Route 4 Corridor Study

Town of East Greenbush, New York

Prepared by the

Capital District Transportation Committee

with

ERDMAN ANTHONY

and

Behan Planning Associates, LLC
Planning Community Futures

2006

Route 4 Corridor Study
Town of East Greenbush, New York

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1. INTRODUCTION

1.1 Background

The Town of East Greenbush is located in the Hudson River Valley in Rensselaer County, New York. Primarily a suburban and rural bedroom community within the Capital District of New York State, East Greenbush has experienced development pressure over the past several years typical of that faced by similar suburban communities in the region.

As a key commercial corridor the northern portion of Route 4 has been the location of the majority of new large format retail development both within the Town of East Greenbush and its neighboring town to the north, North Greenbush, bringing with it concerns about traffic growth and change. In addition to the intensifying retail development in the northern section along Route 4, office/technology development has been occurring on Mannix Road (East Greenbush Tech Park) and a large complex is proposed within the Mill Creek Commerce Park, which is located between Route 4, Third Avenue Extension and Route 151 (Couse Corners). In addition other major intersecting routes along Route 4 are also the focus of various types of existing and potential future non-retail commercial and residential development, including Third Avenue Extension, I-90 Exit 9, Route 151 and Routes 9&20. The area east of Route 151, home to the Columbia High School, has also seen new development in recent years in the form of a new YMCA and Town Library.

Aerial photo of East Greenbush

The potential effects of traffic and change are also a concern to the community along the southern piece of the Route 4 corridor where primarily residential uses are found.

The scale of recent change and potential future changes both within East Greenbush and in surrounding communities prompted the Town to undertake its' recently adopted town-wide Land Use Plan Update and Zoning Study and this Route 4 Corridor Study.

1.2 Study Purpose

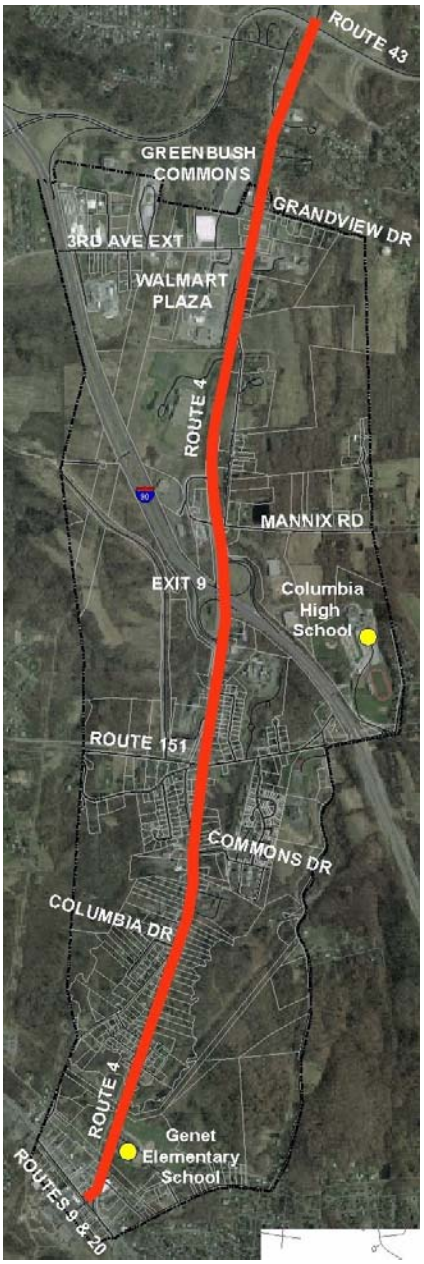
In light of changes that have been occurring along the Route 4 Corridor which is owned and maintained by New York State, this study was proposed by the Town of East Greenbush and funded through CDTC's Community and Transportation Linkage Planning Program. In addition, the Town recently updated (August 2006) its previous master plan through a Land Use Plan Update and Zoning Study, which was closely coordinated with this Rte 4 corridor linkage study.

The purpose of this linkage study is to examine the Route 4 Corridor within East Greenbush in relation to both the current transportation system, existing adjacent land use and likely future conditions in order to provide the framework for a planned set of conceptual transportation improvements and management actions that will enable the Town to incrementally pursue its land use and transportation vision and goals for the corridor:

- Create a unified vision of what the Route 4 Corridor should look like in the years to come based on existing conditions and looking ahead into the future (as identified in the Town's Land Use & Zoning Study).

- Produce a plan with short term and longer term recommendations designed to achieve that vision to enhance the transportation system and existing and future land uses planned for the corridor.

- Position the Town and NYSDOT to take advantage of any opportunities related to development's mitigation of traffic impacts and funding in a comprehensive fashion.



Route 4 Corridor Study Area

The primary goal of this study is to develop multi-modal transportation improvement concepts to support and achieve the Town's land use vision for the Route 4 corridor. Improvements suggested are intended to improve Route 4 over time to ensure it provides safe and efficient access for pedestrians, bicyclists and motor vehicles. A key feature of this goal is to create a walkable corridor along Route 4 in an effort to develop a strong network of walkable corridors connecting surrounding neighborhoods to major destinations.

1.3 Study Area

For the purposes of this linkage study, the Route 4 corridor study area is approximately four (4) miles long from the Routes 4/43 intersection in North Greenbush to its southern terminus at Routes 9&20 in East Greenbush. The width of the study area focuses primarily on the properties adjacent to the corridor along the east and west side of Route 4. Particular attention was given to the following intersections within the study area:

- Route 43
- Grandview Drive
- Third Avenue Extension

- Wal-Mart Shopping Center Driveway
- Mannix Road
- I-90 Westbound Ramps
- I-90 Eastbound Ramps
- Route 151 (Couse Corners)
- Commons Drive
- Columbia Drive
- Genet Elementary School Driveway
- Routes 9&20 (Columbia Turnpike)

1.4 Study Process/Methodology

The study included the following major tasks performed by the study team on behalf of the advisory committee:

- Existing conditions inventory/analysis/issues identification
- Coordination with Land Use Plan Update and Zoning Study
- Review of other relevant studies
- Identification of future land use scenario
- Development of transportation goals and objectives
- Exploration of different concepts
- Develop draft conceptual transportation improvements
- Develop draft implementation plan and generalized cost estimates
- Develop Route 4 Corridor Plan Report (this report)

1.5 Study Advisory Committee

A Study Advisory Committee (SAC) was established and met many times with the consultant team to provide guidance, feedback, and input on the corridor study. The committee included representatives from the Town, New York State Department of Transportation (NYSDOT), Rensselaer County Economic Development and Planning, and CDTC.

1.6 Public Process and Input

Building consensus amongst the community, state and local officials for the recommended conceptual transportation improvements developed for the Route 4 corridor is important to the implementation of study recommendations over time. Therefore in addition to the SAC meetings, four public meetings were held. The first of these, held on May 19, 2005, focused on existing conditions analysis and issues/concerns. On March 2, 2006 a second meeting was held which included a presentation by NYSDOT's Roundabout

Public Meeting #2:
NYSDOT Roundabout Unit Presentation

Unit regarding roundabouts generally and how they might fit at specific intersections along the corridor. The third public meeting took place on June 6, 2006 using a workshop format where community residents and other stakeholders reviewed and discussed the draft conceptual corridor wide improvements. A fourth meeting was held on July 24, 2006 to focus on Route 4 south residents' issues, concerns and thoughts on the related draft conceptual improvement options as there was a concern that this group was not well represented at the third public meeting. **Appendix A** provides a summary of the issues identified along the entire corridor and the public meeting presentations.

1.7 Coordination with Town Land Use and Zoning Study

During the Town-wide Land Use Plan Update and Zoning Study, adopted in 2006, several Character Areas were identified for the purposes of focusing analysis, visioning and public discussion. Routes 4 North and South were two such character areas, with Route 4 North defined as the section from the town's northern border with North Greenbush south to the intersection of Route 4 with Route 151 and Route 4 South defined as the segment from Route 151 (Couse Corners) south to the intersection with Routes 9 & 20.

Key information from the Land Use Plan Update and Zoning Study that fed into the Rte 4 Study work included results from a town-wide survey in which a majority of respondents indicated they want to see Route 4 become more bicycle and pedestrian friendly and to have sidewalks, and the recommendation to retain existing Route 4 Corridor zoning primarily as it is today - meaning that the Town wants to retain the current scale of Route 4 South.

Through the Land Use Plan Update and Zoning Study, East Greenbush articulated town-wide and character area vision statements. A series of vision statements, along with recommendations for land use and transportation actions designed to achieve this vision over time, were identified for the Route 4 Corridor character area.

Relevant excerpts from the ***East Greenbush Land Use Plan Update and Zoning Study***:

Vision for Transportation in the Town of East Greenbush

An integrated transportation system, including walkable, pedestrian-friendly neighborhoods and commercial areas; an efficient, interconnected roadway network, public transportation options that are linked to a walkable, pedestrian-scaled environment; and bicycle and trail options. To achieve this goal, land use and transportation options should be planned for concurrently.

Town-wide Land-Use Vision Concepts:

- Provide for and focus new growth and redevelopment in areas where infrastructure exists and within infrastructure means.

- Enhance and create walkable places with unique, identifiable character throughout town: such as at a focused, connected place at the intersection of Route 4 and 151 at Couse Corners -- to connect the increasing civic and institutional activities in this area to the existing neighborhoods; and to ensure that new workplace centers such as the future Mill Creek Commerce Park offer a unique, attractive sense of place to sustain the interests and investment of future employers and employees and the community over the long run.
- Focus and enhance high-quality commercial development along the northern portion of Route 4 while protecting the existing surrounding neighborhoods.
- Maintain the current scale of Route 4 south.
- Foster additional local road connections between existing and new neighborhoods as part of a rich network with a diversity of travel options.

Character Area Vision and Major Recommendations – Route 4 Vision:

The vision for Route 4 North (from the town's border with North Greenbush to the Couse Corners area) includes focused, quality commercial and corporate offices with supporting retail and protected surrounding residential neighborhoods.

The vision for Route 4 South (from Couse Corners south to the intersection of Route 4 and Columbia Turnpike) is to protect the existing quality of life and create an enhanced residential experience through roadway and pedestrian improvements.

Major Recommendations:

- Develop a streetscape improvement plan to realize the vision of Route 4 as a commercial avenue in the north and neighborhood avenue in the south with an appropriate transition at the Couse Corners gateway area. Integrate potential public transit connections and bus shelters into this plan.

Recommendations- Route 4 North and South:

- Mitigate traffic impacts of future development in the OC zone (Mill Creek Commerce Park), to minimize additional impacts to existing neighborhoods and community character of Couse Corners and Third Avenue Extension neighborhoods.
- Create development design guidelines for commercial development uses.
- Create an interconnected path system for safe biking and walking along Route 4 and Michael Road leading to the YMCA, library and other key places.
- Develop a master plan (for) the open lands at Couse Corners and ensure an adequate mix of development (if desired) and conservation is achieved. Create a focused neighborhood-scaled gateway at Couse Corners, including traffic/safety improvements, a public park and trail connection and neighborhood-scaled street amenities.

Town-wide Principles - Build a diverse and functional traffic and circulation system:

- Identify and develop new town-wide connections to help alleviate traffic pressures along Route 4 and connect the town's major nodes and destinations
- Develop public transit options to help alleviate traffic and offer transportation alternatives for residents.
- Provide alternatives for pedestrians including trail, sidewalks, and appropriate road crossings as intersections.

2. ROUTE 4 CORRIDOR PLAN GOALS AND OBJECTIVES

Using information on existing conditions and potential future trends, as well as stakeholder and public input regarding issues confronting the corridor, the vision statements and recommendations listed above were then used to craft a set goals and objectives for the corridor. These goals and objectives in turn guided the development of the recommended short and long term Route 4 Corridor transportation system improvement concepts developed during the study.

Goal: Support the Town's Land Use Vision to have Route 4 Serve as a commercial avenue in the north and a neighborhood avenue in the south with an appropriate transition at the Couse Corners gateway area through development of a corridor improvement plan consistent with the Town's vision that includes elements resulting in a ***balance between***:

- preserving traffic flow, accessibility, and safety, with
- an attractive and functional street and adjacent land use environment that encourages
- walking, bicycling and transit use.

This multi-modal corridor improvement plan should:

- help create opportunities for attractive gateways and enhancement of nearby civic uses
- preserve and enhance the quality of life for surrounding residential neighborhoods
- optimize the area's development potential by making the area more attractive for a variety of quality development options, similar to that described in the Mill Creek GEIS.

By working toward an overall corridor design that takes all road users into account, and is integrated appropriately with adjacent land use, the Route 4 Corridor can become a stronger community, economic, social and aesthetic asset for the Town.

Objectives: Transportation System Management/Operations:

Maintain good quality of traffic flow and traffic safety through use of various techniques that may include traffic calming, signal coordination, roundabout designs, access management, and limited capacity improvements, among others.

Transform Route 4 over time into a Commercial/Neighborhood Avenue welcoming to all roadway users:
Explore improvement concepts that result in an attractive streetscape and create opportunities for community gateways and attractively designed destinations that can be reached by motor vehicles, transit, and pedestrians and bicyclists.

Plan for All Travel Modes:
Develop an improvement plan that includes specific elements that support accessibility and safety for various modes of travel including transit, walking and bicycling.

Manage Access along the Corridor: Incorporate access management techniques into the improvement plan that will work to preserve the function of the corridor in serving through trips while providing safe, convenient and consolidated access to adjoining land uses.

Support Desired Economic Development within the Corridor:
Develop a corridor transportation plan that can support multi-modal traffic generated by desired economic development consistent with the Town's land use vision in a manner that meets other stated objectives. Develop an approach that relies on public/private partnerships in sharing responsibility appropriately for mitigation of transportation system impacts and ensure that short-term needs are considered within the context of long-term goals of the Town.

Foster use of Site Design Elements needed to support a Sustainable Transportation System: Identify various site design techniques that can be used to ensure well designed development sites that promote access management and transit friendliness.

3. REVIEW OF RECENT RELATED STUDIES

Information from other recent studies in the Route 4 Corridor area was collected and reviewed to ensure that recommended improvements were noted and could be coordinated with Route 4 Corridor Study recommended improvements as appropriate. This review was also used to gain information regarding potential future development within the corridor which was then used in putting together the future trip estimates used in the subarea traffic model developed for this corridor study (see section IV. below).

Studies were reviewed pertaining to: East Greenbush Technology Park, Mill Creek Commerce Park Generic Environmental Impact Study (GEIS), NY 151 Corridor Linkage Study, the Routes 4/43 GEIS (North Greenbush, NY), and the Routes 9 & 20 Design Enhancements Linkage Study.

3.1 East Greenbush Technology Park

The East Greenbush Technology Park consists of about a 79-acre site that is proposed to include a significant research and development subdivision (at full buildout greater than 700,000 square feet (SF)). The site is to include a mix of uses such as a hotel, precision service, manufacturing and light industrial businesses and is being developed as two phases. Phase 1, which is almost complete, includes approximately 273,000 SF and consists primarily of office/research and development space along with a Marriott Residence Inn. Current site access is provided by a single driveway located on the south side of Upper Mannix Road, just east of the Thompson Hill Road and US Route 4 intersection.

When the traffic model was developed for this study, only 130,250 SF of office/research and development space was open and fully occupied. The remaining portion of the Phase 1 development along with the Marriott Residence Inn was under construction; therefore, traffic volumes for this portion of the site were estimated in the traffic model.

Phase 2 is anticipated to include approximately 450,000 SF of office/research and development space. This portion of the East Greenbush Technology Park is currently undergoing site plan approval and the State Environmental Quality Review Act (SEQRA) process and is proposed to be constructed over the next 10 to 20 years. The NYSDOT is currently reviewing and will provide comments on the Traffic Impact Study and Signal Warrant Analysis related to Phases 1 and 2 of this site. The developer will then be responsible to address these comments prior to granting of required highway work permits.

3.2 Mill Creek Commerce Park GEIS

The Mill Creek Commerce Park is a planned business and retail park on approximately 460 acres of land located adjacent to Exit 9, north of NY 151, and south of Third Avenue Extension. Based on the Final GEIS and Concept Plan completed in 2002, this site is expected to house 1,350,000 SF (30.99 acres) of building area and could include a mix of

uses such as corporate, business and professional office space, retail services, light assembly and fabrication space. Site access is proposed from the existing Tempel Lane intersection with Route 151 and from a proposed northern site roadway along Third Avenue Extension. The GEIS recommended various roadway changes in conjunction with this development and included roadway and intersection widening (i.e. adding turn lanes at NY 151/Rte 4 and Third Avenue Extension/Rte 4), adding several traffic signals (I-90 ramps, new site northern roadway and Third Avenue Extension), and coordinating signals among other recommendations to accommodate development related traffic. An internal trail system for pedestrians was also proposed.

3.3. Routes 9 & 20 Design Enhancements Corridor Study

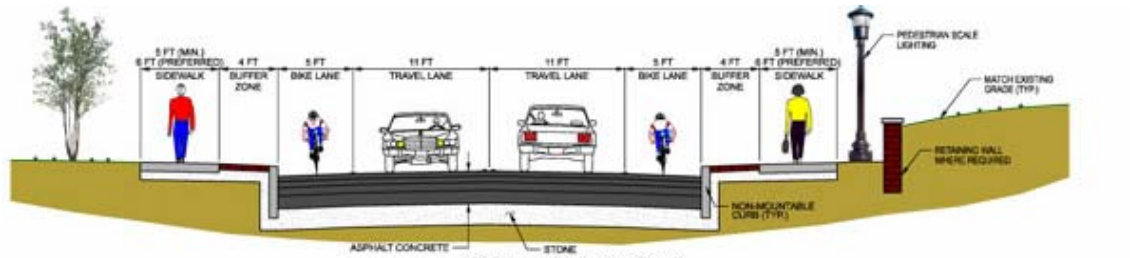
Conceptual visualization of Routes 9/20 included in the Design Enhancements Study, 2003

Debate over the appearance and function of the Route 9 & 20 corridor in the town highlighted the need for an overall vision for the future of the corridor. A 2003 study sponsored by the Town of East Greenbush and undertaken with CDTC linkage study funds was used to create a vision that evolved from public input at the study's extensive public workshops and design charette. Corridor Plan goals that arose from the public visioning sessions can be summarized as 1) improving the aesthetics of the corridor; 2) improving bicycle and pedestrian safety and enhancing the pedestrian realm; 3) incorporating traffic calming features; 4) reducing local traffic through the use of parallel streets; and 5) allowing mixed uses and limiting the scale of new commercial uses between existing activity centers. Short and long range actions were recommended in the plan for the town, NYSDOT, CDTC and other stakeholders to consider when implementing projects in the Route 9 and 20 corridor area. One recommendation of relevance to the Route 4 corridor was to reshape the Route 4/Rtes 9 & 20 intersection into a more pedestrian friendly intersection. As opportunities arise, it is envisioned that the 9 & 20 corridor will transform over time into a more walkable, attractive environment that creates a sense of place for residents in the future.

Pedestrian Friendly Intersection Concept
Routes 9 & 20 Linkage Study

3.4 Route 151 Corridor Study

The Route 151 Corridor Study completed in 2004 was also done through the CDTC Linkage Planning Program. The study developed a set of recommended conceptual short and long-term transportation actions for Route 151 between Columbia High School and Route 4 designed to improve pedestrian, bicycle and vehicular safety and mobility in the corridor with an emphasis on pedestrian safety and access between the High School, the Town Library and the YMCA. Short term actions focused on low cost improvements to the High School access road to eliminate backups onto NY 151 as well as other school/pedestrian related signage/lighting on NY 151. Longer term recommendations included providing sidewalks, bicycle lanes, high visibility crosswalks, pedestrian crossing signals at signalized intersection(s), a signal at Michael Rd as it becomes warranted, and a secondary access road to the High School from Mannix Road, including a connection to the East Greenbush Technology Park. Other recommendations included installing landscaping and various median treatments that would improve the visual character of the area and calm traffic, and installing pedestrian scale lighting to enhance pedestrian activity and calm traffic.



NY Route 151 (Luther Road)
Long Term Recommendations
From East of US Route 4 to East of Michael Road

3.5 Route 4/43 GEIS (North Greenbush)

After construction of the I-90 Exit 8 Phase 1 Connector in the Town of North Greenbush, and as planning continued for an extension of a Phase 2 Connector from the vicinity of the intersection of Routes 4/43 northward through the RPI Technology Park to Hudson Valley Community College, the Town of North Greenbush initiated a Generic Environmental Impact Statement (GEIS) for the Route 4/43 Corridor Study in 2004. As stated in the GEIS Executive Summary, the study was done for the purposes of "evaluating potential development under existing zoning classifications as well as under potential zoning changes as requested by property owners in the Route 4/43 Corridor Study Area". Potential transportation impacts associated with five future land development scenarios were considered for the corridor in this study based on existing and proposed revised zoning by North Greenbush.

At the time of this GEIS the transportation improvement recommendations listed below were included in that document for the Route 4 corridor based on land use assumptions in play at that time related to the GEIS land development scenarios considered. It should be noted that some of those land use assumptions may no longer be valid.

Rtes 4 & 43 GEIS transportation recommendations:

- Widen Route 4 from Route 43 to Third Ave. Extension to provide a five lane cross-section with two travel lanes in each direction and a center left turn lane.
- Install a traffic signal at Route 4 and a mutual access location to serve developable properties currently proposed for Lowe's Home Improvement Store and Tech Valley commercial properties.
- Modify or replace the traffic signal at Route 4/Best Road for access to development parcel in the northeast quadrant of Route 4 and Route 43.
- Install communications systems and supporting detection equipment to provide signal coordination within the study area.
- Commercial buildings should be sited to provide the opportunity for direct pedestrian connections between transit stops and commercial establishments.
- An interconnected, continuous network of sidewalks and/or multi-use facilities should be provided that link transit stops to commercial activity areas and residential neighborhoods.
- Gaps in sidewalk connections should be filled.
- Future commercial development should provide sidewalks that connect to, and expand upon the existing sidewalk system.

3.6 Additional Supporting Plans and Policies

In addition to the Town's Land Use Plan Update and Zoning Study, as mentioned above, CDTC's New Visions Plan (the Regional Long Range Transportation Plan which can be found online at: http://www.cdtcmpo.org/rtp.htm) and the Governor's Quality Communities initiative also call for designing land development and transportation projects to support and proactively create vibrant communities. Recommendations and guidance from these plans and policies were considered during the development of the Route 4 Corridor Study recommendations. Specific planning and investment principles found in CDTC's New Visions Plan of importance to the Route 4 Corridor Study include:

- ***Cost-effective operational actions are preferable*** to capacity expansion
- ***Land use planning and management is critical*** to the protection of transportation system investment. (… Pro-active corridor management that fosters efficient settlement patterns protects mobility. Site design practices that limit access to highways, are transit friendly, and provide pedestrian access help avoid gridlock.)
- ***Encouraging bicycle and pedestrian travel is a socially, economically and environmentally responsible approach*** to improving the performance of our transportation system.
- In addition to supporting desired land settlement patterns, ***transit service helps meet multiple regional objectives*** in the Capital District
- ***Managing traffic flows on the Capital District …arterial system is critical*** for both economic and social reasons. (Good arterial corridor management planning designs facilities that adequately serve traffic yet guide surrounding development in a sustainable manner. Development opportunities can be embraced when access, transit, and pedestrian issues are properly addressed.)

- ***Design of street layout and location of complementary uses creates a pedestrian scale*** and provides increased accessibility without compromising the attractiveness of development.
- ***Possible bicycle/pedestrian-related improvements will be considered from the perspective of developing a system*** -- not just based on whether a particular facility is currently used.

4. EXISTING CONDITIONS

The existing conditions inventory and analysis of the study area was undertaken to establish a baseline of how things currently operate and for comparison purposes later in the study to evaluate the advantages and disadvantages of conceptual improvement alternatives along the corridor. This inventory and analysis included a review of existing land uses and zoning along the corridor, an inventory of study area roadway and intersection geometry and traffic control devices, collection of daily and peak hour traffic volumes, and a review of safety statistics with the study area. A summary of the pertinent information is presented in this section. Existing available generalized information on soils and slopes along the Route 4 Corridor was also gathered to provide a general indication of areas that may present constraints for corridor improvements. Maps displaying this information are contained in Appendix I.

4.1 Existing Corridor Characteristics: Land Use and Zoning

For the purposes of this study, the Route 4 study area has been broken down into three distinct sections to describe the land uses along the corridor:

1. Route 43 to Mannix Road, which consist of primarily commercial uses
2. Mannix Road to Route 151 (Couse Corners) with limited commercial uses, town civic uses, and surrounding residential neighborhoods
3. Route 151 to Routes 9&20, which is primarily residential in nature with a concentration of commercial uses near Routes 9&20

Route 43 to Mannix Road: This area is primarily commercial in nature and has experienced recent growth. Zoning districts include Corporate Office/Regional Commercial on the west side of Route 4 with Residential Buffer on the east. Land uses include large format retail such as Home Depot, Staples, and Target, as well as a movie theater, restaurants, and other smaller retail type facilities within the larger shopping plazas, in addition to some commercial or institutional parcels that have direct access to Route 4 or adjacent roadways.

The site layout of most of the development in this area is typical of other suburban-style sites in the Capital District and elsewhere across the nation in that it is primarily auto-oriented with stores and other buildings set back significant distances from the main street with the parking lots between the buildings and the street. Pedestrian connections within the sites or from the buildings to the roadway are limited or non-existent.

This section of the corridor is also home to Albany International which sits on a large parcel on the west side of Route 4. There are some fields and residential uses found along the east side of the corridor.

Mannix Road to Route 151: Land uses in this section include some commercial activity, important town civic institutions, and surrounding residential neighborhoods found within this section of the study area, including the East Greenbush Technology Park with access provided via Mannix Road. Several hotels, one within the East Greenbush Technology Park, have recently been built on either side of Route 4 along Mannix Rd. Single parcel developments for beverage and convenience uses (i.e. Dunkin Donuts, Stewarts) with individual driveways accessing Route 4 can be found north of Route 151 along with some larger commercial office or health/institutional uses as well as individual residential parcels on the east side of the roadway that front onto it and have direct single driveway access.

Figure 4-1

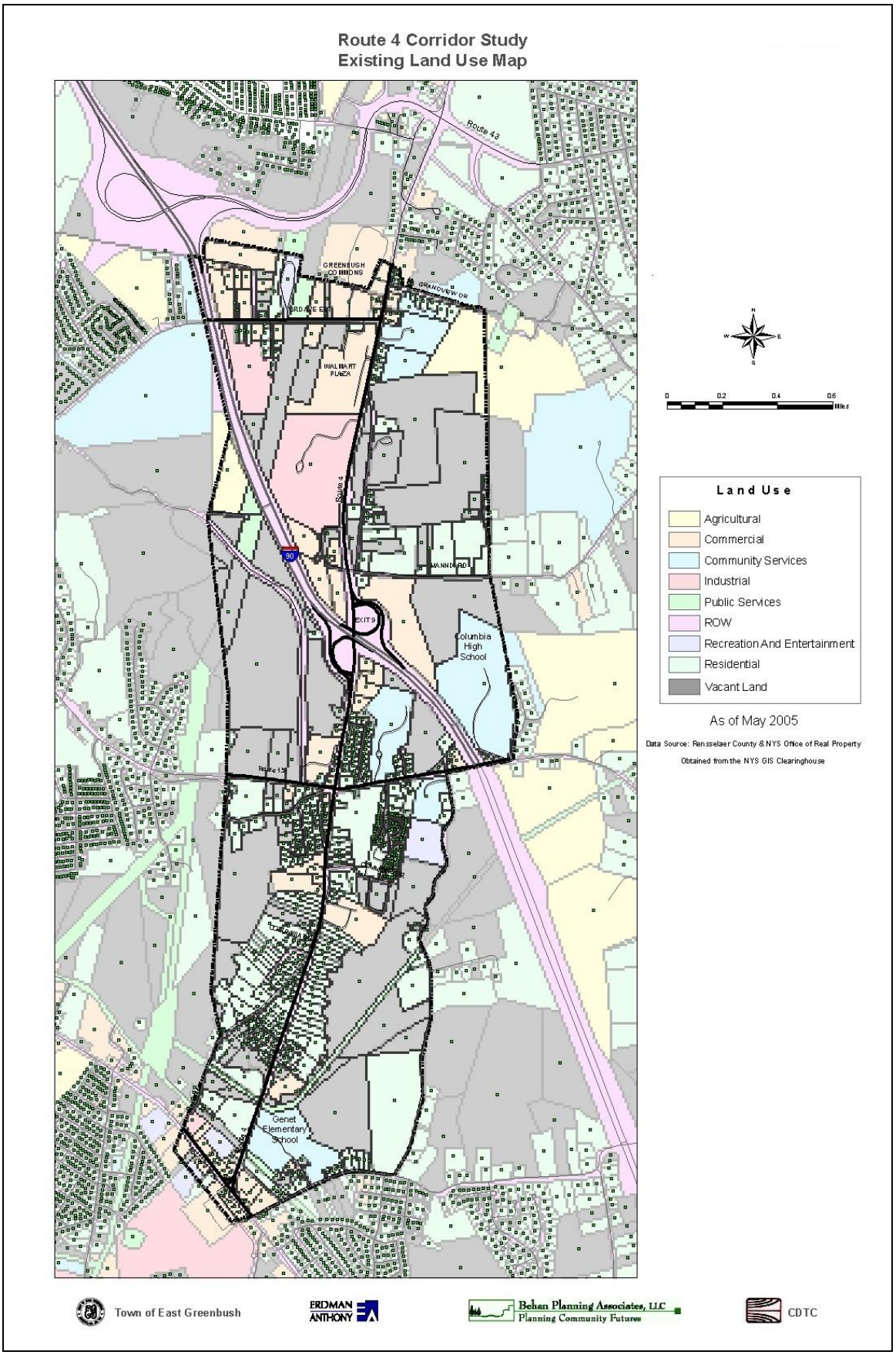

Route 4 Corridor Study
Existing Land Use Map
Route 43
GREENBUSH COMMONS
GRANDVIEW DR
3RD AVE EXT
WAL MART PLAZA
Route 4
90
MAIN RD
EXIT 5
Columbia High School
Route 136
Genet Elementary School
N
W
E
S
0
0.2
0.4
0.6
Miles
Land Use
Agricultural
Commercial
Community Services
Industrial
Public Services
ROW
Recreation And Entertainment
Residential
Vacant Land
As of May 2005
Data Source: Rensselaer County & NYS Office of Real Property
Obtained from the NYS GIS Clearinghouse
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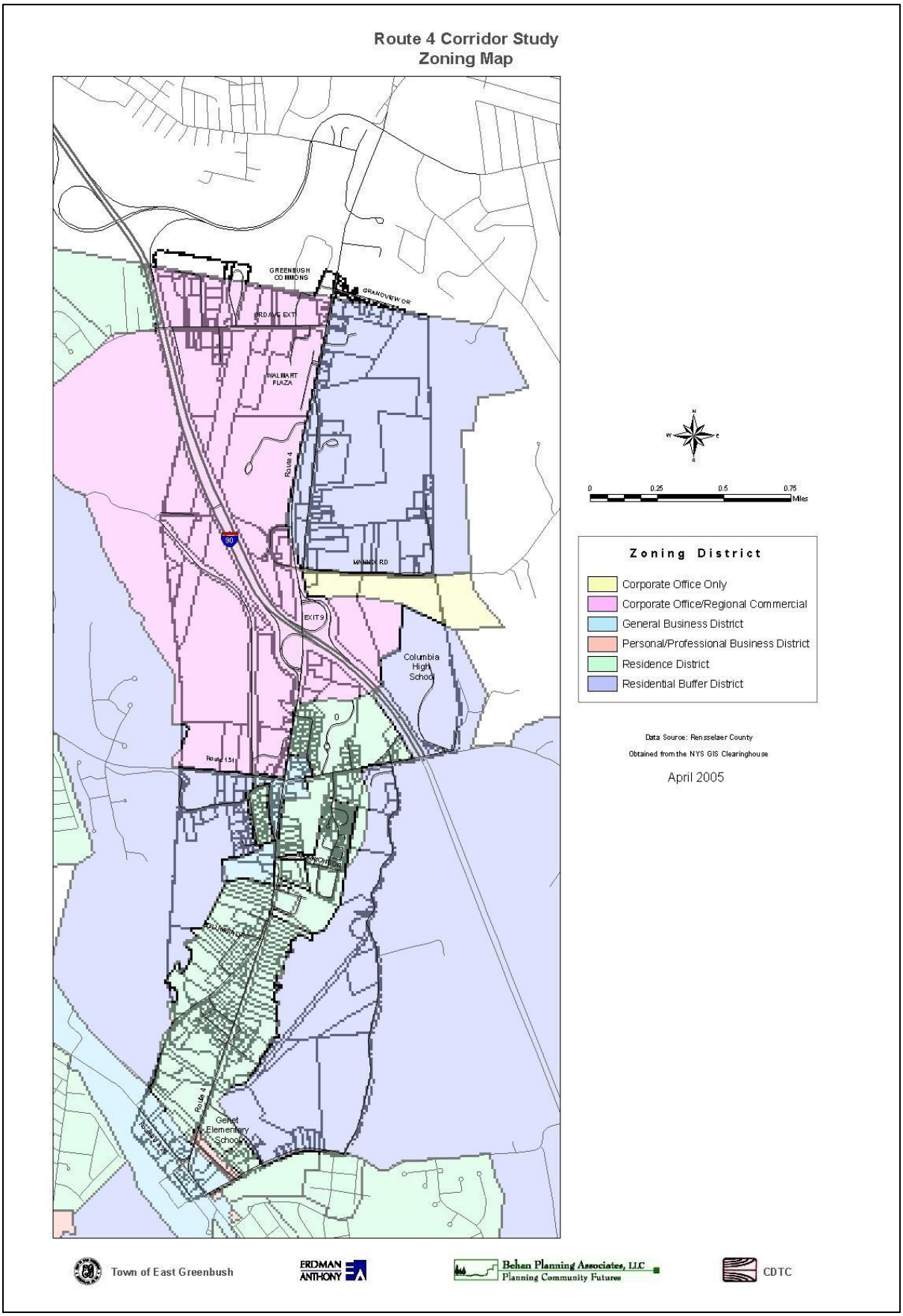
Figure 4-2


Route 4 Corridor Study
Zoning Map
GREENBUSH COMMONS
GRANDVIEW DR
3RD AVE EXT
WALMART PLAZA
Route 4
90
MANNOR RD
EXIT 9
Columbia High School
Route 131
Gehet Elementary School
0
0.25
0.5
0.75
Miles
Zoning District
Corporate Office Only
Corporate Office/Regional Commercial
General Business District
Personal/Professional Business District
Residence District
Residential Buffer District
Data Source: Rensselaer County
Obtained from the NYS GIS Clearinghouse
April 2005
Town of East Greenbush
ERDMAN ANTHONY
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CDTC

Several important town civic institutions like the YMCA, East Greenbush Community Library, fire station, rescue squad and Columbia High School are located on Route 151, which are surrounded by residential neighborhoods. West of Route 4, between Route 151 to Third Avenue Extension, is the Mill Creek Commerce Park site.

Existing Zoning Districts in this area include: Residence, Residential Buffer, Corporate Office, General Business, and Corporate Office/Regional Commercial.

Route 151 to Routes 9 & 20: The remaining section of the Route 4 study area from Route 151 to Routes 9&20 is primarily residential in nature. There are a few interspersed commercial uses that were primarily residential conversions. An apartment complex and the Genet Elementary School are located on the eastern side of Route 4 along this section. The southern extent of the corridor at Routes 9&20 is another commercial shopping area. The land uses in this area include Friendly's restaurant, Pizza Hut, True Value Hardware, and several retail facilities within the Hannaford shopping plaza, south of Routes 9 & 20.

Route 4 looking south at Routes 9&20 intersection

Zoning Districts include Residence, Residential Buffer, General Business and Personal/Professional Business.

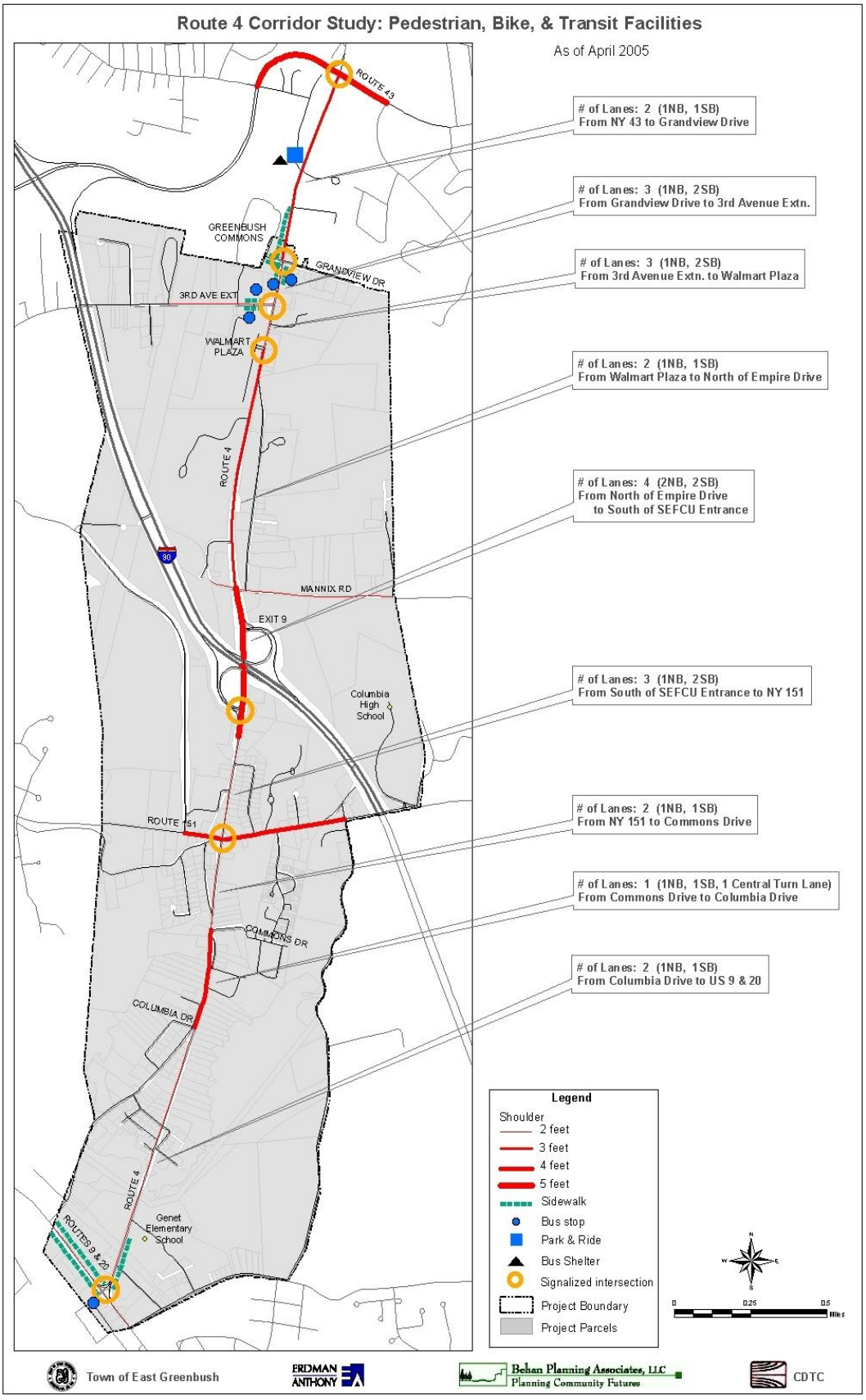
4.2 Existing Transportation Conditions

Within the Route 4 study area, U.S. Route 4 is a principal arterial roadway that extends in a general north-south direction from North Greenbush to Routes 9&20 in East Greenbush. The main function as a principal arterial is to carry through traffic; however, it is important to remember that it also serves local or "access" trips. The number of lanes along Route 4 varies between 2 and 5 lanes within the study area. The total roadway width varies between 28 and 58 feet throughout the corridor with 12-foot lanes and 2 to 5-foot shoulders along either side of Route 4. The speed limit between Route 43 and Third Avenue Extension is 40 miles per hour (mph), and it increases to 45 mph for the remaining section of the Route 4 study area. At the time of this study there were six signalized intersections at the following locations within the Route 4 study area (a signal has since been added at the I-90 Exit 9 eastbound ramp):

- Route 43
- Grandview Drive
- Third Avenue Extension
- Wal-Mart Shopping Center Driveway
- Route 151
- Routes 9&20

Figure 4-3 highlights signalized intersections and illustrates the location of sidewalks, transit stops and park and ride lots. The current pedestrian system does not provide for

Figure 4-3


Route 4 Corridor Study: Pedestrian, Bike, & Transit Facilities
As of April 2005
ROUTE 43
GREENBUSH COMMONS
GRANDVIEW DR
3RD AVE EXT
WALMART PLAZA
ROUTE 4
90
MANNIX RD
EXIT 9
Columbia High School
ROUTE 151
COMMONS DR
COLUMBIA DR
ROUTE 4
ROUTES 9 & 20
Genet Elementary School
# of Lanes: 2 (1NB, 1SB)
From NY 43 to Grandview Drive
# of Lanes: 3 (1NB, 2SB)
From Grandview Drive to 3rd Avenue Extn.
# of Lanes: 3 (1NB, 2SB)
From 3rd Avenue Extn. to Walmart Plaza
# of Lanes: 2 (1NB, 1SB)
From Walmart Plaza to North of Empire Drive
# of Lanes: 4 (2NB, 2SB)
From North of Empire Drive
to South of SEFCU Entrance
# of Lanes: 3 (1NB, 2SB)
From South of SEFCU Entrance to NY 151
# of Lanes: 2 (1NB, 1SB)
From NY 151 to Commons Drive
# of Lanes: 1 (1NB, 1SB, 1 Central Turn Lane)
From Commons Drive to Columbia Drive
# of Lanes: 2 (1NB, 1SB)
From Columbia Drive to US 9 & 20
Legend
Shoulder
2 feet
3 feet
4 feet
5 feet
Sidewalk
Bus stop
Park & Ride
Bus Shelter
Signalized intersection
Project Boundary
Project Parcels
0
0.25
0.5
Miles
Town of East Greenbush
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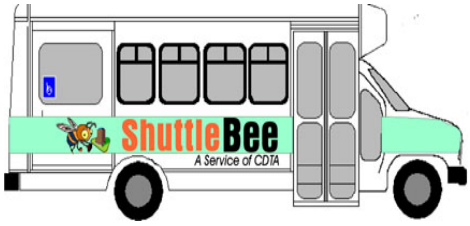
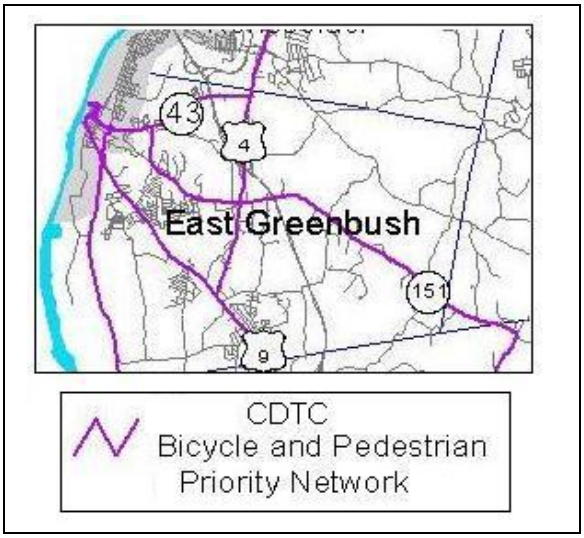
safety or comfort in the most critical intersections. Sidewalks are virtually absent along the corridor, with some limited disconnected sections between Grandview Drive and Third Avenue Extension and at the Route 4/ Routes 9&20 intersection. Crosswalks can be found at only two intersections and there are no "Walk" Signals at any of the signalized intersections. Bicyclists can use the existing shoulders aside the travel lanes on either side of the roadway, which vary in width along the corridor from 2 to 5 feet in width.



The Capital District Transportation Authority (CDTA) currently provides the ***Shuttle Bee*** transit service along Route 4 between RPI Tech Park and Eden Park off of NY 151. CDTA also provides standard transit service between the park and ride lot on Route 4 south of Route 43 and Albany (Bus Route 14), and Troy (Bus Route 24). However, there is limited use of the CDTA services within the corridor, which is in part related to the lack of comfortable pedestrian accommodations as well as site layout of adjacent land uses.



Route 4 within both North and East Greenbush is included in CDTC's **Bicycle and Pedestrian Priority Network** which is defined as "a bicycle and pedestrian priority treatment network (that) provides a "backbone" for a region-wide bicycle and pedestrian travel system. The network of approximately 355 miles contains those facilities which have high existing or potential bicycle and pedestrian travel but also present many barriers, including high traffic volumes/speeds, limited pavement space and busy or confusing traffic patterns. These facilities connect major activity centers, are accessible to residential areas via local roads, and have few practical alternatives nearby." Other roadways intersecting Route 4 and also on the Bicycle and Pedestrian Priority Network include NY 151, Third Avenue Ext. and Routes 9 & 20.

4.3 Existing Traffic Volumes

Automatic traffic recorders (ATRs) and manual traffic counts were used to measure the daily and evening commuter peak hour traffic flows through the study area in October 2004. Manual turning movement counts (TMCs) and observations were conducted by CDTC staff at all study area intersections, except Route 43 and Route 9&20 which were provided by NYSDOT, as part of this data gathering effort. The TMCs were taken on a typical weekday between 4:00 PM and 6:00 PM to coincide with peak commuter traffic activity. The weekday evening peak hour TMC volumes were used to conduct the signalized and unsignalized intersection level of service (LOS) analysis.

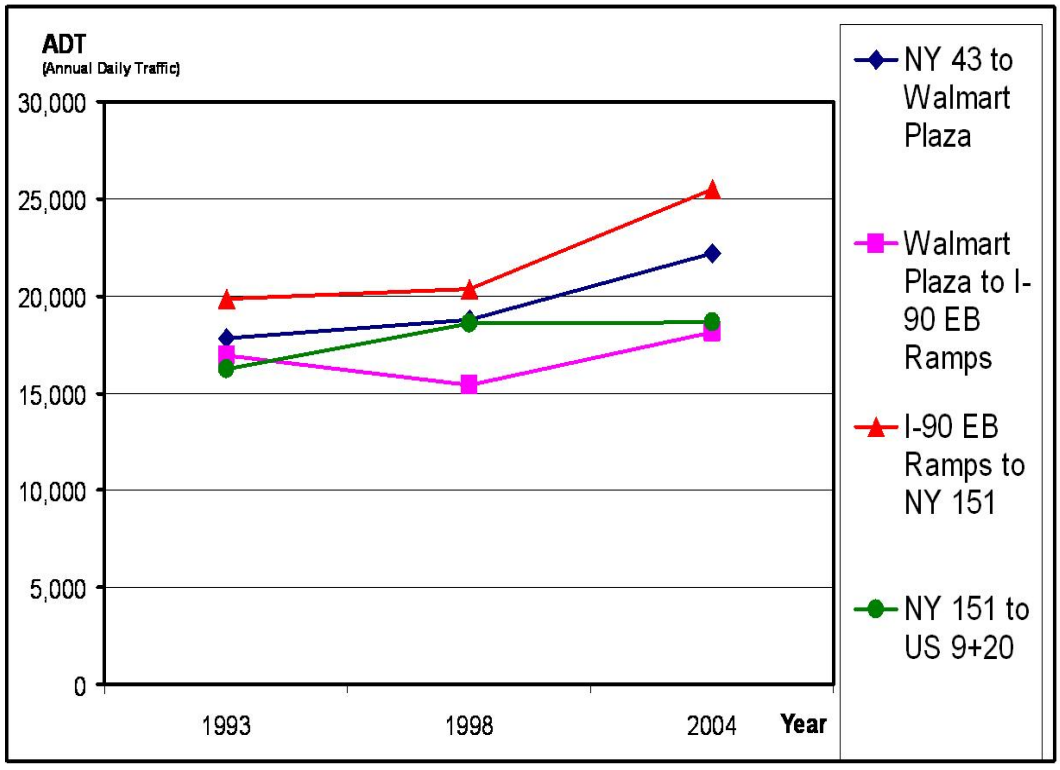
Table 4 - 1 summarizes the daily and peak hour traffic volumes recorded by the ATRs; the evening peak hour volume by northbound (NB) or southbound (SB) direction is also noted.

Table 4 - 1: Route 4 Daily and Evening Peak Hour Traffic Volumes

Roadway Segment	Average Daily Traffic Volumes (vehicles/day)	Evening Peak Hour Volume	High Volume Direction
Route 43 to Grandview Dr.	23,665	2,090	1,170 NB
Grandview Dr. to Third Ave. Ext.	23,665	1,790	980 NB
Third Ave. Ext. to Wal-Mart	18,770	1,400	700 SB
Wal-Mart to Mannix Road	18,770	1,595	870 SB
Mannix Road to I-90 WB Ramps	18,770	1,690	945 SB
I-90 WB Ramps to I-90 EB Ramps	21,530	1,845	1,035 NB
I-90 EB Ramps to Route 151	24,555	2,435	1,335 NB
Route 151 to Commons Drive	15,905	1,600	875 SB
Commons Drive to Columbia Drive	15,905	1,645	900 SB
Columbia Drive to Genet Elem. School	15,905	1,615	865 SB
Genet Elem. School to Routes 9&20	15,905	1,575	855 SB

Figure 4 - 4 illustrates the average daily traffic growth between 1993 and 2004 along the

Figure 4 - 4



Route 4 corridor. Prior to 1998, the average traffic volumes between Route 43 in North Greenbush and Route 151 (Couse Corners) had either decreased or experienced very little growth. However, this same segment of Route 4 experienced significant traffic growth between 1998 and 2004.

As shown in the figure above, the southern section of Route 4 between Route 151 and Routes 9&20 experienced some growth in the average daily traffic volumes between 1993 and 1998, but little to no growth between 1998 and 2004.

4.4 Existing Intersection and Roadway Segment Levels of Service and Delays

Intersection and roadway segment **operation** can be characterized by level of service (LOS) which is a measure of the **quality** of traffic flow, while **capacity,** which will be discussed in a later section of this report is a measure of the **quantity** of traffic flow. **Level-of-Service (LOS)** is a traffic engineering term used to indicate different operating conditions that occur at an intersection or on a given roadway segment under various traffic volume loads.

4.4.1 Intersections: The *Highway Capacity Manual* (Transportation Research Board, 2000) defines **intersection level of service (LOS)** in terms of average delay per vehicle and quantifies LOS with grades A through F. **LOS A operation has low control delay** (less than ten [10] seconds per vehicle at signalized intersections) while an intersection operating at **LOS F experiences relatively high control delay** (greater than 80 seconds per vehicle at signalized intersections). Intersection delay is based upon several factors including approach volume, geometry, traffic control, heavy vehicle percentage, and several other factors. Average intersection delay, defined as the amount of time a typical vehicle must stop and wait at an intersection prior to proceeding through the intersection, is used to determine the level-of-service provided by the intersection.

CDTC conducted weekday evening (PM) peak hour intersection capacity analyses at the Route 4 study area intersections using the 2000 *Highway Capacity Manual* and latest version of the Highway Capacity Software (version 4.1e). The tables on the following pages summarize the results of the signalized and unsignalized capacity analyses. These results include the LOS which is defined above; the volume to capacity (V/C) ratio (which compares the amount of traffic on an intersection approach or roadway segment to the number and width of the intersection's or segment's turn or travel lanes, among other factors); and the calculated delay. Accepted engineering practice recommends that the V/C ratio not exceed a value of 1.0 during the peak travel hour. A V/C ratio close to 1.0 can indicate that an intersection or segment is close to its saturation point or its ability to process the traffic that desires to move through it. At signalized intersections, higher delay can be related to signal timing or phasing issues related to various turn movements on each approach and relative approach volumes, not just the amount of traffic.

The evaluation criteria used to analyze the intersections are based on the 2000 *Highway Capacity Manual (HCM)* and latest version of the Highway Capacity Software (version

4.1e). The detailed analysis conducted for each intersection is available and is included in **Appendix D**. The HCM analysis considers the operation of all traffic entering the intersection, these LOS results for overall intersection conditions are shown in Table 4 – 2 below:

Table 4 – 2 Signalized Intersection Capacity Analysis:

US Route 4 at:	Volume to Capacity Ratio	Delay (sec)	Level-of-Service (LOS)
Grandview Drive (Home Depot Plaza)	0.79	90.0	F
Third Avenue Extension	0.62	26.1	C
Wal-Mart Plaza	0.49	14.3	B
Route 151 (Couse Corners)	0.86	79.1	E
Routes 9 & 20 (Columbia Turnpike)	0.84	44.8	D

Note: At the time of this analysis, the signal at the I-90 Exit 9 Eastbound ramps had not yet been installed.

The analysis indicated that the signalized intersections operated at level-of-service (LOS) D or better during the evening peak hour, except at the Route 4 intersections with Grandview Drive and Route 151. CDTC observed a significant number of vehicles waiting along Route 4 to get through the traffic signal at Grandview Drive, which for short periods (15-20 minutes) during the peak hour would extend south along Route 4 to and beyond the Third Avenue Extension traffic signal. The Route 4 at Route 151 intersection also experiences a long line of vehicles waiting to travel south along Route 4 during the evening peak hour, which again for about 15 to 20 minutes would extend north along Route 4 to the I-90 eastbound ramps intersection. It is important to note that these delays only occur for a short period of time and do not have a significant affect on the overall travel speed along the corridor, which is illustrated by the speed and delay run results (roadway segment LOS) summarized below.

It should be noted that for CDTC's regional and corridor planning efforts, level-of-service "D" is identified as desirable for overall intersection performance but level-of-service "E" is identified as acceptable for individual movements within the intersection. There are times when LOS F has to be accepted, especially when community context makes it inappropriate to widen or add lanes at an intersection.

For unsignalized intersections, the analysis considers the operation of all traffic entering the intersection, but the LOS results are only calculated for each minor movement. The unsignalized LOS represents the minor movements that operate the worst at each intersection, typically the side street movements. The analysis results for the unsignalized intersections are shown in Table 4 – 3 on the following page.

Based on the traffic analysis and field observations, it is difficult for a vehicle to turn left out of most of the unsignalized intersections evaluated. The Route 4 intersections with

Mannix Road and the I-90 eastbound and westbound ramps experience the most left turning vehicle delays during the evening peak hour. **Again, at the time of this analysis the signal had not yet been installed at the I-90 Eastbound Ramps; this signal was installed during the spring of 2006 to address a documented safety problem of the type that can be addressed by installation of a signal.**

The high travel speeds, high traffic volumes and apparent driver confusion regarding lane configurations along this segment of Route 4 are some of the contributing factors that lead to the left turning delays at these unsignalized intersections.

Table 4 – 3 Unsignalized Intersection Capacity Analysis:

US Route 4 at:	Volume to Capacity Ratio (Volume)	Delay (sec)	Level of Service (LOS)
Mannix Road			
EB Left/Through/Right	0.19 (30)	25.5	D
WB Left/Through/Right	1.06 (62)	208.0	F
I-90 Westbound Ramps			
WB Left	0.73 (60)	105.2	F
WB Right	0.22 (120)	11.9	B
I-90 Eastbound Ramps			
EB Left	1.00 (101)	156.6	F
EB Right	1.47 (865)	239.3	F
Commons Drive			
WB Left/Right	0.15 (17)	32.2	D
Columbia Drive			
EB Left/Right	0.13 (9)	48.8	E
Genet Elementary School Driveway			
EB Left	0.40 (30)	62.2	F
EB Right	0.24 (72)	16.2	C

4.4.2 Roadway Segments: CDTC conducted speed and delay runs along the Route 4 corridor during the morning and evening commuter peak periods in March 2004 and March 2005. The travel time and speed data collected were then analyzed using the *Highway Capacity Manual* Urban Streets Methodologies (HCM 2000) to determine segment Level of Service or LOS.

LOS for roadway segments is based on both vehicle running speed and delays at traffic controlled intersections (i.e. signals) to determine the average travel speed along a roadway. This speed information is then compared with the range of free-flow speeds of various classes of streets to determine the LOS. In this case, Route 4 within the study area is classified as a Class I Urban Street because it meets certain criteria as laid out in the *Highway Capacity Manual*. (Route 4 is classified as a Class I Urban Street, because

the free flow speed along Route 4 ranges between 55 to 45 miles per hour (mph) and the typical free flow speed is 50 mph.)

The Route 4 roadway segment LOS results are based on the following average travel speed ranges outlined in the *Highway Capacity Manual* for Class I Urban Streets:

Level-of-Service	Average Travel Speed
A	> 42
B	> 34-42
C	> 27-34
D	> 21-27
E	> 16-21
F	≤ 16

As shown in Table 4 -4, vehicles traveling along the Route 4 corridor can travel on average between 35 and 43 mph southbound and 24 and 44 mph northbound during both the morning and evening peak commuting periods. This translates to roadway segment level of service results of D or better, with most segments operating at LOS B or better during the analysis periods.

Table 4 – 4 Route 4 Roadway Segment Level-of-Service Analysis:

Direction of Travel:	**Southbound**	
Location	**Average Travel Speed (mph)**	**Roadway Segment LOS**
Route 43 to/from Wal-Mart	38 [39]	B [B]
Wal-Mart to/from Route 151	43 [39]	A [B]
Route 151 to/from Routes 9&20	38 [35]	B [B]

Direction of Travel:	**Northbound**	
Location	**Average Travel Speed (mph)**	**Roadway Segment LOS**
Route 9&20 to/from Route 151	39 [34]	B [B]
Route 151 to/from Wal-Mart	44 [43]	A [A]
Wal-Mart to/from Route 43	32 [24]	C [D]

Notes: XX = Weekday Morning Peak Period results
[XX] = Weekday Evening Peak Period results

4.4.3 Roadway Segment Capacity Analysis

In addition to the intersection analysis and roadway segment LOS analyses described above, mid-block or mainline traffic conditions were also evaluated by using guidelines established for CDTC's regional planning work. Mainline highway capacity deficiencies are identified by comparing mid-block traffic volumes against estimated mid-block capacities. The working guidelines for arterial and collector roadway capacity used in CDTC's regional STEP model are summarized in Table 4 – 5. Ideally, traffic conditions on non-residential arterials should not exceed LOS D threshold volumes. LOS E volumes could be considered acceptable if intersections operate acceptably and/or access is managed well. Please see Appendix H for more details.

Table 4 – 5:

***Adapted from* CDTC Standards/Criteria for Highway System Evaluation Recommended for Use in Regional Subarea and Traffic**

Urban Arterial, Collector, Expressway, and Local Road Mid-Block Capacity Thresholds

Roadway Type	Approximate LOS D Capacity (each direction)	Approximate LOS E Capacity (each direction)
Surface Arterial and Collector Roadway		
Single Lane (each direction)	1,000 vph	1,300 vph
Two Lane Undivided (each direction)	2,500 vph	3,120 vph
Two Lane Divided with Flush Median (each direction)	2,800 vph	3,500 vph

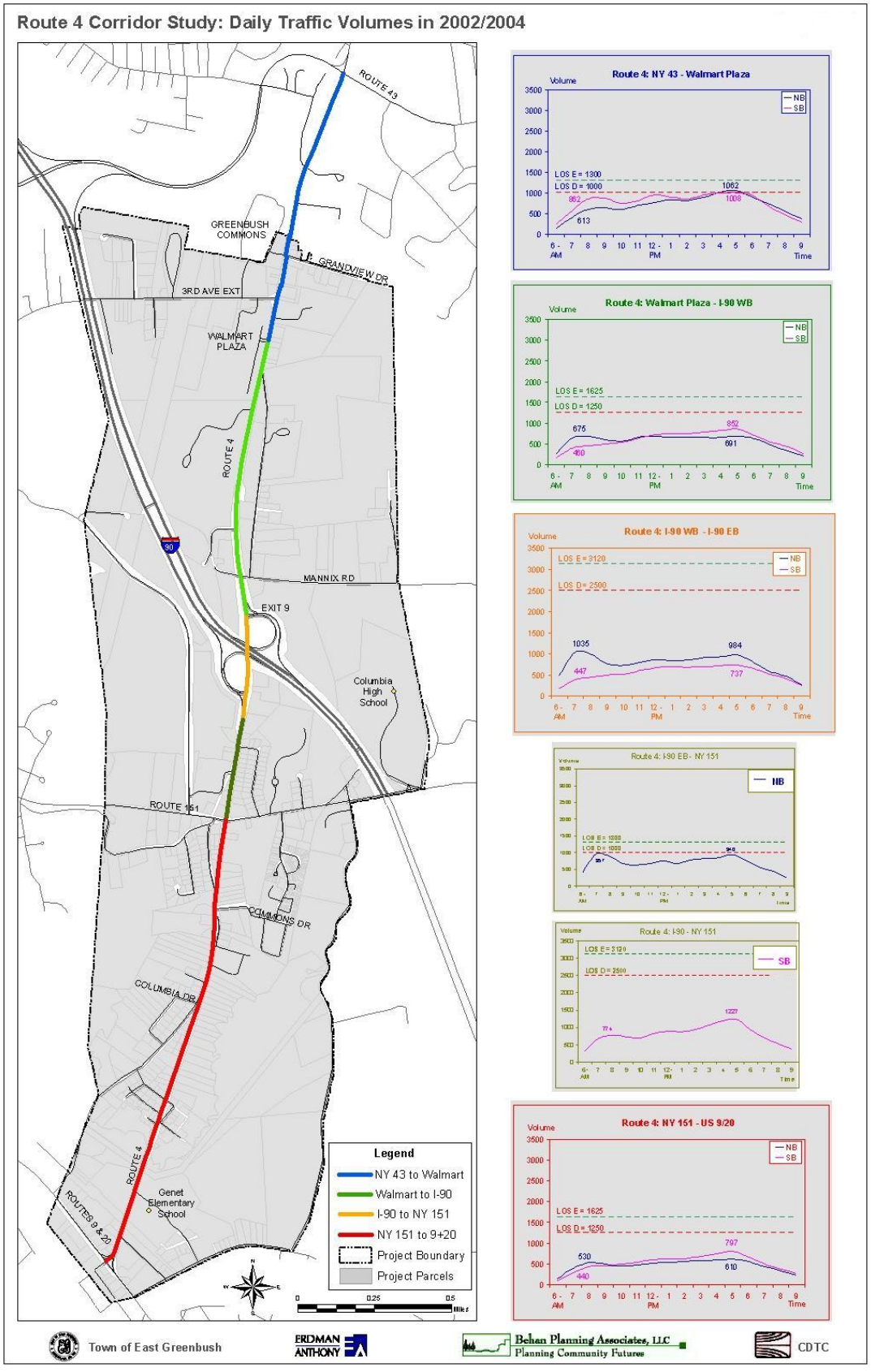
Notes:

1. Thresholds for surface arterials and collector roadways would apply to roadways primarily serving commercial areas of the community. Lower thresholds should be considered for residential areas.
2. Thresholds for single lane arterials and collector roadways assume left turns are not managed. Higher quality access management, such as the presence of a median left turn lane, would argue for a higher threshold. For a three lane facility (one lane in each direction with median turning lane), using a LOS D capacity of 1250 and LOS E capacity of 1625 in each direction would be consistent with CDTC STEP Model practice. Microsimulation has been used in specific cases to assist in determining acceptable mid-block movements in the context of a system of traffic signals.
3. The thresholds used in this table should not be used as justification for widening a road. Careful consideration of the CDTC Congestion Management System and sensitivity to the land use context would be necessary in any decision to add capacity. Other ways of managing traffic, land use and development must be considered.

Route 4 is an urban principal arterial consisting with the number of lanes varying between 2 and 5 lanes within the study area. As shown in Figure 4 – 5 on the following page, average daily traffic volumes were compared to the theoretical capacity provided by the number of lanes in a particular segment using the capacity thresholds and corresponding LOS as shown in the table above. Based on this analysis, the overall corridor mid-block capacity LOS is acceptable, with the exception of a few areas that approach or exceed LOS D for certain time periods.

Photos of Route 4
taken during the late morning

Figure 4-5


Route 4 Corridor Study: Daily Traffic Volumes in 2002/2004
ROUTE 43
GREENBUSH COMMONS
GRANDVIEW DR
3RD AVE EXT
WALMART PLAZA
ROUTE 4
90
MANNIX RD
EXIT 9
Columbia High School
ROUTE 151
COMMONS DR
COLUMBIA DR
ROUTE 4
Genet Elementary School
ROUTES 9 & 20
Legend
NY 43 to Walmart
Walmart to I-90
I-90 to NY 151
NY 151 to 9+20
Project Boundary
Project Parcels
Route 4: NY 43 - Walmart Plaza
Route 4: Walmart Plaza - I-90 WB
Route 4: I-90 WB - I-90 EB
Route 4: I-90 EB - NY 151
Route 4: I-90 - NY 151
Route 4: NY 151 - US 9/20
Volume
Time
NB
SB
Town of East Greenbush
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Planning Community Futures
CDTC

4.4.4 Driveway Level of Compatibility

CDTC also evaluated the driveway level of compatibility (LOC) ratings (from A to F) for the Route 4 corridor. The LOC ratings compare the number and spacing between residential or commercial driveways along a roadway segment to its traffic volume; ***the more frequent the number of driveways and higher the traffic volumes the lower the rating.*** This comparison provides a measure of arterial function in terms of potential conflicts between through traffic on a roadway and vehicles turning into or out of adjacent driveways. An LOC of "C" or better indicates that the interplay between driveway access and through traffic is adequate. Ratings from "D to F" signal there is probably constant conflict between access to/from a roadway and through traffic often resulting in problems with traffic flow and increased crashes.

As can be seen in Table 4 - 6 below which summarizes the results of the existing driveway LOC ratings for the corridor, there are certain sections of the Route 4 Corridor which have undesirable driveway level of compatibility ratings. It is important to appropriately design access management treatments in these areas to mitigate the impacts of traffic on residential uses in the residential areas and to mitigate the impact of commercial access on the roadway's arterial function in the commercial areas.

Table 4 – 6 Route 4 Driveway Level of Compatibility Ratings:

Road Segment	Existing Residential Driveway LOC	Existing Commercial Driveway LOC
Route 43 – Grandview Dr/Greenbush Commons	D	D
Grandview Dr – Third Ave Ext	---	D
Third Ave Ext – Walmart Plaza	A	B
Walmart Plaza – Mannix Rd	B	A
Mannix Rd – I-90 EB ramps	A	A
I-90 EB ramps – Route 151 (Couse Corners)	E	C
Route 151 (Couse Corners) – Commons Dr	D	C
Commons Drive-Old Troy Rd/Columbia Dr	E	B
Old Troy Rd/Columbia Dr-Genet Elementary Driveway	E	A
Genet Elementary Driveway-Routes 9&20	A	C
Corridor Totals	**D**	**C**

4.5 Safety

Erdman, Anthony and Associates, Inc. reviewed crash reports from January 2002 through December 2004 within the Route 4 corridor study area. The analysis included all crashes that occurred on Route 4 from the northern East Greenbush Town Line to the intersection with Routes 9&20. The accident reports, obtained from the East Greenbush Police Department, indicated that there were 331 crashes (average of about 110 crashes per year) along the approximately 4 mile segment of Route 4 over the three year period reviewed. A table summarizing the breakdown of the types of crashes that occurred on Route 4 and crash diagrams for the major intersections along the corridor are included in **Appendix F**.

The overall segment crash rate for the corridor was calculated to be 2.4 accidents/ million vehicle miles traveled (acc/mvm). The expected statewide average crash rates for a two-lane and four-lane free access undivided urban facility are 2.94 acc/mvm and 2.11 acc/mvm, respectively. Route 4 varies between a two-lane roadway and a four-lane roadway; therefore, the 2.4 acc/mvm average crash rate is lower than the statewide expected rate for a two-lane roadway, but higher than the expected statewide rate for a four-lane roadway.

The entire Route 4 corridor analysis was broken down into smaller segments to conduct a more detailed **segment analysis of the crashes**, which resulted in the following five sections of Route 4 that exceeded the expected statewide average crash rates:

- Grandview Drive to Third Avenue Extension
- Third Avenue Extension to Wal-Mart Shopping Center Driveway
- I-90 Eastbound Ramps to Route 151
- Route 151 to Commons Drive
- Genet Elementary Driveway to Routes 9&20

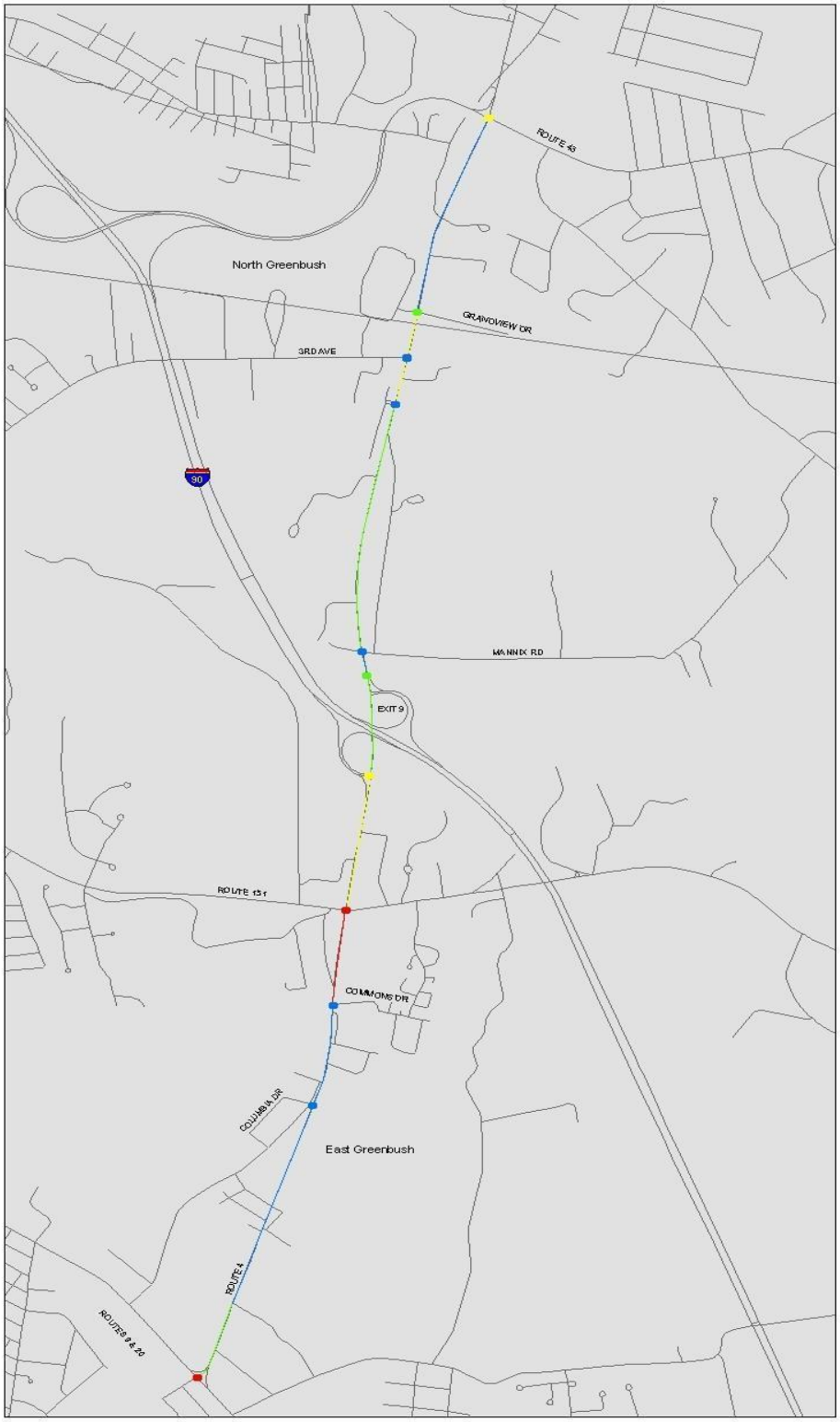
About 85 percent of these crashes were with other motor vehicles and were caused by driver inattention. Over 50 percent of the crashes were rear-end type collisions, which may be attributable to the high travel speeds along the corridor accompanied with vehicles stopped in the travel lanes waiting to make left turns into side streets and/or driveways along the corridor.

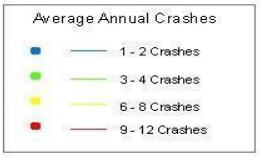
A review of the **crash rates of the major intersections** highlighted as part of the study area was also conducted. The signalized Route 4 intersections with Route 151 and Routes 9&20 exceed the expected statewide average crash rates. The STOP controlled intersections reviewed including the I-90 westbound and eastbound ramps exceed the expected statewide average crash rates. Again, these primarily appear to be due to driver inattention with 48 percent of the crashes being rear-end type collisions.
The crash reports also revealed that the I-90 eastbound and westbound ramps intersections with Route 4 had a high number of right-angle type collisions (26% and 30%, respectively) where traffic was turning left from the off-ramps onto Route 4. The Route 4 signalized intersection with Routes 9&20 also experienced a high frequency of rear-end collisions (28%) on the slip ramp from Route 4 southbound onto Routes 9&20 westbound. The high traffic volumes and travel speeds along the corridor make it difficult for motorists to find acceptable gaps in traffic to make safe left turns onto Route 4 and to merge safely onto Route 4 and Routes 9&20 from the right turn slip ramps.

Figure 4 – 6, below, is a map showing the annual average crashes per roadway segment and intersections as compiled from a variety of sources covering years 1999 – 2004.

Figure 4-6

Route 4 Corridor Average Annual Crashes





Data Sources: State Crash Data & East Greenbush Police Reports
Data collected for years
1999 - 2004

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4.6 Signal Warrant Analysis

The unsignalized intersection of Route 4 with Mannix Road currently operates poorly, especially during the evening commuter peak hour. The high speeds of the vehicles traveling along Route 4 at/near this intersection make it difficult for motorists to turn into and out of Mannix Road. Traffic volumes are continually increasing at this location because of the current and future development of the East Greenbush Technology Park, which will lead to further degradation of the already poor intersection operations at Mannix Road. Therefore, Erdman, Anthony and Associates, Inc. conducted a signal warrant analysis at this location to determine if a traffic signal is needed. The 11 warrants evaluated are outlined in the Manual of Uniform Traffic Control Devices (MUTCD) and include:

Warrant 1 - Minimum Vehicular Volume
Warrant 2 - Interruption of Continuous Traffic
Warrant 3 - Minimum Pedestrian Volume
Warrant 4 - School Crossing
Warrant 5 - Progressive Movement
Warrant 6 - Accident Experience
Warrant 7 - Systems Warrant
Warrant 8 - Combination of Warrants
Warrant 9 - Four Hour Volumes
Warrant 10 - Peak Hour Delay
Warrant 11 - Peak Hour Volume

The analysis was conducted for both the existing traffic volume conditions which included traffic from the new Marriott and projected Phase 1 build out conditions for the East Greenbush Technology Park. The existing conditions traffic volume data was collected in May 2005. The analysis of the projected future traffic volumes from the East Greenbush Technology Park Phase 1 development included:

- 24,750 square feet of unoccupied office space in an existing building
- 60,000 square feet of office space for Phoenix Home Life

The results of the signal warrant analyses indicated that none of the warrants are met under the existing safety and traffic volume conditions. There were 5 accidents that occurred in the first 6 months of 2005, which is the minimum threshold to meet Warrant 6. However, 3 of those 5 accidents were rear-end type accidents, which are not considered the type of accident that are susceptible to correction by a traffic signal. The signal warrant analysis for the projected future traffic volumes estimated for Phase 1 of the East Greenbush Technology Park appear to meet Warrants 2, 9, 10, and 11. However, these are projected traffic volumes based on trip generation estimates reported for similar type facilities in other parts of the state or country in the Institute of Transportation Engineers *Trip Generation Manual, 7th Edition*. It is difficult to predict exactly when these projected traffic volume levels will be met and once they are met, then the disadvantages of installing a traffic signal will have to be weighed against the

advantages of it increasing the safety for vehicles exiting Mannix Road. The negative aspects of installing a traffic signal at Mannix Road are that it will increase travel time and delays for the Route 4 through traffic and could increase the number of rear-end accidents.

At this time, the conclusion of the signal warrant analysis is that it is not warranted. The Town of East Greenbush and the New York State Department of Transportation are committed to working with the developer of the East Greenbush Technology Park to identify the appropriate intersection improvement for Route 4 at Mannix Road. The feasibility of a roundabout at this location was evaluated as part of this study and is included in the preferred set of roadway improvement concepts as this type of intersection control can provide the safest and most efficient vehicle and pedestrian access to/from Mannix Road via Route 4.

5. DEVELOPMENT OF TRAFFIC FORECASTS BASED ON THE CDTC STEP MODEL AND FUTURE LAND USE DEVELOPMENT ASSUMPTIONS

CDTC developed PM peak hour traffic forecasts through the year 2025 for the Route 4 Corridor based on the CDTC STEP Model and future land use development assumptions consistent with the development of the East Greenbush Land Use and Zoning Study. The purpose of developing traffic forecasts is to be able to assess how well traffic improvements will work with anticipated development and traffic growth.

The method used to produce the future land use development assumptions for the corridor included:

- gathering information from Town and County staff regarding known planned development likely coming online in the near term
- examining regional trends in build out rates for larger sites to then apply to comparable potential development within the corridor (i.e. East Greenbush Technology Park and Mill Creek Commerce Park), and
- incorporating the 2006 East Greenbush Land Use and Zoning Study recommendations to essentially retain existing zoning patterns along the Route 4 corridor. This was the basis for the assumption that potential future commercial development would occur within existing commercially zoned areas to the north and west of NY 151 but not within the residentially zoned parcels directly abutting Route 4 south of NY 151.

As described below these future land use development assumptions were then translated into potential future square footage or units of development that then provided the basis for estimating future trips as shown in Table 2.

5.1 The CDTC STEP Model

The CDTC STEP (Systematic Traffic Evaluation and Planning) Model is a tool for understanding traffic patterns and forecasting traffic growth. It has been developed by CDTC to represent all PM peak hour trips in the four county CDTC region. The simulation of travel is based on the premise that the magnitude and pattern of travel is a stable function of the characteristics of the land use pattern and of the transportation system. It has been demonstrated that the relationships between land use and the transportation system and attendant travel remain reasonably stable over time, thus enabling the forecast of future travel patterns based upon a future land use development pattern. By considering the future distribution and intensity of land use activity in a corridor and in the surrounding communities as the major factor influencing future traffic patterns, a transportation plan could be developed which would not only serve the existing traffic patterns in the area, but which would also serve the new pattern that will evolve with changing development.

For existing traffic, trips were calculated based on the number of households and employment by type in each of 500 zones in the Capital District. Future trips are based on Capital District Regional Planning Commission forecasts of households and employment in the four county area, and corridor-area-specific trip estimates based on the future land use development assumptions as mentioned above. Trip distribution—how many trips travel from one zone to another—is estimated using a probability model (called the gravity model). The model assigns trips using probabilities based on distance and trip type—so, for example, work trips are more likely to be longer than shopping trips. Therefore, based on distance, the model will predict some of the trips for a workplace in East Greenbush will come from East Greenbush, but some will also come from other towns in Rensselaer County, and from Albany, Saratoga, and Schenectady Counties. The trip distribution is verified by assigning trips on the network and comparing assigned volumes with real world traffic counts. Future traffic is then assigned to the network to develop forecasts of future traffic volumes.

5.2 Route 4 Corridor Land Use and Trips

The STEP Model was refined to represent more detail in the Route 4 Corridor for this study. Year 2004 traffic counts were collected. Trip generation estimates for specific developments in the Route 4 corridor were represented in the model. A year 2004 traffic assignment was run and found to have very good agreement with year 2004 traffic counts. Future traffic assignments were developed for the years 2015 and 2025. The traffic assignments incorporated CDRPC forecasts of household growth and employment growth for the entire four county region. In addition, site specific trip generation forecasts were developed for residential and commercial development in the Route 4 corridor and incorporated into the STEP Model.

Table 5 – 1 summarizes residential and commercial development expected in the Route 4 corridor in the Town of East Greenbush for the year 2015; as well as additional development expected in the Town in the Route 4 corridor for the year 2025. Because it

is difficult to predict with certainty the pace and intensity of development, three scenarios were developed and separate traffic assignment forecasts were developed for each scenario. The three scenarios are:

Scenario 1: Medium Growth = Year 2015 traffic, assuming 50% build out of the Mill Creek Commerce Park (Tempel Lane) and East Greenbush Technology Park Developments (Mannix Road)

Scenario 2: Medium Growth = Year 2025 traffic, assuming 75% build out of the Mill Creek Commerce Park (Tempel Lane) and East Greenbush Technology Park Developments (Mannix Road); and

Scenario 3: High Growth = Year 2025 traffic, assuming 100% build out of the Mill Creek Commerce Park (Tempel Lane) and East Greenbush Technology Park Developments (Mannix Road).

5.3 Future Travel Forecasts

The results of the CDTC STEP Model forecasts relative to each scenario are shown in Tables 5 - 2, 5 - 3, and 5 - 4. These forecasts were used to evaluate future traffic operations without making any system improvements. The forecasts were also used to evaluate the benefits of different alternative improvements.

Because the CDTC STEP Model is regional in scope, it models commuting trips throughout the region. So, for example, a new office building in the East Greenbush Technology Park will generate a significant share of workers that will travel home in the PM peak to the East Greenbush area; but a significant share will also travel to Albany County and other counties. The model captures this pattern, and predicts significant volumes traveling from Mannix Road to I-90 via Exit 9. Likewise, a significant share of traffic that would be generated from the Mill Creek Commerce Park is predicted to travel through the Route 151/Route 4 intersection heading for I-90 via Exit 9. This allows the model to predict changing patterns in turn movements based on future development. For example, development at the Mill Creek Commerce Park on Tempel Lane can be expected to increase the left turn traffic at Route 151/ Route 4 from the eastbound direction to the northbound direction. This is in fact what the model predicts.

Because the model incorporates a realistic representation of traffic patterns that will result from existing development combined with future expected development, it provides us with the ability to evaluate how well the major intersections and roadway segments will function in the future under different improvement alternatives.

Table 5 - 1
Future Land Use Development Assumptions and Corresponding Estimates of New Trips Generated

Future Land Use Development Assumptions and Corresponding Estimates of New Trips Generated for Use in the Future Scenario Year 2015 Trip Tables

No.	Land Use	Location	TAZ	Size[12]	Units (SF = square footage)	Trip Generation Rate (trips per unit or 1000 SF)	Total PM Peak Hour Trip Generation	Comments
1	Restaurant[1]	Grandview Drive	303	200	seats	0.42	63	The Total Trip Generation number represents a 25% reduction from the total estimate due to the expected proportion of pass-by trips.
2	Dunkin Donuts[2]	Rte 4, north of Rte 151	504	2,560	SF	18	35	The Total Trip Generation number represents a 25% reduction from the total estimate due to the expected proportion of pass-by trips.
3	Grease Monkey[3]	Rte 4, north of Rtes. 9&20	257	6,000	SF	7.95	48	
4	Eddy Senior Housing[4] (Hawthorne Ridge)	Michael Road	345	80	units	0.11	9	
5	Residential Development[5]	Michael Road	345	30	single-family houses	1.01	30	
6	Hamlet at East Greenbush	Phillips Road and Routes 9&20, west of Route 4	503 and 256					
	single-family residential[5]			48	single-family houses	1.01	48	
	residential condominium/townhouses[6]			98	townhouses	0.52	51	
	apartments[7]			102	apartments	0.62	63	
	office/commerical[8]			150,000	SF	1.51	227	
7	Forrest Pointe:	Routes 9&20, west of Route 4 (behind Price Chopper Plaza)	256					
	apartments[7]			200	apartments	0.62	124	
	residential condominium/townhouses[6]			80	twin homes	0.52	42	
8	Lowe's Home Improvement Store[9]	Assumed Bloomingrove Drive site in North Greenbush (an alternative site would potentially be east of Third Ave Ext. (NYSDOT site))	303a	150,000	SF	2.45	276	The Total Trip Generation number represents a 25% reduction from the total estimate due to the expected proportion of pass-by trips.
9	Residential Development[5]	Thompson Hill Road	506	29	single-family houses	1.01	29	
10	Greenbush Terrace Apartments (senior housing)[4]	Gilligan Road, near Routes 9&20	260	72	units	0.11	8	
11	Witbeck Subdivision[6]	Hampton Manor neighborhood, near Route 151	253	40	twin homes	0.52	21	
12	Ridge Road Senior Housing[4]	Ridge Road	254	80	units	0.11	9	
13	Forrest Ridge Residential Development[5]	Hayes Road	260	32	single-family houses	1.01	32	
14	Park Ridge Residential Development[5]	Route 151, east of Columbia HS	488	29	single-family houses	1.01	29	
15	East Greenbush Technology Park[10]	Mannix Rd, east of Route 4	122	227,361	SF	1.50 (Phase 1) 1.08 (Phases 2 & 3)	421	The Size number represents the sum of 100% of Phase 1 building SF (143,050 sf)plus an assumption of 50% buildout for both Phases 2 and 3 by 2015 (227,361 sf).
16	Mill Creek Commerce Park[11]	West of Route 4, south of Third Ave Ext. and north of NY 151	199 and 462	690,125	SF	1.29	890	The Size number represents an assumption of 50% buildout by 2015.
						Total New Trips =	2,454	

Table 5 - 1 Continued
Future Land Use Development Assumptions and Corresponding Estimates of New Trips Generated

Land Use Development and New Trips Generated Between 2015 and 2025 Under the Future Medium Growth Scenario

15	East Greenbush Technology Park[10]	Mannix Rd, east of Route 4	122	113,681	SF	1.08 (Phases 2 & 3)	123	For the 2025 medium scenario 75% buildout of Phases 2 & 3 was assumed for an additional 113,681 sf.
16	Mill Creek Commerce Park[11]	West of Route 4, south of Third Ave Ext. and north of NY 151	199 and 462	345,063	SF	1.29	445	For the 2025 medium scenario 75% buildout of of the entire Commerce Park was assumed for an additional 345,063 sf.
						Total New Trips =	568	

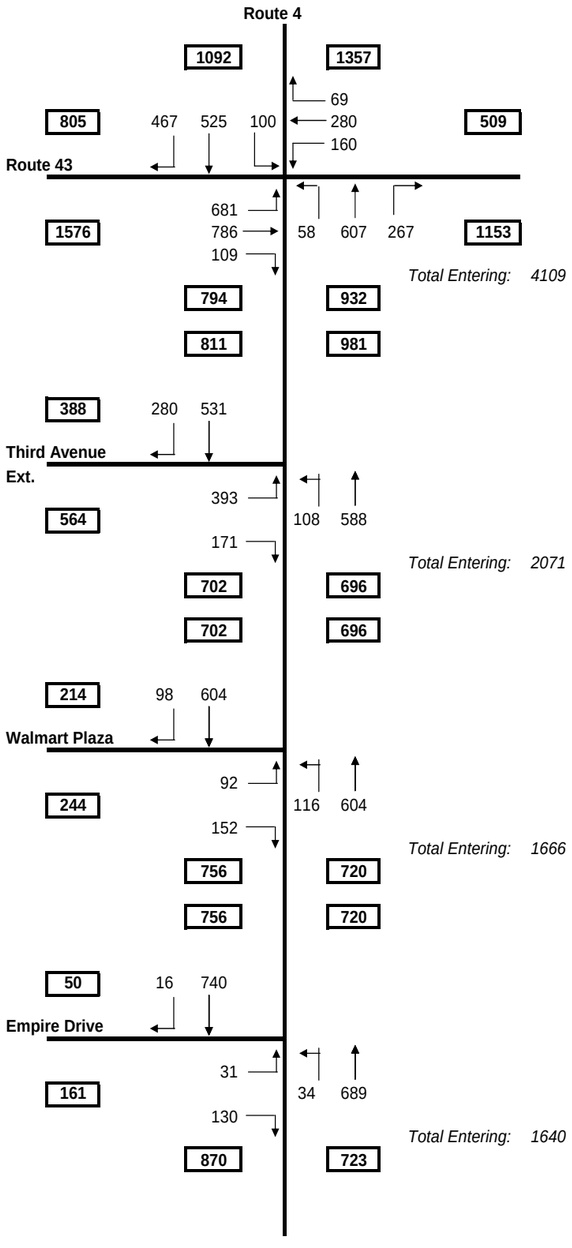
Land Use Development and New Trips Generated Between 2015 and 2025 Under the Future High Growth Scenario

15	East Greenbush Technology Park[10]	Mannix Rd, east of Route 4	122	227,361	SF	1.08 (Phases 2 & 3)	246	For the 2025 high scenario 100% buildout of Phases 2 & 3 was assumed for an additional 227,361 sf.
16	Mill Creek Commerce Park[11]	West of Route 4, south of Third Ave Ext. and north of NY 151	199 and 462	690,125	SF	1.29	890	For the 2025 medium scenario 100% buildout of of the entire Commerce Park was assumed for an additional 690,125 sf.
						Total New Trips =	1136	

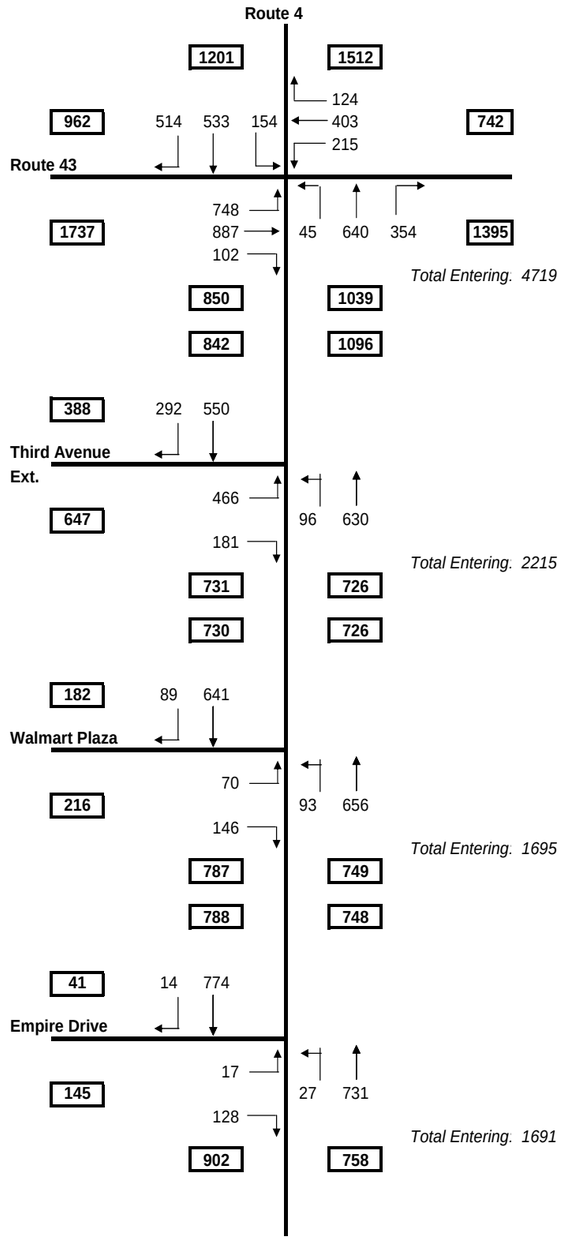
Notes:
1. Trip generation rate based on ITE Land Use Code 932 (High-Turnover Sit-Down Restaurant) during the PM peak hour.
2. Trip generation rate based on average local rate found at Dunkin Donuts (4,000 SF) on Wolf Road during the PM peak hour. (ITE rate is 34.64)
3. Trip generation rate based on average local rate found at similar automobile care centers during the PM peak hour. (ITE rate is 3.38)
4. Trip generation rate based on ITE Land Use Code 252 (Senior Adult Housing-Attached) during the PM peak hour.
5. Trip generation rate based on ITE Land Use Code 210 (Single-Family Detached Housing) during the PM peak hour.
6. Trip generation rate based on ITE Land Use Code 230 (Residential Condominium/Townhouse) during the PM peak hour.
7. Trip generation rate based on ITE Land Use Code 220 (Apartments) during the PM peak hour.
8. Trip generation rate based on ITE Land Use Code 710 (General Office Building) during the PM peak hour.
9. Trip generation rate based on ITE Land Use Code 862 (Home Improvement Superstore) during the PM peak hour.
10. Trip generation rate based on ITE Land Use Code 760 (R & D Center) during the PM peak hour for Phases 2 & 3. ITE LU Code 750 (Office Park) applied to remainder of Phase 1.
11. Trip generation rate based on ITE Land Use Code 770 (Business Park) during the PM peak hour.
12. Sources include East Greenbush Town officials; East Greenbush Technology Park site plan; CDTC staff field checks; Mill Creek Commerce Park GEIS.

Table 5 - 2

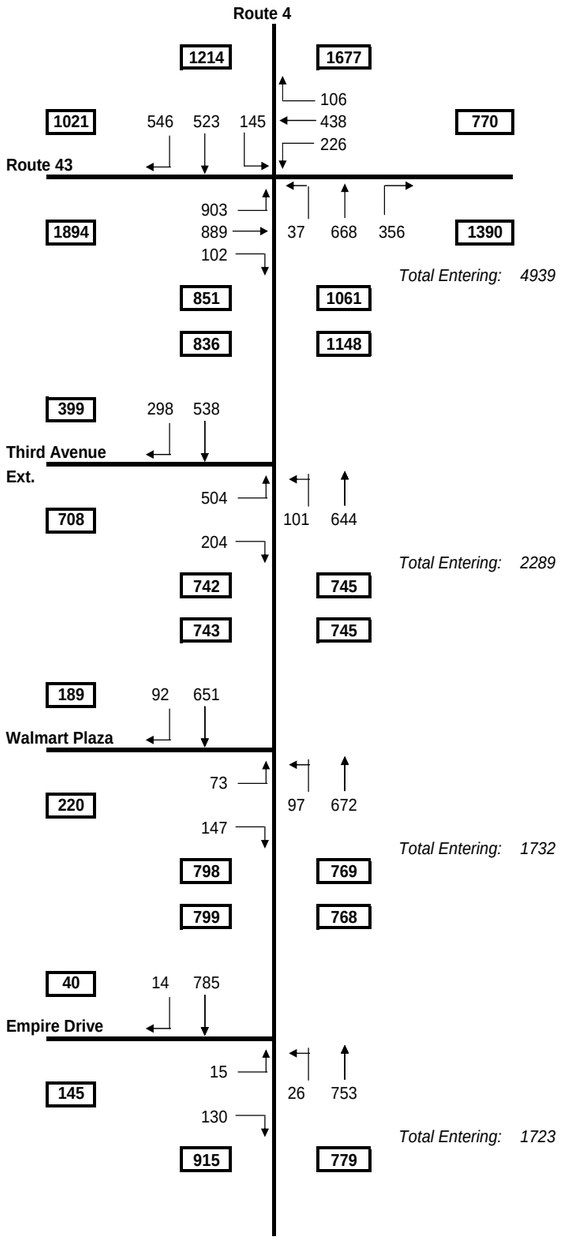
Year 2004 PM Peak Hour Count Volumes
Route 4 Corridor



2015 Forecast: Medium growth (Scenario 1)
Route 4 Corridor



2025 Forecast: Medium growth (Scenario 2)
Route 4 Corridor



2025 Forecast: High growth (Scenario 3)
Route 4 Corridor

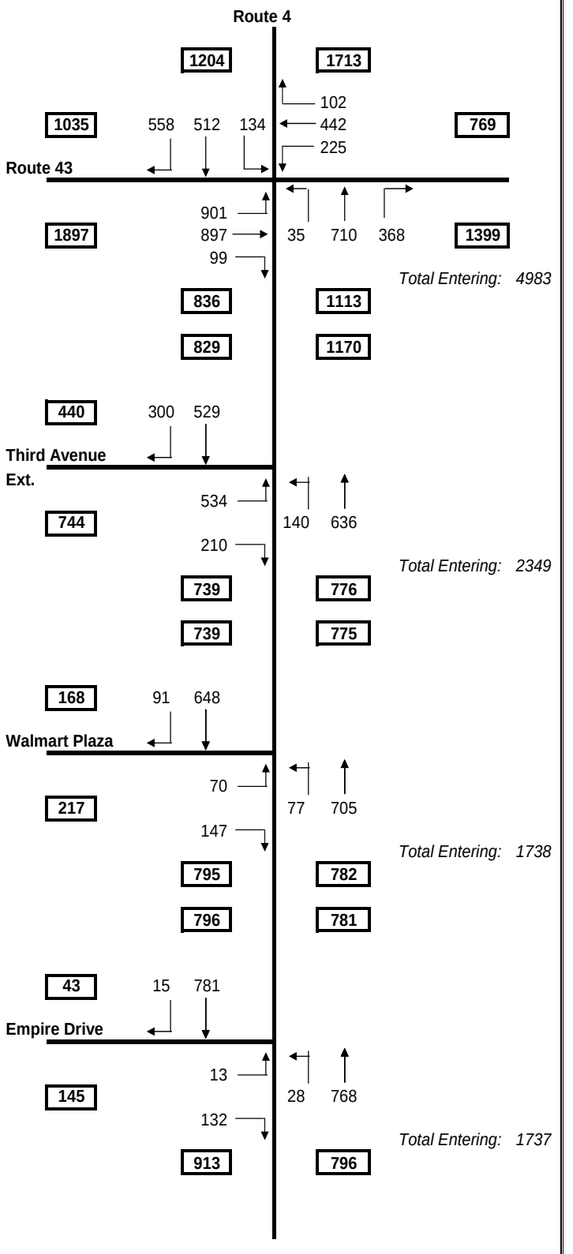
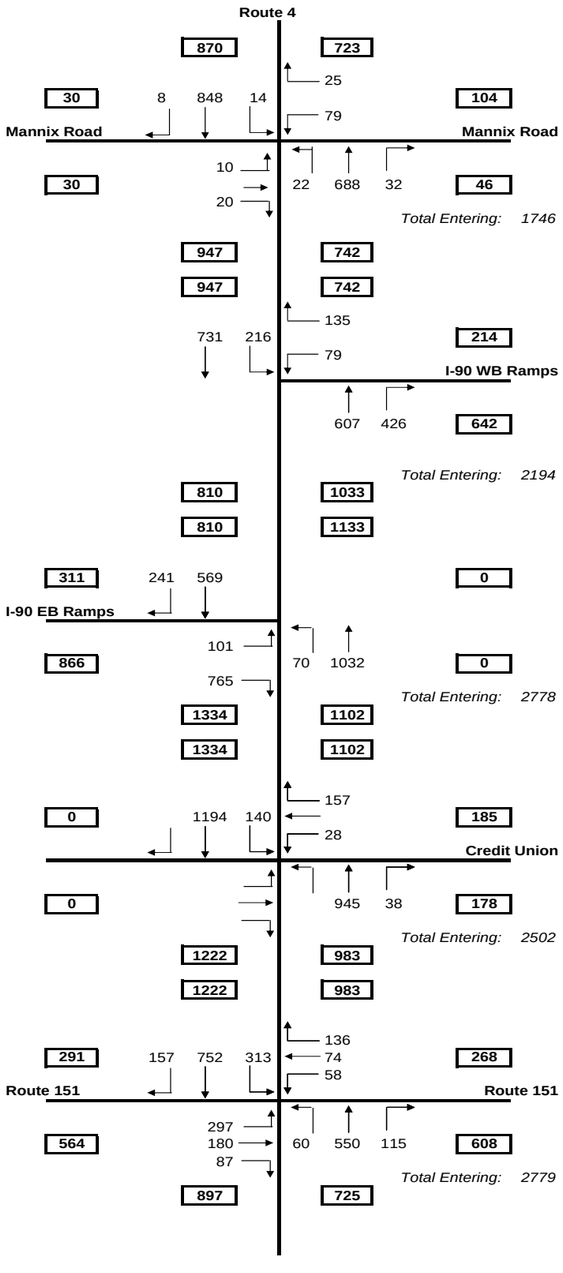
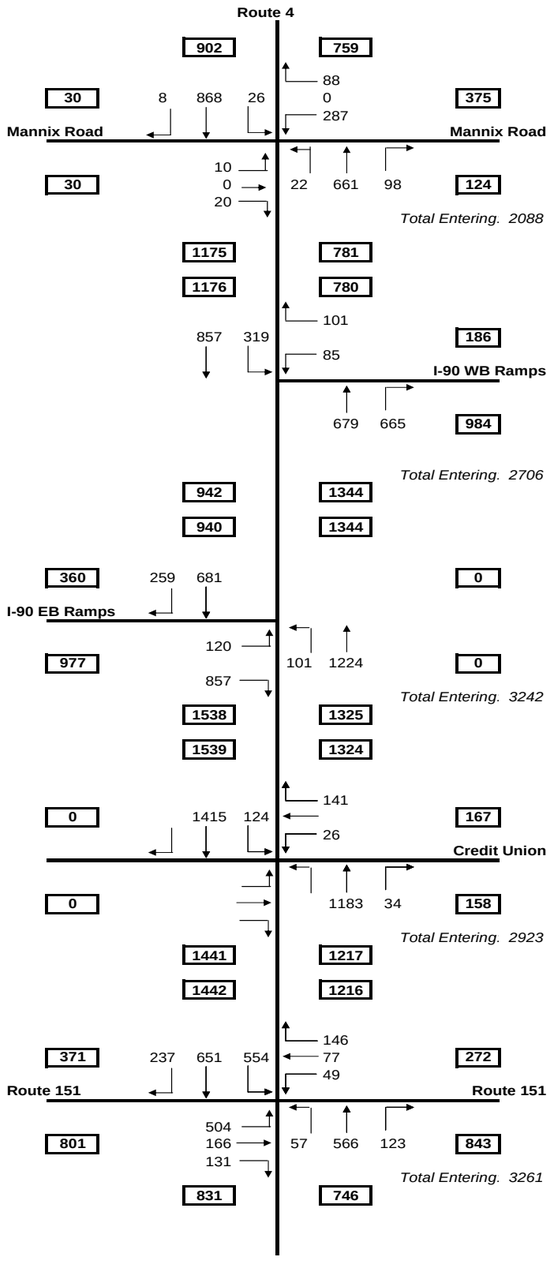


Table 5 - 3

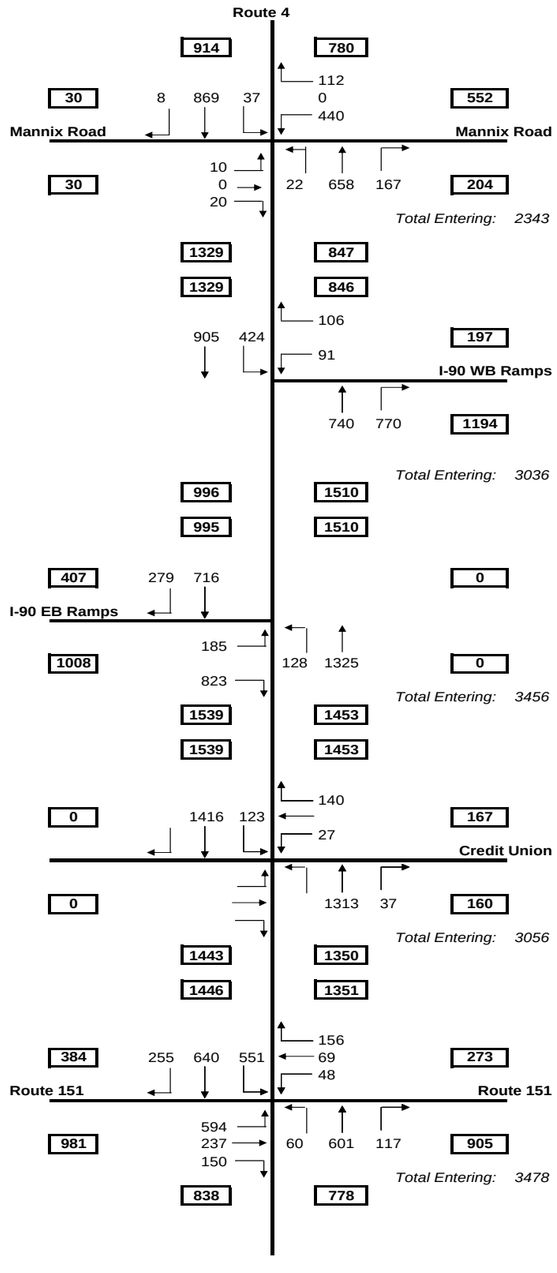
Year 2004 PM Peak Hour Count Volumes
Route 4 Corridor



2015 Forecast: Medium growth (Scenario 1)
Route 4 Corridor



2025 Forecast: Medium growth (Scenario 2)
Route 4 Corridor



2025 Forecast: High growth (Scenario 3)
Route 4 Corridor

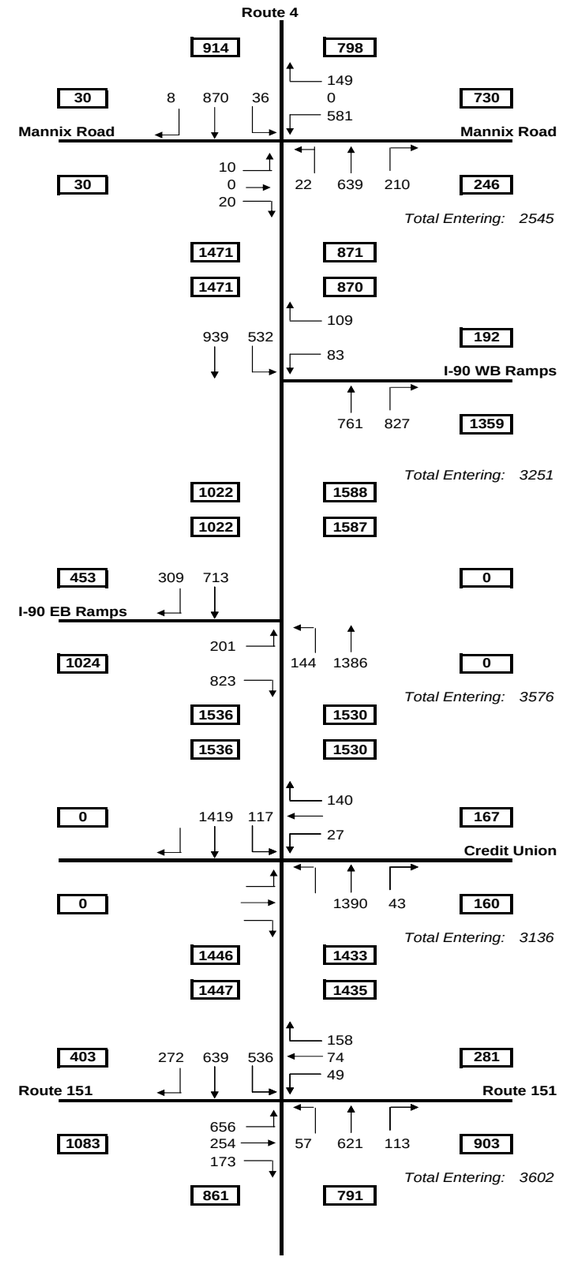
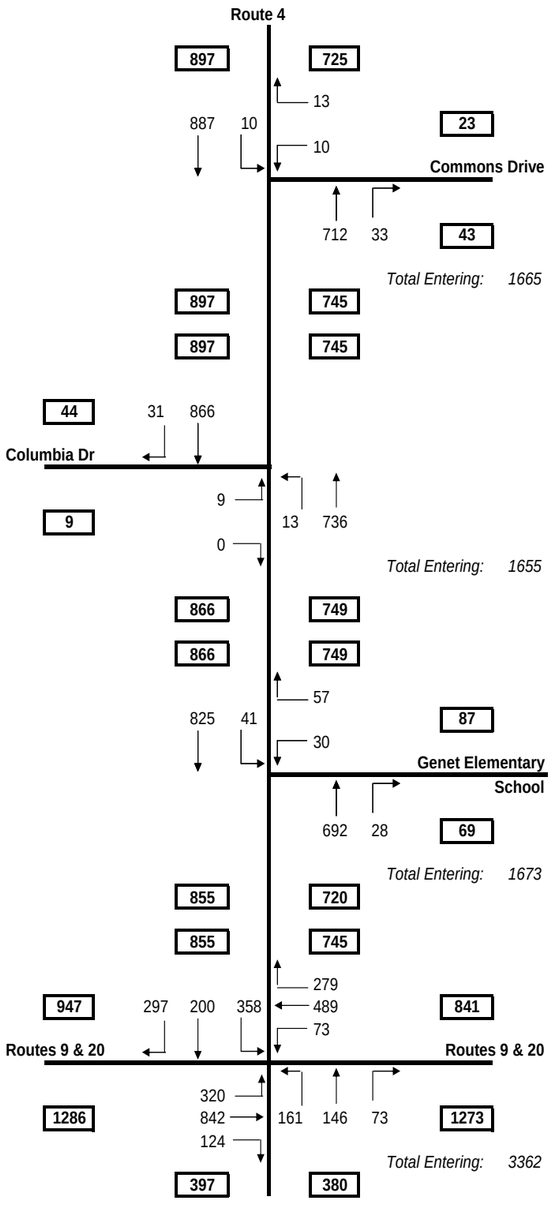
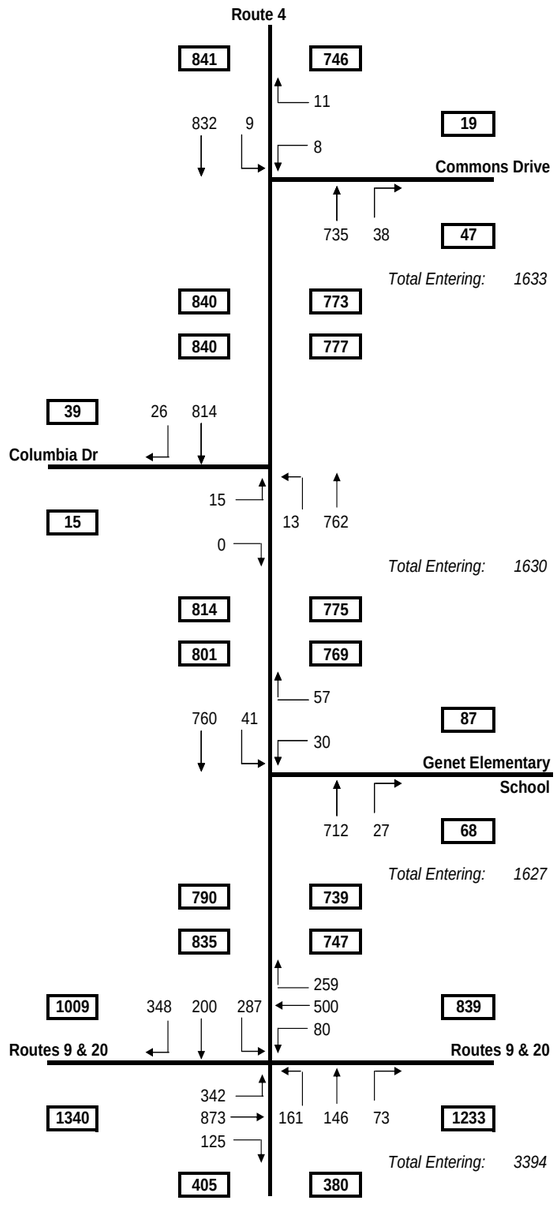


Table 5 - 4

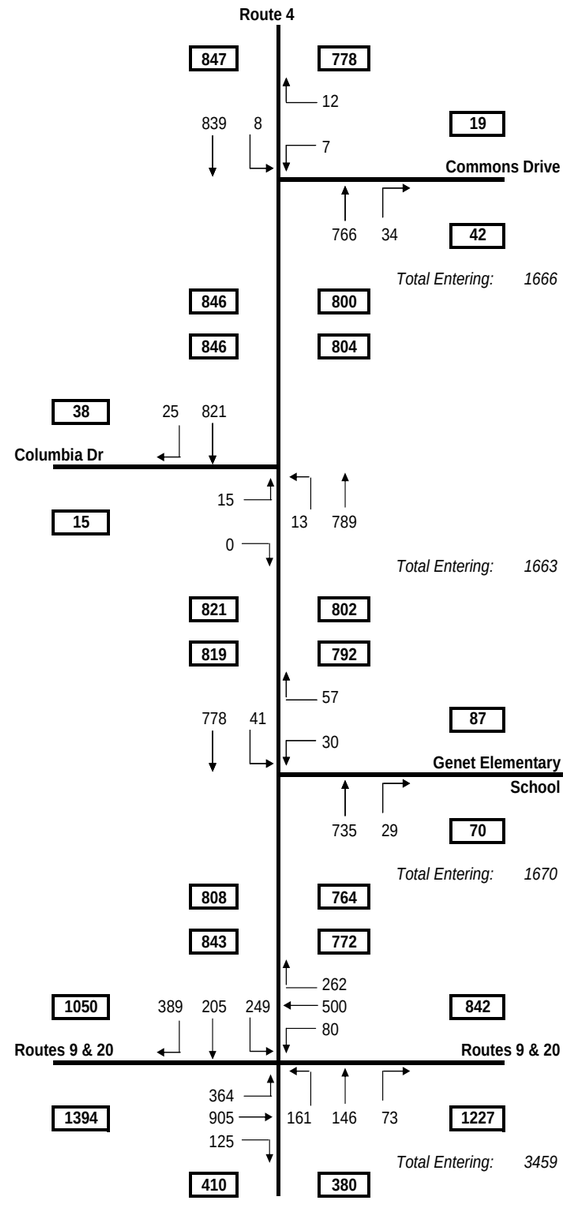
Year 2004 PM Peak Hour Count Volumes
Route 4 Corridor



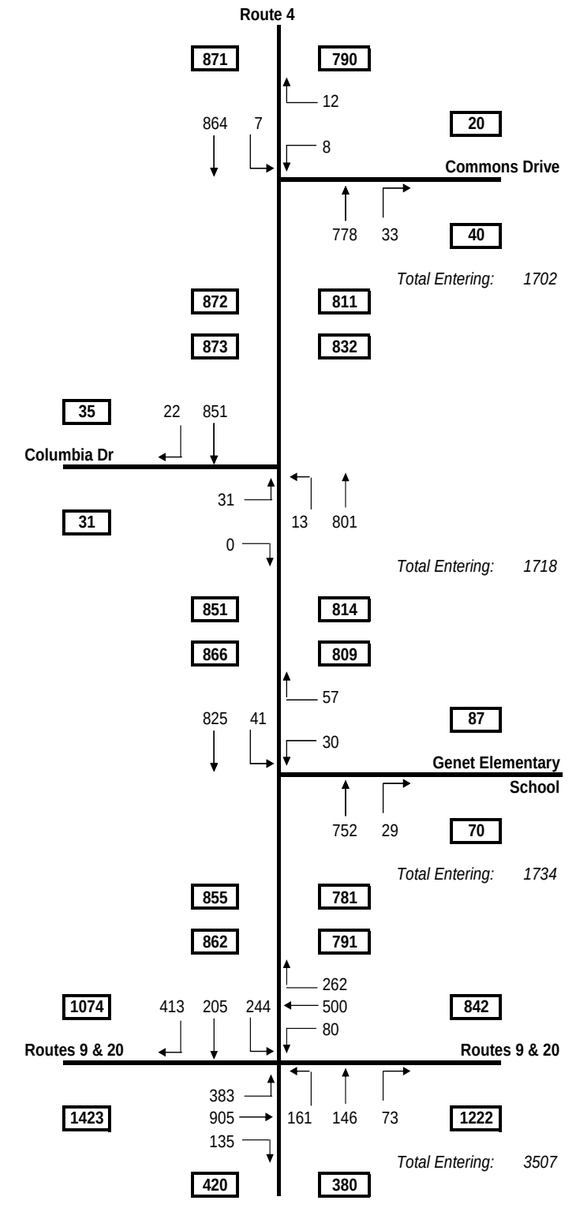
2015 Forecast: Medium growth (Scenario 1)
Route 4 Corridor



2025 Forecast: Medium growth (Scenario 2)
Route 4 Corridor



2025 Forecast: High growth (Scenario 3)
Route 4 Corridor



6. ROUTE 4 CORRIDOR TRANSPORTATION PLAN

Basis for Recommendations: The primary goals of this study are to develop conceptual transportation improvements and management actions for the Route 4 corridor that will enable the Town of East Greenbush to reach its land use and transportation goals for the corridor.

This section provides a summary along with graphics of the preferred conceptual transportation improvements for the Route 4 Corridor within the study area.

These conceptual improvements were developed based on information provided in the sections above including:

- Review of the future Route 4 corridor vision as laid out in the Town of East Greenbush Land Use Plan Update and Zoning Study adopted in 2006
- Findings from the existing conditions analysis that illuminated deficiencies and opportunities related to the corridor's transportation system, and review of other related studies
- The issues identified through stakeholder and public outreach
- The goals and objectives developed during the study in consideration of each of the items above
- Future Corridor Needs
    - What will the future system have to deal with in terms of likely future land use translated into future trip estimates? (traffic modeling)
    - What corridor improvements are needed to accommodate these trips ***and*** provide access and safety for all modes while moving toward the corridor vision to have Route 4 serve as a commercial avenue in the north and a neighborhood avenue in the south with an appropriate transition at the Couse Corners gateway area?

The basic transportation recommendations are to facilitate a multi-modal future and preserve and improve the capacity and safety of Route 4 through: good access management including raised and flush medians, providing inter-parcel connections and reductions in driveways; innovative treatments at intersections including signal coordination and roundabout designs; pedestrian and bicycle treatments including signalized crosswalks, sidewalks and bicycle lanes; bus stops where the combination of bus service and safe pedestrian accommodation to a desired destination occurs; and traffic calming to promote vehicle travel speeds more appropriate for a multi-modal corridor.

On the land use side, the development of commercial design guidelines and form based design standards as recommended in the Town's Land Use Plan Update to support mixed-use buildings to help ensure high-quality places for the community including new corporate offices and commercial centers that provide a mix of interconnected and complementary uses will support and encourage transit use along the corridor.

To transform the Route 4 Corridor over time into the community street or avenue envisioned in the Town's Land Use Plan Update and Zoning Study it is important that the recommendation in that Plan Update to further study and subsequently develop Commercial Site Design Guidelines be pursued by the Town. These guidelines should be incorporated into the site plan review and subdivision approval processes to ensure that newly developed and redeveloped land uses along the corridor are well designed for safe and attractive pedestrian, transit and bicycle accessibility. As evidenced by residents' responses to the Community Survey conducted as part of the Land Use Plan Update, and in comments made at this study's public meetings, residents are in support of the Town developing and applying design guidelines.

To facilitate multi-modal access these design guidelines or standards should address building orientation and layout, location and design of pedestrian and bicycle connections, relationship and connection to transit facilities, parking placement, number of spaces and layout, and motor vehicle site access and circulation. A useful resource in this regard is the recent report by the Institute of Transportation Engineers (ITE) entitled ***Promoting Sustainable Transportation Through Site Design: An ITE Proposed Recommended Practice.***
See http://www.cite7.org/Technical_Projects/sitedesignreview.htm

Taken together, ***these conceptual improvements include elements to address traffic system management, access management and bicycle and pedestrian accommodations*** within each corridor segment and at specific intersections as described in the following section. ***Transit accommodation will be achieved*** in part by enhancing the pedestrian friendliness of the corridor itself and in part by providing specific transit accommodations such as passenger waiting areas with benches and/or shelters at appropriate locations.

The conceptual improvements described below will most likely be achieved in an incremental fashion as indicated in the **Implementation Plan**. These recommendations are conceptual in nature and as such when specific projects become funded, detailed engineering design will be required. As part of that process it may be that to fit each of the elements described below some tradeoffs may have to be made. However, as expressed at the third Public Meeting, existing elements of the Route 4 "context" that add community value such as mature trees, should be preserved for example in the area between 3rd Avenue Ext. and Mannix Road as well as between Route 151 and Routes 9&20. Furthermore, specific design elements such as curbing need to be explored during design. Use of curbing was suggested by residents at Public Meeting 3 as a way to separate sidewalks from the roadway.

6.1 General Description and Benefits of Recommended Route 4 Corridor Conceptual Improvements.

Each of the recommended conceptual transportation improvements detailed for specific intersections and each of the Route 4 segments fit into one of the categories below:

- **Pedestrian treatments** include sidewalks and signalized crosswalks which provide safe places for walking and enhance transit access.

- **Bicycle facilities** include striped on road bike lanes which provide safe space for bicyclists without requiring separate off road facilities)

- **Medians** include raised (can be landscaped) or flush (can serve as two way left turn lanes [TWLTL]:

  - **Raised medians** provide opportunities for pedestrian refuge in crossing the street and access management by limiting left turns as well as visual enhancement.
  - **Flush medians** provide space for turning vehicles. These can also serve to calm traffic and enhance the look of the corridor through use of special pavement treatments and designs.

- **Narrow Travel lanes**: these may be applicable, after determining appropriateness during preliminary engineering, and can work to slow and calm traffic while making room for sidewalks and shoulder bike lanes while minimizing impacts to adjacent properties. As reported in the *ITE Proposed Recommended Practice: Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities,* ITE, 2006, pg. 119, wider travel lanes only marginally increase traffic capacity. This recommended practice cites the *Highway Capacity Manual* (2002), that states an 11-ft. wide lane reduces the saturation flow rate by 3 percent when compared to a 12-ft. lane, while a 10-ft. wide lane reduces the saturation flow rate by about 7 percent, and suggests that other means of capacity enhancement such as access management or signal synchronization be considered before using wider lanes.

- **Streetscaping/Landscaping** includes well designed plantings and other treatments which can provide visual enhancement and traffic calming.

- **Access Management** (which also includes medians described above) can improve safety for all modes and preserve and enhance traffic flow by limiting and consolidating site driveways to reduce the conflicts between pedestrians and vehicles traveling through the corridor with those turning left into and out of developments along the corridor. It is also accomplished in part by providing vehicular/pedestrian connections between adjacent parcels which also reduces some trips from using main arterial for access.

- **Transit Accommodations** could include expanded sidewalk areas in the appropriate locations to provide space to wait for a bus, a pad for a bench or a shelter, or simply a bus stop sign.

- **Signal Coordination** involves establishing relationships between adjacent traffic signals based on the time difference, in seconds, in the beginning of the green phase between adjacent signals. By coordinating traffic signals along a corridor there is a greater likelihood that vehicles can travel through adjacent traffic signals without making unnecessary stops. Fewer stops can result in fewer delays and a reduction in overall corridor travel times with vehicles traveling at reasonable speeds acceptable to all corridor users. Adequate pedestrian signal phasing can be incorporated well into a coordinated signal system.

- **Intersection Changes** recommended in this plan include roundabouts and bringing turn movements under signal control at other locations (9& 20 and EB ramps). These changes can result in an increase in intersection capacity, reduction in crashes and the opportunity to achieve other objectives important to the Town such as improved corridor aesthetics.

6.2 Recommended Conceptual Intersection Improvements:

Conceptual transportation improvements were identified for the following key intersections:

- Mannix Road
- I-90 Westbound Ramps
- I-90 Eastbound Ramps
- Route 151 (Couse Corners)
- Routes 9&20 (Columbia Turnpike)

Conventional intersection treatments were evaluated as well as roundabout concepts. ***Roundabouts are recommended*** as the preferred intersection improvement at several of the intersections listed above. A roundabout is an unsignalized circular intersection.

According to the NYSDOT, the following three basic principals distinguish a roundabout from a traffic circle:

- The "yield at entry" rule, which means that vehicles must wait for a gap in the circulating traffic flow before they can enter the circle.
- Roundabouts involve low speeds for entering and circulating vehicles, which is governed by small diameters and curved entrances.
- Roundabouts are designed to restrict vehicle speeds to 30 mph or less within the circle.

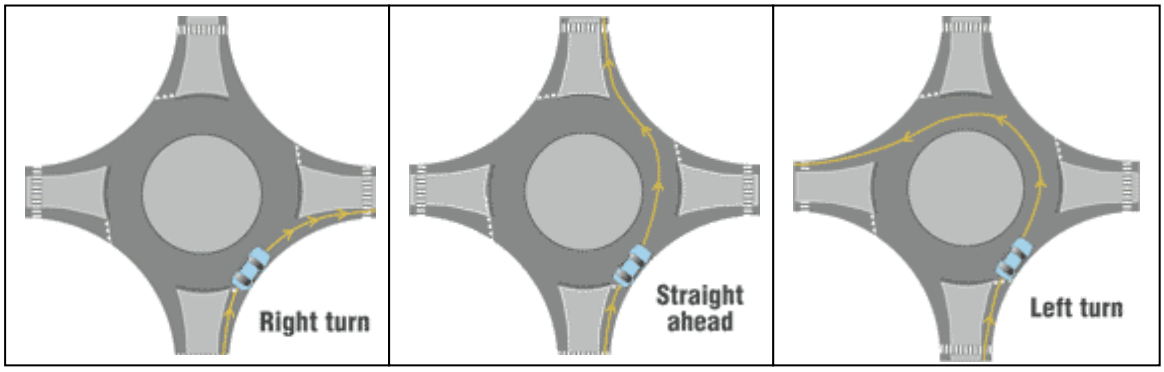
Roundabouts have been found to reduce vehicle delays, increase capacity of the intersection, improve safety for all travel modes and improve aesthetics.

A study conducted by the Insurance Institute for Highway Safety (IIHS) in 2000 (cited in an IIHS Report titled ***Crash Reductions Following Installation of Roundabouts in the United States)*** found that at 24 intersections converted to roundabouts total crashes declined by 39 percent. Even more impressive is that all injury crashes at these locations declined by 76 percent with serious injury/fatal crashes dropping by 89 percent. Also, according to the IIHS report, pedestrian crashes were typically reduced by 30-40 percent after conversions from signal controlled or stop-controlled intersections to roundabouts, while bicycle crashes were reduced by approximately 10-20 percent.

The severity of pedestrian crashes is lower for roundabouts than for other forms of traffic control due to low traffic speeds within roundabouts and provision of refuge islands which make crossing distances shorter.

Roundabouts allow for safe u-turn movements, which permit drivers to minimize hazardous left turns, and making them attractive access management tools. They also can serve as a traffic calming measure that can create gateways into different segments of the Route 4 corridor.

Common traffic maneuvers at roundabouts



http://www.iihs.org/research/qanda/roundabouts.html

Transit Considerations at roundabouts include proper bus stop placement with careful attention to the pedestrian portion of the transit trip. Therefore, appropriate bus stop locations, and their design, need to be considered up front during the design of any roundabouts. In general, a far side stop location is preferable at a round intersection to a near side, but bus stop locations need to be examined on a case by case basis. A common issue related to transit accommodation at roundabouts is that if bus stop locations are located away from the intersection this often results in the pedestrian portion of the transit trip being lengthened, as frequently the transit rider's destination is at or near the intersection or they have to cross at the intersection upon their return trip. According to the State of Oregon's Department of Transportation Highway Design Manual, 2003, pg 9 – 42, Transit Considerations**, "**the placement of bus stops near roundabouts should be

consistent with the needs of the users and the desired operations of the roundabout. Bus stops should be close to passenger generators or destinations, and pedestrian crossings of the roundabout legs should be minimized. A bus stop is best situated either on an exit lane, in a pullout just past the crosswalk (far side stop) or on an approach leg 60 feet upstream from the crosswalk in a pullout (near side stop)".

The NYSDOT Roundabout Unit evaluated the feasibility of converting the Route 4 intersections with Mannix Road, I-90 Eastbound Ramps, and Route 151 (Couse Corners) to roundabouts. Their analysis concluded that roundabouts would operate at LOS B under the future high growth scenario in 2025 with delays less than 30 seconds at all approaches. They created a VISSIM traffic simulation that illustrates how these intersections will operate in the future as roundabouts, which was shown to the community at a public meeting held on March 2, 2006.

CDTC also evaluated the future capacity needs of these intersections if "traditional" intersection improvements were recommended. A "traditional" intersection improvement typically means modifying the intersection geometry, widening the approaches to the intersection, and installing a traffic signal or changing the existing signal timing and phasing. The preferred recommended intersection improvements, based on the roundabout and "traditional" intersection control analyses for each of the key intersections within the study area, are summarized below. Intersection LOS analyses for the estimated future 2015 and 2025 evening peak hour traffic conditions for each of the intersections described below are included in **Appendix D**.

6.2.1 Route 4 Intersection with Mannix Road

This intersection is currently two-way stop controlled on the Mannix Road approaches and operates at a LOS of D (eastbound approach) and F (westbound approach) in the PM peak hour. As with all of the stop sign controlled intersections within the study area, crashes at this location also exceed the statewide average crash rate for similar facilities. However, as indicated above in the signal warrant analysis summary, crashes here were mostly rear end collisions, which are not considered the type that are reduced by installation of a traffic signal (in some situations traffic signals can result in increased rear end collisions see www.wsdot.wa.gov/biz/trafficoperations/traffic/signals.htm).

In addition, the relatively high speeds of vehicles traveling along Route 4 at or near this intersection make it difficult for motorists to turn into and out of Mannix Road. As traffic volumes grow at this location due to planned and proposed expansion of the East Greenbush Technology Park, improvements will be required to this intersection to offset the already poor intersection operations at Mannix Road under its current conditions.

A roundabout is recommended at this location as the preferred improvement concept, which is shown below and in **conceptual Drawing 7 of 16**. A roundabout will improve the safety for both vehicles and pedestrians as well as accommodate the anticipated future 2025 peak period traffic volumes at this intersection (analysis indicates a two lane roundabout here would operate at a LOS A from day of opening and under the estimated

Figure 6-1
Visualization of a Roundabout at the Mannix Road/Rte 4 Intersection

year 2015 peak period traffic volumes; using 2025 estimated volumes the LOS is expected to be much better than the current situation for all approaches). The traffic calming affect of roundabouts provides for good speed consistency and will create a "gateway" for the Town of East Greenbush.

Installing a traffic signal at this intersection is an alternative improvement concept that was considered as part of this study. However, based on the signal warrant analysis discussed previously a signal is not currently warranted at this location. A signal does help to create adequate gaps for vehicles entering and exiting Mannix Road, which in turn causes more delay for motorists traveling along Route 4. A signal would provide minimal benefits for pedestrians and has the potential to increase rear-end crashes. Therefore, it is not the preferred improvement option for this intersection.

6.2.2. Route 4 Intersection with I-90 Westbound Ramps

Conceptual Drawing 7 of 16 shows the recommended conceptual improvements for the I-90 westbound ramps intersection with Route 4. The geometry for this intersection should be modified to remove the northbound right turn slip ramp and create a right turn that is under STOP sign control.

If a roundabout is constructed at the Route 4 intersection with Mannix Road, left turns from the I-90 westbound ramps should be prohibited. These left turning vehicles from I-90 westbound ramps would then turn right off the ramps and make a U-turn at the Mannix Road roundabout to go southbound on Route 4. This would reduce the number of conflicts at the I-90 westbound ramp intersection with Route 4 and improve the poor operation of this location. Appropriate wayfinding signage should be provided.

6.2.3 Route 4 Intersection with I-90 Eastbound Ramps

The NYSDOT recently installed a traffic signal this year (2006) at the I-90 eastbound ramps intersection with Route 4, which is shown in **conceptual Drawing 9 of 16**. There is an immediate safety concern at this location that can be addressed by installing a traffic signal, which is a low cost short-term solution. NYSDOT will also be removing the southbound right turn slip ramp and installing a right-turn lane that will be controlled by the new traffic signal. The Town of East Greenbush is working with the owners of the SEFCU/Cracker Barrel development area to realign their access driveway with the new traffic signal. Their existing driveway would then be closed or modified to a right-in/right-out only access, which will make this development easier and safer to access.

The preferred longer-term improvement concept is to remove the traffic signal and install a roundabout at this intersection, with the SEFCU development access driveway as the fourth leg (as shown in the box graphic on **conceptual Drawing 9 of 16**). A roundabout will provide the best safety benefit for both vehicles and pedestrians and accommodate the estimated future 2025 peak period traffic volumes.

6.2.4 Route 4 Intersection with Route 151 (Couse Corners)

The preferred improvement concept for this intersection is to install a roundabout, which is shown above and in **conceptual Drawing 10 of 16**. Reconstructing this intersection as a roundabout would eliminate the need to significantly widen each approach to this intersection to accommodate both the future 2015 and 2025 peak period traffic volumes estimated as part of this study. A roundabout is also anticipated to provide for improved traffic operations for vehicles, pedestrians and bicyclists under future year conditions.

Figure 6-2
Visualization of a Roundabout at the NY 151/Rte 4 Intersection

Conceptual Drawing 11 of 16 also shows the recommended driveway locations for future development of the vacant properties located on the southeast and northeast quadrants of the intersection. These recommended driveway locations are provided to help the Town determine the most appropriate future access points for development of these vacant parcels that will work best with the recommended roundabout.

6.2.5 Route 4 Intersection with Routes 9&20 (Columbia Turnpike)

Even though this location was recently reconstructed, conceptual transportation improvements were considered as part of this study. **Conceptual Drawing 16 of 16** illustrates the following geometric and pedestrian enhancements to increase the safety for both vehicles and pedestrians at this intersection:

- Remove the westbound right turn slip ramp (identified as high crash location) and make it a signal controlled right turn lane.

- Consider either removing the northbound right turn slip ramp to make it a signal controlled right turn lane (approximately 78 right turns in the PM peak hour) **or** redesigning the northbound right turn slip ramp [See discussion below].
- Install WALK/DON'T WALK count down signals at intersection crosswalks.
- In conjunction with any intersection redesign efforts, bus stop placement and installation should be done in such a way as to safely allow people to transfer between CDTA's fixed route bus service available along Rtes 9 & 20 and CDTA's Route 4 shuttle service, and vice versa.

These actions would reduce crossing distances and make the intersection more pedestrian friendly. It would also reduce crashes that occur as a result of vehicles using a right turn slip ramp, but failing to merge safely with traffic exiting the intersection from the northbound and westbound departure lanes. These improvement recommendations are consistent with the long range actions recommended for NYSDOT in the final report of the Routes 9&20 Corridor Master Plan, which stated, "Work with the Town to redesign the Route 4 intersection to minimize turning radii, enhance the intersection for pedestrian crossings and streetscape improvements utilizing signage, street trees, architectural lighting and pedestrian amenities." The westbound right turn slip ramp (from Rte 4 turning onto Rtes 9 & 20) had a higher crash rate than the northbound slip ramp. Other means could be explored to make this intersection more pedestrian friendly while retaining the northbound right turn slip ramp, if deemed appropriate after further investigation during design of any improvement project here, and should include designing the channelization island to slow down traffic (to speeds of 5 – 10 mph), separate conflicts between right-turning vehicles and pedestrians, and provide high pedestrian visibility. The *ITE Proposed Recommended Practice: Context Sensitive Solutions in Designing Major Urban Thoroughfares for Walkable Communities,* ITE, 2006, pg. 164 provides useful information regarding pedestrian "friendlier" design of channelized right turn lanes.

A longer term conceptual improvement option for this intersection would be further analysis to see if the signal should be removed and replaced with a roundabout.

6.3 Recommended Corridor Wide Improvements

This section of the report summarizes the conceptual transportation recommendations developed along the entire Route 4 corridor, which include sidewalks, bike lanes, median treatments, narrowing travel lanes, transit accommodations, streetscaping/landscaping, signal coordination, and access management actions to reduce both vehicular as well as pedestrian conflicts into and out of adjacent developments. It was determined that none of the segments need additional capacity in the future based on the trip generation estimates used, however intersection improvements as explained above would be needed to accommodate future trips as estimated.

Specific access management actions as well as conceptual transportation improvements were developed for the entire Route 4 corridor. The corridor was divided into the following four segments to summarize these recommendations:

- Route 43 (North Greenbush) to Third Avenue Extension
- Third Avenue Extension to Mannix Road
- Mannix Road to Route 151 (Couse Corners)
- Route 151 (Couse Corners) to Routes 9&20 (Columbia Turnpike)

6.3.1 Route 4 Segment: Route 43 to Third Avenue Extension

Issues: This segment of the Route 4 Corridor currently experiences significant weekday evening peak hour traffic congestion and has experienced significant traffic growth since 1998. The existing conditions analysis indicates that this section also exhibits some safety problems. Additional future development is likely to occur in this segment both in North and East Greenbush and mitigation of associated traffic impacts will be an issue to be addressed. Also along this segment, the pedestrian and bicycle environment is lacking. Although there is regular bus service with bus stops identified only by signs on poles, CDTA transit service is not widely used in this segment in part due to the poor pedestrian environment.

Related Goals/Objectives: The East Greenbush Land Use and Zoning Study (2006) says: *The vision for Route 4 North* includes focused, quality commercial and corporate offices with supporting retail and protected surrounding residential neighborhoods. That Study recommends that a streetscape improvement plan be developed to realize the vision of Route 4 as a commercial avenue in the north and that potential public transit connections and bus shelters should be integrated into this plan. Goals of this Corridor Study include maintaining good quality of traffic flow and traffic safety through use of various techniques that may include traffic calming, signal coordination, roundabout designs, access management, and limited capacity improvements, among others.
The signalized intersections within this segment of Route 4 were recently reconstructed including some additional turn lanes as part of the development of the new Target store and redevelopment of the Wal-Mart shopping plaza (Rensselaer County Plaza).

Recommended Conceptual Improvements: Decisions regarding future development approvals and potential related roadway changes along Route 4 in adjacent North Greenbush are currently pending. However, any additional future development may trigger the need for additional roadway capacity from Route 43 to Third Avenue Extension or other approaches to reduce delay. Accordingly, NYSDOT should continue to require coordinated developer mitigation between the Towns of East and North Greenbush for any new development relative to the future capacity needs of this roadway segment.

A shorter-term recommended action is to coordinate the traffic signals in this segment of Route 4 to address existing and future congestion. Traffic signal conduit and pullboxes have been installed with three of the newer signals here as part of various highway work permits granted relative to more recent large developments along this segment, allowing interconnection and subsequent signal coordination.

In the longer-term a roundabout at Third Avenue Extension should be considered in conjunction with any future development plans for this area after further careful analysis. The Town's of North and East Greenbush should require the developers of any additional large-scale development within this area to evaluate the feasibility of installing roundabouts at the existing signalized intersection locations or other alternative safety and capacity enhancing intersection treatments to be coordinated with transportation planning efforts currently ongoing in the Town of North Greenbush. The Bloomingrove Drive/Rte 4 intersection was identified as a location of concern meriting further attention.

In addition, any newly developed or re-developed sites should be required to provide inter-parcel connections, and other appropriate access management treatments such as consolidated or limited site driveways and interior site access for pedestrians linked to Route 4 sidewalks.

With respect to supporting transit use in the corridor, sidewalks should be expanded around existing bus stop locations to provide adequate waiting areas. Such waiting areas should also include benches. If bus ridership were improved in these locations such that the CDTA minimum threshold of 100 passengers per day after these improvements were made, or if a developer sought such improvement and covered the cost, a bus shelter could be warranted and installed. If paired bus stops are desired these should only be established at intersections with pedestrian signals and crosswalks.

Conceptual Drawings 1 through 3 of 16 illustrate the preferred roadway cross-section for this segment of Route 4, which is recommended to include the following transportation elements:

- Coordinate all existing and any future signals within this segment of Route 4.
- Install additional crosswalks at signalized intersections where appropriate and install WALK/DON'T WALK count down signals at existing crosswalks (at Third Ave Ext/Rte 4 and Grandview/Rte 4) and any future signalized crossings.
- Selection of future median treatments should be coordinated between the Towns and NYSDOT and should include either the use of "street print" for a flush median or potentially an irrigated landscaped raised median where appropriate.
- Install sidewalks on both sides of Route 4 to connect to and provide continuous sidewalks to and through North Greenbush.
- Designate existing shoulders as 5 foot striped bike lanes on each side of Route 4.
- As new or redevelopment occurs provide coordinated, shared access and limit and consolidate driveways.

6.3.2 Route 4 Segment: Third Avenue Extension to Mannix Road

Issues: Safety and higher than desired travel speeds were identified as issues here. It is difficult for a vehicle to turn left out of unsignalized intersections, including Mannix Road which currently experiences left turning vehicle delays during the evening peak hour. The high travel speeds, traffic volumes and apparent driver confusion regarding

lane configurations are contributing factors that lead to this left turn delay. Traffic volumes have grown along this segment since 1998. Additional future development is planned at the East Greenbush Technology Park east of Route 4. Pedestrian or bicycle travel is limited to existing roadway shoulders in this section. The entire Route 4 corridor was identified by Town survey respondents as benefiting from improvements to the bicycle and pedestrian environment, the highest percentage of any town corridor. CDTA service in this segment is limited to shuttle service only, although the larger buses do access the Wal-Mart property; CDTA service is not widely used.

Related Goals/Objectives: Maintain good quality of traffic flow and traffic safety through use of various techniques that may include traffic calming, signal coordination, roundabout designs, and access management. Explore improvement concepts that result in an attractive streetscape and create opportunities for community gateways and attractively designed destinations that can be reached by motor vehicles, transit, and pedestrians and bicyclists to support the Town's Land Use Vision to have Route 4 serve as a commercial avenue in the north. Develop a plan that can support multi-modal traffic generated by desired economic development consistent with the Town's land use vision.

Recommended Conceptual Improvements: Any future reconstruction of this portion of Route 4 should include the following conceptual transportation improvements to increase the safety and operational efficiency for motor vehicles, bicycles and pedestrians, as well as the overall attractiveness of the roadway, which are also shown graphically in **conceptual Drawings 4 through 7 of 16**:

- Coordinate the Wal-Mart traffic signal with the existing traffic signals along Route 4 north of Wal-Mart to Route 43 in North Greenbush.
- Install WALK/DON'T WALK count down signals at the Route 4/Wal-Mart signalized intersection crosswalks.
- Install "street print" for flush median between Third Avenue Extension and Empire Drive.
- Provide for a continuous raised median between Empire Drive and Mannix Road; explore narrowing of roadway north of Mannix Road.
- Narrow travel lanes, if possible.
- Install a 5 foot bike lane along Route 4 in each direction.
- Install sidewalks on both sides of Route 4.
- Provide additional landscaping on each side of Route 4 to calm traffic speeds, where possible.
- New development or redevelopment should provide pedestrian access.
- In conjunction with the addition of sidewalks, paired bus stop installation should be considered where there are signalized crosswalks.

The Town of East Greenbush should consider modifying the alignment of the Thompson Hill Road intersection (see **conceptual Drawing 4 of 16)** with Route 4 to make it a "T" intersection or restrict access to right-in/right-out only. The skewed angle of this intersection makes it difficult for vehicles to turn left out of Thompson Hill Road onto Route 4. Realigning this roadway to create a standard "T" intersection with Route 4 will

help improve the safety for exiting vehicles at this intersection. Restricting access to right-in/right-out only will also improve the operations of this intersection and motorists that need to make a left into or out of Thompson Hill Road can use the Mannix Road intersection.

New development or redevelopment should include site designs that minimize walking distances to Route 4. By placing parking to the side and/or rear of buildings, orienting buildings to the street, and minimizing driveway length appropriately while providing safe pedestrian connections, use of transit will be supported and more attractive.

6.3.3 Route 4 Segment: Mannix Road to Route 151 (Couse Corners)

Issues: This segment has the highest traffic volumes along the corridor within the Town and has experienced significant traffic growth. Several intersections exceeded the statewide average crash rate and some also experience evening peak hour delay. Public comments were received regarding concern over current intersection lane and signal configurations. Field observations found a significant queuing of vehicles waiting to get through the traffic signal at Route 151, which for short periods (15-20 minutes) during peak hour extends north along Route 4 to the I-90 Eastbound ramps. The residential LOC rating was "poor" for portions of this segment. The high traffic volumes and travel speeds along the corridor make it difficult for motorists to find acceptable gaps in traffic to make safe left turns onto Route 4 and to merge safely onto Route 4 in some locations. Left turns into driveways for commercial uses on the northwest side of the Route 151 intersection were identified as a concern as some northbound vehicles have been reported to be illegally using the southbound left turn lane for this purpose. In addition, west of the NY 151/Rte 4 intersection along NY 151, concern was expressed regarding the ability to make left turns to/from parcels on either side of the roadway. Pedestrian or bicycle accommodations are lacking. CDTA service in this segment is limited to shuttle service only, which is not widely used. The need for better aesthetics was identified. There are a number of civic destinations near and adjacent to Route 151.

Related Goals/Objectives: Support the Town's Land Use Vision to have Route 4 serve as a commercial avenue in the north and a neighborhood avenue in the south with an appropriate transition at the Couse Corners gateway area. Mitigate traffic impacts of future development in the OC zone, to minimize impacts to existing neighborhoods and community character. Create system for safe biking and walking along Route 4. Explore concepts that result in an attractive streetscape and create opportunities for community gateways. The corridor improvement plan should also help preserve and enhance the quality of life for surrounding residential neighborhoods; and, optimize the area's development potential by making the area more attractive. Incorporate access management techniques into the improvement plan and maintain good quality of traffic flow and traffic safety through use of various techniques that may include traffic calming, signal coordination, roundabout designs, access management, etc.

Recommended Conceptual Improvements: This segment of the Route 4 corridor is a critical transportation piece, especially with the proposed East Greenbush Technology Park and potential Mill Creek Commerce Park developments. Therefore, particular

attention was given to this segment as is indicated by the long-term vision of having roundabouts in place for the intersection control at Mannix Road, the I-90 eastbound ramps, and Route 151.

New development or redevelopment should include site designs that minimize walking distances to Route 4. By reducing the number of overall parking spaces per site and placing parking to the side and/or rear of buildings, in addition to orienting buildings to the street and minimizing driveway length appropriately while providing safe pedestrian connections, use of transit will be supported and more attractive, while enhancing the overall walkability of the area as well as enhancing community quality of life.

Conceptual Drawings 8 through 10 of 16 also show the additional conceptual transportation improvements recommended for this segment of Route 4 that include vehicular as well as bicycle and pedestrian enhancements to the corridor:

- Install a raised (preferred) or flush median along this segment of Route 4, using "street print" type material. If roundabouts are installed at Route 151, the Exit 9 Interchange Ramps, and Mannix Road, then left turns can be accommodated via U-turns at these roundabouts, which makes raised medians the most appropriate for this segment of Route 4.
- Provide sidewalks along both sides of Route 4.
- Designate the existing shoulders as 5-foot striped bike lanes on both sides of the roadway.
- At the I-90 Exit 9 eastbound ramp include a leg to the new signalized intersection (or in the long-term a roundabout leg) that provides access to the SEFCU/Cracker Barrel development.
- Explore narrowing the section of the bridge between the I-90 ramps to calm traffic and to provide room for sidewalks, bike lanes and landscaping.
- New development or redevelopment should provide pedestrian access.
- In conjunction with the addition of sidewalks, paired bus stop installation should be considered where there are signalized crosswalks.
- Provide one consolidated access driveway and shared access between parcels in the vicinity of the northwest quadrant of the Rte 4/NY 151 intersection. Consider prohibiting left turns into these sites, or some other measure, to mitigate a current situation where northbound traffic on Rte 4 uses the southbound turn lane to access these sites.

Access to and from the Mill Creek Commerce Park development was also discussed as part of this study. It was suggested that a new right-in/right-out only access driveway be considered along the west side of Route 4 across from Glaz Street to help ease this site's traffic impacts to the Route 4 at Route 151 intersection. This access improvement would be in addition to those mentioned previously in an earlier section of this report, which were recommended as part of the FGEIS for this site (i.e. extending Tempel Lane to Third Ave Ext). Also examine installation of a roundabout at the Tempel Lane/NY 151 intersection when needed as Mill Creek Commerce Park development occurs. The ability of vehicles to make left turns into/out of parcels between Tempel Lane and Rte 4 along

NY 151, and into/out of Couse Place, needs to be adequately considered in any improvement concepts designed for this area.

6.3.4 Route 4 Segment: Route 151 (Couse Corners) to Routes 9&20 (Columbia Turnpike)

Issues: Traffic volumes in this segment of the corridor have remained relatively unchanged since 1998. By retaining existing residential zoning, traffic growth along this segment is forecast to be very moderate. However this segment currently receives "poor" ratings for residential/arterial compatibility. Based on the traffic analysis and field observations, left turns out of most of the unsignalized intersections evaluated are difficult; the need for better options to turn left onto Couse Place from Route 4 northbound and for turning left onto Couse Place from Route 151 westbound were identified as issues. Concern was also expressed regarding traffic speeds and safety along this segment of Route 4. The number of average annual crashes between NY 151 and Commons Drive was higher than other sections of the corridor. Concern was also expressed about the difficulty of making left turns out of driveways on Route 4 south of Route 151. The Genet Elementary School is located in this segment and safe access to/from this facility is important. Limited pedestrian facilities exist at the Rte 4/9&20 intersection and along the corridor pedestrian and bicycle accommodation is limited to the existing shoulders. Proposed improvement concepts should focus on making the residential area more livable through access management, traffic calming/speed management and streetscaping elements. CDTA service in this area is limited to the shuttle along Route 4 itself, but regular fixed route service is provided along Rtes 9 & 20; adequate accommodation of transfers between these two routes/services is an issue.

Related Goals/Objectives: The goal is to transform Route 4 over time into a neighborhood avenue welcoming to all roadway users. Explore improvement concepts that result in an attractive streetscape and create opportunities for community gateways and attractively designed destinations that can be reached by many modes. Develop an improvement plan that includes specific elements that support accessibility and safety for cars, transit, walking and bicycling. Incorporate access management and speed management techniques to preserve the function of the corridor in serving through trips while providing safe, convenient and consolidated access to adjoining land uses.

Conceptual Drawings 11 through 16 of 16 show the following recommended conceptual transportation improvements for this segment of the Route 4 corridor evaluated, which includes enhancements for both vehicular and pedestrian traffic:

- Designate the existing shoulders as 5-foot striped bike lanes along each side of Route 4.
- Narrow travel lanes, if possible.
- Install a flush median that has a "street print" application of contrasting texture and color or raised landscaped median where possible. (Left turn bays or TWLTL (two way left turn lane) arrows would most likely also need to be incorporated

into any median treatment). This will provide space for left turning vehicles into adjacent residences while also serving to somewhat calm traffic.

- Install sidewalks along both sides of Route 4.
- In conjunction with the addition of sidewalks, paired bus stop installation should be considered in conjunction with signalized crosswalks.
- Along the edge of the roadway, install either continuously spaced tree plantings the length of the segment or alternatively consider clustering trees and other landscaping at intersections/other desired areas to calm traffic. This will also provide dampening of roadway sounds and enhance the look of the corridor.
- Where properties have access to side streets, access should be restricted to side streets only, which is already the case for some properties around Columbia Drive. Within the limited commercially zoned area along this segment, any commercial development or redevelopment should be required to provide inter-parcel connections and/or shared driveways where possible as well as appropriate pedestrian access ways into these sites.
- Redesign access in the future when redevelopment occurs in the vicinity of the southwest corner of the roundabout intersection of NY 151/Rte 4. This redesign should result in consolidated driveways with turn restrictions (rights in/out only) and adequate corner clearance. Specific access changes to address Couse Place turning issues were explored but none are proposed at this time.
- Future access to newly developed parcels near the southeast quadrant of the NY 151/Rte 4 roundabout should also be designed with turn limitations (rights in/out only), adequate corner clearance and in a manner that limits the number of access points.

In the short term, the Town should work with NYSDOT to explore lowering the 45 mph speed limit along the corridor, with the first priority being this segment lined with primarily residential uses. In comparison, Route 4 in North Greenbush has a speed limit of 40 mph, while the westerly portion of Rtes 9 & 20 in the Town has a speed limit of 35 mph. Speed enforcement is another action that could be implemented in the short term to lower traffic speeds along the corridor. In conjunction with exploration of options to lower the speed limit, an examination of the potential to restripe the existing travel lanes from the current 12 foot width to appropriate narrower widths may assist in managing speeds along this segment. In addition, use of appropriate warning signage regarding the presence of driveways and the potential for encountering turning vehicles ahead should also be explored as a potential way to slow speeds and reduce crashes.

Another option that should be considered as a possible option for traffic calming and access management for adjacent properties along this segment of the corridor is to install additional roundabouts evenly spaced between Route 151 and Routes 9&20 at some local streets contingent on future volumes and operating conditions (i.e. perhaps at Mill Creek Drive or Columbia Drive and/or at a modified shared access driveway for Genet Elementary School). This would calm traffic and provide street crossing opportunities that do not currently exist. This option could also include the recommendation to install a landscaped median depending on the available right-of-way. If a narrower median was installed it should be a raised, non-landscaped median that would be aesthetically

pleasing and low maintenance (brick pavers or some other acceptable treatment) that would prohibit vehicles from making left turns between the roundabouts. Left turn movements would be accommodated by u-turns at the roundabouts and subsequent right turns into properties. This option would also include a 5 foot bike lane, sidewalks along both sides of Route 4 and narrower travel lanes, where appropriate.

6.4 Access Management

One of the key elements of the Route 4 Corridor Plan is access management. According to the Transportation Research Board's (TRB) Committee on Access Management *"By managing roadway access, government agencies can increase public safety, extend the life of major roadways, reduce traffic congestion, support alternative transportation modes (such as bicycling, transit and walking), and even improve the appearance and quality of the built environment."*

Benefits of Access Management Techniques:

- Fewer crashes and safer roadways
- Fewer traffic delays
- Fewer potential conflicts with vehicles entering or leaving the roadway
- Fewer driveways to cross for bicyclists and pedestrians
- A safe place for pedestrians to stand in the middle of the street if medians or islands are used
- Better overall access to developments because traffic will flow more smoothly
- Decreased roadway costs
- Increased capacity per lane of roadway
- Gateway and other roadway amenities can be added to improve area appearance
- Unsightly strip development can be avoided

Source: Ulster County Access Management Guidelines,2003

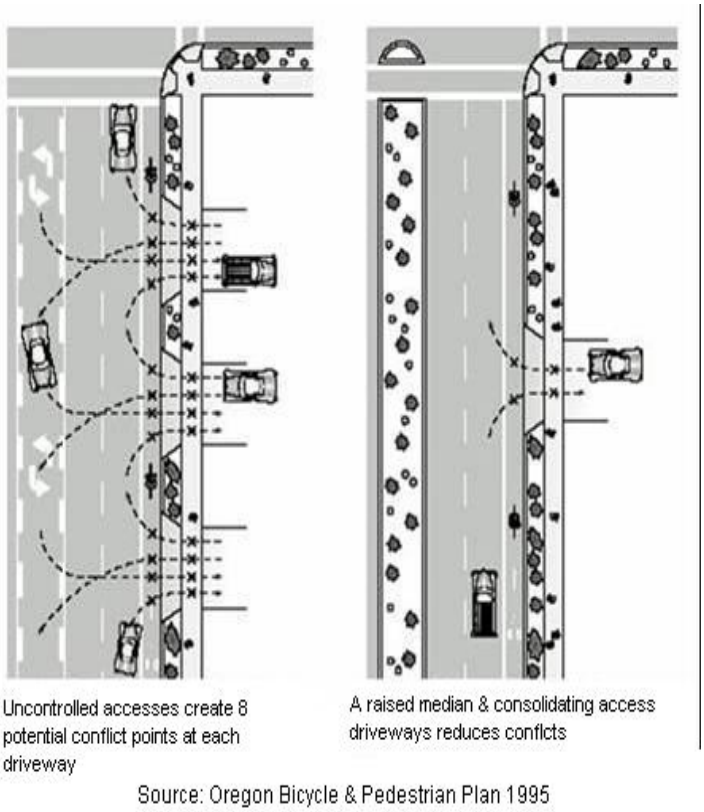
What is Access Management?

"Access management is the systematic control of the location, spacing, design, and operation of driveways, median openings, interchanges, and street connections to a roadway. It also involves roadway design applications, such as median treatments and auxiliary lanes, and the appropriate spacing of traffic signals. The purpose of access management is to provide vehicular access to land development in a manner that preserves the safety and efficiency of the transportation system… Access management is particularly important along arterials and other primary roads that are expected to provide safe and efficient movement of traffic, as well as access to property." It has been shown that good access management can reduce crashes (by 50 percent or more, depending on the condition and treatment used) and increase roadway carrying capacity. (Access Management Manual, TRB (2003))

As a major north-south arterial, Route 4 provides the primary vehicular access between East Greenbush and North Greenbush. However, it also functions as a local road that

provides access to commercial destinations along the northern and southern pieces of the corridor as well as civic and residential uses in the remaining portion of the corridor.

As traffic increases along the corridor the conflicts between the through arterial traffic and local development traffic will become more problematic in terms of congestion and crashes. This may lead to a decline in the economic vitality that the corridor is currently experiencing as well as quality of life along the corridor.



Source: Oregon Bicycle & Pedestrian Plan 1995

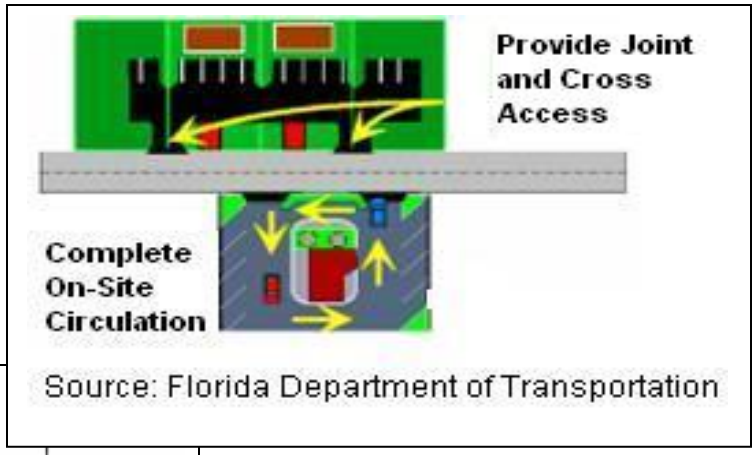
One of the key ways to improve traffic flow and safety along the Route 4 Corridor is to employ access management strategies.
Implementing access management strategies can result in a roadway that functions safely and efficiently for both vehicles and pedestrians and bicycles, and creates a more attractive corridor.

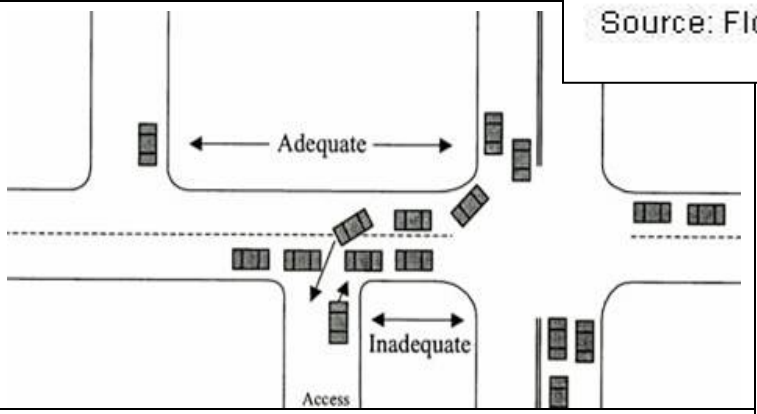
Access management strategies to reduce vehicle-to-vehicle and vehicle-to pedestrian or bicycle conflict points involve consolidating or eliminating driveways where possible as redevelopment occurs, consolidating the turning movements in and out of developments at central locations, or shifting them to side streets or minimizing the more problematic left turns. Reducing the number of access points along a corridor can significantly reduce the number of crashes. By reducing or eliminating left turns in conjunction with roundabouts, access can be accommodated well while safety, traffic flow, bicycle and pedestrian attractiveness, as well as overall corridor aesthetics can be improved.

Both the Town of East Greenbush and the New York State Department of Transportation (NYSDOT) have responsibilities related to access management along Route 4. New York State owns the highway itself and has ownership and maintenance responsibilities for the right of way. Also any property owner desiring access to the state highway must be granted a NYS highway access permit in order to construct driveways connecting to it. The Town of East Greenbush however retains land use regulatory authority over parcels adjacent to the highway right of way. Local land use regulations relating to site plan and subdivision review and approval can provide the most effective means to manage access along the arterial.

The Town and NYSDOT, working cooperatively, should apply the following principles to access points related to new development or redevelopment of sites along the Route 4 Corridor:

- ***Minimize curb cuts*** to reduce conflicts between vehicles, pedestrians and bicyclists, and thereby reduce the potential for crashes. Accomplish this by limiting the number of driveways per site, requiring shared access arrangements and finding alternative access where possible (if access from a side road is available, provide access at that location).





Corner Clearance
Source: *Iowa Access Management Guidebook*, October 2000

- Provide adequate ***corner clearance*** by locating driveways and major entrances away from intersections and away from each other to minimize interference with traffic operations, minimize crashes and provide for adequate storage lengths for turning vehicles.

- ***Make sidewalks continuous*** across driveways to increase pedestrian visibility to turning vehicles.

- Use ***median treatments*** where possible and coordinate median openings to manage access and minimize conflicts. [Both raised and flush medians (also called two-way left turn lanes, TWLTL) should be considered where appropriate. Each type can have benefits, although raised medians have been shown to provide greater safety and capacity benefits when compared to flush medians, with flush medians providing safety and capacity advantages when compared to roadways without such treatments.]

What are the Benefits of Raised Medians?

> Safety
> Fewer and less severe traffic crashes
> Less auto/pedestrian conflict
> Efficiency
> Greater vehicle capacity
> Less stop and go traffic
> Aesthetics
> More room for landscaping and pedestrians
> More attractive corridors
> Less roadway pavement

Source: CUTR, *Median Handbook*, 1997.

7. IMPLEMENTATION PLAN

Table 7 - 1 below serves as the implementation plan in tabular format. It provides a listing of the recommended improvements for each intersection and segment along Route 4 as described above, and the order of magnitude cost estimates*, potential funding sources and estimated time frames of implementation for each. Order of magnitude costs are rough estimates that will require detailed engineering analysis to produce more precise estimates as improvement projects proceed from a conceptual stage through required project implementation phases. In addition estimates and actual costs of implementation may vary somewhat depending on the entity undertaking the project and the funding source used (i.e. local, state, federal or private developer).

The Route 4 Corridor Plan provides a framework for the future conceptual improvements to be achieved incrementally over time, recognizing there is not a roadway reconstruction project currently planned or funded. However, some recommended improvements currently have partial funding secured by the Town from state and federal sources both for preliminary engineering and design, and potentially as partial funding for construction. These improvements, when coordinated with required mitigation from adjacent land use development may be achieved within a shorter time period, while others will occur over a longer term after funding opportunities arise in the future. The benefit of working cooperatively to craft a corridor-wide conceptual improvement plan is that it positions the Town and the New York State Department of Transportation to take advantage of any opportunities related to development's mitigation of traffic impacts and potential funding from a variety of sources in a comprehensive manner, which is important in the current fiscal climate in which traditional funding sources are very limited.

* Order of Magnitude Cost Estimates are by definition approximate estimates derived without the benefit of detailed data on such factors as site conditions (including site specific slope or soils analysis) right of way costs and other variables. This type of general cost estimate is appropriate for use with conceptual improvement projects similar to those shown here; order of magnitude costs are meant to provide an idea of the potential costs of improvement projects that may be pursued in the future.

Table 7 - 1- East Greenbush Route 4 Corridor Study

Conceptual Transportation Improvement Projects: Information for Implementation/Generalized Order of Magnitude Cost Estimates[1,2]

Location		Description	Order of Magnitude Cost Estimate	Potential Funding Source	Timeframe (short/medium or longer term) (= 1-5/5-10 or 10+ years)
Intersection Improvements					
Rte 4/	**Mannix Road**	**Roundabout** - install a two-lane roundabout	$400,000 [3]	Public/Private Partnership:	short/medium term
		with appropriate landscaping, signage, lighting and medians (as needed at approaches)		NYS Multimodal funds (Town has obtained)/Adjacent Development	
Rte 4/	**I-90 Exit 9 Westbound Ramps**	**Short Term Option**	$77,500		
		Modify intersection to remove the northbound right			short term in conjunction
		turn slip ramp and bring right turns under			with EB ramp signal installation
		STOP sign control.			
		Medium Term Option	$86,500		
		Modify intersection to prohibit left turns onto Rte 4			medium term in conjunction
		(left turns would be accommodated via U-turns			with Mannix Rd. Roundabout
		at the Mannix Road roundabout)			
Rte 4/	**I-90 Exit 9 Eastbound Ramps**	**Short Term Action**			
		NYSDOT has installed a traffic signal. Right turns		NYSDOT STAR Funds	complete
		southbound will now be brought under traffic signal control.			
		Additional Option Under this Action			
		Realign SEFCU/Cracker Barrel access driveway with	$30,000	Adjacent Development	short term
		new traffic signal and close or modify existing	or		
		driveway to a right-in/right-out only access	$20,000		
		Long Term Option			
		Remove traffic signal and install a roundabout	$400,000	Adjacent Development/State/TIP	long term
Rte 4/	**NY 151 (Couse Corners)**	**Roundabout** - install a two-lane roundabout	$400,000	Public/Private Partnership:	medium/long term depending on
		with appropriate landscaping, signage and lighting		Town has HUD grant to be applied to cost of preliminary design	pace of development at Mill Creek
				Adjacent Development/State/TIP3	Commerce Park site
Rte 4/	**Rtes 9 & 20**	Remove right turn slip ramps and convert to right turn	$9,000	State/TIP	medium/long term
		lanes to bring right turns under traffic signal control			
		Longer Term Option		State/TIP/Adjacent Development	long term
		Remove traffic signal and install a roundabout	$400,000		
NY 151/	**Temple Lane**	Install a roundabout	$400,000	Adjacent Development	medium/long term depending on
					pace of development at Mill Creek
					Commerce Park site
Rte4/	**Third Ave Extension**	Install a roundabout	$400,000	Impacting Development/State coordinated	medium/long term depending on pace
					and scale development in N. Greenbush
Improvements within Rte 4 Segments					
Route 43 to Third Avenue Extension		Coordinate traffic signals	$0	NYSDOT	short term
Segment				interconnects are in place/ were development funded	
Length	0.91				
(miles)		Pedestrian improvements at signalized intersections	$8,500	CDTC Spot Improvement Pgm/State/Adjacent Development	short/medium term
		(pedestrian signal heads/crosswalks)			
		Access management treatments: interconnecting	$ _____	New Development/Redevelopment of corridor properties	ongoing
		parcels, driveway consolidation, pedestrian access			

Table 7 - 1 CONTINUED East Greenbush Route 4 Corridor Study

Conceptual Transportation Improvement Projects: Information for Implementation/Generalized Order of Magnitude Cost Estimates

Route 43 to Third Avenue Extension		Fill in gaps to create continuous sidewalks both sides of Rte 4	$170,000	State/TEP/TIP/Adjacent Development	development related opportunities or medium/long term
CONTINUED					
Segment		Expand sidewalks/install benches at CDTA bus stops to provide waiting areas	$4,000 per bench w/pad	CDTA's Shelter Program/Adjacent Development	development related opportunities or medium/long term
Length	0.91	Install bus shelters if ridership =100+ riders per day, or developer desires and pays	$8,000 - $12,000	CDTA's Shelter Program/Adjacent Development	development related opportunities or medium/long term
(miles)					
		Designate existing shoulder as 5 foot striped bike lanes	$33,000	State/TEP4/TIP/Adjacent Development	medium/long term
		Capacity/access management improvements = roundabouts/	$_____ - $_____	Impacting Development/State coordinated	medium/long term depending on pace
		median treatments (raised or attractive flush)			and scale development in N. Greenbush
Third Avenue Extension to Mannix Road		Coordinate Walmart traffic signal with signals to the north	$0	NYSDOT	short term
Segment				interconnects are in place/ were development funded	
Length	0.86				
(miles)		Pedestrian improvements at Walmart signalized intersection	$6,000	CDTC Spot Improvement Pgm/State/Adjacent Development	short/medium term
		(pedestrian signal heads/crosswalks)			
		With ped signals/crosswalks and sidewalks on both sides, add paired bus stops w/signs	$50 - $250/sign - sign&pole	CDTA/Adjacent Development	medium/long term
		Install flush median ("street print" type): Third Avenue Ext - Empire Dr	$225,000	State/TIP/Adjacent Development	medium/long term
		Any future reconstruction project should include:	$425,000	State/TIP	long term
		Install a continuous raised median: Empire Dr -Mannix Rd	$85,500		
		Narrow travel lanes to slow traffic/make room for other treatments			
		Install a 5 foot bike lane along Route 4 in each direction	$73,500		
		Install sidewalks on both sides of Route 4	$172,000		
		Provide additional landscaping			
		Modify Thompson Hill Rd intersection w/Rte 4	$30,000	State/TIP/Adjacent Development	long term (unless opportunity arises
					related to development in short/medium term)
Mannix Road to NY 151 (Couse Corners)		Any future reconstruction project should include:	$750,000	State/TIP	long term
Segment		Install a raised median (w/roundabouts) provide opening for Glaz St.			
Length	0.80				
(miles)		Provide sidewalks along both sides of Route 4.	$160,000		
		Designate existing shoulders as 5-foot striped bike lanes	$10,000		
		Narrow section btwn I-90 ramps to calm traffic/make room for other treatments			
		Provide additional landscaping			
		With ped signals/crosswalks and sidewalks on both sides, add paired bus stops w/signs	$50 - $250/sign - sign&pole	CDTA/Adjacent Development	medium/long term
		Construct right-in/right-out only access driveway from Mill Creek site onto Rte 4	$20,000	Adjacent Development	medium/long term depending on pace of development at
					Mill Creek Commerce Park site
		Access management treatments: interconnecting parcels, appropriate driveway	$ _____	New Development/Redevelopment of corridor properties	ongoing
		spacing & consolidation/appropriate turn movement restrictions, pedestrian access			
NY 151 (Couse Corners) to Routes 9&20		Any future reconstruction project should include:	$1,865,000	State/TIP	long term
Segment		Install flush median ("street print" type)	$1,084,160		
Length	1.54	Provide sidewalks along both sides of Route 4.	$439,700	TEP/TIP/State	medium/long term
(miles)		Install a 5 foot bike lane along Route 4 in each direction	$131,340	TEP/TIP/State	medium/long term
		Narrow travel lanes to slow traffic/make room for other treatments			
		Provide additional landscaping			
		Access management treatments: interconnecting parcels, appropriate driveway	$ _____	New Development/Redevelopment of corridor properties	ongoing
		spacing & consolidation/appropriate turn movement restrictions, pedestrian access			
		With ped signals/crosswalks and sidewalks on both sides, add paired bus stops w/signs	$50 - $250/sign - sign&pole	CDTA/Adjacent Development	medium/long term

Notes:
1 Generalized cost estimates do not include estimates for Right of Way (ROW) costs
2 Order of Magnitude Costs = Rough estimates that will require detailed engineering analysis for more precise estimates
3 A more detailed cost estimate was done based on site specific information including a land survey by a traffic engineering consultant as part of a development project review. This detailed cost estimate was $1.1M and used some different assumptions than those used in the order of magnitude cost estimate.
TIP = Transportation Improvement Program TEP = Transportation Enhancement Program

8. POTENTIAL FUNDING SOURCES

There are a number of potential funding sources that may be available for some of the recommended corridor transportation improvements. These include public and private sources as described below:

8.1. Transportation Enhancement Program (TEP):

The CDTC is the designated Metropolitan Planning Organization (MPO) in the Capital Region. They are committed to enhancing pedestrian and bicycle mobility in the MPO area, which includes Albany, Schenectady, Rensselaer, and Saratoga Counties. As part of their planning process, they typically allocate funds for pedestrian, bicycle and canal projects. When funds become available, CDTC sends notices to local communities and other potential applicants soliciting projects, which could be partially funded as part of TEP. It is important to note that the program is administered as a grant and as a result, the federal contribution is fixed at a maximum of 80% of the project cost. Funding under the TEP is limited and only a select number of projects are typically approved in the State of New York.

The types of projects that are funded through this program must satisfy a minimum of one (1) of the twelve (12) categories; one of these categories is: provisions of facilities for bicycle and pedestrians.

A TEP Guidebook, which further explains the program, is available through CDTC and NYSDOT Offices.

8.2. Transportation Improvement Program (TIP):

The CDTC has responsibility under federal law to adopt a multi-year program of proposed transportation improvement projects within the MPO area. Similar to TEP, CDTC, with representatives from NYSDOT, the region's counties, and local governments who make up its Policy and Planning Committees, is the responsible MPO for programming federal transportation funds for state and local highway and transit projects. CDTC typically forwards notices to communities soliciting projects, which could be partially funded as part of the TIP Program. Communities that are interested in having their project considered for funding must complete and submit a Project Justification Package for CDTC's review. After a competitive selection process, if the project is selected, it would receive federal funds up to a maximum of 80% of the overall cost. The remaining 20% would be the responsibility of the project sponsor. A minimum requirement for projects to receive federal funding is that the facility must be on the federal aid eligible list and thus the roadway must function as a collector or arterial highway. Route 4 is eligible to receive federal aid. Therefore, the reconstruction of Route 4, including adding sidewalks and bicycle lanes can potentially be funded under this program, although it should be noted for the past several TIP funding rounds monies available for new projects has been limited.

8.3 New York State Multi-Modal Program Funding (MMPF):

The Multi-Modal Program legislation requires that all funds be solely utilized for capital project costs for construction, reconstruction, reconditioning, and preserving of facilities and equipment with a service life of ten (10) years or more. However, funds cannot be used for the mandated non-federal matching share of federally funded projects.
The amount of funds available under the Multi-Modal Program is very limited. The Town has received MMPF funds for traffic control at Mannix Rd/Rte 4 and for improvements in the Tempel Lane area related to Mill Creek Commerce Park. The most likely scenario would be to utilize multi-modal funding for right-of-way acquisition, preliminary engineering, and construction supervision and the inspection portion of a project.

8.4 State Administered Community Development Block Grant (CDBG):

This is a federally funded program administered under CDBG Small Cities Program. New York State is responsible for distributing funds to non-entitlement communities such as cities, towns, and villages with a population of less than 50,000. Projects, which receive funding under this program, need to be part of an overall revitalization project that benefits low-to-moderate income families within the area. Based upon history of projects funded under this program, it is unlikely that the long-term action recommendations will be selected to receive CDBG funds.

8.5 New York State Marchiselli Funds (NYSMF):

As previously stated, TIP projects are 80% federally funded and remaining 20% would be the responsibility of the project sponsor. However, locally sponsored projects have received Marchiselli Aid, which is a state funding source that can fund up to three-quarters of the local cost. It is important to note that these funds must only be utilized for highway use. Pedestrian and bicycle facility type projects are not eligible to receive Marchiselli Aid, unless is part of a highway construction project. There is no assurance that Marchiselli funding will be available to offset some of the local share of the project cost.

8.6 Transportation and Community and System Preservation Pilot Program (TCSP):

The TCSP is a nationwide discretionary program administered by the Federal Highway Administration. Projects, which are eligible for funding, must meet several objectives, which include:
Improve the efficiency of the transportation system.
Reduce the impacts of transportation on the environment.
Reduce the need for costly future public infrastructure.
Ensure efficient access to jobs, services and centers of trade.
Encourage private sector development patterns.
Similar to the CDBG Program, TCSP funding availability is very limited.

8.7 Spot Improvement Program:

CDTC has set aside $100,000 per year for projects that provide low cost pedestrian and bicycle improvements that are too small for other programs such as TIP and TEP. Spot improvement projects typically address problems at specific locations such as intersections and short lengths of roadway. All Spot improvement projects are funded with a maximum of 80% federal funds and are capped. The remaining 20% is a local match and typically funded by the project sponsor.
The short-term recommendations regarding pedestrian signals and other improvements at various intersections are the type of project that may be funded as a spot improvement project.

8.8 Capital District Transportation Authority (CDTA) Bench and Shelter Program:

CDTA typically budgets approximately $100,000 system-wide per year for shelters and benches, including replacements. On an annual basis the demand for new or replacement shelters generally far outweighs available funds. For example, in 2006, 30 candidate locations were evaluated and 12 new shelters and 11 benches were funded.

Starting in 2004, CDTA formalized the criteria used to determine placement of new shelters. Lower volume stops may be outfitted with a bench to stretch the budget while providing basic waiting area accommodation.

Candidates for the shelter program are evaluated using the following criteria:

- Number of passengers that board at the stop (benchmark at 100/day, but exceptions are made if other conditions met)
- Number of routes that use the stop, with priority given to transfer points (where more than one route converge)
- Presence/absence of safe pedestrian access (sidewalks, crosswalks, traffic light with pedestrian phase)
- Adjacent land use (priority to higher density, transit-friendly development with street frontage)
- Number of Customer Requests and/or recommendation by Division Superintendent or honoring prior commitments
- Willingness of landowner/road owner to sign use agreement and/or maintain
- Adjacent road reconstruction -- capital project or developer will pay for pad, electrical hook-up, shelter or a pad already exists; and
- Low-income neighborhoods are given special consideration

8.9 Local Sources:

There may be several local source options available to fund the recommended improvements. One potential source is the Town's general fund. Under this option, the Town would need to set aside funds on an annual basis until adequate funding is available to construct the proposed improvements. Another option is the Town could

bond the recommended improvements. However, due to budgetary constraints, local funding of the proposed long-term action improvements is unlikely.

8.10 Mitigation from Development/Redevelopment:

It has always been the practice in the Town that developers construct local roads within a commercial/residential development, dedicate the right-of-way to the Town and participate in the design and construction or other needed improvements to local, collector and arterial roadways and intersections that are impacted by their proposed developments. Therefore, future developments are potential funding sources when mitigation of transportation impacts are required by such developments as identified during the Town's conducting of the required State Environmental Review Act process (SEQRA) for proposed developments or redevelopments. Through this process the specific transportation impacts of such proposed developments or redevelopments must be identified along with measures needed to mitigate these impacts.

One area municipality, the Town of Colonie, has used a Generic Environmental Impact Statement (GEIS) to identify a set of needed transportation improvements within the Albany International Airport Area corresponding to forecast development. The Airport GEIS findings statement identified some projects as publicly funded, some projects as privately funded and some with joint public/private financing. The implementation stage of the Airport Area GEIS has been underway for roughly 13 years. CDTC staff has participated in the assessment of over 240 site reviews under contract with the Town of Colonie. Mitigation costs are assessed on a direct impact basis, not on a dollar per square foot ($/sf) basis. The direct impact approach uses trip generation estimates and traffic assignment to develop the percentage of peak-hour capacity consumed by the proposed development. This ensures that each development pays for the roadway capacity it consumes. Uniform application of mitigation requirements is a key element of the Town of Colonie's approach. By 2010, the mitigation fees are expected to total $15 million, covering roughly 30 percent of all improvement costs. These fees have helped advance the Albany Shaker Road project, CDTA's Shuttlefly service, and service road construction. Land use development was scaled back to ensure that traffic levels would not exceed the capacity of the 2010 transportation system. CDTC, in collaboration with the town and county, continues to monitor traffic and land use changes.

In addition to required mitigation related to local, collector or arterial roadways and intersections as impacted by development, transit/travel demand management (TDM) actions should also be explored in coordination with CDTA relative to new developments or redevelopments. The demand-responsive ShuttleBee running along Route 4 has potential for growth in the long term and can provide needed travel choices for town residents and workers. One way to ensure continued funding for this service is to consider including transit in the mix of required mitigation of traffic impacts from new proposals or redevelopments.

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Town of East Greenbush, NY
Route 4 Corridor Study

Route 43 to 3rd Avenue Extension

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Capital District Transportation Comittee	ERDMAN ANTHONY	Behan Planning Associates, LLC	Town of East Greenbush	Town of East Greenbush, NY Route 4 Corridor Study	Route 43 to 3rd Avenue Extension	Drawing 3 of 16

BETWEEN 3RD AVENUE EXTENSION AND MANNIX ROAD:

- PROVIDE 5 FOOT BIKE LANES ON BOTH SIDES OF ROUTE 4.
- PROVIDE SIDEWALK ON EAST SIDE OF ROUTE 4 (PREFERRED OPTION).
- PROVIDE RAISED AND/OR FLUSH MEDIAN (STREET PRINT OR DIFFERENT TEXTURE).
- NARROW TRAVEL LANES.
- PROVIDE ADDITIONAL LANDSCAPING ON EACH SIDE OF ROUTE 4 IF POSSIBLE.
- COORDINATE TRAFFIC SIGNAL AT WALMART WITH TRAFFIC SIGNALS TO THE NORTH.
- NEW DEVELOPMENT AND/OR REDEVELOPMENT SHOULD PROVIDE PEDESTRIAN ACCESS.
- CONSIDER TRAFFIC CALMING AND PEDESTRIAN ACCOMODATIONS ALONG THOMPSON HILL ROAD. (IN ADDITION, IF EAST SIDE ROUTE 4 SIDEWALKS PROVE DIFFICULT IN THIS SECTION SIDEWALKS HERE WOULD PROVIDE ADEQUATE PEDESTRIAN ACCESS WITHIN THE CORRIDOR)

Option 1: Restrict Access To Right-in/Right-out Only.
Option 2: Realign Roadway To Form A Standard "T" Intersection.

New Flush Median (Street Print or Textured)

Approximate Existing R.O.W.

New Sidewalk

New Bike Lanes

New Flush Median (Street Print or Textured)

As Redevelopment Occurs, Provide Shared Access And Reduce The Number Of Driveways

Third Avenue Extension

Approximate Existing R.O.W.

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BETWEEN 3RD AVENUE EXTENSION AND MANNIX ROAD:

- PROVIDE 5 FOOT BIKE LANES ON BOTH SIDES OF ROUTE 4.
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Town of East Greenbush, NY
Route 4 Corridor Study

3rd Avenue Extension to Mannix Road

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BETWEEN 3RD AVENUE EXTENSION AND MANNIX ROAD:

- PROVIDE 5 FOOT BIKE LANES ON BOTH SIDES OF ROUTE 4.
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- NARROW TRAVEL LANES.
- PROVIDE ADDITIONAL LANDSCAPING ON EACH SIDE OF ROUTE 4 IF POSSIBLE.
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Town of East Greenbush, NY
Route 4 Corridor Study

3rd Avenue Extension to Mannix Road

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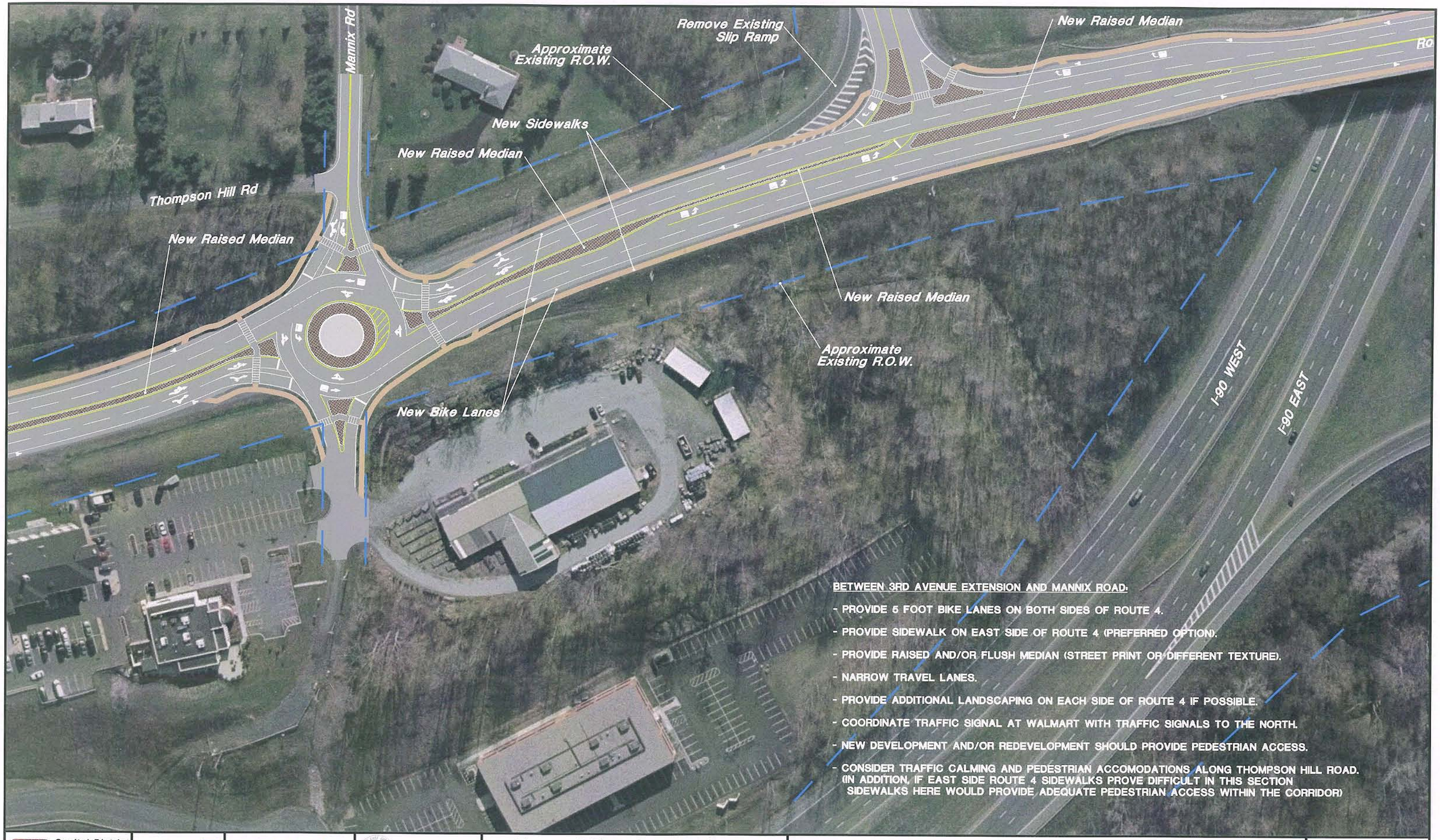

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Town of East Greenbush, NY
Route 4 Corridor Study

3rd Avenue Extension to Mannix Road

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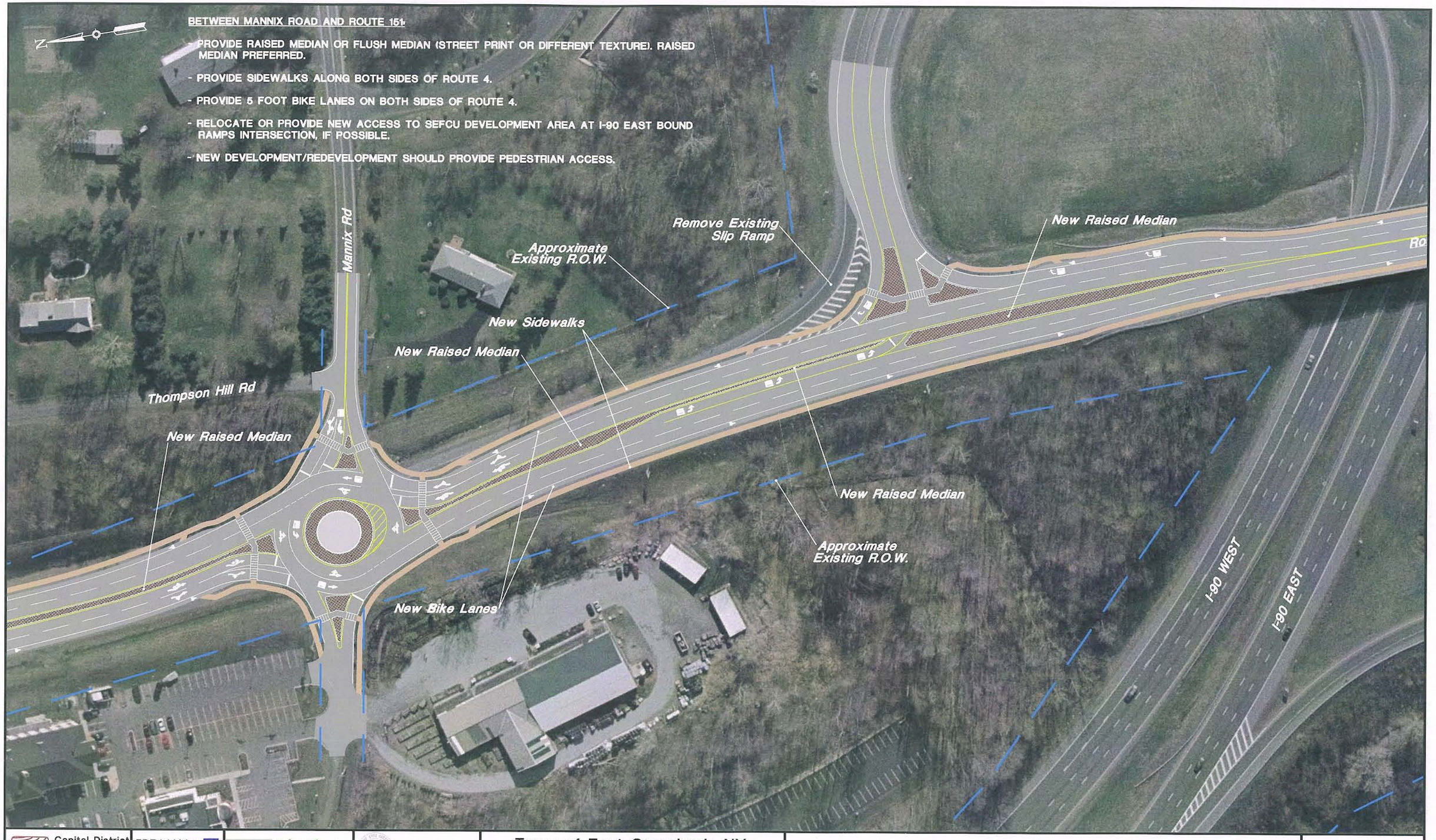

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I-90 WEST

I-90 EAST

Approximate Existing R.O.W.

New Raised Median

New Sidewalks

New Bike Lanes

Route 4

New Raised Median

Entrance Ramp to I-90 East

Approximate Existing R.O.W.

Exit Ramp from I-90 East

SEFCU Development Entrance Alternative

BETWEEN MANNIX ROAD AND ROUTE 151:

- PROVIDE RAISED MEDIAN OR FLUSH MEDIAN (STREET PRINT OR DIFFERENT TEXTURE). RAISED MEDIAN PREFERRED.
- PROVIDE SIDEWALKS ALONG BOTH SIDES OF ROUTE 4.
- PROVIDE 5 FOOT BIKE LANES ON BOTH SIDES OF ROUTE 4.
- RELOCATE OR PROVIDE NEW ACCESS TO SEFCU DEVELOPMENT AREA AT I-90 EAST BOUND RAMPS INTERSECTION, IF POSSIBLE.
- NEW DEVELOPMENT/REDEVELOPMENT SHOULD PROVIDE PEDESTRIAN ACCESS.

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Mannix Road to Route 151

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BETWEEN MANNIX ROAD AND ROUTE 151:

- PROVIDE RAISED MEDIAN OR FLUSH MEDIAN (STREET PRINT OR DIFFERENT TEXTURE). RAISED MEDIAN PREFERRED.
- PROVIDE SIDEWALKS ALONG BOTH SIDES OF ROUTE 4.
- PROVIDE 5 FOOT BIKE LANES ON BOTH SIDES OF ROUTE 4.
- RELOCATE OR PROVIDE NEW ACCESS TO SEFCU DEVELOPMENT AREA AT I-90 EAST BOUND RAMPS INTERSECTION, IF POSSIBLE.
- NEW DEVELOPMENT/REDEVELOPMENT SHOULD PROVIDE PEDESTRIAN ACCESS.

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Town of East Greenbush, NY
Route 4 Corridor Study

Mannix Road to Route 151

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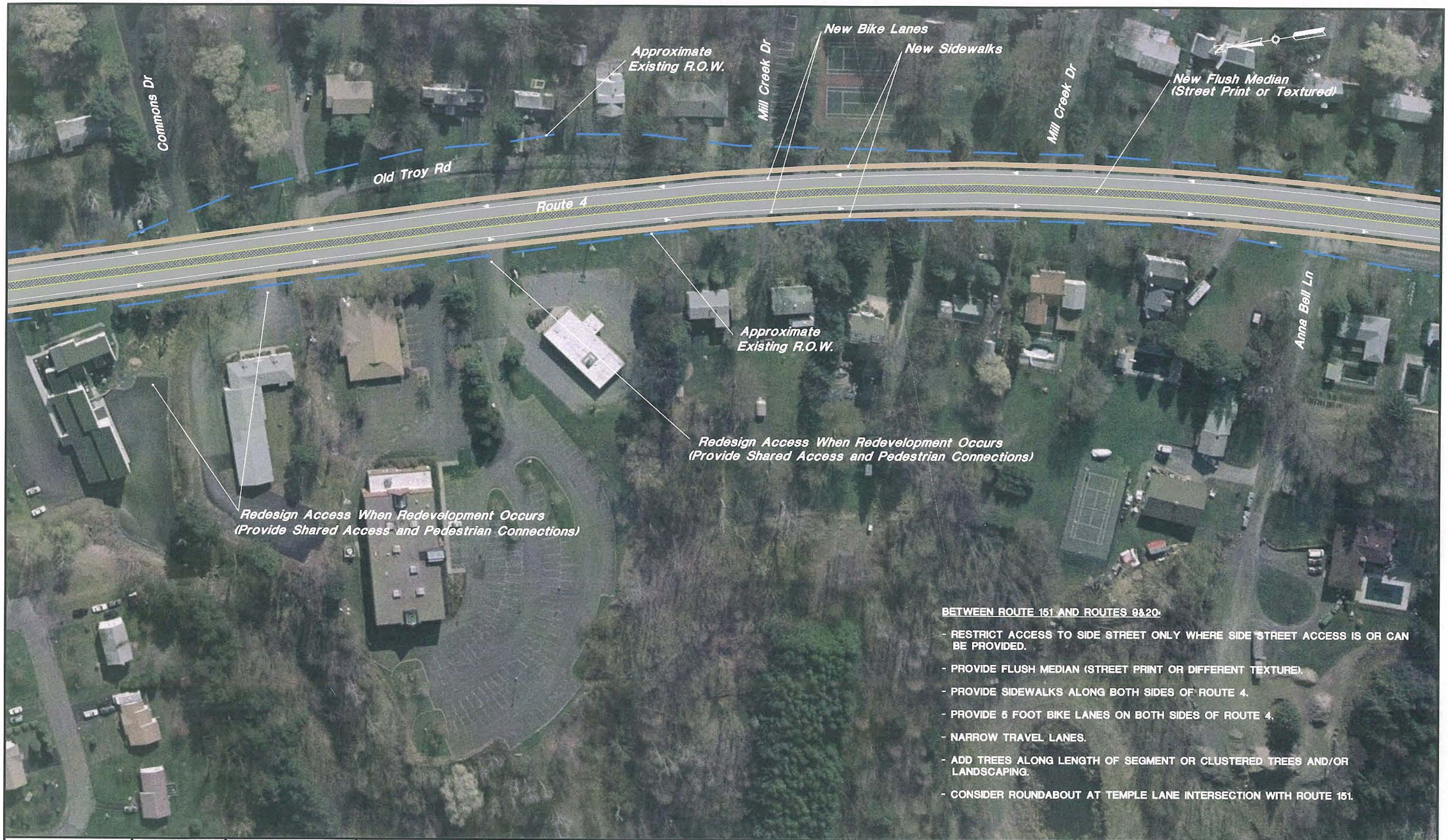

BETWEEN ROUTE 151 AND ROUTES 9&20:

- RESTRICT ACCESS TO SIDE STREET ONLY WHERE SIDE STREET ACCESS IS OR CAN BE PROVIDED.
- PROVIDE FLUSH MEDIAN (STREET PRINT OR DIFFERENT TEXTURE).
- PROVIDE SIDEWALKS ALONG BOTH SIDES OF ROUTE 4.
- PROVIDE 5 FOOT BIKE LANES ON BOTH SIDES OF ROUTE 4.
- NARROW TRAVEL LANES.
- ADD TREES ALONG LENGTH OF SEGMENT OR CLUSTERED TREES AND/OR LANDSCAPING.
- CONSIDER ROUNDABOUT AT TEMPLE LANE INTERSECTION WITH ROUTE 151.

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Town of East Greenbush, NY
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Route 151 to Route 9&20

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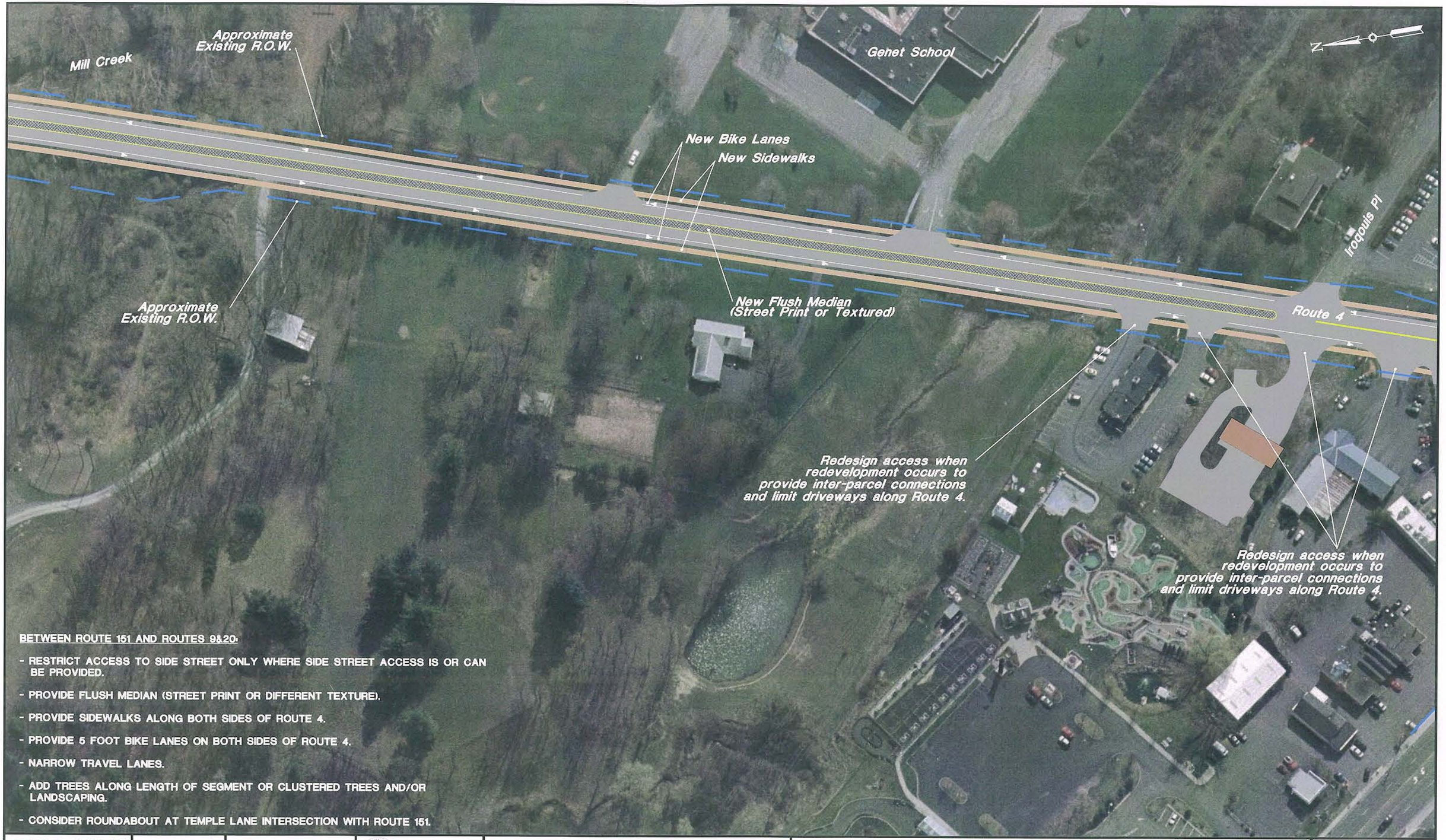

BETWEEN ROUTE 151 AND ROUTES 9&20:

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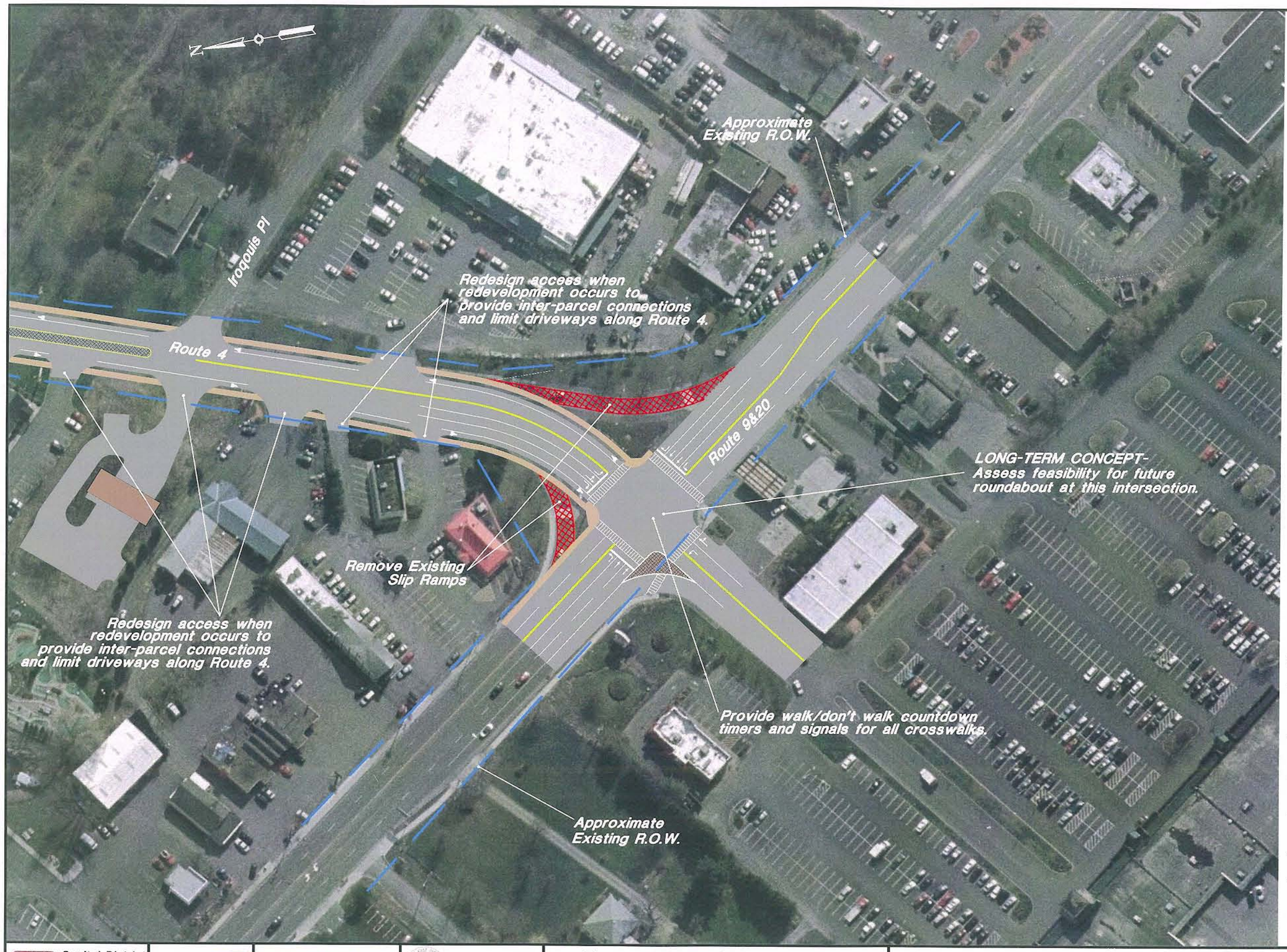
- ADD TREES ALONG LENGTH OF SEGMENT OR CLUSTERED TREES AND/OR LANDSCAPING.
- CONSIDER ROUNDABOUT AT TEMPLE LANE INTERSECTION WITH ROUTE 151.

Capital District Transportation Comittee; ERDMAN ANTHONY; Behan Planning Associates, LLC; Town of East Greenbush	Town of East Greenbush, NY Route 4 Corridor Study	Route 151 to Route 9&20	Drawing 15 of 16



BETWEEN ROUTE 151 AND ROUTES 9&20:

- RESTRICT ACCESS TO SIDE STREET ONLY WHERE SIDE STREET ACCESS IS OR CAN BE PROVIDED.
- PROVIDE FLUSH MEDIAN (STREET PRINT OR DIFFERENT TEXTURE).
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- PROVIDE 5 FOOT BIKE LANES ON BOTH SIDES OF ROUTE 4.
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Route 4 Corridor Study

Route 151 to Route 9&20

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