide four lane section with a +/- 57 foot curb to curb dimension leaving room for variable with excess pavement shoulders on each side. The pedestrian crossing at Sinawoy Road is limited to the north side of the intersection creating a long and indirect crossing to the businesses on either side of Route 1.

Existing Cross Section: Strickland Road/Sinawoy Road



Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.



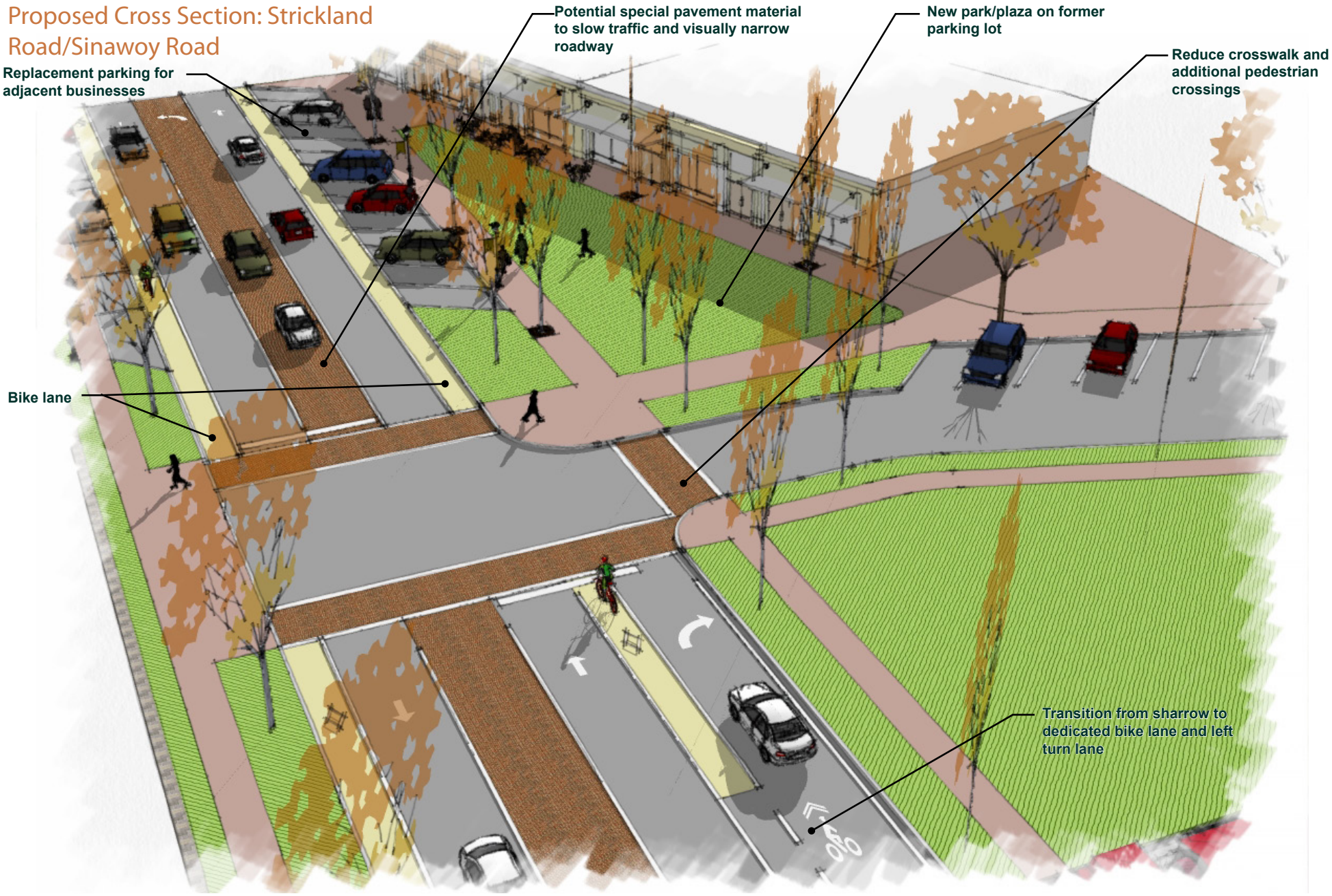
Proposed Cross Section: Back-in Angle Parking (one side) with Bike Lanes

The proposed cross section employs the three-lane cross section and incorporates on-street bicycle lanes. Key features include:

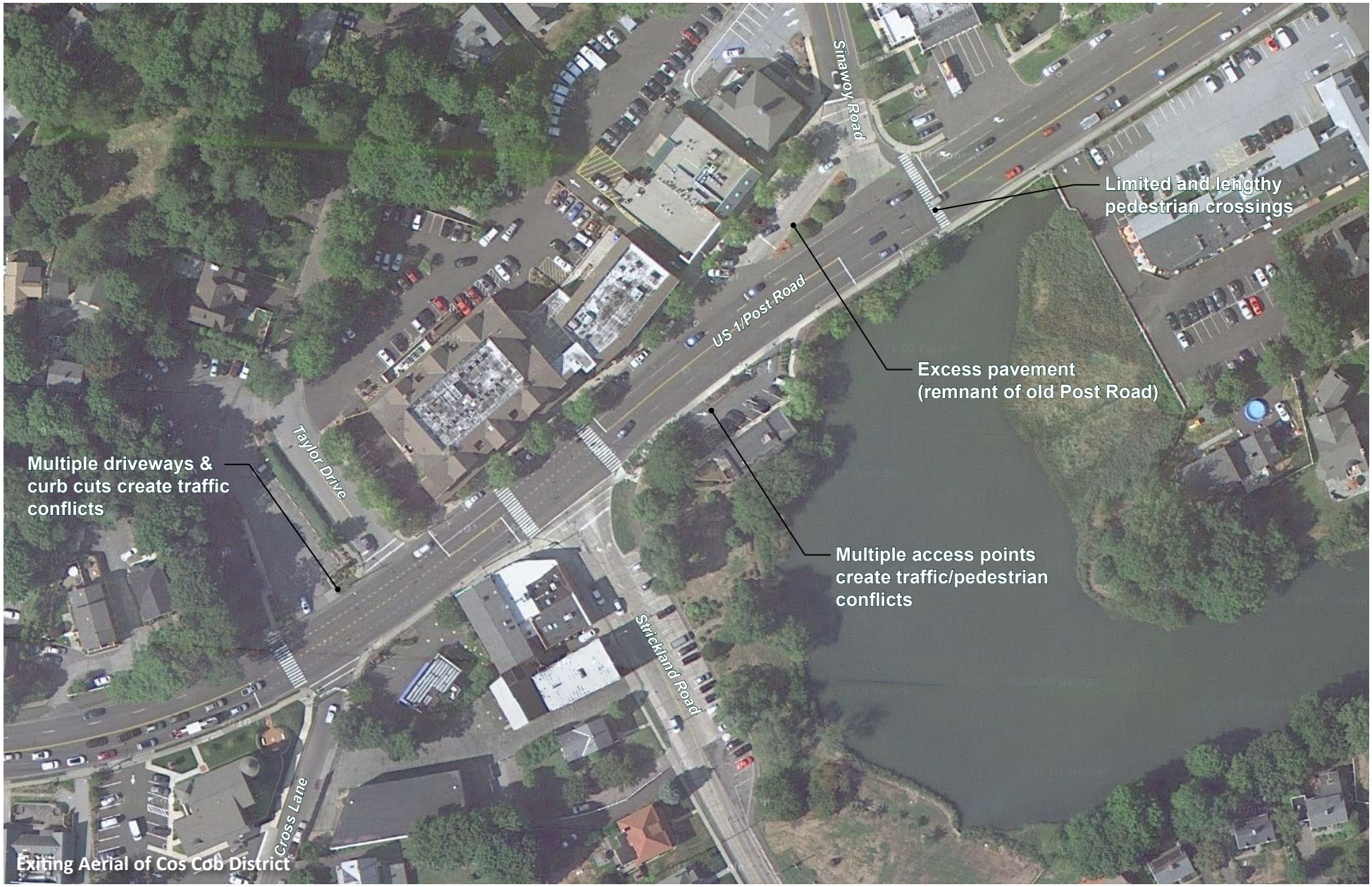
- Reduced pavement width and pedestrian crossings with a three-lane cross section.
- Parallel on-street parking on the south side of Route 1.
- Back-in angle on-street parking on the north side of Route 1.
- On-street bicycle lanes on both sides serving cyclists and as a buffer between the parking and travel lanes.
- Creation of a new public space (triangular green or plaza) at this prominent corner by relocating the small parking lot adjacent to the buildings with on-street parking on Route 1.
- Shorter pedestrian crossings on all approaches of the Sinawoy Road intersection.

Existing Cross Section: Strickland Road/ Sinawoy Road

Proposed Cross Section: Strickland Road/Sinawoy Road



Cos Cob: Existing



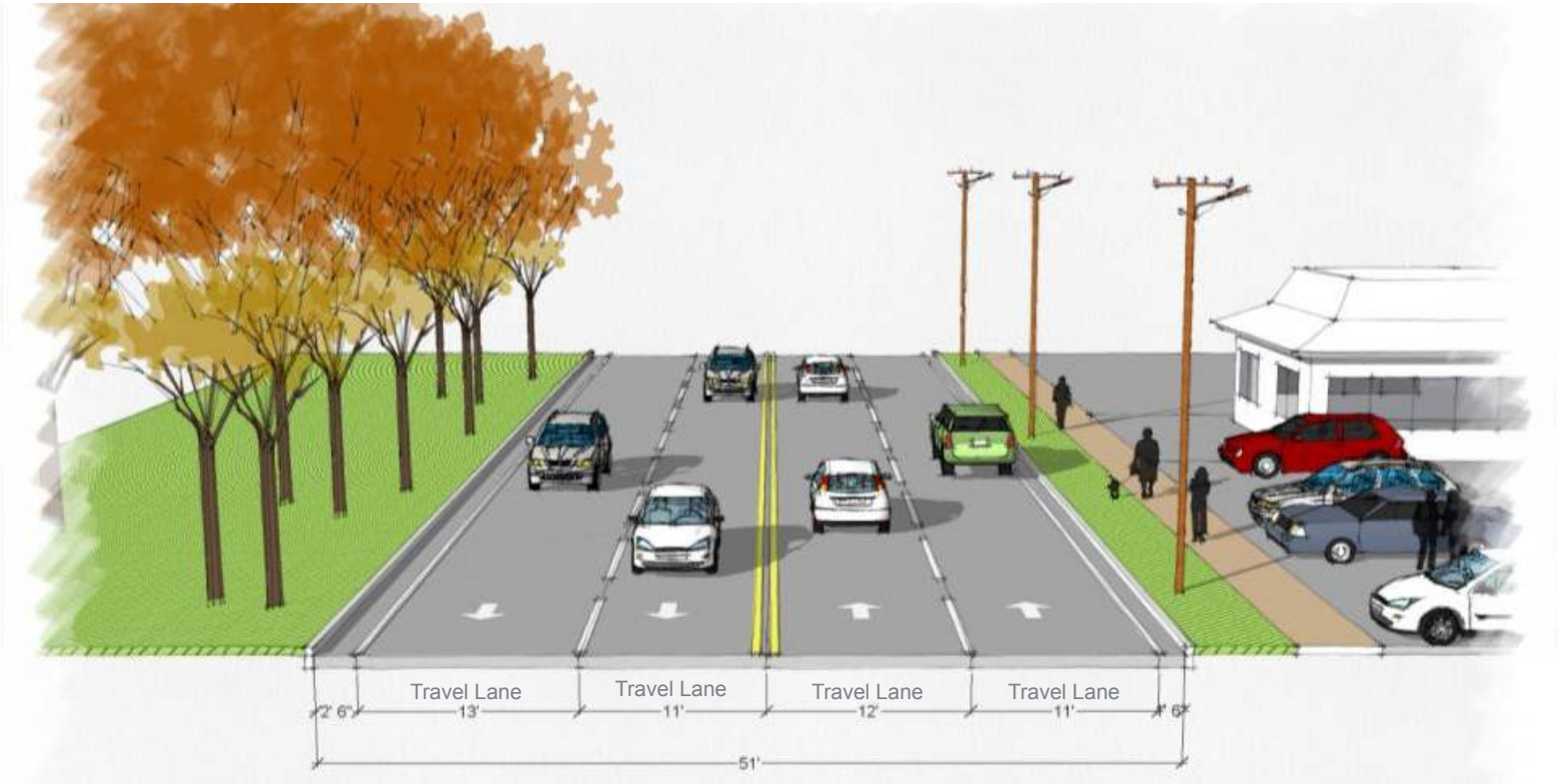
Exiting Aerial of Cos Cob District

Cos Cob: Proposed

View at Strickland Road: Before

Before: The view of the Strickland Road intersection illustrates the physical and visual impact of the wide pedestrian crossings and auto-dominated roadway in this district that wants to be more pedestrian-oriented.

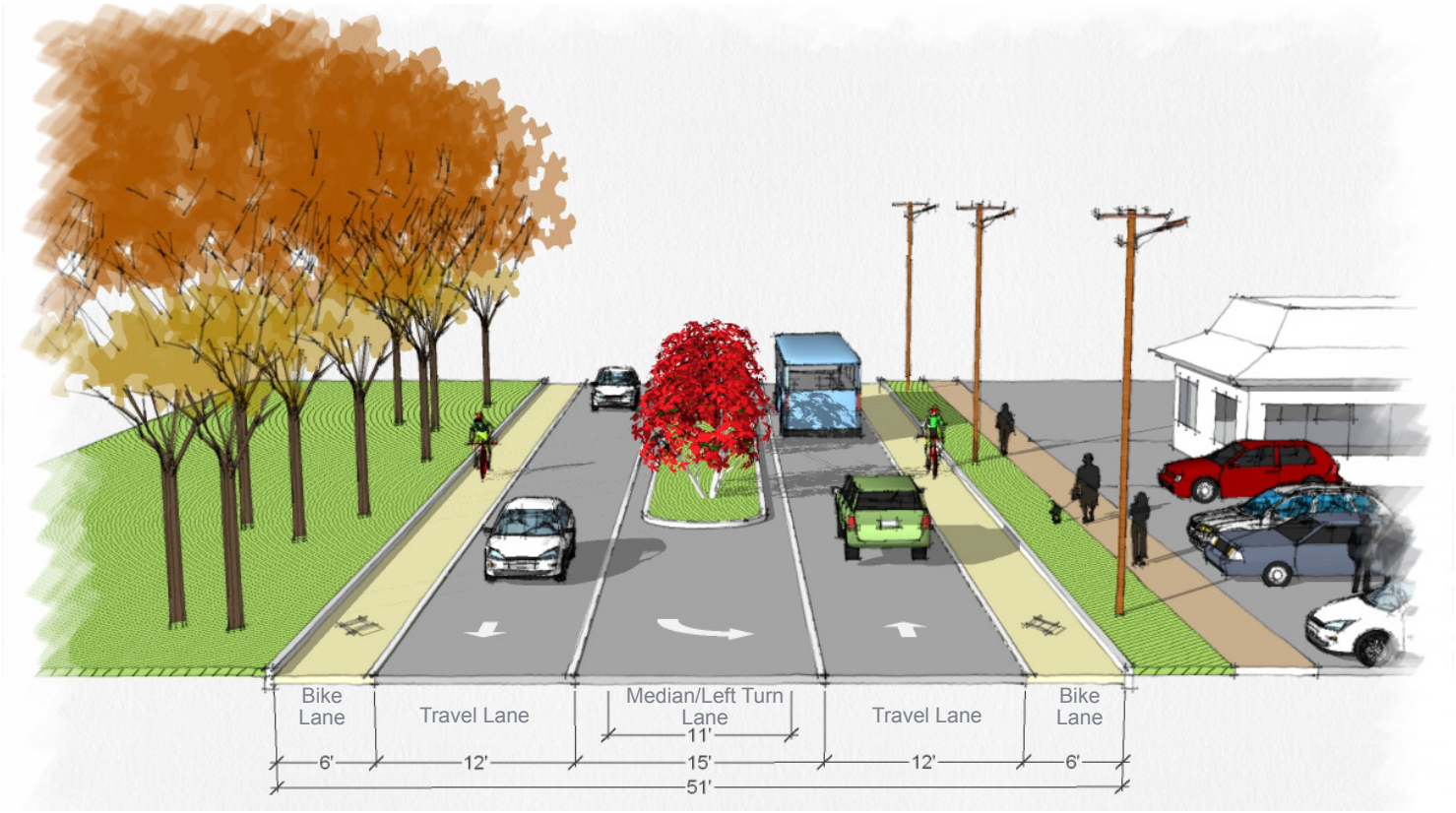
After: The proposed redesign eliminates a travel lane, incorporates new on-street parking, adds bulb-outs at the intersection, and includes street trees and landscaping. The pedestrian crossings are shorter, more visually prominent and designed as extensions of the sidewalks and streetscape with materials that contrast with the roadway pavement.



Existing Cross Section: (Cross to Indian Field Road)

The cross section of Route 1 from Cross Lane to Indian Field Road is four travel lanes (two in each direction) with a varied striped shoulder. The curb to curb dimension is +/- 50 feet. This is predominantly a strip commercial area with multiple curb cuts resulting in many left turns occurring in the center travel lanes.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.



Proposed Cross Section: (Cross to Indian Field Road)

The proposed section restripes the roadway into a three-lane section.

- Allows for the addition of bicycle lanes.
- Provides a dedicated left turn lane throughout, providing for safer left turns at intersections and various driveways and curb cuts along the corridor.
- Some sections of the corridor with limited driveways could include landscaped islands in place of the center left turn lane. This design feature would help visually narrow the road and provided attractive visual enhancements to the roadway.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.

Indian Field Road Intersection

Proposed changes to the intersection of Route 1 and Indian Field Road include removing left turns from northbound Route 1 and moving them to a new intersection 800 feet to the north. This reduces the amount of time needed for turns at the intersection, therefore providing additional time for Route 1 traffic. Also, under proposed conditions, a pedestrian crossing Indian Field Road would not stop Route 1 traffic.

Traffic Analysis: Three-Lane Section

Traffic operations through the Cos Cob area (River Road to Indian Field Road) are directly effected by the high number of turning vehicles without turn lanes (four lane section), offset intersections requiring longer cycle lengths and significant amounts of green time from the signals, and the exclusive pedestrian phases which essentially "shut down" Route 1 for up to 25 seconds each time a pedestrian crosses a street, regardless of whether the pedestrian is crossing Route 1 or a side-street. These conditions create areas of significant peak hour congestion most notably in the Strickland Road/Taylor Drive/Cross Lane intersection.

The proposed design changes in the Cos Cob area involve converting the four lane cross section to a three-lane cross section (one through lane in each direction with a left turn lane at the intersections) from River Road to Indian Field Road. In addition, based on right turning movement volume, dedicated right turn lanes are also proposed for the following locations:

- Southbound at Hillside Drive (to accommodate AM peak High-school traffic)
- Northbound at Indian Field Road (traffic going to I-95)
- Southbound Sinawoy Road (traffic going to neighborhoods on north side of Cos Cob)
- Southbound Orchard Street (high volumes and right turns at the skewed intersection slowing the through traffic significantly resulted in the need for the right turn lane)

Traffic analysis results for the proposed three lane cross section show an overall decrease in travel time with minor increases in intersection delay at several intersections (compared to existing conditions and the No Build scenario). The most notable decrease in delay occurs at the Strickland Road/Taylor Drive/Cross Lane intersection which showed a 75% decrease in delay (from 75 seconds under existing conditions to 19 seconds under proposed conditions). This significant decrease in delay at the Strickland Road/Taylor Drive/Cross Lane intersection and reductions in travel time along this section of roadway can be attributed to several factors:

- **Dedicated left turn lanes** separate the left turning traffic from the through movements. This removed the possibility of getting "trapped" behind a left turning vehicle. This provision of dedicated left turn lanes also allows dedicated left turn phases which do not have to happen every cycle, and eliminates the need for several signal phases therefore increasing the green time available for Route 1 traffic flow.
- **Realignment of Cross and Taylor** allows these phases to move concurrently, which eliminates one phase of the traffic signal therefore reducing the amount of "lost" time (i.e. yellow and red signal times)
- **Improved progression** between the intersections reduces the number of times a driver needs to stop at a signal, therefore reducing travel times.
- **Reduced cycle lengths** improve overall intersection performance, as side street and turning traffic does not have to wait as long to progress through the intersection.
- **Changes to the pedestrian phases** reduce the amount of time that vehicles have to wait for a pedestrian to cross the street. The current signal phasing results in all traffic on Route 1 and the side streets stopping for approximately 23 seconds for a pedestrian to cross the street. If a pedestrian is walking along Route 1, and crossing, Taylor, Cross or Strickland, it should not be necessary to stop traffic on Route 1.

Impact of Pedestrian Only Signal Phases

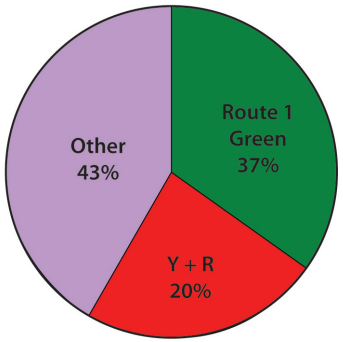
Throughout the Town of Greenwich, exclusive pedestrian only phases are provided at the signalized intersections. The time provided to the pedestrian phase varies based on the width of the roadway, but generally range between 17 and 25 seconds. The time is allotted exclusively to the pedestrian, and no vehicles are permitted to enter the intersections from any direction during this phase (other than where right-turns-on-red are permitted). While this guarantees safe pedestrian access across the corridor, it eliminates vehicular movement for a significant percentage of a signal's available green time. It is an "operational" response to a "design" problem. The design of the road remains wide and fundamentally pedestrian-hostile. And the unintended consequence is added vehicular delay.

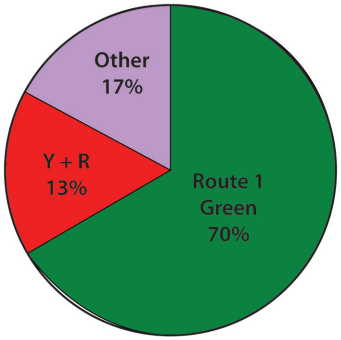
The proposed reduced cross sections and pedestrian bulb-outs at intersections take a "design" approach to this problem. The proposed design reduces the width of the road through bulb-outs and/or vehicle lane removal, creating shortened pedestrian crossings, wider sidewalks and reduced vehicle speeds. Employing these design solutions while eliminating the pedestrian-only signal phases, results in a more pedestrian-oriented design with less vehicle delay.

Benefits include:

- The reduced crossing time results in more available time for movement of vehicles
- Changing from an exclusive pedestrian phase, to a concurrent pedestrian phase, allows vehicles to move in the same direction as the pedestrians
- Bumps outs reduce the crossing distance, and exposure of pedestrians to vehicles, as well as increasing visibility to drivers.

Allocation of Signal Time (@ Strickland Road Intersection)





Existing:

- 23 seconds dedicated to pedestrian phases
- 6 signal phases
- 20% lost time (yellow & red)
- 37% green time allocated to Route 1 through traffic

Proposed:

- Shorted pedestrian crossing time 16 seconds vs. 23 seconds
- 4 phases
- 13% lost time (yellow & red)
- 70% green time allocated to Route 1 through traffic

	COS COB		
	Level of Service (delay)		
Intersection	**Existing**	***No Build**	**Build**
Hillside road	B (17)	B (19)	C (26)
Indian Field Road / Old Post Road #6	C (35)	C (33)	C (24)
Strickland Road /Taylor Drive / Cross Lane	E (75)	D (42)	B (19)
Sinawoy Road	C (30)	B (15)	B (11)
Orchard Street / Mead Ave	D (42)	D (40)	D (36)
River Road	C (35)	D (40)	C (27)

* No Build analysis conducted using design traffic volumes, and assumes improved signal timings are implemented.

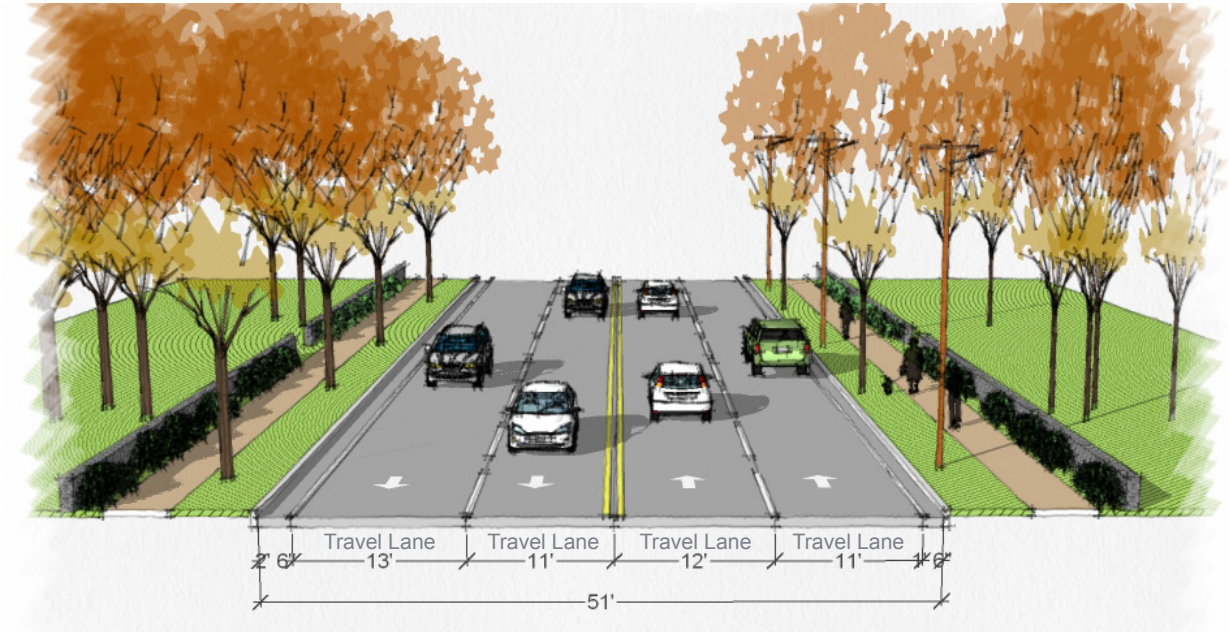
4.5 Greenwich Green District

Corridor Alternatives

Context-Theme-Vision

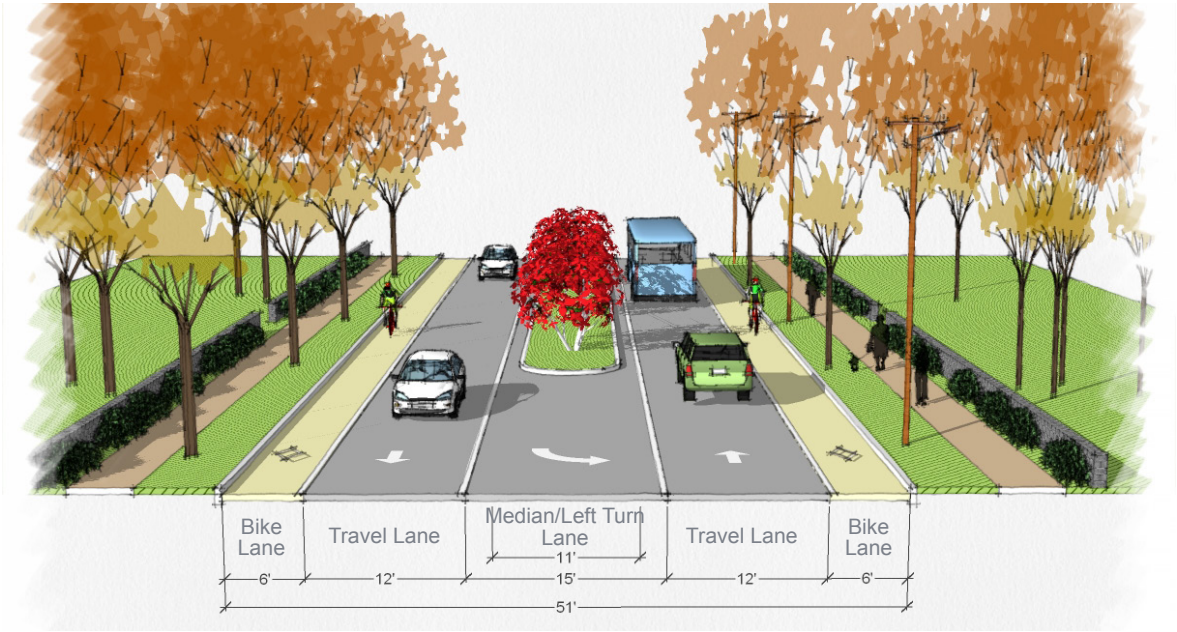
This segment of Route 1 from Indian Field to Maple includes the corridor's highest concentration of civic and historic resources including; Greenwich High School, Christ Church, the YWCA, Temple Sholom, the General Israel Putnam Cottage "Knapp's Tavern", and the Second Congregational Church. The unique character of this segment includes a significant canopy of trees, expansive lawns, historic stone walls, monuments and historic architecture. Design solutions will look to calm the corridor's "highway" behavior and insert needed bicycle lanes by reshaping the roadway from four to three lanes.

Route 1 in Greenwich



Existing Cross Section: (Indian Field to Maple)

The cross section of Route 1 from Indian Field to Maple is four travel lanes (two in each direction) with a varied striped shoulder. The curb to curb dimension is +/- 50 feet with no room for left turn lanes except at key intersections such as Hillside Road. The hilly topography along with the four lane cross section encourages speeding on this segment creating safety issues with the numerous driveways for this area's residential and civic uses.



Proposed Cross Section: (Indian Field to Maple)

The proposed section restripes the roadway into a three-lane section.

- Allows for the addition of bicycle lanes.
- Provides a dedicated left turn lane throughout, providing for safer left turns at intersections and various driveways and curb cuts along the corridor.
- Some sections of the corridor with limited driveways could include landscaped islands in place of the center left turn lane. This design feature would help visually narrow the road and provided attractive visual enhancements to the roadway.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.

4.6 Downtown Greenwich District

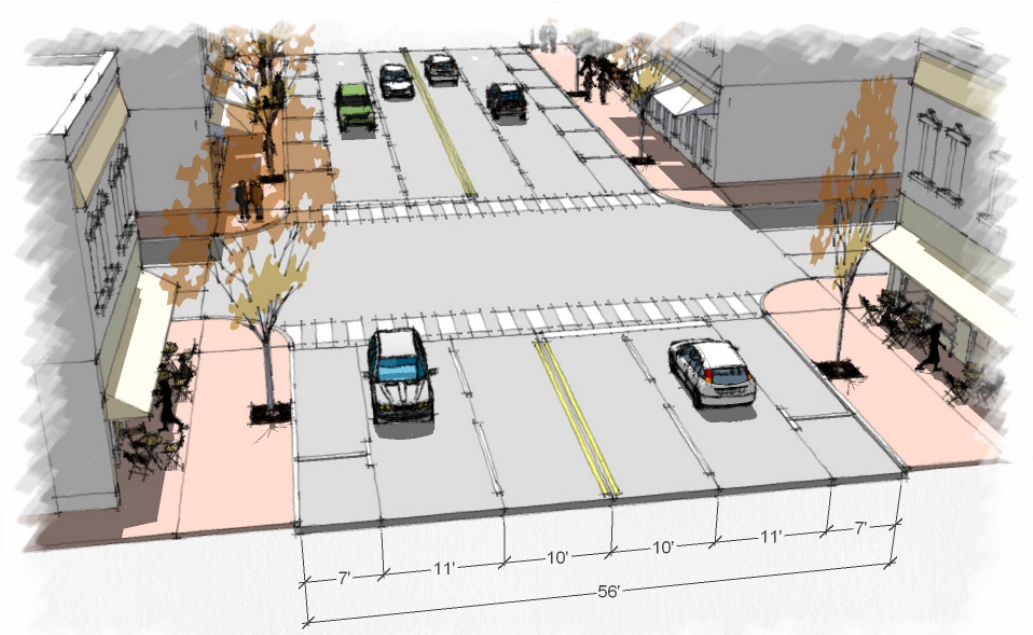
Corridor Alternatives

Context-Theme-Vision

Downtown Greenwich is a vibrant commercial “main street” and has the highest concentration of development along the corridor with a range of retail, office, and civic uses oriented in an urban and pedestrian-friendly form. The historic pattern of road has created a unique bock pattern with several off-set intersections and small blocks. Design alternatives will seek to strengthen pedestrian access and connectivity while managing long-term access for new infill development.

Route 1 in Downtown Greenwich

Existing Route 1 in Downtown Greenwich



Proposed Route 1 in Downtown Greenwich (with bulbouts)

Three Lanes vs. Four Lanes

A preliminary traffic analysis was conducted to test the impact of reducing the roadway from four lanes to three lanes in the Downtown Greenwich district. This proposed three lane section would allow for the addition of bike lanes and a dedicated center left turn lane. The results of this analysis indicated significant increased delay. This is primarily due to the heavy side street volumes and the three lane scenario's loss of left turn capacity caused by the short block length and off-set intersections. In the four lane section, the two center travel lanes act as left turn lanes and, in a short block, the capacity of those lanes is directly related to their length (times two, one in each direction). In the three lane section that left turn capacity is cut in half with the two left turn lanes now sharing one center left turn lane. The result with a high volume of left turning movements such as in Downtown Greenwich is the left turning vehicles stack up into the travel lane and through adjacent intersections, causing increased delay throughout the corridor.

Proposed Cross Section & Bulb-Outs

There are pedestrian improvements that can be made to the existing street cross section. This would include the installation of pedestrian bulb-outs on the corners of the intersections through the downtown area. These bulb-outs would occur at the intersections enclosing the on-street parking and shortening the pedestrian intersection crossings by +/- 16 feet (the width of two lanes of on-street parking). Under existing conditions, the signalized intersections require approximately 25 seconds to allow pedestrians to cross the street. This pedestrian crossing time would be reduced by the installation of the bulb-outs and additional time could be provided to the vehicular movements, decreasing overall vehicular delay.

Maher/Milbank/Maple Intersection

A number of reconfiguration and redesign alternatives for this multi-leg and off-set intersection were developed during the design workshop with the goal of clarifying traffic movements and enhancing pedestrian access. While no overall reconfiguration scenario proved to solve these issues, several smaller scale interventions are recommended.

Intersection Striping

Analysis of this intersection found that because the center lane in each direction through the intersection is used primarily by left turning vehicles, that it may be beneficial to stripe and signalize the intersection as one through lane per direction, with dedicated left turn lanes. This would simplify the traffic signal phases, and help move traffic through the intersection. This concept will be further evaluated in the next phase of the project.

Maple Avenue Pedestrian Crossing

On the north side of Route 1 there is a missing pedestrian link through the triangular park and across Maple Avenue. There is currently a worn path through the park and pedestrians cross Maple without the aid of a pedestrian crossing. The design proposal is for a sidewalk/path to be built in the park (along the existing worn path) to a crossing point on Maple located approximately 100 to 150 feet north of the Route 1 intersection. This distance allows for maximum visibility at the curve on Maple and puts pedestrians out of the signal operation. To facilitate safe crossing a landscaped island is proposed in the center of Maple, allowing pedestrians to cross traffic one lane at a time and provide safe refuge in the middle to await gaps in traffic flow.

Milbank Pedestrian Crossing

Workshop participants expressed the desire for an additional pedestrian crossing at the Milbank/Route 1 intersection. The proposed design includes a bulb-out on the south side of Route 1 with a crosswalk and short sidewalk connecting to the existing sidewalk on the north side of Route 1. This crossing will need to be further evaluated and tested with the signal operations of this intersection.

Whole Foods Access

Just south of the Maher intersection is the Whole Foods grocery store. Its parking lot has a full access driveway access onto Route 1 which is the cause of traffic conflicts typical of mid-block left turns on and off a four lane roadway. Limited alternatives to mitigate the number of vehicles using the Route 1 driveway include gaining a secondary access point to the parking lot potentially through the adjacent commercial property to the north, providing a connection to Milbank. This connection while physically feasible would require cooperation with the adjacent land owner and consensus from the surrounding neighborhood.

In the future, this type of shared/joint access should be required of development along Route 1, particularly in the Downtown where minimizing driveways and curb cuts is critically important to maintaining the pedestrian-oriented business environment and managing vehicular traffic and safety.

4.7 Byram District

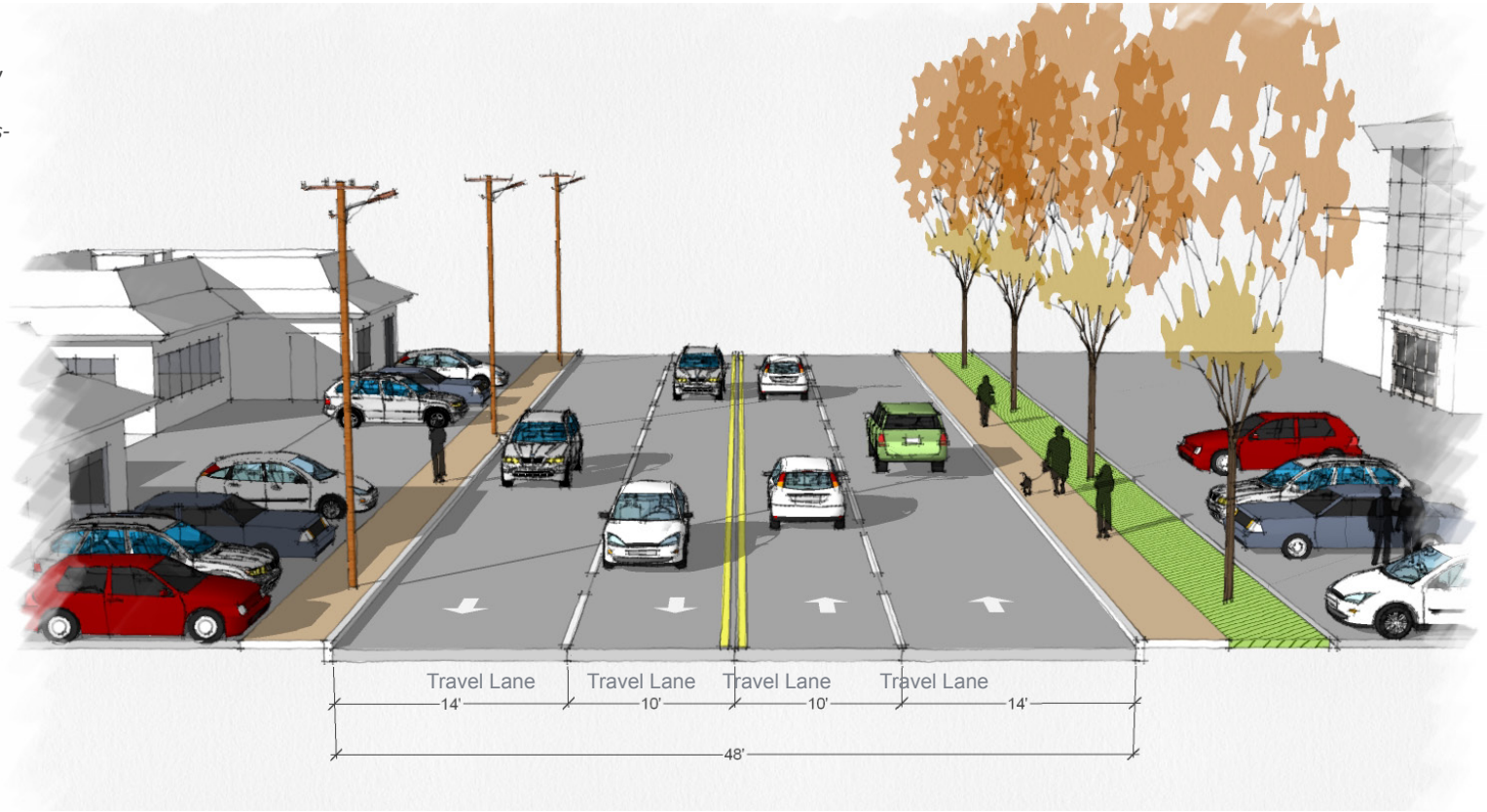
Corridor Alternatives

Context-Theme-Vision

South of Downtown Greenwich, Route 1 runs through the Byram Neighborhood to the State Line. Along the corridor is a mix of undeveloped land, strip commercial and residential neighborhoods. The four lane section is auto-oriented and lacks a complete sidewalk system. The “highway” character of the corridor separates the Byram Neighborhood creating a barrier between schools, parks and homes. The Byram Circle sits at the State Line and is a locally notorious traffic issue. Design solutions will look to calm the corridor’s “highway” behavior and insert needed bicycle lanes by reshaping the roadway from four to three lanes. The Byram Circle is reconceived and reconfigured as a prominent gateway and redevelopment opportunity that provides a safer and clearer traffic solution that supports pedestrian and bicycle access to the surrounding neighborhoods.

Route 1 in Greenwich Byram Neighborhood

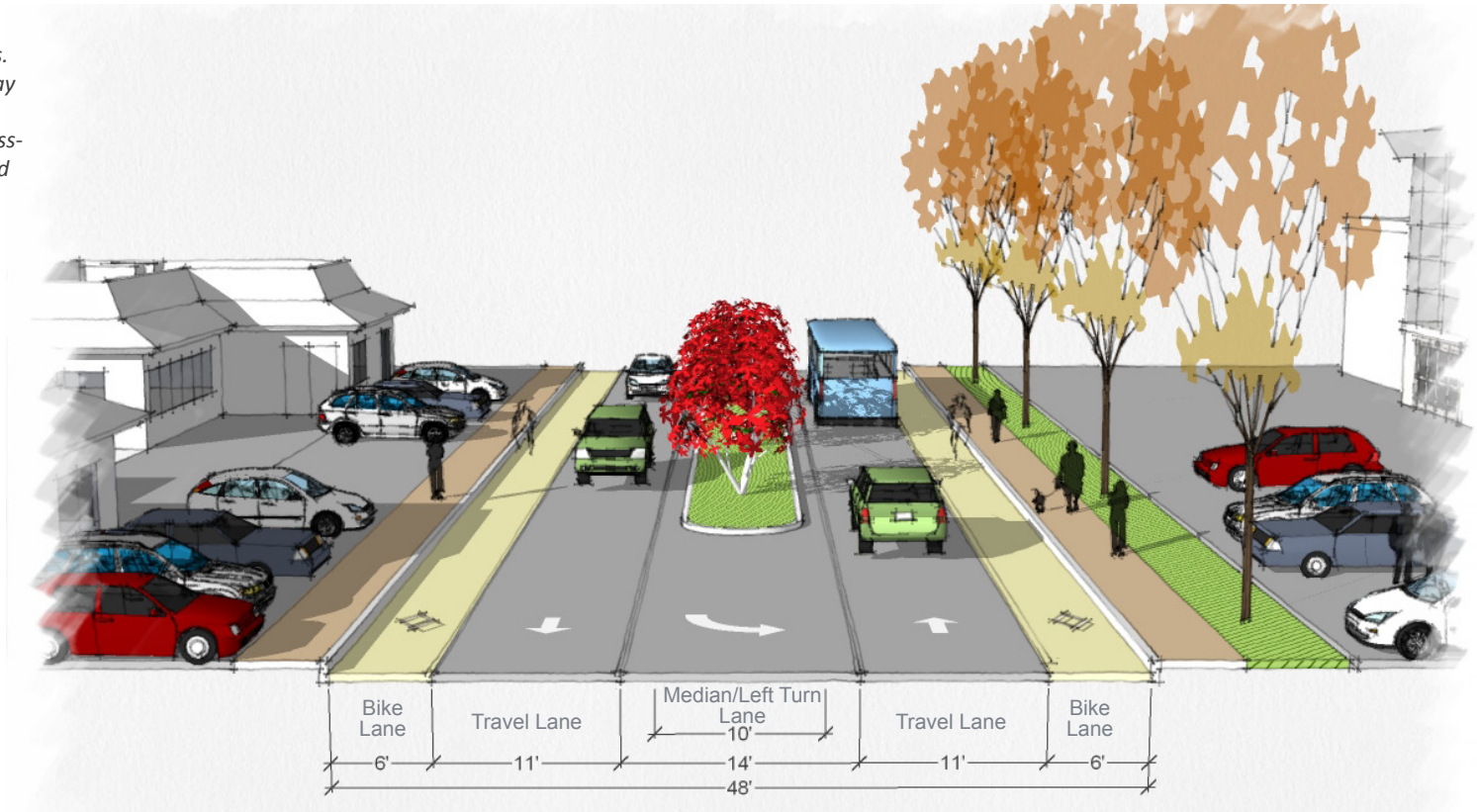
Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.



Existing Cross Section (Dearfield to State Line)

The cross section of Route 1 from Dearfield to the State Line is four travel lanes (two in each direction) with left turns occurring in the center travel lanes. The curb to curb dimension is 48 feet. Route 1 runs through a predominantly strip commercial area in this district with numerous curb cuts and driveways generating mid block left turns creating a capacity and safety issue along the roadway.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.

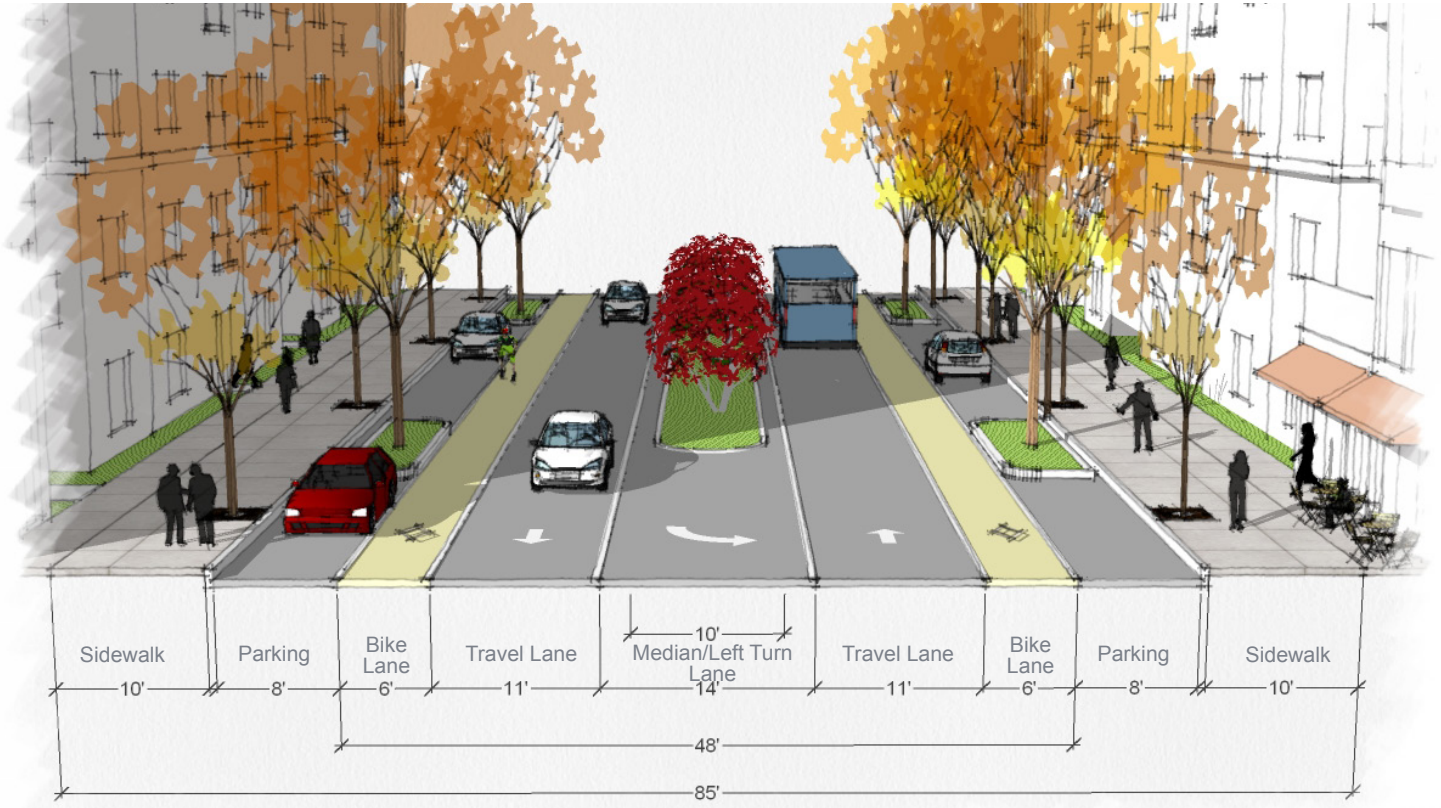


Proposed Cross Section (Dearfield to State Line)

The proposed section restripes the roadway into a three-lane section.

- Allows for the addition of bicycle lanes.
- Provides a dedicated left turn lane throughout, providing for safer left turns at intersections and various driveways and curb cuts along the corridor.
- Some sections of the corridor with limited driveways could include landscaped islands in place of the center left turn lane. This design feature would help visually narrow the road and provide attractive visual enhancements to the roadway.

Note: Sections represent potential sample dimensions. Curb-to-curb and right-of-way dimensions vary throughout the corridor and existing cross-section dimensions are based on selected field measurements.



Proposed Cross Section (with redevelopment)

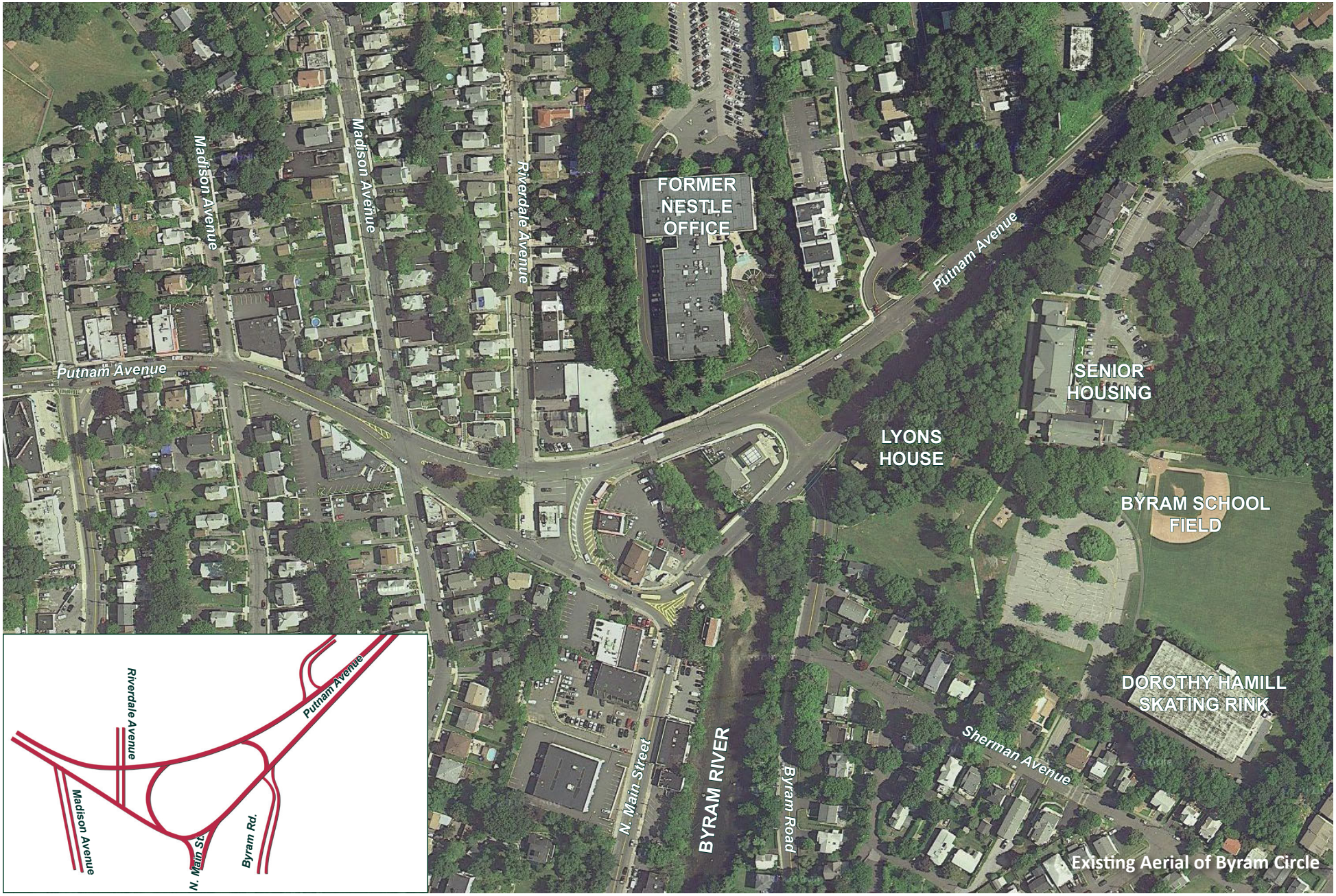
The proposed road section can evolve over time with redevelopment to shape a more pedestrian-friendly and urban pattern.

- As redevelopment occurs buildings should be sited along a "build-to line" that places them close to the street.
- On-street parking and wider sidewalks should be incorporated on the "development side" of the existing curb to create a "complete" street with bike lanes, wide sidewalks and on-street parking supporting pedestrian-oriented redevelopment. This may require private dedication or granting of easements where right-of-way is limited.
- Driveway access should be consolidated and/or located on side streets in order to organize turning movements at street intersections and minimize mid-block curb cuts.
- Parking lots should be located behind development to support active uses along the corridor.

View of Route 1 at Livingston Street

Before: This view of Route 1 at Livingston Street illustrates the expanse of pavement and lack of pedestrian amenities in this section of the corridor. Parking lots and multiple curb cuts break up the roadway creating a pedestrian-hostile environment.

After: The proposed three lane redesign provides room for bicycle lanes with future redevelopment and driveway consolidation providing opportunities for sidewalk expansion and streetscape.



Existing Aerial of Byram Circle

Byram Circle

Well before the motor vehicle was invented, the original alignment of the streets and their confluence at the Byram River likely had logic due, perhaps, to their evolution from a series of historic trails and/or old farm-to-market roads. Based on today's uniquely poor layout and function of Byram Circle, it is likely that, over the last century, there was never a unified plan to help it evolve coherently. Instead, there appears to have been a series of incremental retrofits, add-ons, and small changes implemented by different people. Perhaps now is the time not to plan and implement the next retrofit (i.e., signalize the traffic circle) but, instead, take a good look at the context and employ a bigger idea.

Existing Condition

Even "well done" traffic circles have inherent problems. They tend to suffer from excessive speeds, unforgiving geometries, tangential entries and exits, and individually controlled intersections that require motorists to queue within the circle. In addition to these basic traffic circle design problems the Byram Circle has a number of unique challenges:

- Short weaving areas caused by a tight and elongated configuration that is constrained by the Byram River, adjacent neighborhoods and historic resources.

- Active commercial land uses and parking lots in the middle with driveways and curb cuts to and from the inside of the circle conflicting with through traffic. As an example, the gas station, on the south part of the traffic circle, has no queuing space for its pumps and any queue extends into the adjacent travel lanes.

- There is also an "orphaned" commercial building with uncontrolled access located on the western splitter island. This building is sandwiched between the circle and the southernmost part of Riverdale Avenue, which cuts through the splitter island.

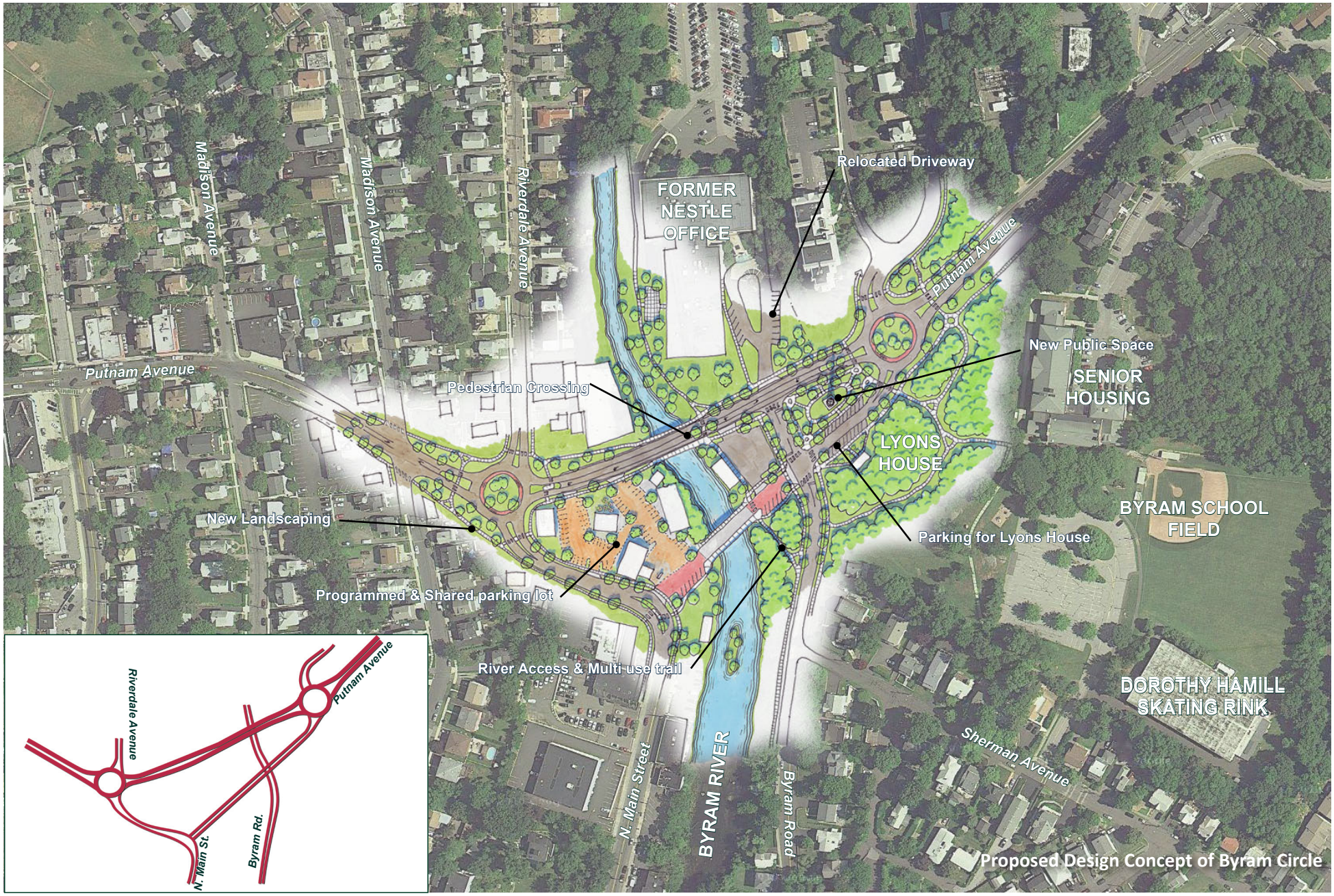
- The traffic circle has side streets entering at odd angles and locations, some of which are difficult to access, including Pemberwick Road, Byram Road, Riverdale Avenue, and Madison Avenue.

- Its operation and use is generally confusing from a way-finding perspective for locals and visitors alike.

- It straddles the Byram River but, misses the opportunity to engage the river, accommodate pedestrians and cyclists, provide for trails or trail access, or provide physical access and visual access to the river.

- It straddles the New York-Connecticut border, which results in two departments of transportation having jurisdiction.

- It does not serve as a gateway to Connecticut and New York and provides limited access for surrounding development such as the former Nestle's office building and the Lyons House, the oldest house in Greenwich.



Proposed Design Concept of Byram Circle

Byram Circle: Proposed Concept

The proposed concept for changing the Byram Circle includes the following objectives:

- simplify the operations
- reduce speeding and increase safety
- connect streets
- consolidate the retail and commercial land uses and provide them with better access and parking
- leverage the river's potential and attract redevelopment
- create complete (i.e., multimodal) streets
- provide the office building and the Lyons House with great addresses

Converting One Circle to Two Roundabouts

To simplify operations, the design concept connects the east and west parts of Route 1 across the northern edge of the former traffic circle as a two-way, two-lane, street, creating a roundabout at each end of the former traffic circle (one at Pemberwick Road and one at Riverdale Avenue). North Main Street would be extended to the west of the former traffic circle and align with Riverdale Avenue. Route 1 would run as a two-way street through the two roundabouts, utilizing the existing northern bridge.

Consequently, there would be two roundabouts framing the retail, commercial, and office land uses. This would result in slow and safe speeds between the roundabouts allowing for safer vehicular, pedestrian and bicycle access to the adjacent neighborhoods and businesses. The roundabouts would also create safer pedestrian connections between the neighborhoods, schools and civic destinations (such as, Dorothy Hamill Skating Rink) north and south across Route 1.

Lyons House Visitor Center and Park

The left over southeast portion of the former traffic circle and the bridge could be recycled into a slow, access-oriented, road, named "Lyons House Lane". Lyons House Lane would employ a series of design measures to encourage slow speeds and pleasant aesthetics. The lane would provide access to the retail and commercial land uses on both sides of the river. Lyons House Lane would intersect Route 1 at Pemberwick Road at the roundabout.

The space between Lyons House Lane, Byram River, and Route 1 would become a public space with a prominent public art element/entrance feature. Across Lyons House Lane, from the public space, would be the Lyons House and visitor center. The parking for the public space and visitor center would be provided on both sides of Lyons House Lane. The Lyons House would, consequently, have a great address, great access, parking, and not need to be moved.

Byram Road & Riverfront Access

Paralleling the Byram River, on the east side, is Byram Road. It would intersect Route 1 at the driveway to the office building, giving the office building a great address. The driveway's sharp S-turn could be straightened and moved to the east side of the office building.

The driveway on the west side of the building would be removed which would allow for some riverfront restoration and a multi-use trail. The trail would connect to the pedestrian bridge over the river, located to the north. To the south, the trail would cross Route 1 with the aid of a median refuge island and then connect through the commercial-retail property and then head south along the River.

Commercial Revitalization

The resulting reconfiguration would support the long-term development and revitalization of the commercial properties within and around the former circle. The synergy between the public space, Lyons House, and commercial and retail properties, in combination with pedestrian-friendly, complete, streets and trail connections would result in an accessible "place". The public space and visitor center would be a great addition to the arrival and departure experiences for both New York and Connecticut. Investment and redevelopment would more than likely follow these infrastructure changes.

Some of the low-value buildings, on the commercial-retail blocks, would likely be redeveloped. The site design and building placement would likely be rearranged to create a very nice relationship with the river, adding further value to the area. The western part of the traffic circle would be eliminated such that the orphaned building would be on the same block as the other commercial and retail buildings.

The parking lots would be reconfigured to result in more parking spaces, landscaping, and logical driveway locations. Former road space would be recycled into landscaping and sidewalks on both sides of Route 1. Route 1 would have bike lanes and left turn lanes to allow easy access into the commercial-retail blocks and to the former Nestle's office building.

Traffic Analysis: Three-Lane Section

Traffic operations and travel times along this section of Route 1 between Western Junior Highway and Brookside Drive are generally free flowing with spot intersections experiencing delay during peak hours of the day. Crashes along this section of the highway are frequent, with crash clusters identified at many of the skewed and unsignalized intersections.

The three-lane roadway concept proposed here consists of using the existing roadway width, and re-striping to provide a single through lane in each direction, with dedicated left turn lanes at the intersections, and a center turn lane between intersections to provide access to the many driveways. The center turn lane, and dedicated left turn lanes at the intersections would be expected to improve safety with minimal impacts on traffic operations.

A preliminary traffic operations analysis of the proposed three-lane design concept was performed using Synchro 7 and its simulation component SimTraffic 1. Results show little change in intersection delay or LOS between the Existing Condition, No Build (signal retiming) and Build (three-lane design concept) options, with overall travel time increasing slightly. The results show that the proposed three-lane cross section from Western Junior Highway to Brookside drive has minimal impact on the traffic operations when compared to No Build conditions. Note: due to the high number of right turns from southbound Route 1 onto Holly Hill a 150-foot right turn lane was added to maintain the intersection LOS.

	BYRAM DISTRICT		
	Level of Service (delay)		
Intersection	**Existing**	***No Build**	**Build**
Western Junior Highway	A (6)	A (6)	A (7)
Weaver Street/Holly Hill Lane	C (24)	C (24)	C (28)
Valley Drive	B (12)	B (12)	B (19)
Harold Ave	A (2)	A (2)	A (4)
Edgewood Drive/ Prospect Street	D (44)	D (53)	D (41)
Brookside Drive	C (21)	C (21)	B (19)

* No Build analysis conducted using design traffic volumes, and assumes improved signal timings are implemented.

4.8 Technical Design Considerations

Corridor Alternatives

Technical Design Considerations

The corridor alternatives presented here are conceptual in nature and will require additional design and evaluation. Their value is to communicate the character and vision of the corridor developed through the project's stakeholder and public process with the intent of creating a safer, multi-modal and economically vibrant corridor.

The design concepts also provide a way to identify technical design considerations that will need to be reviewed and addressed for implementation. These considerations include design details that may be different or inconsistent with the Connecticut Department of Transportation's Highway Design Manual or current agency policy. The following outlines some of the critical design issues that will need to be addressed and considered in the further development of the corridor alternatives.

Lane widths/ Shy lines

According to the Connecticut Department of Transportation's Highway Design Manual (HDM) – Chapter 2, the minimum travel lane width for through lanes on a principal urban arterial is 11', with a 10' minimum for turn lanes. Lane widths of less than 11' can be considered in constrained locations, though such situations should not be used to justify reduced widths throughout the corridor.

Shy lines must also be accounted for when determining lane width along the corridor. "Shy line" refers to the area along the edge of the traveled way which should be kept clear of obstacles that may cause motorists to reduce speeds or change their vehicle's position. The HDM specifies that a 2' shy line should be maintained on either side of any vertical curb, including the curbs on raised medians and bump-outs.

Two Way Left Turn Lanes

A two way left turn lane (TWLTL) is a center lane that is intended for shared use by vehicles making left turns in either direction. TWLTL's can reduce both delay and rear-end collisions by separating left turning vehicles from through traffic.

The minimum width for a two way left turn lane (TWLTL) as required by ConnDOT is 12' although a 14' lane is preferred. Fourteen to 16' TWTL's are possible for many segments of Route 1, although narrower TWLTL's may be required in the town centers where the curb to curb width is reduced.

In each location where TWTL's are proposed, the design of the TWLTL will need to consider the following issues and design features:

- Design vehicle
- Overlap between intersections
- Turning traffic volumes
- Truck volumes
- Turning radii
- Driveway locations
- Sight distance

Back-in-angle Parking

To date, back-in angle parking has been used very sparingly in Connecticut. The Stamford Police Department has had success parking its cruisers in such a manner on Bedford Street.

ConnDOT has indicated that adding new on-street parking spaces along Route 1 would be an issue due to the potential impact on safety and traffic operations associated with on-street parking. It may be possible to change the type of parking or consolidate existing parking spaces as long as no new front angle parking is recommended. This could include the conversion of front-in angle parking to back-in angle parking. Further evaluation by ConnDOT will be necessary prior to approval of back-in-angle parking.

Bicycle Facility Connectivity

ConnDOT has indicated that bicycle lanes should not start and stop at undefined termini. Rather, where a bike lane terminates, there should be some indication to the cyclist where to go (e.g. sidewalk or parallel street). Sharrows can also be used where bike lanes terminate. A sharrow is a pavement marking installed on streets with significant bicycle traffic but too narrow for conventional bike lanes. A sharrow is intended to alert drivers that the road is intended to be shared and bicyclists should be expected. Sharrows also indicate where bicyclists should ride to avoid conflicts with the doors of parked vehicles. They should not be overused or placed every few hundred feet. ConnDOT will require that maintenance of the sharrows be addressed through an agreement with the Town.

Roundabouts

All proposed roundabouts will need to go through the ConnDOT Roundabout committee. ConnDOT is currently focused on gaining more experience with and evaluating the performance of single lane roundabouts. They do not currently allow multi-lane roundabouts to be installed on their streets.

ConnDOT is open to the possibility of “hybrid” roundabouts, similar to that proposed for Greenwich Avenue and West Main St and is in the process of implementing a single lane roundabout at the intersection of CT 82 and CT 85 in Salem, which includes bypass lanes that remove the right-turns from the circulating lane.

Pavement Treatments

ConnDOT has experimented with several different types of stamped concrete with varying levels of success depending on specific products. ConnDOT is not opposed to textured/stamped bituminous pavements as long as there is a maintenance agreement in place with the Town. While ConnDOT would generally recommend against the use of pavers, interlocking pavers could be used as an alternative to stamped concrete as long as there is a maintenance agreement in place with the Town.

Right of Way Impacts

Although many of the recommendations would likely not have an impact on right-of-way (ROW), there are some locations where the concepts would involve ROW impacts. As the project and/or components of the project move forward, more detailed design will be completed to identify and determine potential impacts including ROW.

Pedestrian phasing

The City of Stamford utilizes concurrent pedestrian phasing at its signals. The Town of Greenwich currently utilizes exclusive pedestrian phasing, but would consider a switch to concurrent phasing depending on community feedback and further evaluation. ConnDOT generally discourages such conversions since State operated signals operate with exclusive pedestrian phases and there is a desire to achieve uniformity and avoid potential confusion with users. The City of Stamford once utilized exclusive pedestrian phasing but converted its signals to concurrent operation over the course of two years. Converting the pedestrian signals on Route 1 from exclusive to concurrent operation could significantly reduce vehicular delays by reducing the amount of time vehicles are stopped on all approaches to the intersections.

It is anticipated that the potential change would occur only in areas where the roadway cross section was changed to incorporate other pedestrian enhancements such as bulb outs. Additionally, it may be possible to modify the existing signals so that pedestrians crossing the side streets would not force a stop to mainline traffic. These and other design considerations will need to be further evaluated, along with community feedback as the project progresses before a decision is made to modify the signals.

Design Workshop Follow Up

4.1 Proposed Concept Features

Following TAG meetings and coordination meetings with CTDOT, the project team was asked to provide additional information regarding several features of the design concepts. This information is presented in the following section.

Lane widths / Shoulders

The width of travel lanes in the corridor varies from 10 to 16 feet. This range of lane widths contributes to the corridor's lack of a consistent identity. Segments of the corridor where lane widths approach 16 feet tend to have more of a commercial suburban highway feel, as opposed to the pedestrian-friendly business district atmosphere found where lane widths are narrower. While the travel lane widths vary, the speed limit does not, which results in today's problem of a range of travel speeds. In order to reduce the variability in cross-section widths and to promote a more unified pedestrian friendly atmosphere and consistent travel speeds along the entire length of the corridor, narrower lanes are proposed in several districts. Narrower lanes may offer several additional benefits, including:

- ***Speed Reduction*** - Narrower travel lanes visually impact drivers, leading them to feel less comfortable traveling at excessive speeds, even if the curb to curb width remains unchanged. According to a study performed by the Federal Highway Administration, reducing lane widths from 12 feet to 11 feet leads to an average speed reduction of about 2 mph. Reducing lane widths from 12 feet to 10 feet can lead to an average speed reduction of over 6 mph[1].

- ***Enhanced Safety*** – Because narrower lane widths tend to reduce travel speeds, drivers have additional time to react to their surroundings. Lower travel speeds may also reduce the severity of crashes that occur. A study by Potts, Harwood, and Richard indicated that the impact of lane widths on crash rates were either not statistically significant or associated with lower crash frequencies[2].

- ***Reclaimed Space*** – Space formerly allocated to the travel lanes can now be allocated to other purposes, such as shoulders, bicycle lanes, or on-street parking. Reclaiming this space will help Route 1 become a complete street in which motorists, bicyclists, and pedestrians are all accommodated.

- ***Easy Implementation*** – Lane widths can be reduced at low cost through the application of pavement markings. Furthermore, the implementation can be completed quickly, with little impact on nearby businesses and residents.

According to the Connecticut Department of Transportation's Highway Design Manual (HDM) – Chapter 2, the minimum lane width for through lanes on a principal urban arterial in this type of area is 11', with a 10' minimum for turn lanes. Lane widths of less than 11' can be considered in constrained locations, though such situations should not be used to justify reduced widths throughout the corridor. According to the HDM, right shoulder width for a non-National Highway System multi-lane principal urban arterial such as Route 1 may vary from two feet to eight feet. Left shoulder widths for this type of roadway can vary from two to four feet.

[1] Transportation Research Board (TRB), Highway Capacity Manual 2010, Volume 2: Uninterrupted Flow, pg 14-11.

[2] Potts, Harwood, and Richard, "Relationship of Lane Width to Safety for Urban and Suburban Arterials", TRB 2007 Annual Meeting CD-ROM. http://www.completestreets.org/webdocs/resources/lanewidth-safety.pdf

Two way left turn lanes

Two way left turn lanes (TWLTL) are recommended on highways where safe and efficient access to businesses is needed. Four lane cross-sections that use the inside lane as a shared through-left tend to be inefficient due to left turning vehicles blocking the through vehicles while they are waiting to turn. A TWLTL is a center lane that is intended for shared use by vehicles making left turns in both directions. TWLTL's can reduce delay, since vehicles attempting to make a left turn will wait to do so in the TWLTL, rather than while obstructing traffic in a through lane. TWLTL's can also improve safety, as the separation of through and left turning traffic lessens the likelihood of rear end collisions. Additional safety improvements include increased separation between opposing lanes of traffic, which may lead to a reduction in head-on collisions.

TWLTL's were recently implemented on five urban arterial roadways in the City of Hartford. This project consisted of cross-section reduction from four lanes of travel to two lanes of travel with a TWLTL, with the reclaimed space allocated to bicycle lanes or designated bus lanes. All five roadways were completed without changing the curb to curb width.

A before-and-after crash analysis of these roadways revealed that crash rates decreased by between 19% and 38% following TWLTL implementation. These reductions correspond to 183 fewer crashes per year on the five arterials

The minimum width for a TWLTL as required by the HDM is 12', although a 14' lane is preferred. Based on field measurements, it appears that a minimum 12' TWLTL can be accommodated in locations where TWLTL's are proposed.

In the design of the TWLTL, the following should be considered:

- Design vehicle;
- Overlap between intersections;
- Turning traffic volumes;
- Truck volumes;
- Turning radii;
- Driveway locations; and,
- Sight distance.

Wethersfield Avenue, Hartford

Back-in-angle parking

Back-in angle parking offers several advantages over traditional front-in angle parking. It provides drivers with a better view of oncoming traffic as they exit the parking space and re-enter the travel lane. It is convenient for shoppers wishing to load their purchases into the trunk of their vehicle. It can also discourage children from approaching through traffic as open vehicle doors form a barrier between the passenger and the street.

Angle parking in general can result in nearly twice as much parking capacity when compared to parallel parking. A typical angle parking space utilizes only 10-12' feet of curb versus 22' feet for a parallel parking space. Converting parallel parking spaces to angle parking, and thus increasing parking capacity could make neighboring businesses more conveniently accessible, and therefore more attractive to customers.

To date back-in angle parking has been used very sparingly in Connecticut. The Stamford Police Department parks its cruisers in such a manner on Bedford Street. The Town of Greenwich has considered testing back-in angle parking on Greenwich Avenue in an effort to try to address the high rate of crashes involving traditional angle parking. It is recommended that if such a test were to take place the Town should perform a before and after evaluation study including a comparison of crash rates.

While back-in angle parking would be new to the State, many municipalities outside of Connecticut are already utilizing it. Cities already using back-in angle parking include:

Arlington, VA	Marquette, MI	San Francisco, CA
Birmingham, AL	New York, NY	Seattle, WA
Charlotte, NC	Olympia, WA	Tacoma, WA
Chico, CA	Plattsburgh, NY	Tucson, AZ
Everett, WA	Portland, OR	Vancouver, WA
Honolulu, HI	Pottstown, PA	Ventura, CA
Indianapolis, IN	Salem, OR	Washington, DC
Knoxville, TN	Salt Lake City, UT	Wilmington, DE

Bedford Street, Stamford

Back-in-angle parking has also shown to result in safety improvements for bicyclists using the roadway. Mall Zoll at the Tucson-Pima County Bicycle Advisory Committee said that after implementing the back-in-angle parking plan in Tucson, Arizona, the City "went from an average of 3-4 bike/car accidents per month to no reported accidents for four years following implementation." The City of Wilmington, Delaware, has six blocks of back-in-angle parking dating back fifty years. According to Thomas Warrington, Traffic Planning Supervisor for the City, who annually reviews all accident reports of three or more accidents in any one location has stated, "going back a number of years, I cannot remember any time I received such a report to indicate that a problem exists with back-in-angle parking."

The Borough of Pottstown, Pennsylvania, implemented back-in-angle parking on their 1.1 mile stretch of Central Business District (CBD). Accident records from three 18-month periods were analyzed, the first two from prior to back-in-angle implementation, and the third from after implementation. Results showed that there was a reduction in the total number of accidents, number of vehicles involved, and number of injuries for the period after back-in-angle parking was implemented. The City of Seattle, Washington, has about 280 blocks of angle parking spaces, of which most are back-in-angle type, and has had back-in-angle parking for more than 30 years.

Average daily traffic (ADT) volumes for these back-in-angle implementation projects were not always available, but where available ranged from 6,500 to 13,800 ADT. The 2008 ADT as counted by CTDOT for the back-in-angle proposed implementation area of the Cos Cob "Hub" is about 22,000 ADT.

CTDOT has indicated that adding new on-street parking spaces to Route 1 would be an issue due to the potential reduction in safety and complication of traffic operations. They are however open to changes in the type of parking or the consolidation of existing parking spaces. This could include the conversion of front-in angle parking to back-in angle parking, although the agency is cautious about such a change. Further evaluation by CTDOT would be necessary.

Should back-in angle parking be implemented, an initial learning curve among drivers should be anticipated. Driver education and signage could be utilized to minimize the learning curve for drivers who are unfamiliar with the concept.

Improved visibility helps bicyclists

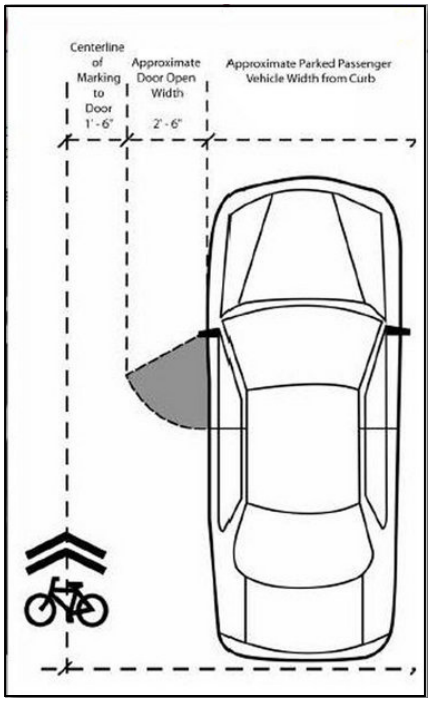
Back-in Angle Parking Sign

Bicycle facility connectivity

Geometric restrictions and high traffic volumes in certain sections of the Route 1 corridor limit the potential to provide dedicated bicycle lanes within the existing roadway. However, in combination with road-diets, bike lanes could be created along much of Route 1 through the study area.

CTDOT has indicated that the proposed bicycle lanes should not start and stop at undefined termini. Rather, where a bike lane terminates, there should be some direction provided to the cyclist indicating where to go (e.g. destinations, sidewalks or parallel street). At locations where a proposed bicycle lane terminates, bicyclists will be directed to parallel routes through signage. Another option could be the use of sharrows.

A sharrow, is a new type of pavement marking device recently approved for use by the Manual on Uniform Traffic Control Devices (MUTCD). They are typically installed on streets with significant bicycle traffic that are too narrow for conventional bike lanes. A sharrow is meant to alert drivers that the road is intended to be shared and bicyclists should be expected. Sharrows also indicate where bicyclists should ride to avoid conflicts with the doors of parked vehicles. The sharrow pavement marking should be placed immediately after intersections and spaced at intervals not greater than 250 feet thereafter. CTDOT would require that maintenance of the sharrows be addressed through an agreement with the Town.



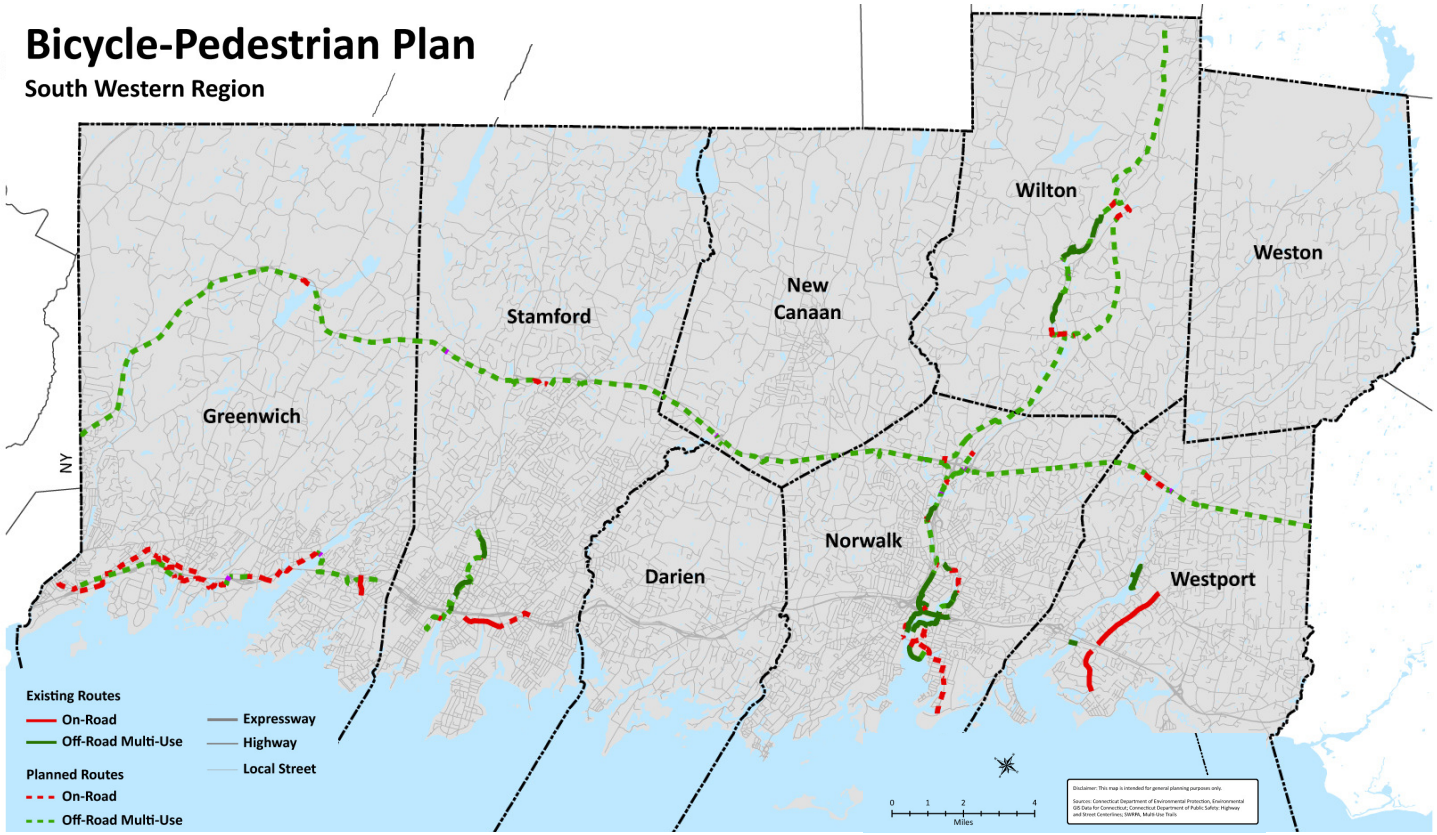
While bicyclists would have the option to utilize the segments of Route 1 where exclusive bicycle lanes are absent, they would also have the option to travel on parallel streets and later reconnect to Route 1 at a location where exclusive bicycle lanes are provided.

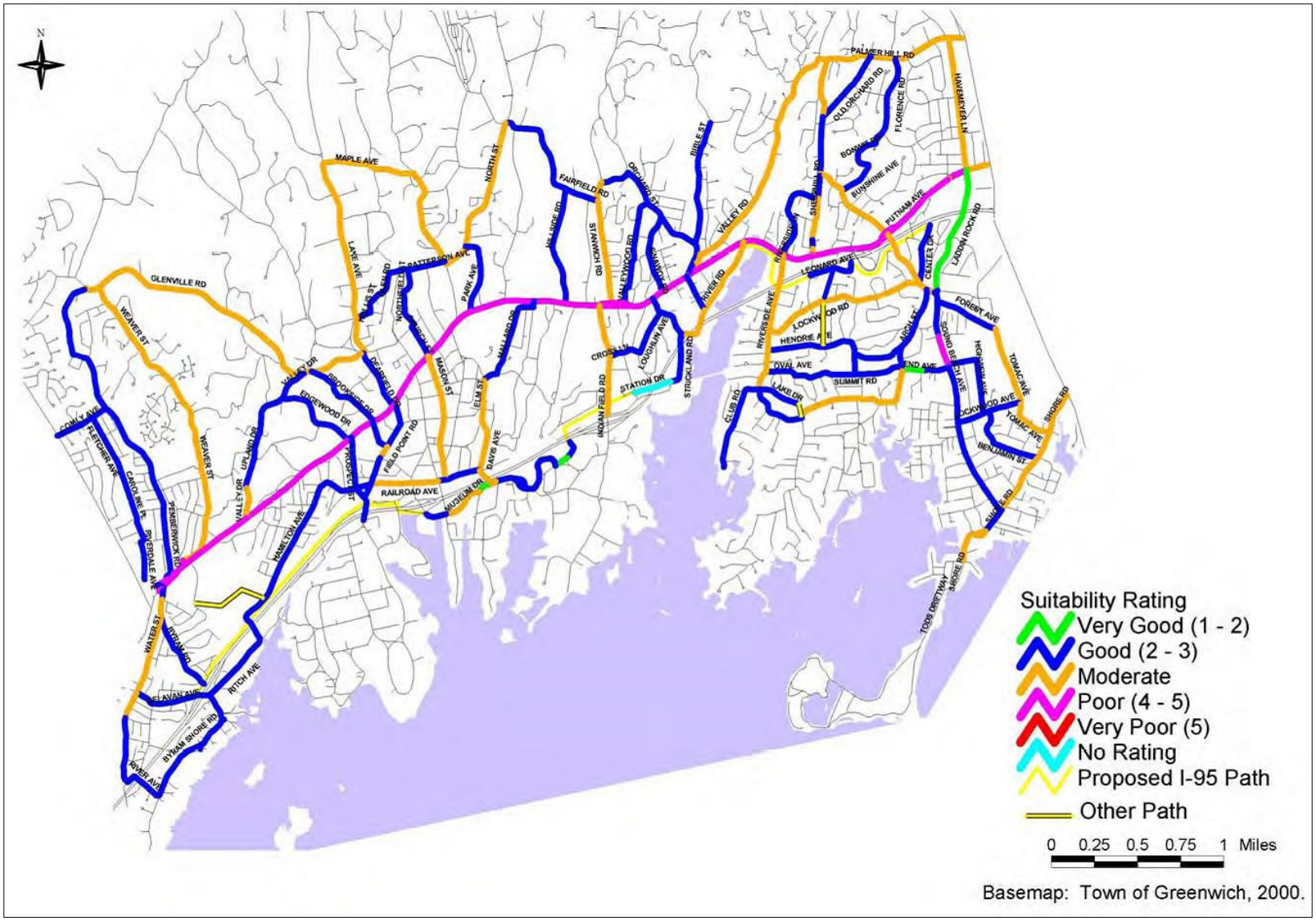
- ***Dearfield Drive to Maple Avenue*** – Bicyclists could bypass this segment of Route 1 by utilizing Dearfield Drive, Lake Avenue, Hollister Street, Patterson Avenue, North Street, and Park Avenue. Each of these streets was identified in the Town of Greenwich's Bicycle Master Plan as having either "Moderate" or "Good" suitability for a bikeway. These ratings determine how well a roadway can accommodate cyclists by taking into account factors such as roadway width, vehicular speed, and daily traffic volume.
- ***Strickland Road to Sound Beach Avenue*** – Bicyclists would have the alternative of bypassing this section of Route 1 by traveling onto

Strickland Road and River Road. To cross the Mianus River between River Road and Riverside Drive, bicyclists could use the sidewalk on US 1. East of the bridge, bicyclists could use Riverside Avenue, Lockwood Road, and Sound Beach Avenue. Each of these roads was rated as either "Moderate" or "Good" suitability for a bikeway. There is an approximate 775 foot gap between River Road and Valley Drive when crossing US 1 with no suitability rating.

- ***Harvard Avenue to Greenwich Avenue*** – This majority of this section of Route 1 could be bypassed by bicyclists via West Avenue, Stillwater Avenue, and West Main Street. While the City of Stamford has not rated the bikeway suitability of these streets, each appears to have sufficient width to accommodate bicyclists.

The proposed Route 1 bicycle lanes would provide a connection to the existing bicycle lanes on Sound Beach Avenue and the trails in Stamford's Mill River Greenway. Providing such connections expands accessibility and mobility for bicyclists.





Town of Greenwich Bicycle Master Plan – Bikeway Suitability

Roundabouts

Roundabouts offer many benefits including crash reduction, less severe crashes, reduced delay, reduced emissions, and landscaping opportunities. Before any construction, roundabouts recommended in this study will need to go through the CTDOT Roundabout committee. At present, CTDOT is focused on gaining more experience with and evaluating the performance of single lane roundabouts. Multi-lane roundabouts are not currently allowed on state roads. The proposed roundabout at Greenwich Avenue and West Main Street would need to be further evaluated since it is a hybrid roundabout with a mix of 2 lanes and 1 lane. CTDOT has indicated they would be open to the possibility of "hybrid" roundabouts.

CTDOT recently completed or has scheduled construction of four roundabouts on State roads. As construction is completed and the operational and safety impacts are evaluated, CTDOT may become more open to additional roundabouts including, potentially, multi-lane and hybrid roundabouts. Examples of roundabouts on Connecticut State roads include:

- ***Route 162 and S.R. 705 (Ocean Avenue and Jones Hill Road), West Haven*** - This roundabout was built to improve capacity of the intersection as well as to enhance safety following several pedestrian collisions and a fatal collision involving a left-turning motorcycle.

Rt 162 and SR 705, West Haven

- ***Route 80 and Route 81, Killingworth*** – CTDOT improved an existing roundabout where insufficient deflection allowed vehicles to travel through the intersection at higher speeds. The excess pavement also contributed to conflicts between entering and exiting vehicles. Minor widening and alignment adjustments improved deflection and reduced the speeds of vehicles approached and circulating within the roundabout. A truck apron was also added to accommodate vehicles with large turning radii.
- ***Route 74 and Route 286, Ellington*** – Construction of a roundabout at the "Five Corners" intersection, where Route 74 intersects Route 286 is near completion. The roundabout was selected as a means of reducing congestion and improving traffic flow during peak hours. It will be the first five-leg roundabout on a State maintained road in Connecticut.
- ***Route 85 and Route 82, Salem*** – Construction of the Salem roundabout is schedule to begin in April 2012. The intersection has experienced a high number of head-on turning accidents in recent years. Accidents involving an adjacent intersection have also been a concern. The roundabout is anticipated to improve safety by eliminating several types of potential conflict. The intersection will become the first "hybrid" roundabout in Connecticut. While two of the approaches will consist of a single entry lane, the other two approaches will include two entry lanes in order to accommodate traffic demand.

Shippan Avenue, Stamford

The Town of Greenwich and City of Stamford are already familiar with roundabouts. In fact, a roundabout recently constructed at the intersection of Havenmeyer Lane and Northridge Road straddles the two municipalities. Additional local roundabouts can be found at the Shippan Avenue/Fairview Avenue and Newfield Avenue/Lakeside Drive/Davenport Ridge Road intersections in Stamford, and at the intersection of Dearfield Drive, Lake Avenue, and Glennville Road in Greenwich.

Pavement Treatments

Pavement treatments can be used to enhance visibility of areas such as crosswalks. This can increase driver alertness, improve pedestrian safety, and improve the overall aesthetic of the roadway.

Several materials have been utilized in Connecticut for such treatments, including brick and stamped concrete:

- ***Brick*** – Brick pavers provide an attractive, though expensive pavement treatment. Brick pavers must be installed correctly in order to prevent shifting and displacement of individual bricks. Granite can be installed on either side of a brick crosswalk in order to discourage shifting. CTDOT generally recommends against the use of brick pavers, but could allow their use on Route 1. If brick pavers were utilized, CTDOT would require them to be interlocking. Interlocking pavers lock together to form a solid unit. As a result spacing is uniform and shifting is minimized.

- ***Stamped Concrete*** – Concrete can be colored and patterned to resemble other materials such as brick, stone, or flagstone. While stamped concrete provides a similar aesthetic to these materials, the cost is typically lower. On heavily traveled roads stamped concrete can wear down over time. Additionally, stamped concrete tends to settle less than the adjacent bituminous resulting in steps that are a problem for plows. CTDOT has experimented with several different types of stamped concrete with little success although two products - Duratherm and Street Print – have been more successful than others. CTDOT is not opposed to stamped bituminous pavements as long as there is a maintenance agreement in place with the local municipality.

Capital Avenue, Hartford

Urban Transitway, Stamford

Pedestrian phasing

The signalized intersections along Route 1 through the Town of Greenwich currently operate with all exclusive pedestrian phases. Route 1 varies between four and five lanes through Greenwich. During an all exclusive pedestrian phase after a pedestrian activates the push button, all vehicular traffic is stopped at a red-light for a predetermined time period which ranges from 20 to 30 seconds. This represents up to 30% of the available time at the signal. Regardless of which roadway the pedestrian is crossing, every approach to the intersection has to stop. For example, in the "Hub" area of Cos Cob, activation of the pedestrian push button on any corner of any of the intersections of Route 1 with Taylor Drive, Cross Lane and Strickland Road results in all traffic stopping at all three intersections for 24 seconds out of an available 112 seconds in a cycle.

In the City of Stamford, where Route 1 varies between two and three lanes, the signals, which have pedestrian actuation, operate with concurrent pedestrian phases. Following pedestrian actuation of a push button, the pedestrian crosses the street in the same direction as the flow of traffic. Turning traffic has to yield to the pedestrians in the crosswalk.

During development of the proposed concepts, it was assumed for analysis purposes that at the locations where the roadway width would be reduced through road diets, the pedestrian phases would also be converted to concurrent pedestrian operations. It is possible, that a hybrid operation could be used in certain locations, where a pedestrian crossing a side-street would not necessarily stop traffic on Route 1, however activation of a push button to cross Route 1, would call an exclusive pedestrian phase.

CTDOT has indicated that it generally discourages such conversions since State operated signals operate with exclusive pedestrian phases and there is a desire to achieve uniformity and avoid confusion amongst users. However, CTDOT does permit municipalities such as Stamford and Greenwich which maintain their traffic signals to implement the change. The City of Stamford once utilized exclusive pedestrian phasing but converted its signals to concurrent operation over the course of two years.

Converting all of the pedestrian signals on the Route 1 from exclusive to concurrent operation has the potential to significantly reduce vehicular delays and in many cases provides the additional available green time to allow a three lane section to operate at an acceptable level of service.

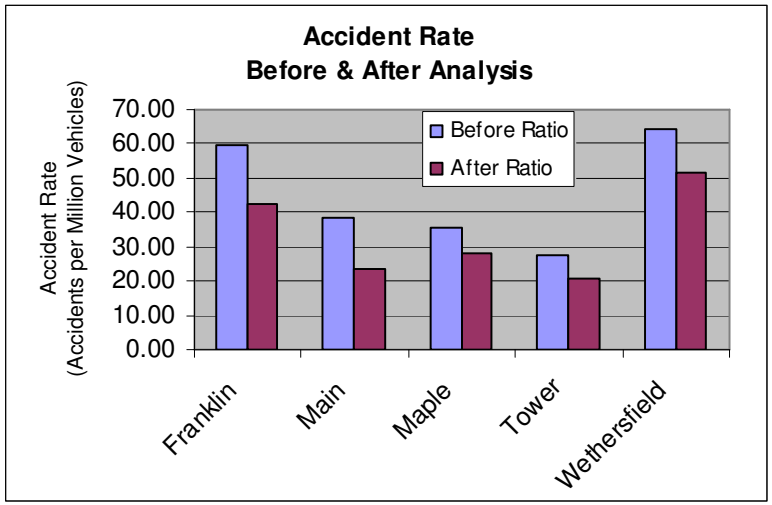
Road Diets

A 'road diet' involves reducing excess travel lanes in order to calm a street. Road diets prohibit aggressive drivers from passing, instead allowing more prudent drivers to set the speed of travel. Reducing extraneous travel lanes allows the reclaimed roadway width to be allocated to other uses, such as bicycle lanes, on-street parking, or landscaped median islands

A before-and-after speed study of Hartford streets on which road diets were implemented revealed speed reductions of up to six miles per hour, with average speed reductions of three to four mile per hour. The impact of road diets on vehicular speeds is often most apparent during peak traffic hours, when queuing is most apparent. Road diets also offer safety benefits. The Hartford streets where road diets were implemented saw a 19% and 38% decrease in crashes following implementation, which corresponds to 183 fewer crashes per year. Several of these streets were similar to segments of Route 1 in terms of land use, property access, and traffic volumes.

On road dieted streets, research indicates that there is an increased likelihood that traffic will divert to alternate routes when average daily traffic exceeds 20,000 vehicles[3]. In the article, *Road Diets "Fixing the Big Roads"*, Burden and Lagerwey suggest that the upper comfort range for arterial conversion appears to be between 20-25,000 ADT[4]. A four lane to three lane road diet was implemented on Tacoma Street in Portland, Oregon, where existing ADT of 30,000 was reduced to 29,500 after the road diet.

Of the locations along Route 1 where a reduced cross section is proposed from four lanes to three lanes, the only location with an ADT above 25,000 is Indian Field Road which had an ADT of 27,900 according to the 2008 CTDOT traffic counts. This intersection has a proposed westbound right turn lane that should help mitigate the addition traffic volume along US 1, and could warrant further investigation moving forward. Six other locations between Prospect St and Orchard St are between 20,000 and 25,000 ADT.



Tower Avenue, Hartford

[3] Federal Highway Administration, "Evaluation of Lane Reduction 'Road Diet' Measures on Crashes", Summary Report # FHWA-HRT-10-053.
[4] Burden and Lagerwey, "Road Diets - Fixing the Big Roads", Walkable Communities, Inc. March 1999, pg 4.