US Route 4 Corridor Study Inter-Municipal Update

Final Concept Report

September 2024

CAPITAL REGION Transportation Council

Engineering
Architecture
Landscape Architecture
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The US Route 4 Corridor Study Inter-Municipal Update is intended to provide a framework for advancing corridor improvements and connectivity for all modes of transportation on the US Route 4 corridor consistent with the Towns' visions for the community. The Concept Plan recommendations are conceptual in nature, and do not commit the Towns of East and North Greenbush or Transportation Council to funding any improvements. The concepts presented in this report may need to be investigated in more detail before any funding commitment is made. Undertaking additional engineering or other follow-up work will be based upon funding availability.

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Executive Summary

The US Route 4 corridor in the Towns of East and North Greenbush has undergone population growth and increased employment opportunities. With the speed of this transformation, the existing infrastructure is stressed with increased traffic and visitor volumes. This is evident in the queues and delays experienced during the midday and evening peak hours along this corridor at the signalized intersections at NY Route 43, Bloomingrove Drive, Grandview Drive, 3rd Avenue Extension, and Rensselaer County Plaza. If these impacts are not mitigated, the continued development will further increase vehicular volumes along the corridor causing additional degradation of operations and additional increases in vehicular delay.

Infrastructure for other modes of travel like walking and cycling are sporadic. Gaps in pedestrian accommodations are interspersed throughout the corridor, inhibiting pedestrian movement. Public transit is another mode that could be leveraged to decrease the vehicular load on the surrounding roadways.

As part of the ongoing effort to maintain operations through this key corridor, in 2006, the Town of East Greenbush and the Capital Region Transportation Council (formerly the Capital District Transportation Committee) coordinated on the US Route 4 Corridor Linkage Study. Since the completion of the 2006 Linkage Study, the corridor underwent significant changes, requiring an exhaustive update, including assumptions and recommendations. The Town of East Greenbush has recently updated their Comprehensive Plan and Comprehensive Zoning Plan along with updating the Western East Greenbush Generic Environmental Impact Statement (GEIS) as part of the Town's ongoing actions to proactively keep the Town's policies in line with current and planned development.

US Route 4, an important arterial in the regional network, is owned and maintained by the New York State Department of Transportation (NYSDOT) with the County Residency located opposite 3rd Avenue Extension. Ongoing coordination with and review by NYSDOT was critical throughout the entire process to ensure the analysis and recommendations were acceptable.

The corridor needs a comprehensive and connected system to continue to accommodate vehicular traffic while allowing those who prefer or require the use of other forms of transportation other than a personal vehicle, to do so safely and efficiently.

This Study explored corridor concepts to support future growth and development. The concepts considered all roadway users and abilities, including pedestrians, transit riders, children, elderly, people with disabilities, freight transportation, and other vehicular traffic. The consideration of the vulnerable populations that experience obstacles in transportation and rely on walking, cycling, or public transit as their primary mode of transportation was included as well. These populations include lower wage earners, people with disabilities, individuals over 65 or under 16 years of age, those whose primary language is not English, and people of color.

The evaluation of the existing conditions allowed the deficiencies of the corridor to be identified. This included a review of the zoning, land use, property ownership, roadway characteristics, pedestrian accommodations, freight, transit, traffic analysis, crash history, environmental resources, and environmental justice. The deficiencies noted were pedestrian and bicycle infrastructure, intersection and roadway capacity, and crash history. The pedestrian and bicycle infrastructure lack continuity throughout the corridor. Some pedestrian facilities exist within the primary study area but are sporadic and make accessing the entire corridor difficult, if not impossible, depending on personal abilities.

The capacity results of the roadway segment south of 3rd Avenue Extension and the intersections with NY Route 43 and 3rd Avenue Extension are below Level of Service (LOS) D for overall intersections and LOS D for the mid-block analysis. The crash history showed that the roadway segments and the intersections of 3rd Avenue Extension and Rensselaer County Plaza had crash rates above the statewide average for similar facilities.

In addition to the deficiencies noted above, the steep slopes and overall topography on the southern end of the primary study area presents challenges to increasing the width of the roadway to allow for additional vehicular capacity.

Using the data gathered and analyzed as part of the existing conditions review, concepts were developed to address the deficiencies identified. From the beginning of the study, the goal of the concepts was to provide short, medium, and long-term solutions for the corridor. The concepts developed are as follows:

1. **Optimized Signal Timing & Improved System Coordination**
   This concept proposes to update the signal system coordination between intersections to allow for improved vehicular progression through the corridor with the reduction of queue spilling.
2. **Service Roads**
   A total of nine (9) service road options were considered that were reduced to the four (4) with the highest potential to reduce traffic on US Route 4. They are located on the west side of US Route 4 and generally connect with at least two of the following roads: Bloomingrove Drive, NY Route 43, Greenbush Commons, and 3rd Avenue Extension.
3. **Additional US Route 4 Northbound Lane**
   This concept builds on Concept 1, with more capacity provided by the additional northbound lane.
4. **Roundabout Intersections**
   This concept proposed converting the five (5) signalized intersections to roundabouts.
5. **Signalized and Roundabout Intersections**
   This concept includes signalized intersections at NY Route 43 and Bloomingrove Drive and roundabout intersections at Greenbush Commons, 3rd Avenue Extension, and Rensselaer County Plaza.

Included in these concepts are access management practices to reduce driveways where possible, bicycle and pedestrian circulation plan, and zoning text amendments.

The analysis of the above-mentioned concepts revealed the preferred short-term improvements that will provide an immediate benefit to the traveling public. The implementation of the medium and long-term improvements will be identified through analysis of US Route 4 traffic after the short-term improvements have been introduced. This analysis will identify current and future challenges and will guide the implementation schedule for future improvements.

The short-term improvements include signal optimization and coordination as described in Concept No. 1. This could include the installation of an adaptive traffic signal control system which as its name suggests, adapts the signal timing to the current volumes the corridor is experiencing, allowing for the system itself to modify the timings for continued efficiency.

The medium-term improvements consist of any combination of the service roads from Concept No. 2. These service roads are low speed local roads with two (2) lanes and pedestrian/bicycle infrastructure. The traffic volumes along the corridor will need to be monitored to determine when traffic operations are declining and when a traffic analysis would be performed to determine which of the configurations is appropriate at that time. This will ensure the corridor can support the increase in vehicular volumes with increased capacity. Coordination with CDTA will be required to explore the possibility of relocating bus stops to these service roads.

The Service Road concepts could be introduced with any of the other concepts. During each phase of implementation, the service road benefits would need to be analyzed to determine the appropriate time for implementation. The service road options can also be done in parts to address future traffic conditions as the need and benefit are realized.

The long-term improvement includes Concept No. 3 with an additional northbound travel lane to address the reduced capacity for northbound traffic and the installation of new traffic signals with adjusted signal timings. This will allow an opportunity to construct new sidewalks to close the gaps in the system along US Route 4. Bicycle accommodations could include shared lane use or a dedicated bike lane, depending on the location within the corridor.

The concepts presented satisfy the study goals and provide the Towns with short, medium, and long-term projects to implement as development along the corridor, and within the local region as well, continues to grow. The improvements presented in this report reflect the objectives and strategies set forth in the Capital Region Congestion Management Process (CMP). The continued growth is expected to bring more workers and patrons to the corridor, reinforcing the need to maintain acceptable levels of vehicular operation and access for users of other modes of transportation at the intersections and throughout the corridor.

The study area is illustrated in Figure 1.1.

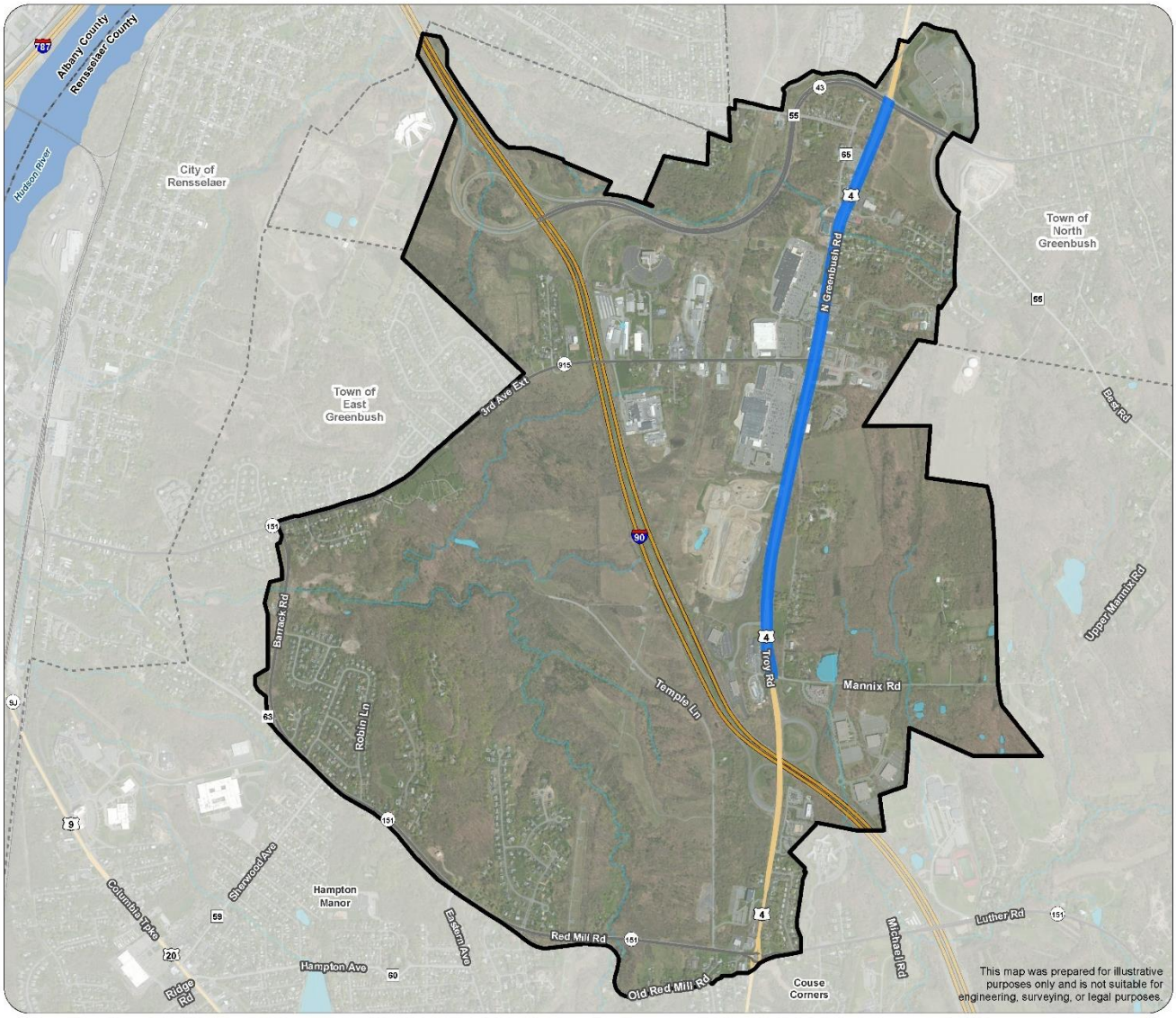

Figure 0.1 Study Area

1 Introduction

The Town of East Greenbush, nestled within the picturesque Rensselaer County, boasts a landscape characterized primarily by suburban and rural land uses. Over the past two decades, East Greenbush has undergone a remarkable transformation, experiencing significant population growth and burgeoning employment opportunities. This rapid development has inevitably exerted pressure on the Town's resources and infrastructure, particularly along the US Route 4 Corridor. Notably, the neighboring Town of North Greenbush shares similar patterns of land use change within the northern portion of this corridor.

Figure 1.2 US Route 4 Photo Viewing North

The US Route 4 Corridor Study Inter-Municipal Update was conducted by the Capital Region Transportation Council (Transportation Council) and the Town of East Greenbush.

Background

US Route 4, a key thoroughfare, runs through both the Town of East Greenbush and its northern neighbor, the Town of North Greenbush, with an array of large-scale commercial and retail establishments. In 2006, in collaboration with the Transportation Council the Town of East Greenbush embarked on the US Route 4 Corridor Linkage Study. Since then, this corridor and its surrounding areas have undergone substantial evolution, necessitating a comprehensive update to the assumptions and recommendations laid out in the previous study. Furthermore, this study takes a more focused look at the northern portion of the corridor. As shown on the Project Area Map below, the primary study area is the 1.7-mile section of US Route 4, starting at the Mannix Road roundabout and heading north into North Greenbush, ending at the NY Route 43 intersection. The secondary study area, also identified on the Project Area Map, includes a larger portion of the land surrounding US Route 4.

The Town of East Greenbush has taken proactive steps to keep pace with development, including a recent update of the Comprehensive Plan and ongoing revisions of the Comprehensive Zoning Laws. As a final phase of these efforts, the Town is also updating the Western East Greenbush

GEIS, with the expectation that the findings and recommendations from this Study will be seamlessly incorporated into the GEIS. Additionally, the Town has implemented a land development impact mitigation fee system, grounded in the GEIS.

The US Route 4 Corridor, owned and operated by NYSDOT, is a critical transportation artery in the region. With NYSDOT's Rensselaer County Residency located within the study area, it was crucial that close coordination with NYSDOT was maintained throughout the entire process. The surge in development pressure and the potential for ongoing growth underscore the need to revisit the assumptions and recommendations of the 2006 US Route 4 Corridor Study.

Purpose of the Study

The primary objective of this updated US Route 4 Corridor Study is to account for the changes since 2006, address existing traffic operation deficiencies, identify necessary improvements to accommodate future growth, and recommend enhancements to the transportation systems for and along the corridor. This Study will explore alternative corridor profiles and develop a Corridor Concept Plan spanning from Mannix Road to NY Route 43, encompassing the Town of East Greenbush and the Town of North Greenbush. The Corridor Concept Plan aligns with the towns' shared goals, focusing on enhancing the US Route 4 corridor, improving mobility, reducing traffic congestion, promoting economic development, enhancing safety, and creating a seamless and integrated multi-modal transportation network.

The purpose of the study is to determine feasible concepts along with an opinion of probable costs that can be used by the Town to prioritize improvements and apply for funding to ultimately design and construct the recommended improvements. This study will identify potential improvements to the US Route 4 corridor that would enhance its walkability and bikeability, improve traffic congestion, and improve its appearance, making the area more appealing to everyone.

Scope of the Study

The intended outcome of this Study is a preferred corridor profile, rooted in extensive public input, which will provide a clear implementation strategy to enhance transportation operations, support future growth and development, and align with the Town of East Greenbush's vision. This Study will consider the diverse needs of all users, including pedestrians, bicyclists, motorists, transit users, freight transportation, children, the elderly, and people with disabilities. A fundamental objective is to address the transportation-related needs of individuals who traditionally experience disadvantages in transportation, encompassing those who rely on walking or cycling as their primary mode of transport, people of color, lower wage

earners, those without personal vehicles, people with disabilities, individuals over 65 or under 16 years of age, and those whose primary language is not English. These needs encompass areas such as clean air, access to schools, parks, business districts, employment locations, traffic crash avoidance, increased physical activity, safety, security, and access to available and affordable housing.

This project was widely advertised through various channels, including the towns' websites, social media, and local notices, to encourage the active participation of all residents in the public input process. The success of this study relies on a collaborative effort to ensure that the US Route 4 Corridor adapts to meet the evolving needs of our community and continues to be a thriving, vibrant, and accessible part of our region's transportation network.

2 Literature Review and Best Practices

The Town of East Greenbush, in cooperation with State and local agencies, has completed a series of planning efforts that support revitalization and community growth within the Town. The documents identified include a number of recommendations that have previously been completed by the Town(s) and several that have yet to be implemented. The studies and plans relevant to the Study area are summarized below.

Town of East Greenbush Comprehensive Plan (2021)

The Town's most recent update to its Comprehensive Plan was adopted in May 2021. In addition to providing an overview of existing conditions within the Town, the plan includes recommendations and provides a roadmap to the future development of East Greenbush.

The Comprehensive Plan identifies US Route 4 as a priority corridor within the Town and sets forth a variety of targeted recommendations related to placemaking as well as transportation and mobility:

- Focus commercial development around key nodes along the Columbia Turnpike and US Route 4 and ensure pedestrian and bicycle connections to those areas.
- Create walkable nodes with unique, identifiable character that have access to services, housing, and commercial establishments.
- Integrate public art into streetscape improvements (e.g., light poles, gateway signage, bus shelters, etc.) where appropriate.
- Identify and develop new Town-wide connections to help alleviate traffic pressures along US Route 4 and connect the Town's major nodes and destinations.
- Work with CDTA to evaluate existing service levels and routes and expand public transit options along US Routes 9, 20, and 4 to help alleviate traffic, connect neighborhoods, and offer transportation alternatives for residents.
- Continue to identify and bridge sidewalk gaps, and provide new sidewalk connections, particularly along Columbia Turnpike, US Route 4 and connections to US Route 4.
- Use traffic calming measures to encourage walking and biking and improve safety (e.g., landscape medians, pavement treatments, bike lanes, street trees and planters), and provide alternatives for pedestrians including trails, sidewalks, and appropriate road crossings at intersections.

Carver Court Residential Development Traffic Impact Evaluation (2021)

A traffic impact evaluation was conducted in 2021 for Carver Court, a proposed 110-lot single-family residential development whose primary access road is projected to intersect with Upper Mannix Road just east of US Route 4 in the Town of East Greenbush. The development, which is slated for completion by 2026, is expected to generate 111 new vehicle trips during the PM peak hour and 83 trips during the AM peak hour, according to the traffic impact evaluation. Traffic volume data collected in February 2021 showed that Upper Mannix Road served approximately 870 vehicles per day near the proposed site. The evaluation noted that there are no sidewalks on Upper Mannix Road – requiring pedestrians and cyclists to share the road with motor vehicles – and the nearest public transit stop is located roughly one mile northwest of the proposed project site, at the Walmart Supercenter on US Route 4.

Town of East Greenbush Complete Streets Policy (2019)

A Complete Streets policy for the Town of East Greenbush was adopted by the Town Board in November 2019. Supported by Section 331 of the Highway Law of the State of New York, which encourages municipalities to consider Complete Streets design features in all phases of local transportation projects, the Town's policy states:

> *[t]he appropriate Town Departments, including Planning and Zoning, and Public Works shall consider the safe and efficient accommodation of bicyclists, pedestrians, transit users, and those involved in goods movement in all new street construction and street reconstruction undertaken by the Town of East Greenbush.*

The Town's adopted policy formally recognized pedestrians and cyclists as equally important to motorists in street planning and design, and established safe and convenient access for all roadway users as its fundamental goal. Anticipated benefits of Complete Streets implementation include increased capacity and efficiency of the road network, reduced traffic congestion, increased safety and accessibility of the network, limiting greenhouse gas emissions and improving general quality of life.

Key elements of the adopted resolution include:

- The Town should coordinate with CDTA while consider Complete Streets improvements. Providing residents and employees with safe access to and from transit stops shall be considered in relevant locations.
- Traffic calming applications help to physically or psychologically calm motor vehicle traffic behaviors thereby aiding in the development of a safe environment for bicycle and pedestrian travel.

- To administer this Policy, the Director of Planning and Zoning will develop implementation strategies, which may include a Complete Streets Checklist, and the Director of Planning and Zoning and Commissioner of Public Works will use these strategies to evaluate all public transportation projects.

Western East Greenbush Final Generic Environmental Impact Statement (2009)

A Final Generic Environmental Impact Statement for Western East Greenbush (FGEIS) (2009) was prepared by the Town of East Greenbush. The FGEIS acknowledges that planning efforts will be required along the US Route 4 Corridor as growth pressures continue within the Town. The FGEIS includes several traffic mitigation recommendations for major transportation arteries in the Town, including the US Route 4 Corridor study area. The FGEIS highlights that higher than desired travel speeds and safety are major issues in this area. The recommendations were created to address concerns that motorists, pedestrians, bicyclists, and transit riders and operators share. Key mitigation identified in the FGEIS include the following:

- Coordinate the Wal-Mart traffic signal with the existing traffic signals along US Route 4 north of Wal-Mart to NY Route 43 in North Greenbush.
- Narrow travel lanes, if possible.
- Install a 5-foot bike lane along US Route 4 in each direction.
- Install sidewalks with ADA-compliant ramps on both sides of US Route 4.
- Provide additional landscaping on each side of US Route 4 to calm traffic speeds, where possible.
- New development or redevelopment should provide pedestrian access, including pedestrian paths on-site. Cost shall be incurred by the affected developers alone and is not included in the improvement costs shown in this report.
- In conjunction with the addition of sidewalks, paired bus stop installation should be considered where there are signalized crosswalks. Ideally, bus stops should include an expanded sidewalk pad to accommodate the installation of benches and/or shelters.
- Consider modifying the alignment of the Thompson Hill Road intersection with US Route 4 to make it a “T” intersection or restrict access to right-in/right-out only.
- Provide support for increasing transit service levels on this major corridor as a long-term traffic mitigation strategy by ensuring that all development and redevelopment proposals specifically consider pedestrian and transit access at the site plan level.

East Greenbush working in conjunction with DOT and local developers have implemented the following from 2009 FGEIS recommendations:

- ✓ Install WALK/DON’T WALK count down signals at the US 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.
- ✓ Install a 2-lane roundabout with appropriate landscaping, signage, lighting, provisions for pedestrians and transit stops, and medians at the US Route 4 and Mannix Road Intersection.
- ✓ Install a 2-lane roundabout with appropriate landscaping, signage, lighting, provisions for pedestrians and transit stops, and medians at the US Route 4 and 3rd Avenue Ext. (NY Route 915E) Intersection.

Comprehensive Zoning Law of the Town of East Greenbush (2008)

The Comprehensive Zoning Law of the Town of East Greenbush (2008) was adopted by the Town on June 11, 2008. As of 2022, the Town is currently in the process of updating the zoning code to be consistent with the adopted Comprehensive Plan. The Zoning Code describes the Town's zoning districts, town-wide zoning standards, and general administration details. The Zoning Section (p. 11) of this document further details the zoning in the area and includes a zoning map of the area.

US Route 4 Corridor Study – Town of East Greenbush (2006)

The US Route 4 Corridor Study (2006) for the Town of East Greenbush was prepared in partnership with the Capital Region Transportation Council. The Study Area focused on a four-mile corridor along US Route 4 starting at the north end, at NY Route 43, and going south to US Routes 9 and 20. The US Route 4 Corridor Study aimed to create a framework for potential transportation improvements and local land management to accomplish the Town's land-use and transportation vision and goals. The study combines information on existing conditions, traffic forecasting, and future land use development assumptions to create a US Route 4 Corridor Transportation Plan that highlights recommendations for the study area. The following is a summary of relevant recommendations from the study:

- Any additional future development may trigger the need for additional roadway capacity from NY 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 US Route 4 to address existing and future congestion.

- 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 Bloomingrove Drive/Rte. 4 intersection was identified as a location of concern meriting further attention.
- 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 US 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.
- The Town of East Greenbush should consider modifying the alignment of the Thompson Hill Road intersection with US Route 4 to make it a "T" intersection or restrict access to right-in/right-out only.
- New development or redevelopment should include site designs that minimize walking distances to US 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, the use of transit will be supported and more attractive.

Town of North Greenbush Zoning Code (Rev. 2016)

The zoning code for the Town of North Greenbush was adopted by the Town Board in 1981 and amended in its entirety in 2016. The purpose of the Zoning Code is to divide the Town into zoning districts and regulate the use, occupancy, location, construction and alteration of Town land for the promotion of the general welfare. The Zoning Section (p. 11) of this document further details the zoning in the area.

Town of North Greenbush Comprehensive Plan (2009)

The primary purpose of the Comprehensive Plan for the Town of North Greenbush (adopted 2009) was to provide a framework for future investment and decision-making in the community. The Plan articulates an overall vision for the Town and the means to achieve the objectives set forth.

The Comprehensive Plan contains information on existing conditions within the Town, including the condition of the transportation network. US Route 4 is identified as the Town's major north-south route, linking the cities of Troy and Rensselaer and beyond. Exit 8 on Interstate 90 provides access to Defreestville and US Route 4. According to NYS Department of

Transportation figures, the Average Annual Daily Traffic (AADT) on the section of US Route 4 from NY Route 43 to Winter Street Extension/County Road 74 was 15,232. Citing data from the 2000 Census, an analysis of commuter patterns in the Town showed that three-quarters (74.9%) of the North Greenbush resident labor force had commute times under twenty-five (25) minutes – a significantly higher percentage than for residents of Rensselaer County or New York State, as a whole.

The *Policy & Implementation* chapter of the Comprehensive Plan includes actions and objectives related to Transportation & Mobility and Land Use, many of which pertain to the US Route 4 Corridor. Examples of these actions and objectives include:

- Create multi-modal transportation opportunities along US Route 4 and manage access to better serve the residential and commercial properties in the Town
- Adjust the intersections of pedestrian, bicycle and motorized traffic, especially in heavily traveled areas, to ensure the safety of each of these modes of transportation
- Encourage the New York State Department of Transportation (NYSDOT) to advance the US Route 4 and I-90 Connector project
- Encourage mixed-use areas in the hamlets and along US Route 4 to provide a rich diversity of housing and small commercial venues

Town of North Greenbush US Route 4 & I-90 Connector Corridor Land Use Planning Study (2006)

The focus of this corridor and land use study was a proposed road that would connect at the SR 43/Interstate 90 off ramp at Exit 8 near Defreestville, run parallel to US Route 4 on the west side of the Rensselaer Tech Park, and intersect with US Route 4 across from Hudson Valley Community College. The study addressed the potential land use impacts of the so-called I-90 Phase II Connector, as well as the impacts of the I-90 Phase I, which created a new intersection at the junction of NY Route 43 and US Route 4. The study comprised an inventory and analysis of existing land uses, a smart growth audit, and a retail market analysis for the given study area. The two overarching goals for the study were:

- Preserve the Town's character and natural resources while supporting balanced high-quality growth that fosters a sense of place and adds value to the community
- Manage traffic and provide efficient, safe multi-modal transportation routes for pedestrians, bicyclists, transit and motor vehicles

Key findings of the Study included:

- The strip/linear commercial zoning along US Route 4 results in a traffic pattern that is auto-dependent

- The Connector may ease US Route 4 congestion in the short-term but in the longer term is anticipated to intensify development along the US Route 4 corridor
- The demand for residential uses near the Connector would increase once the Connector was constructed

Capital Region Transportation Council Capital District Trails Plan (2018)

The Capital District Trails Plan focuses on the role and impact of multi-use trails within the larger transportation system of the region. The goal of the plan is to develop an updated vision for a seamless regional transportation network that connects cities, towns and villages throughout the Capital District. Multi-use trails are identified as complementing local roadway infrastructure and public transit systems, providing a host of economic, environmental and cultural benefits to the communities in which trails are located.

The Trails Plan notes the completion of the vision concept for the Albany-Hudson Electric Trail (AHET), involving the conversion of a rail ROW into a multi-use path that crosses US Route 4 just north of US Route 20 in the Town of East Greenbush. The 15.6-mile section of the AHET located within the Capital District represents a component of the larger 750-mile Empire State Trail system, which stretches from New York City to the Canadian border and from Albany to Buffalo.

The Trails Plan provides data to support the socio-economic benefits of multi-use trails, including figures on tourism and consumer spending, as well as the effect that proximity to trails has on property values. In addition to providing trails management best practices and an implementation roadmap, the Trails Plan includes appendices that capture trail construction impacts, residential property value impacts, and annual trail-related spending impacts.

Capital Region Transportation Council Regional Freight Plan (2016)

The Transportation Council, the metropolitan planning organization for the four counties of New York's capital region – Albany, Rensselaer, Saratoga, and Schenectady – undertook a Freight and Goods Movement Study to better understand the role and profile of freight transportation throughout the region. The resulting Regional Freight and Goods Movement Plan provides a snapshot of conditions for multiple freight modes – i.e., truck, rail, water, air, and pipeline – in the Capital District and identifies gaps to be addressed through near- and long-term capital investments and policy initiatives.

The predominant freight mode within the US Route 4 Corridor study area is truck freight. The Capital Region Transportation Council Regional Freight and Goods Movement Plan notes that when freight moves via truck, it affects roadway safety, bridge and pavement condition,

congestion, and community quality of life. It is vital for local governments to work cooperatively at a regional level to promote a safe and effective regional road network.

The Regional Freight Plan includes defined typologies of freight routes and freight-related land uses. Also included are suggested regulatory and planning tools for local governments to consider when addressing freight-related activities within their respective jurisdictions:

- Regulatory Tools
- Road Use Agreements
- Local Truck Routes
- Community Benefit Agreements
- Zoning-Freight Overlay Districts
- Light and Noise Pollution Controls
- Special Tax Districts

Planning Tools

- Freight Related Traffic Impact Analysis
- Off-Peak Delivery Programs
- Vegetated Buffer Zones
- Freight Clusters
- Collaborative Crossing Improvements
- Freight Priority Network-Centric Growth
- Industrial Infill Incentives
- Delivery Consolidation Programs
- Context-Sensitive Design Specifications

3 Existing Conditions Overview

The Existing Conditions Technical Memorandum provides a comprehensive overview of the current state of the US Route 4 Corridor, emphasizing the key components that influence transportation and land use planning. This memorandum aims to inform future recommendations by assessing various factors, including zoning, land use, property ownership, roadway characteristics, pedestrian accommodations, freight, transit, traffic data and analysis, crash history, environmental resources, and considerations related to environmental justice, limited English proficiency, and environmental mitigation. The following is a brief overview of the sections within the Existing Conditions Technical Memorandum. The full Technical Memorandum can be found in **Appendix II**.

Introduction & Background

Examining the historical context of the corridor, the background section outlines the evolution of the US Route 4 corridor since 2006, highlighting economic growth, infrastructure improvements, and the increasing demand on the existing transportation facilities. The 2006 study incorporates recommendations included in various Generic Environmental Impact Studies (GEIS), the NY Route 151 Linkage Study and the Routes 9 and 20 Linkage Study. This historical perspective sets the stage for understanding the current challenges and opportunities in the study area.

Zoning

An analysis of zoning regulations within the study area reveals the predominant commercial and business nature of the corridor. This section explores how zoning ordinances align with the objectives of the Town of East Greenbush Comprehensive Plan (2021) and other relevant planning documents, emphasizing the regulatory framework that shapes land use along the corridor.

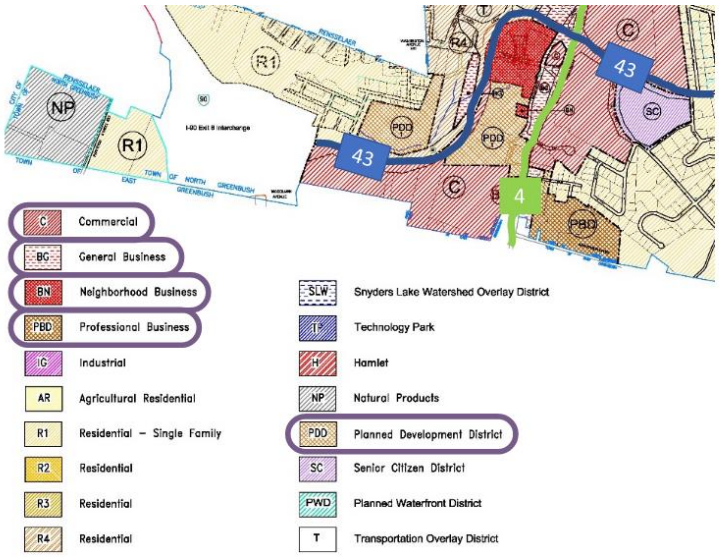

Figure 3.1 North Greenbush Zoning Overview

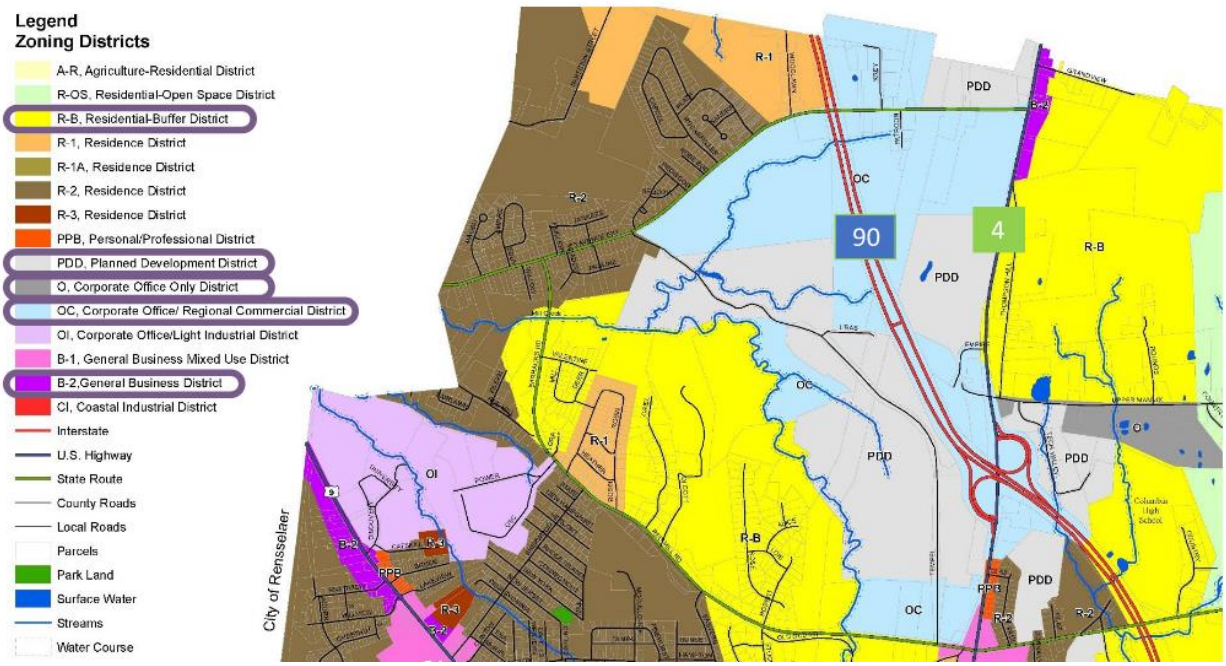

Figure 3.2 East Greenbush Zoning Overview

Land Use

The land use section provides an overview of current land use patterns, focusing on the mix of commercial and residential uses within the primary and secondary study areas. It examines how land use aligns with planning goals, including recommendations from the Town of East Greenbush Comprehensive Plan (2021) and the Town of North Greenbush Comprehensive Plan (2009).

Property Ownership

Understanding property ownership patterns along the corridor is crucial for planning and development. This section analyzes ownership structures and highlights potential implications for future improvements and collaborations among property owners.

Roadway Physical Characteristics

A detailed assessment of roadway physical characteristics explores the existing conditions of the US Route 4 corridor, encompassing aspects such as road width, signage, and landscaping. This examination provides a foundation for identifying potential enhancements that align with the complete streets approach and the goals of the study.

Figure 3.3 US Route 4 Roadway Photo

Pedestrian Accommodations

This section evaluates the current pedestrian infrastructure, including sidewalks, crosswalks, and pedestrian signals, with a focus on safety and connectivity. It highlights areas lacking in infrastructure with the goal of enhancing walkability and accessibility.

Figure 3.4 US Route 4 Pedestrian Accommodations Photo

Freight

Analyzing the role of freight within the corridor, this section assesses the impact of truck freight on safety, congestion, and community life. With the growth of major retailers and continued growth of freight, this is an important topic to address. It also explores the recommendations from the Capital Region Transportation Council Regional Freight Plan (2016) to ensure the efficient and safe movement of goods.

Transit

Examining the existing CDTA transit infrastructure and services along the corridor, this section identifies opportunities to improve connectivity and accessibility for public transportation users. It aligns with the goals of creating a connected and integrated multi-modal transportation network.

Figure 3.5 Defreestville Park and Ride Photo

Traffic Data

An analysis of current traffic data collected in 2022 provides insights into traffic patterns, volume, and congestion levels within the study area. This information serves as a foundation for traffic management strategies and future capacity planning. Figure 3.6 identifies the existing level of service for the existing traffic volumes during the midday and evening peak hours.

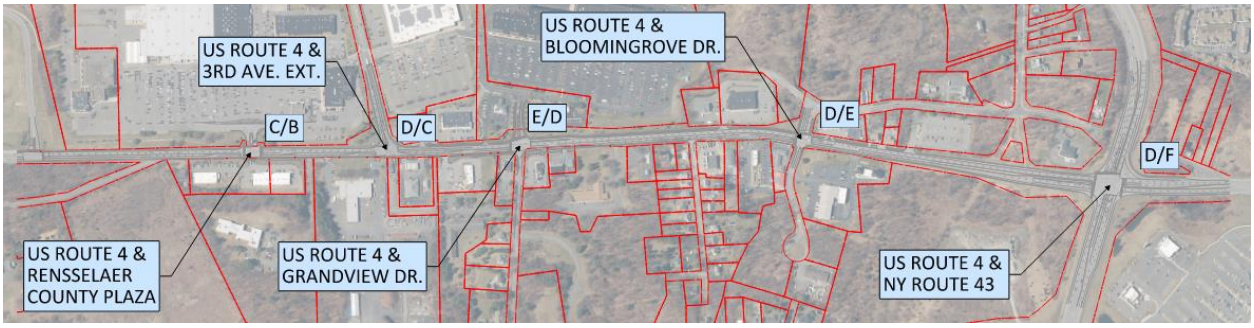

Figure 3.6 Existing Traffic Overview and Midday/Evening Intersection LOS

Crash History

The crash history section examines historical crash data to identify safety concerns and hotspots within the corridor. Its purpose is to inform recommendations for safety improvements and traffic calming measures. The crash heat map provided in Figure 3.7 identifies the locations with the highest crashes with the brightest color.

Environmental Resources

An overview of environmental resources within the study area assesses natural features, including wetlands, water bodies, and green spaces. This analysis helps balance transportation needs with environmental preservation. As noted in previous sections, residents have stated the importance of considering environmental resources in the area.

Environmental Justice, Limited English Proficiency, & Environmental Mitigation

This section addresses considerations of environmental justice, limited English proficiency, and environmental mitigation. It ensures that the study accounts for potential disparities in the impact of transportation improvements and actively works to minimize adverse effects on vulnerable populations. The analysis considers how language barriers may affect community engagement and proposes mitigation measures for potential environmental impacts.

4 Operational Analysis

Analysis of future traffic volumes and potential corridor-wide improvements was conducted using Synchro © traffic simulation software. A complete future operational analysis, concept plans and output files can be found in **Appendix III**.

Future Conditions and Growth

A horizon year of 2045 was selected for the study to assess growth and potential improvements along the US Route 4 corridor. The horizon year was selected based on the standard practice of projecting traffic volumes 20 years in the future and rounding up, in this case 2045 was selected by rounding 2042 to 2045. This approach allows the evaluation of any potential improvements to address current deficiencies in addition to anticipated deficiencies along the corridor up to the horizon year.

Background traffic growth was developed using the Transportation Council's Systematic Traffic Evaluation and Planning (STEP) model. A growth rate for the 2045 horizon year was determined by utilizing the observed growth over the last 20 years within the study area. Under current conditions, the northern portion of US Route 4 within the study area is more densely populated and traveled, therefore two growth rates for the entire corridor were developed. A growth rate of 0.8% was applied to the observed traffic volumes between NY Route 43 and 3rd Avenue Extension. A growth rate of 0.4% was applied to traffic volumes south of 3rd Avenue Extension as this portion of the study area is less populated and has experienced less growth over the past 20 years.

Two scenarios are presented in the report to properly compare existing traffic conditions along the corridor with any of the proposed improvements discussed in the following section of this report. The first scenario projects 2022 volumes to 2045 using the established growth rates with no improvements made along the corridor. The second scenario projects the 2022 volumes to 2045 using the same growth factors as Scenario One, but incorporates the improvements contained in each of the identified concepts. Comparing the concepts analyzed in the two scenarios provides the projected improvement in level of service for each intersection. The following section summarizes the improvements included as part of Concept Nos. 1-5.

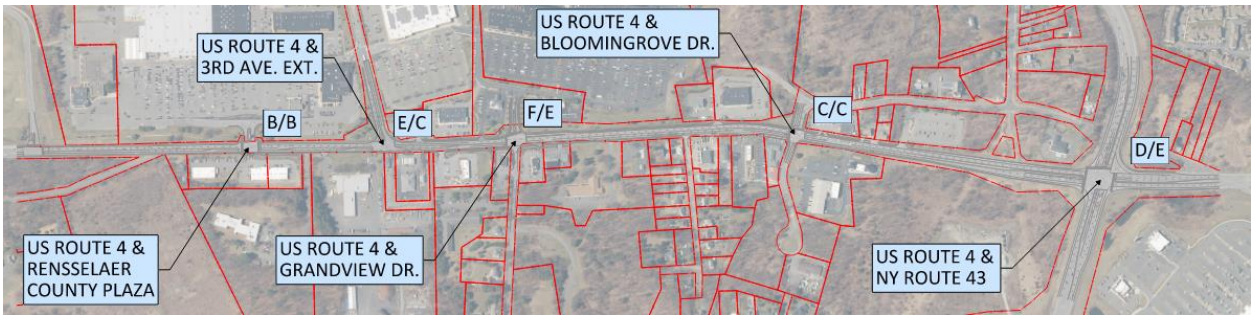

Figure 4.1 Existing Geometry in 2045 and Midday/Evening Intersection LOS

Future Operational Analysis

The anticipated corridor-wide improvements offered by each of the concepts were evaluated using level of service (LOS) to determine the operating conditions of each movement at the study intersections at the specified horizon year of 2045. The traffic simulation software Synchro © was used in this analysis. Five (5) concepts were developed as part of the Future Operational Analysis to ease congestion and promote mobility through the US Route 4 corridor and are summarized below:

Concept No. 1 – Existing Signal Coordination – Improvements in Concept No. 1 consist of optimized signal timings of the five (5) intersections along US Route 4 within the study area. Intersections 2 through 5 will be coordinated to allow northbound and southbound traffic to flow in groups (platoons) through the corridor. Moving vehicles through a corridor in groups provides space for vehicles waiting at upstream signals and entering from side roads to queue at the next signal without overflowing into the intersection.

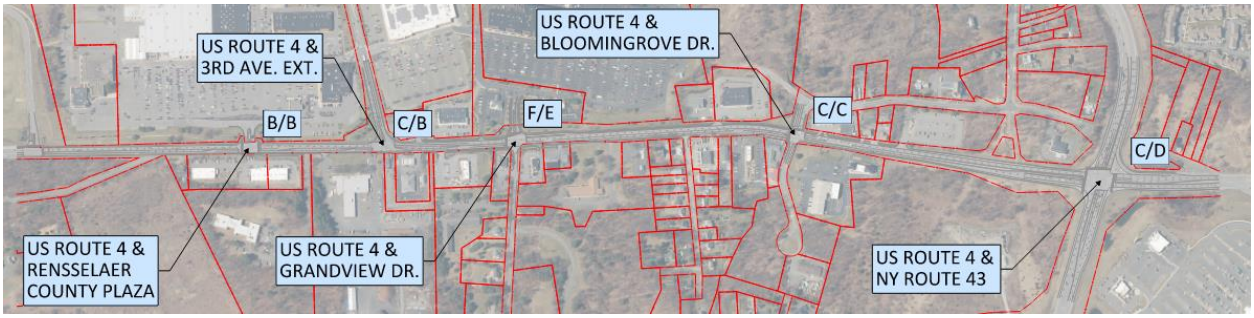

Figure 4.2 Concept No. 1 Overview and Midday/Evening Intersection LOS

The intersection of US Route 4 and NY Route 43 is not coordinated with the other signals in the study area as the high volume of traffic and existing intersection geometry would result in a cycle length that is not compatible with coordination of the other four (4) signals. The signal timing at this intersection will be optimized by removing the split phasing of the eastbound and westbound traffic thus shortening the overall cycle length and reducing the associated delay. The improvements described for this concept are best implemented as a short-term fix to help reduce congestion, with more substantial improvements likely needed to address future traffic.

Concept No. 2 – Service Roads – The improvements presented in Concept No. 2 are presented as an augmentation to any one of the other concepts presented in this report. Nine (9) layouts were determined as potential service road options between Bloomingrove Drive and 3rd Avenue Extension. The Transportation Council's STEP model was used to identify four (4) layouts with the greatest effect on US Route 4 traffic. All service roads are low speed local roads with a single travel lane in each direction. These roads include the option for multi-modal infrastructure such as pedestrian pathways and the relocation of bus routes from US Route 4 to the service roads. All service road layouts are described within the Future Operational Analysis as part of **Appendix III**. A focus was placed on northbound traffic reductions when comparing the service road alternatives since northbound traffic is observed as being the most congested under existing conditions.

The improvements provided by Concept No. 2 were assessed by applying traffic volume modifications to Concept Nos. 1-5. The traffic volume adjustments were determined through use of modeling service road options in the STEP model. A summary of the LOS analysis of the other concepts with service roads is included in **Table 1** in the Results section of this chapter.

Concept No. 3 – Additional Northbound Lane – A second northbound lane is added to US Route 4 between Thompson Hill Road and NY Route 43 in this concept. This second lane addresses the capacity issues faced by the current corridor geometry by providing a second travel lane through the most congested portion of the study area. Signal optimization and coordination is applied to the southern four (4) intersections with the timings optimized to account for the additional lane. As is the case in Concept No. 1, the intersection of US Route 4 and NY Route 43 is optimized by removing the split phasing and adjusting the signal timings. This signal remains uncoordinated with the remaining signals along the corridor. The Future Operational Analysis of this concept showed that the second northbound lane alleviates much of the delay experienced along US Route 4 during the peak hours identified in the study.

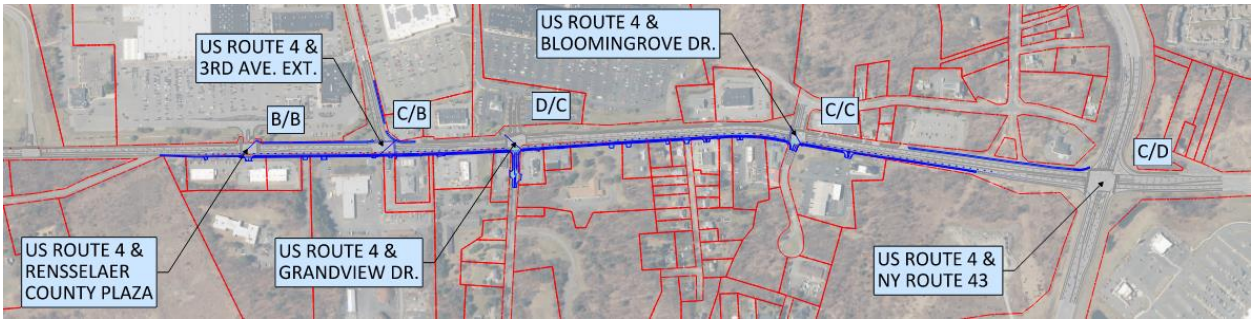

Figure 4.3 Concept No. 3 Overview and Midday/Evening Intersection LOS

Concept No. 3A – This concept is an optional reconfiguration of the Grandview Drive approach to US Route 4 to provide a separate left turn lane for traffic on Grandview Drive. This option was developed in response to the heavy traffic volumes observed at this approach during the midday peak hour.

Figure 4.4 Concept No. 3A

Concept No. 4 – Roundabouts at all Intersections – This concept introduces two lane roundabouts at each of the five (5) signalized intersections within the study area. Analysis showed that the intersection of US Route 4 and NY Route 43 experienced an increase in delays during the evening peak hour. The heavy eastbound traffic on NY Route 43 does not provide sufficient gaps in traffic for other approaches to safely enter the roundabout. A traffic signal to meter the eastbound approach was determined to improve delay, but not to acceptable levels. The eastbound traffic departing Greenbush Commons is expected to operate to LOS F conditions due to the northbound and southbound traffic limiting the number of gaps for these vehicles to enter the roundabouts. The remaining intersections operate at an acceptable level of service.

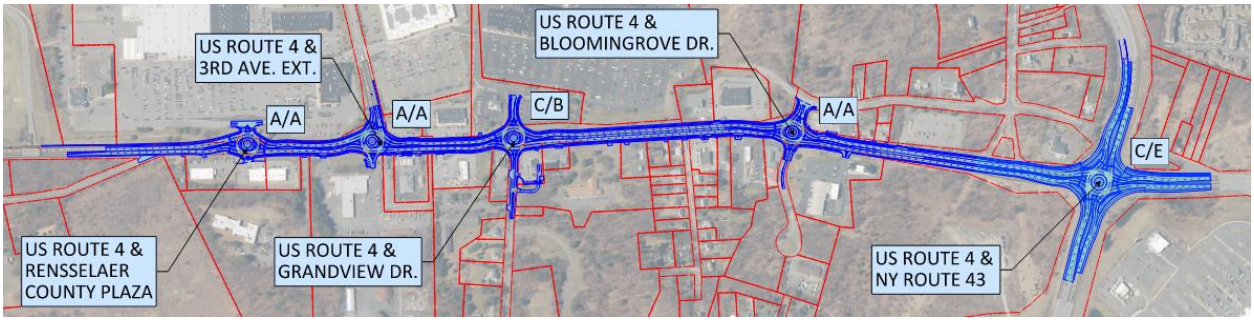

Figure 4.5 Concept No. 4 Overview and Midday/Evening Intersection LOS

The unsatisfactory delay at the intersection of US Route 4 and NY Route 43 and the significant right-of-way impacts required to construct this option led to the dismissal of Concept No. 4 from final recommendation. Elements of this concept that provided an improvement were incorporated with improvements identified in Concept No. 3 to form Concept No. 5.

Concept No. 5 – Combination of Roundabouts and Signalized Intersections – This concept builds upon Concept Nos. 3 and 4 by utilizing the intersection control methods that yield the greatest

level of service for each intersection. The signal timings of the northern two intersections are optimized but remain uncoordinated due to the differing cycle lengths and distance between intersections. The remaining three intersections are replaced with two-lane roundabouts. These three intersections were selected to be analyzed as roundabouts due to the analysis of Concept No. 4 and the proximity of these three (3) intersections. US Route 4 is widened to provide two (2) travel lanes in each direction along the corridor to provide the required capacity upgrades along the corridor.

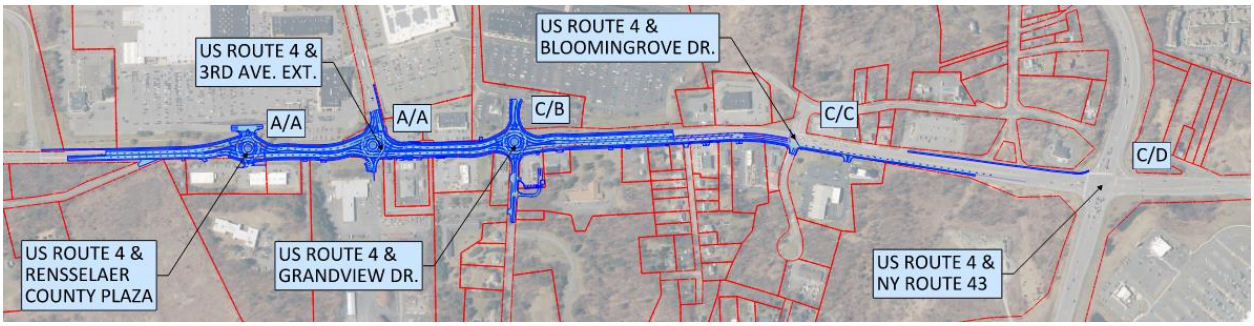

Figure 4.6 Concept No. 5 Overview and Midday/Evening Intersection LOS

The combination of the improvements described in Concept Nos. 3 and 4 provided the greatest decrease in delay throughout the corridor among the options presented in this report. It should be noted that this option includes increased right-of-way impacts when compared to Concept Nos. 1 and 3 due to the proposed roadway geometry and existing topography.

Concept Nos. 4A and 5A – This concept is applicable to Concept Nos. 4 and 5 with a roundabout at the intersection of US Route 4 and Grandview Drive. A left turn lane into the Starbucks on Grandview Drive provides additional storage space and prevents any potential left turn from blocking eastbound traffic on Grandview Drive. The driveway configuration is adjusted to provide a one-way entrance to Starbucks along Grandview Drive at the rear of the property. This moves the driveway away from the intersection, increasing available storage space for vehicles entering. Similar to Concept No. 3, a two-lane exit from Grandview can be implemented at this location to accommodate increased traffic volumes.

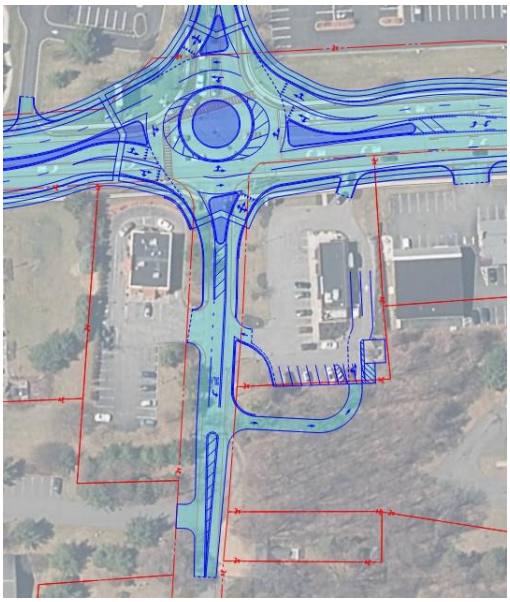

Figure 4.7 Concept No. 4A and 5A

A summary of the average overall intersection delay based on the Future Operational Analysis is shown below in **Table 1**. As defined by the NYSDOT Highway Design Manual and other industry standards, LOS D is acceptable during the peak hour of operations at an intersection. Proposed recommendations based on the Future Operational Analysis can be found in **Chapter 5** of this report. Refer to **Appendix III** for complete analysis of each concept presented along with Synchro © output files.

Each intersection is assigned a corresponding number for use in the corresponding **Table 1**. The intersections with US Route 4 are as follows:

1. NY Route 43
2. Bloomingrove Drive / Agway Drive
3. Grandview Drive / Greenbush Commons
4. 3rd Avenue Extension
5. Rensselaer County Plaza / North Greenbush Square

Table 1: Intersection Level of Service Summary Comparison – With and Without Service Roads

Intersection	Peak	No-Build	Concept No. 1	Concept No. 1 with Service Road	Concept No. 3	Concept No. 3 with Service Road	Concept No. 4	Concept No. 4 with Service Road	Concept No. 5	Concept No. 5 with Service Road
No. 1	MID	D (48.9)	C (29.5)	C (29.0)	C (29.5)	C (29.0)	C (23.4)	C (23.4)	C (29.5)	C (29.0)
	PM	E (70.3)	D (39.8)	D (38.8)	D (39.8)	D (38.8)	E (48.7)	F (54.0)	D (39.8)	D (38.8)
No. 2	MID	C (25.2)	C (27.5)	C (22.6)	C (23.4)	C (20.8)	A (5.8)	A (4.9)	C (20.8)	B (18.5)
	PM	C (27.2)	C (28.0)	C (25.9)	C (24.8)	C (24.9)	A (5.3)	A (5.5)	C (24.1)	C (21.3)
No. 3	MID	F (93.0)	F (80.7)	E (56.0)	D (37.2)	D (40.3)	C (21.0)	C (20.8)	C (17.2)	A (6.9)
	PM	E (64.7)	E (74.8)	D (42.9)	C (31.0)	C (30.5)	B (10.3)	A (4.4)	B (10.1)	A (4.3)
No. 4	MID	E (76.0)	C (22.6)	C (26.0)	C (23.2)	C (26.9)	A (5.8)	A (8.1)	A (7.8)	A (7.4)
	PM	C (22.2)	B (14.3)	B (18.3)	B (15.9)	B (19.9)	A (5.5)	A (5.5)	A (5.1)	A (5.2)
No. 5	MID	B (16.5)	B (10.1)	B (10.1)	B (10.4)	B (12.0)	A (3.9)	A (5.3)	A (4.5)	A (4.9)
	PM	B (14.3)	B (10.2)	B (10.2)	B (10.9)	B (10.9)	A (4.7)	A (4.0)	A (4.1)	A (5.9)

Using the methodology provided in the Highway Capacity Manual (HCM), the midblock level of service was determined for each of the four (4) segments between the identified signalized intersections within the study limits. **Table 2** below summarizes the midblock level of service for the horizon year of 2045. The analysis presents an anticipated level of service along US Route 4 without the implementation of upgrades to address current deficiencies throughout the corridor. Like intersection analysis, LOS D for midblock level-of-service is considered acceptable during the peak hour(s). Refer to **Appendix III** for the complete midblock analysis.

Table 2: Midblock Level of Service Analysis

Segment	Description	Midday Level of Service		Evening Level of Service	
		Northbound	Southbound	Northbound	Southbound
1	NY Route 43 to Bloomingrove Drive	E	C	F	D
2	Bloomingrove Drive to Grandview Drive	D	D	D	D
3	Grandview Drive to 3rd Avenue Ext.	F	F	F	E
4	3rd Avenue Ext. to Greenbush Commons	E	E	D	E

5 Public and Stakeholder Outreach Efforts

The engagement of the public and stakeholders was paramount in shaping the direction of this study and comprehending the challenges faced within the US Route 4 corridor. To foster inclusive dialogue, the study team conducted four (4) Study Advisory Committee meetings and two (2) public meetings. These meetings provided valuable opportunities for members of the public, staff, stakeholders, and various agencies to familiarize themselves with the study's progress, contribute their insights, and steer the concepts. Furthermore, at the time of the US Route 4 Study, East Greenbush was in the process of updating its Comprehensive Zoning Code. With that, the consultant worked with the Zoning Update Steering Committee to ensure the zoning was updated to fit the future vison for the corridor. Providing a final report with stakeholder comments considered wherever practicable ensures that the study's outcomes are transparently communicated to the community.

Beyond the committee meetings and public meetings, the project leveraged its online presence to disseminate information and gather feedback. The project website, accessible at https://www.nyroute4study.com/, served as a centralized hub for project updates, documents, meeting materials, comment submission form and hosted the project community survey. The wealth of comments and insights received through the website, survey, and public meetings has been thoughtfully summarized and is included in the Appendices. Importantly, these comments have played a pivotal role in the study's evolution, prompting adjustments to the concept design in numerous instances. The collaborative nature of this public involvement process underscores its significance in refining and enhancing the study's outcomes to align more closely with the needs and perspectives of the community.

Public Meeting #1

The first public meeting took place on Monday, March 27, 2023, at 6:30 pm at the Defreestville Fire Department with a virtual Zoom option. The meeting commenced with welcoming remarks and introductions. Much of the session was dedicated to a detailed overview of the project, including its objectives, scope, and schedule. Attendees were provided with insights into the existing conditions of the corridor, setting the groundwork for further discussions.

Figure 5.1 Public Meeting 1 Audience Photo

A significant part of the meeting was allocated to a Mini-Visioning Session, where participants succinctly described their favorite aspects of the corridor, identified challenges using brief descriptors, and shared their aspirations for future changes. This interactive session aimed to capture diverse perspectives and actively engage attendees both in person and on zoom.

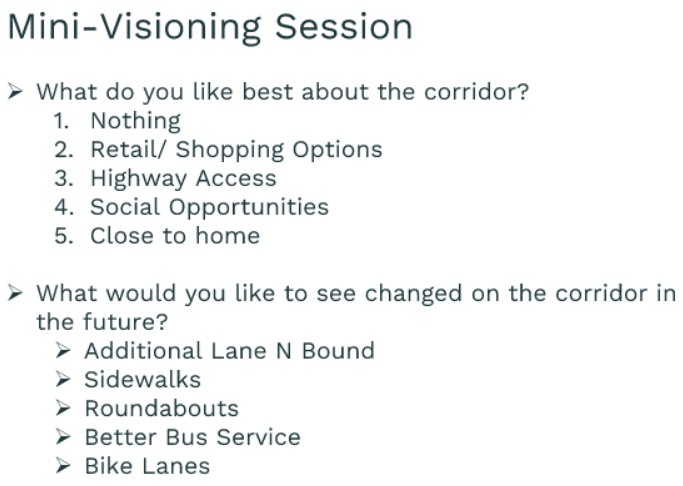

Figure 5.2 Mini-Visioning Session Results

The meeting concluded by outlining the Next Steps, providing an overview of immediate plans and future phases of the project. This forward-looking segment offered attendees a roadmap for anticipating and actively participating in the study's progression. The meeting successfully blended informative presentations, interactive discussions, and forward-looking insights, fostering a collaborative environment for meaningful engagement and contributions from all participants. A full summary of the public meeting as well as the materials used and presented are included in **Appendix IV**.

Figure 5.3 Survey Results

Public Meeting #2

The second public meeting took place on Tuesday, January 30, 2024, at 6:30 pm at Columbia High School with a virtual Zoom option. The meeting commenced with welcoming remarks and introductions. The session began with an overview of the project, including its objectives, scope, and schedule, as well as a highlight of the existing conditions of the corridor.

A significant part of the meeting was allocated to a review of the concepts and the corresponding future Level of Services. The concepts were then broken down into short-term, medium-term, and long-term phases to help aid with implementation.

The meeting concluded by outlining the Next Steps and opening the floor up for comments and/or questions.

A full summary of the public meeting as well as the materials used and presented are included in **Appendix IV**.

Study Advisory Committee Meeting #1

The Kick-off or Study Advisory Committee Meeting (SAC) #1 was held Wednesday, August 3, 2022, and aimed to address critical issues and engage in discussions regarding the study's purpose and necessity. The consultants delivered a concise overview of previous planning efforts, the scope of work, and methodologies for public participation. Additionally, the consultant team introduced the project website, seeking feedback from the committee on the initial iteration. During the meeting, the consultants identified requirements for existing conditions and confirmed the roles and responsibilities of the Consultant, Town representatives, Capital Region Transportation Council staff, and Study Advisory Committee members. The meeting concluded with next steps and scheduling of the next SAC meeting.

A full summary of the Study Advisory Committee meeting as well as the materials used are included in **Appendix VI**.

Figure 5.4 Study Advisory Committee Corridor Site Visit Photo

Study Advisory Committee Meeting #2

Study Advisory Committee Meeting #2 was held Wednesday, October 26, 2022, and aimed to conduct a comprehensive assessment of existing conditions, employing a two-part approach for a thorough examination. The initial segment featured a detailed PowerPoint presentation delivered by the consultant, elucidating the culmination and assessment of data collected by the consultants, town officials, and the Transportation Council concerning Existing Conditions.

The second phase of the meeting involved a corridor caravan, strategically designed to enhance the understanding of the US Route 4 study corridor. The itinerary encompassed a journey down the corridor, punctuated by three strategic stops: Thomson Hill Road, Target Parking Lot, and the CDTA Park & Ride. These stops were carefully selected to facilitate on-site inspections and discussions among Members of the Study Advisory Committee. During the caravan, committee members embarked on walks along different sections of the corridor, providing an invaluable opportunity to delve into specific issues and identify potential opportunities for improvement and development. This hands-on approach allowed for a nuanced exploration of the corridor's nuances and fostered dynamic discussions among committee members.

A full summary of the Study Advisory Committee meeting as well as the materials used are included in **Appendix VI**.

Study Advisory Committee Meeting #3

Study Advisory Committee Meeting #3 was held Friday, May 19, 2023. The meeting unfolded with a structured agenda, fostering collaboration and information exchange among committee members. The session commenced with a warm welcome. The meeting progressed to an insightful overview of the initial phase of public engagement, offering a foundation for informed decision-making. This was followed by an analysis of key findings from the public survey, providing valuable insights into community perspectives.

The focal point then shifted to a robust discussion on Future Operational Analysis concepts. Committee members engaged in thoughtful conversations, exploring various strategies and approaches. The "Next Steps" agenda item highlighted the committee's commitment to progress, with a particular emphasis on finalizing the discussed concepts. The meeting concluded with forward-looking planning for Study Advisory Committee Meeting #4, ensuring a seamless transition into the next phase of the study.

A full summary of the Study Advisory Committee meeting as well as the materials used are included in **Appendix VI**.

Study Advisory Committee Meeting #4

Study Advisory Committee Meeting #4 took place Monday, September 11, 2023, and unfolded with welcoming introductions. The session kicked off with a Concept Overview, providing committee members with a detailed understanding of updated proposed concepts derived from the previous meeting. This set the stage for informed deliberations on the potential direction for the study.

The meeting progressed to a crucial agenda item: "Corridor Improvement Phases." Committee members were presented with proposed phases and moved into discussing the strategic implementation of improvements along the corridor. This discussion facilitated a comprehensive exploration of the study's practical implications and potential benefits.

The ensuing Discussion segment allowed committee members to exchange insights and perspectives on the proposed corridor improvements and how they would fit into the outlined phased approach. This collaborative discourse enhanced the depth of understanding and contributed to the refinement of concepts.

Moving into Next Steps, the consultant outlined key actions to maintain the study's momentum. This included the scheduling of Public Meeting #2, emphasizing continued public engagement. Additionally, the consultant turned attention to the Draft Report Preparation, underscoring the commitment to document and communicate the study's progress and findings.

A full summary of the Study Advisory Committee meeting as well as the materials used are included in **Appendix VI**.

Study Survey

The public engagement component of the US Route 4 Corridor Study Inter-municipal Update involved a comprehensive online survey designed to gather insights from residents, employees, and community members. The 21-question survey, conducted via the Survey Monkey platform from February 3 to April 25, 2023, received a robust response of 784 participants. The survey, accessible through the project website and town websites, utilized social media, email, and community distribution to ensure widespread participation. Participants provided confidential input on various aspects of the US Route 4 Corridor, contributing to the development of Corridor Concepts aligned with community goals.

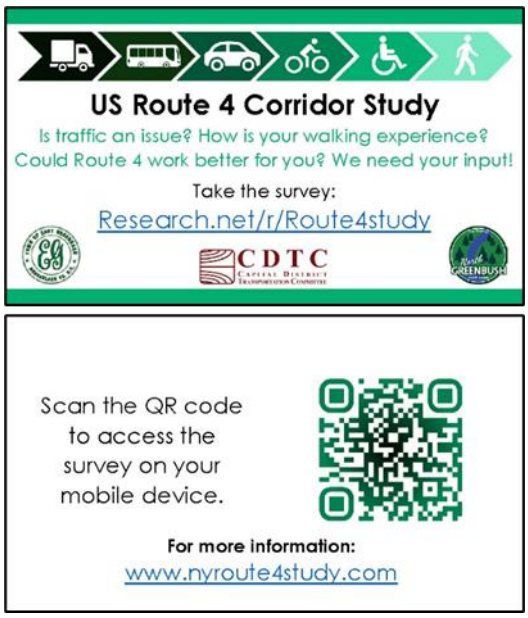

Figure 5.5 Survey Card

The survey focused on four key areas: Demographic Information, Use of Corridor, Experience/Quality of Life, and Suggestions for the Future. Demographic Information sought to establish the participants' profiles, emphasizing the importance of diverse input for inclusive decision-making. Use of Corridor delved into participants' interactions with the corridor, shedding light on activities, access patterns, and opportunities for improvement. Experience/Quality of Life explored participant sentiments on topics such as land use, safety, and the overall environment. Suggestions for the Future allowed participants to provide additional thoughts, challenges, and opportunities.

The survey results, detailed in a comprehensive report, highlighted key demographic trends, usage patterns, and community preferences. Noteworthy findings include diverse age representation, predominant use of the corridor for shopping and dining, and a strong desire to protect natural resources. The report emphasizes the importance of survey limitations, clarifying that while not statistically valid alone, the survey aids in identifying common themes and trends. The survey stands as a valuable tool for community engagement, shaping the ongoing planning and decision-making processes for the US Route 4 Corridor.

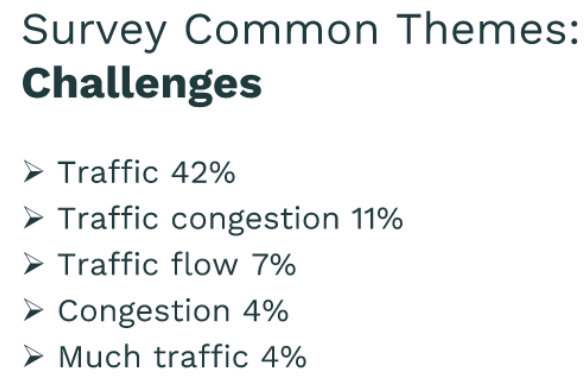

Figure 5.6 US Route 4 Challenges Themes

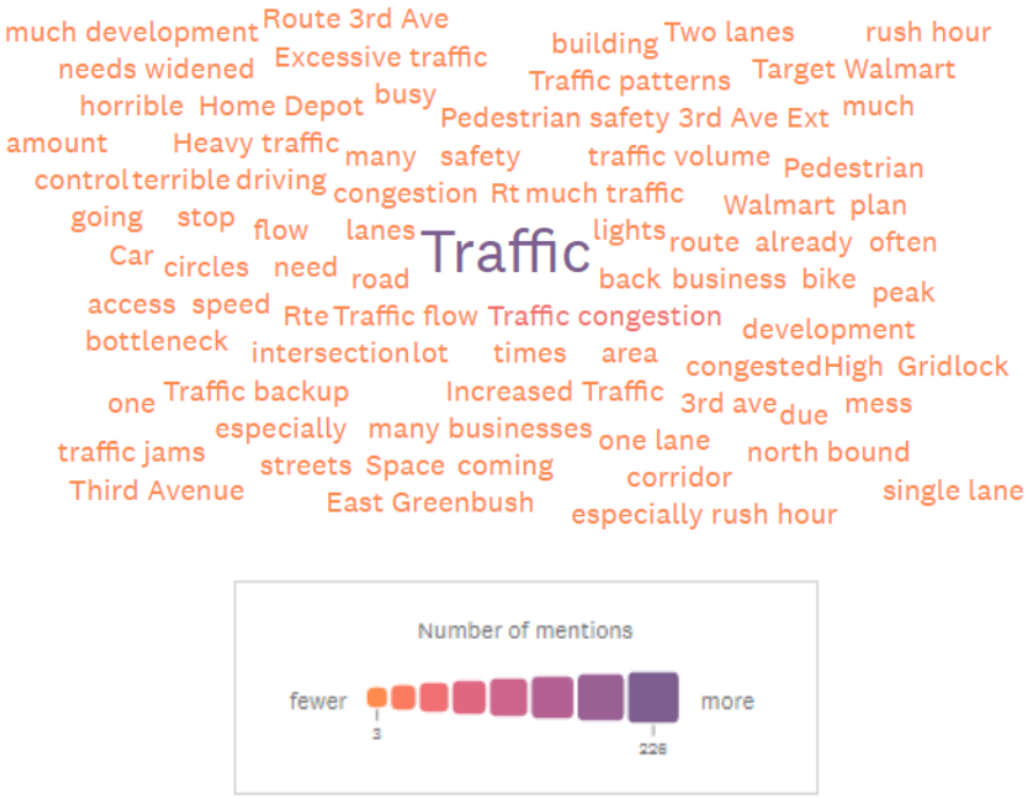

Figure 5.7 Identified Challenges along US Route 4

A full summary of the Survey as well as all responses received are included in **Appendix V**.

6 Proposed Recommendations

Overview of Corridor Improvements

Public feedback on the concepts presented in Chapter 4 was solicited from sources such as the Towns of North and East Greenbush, the Capital Region Transportation Council, CDTA, the SAC and NYSDOT. Strong public engagement was observed throughout the duration of the study, with well attended meetings and discussions among residents. The recommendations included as part of this study strive to address comments and concerns received from study stakeholders and residents to the fullest extent practicable.

The analysis of the concepts developed as part of this study shows that each of the concepts presented as part of this study all meet the project goals to varying degrees. Refer to Chapter 4 for a description of each concept and the resulting analysis. Concept No. 3 was identified as the preferred concept upon completion of the Future Operational Analysis. Although Concept No. 5 reduces delay along the corridor more than the preferred concept, the delay reduction is relegated to intersections and approaches that do not experience heavy delays under the current conditions. The additional cost and right-of-way impacts associated with Concept No. 5 for a minimal decrease in delay was the deciding factor in recommending Concept No. 3 as the proposed recommendation for US Route 4. Each improvement was evaluated using Crash Modifications Factors (CMF) from the FHWA CMF Clearinghouse. The complete Future Operational Analysis and recommendations can be found in **Appendix III**.

Phased Recommendations

A phased implementation strategy is recommended for the study area to address current deficiencies without waiting for funding to become available for the more substantial recommendations. Observation and analysis of the traffic throughout the study area is recommended after the implementation of each phase. This analysis allows for future deficiencies to be identified, with implementation strategies and funding sources to be identified in advance of severe service degradation along the corridor.

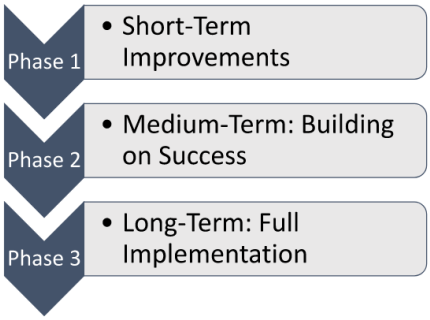

Figure 6.1 Implementation Phases

Phase 1

Figure 6.2 US Route 4 Traffic Signal at Grandview Drive

Phase 1 includes the coordination of the existing signals along US Route 4 between Rensselaer County Plaza and Bloomingrove Drive. The intersection of US Route 4 and NY Route 43 is not coordinated; however, the cycle length is optimized by removing the existing split-phasing configuration and allowing for simultaneous left turn movements. The remaining signals are re-timed under a common cycle length, allowing for coordination through these intersections for the northbound and southbound traffic along US Route 4. A two lane, low speed service road connecting Bloomingrove Drive and the Home Depot Plaza as shown in Concept No. 2A is included as part of the short-term improvements with pedestrian and bicycle accommodations along with relocated CDTA bus stops. A review of CMF associated with signal coordination along an arterial road vary but show a decrease in crashes along the roadway due to more consistent and predictable flows, reducing rear-end collisions at intersections. The improvements presented in Phase 1 will not solve the capacity issues estimated at the horizon year but will provide short-term relief and improved traffic flow until future improvements are implemented.

Phase 2

Phase 2 includes the periodic review of the improvements implemented in Phase 1 to assess traffic conditions. If a degradation in traffic operations is observed, analysis of the implementation of an additional low speed service road to complement the service road proposed as part of Phase 1 would be warranted. One or more of the three (3) remaining service road layouts will be identified through a traffic analysis to provide further relief to US Route 4 without undertaking major work along the corridor. Bus stops can be relocated to these service roads, with pedestrian infrastructure maintaining connections to major destinations and additional locations within the corridor. The implementation of a service road may delay the need for any major improvements along US Route 4 itself, with signal timing adjustments required to account for the service roads affecting volumes. The addition of any service road concept is anticipated to reduce the number of vehicles on US Route 4, reducing the likelihood of crashes along the corridor. The periodic analysis of the improvements introduced in Phases 1 and 2 will aid in identifying the appropriate implementation strategy and timeline for Phase 3.

Phase 3

Phase 3 includes the widening of US Route 4 to provide a second northbound travel lane through the study area. The improvements presented as part of Phase 3 are envisioned as long-term strategies to address traffic volumes and delays at the study horizon year. The additional northbound lane addresses capacity issues along the corridor that cannot be addressed with the improvements introduced in Phases 1 and 2. The installation of new traffic signals and timing modifications are included in Phase 3 to accommodate the additional northbound lane between Rensselaer County Plaza and Bloomingrove Drive. Like Phase 1, signal coordination will be utilized to maintain steady traffic flow through this segment and ease congestion during peak hours of the day.

NYSDOT crash rates for various facilities indicate that additional travel lanes correlate to an increase in crashes within a segment of roadway. The additional lane creates scenarios where crashes when changing lanes are possible. Adaptive signal control is an additional option that can be implemented alongside Phase 1 and Phase 3 with the traffic signal changes included in each phase. Adaptive signals continuously monitor traffic volumes using sensors and adjust the traffic signal timings along a corridor to accommodate current traffic volumes. This would allow the entire corridor to operate at increased efficiency. CMF results for adaptive signals vary but show an overall decrease in crashes when implemented in a suburban setting.

Roadway Travel Times

A travel time estimate between the intersections of NY Route 43 and Rensselaer County Plaza was developed for the evening peak hour. Concept No. 1 provides a small benefit to northbound traffic travel times due to optimized signal timings and signal coordination. The capacity added by the second northbound lane in Concept No. 3 provides the greatest reduction in travel time. Southbound travel times are slightly reduced in both concepts due to optimized signal timings. No capacity improvements are included for southbound traffic as two southbound lanes are present in the current configuration and are sufficient for the observed volumes. See **Table 3** below for travel time estimates throughout the corridor.

Table 3: Evening Peak Hour Travel Time Estimates (min.)

Direction	Existing Geometry (2022)	Existing Geometry (2045)	Concept No. 1	Concept No. 3
US Route 4 Northbound	5.49	7.39	6.76	4.95
US Route 4 Southbound	5.35	5.54	4.76	4.32

Additional Service Roads

Additional service roads or modifications to the roads included in Phases 1 and 2 are an additional option for Phase 3 improvements. These service roads can be implemented alongside any of the phased improvements and are not tied to a single phase or improvement(s). Additional routes for motorists visiting commercial properties are provided with these roads, reducing the overall demand on the US Route 4 intersections included as part of the study. Bus stops can be relocated to these roads, further reducing the total number of vehicles on US Route 4 between 3rd Avenue Extension and Bloomingrove Drive. Pedestrian connections to the various bus stops and commercial properties would be included.

Pedestrian Connectivity

Gaps in pedestrian infrastructure were identified as being intermittent along the US Route 4 corridor. Pedestrian crossings are included as part of this phase, with crosswalks being restriped and pedestrian phases included in the retimed signals. Phase 2 does not address the gaps along US Route 4, but rather introduces additional pedestrian routes alongside the service roads. These roads will provide connections between shopping plazas and existing sidewalks to promote more comprehensive linkages throughout the study area.

The widening of US Route 4 in Phase 3 provides the opportunity to improve pedestrian circulation by providing a continuous pedestrian route along the east side of the road. Pedestrian signals and crossings will be improved alongside the signal modifications required to accommodate a second northbound lane. Additional sidewalk projects that do not impact the mainline operations along US Route 4 can be implemented during any phase to address connectivity gaps on the west side of the corridor.

Bicycle Accommodations

No bicycle specific improvements are included in Phase 1 as no geometric changes to the roadway are included as part of this phase. If traffic analysis supports the inclusion of the service road connecting Bloomingrove Drive and Greenbush commons, parallel bicycle facilities can be included. The service road option(s) included in Phase 2 include the option to construct parallel bicycle facilities to begin connecting existing gaps in bicycle circulation routes. The existing topography and right-of-way limit the available options for bicycle facilities to be installed alongside the second northbound lane introduced in Phase 3 between Rensselaer County Plaza and Greenbush Commons. Shared-use lanes are likely to be utilized between these locations to maintain bicycle connectivity. Between Thompson Hill Road and Greenbush Commons, space is available for dedicated bicycle infrastructure to be installed alongside US Route 4. The existing topography allows for the installation of bicycle infrastructure from Greenbush Commons to the intersection of US Route 4 and NY Route 43.

Driveway Consolidation

Similar to the service road implementation strategy, driveway consolidation along the corridor is not tied to a specific phase of improvements. Consolidation of the driveways for Gene's Fish Fry, NYSDOT, and Stewart's reduces the number of driveways in this short stretch of road from five (5) to three (3). The existing entrance to Gene's Fish Fry would be connected to the NYSDOT driveway at the intersection of 3rd Avenue Extension. 3rd Avenue Extension would be realigned to intersect US Route 4 at a perpendicular angle across from the existing NYSDOT Driveway. This configuration would allow NYSDOT plow trucks and service vehicles egress and ingress to US Route 4 with the use of a dedicated signal phase for the driveway. The proximity of the exit to Gene's Fish Fry and Stewart's allows for the combination of these driveways to further reduce driveway openings along this segment of US Route 4. This stretch of multiple driveways is located within the most heavily congested segment of the corridor.

Additional options for driveway consolidation consist of providing access to Rosewood Nursing Home though the use of the southern NYSDOT driveway.

Consolidating the driveways in this segment places driveways at a more standard spacing, reducing the number of points a driver needs to watch for when driving, thus reducing crashes by reducing the number of driveways that interact with the vehicle queues at intersection approaches. The consolidation and spacing of driveways will help to reduce the delay currently experienced by vehicles on US Route 4 that is attributed to vehicles entering and exiting the roadway at multiple points within a short segment of road.

Figure 6.3 US Route 4 Driveway Consolidation

Planning-Level Cost Estimates

Order-of-magnitude cost estimates have been prepared for the recommended improvements as summarized below. These estimates are based on recent (2023) unit pricing available through the NYSDOT's Pay Item Catalog for Region 1 projects and are intended to give a sense of potential costs for major elements recommended. Further refinement through design and engineering will refine these planning-level cost estimates.

Table 4: Cost Estimate Summary	
Improvements	**Planning-Level Costs (2023 Dollars[1])**
Phase 1 – Signal Coordination	$400,000
Phase 2 – Service Roads	$10,346,000 (Concept 2 I)[2]
Phase 3 – Additional Northbound Lane	$8,701,000
Total	**$19,447,000**

[1] Totals include work zone traffic control, survey, mobilization, contingencies, inspection, and design costs. Row acquisition and incidentals costs are not included.

[2] Service Road Concept 2 I is the most expensive service road option proposed.

Refer to **Appendix III** for separate costs based on type of recommendation within the segment.

7 Implementation Plan

This chapter provides information to assist the Town of East Greenbush with implementation of the US Route 4 Concept Plan. Included below is a list of potential funding sources, a breakout of major elements of the concept plan and anticipated project partners.

Funding Considerations

There are many potential funding sources that the Town of East Greenbush can pursue to help with the implementation of the phased recommendations outlined in Chapter 6. The potential funding sources vary between federal, state, and local sources. It is important for the Town to submit applications for funding to the appropriate program, at the right time for the project, and with ample project information and support to show why the project is important to the Town and that the Town is prepared to provide the required local match. Since funding opportunities can arise throughout the year, it is imperative that the Town maintain contact with NYSDOT Region 1 Local Programs Bureau to ensure that no funding opportunities are missed.

Federal Funding Programs

Transportation Improvement Program (TIP): The Federal Highway Administration manages funding for all projects eligible under the Surface Transportation Block Grant Program (STBG), and the Highway Safety Improvement Program (HSIP). These reimbursement programs cover up to 80% of the project cost and the project Sponsor is responsible for the remaining 20%. Projects must be within the right-of-way of federal aid eligible roadways; all roadways evaluated as part of this study are eligible. US Route 4 is part of the National Highway System (NHS) and is eligible for National Highway Performance Program (NHPP) funding through the TIP.

- **Surface Transportation Block Grant Program (STBG):** The STBG program provides flexible funding that may be used by States and localities for projects to preserve and improve the conditions and performance on any Federal-aid highway, bridge and tunnel projects on any public road, pedestrian and bicycle infrastructure, and transit capital projects, including intercity bus terminals.
- **Highway Safety Improvement Program (HSIP):** Program that provides funds for projects that aim to achieve significant reduction in traffic fatalities and serious injuries on all public roads. The HSIP fund source will reimburse up to 90% of the project cost for eligible improvements.

To apply for federal funding, the Town can respond to a TIP solicitation advertised by the Capital Region Transportation Council. The Transportation Council staff review applications and

recommend projects to be funded, while the ultimate decision is made by various committees and is subject to public comment.

State Funding Programs

NYSDOT TAP-CMAQ-CRP Program (TAP/CMAQ/CRP): Funding is available through NYSDOT to support bicycle, pedestrian, multi-use path, and non-motorized transportation-related projects and programs that support the goals of New York's national-led Climate Leadership and Community Protection Act (CLCPA). Although these programs are administered by NYSDOT, the fund sources are federal and require a 20% local match. Projects must be within the right-of-way of federal aid eligible roadways; all roadways evaluated as part of this study are eligible. Funded projects will receive a minimum of $500,000 and a maximum of $5,000,000 (prior to the 20% local match). Municipalities may request funding from two different fund sources:

- **Transportation Alternatives Program (TAP):** TAP funding helps communities deliver safe, transformative, and innovative transportation projects which expand, enhance, and modernize walking and biking options and connections to transit. TAP project funding focuses primarily on benefits for bicyclists, pedestrians, and other amenities for non-drivers. Projects are expected to improve mobility, accessibility, and the community's transportation character such that the street network is more vibrant, walkable, and safer for all transportation mode users, pedestrians, bicyclists, transit users, and drivers. Specific project categories related to the recommended projects include:
    - Planning, design and construction of infrastructure-related projects to improve non-driver safety and access to public transportation and enhanced mobility;
    - Safe routes to school (enable and encourages children to walk or bike to school); and
    - Planning, design and construction of on-road and off-road trail facilities for pedestrians, bicyclists and non-motorized transportation users.
- **The Congestion Mitigation and Air Quality Improvement (CMAQ) Program:** The CMAQ program provides funding to State and local entities for transportation projects that reduce vehicle emissions and traffic congestion in areas where air quality does not meet or previously did not attain the National Ambient Air Quality Standards.
- **Carbon Reduction Program (CRP):** The CRP program provides funding for projects that support the reduction of transportation emissions in small urban areas and rural areas by facilitating the use of alternatives to single-occupancy vehicle trips, the development of facilities for biking, walking, and other forms of nonmotorized transportation, and other emission reduction strategies.

NYSDEC Climate Smart Communities Program (CSC): The Climate Smart Communities Grant program was established in 2016 to provide 50/50 matching grants to cities, towns, villages, and counties of the State of New York for eligible climate change mitigation, adaptation, and planning and assessment projects. Municipalities need not be registered or certified as a Climate Smart Community to apply for a grant. Implementation projects for which funding can be sought are those related to the reduction of greenhouse gas (typically transportation alternatives) and climate change adaptation. There are two funding pools for this grant. The first funding pool includes projects requesting funds ranging from $5 million to $100 million. The second funding pool includes projects requesting funds ranging from $250,000 to $4,999,999.

The NYSDEC typically requests applications for the Climate Smart Community Grant Program annually. Applications are prepared and submitted online using the NYS Consolidated Funding Application (CFA).

NYSDOT Multi-Modal Program (MM): The Multi-Modal Program is managed through NYSDOT's Local Programs Bureau and provides reimbursement funding for five (5) specifically authorized transportation capital project "modes" found in State Transportation Law 14-k and NYSDOT Program Policy - Rail, Port, Fixed Ferry Facilities, Airport, and State and Local Highway and Bridge projects. The program does not have a required local match.

To obtain funding through the NYSDOT's Multi-Modal Program, the Governor or a Legislative Member must nominate the project, and NYSDOT will be notified when funding is secured. Additional information and current opportunities should be discussed with the NYSDOT Region 1 Local Programs Bureau. The funding ranges for this grant are not specified.

Regional Economic Development Council (REDC) Grants: Through the REDCs, community, business, academic leaders, and members of the public in each region of the state put to work their unique knowledge and understanding of local priorities and assets to help direct state investment in support of job creation and economic growth. The Village may consider REDC grants to fund sidewalk projects that will connect residents to businesses or to public transportation.

REDC Grants may be applied for through the CFA, which allows applicants to be considered for multiple sources of funding for a project by filling out just one application. The CFAs are typically announced in May each year with applications due at the end of July. Several of the grants under the CFA have a minimum funding amount, ranging from $25,000 to $150,000.

Community Resiliency, Economic Sustainability and Technology (CREST) Grant Program: The CREST program, administered by the Dormitory Authority of the State of New York (DASNY), provides reimbursement-based grants of capital costs for projects undertaken by eligible entities. The minimum grant award is $50,000.

Empire State Development Grants (ESD): Available through the Consolidated Funding Application process, ESD provides funds for infrastructure investments under certain programs. Funds may be used to finance infrastructure investments with a goal of attracting new businesses and expanding existing businesses, thereby fostering further investment. Infrastructure projects may include transportation, water and sewer, and parking, among other investments. Depending on the applicable program, a funding match may be required.

Local Funding Partners and Programs

National Grid Grants (GRID): National Grid Economic Development offers grant assistance for many different phases of economic development and community revitalization projects. National Grid may be able to help with staff assistance and resources from their Public Service Commission approved Economic Development Plan. These grants could be explored for assisting with relocation of existing utility poles and infrastructure, and installation of energy efficient site lighting. This grant can be considered to implement street lighting at intersections throughout the Town.

The Capital Region Transportation Council has partnered with the Capital District Regional Planning Commission (CDRPC) to provide the **Technical Assistance Program (Tech Assist)**. The Tech Assist Program is intended to fill gaps in local level planning needs and to enhance capacity to advance projects that resonate with one or more of the Quality Region Principles of the New Visions 2040 Regional Transportation Plan. The program offers The Capital Region Transportation Council and CDRPC staff time and expertise to local governments undertaking small scale community planning initiatives. The Tech Assist Program requires a minimum of a 25% local match for the total project cost. This program could be used to further study the level of service and capacity needs for the remaining intersections along US Route 4 that were not included in the concept study.

The following table details the recommendations identified during the Operational Analysis and includes potential implementation partners and funding sources.

Table 5: Implementation Plan		
Recommended Improvement	**Potential Grant Funding Sources**	**Potential Project Partners**
Traffic Signals & Pedestrian Signals	TIP (STBG,NHPP,HSIP), TAP, MM, CRP, CMAQ	Town of North Greenbush, Town of East Greenbush, NYSDOT
Service Roads with Sidewalks	TAP, CMAQ, CRP, MM	Town of North Greenbush, Town of East Greenbush
Sidewalks and Curb Ramps	TAP, TIP, CFA, CRP, REDC	Town of North Greenbush, Town of East Greenbush
Bicycle / Pedestrian Accommodations, Lighting	CFA, TIP, GRID	Town of North Greenbush, Town of East Greenbush
Access Management	CFA, TIP, TAP	Town of North Greenbush, Town of East Greenbush, Property Owners
Additional Northbound Lane	TAP, CRP, CMAQ, MM	Town of North Greenbush, Town of East Greenbush, NYSDOT

Public Education

In addition to the physical design and construction of the recommended improvements, a public education component may be needed to ensure the public is aware of the laws and recommended pedestrian safety best practices associated with pedestrian travel in urban corridors. With the new pedestrian and vehicle infrastructure in place, cyclists and pedestrians need to be educated on where the infrastructure is located and the regulations of the infrastructure to ensure the safety of vehicular users, pedestrians, and bicyclists alike. Education programs can include public workshops, school-based programs, and the distribution of educational materials to Town residents via websites, social media platforms, and mailings.

Coordination and Approvals

Pedestrian and bicycle facilities should be constructed as part of the proposed developments along the frontage to the extent practicable with an overall Town plan to provide connection to other facilities throughout the Town and provide a comprehensive and cohesive network for all modes of travel.

Sidewalks and Curb Ramps

Due to the Towns's ongoing effort to upgrade pedestrian infrastructure to meet ADA standards, all existing curb ramps shall be re-evaluated at the time of final design to determine the need for reconstruction.

Right-of-Way

It should be noted that the right-of-way boundaries depicted on the concept plans are based on a tax map accuracy and will need to be confirmed during design. If work is to be proposed outside of the roadway boundary, right-of-way would need to be acquired from the adjacent property owners. Property access releases may also be required to perform the work proposed, such as sidewalk replacement to the face of existing buildings.

NYSDOT

Coordination with the NYSDOT will be required to complete the work. Any work within the US Route 4 corridor right-of-way will require the acquisition of a Highway Work Permit before improvements can be implemented. The NYSDOT will be given the opportunity to review the concept plans and provide feedback.

The recommendations presented as part of this report can be broken down into short, medium and long-term projects. The exact timeframe of each project is dependent on analysis of traffic volumes up to the horizon year to accurately identify when improvements are required for the corridor. The improvements suggested as part of this study support the 2023 Congestion Management Process (CMP) published by the Capital Region Transportation Council.

Short-term improvements as part of this study include the implementation of Phase 1, which includes signal optimization and coordination along the US Route 4 corridor. This phase can be implemented immediately to optimize the current infrastructure along US Route 4. No geometric changes to the roadway aside from restriping certain intersections are included as part of this phase.

Medium-term improvements should be based on the analysis of the improvements introduced in Phase 1. The short-term improvements are unlikely to fully address traffic volumes and associated congestion for the horizon year for the US Route 4 corridor. Phase 2 provides multiple service road options to address traffic congestion without modifying roadway geometry along US Route 4. The implementation timeframe of Phase 2 is dependent on periodic traffic analysis of the Phase 1 improvements to proactively introduce upgrades to alleviate congestion throughout the corridor before additional service degradation is observed.

The improvements introduced in Phase 1 are unlikely to fully address the current deficiencies along the US Route 4 Corridor, therefore the medium-term improvements shall be implemented based on traffic analysis and observed conditions.

Long-term improvements include the addition of a second northbound lane along US Route 4. Analysis of the benefits from the signal coordination in Phase 1 and the service road(s) selected in Phase 2 will identify if the need exists and the corresponding appropriate time to implement Phase 3. New signals and timings are required along US Route 4 to accommodate the revised roadway geometry and vehicular travel patterns. In addition to the second northbound lane,

the need for additions to the service roads should be evaluated periodically after the implementation of the medium-term improvements.