CORRIDOR PLAN & DESIGN GUIDELINES

Columbia Turnpike and Troy Road • East Greenbush, New York

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WITH SUPPORT FROM:
Capital District Transportation Committee
Linkage Program

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INTRODUCTION

01 VISION

The Columbia Turnpike (Route 9/20) and Troy Road (Route 4) are the Town of East Greenbush's principal commercial and transportation corridors. This *Columbia Turnpike and Troy Road Corridor Concept Plan and Design Guidelines* is intended to be a practical and implementable guide to revitalizing these corridors through improved site design and enhanced pedestrian amenities.

The recommendations outlined in this plan represent an effort to respect the town's past as well as define its future character. As a part of this effort, the plan seeks to balance the interest of all members of the community by providing a shared vision that is context sensitive and affords a degree of flexibility.

Ultimately, the goal of this plan is to improve the quality of life and community character for East Greenbush residents by enhancing the aesthetics of the built environment and fostering vibrant, pedestrian friendly and accessible land use patterns. This will in turn attract new investments and provide an opportunity for people to interact with one another. Simply put… **a place for things to do and places to go by foot, bike, bus, or car.**

02 PLANNING PROCESS

East Greenbush embarked on a planning process to enhance the Columbia Turnpike and Troy Road corridors in May 2013 after the town received a Capital District Transportation Committee (CDTC) Linkage Program grant to examine land use and site design strategies. As a strategic planning exercise, the process included the following components:

- Identify and explore the issues and opportunities associated with the Troy Road and Columbia Turnpike corridors' design characteristics;
- Engage the public by incorporating multiple participation techniques;
- Evaluate and prioritize recommendations and alternatives; and
- Develop a course of action that will successfully shape the future of both corridors and guide the Town Board with implementation.

Through the following steps and strategies, the planning process emphasized extensive public participation. This allowed members of the community to discuss issues that the town currently faces and to provide input on the solutions gathered for this plan.

Advisory Plan Committee

An advisory committee comprised of local residents, business persons, town staff and elected officials, and Rensselaer County, Capital District Regional Planning Commission (CDRPC), and CDTC representatives guided the planning process. The advisory committee represented a broad spectrum of the community, ensuring a fair and balanced planning process. The advisory committee was assisted by planning consultants, The Chazen Companies and PlaceSense.

The advisory committee sought input from the entire community throughout the planning process as they gathered information, explored issues and opportunities, and developed the recommendations that are outlined in this plan. When the planning process is complete, the advisory committee will have hosted two public workshops, conducted a property owner focus group meeting, and participated in a site design visioning exercise. The advisory committee used print, web, and social media to distribute information and solicit input from the public and contacted many other stakeholders who provided valuable information that was then used to develop the recommendations that are outlined in this plan.

Inventory and Analysis

The first step in the planning process was to conduct an inventory and analysis of the study area's existing conditions. The advisory committee gathered and examined information from a wide range of sources including NYS Department of Transportation (NYSDOT) traffic data, and Rensselaer County Bureau of Tax Services parcel data. They examined community facilities and infrastructure such as roads, pedestrian networks, parks, and schools. The advisory committee also reviewed previous planning initiatives and studies, which are summarized below under existing conditions.

The advisory committee used Geographic Information System (GIS) and 3D software to analyze and map relevant data and proposed initiatives.

In addition to the above, the Capital District Transportation Committee (CDTC) prepared a Transportation System Assessment for the Troy Road and Columbia Turnpike corridors, which provided current demographic information and the existing transportation conditions. The CDTC's Transportation System Assessment is provided in Appendix 1.

Property Owner Focus Group Meetings

In an effort to directly engage those that own property and businesses within the study area, the advisory committee invited residents and business owners along the Troy Road and Columbia Turnpike corridors to attend an August 6, 2013 focus group meeting at Town Hall. The meeting included a brief presentation about the project's goals and objectives.

Following the presentation, participants took part in a roundtable discussion about how to improve the study area's visual and physical character. Using scaled renderings of roadway cross-sections and building types and sizes, participants identified alternative site designs and standards.

Public Workshops

The advisory committee hosted the first public workshop on October 2, 2013 at the Town Hall. Residents and businesses owners attended the workshop, which included a presentation of the study area's site design, land use, and transportation characteristics.

Following the presentation, attendees took part in a visual preference survey and through a participatory mapping exercise offered their ideas on what issues should be addressed and what opportunities should be pursued. Participants identified a series of site design, streetscape, pedestrian, public facility, and land use improvements. A summary of this workshop is included in Appendix 2.

The advisory committee used this information to inform draft plan recommendations, which were prepared during a series of subsequent

committee meetings and prioritized in order to identify the most important and practicable initiatives.

A second public workshop was held on April 7, 2014 at the Town Hall. The draft Concept Plan and Design Guidelines were presented and discussed. The feedback from those in attendance was generally positive on the draft, although some questions were raised about backing off the requirement in the currently adopted zoning for multi-story buildings.

The primary issue of concern was how the recommendations would be implemented. A joint meeting of town boards was suggested to familiarize everyone with the plan and guidelines and discuss how best to implement them. Following this workshop, further revisions were made to the draft plan and guidelines to incorporate a more robust implementation strategy.

03 EXISTING CONDITIONS

The discussion of existing conditions within the Columbia Turnpike and Troy Road corridors below is a summary of a detailed Existing Conditions Report prepared by the Capital District Transportation Committee and incorporated into this document as Appendix 1.

Roadway and Transportation Systems

Columbia Turnpike (Route 9 and 20) runs north-south from the City of Rensselaer line to the Schodack town line. From Rensselaer south, land use transitions from residential to commercial, small commercial and large commercial strip development.

This corridor has been described in past studies as a "sterile, non-descript automobile oriented environment" that is "unfriendly to pedestrians." Much of this is due to a construction project more than 10 years ago that removed valuable trees from the streetscape, widened the road, and added a turning lane. While the project intended to improve safety, it removed much of the corridor's sense of place. Since then, East Greenbush has tried to improve the corridor, proposing minor changes that could serve as a catalyst for the future and make it a "community street."

Columbia Turnpike has a five lane cross-section (4 travel lanes and a center two-way left turn lane) and continuous sidewalks on both sides with crosswalks at major signalized intersections. The corridor has 11 signalized intersections - six of these include pedestrian signals and crosswalks, and five traffic signals without.

The Capital District Transportation Authority (CDTA) operates one bus route, the 233, that serves the corridor. Though sidewalk and bus stop improvements have been constructed in recent years, this area is still auto-oriented and lacking in pedestrian-friendly design. Due to narrow or no roadway shoulders and numerous

driveways the corridor is not considered "bicycle friendly."

The estimated annual average daily traffic volume for the corridor ranges from 15,000 (between east of Route 4 and the Town of Schodack) to 27,600 (west of Route 4 to the City of Rensselaer). Posted speed limits within the corridor increase from 30 miles per hour near the City of Rensselaer line to 40 miles per hour just north of Barber Drive. Parking within the corridor is off-street.

Troy Road (Route 4) also runs north-south from the North Greenbush line until it intersects with Columbia Turnpike. Development along the Route 4 corridor is diverse - single-family residential, large apartment complexes, office parks, and intense large-scale retail. Troy Road is a key commercial corridor and has been the focus of most of the retail development within East Greenbush and its neighboring towns.

The character of Troy Road/Route 4 changes from south to north reflecting the character, density and intensity of adjacent land uses and intersecting roadways. In the southern section, it is primarily a two-lane roadway providing access to adjacent residential and commercial parcels as well as adjacent residential neighborhoods. North of the new roundabout at NY 151/Couse Corners, the cross-section of Troy Road alternates between a five- to four-lane roadway. Similar to Columbia Turnpike, Troy Road serves motor vehicle travel well.

Public transit access is limited to the northern section of Troy Road via CDTA's bus route 214 with both weekday and weekend service between downtown Albany, the Rensselaer Amtrak Station and northern Troy Road.

The Troy Road corridor has a total of five signalized intersections and two roundabouts. All of these but one have crosswalks and pedestrian signals, except at the roundabouts which are unsignalized. In contrast to Columbia Turnpike, sidewalks along the Troy Road corridor are limited primarily to the northern section. There are no sidewalks south of NY 151/Couse Corners.

With its striped shoulders and better pavement condition, Troy Road is considered somewhat more "bicycle friendly" than Columbia Turnpike.

The estimated annual average daily traffic volumes for the corridor range from 14,000 (between Columbia Turnpike to Luther Road) to 24,500 to the north. The posted speed limit within the corridor is 45 miles per hour and all parking is provided off-street.

Past Studies

The Town of East Greenbush has conducted several planning studies that directly relate to the study area:

- Creating Healthy Places in Rensselaer County (2012)
- East Greenbush Amenities Plan (2012)
- Albany Hudson Electric Trail Feasibility Study (2011)
- Western East Greenbush Final GEIS (2009)
- Land Use Plan Update and Zoning Study (2006)
- Route 4 Corridor Linkage Study (2006)
- NY 151 Corridor Study (2004)
- East Greenbush Route 9 and 20 Corridor Master Plan (2003)

These prior plans and studies were used as a foundation for this project. A brief summary of several of those documents follows, and a more detailed summary is included in Appendix 1.

Land Use Plan Update and Zoning Study

The 2006 Land Use Plan Update and Zoning Study reviewed existing land use patterns and provided recommendations for both land use and zoning that reflect the town-wide vision for the future. The plan's main goal is to achieve a high quality built environment that enhances and supports the community's special

attributes and unique values. Land use concepts born out of this plan include:

- Focus growth and redevelopment in areas with sufficient infrastructure.
- Enhance and create walkable places with a unique and identifiable character.
- Strengthen Route 9 and 20 as Main Street,
- Limit commercial expansion on Route 4 south of Route 151.
- Design with sensitivity to the natural environment and residential neighborhood setting within corporate, office and institutional growth areas.
- Conserve historic settlements and hamlets.

The plan further identified several "character areas" and provides recommendations for each. For the Columbia Turnpike character area, the plan recommends the development of commercial design guidelines, a marketing package including incentives for redevelopment of underutilized sites, site specific cooperative planning to redevelop key catalyst parcels, and revised parking requirement for commercial uses.

Recommendations for the Route 4 North area included:

- Creating design guidelines for commercial development along the northern portion of Route 4 and for Mill Creek Commercial Park;
- Revising the list of allowed uses in existing zoning; and
- Developing trail connections between existing and new residential and commercial development and important natural features such as Mill Creek.

Recommendations for the Route 4 South area included:

- Revising the list of allowed uses in existing zoning, creating interconnected greenway systems linking neighborhoods along Route 4 to important civic and natural features;
- Developing a focused neighborhood scaled gateway at Couse Corner; and
- Developing a streetscape improvement plan.

Route 4 Corridor Linkage Study

The 2006 Route 4 Corridor Linkage Study was initiated through the CDTC Community and Transportation Linkage Planning Program, and it was prepared to develop conceptual transportation improvements and management actions for the corridor to achieve identified land use and transportation goals. This included facilitating a multi-modal future and improving the capacity and safety of Route 4 through:

- Access management.
- Raised and flushed medians.
- Inter-parcel connections & shared driveways.
- Innovative intersection treatments.
- Signal coordination & roundabout designs.
- Signalized crosswalks.
- Sidewalks and bike lanes.
- Bus stops.
- Traffic calming.

It also spoke to land use goals focusing on commercial design guidelines, form based design standards, and walkable, transit-oriented high quality commercial development.

NY 151 Corridor Study

The 2004 Route 151 Corridor Study was also a CDTC Linkage Study. The purpose of the study was to provide safe and efficient circulation of pedestrians, bicyclists, and motor vehicles in order to improve quality of life within the corridor. The study further sought to improve pedestrian, bicycle and vehicular safety and mobility in the corridor, prioritize recommendations to help achieve vision for the Route 151 corridor, and identify funding opportunities and implementation strategies.

The study recommends monitoring traffic volumes, adopting residential and commercial

driveway standards, improved ingress/egress with the high school access road, and other physical access and safety improvements including: high visibility crosswalk, pedestrian countdown signals, bicycle lanes, shared lane, traffic signals, and secondary access roads.

East Greenbush Route 9 & 20 Corridor Master Plan

The 2003 Route 9 and 20 Corridor Master Plan was funded by the CDTC Community and Transportation Linkage Planning Program. The impetus for developing this Master Plan was a NYS Department of Transportation reconstruction of Route 9 and 20 that eliminated street trees and widened the roadway. Some of the goals established within the Master Plan include:

- Improving the aesthetics of the corridor thereby making it more attractive to businesses and new residents.
- Improving bicycle and pedestrian safety,
- Defining gateways, activity centers, and other unique features along the corridor to develop a sense of place.
- Implementing traffic calming measures.
- Encouraging alternative transportation modes.
- Developing a bicycle trail system.
- Revising land use regulations to enhance the corridor's character.

Physical improvements recommended include improved sidewalks, crosswalks, streetscape amenities, road striping, signalization plans, and signage plans. The Master Plan also recommends zoning revisions, an update to the town's Comprehensive Plan and other ongoing planning efforts including a market analysis for the Routes 9 and 20 and Route 4 corridors.

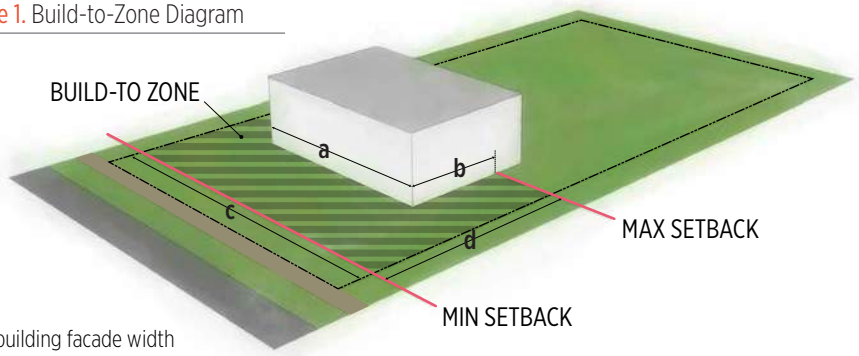
04 USING THIS DOCUMENT

This Concept Plan and Design Guidelines has divided the Columbia Turnpike and Troy Road corridors into several sub-zones. Each sub-zone has a set of guidelines that is structured to respond to a distinct set of planning and design issues at the neighborhood, street, site and building levels.

The guidelines are intended to provide a verbal description supplemented by visually illustrative examples of how future development should be planned and designed to further East Greenbush's goals for these highway corridors. They are intended to complement the town's existing zoning law and as such are intended to be directive instead of restrictive. There are several specific zoning changes recommended in this plan, primarily with regard to height, setbacks and build-to lines. It should also be emphasized that sidewalks and related pedestrian accommodations are required, not optional, elements within the corridors.

The guidelines illustrate the form, character and design elements the town desires. They are meant to be an explanatory tool to provide land owners, business owners, developers and project designers with insight into the town's vision and hopes for physical changes and improvements to properties along the Columbia Turnpike and Troy Road corridors.

Figure 1. Build-to-Zone Diagram



a = building facade width
b = building depth within build-to zone
c = build-to zone width
d = build-to zone depth

The guidelines may specify a percentage of the build-to zone that should be occupied by a building equal to the depth of the building within the build-to zone divided by the total width of the build-to zone:

% = b ÷ c

Or, the guidelines may specify a percentage of the build-to zone that should be occupied by a building equal to the width of the building divided by the width of the build-to zone:

% = a ÷ c

05 GENERAL CONCEPTS

Several general planning and design concepts used in these design guidelines are explained below. This plan recommends that the East Greenbush Comprehensive Zoning Law be revised to reflect or reference the build-to zones and street width-to-building height ratios suggested in the guidelines.

Build-to Zone

These guidelines recommend a build-to zone for properties on Columbia Turnpike and Troy Road. A build-to zone establishes the area on the lot between a minimum and maximum setback where principal buildings must be located, as shown in Figure 1. The guidelines further recommend what percentage of the build-to zone must be occupied by a building in some areas.

Street Width-to-Building Height Ratio

People are more comfortable walking on streets that have a sense of enclosure. These guidelines also recommend a maximum street width-to-building height ratio along the Columbia Turnpike and Troy Road corridors (see the Implementation section). The street width-to-building height ratio measures a building's setback from the road centerline in relation to the height of the building, as shown in Figure 2.

A sense of enclosure can be perceived with a ratio of 4:1, but is much stronger with a ratio of 3:1. Ratios of 2:1 and 1:1 are typical in a higher-density downtown or urban context. Rather than entirely prohibiting parking in front of buildings, a street width-to-building height ratio standard allows for a limited amount of parking (1 or 2 rows) in front of taller buildings. This would be combined with improved pedestrian connections, site amenities and landscaping to enhance the character and walkability of the corridors.

Figure 2. Street Width-to-Building Height Ratio Diagram

Street Width-to-Building Height Ratio. A sense of enclosure helps make a street a pleasant and appealing place to walk. The more equal the distance from the center of the road to the front of the building and the height of the building are, the greater the sense of enclosure. Once the ratio surpasses 4:1, the sense of enclosure and its associated walkability benefits are lost.

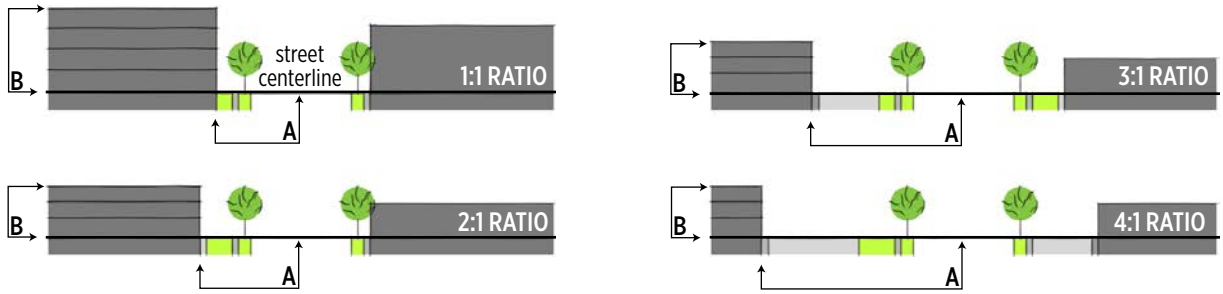


Figure 3. Three zones on the rural-to-urban transect representing medium-density sub-urban to higher-density town center development patterns.

Rural-to-Urban Transect

Columbia Turnpike and Troy Road were once rural roads that over time developed into trolley line suburbs, and then into auto-oriented commercial corridors. That evolution is still evident in the mix of settlement patterns, building types and land uses along the corridor. A principal reason for creating these guidelines was the recognition that a "one size fits all" approach to regulating land use and development within the corridors was not appropriate or effective.

The rural-to-urban transect recognizes the full range of environments from densely developed urban cores to undeveloped natural areas. This system supplements or replaces conventional zoning systems that have encouraged a car-dependent culture and land-consuming sprawl. Transect zones provide the basis for real neighborhood structure, which requires walkable streets, mixed uses, transportation options, and housing diversity.

The urban-to-rural transect is commonly divided into six zones that vary by the ratio and intensity of their natural and built components. This plan applies three of those six zones to the highway corridors - T3, T4 and T5 - as shown in Figures 3 and 4.

These design guidelines assign land within the Columbia Turnpike and Troy Road corridors into a transect zone based on the road segment the property fronts on as shown in the Transect Zone Map on page 19. The intent is to create a series of transitional zones that move from

Figure 4. The Columbia Turnpike and Troy Road corridors are "not all one thing" as illustrated in these three views along the highway, and transition between rural (T1-T3), suburban (T3-T4) and urban environments (T5-T6).

higher to lower densities and mix of uses as people travel along the corridor from each center of activity.

As a result of breaking the corridors into a series of transect-based segments, the characteristics of each area is enhanced by fostering context sensitive styles and densities, as opposed to blanketed conventional zoning standards.

Site Design Standards

The following standards are intended to guide new and upgrades to existing site design throughout the corridor to create an environment that is pedestrian-friendly and visually appealing.

- Access Management. Adjoining lots should share access and provide internal vehicular and pedestrian access between lots whenever possible.

  Creation of additional curb cuts on Columbia Turnpike and Troy Road should be avoided and unnecessary curb cuts eliminated whenever possible.

  Pre-existing, uncontrolled access along the frontage should be redesigned with curbing, landscaping, fencing or other appropriate techniques to limit access to defined curb cuts whenever possible.

Figure 5. Recent development on Columbia Turnpike that incorporated good access management techniques.

- Walking, Biking, Transit. Sidewalks and walkways should be constructed along public right-of-ways, internal parking areas, between pedestrian spaces, and to adjoining land uses. Walkways from sidewalks should connect to pedestrian-oriented building entrances.

  Features such as crosswalks, pedestrian islands, and parking lot medians with sidewalks should be incorporated throughout a site design. All crosswalks and walkways should be distinguished from driving surfaces through the use of textured and painted surfaces.

  Bicycle racks and transit stop accommodations should also be provided where appropriate (see Appendix 4 and 5).

- Landscaping and Greenspace. Attractive and well planned landscaping and greenspace should be incorporated into site designs.

  Street trees should be provided along the frontage adjacent to the sidewalk.

  Existing landscaping standards within the town's zoning should be revised to increase the number of landscape perimeter islands required within parking lots.

  Additional landscaping and greenspace should be considered in an effort to manage stormwater through low impact development techniques.

- Parking. Parking should primarily be located along the side and in the rear of buildings. A minimum amount of parking may be located between the building and street as specified in the guidelines for each transect zone.

  Existing off-street and shared parking standards within the town's zoning should be enforced. However, this plan recommends that the town provide additional flexibility to allow for a limited amount of parking in front of buildings within the B-2 zoning district as described in the guidelines.

  For larger parking lots, landscape median islands with sidewalks should be required for a select number of single parking bays. Medians with sidewalks should align with pedestrian site access and building entrances.

  New parking areas, particularly large lots, should consider incorporating or should plan for the future installation of electric vehicle charging stations. Charging stations should be located in close proximity to electrical infrastructure to reduce installation and construction costs. Businesses may choose to provide priority parking to electric vehicles to demonstrate their corporate pledge to sustainability (see Appendix 6).

- Signs. Signs should not be a the dominant visual element within the corridors. By bringing buildings closer to the street, building-mounted signs will be visible to passing drivers and pedestrians. Signs should complement the architectural style and materials of the building. New commercial or mixed-use buildings should be designed to provide an appropriate space for wall-mounted signs. Free-standing signs located adjacent to sidewalks should be pedestrian-scaled. Use of monument signs rather than pole signs is encouraged. Use of directory signs at shared entrances is preferred to multiple individual signs.
- Lighting. Lighting is a critical component of creating a pedestrian-friendly environment. People need to feel safe walking at night and all areas intended for pedestrian traffic should be appropriately lit with fully-shielded, downward directed light fixtures. Buildings should be designed with windows that look out onto walkways, parking lots and common areas to further enhance safety and security (see Appendix 10). Light fixtures can also be an attractive site element and should be selected to complement the architectural style and materials of nearby buildings.

Development Patterns and Connectivity

Improved site designs will foster a more aesthetically appealing and pedestrian-oriented environment along Troy Road and Columbia Turnpike. However, the development of a truly walkable community that is more economically sustainable will very much depend upon higher density residential and professional office growth that extends beyond the limits of the immediate study area. For example, in addition to traffic volumes, businesses look for a critical mass of residents and office workers when determining where to invest.

Furthermore, local and express bus operations, a key multi-modal option, often requires a minimum average of 15 units per acre in order to be economically viable. Finally,

urban planners and transportation engineers widely recognize that a ¼ mile distance (approximately a five minute walk) is the optimum length where most people will find it easier, more efficient, and/or more enjoyable to walk. As such, creating land use patterns that are well-connected and that offer a variety of live, work, or play options is important.

Traditional highway commercial land uses often encourage isolated development patterns, whereby an individual must drive from one location to the next, fostering a high degree of auto-dependency. Adjoining residential and commercial developments connect via a hierarchal network of roadways, channeling traffic through a series of local, collector, and arterial roadways. Such configurations are auto focused, often have limited pedestrian access, and can result in isolated neighborhoods.

In order to create a critical mass of residential units and professional office space that is needed to encourage new investments and promote walkability, a more traditional network of walkable roadways and land use patterns should be developed in adjoining areas along Troy Road and Columbia Turnpike. Such networks often include a system of parallel connectors that provide multiple and direct routes between origins and destinations.

According to the Institute of Transportation Engineers (ITE), the advantage of a more traditional roadway network includes the following:

- Reduced concentrations of traffic on a limited number of thoroughfares.
- Reduced vehicle miles of travel due to more direct routes.
- Increased pedestrian and multi-modal travel options along low and high-volume roadways.
- More direct walking routes to nearby transit systems.
- Increased densities and more flexible phasing for developers.
- Improved emergency vehicle access via redundant road networks.

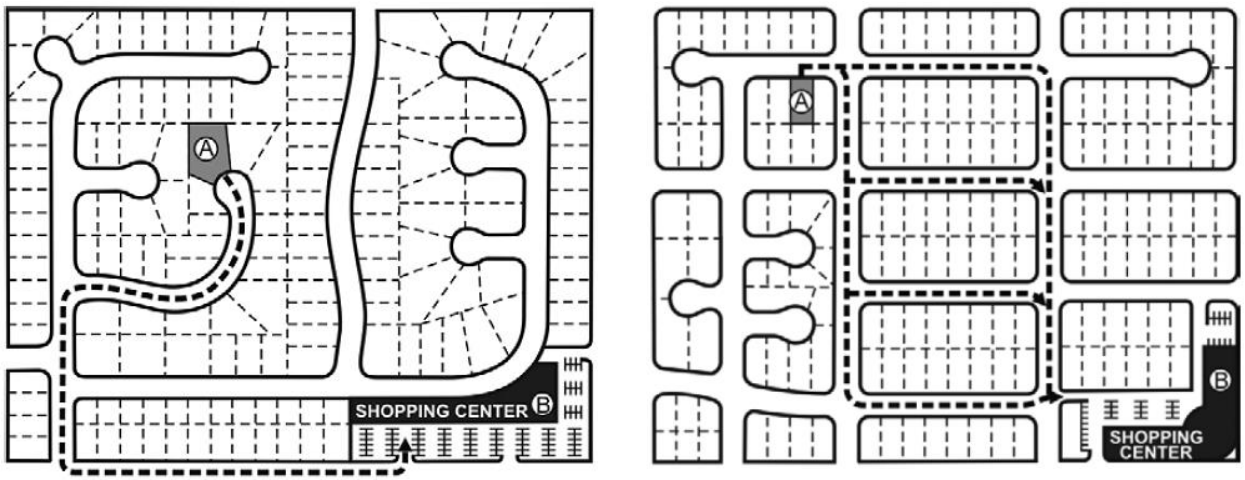


Figure 6. Isolated street system that limits travel routes and channelize traffic (left) as compared to an interconnected street grid that offers multiple routes that disperses traffic (right).

Ultimately, the goal of such a roadway network is to provide a high degree of connectivity and accessibility between neighborhoods and activity centers by offering inter-modal options and a high ratio of intersections and route choices. According to ITE, planning and developing a multi-modal network is an iterative process that requires long-range planning at the regional and community scale and thoughtful and context sensitive implementation at the sketch plan and site design scale.

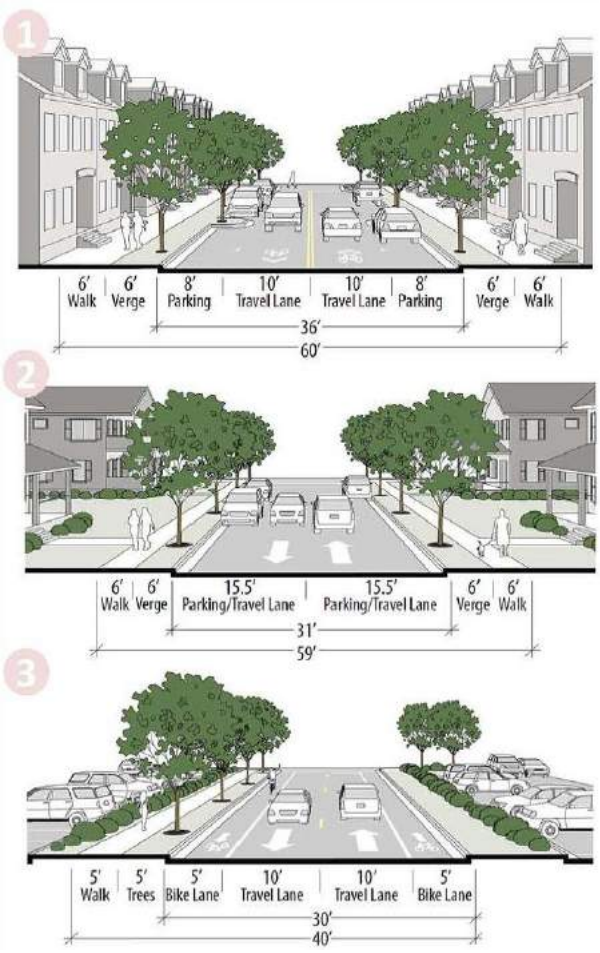


Figure 7. New or improved thoroughfares and local streets should incorporate complete street design principles. Busier thoroughfares (1) may provide access to existing shopping centers or to areas that have and/or accommodate greater development densities along Troy Road and Columbia Turnpike. Local streets may be designed to accommodate mixed use (2) or lower density neighborhood development patterns (3). *Image Source: Malta Formed Based Code.*

The former requires the identification of where such development patterns are desirable and how conceptual roadways might be configured. The latter require the establishment of roadways and easements (for future connections) that link with adjoining land uses and the provision of multi-modal transportation options and amenities.

With Troy Road and Columbia Turnpike serving as the town's principal thoroughfares, smaller-scale, secondary thoroughfares (particularly within the T5 and T4 transect zones), spaced at no greater than one-half mile, should be considered in order to provide access to adjoining and/or undeveloped land areas. Local streets that connect these secondary thoroughfares should be spaced somewhere between 200 to 600 feet apart, creating a series of higher density, mixed-use neighborhoods and blocks.

All roadways should be pedestrian oriented, neighborhood in scale (see Figure 8), and incorporate complete street design features (see Appendix 3). The Concept Map on page 17 illustrates where such opportunities should be explored.

While the Concept Map illustrates where higher density multi-modal roadway networks should be explored, more detailed plans that illustrate site-specific roadway patterns and design standards should be prepared. It is recommended that the ITE's *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* (2010) be used a reference when preparing such a plan.

06 RECOMMENDED ELEMENTS

These design guidelines recommend that applicants incorporate the following approaches and elements into project design throughout the corridor.

Complete Streets

Complete Streets are roadways that are designed and constructed to serve everyone - pedestrians, bicyclists, and drivers - and they take into account the transportation needs of all users, including children, older adults, and people with disabilities or impaired mobility. Complete Streets typically include a combination of the following elements:

- Pedestrian and ADA Compliant Elements. Sidewalks, crosswalks, curb ramps, accessible pedestrian signals, detectable tactile cues and warnings, and longer walk intervals at traffic signals.
- Bicycle Elements. Bicycle routes and lanes, signage and pavement markings, and bicycle racks.
- Streetscape Elements. Street trees, landscaping, rain gardens, permeable paving material, and buffers between vehicles and people.
- Traffic Calming and Access Management Elements. Intersection bump-outs, curb extensions, textured material, and center refuge islands. Driveway consolidations, modifications and closures, and shared site access.
- Transit and Parking Elements. Accessible bus stops, shelters and pull-outs integrated with pedestrian enhancements. Delineated on-street parking spaces and curb/sidewalk bump-outs.

Achieving complete streets will require a partnership between private development, the Town of East Greenbush and the New York State Department of Transportation. More guidance on Complete Streets can be found in Appendix 3.

Green Infrastructure

Additional site design and landscaping features should be considered in an effort to address stormwater runoff. Conventional approaches to stormwater management are based on conveyance using engineered and often single purpose and centralized systems. Whereas a green infrastructure approach uses natural design features to reduce runoff, promote infiltration, and treat water quality.

Green infrastructure practices may include green roofs, cisterns and rain barrels, bioretention basins or rain gardens, stormwater planters, and pervious surfaces. The *New York State Stormwater Management Design Manual* includes an inventory of green infrastructure practices that should be incorporated into site designs whenever possible (http://www.dec.ny.gov/docs/water_pdf/swdm2010chptr5.pdf).

In addition to the Design Manual, the USEPA's Green Infrastructure portal provides tools and techniques, municipal implementation and funding strategies, case studies, and research (http://water.epa.gov/infrastructure/greeninfrastructure/index.cfm#tabs-1).

CONCEPT PLAN

This chapter presents two maps that illustrate the concept plan and transect zones for the Columbia Turnpike and Troy Road corridors.

07 CONCEPT PLAN

The concept plan builds upon the prior planning work for the corridors and incorporates input from town staff and officials, the project steering committee, and community members who participated in the focus groups and workshops held during the planning process.

While improved site designs will enhance pedestrian access and mobility and the aesthetic quality of the Troy Road and Columbia Turnpike Corridors, increased multimodal opportunities, strong neighborhood connections, and pedestrian-scaled growth patterns are equally essential. The concept plan incorporates proposed trail opportunities, including along the former trolley line and around Hampton Lake, and existing transit locations. It also illustrates where stronger pedestrian connections to adjoining neighborhoods are desired/needed (as identified during town public workshops).

As discussed in the introduction, creating vibrant, pedestrian-friendly, mixed-use corridors will require more than improvements to the immediate frontage properties along Columbia Turnpike and Troy Road. It will require infill extending back from the highway corridors with mixed-use and higher-density residential development.

The concept map illustrates conceptual block patterns and infill opportunities that mirror the Institute of Transportation Engineers' (ITE) recommended thoroughfare and local roadway configuration as identified in *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* (2010). Such patterns are recommended in order to promote walkability and to support a critical mass of higher density residential development and professional office space that is needed to sustain existing businesses and future economic growth.

08 TRANSECT MAP

The transect zone map illustrates the transects (from T3 to T5) along Columbia Turnpike and Troy Road, as well as two special areas - the SUNY Albany East Campus and the land around Exit 9. Guidelines for each transect or area are presented in the next chapter.

The Town of East Greenbush could use this transect map in several ways depending on the degree to which the town wants to pursue further revisions to its zoning law:

- As the foundation for a complete form-based code for the study area, which would replace the current zoning districts and standards.
- As an overlay district, which would supplement the current zoning districts and standards.
- As an accompaniment to the design guidelines without making it a regulatory map.

CDTA Bus Stops
Trail Opportunity
Neighborhood Pedestrian Access
Study Area Corridor
Quarter Mile Walking Distance
Conceptual Growth Block/Street Pattern

Enhance Town Gateway

Utility Trail Opportunity

Temple Lane Trail Opportunity

Enhance Town Gateway

Strengthen Pedestrian Connection to Neighborhood

Utility Trail Opportunity

Hampton Lake Trail Opportunity

Trolley Line Trail Opportunity

Strengthen Pedestrian Connection to Neighborhood

Improve Pedestrian Access to High School, Library, and Senior Housing

Utility Trail Opportunity

Utility Trail Opportunity

Reconstruct Intersection to Enhance Pedestrian Access and Improve Town Center Aesthetic

Strengthen Pedestrian Connection to Neighborhood

Consolidation of smaller lots and thoughtful subdivision of larger parcels, coupled with the establishment of new roadways, easements, and pedestrian enhancements, will allow for the creation of a more interconnect block pattern and increased economic development opportunities throughout the study area corridor.

Trolley Line Trail Opportunity

Neighborhood & School Connection

Improve Pedestrian Access to School

Enhance Town Gateway

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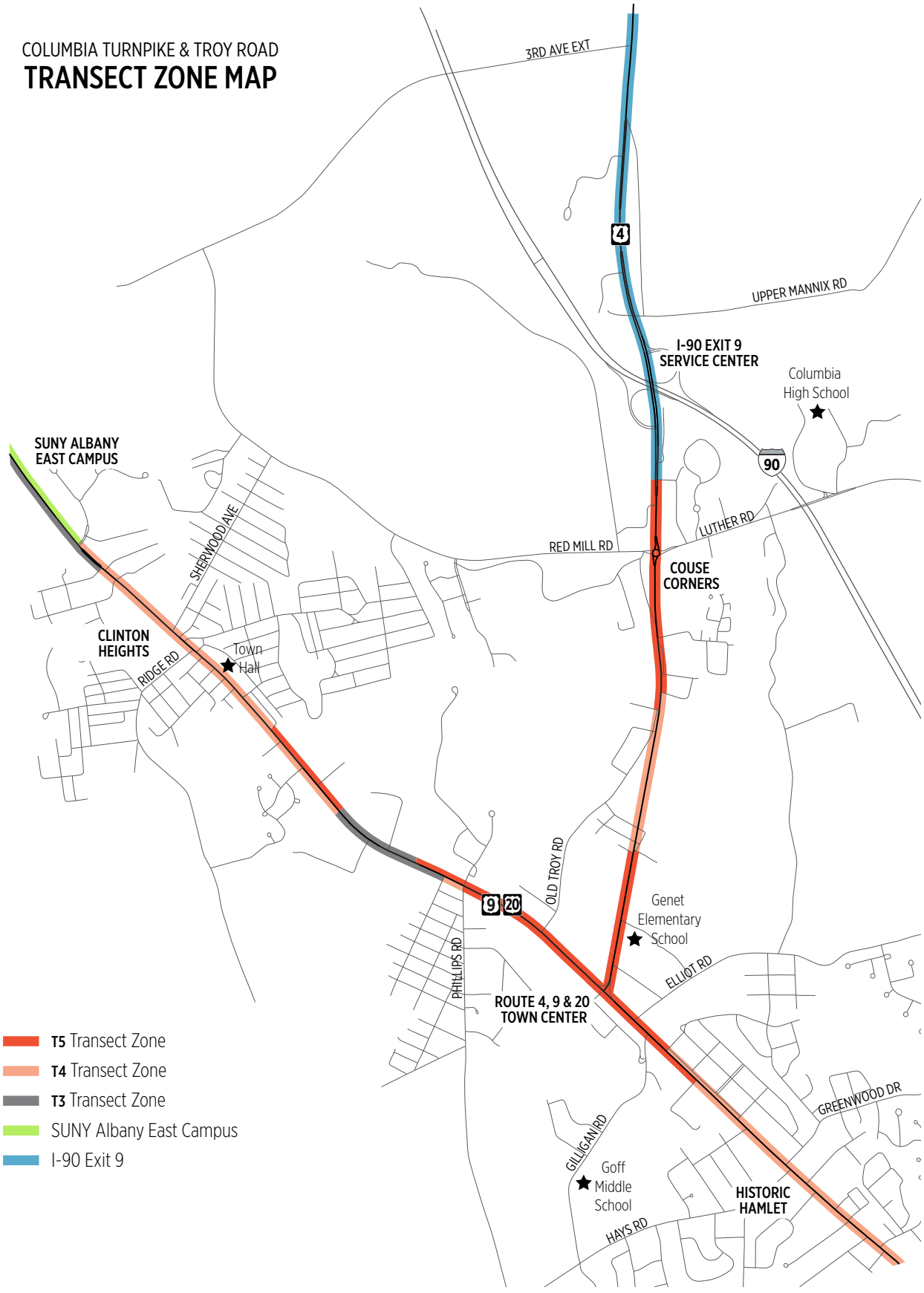
COLUMBIA TURNPIKE & TROY ROAD

TRANSECT ZONE MAP



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DESIGN GUIDELINES

09 T5 TRANSECT ZONE

Existing Conditions

The T5 transect zone includes:

- Columbia Turnpike and Route 4 Intersection. This highly developed area has evolved with a mix of land uses and building types including restaurants, fast food dining, grocery stores, banks, family-owned business, and shopping plazas. It is largely an auto-oriented environment, but it adjoins several residential neighborhoods and is close to local schools, including Genet Elementary and Goff Middle Schools.
- Couse Corners. The new roundabout at the Route 4 and 151 is the focal point of the Couse Corner area, which is currently developed with a cluster of small-scale commercial uses and professional offices and adjoining residential neighborhoods and with opportunity for future growth.
- Underutilized Lands. There are several large properties fronting on Columbia Turnpike or Troy Road that are currently undeveloped, developed at low densities, and/or underutilized, including the former shopping plaza on Bass Lane and residential land around Genet Elementary School.

Intent

The intent of the T5 Zone is to promote higher-density, mixed-use redevelopment and infill development and to encourage higher-quality, well-designed development. The result will be attractive, coherent centers of activity and commerce that are linked to nearby residential neighborhoods. These areas will become less auto-oriented and more pedestrian-friendly as an interconnected network of streets, service drives, parking lots, sidewalks, paths and walkways takes shape.

This transect zone also provides an opportunity for a type of development that East Greenbush currently lacks - higher-density, compact, multi-family housing in close proximity to transit, shopping, schools, and other services. Higher-density housing along the Columbia Turnpike and Troy Road corridors would improve the viability of nearby businesses by expanding their customer base. It would provide a form of housing that is likely to be in greater demand over the next several decades by both aging baby-boomers and young millenials.

Design Standards

The T5 zone should serve as a focal point for higher-density, mixed-use sites and buildings designed in accordance with the following guidelines:

- Building Placement and Orientation. Buildings should face the street with visually interesting facades that invite pedestrian activity by incorporating prominent front entrances and street-level windows. A strong street wall of primarily multi-story buildings situated relatively close to the sidewalk should define the street frontage. The build-to zone should range from 10-70 feet.
- Building Height. Most new buildings should be two or three stories tall, but single-story buildings will be permitted. If buildings are single-story, they should occupy at least 60% of the build-to zone, which would likely accommodate not more than one bay of parking and a one-way drive aisle between the building and the street. Multi-story buildings may be located at the edge of the build-to zone, which could accommodate up to two bays of parking and a drive aisle between the building and the street.

Figure 8. Examples of multi-story, mixed-use buildings that accommodate ground floor retail, office or other commercial uses with upper-story residential or office uses. The ground floor is not intended for residential uses. The mass of the large buildings is broken up with variation in roof forms, variation in the facade with wall projections and recesses, fenestration, and other architectural details. The site design features strong pedestrian connections and public amenities like outdoor seating, plazas, promenades, etc. This form and scale of development is highly desirable in the T5 transect zone.

- Massing. Large buildings should incorporate design elements such as wall offsets, material, and colors to reduce their perceived mass and maintain a human scale. Buildings should incorporate appropriately scaled features that express architectural or structural elements (cornices, lintels, columns, frieze, etc.). Large blank walls along primary and secondary streets, pedestrian spaces, or internal parking areas are strongly discouraged.
- Roofs. Buildings should have flat roofs, steeply pitched, gabled, and/or dormered roofs with appropriately scaled overhangs and/or cornice details.
- Doors and Windows. Large buildings should have multiple entrances that are thoughtfully spaced. Facades should incorporate a regular pattern of windows on the ground and upper floors. Street level windows should allow views into the ground story. A majority of the ground floor (as measured by a percentage of the overall wall area) should be transparent.
- Materials. The use of high-quality, traditional building materials (or faux composites) is encouraged (masonry, wood, metals, etc.).
- Use. First floor commercial uses for buildings fronting directly on Columbia Turnpike or Troy Road are preferred, with residential uses above or located separately in the rear. While professional office space can be located in a stand-alone building, retail, dining and personal service uses on the ground floor are encouraged. Higher-density residential development may be located behind a mixed-use built frontage or an attractively landscaped buffer. Residential building types may include garden apartments, multiplexes, row houses, townhouses, duplexes and single-family homes.
- Density. Neighborhoods with a mix of housing types that have an average density of at least 16 dwellings per acre are encouraged (a density that will support transit service).
- Landscaping. Attractive and well planned landscaping should be incorporated into site designs. Existing landscaping standards should be improved to include an increase in the number of landscape perimeter islands within parking lots. For larger parking lots, landscape median islands with sidewalks should be required for a select

Figure 9. Examples of single-story and/or single-use buildings that could be incorporated into mixed-use developments and that would complement the architectural character and surrounding higher-density, multi-story structures. Existing single-story structures could be improved to incorporate similar architectural elements and design characteristics. Because of the auto-oriented nature of single-story and/or single-use development, such buildings should be located closer to the street with only one parking bay and drive lane along the front within the build-to zone. Pedestrian connections and public outdoor spaces and amenities can further integrate existing or new single-story and/or single-use buildings into a mixed-use site.

number of single parking bays. Medians with sidewalks should align with pedestrian site access and building entrances.

- Parking. Most parking should be provided to the side or rear of buildings, preferably in shared lots located in the center of blocks and screened from the street by buildings. Where parking will be located in front of buildings it should be separated and screened from the sidewalk through landscaping, fencing, walls, and/or change in elevation. Where parking exists in front of buildings that cannot reasonably be eliminated or relocated, effort should be made to screen it and create a landscaped buffer between the parking area and sidewalk. Bicycle parking should also be provided. Additional parking management strategies should be evaluated as density increases such as reduced parking requirements, parking in-lieu of fees, municipal parking lots and/or structures, web-based parking information and mapping, and on-street parking.
- Access Management. Access and parking areas should be shared and interconnected between adjoining lots.
- Transit. Transit stop accommodations should also be provided at suitable locations along the Columbia Turnpike corridor and space should be reserved for future transit accommodations along the Troy Road corridor.
- Signs. Existing standards should be used to promote attractive and appropriately scaled signage. This may include a combination of wall, awning, canopy, shingle, window, monument, and sidewalk signs. Signs should be illuminated with direct and shielded lighting and backlit signs should be discouraged.
- Public Amenities. Site designs should incorporate some combination of public amenities such as outdoor seating, café space, plazas, and attractive landscape features (e.g., water features, etc.).

Figure 10. Examples of the types and densities of residential development that are desirable within the T5 transect zone. There should be a range of housing opportunities from residential on the upper floors of mixed-use buildings to single-family homes on small lots. Residential housing should be subordinate to larger, mixed use developments, with the intent to promote live, work, and play opportunities and to provide a critical mass of residents that is needed to support new and existing businesses. Such housing can be used to create a transition from high-intensity commercial or mixed-use areas to existing single-family neighborhoods.

Residential infill between a shopping plaza and a residential neighborhood provides housing within easy walking distance of a grocery store and pharmacy. Some buildings provide underground parking.

This new development under construction features mixed-use buildings with commercial uses on the first floor and several floors of residential above. The buildings front on the street with parking in the center of the block.

A new development organized around a village green. It includes both single-use residential and commercial buildings, as well as mixed-use buildings.

Multi-unit buildings front on greenspace and streets with sidewalks. Parking is provided on-street and in small parking lots dispersed throughout the development.

This compact development consists of duplexes and triplexes that offer another form of family housing. Buildings incorporate private garages and driveways.

Single-family housing development with homes on small lots with front entrances and porches. Vehicular access and parking is provided by rear alleys.

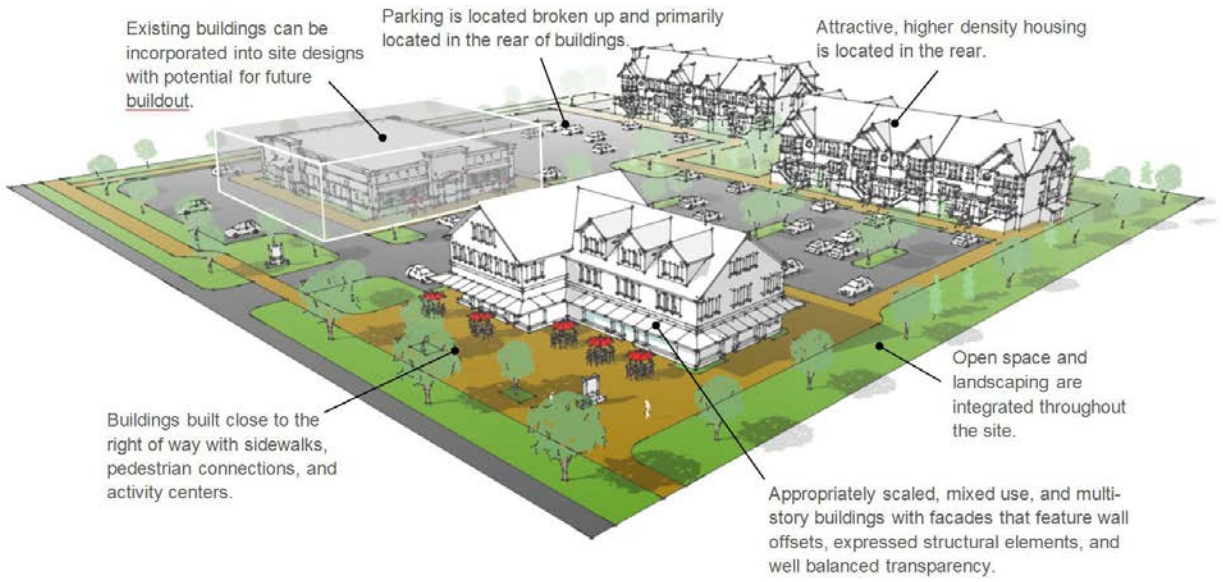


Figure 11. Desired development concepts and approaches around the Columbia Turnpike and Troy Road intersection.

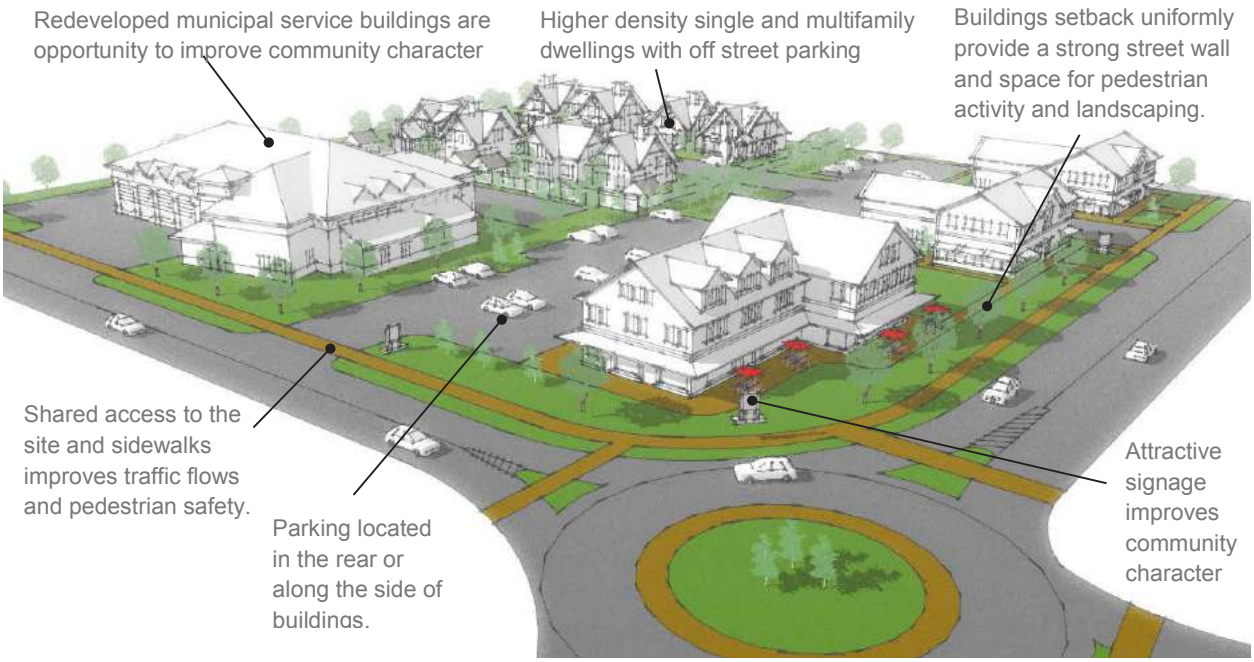


Figure 12. Desired development concepts and approaches at Couse Corners.

10 T4 TRANSECT ZONE

Existing Conditions

The T4 transect zone includes:

- Historic Hamlet. East Greenbush's historic hamlet is located on Columbia Turnpike at the intersection of Greenwood Drive and Hays Road. It has traditional block commercial buildings on the east side of the highway on either side of Greenwood Drive, most of which are built to the edge of the sidewalk and are two stories. On the west side of Columbia Turnpike, there are a number of historically significant civic buildings and larger residences. These are set back from the street with lawn and landscaping in front. Over time, the widening of Columbia Turnpike and the addition of some single-story commercial buildings has frayed the historic fabric of the hamlet.
- Clinton Heights. This existing neighborhood extending from Lakeview to Hampton Avenue along Columbia Turnpike is defined by a mix of one- and two-story residential and commercial uses that are in close proximity to the roadway and connected by an existing sidewalk network.
- Residential Areas. A number of single-family residential neighborhoods front on Columbia Turnpike and Troy Road. Over time, road widening, commercial development and traffic has reduced the desirability of living in a single-family home directly on the highway, and increased interest in converting these properties to multi-family rentals and small businesses.

Intent

The intent of the T4 Zone is to create a pedestrian-friendly village or neighborhood atmosphere with moderate-density, mixed-use development at a scale that will enhance the existing mix of uses, protect historic character, and encourage revitalization and attractive infill development.

In addition to attracting new business and economic development opportunities, this transect zone is intended to complement and provide service to surrounding residential neighborhoods, while avoiding adverse impacts to the adjoining neighborhood. It recognizes that properties along the Columbia Turnpike and Troy Roy corridor are the "front door" of the neighborhoods beyond and should contribute positively to the quality and appeal of those neighborhoods.

This transect zone is also intended to reinforce the role of East Greenbush's historic hamlet as a traditional center for the community, which is highly valued by town residents. The hamlet's historic settlement pattern features different frontage and building types on either side of Columbia Turnpike. This unique feature of the hamlet should be maintained.

Design Standards

The T4 Zone should be revitalized with a mix of moderate-density, mixed-use sites and buildings that are well-integrated with adjoining residential neighborhoods in accordance with the following guidelines:

- Infill and Redevelopment. Infill development and re-development of underutilized properties and single-story buildings is encouraged to repair and extend the existing commercial block pattern within the historic hamlet and Clinton Heights. New buildings should be compatible with existing, traditional buildings in scale and design.

- Historic Character. Preservation of the historic buildings within the hamlet is a paramount concern. Exterior modifications, particularly to the front facades, should preserve or restore the integrity of the original architecture and additions should be compatible with and subordinate to the original architecture. New buildings should be compatible with historic buildings in scale and design, and should be set back a depth compatible with adjoining properties with a front yard consisting primarily of lawn and landscaping.

- Building Types. Within residential areas, buildings should be converted residences or new buildings built to appear as single-family homes. Additions or outbuildings needed to accommodate the business should maintain the residential appearance of the property and be in scale with the existing building.

- Building Placement and Orientation. Buildings should have a prominent pedestrian entrance facing the street with a walkway to the sidewalk. Service doors and areas should be located to the side or rear of the building and should be largely invisible

from the street. To promote a pedestrian-scale village or neighborhood character, buildings should be set back enough from the right-of-way to provide pedestrian access and/or attractive landscaping as described below:

- Hamlet East Side of Columbia Turnpike. This side of the highway should be defined by a consistent street wall of primarily multi-story commercial block buildings with ground level storefronts situated at or close to the sidewalk. The build-to-zone should range from 0 to 40 feet and building facades should take up 60 to 100% of the lot width. No additional parking should be located between the building and the street. Where existing buildings are set back from the edge build-to-zone should range from 20 to 40 feet and building facades should take up 20 to 50% of the lot width. No parking should be located between the building and the street.
- Clinton Heights. The build-to zone on both sides of Columbia Turnpike should range from 20 to 30 feet and building facades should take up 60 to 100% of the lot width.
- Residential Areas. The frontage should appear largely the same as a typical single-family home in the neighborhood. Buildings should be set back with a shallow front yard consisting primarily of lawn and landscaping

- Building Height. While single-story buildings may be permitted, two- to three-story buildings are strongly encouraged, particularly within the hamlet and Clinton Heights.
- Roofs. Buildings may have flat roofs, but steeply pitched, gabled, and/or dormered roofs with appropriately scaled overhangs and/or cornice details are preferred.
- Use. Buildings in the hamlet and Clinton Heights may be a mix of commercial, professional office, residential. First floor commercial uses along primary and secondary roadways is preferred, with residential uses above or located separately in the rear. While professional office space can be located in a stand-alone building, retail, dining and personal service uses on the ground floor are encouraged.
- Landscaping. Where buildings are not built to the sidewalk, landscaping, including street trees, should be provided along the frontage adjacent to the sidewalk. Landscaping may also be used to highlight or define signs, walkways and entrances, and to screen parking and service areas.
- Parking. Parking along the side and in the rear of buildings is strongly encouraged. However, minimal parking within the build-to zone may be allowed. Where more than one row of parking exists in front of buildings that cannot reasonably be eliminated or relocated, effort should be made to screen it and create a landscaped buffer between the parking area and sidewalk. Most parking should be provided in shared lots located in the center of blocks and screened from the street by buildings. Opportunities to establish on-street parking in the hamlet should be pursued. In residential neighborhoods, the view of parking areas from the street and adjoining properties should be screened with landscaping and fencing. Additional parking should only be allowed in residential front yards to provide mandated accessible parking when it cannot be accommodated elsewhere on the property.
- Access Management. Access and parking areas should be shared and interconnected between adjoining lots.
- Signs. Signs should be compatible with the building in style, design and color. Most signs should be mounted on and integrated into the architecture of buildings. External lights mounted above are preferred for lighting signs. Within residential

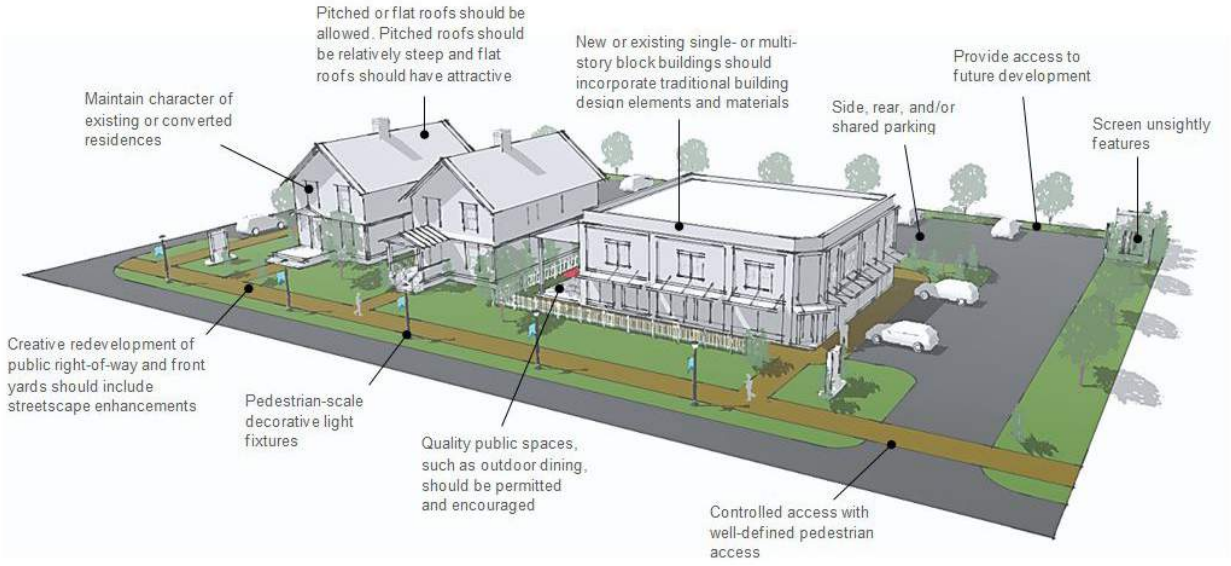


Figure 13. Desired development concepts and approaches in Clinton Heights.

neighborhoods, signs should not dominate the frontage and should be compatible with the building in scale, style, design and color.

- Public Amenities. Site designs should encourage and attract pedestrian activity. Walkways and open spaces that promote movement throughout the site and to the surrounding area should be provided along roadways, parking lots, and between adjoining land uses. Walkways from sidewalks should connect prominent building entrances. Amenities such as pedestrian-scale sidewalk lighting, accent pavers, planters, street trees, appropriately-scaled signage, and outdoor seating should be used to provide a safe and pleasant pedestrian environment. Within Clinton Heights, the existing sidewalk network is incomplete and new development must provide sidewalks where segments are missing in accordance with the town's zoning.

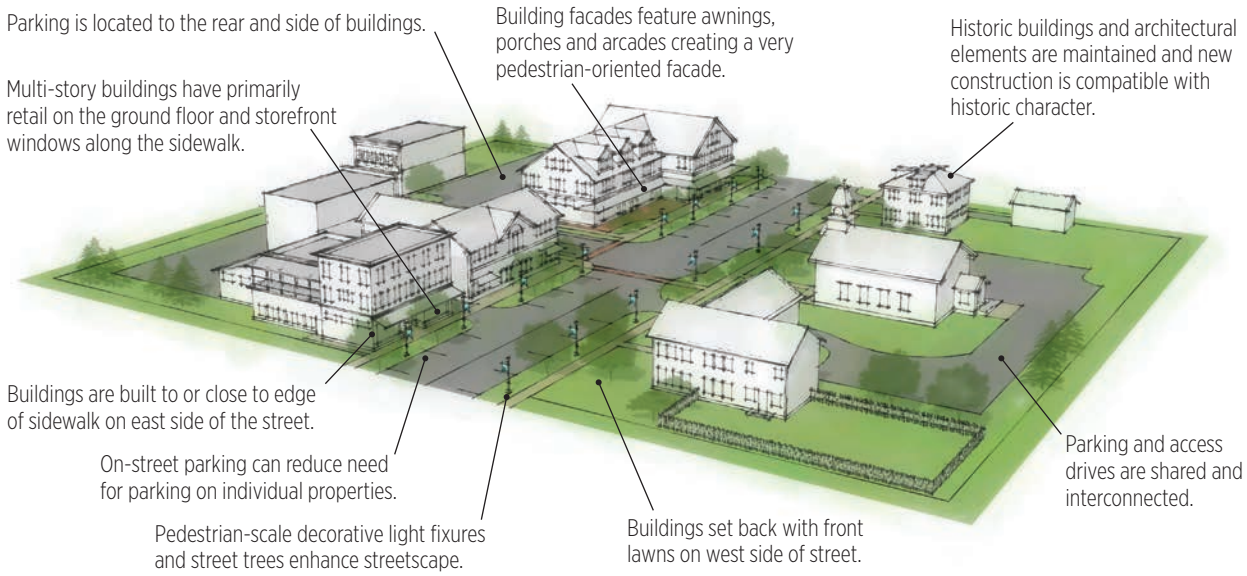


Figure 14. Desired development concepts and approaches for the historic hamlet.

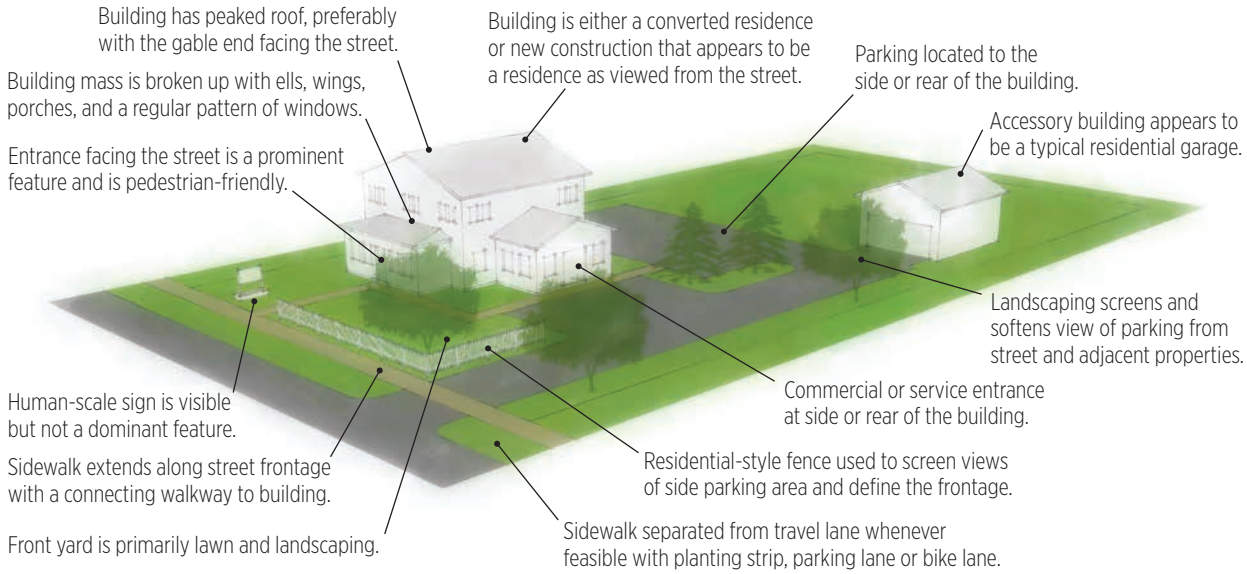


Figure 15. Desired development concepts and approaches for commercial uses in residential areas.

11 T3 TRANSECT ZONE

Existing Conditions

This transect zone includes areas along Columbia Turnpike that are dominated by lower-density agricultural, industrial, commercial, utility and municipal land uses. The frontage is not intensively developed and there are stretches of naturally vegetated open land. Several of these properties are large and deep with opportunities for infill development.

Intent

This transect zone is intended to accommodate commercial and light industrial uses that are more land intensive, that would not be compatible within or adjacent to residential or high-density mixed-use neighborhoods, or that are not the types of businesses that people would customarily walk to.

Design Standards

Infill development in the T3 transect zone should preserve and enhance the character of the corridor in accordance with the following guidelines:

- Screening and Buffering. New development should maintain or establish a naturally vegetated buffer with adjoining lots, particularly where more intensive uses are adjacent to residential neighborhoods. More intensive land use activities and utilitarian buildings should be screened from the street, preferably by retaining existing natural vegetation or establishing informally landscaped, naturalistic buffers to maintain a corridor that people will feel comfortable traveling through whether by car, bike or foot.
- Building Placement and Orientation. The build-to-zone should range from 45 to 75 feet. Buildings fronting on the street should have features such as windows and a pedestrian entrance that create an attractive facade. Service doors and areas should be located to the side or rear of the building and should not be prominent features visible from the street.
- Building Height. While single-story buildings are permitted, multi-story buildings are encouraged.
- Roofs. Buildings may have flat roofs, but steeply pitched, gabled, and/or dormered roofs with appropriately scaled overhangs and/or cornice details are preferred.
- Signs. Signs should be compatible with the site and building in scale, style, design and color.
- Access Management. Access and parking areas should be shared and interconnected between adjoining lots wherever feasible.
- Parking. There may be more flexibility on where parking should be located in relation to buildings, provided it will be effectively screened from the street, and particularly for non-retail or customer-oriented businesses.

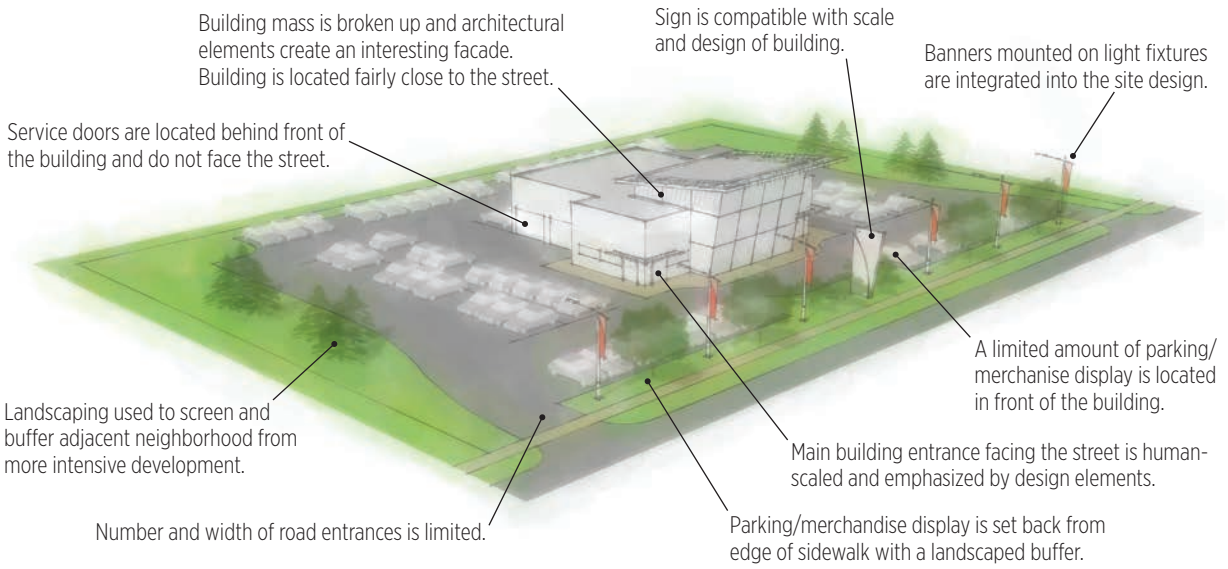


Figure 16. Design approaches and concepts to accommodate auto-dependent and similar uses that are not particularly pedestrian-oriented into the corridors.

12 EXIT 9

Existing Conditions

This area extends along Troy Road (Route 4) from East Greenbush's northern municipal boundary to Glaz Street, encompassing a wide range of commercial development and professional office buildings, including Walmart, Regal Cinemas, Federal Express shipping center, Holiday Inn, and Cracker Barrel. Interstate 90's Exit 9 partial cloverleaf interchange is the area's defining transportation feature, splitting the corridor with larger-scale development patterns to the north and a cluster of smaller highway commercial uses to the south, opposite the westbound exit and entrance.

Intent

The intent of the Exit 9 area is to permit and encourage a grouping of office and commercial uses, easily accessible by major roads, and built to a high standard. The intended uses include corporate office centers, tourist accommodations, convention centers, and regional level commercial uses such as a regional shopping center. The regulations are designed to encourage large-scale campus-type developments, and to discourage a strip form of development.

Design Standards

Future growth and development near Exit 9 should promote pedestrian-friendly infill to complement existing large-scale development in accordance with the following guidelines:

- Building Placement and Orientation. The development of attached or detached smaller retail stores is encouraged. The presence of smaller retail stores breaks up large expanses and provides for a more pedestrian friendly environment. While maintaining architectural continuity, smaller retail stores should have additional and appropriately scaled architectural features and street level windows that allow views into the ground story. This may include expression of architectural or structural elements, use of additional materials (high quality such as real or composite wood or brick is preferred), and thoughtfully designed entrances.
- Massing. In order to improve the aesthetic quality and provide for convenient access, large retail buildings should provide multiple entrances, incorporate wall offsets, and have repeating architectural patterns and materials that provide visual interest at a more pedestrian scale that recognizes local character. The use of overhangs, canopies or porticos, raised cornice parapets over the doors, and peaked roof forms or arches is preferred. Variation in roof lines should be used to add interest and reduce the massive scale of large buildings.
- Pedestrian Orientation, Scale and Amenities. Buildings should offer attractive and inviting pedestrian-scale features, spaces, and amenities. Entrances and parking lots should be configured to be functional and inviting with walkways conveniently tied to logical destinations.

  Pedestrian ways should be anchored by special design features such as towers, arcades, porticos, pedestrian light fixtures, bollards, planter walls, and other architectural elements that define circulation ways and outdoor spaces such as plazas, patios, courtyards, and window shopping areas. These features and spaces should enhance the building and the large

retail development as integral parts of the community fabric.

In order to improve pedestrian flow in an otherwise auto-oriented development, sidewalks must be provided along all public streets in accordance with the town's zoning and should also be created along the full length of building façades with public entrances. Internal pedestrian walkways should be provided from public sidewalks to public entrances.

- Parking. Parking areas should be distributed around primary and small retail buildings in order to shorten the distance to other buildings and sidewalks and to reduce the scale of paved surfaces. Parking lots should incorporate median islands with sidewalks every select number of single parking bays. Medians with sidewalks should align with building entrances. All internal pedestrian crosswalks and walkways should be distinguished from driving surfaces through the use of textured and painted surfaces.

- Access Management and Connectivity. Curb cuts should be minimized by requiring (whenever practicable) that adjacent uses share or combine access. Vehicular and pedestrian connections should be made between adjoining developments.

- Transit. Bus stops and drop-off/pick-up points should be considered as integral parts of the site design. Transit stop access and accommodations should be located in areas that do not conflict with primary vehicular access, internal traffic flows, or adjacent street traffic flows.

- Landscaping. Landscaping should be used to enhance the internal attractiveness of the site, break large expanses of parking, and mitigate impacts to surrounding properties as a result of the development. The existing landscaping standards in the town's zoning should be increased for parking lots (e.g., from 5 to 15%). Additional landscaping should be considered in an effort to address stormwater management. This may include green roofs, bio-retention basins or rain gardens, and pervious surfaces. For

example, median islands could be installed below the level of the parking lot surface in order to capture runoff.

- Signs. The town's existing signage standards should be used to promote attractive and appropriately scaled signage. This may include a combination of wall, awning, canopy, shingle, window, monument, and sidewalk signs. All signs should be located on the same lot as the permitted use and illuminated with direct and shielded lighting. With the exception of channel lettering and opaque backgrounds, backlit signs should be prohibited. A common sign plan should be prepared for all sites with more than one tenant. All tenant signs should then meet the requirements of the common sign plan. The common sign plan should indicate the standards of consistency of all signs on the subject property (color, graphic styles, location, etc.).

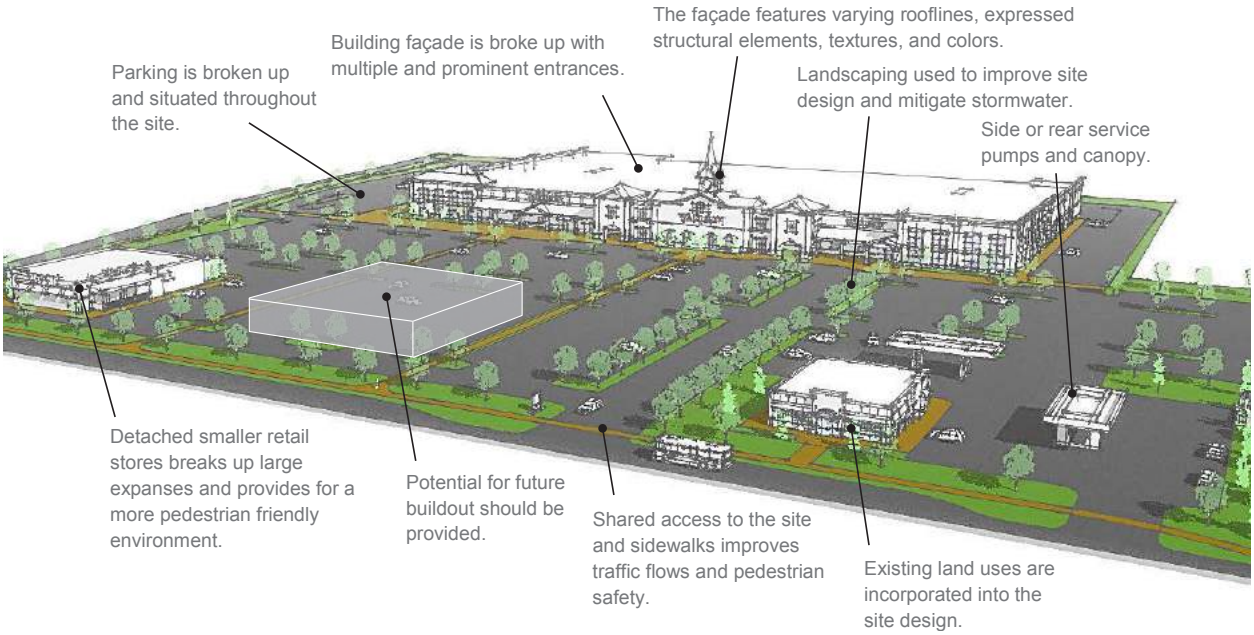


Figure 17. Design approaches and concepts for large-scale retail buildings and developments that promote infill development, are more pedestrian-friendly, and enhance community character.

13 SUNY ALBANY CAMPUS

Existing Conditions

Due to the topography and existing development pattern, most of the SUNY Albany East Campus sits above Columbia Turnpike and does not relate to the street. The buildings face inward, fronting on University Place. The rear facades of several buildings are visible from the highway. A naturally vegetated hillside currently separates and screens the campus. This segment of Columbia Turnpike currently lacks sidewalks.

Design Standards

Within the SUNY Albany East Campus, primary building facades may not face Columbia Turnpike. However, any facade visible from the street should be similar in design, quality and materials to the primary facade.

Any utilities, parking areas or service elements should be screened from view on Columbia Turnpike. The Gen•NY•Sis building should serve as a model for any future development on the campus in terms of quality of design, scale, massing, height and materials.

The SUNY Albany East Campus frontage on Columbia Turnpike should be attractively landscaped with views of the campus buildings beyond. Parking should not be located along the perimeter between the campus buildings and Columbia Turnpike. The campus entrance at Discovery Drive should continue to serve as a gateway to the campus and East Greenbush generally. It is a logical location for a transit stop with a bus shelter and improved pedestrian access, particularly south along Columbia Turnpike. Completion of the sidewalk from the campus to Clinton Heights should be a high priority to connect this employment and activity center to nearby businesses and housing along Columbia Turnpike.

IMPLEMENTATION

01 OVERVIEW

These design guidelines are intended to assist those proposing new development or redevelopment along the Columbia Turnpike and Troy Road corridors in East Greenbush with planning and designing their project. The town can also adopt these guidelines so that they can be used by the planning and zoning boards as a basis for the review and evaluation of applications. Once adopted, they could become a supplement to the town's zoning code, providing more specific standards for the aesthetics and quality of the built environment along Columbia Turnpike and Troy Road.

02 NEXT STEPS

Following adoption of this concept plan and design guidelines, East Greenbush could pursue implementation of these design guidelines through revisions to the town's zoning law. There are several options for zoning revisions that range in comprehensiveness and complexity as described below:

- Revise Standards. Specific elements like the setbacks, building heights, frontage build-out, street width-to building height ratios, and/or densities recommended in these regulations could be incorporated by revising the dimensional and density standards for the existing zoning districts along the corridors.

  The plan and guidelines also recommend specific changes to existing landscaping requirements, including within parking lots and along the frontage. The sidewalk requirements should be strengthened so that they are less able to be waived or modified during development review. Various standards such as residential density, parking, landscaping, signage and lighting may need to be adjusted to accommodate desired higher-density, mixed-use redevelopment and infill development. The existing standards work well in a suburban context, but within the T5 and T4 transect zones they could be inadvertently creating barriers to the more compact development patterns encouraged in this plan and in the existing B1 zoning district.

- Adopt Overlay District. An overlay district could be adopted that would encompass the parcels fronting on Columbia Turnpike or Troy Road and/or that would encompass land within 800 to 1,200 feet from the road centerline. Within that overlay district, the underlying zoning standards could be supplemented or superseded by the standards set forth in these guidelines.

- Revise Districts and Boundaries. The corridors or portions of the corridor areas could be re-zoned entirely, replacing one or more existing zoning districts with new districts built upon this concept plan and design guidelines, particularly the transect and form-based code approach to regulating development. That offer landowners and developers greater flexibility in use, higher densities and a more streamlined permitting process in exchange for higher quality projects that would create a more attractive, walkable and vital environment in the corridors.

03 CHALLENGES & FLEXIBILITY

As this plan is implemented, it is important to recognize the challenges posed by the existing development pattern and transportation infrastructure, and incorporate some flexibility within the town's zoning to allow private developers to respond to those challenges while

still furthering the town's goals and vision for the corridors.

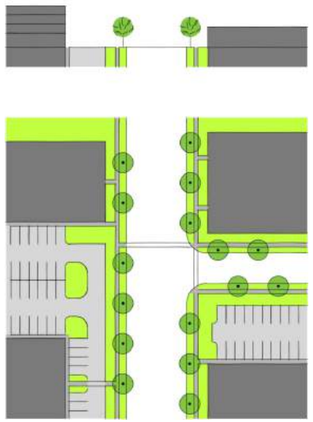
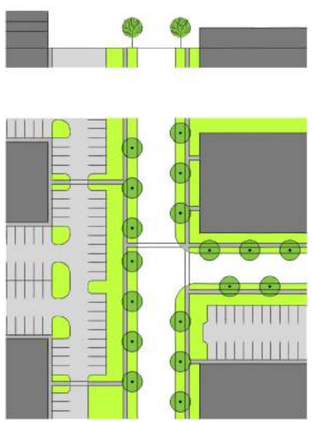
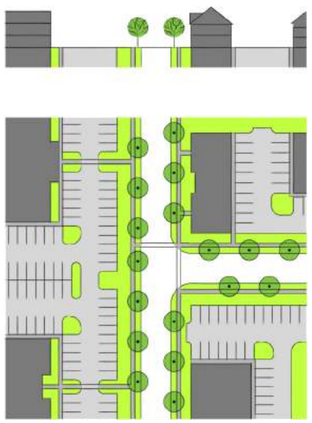
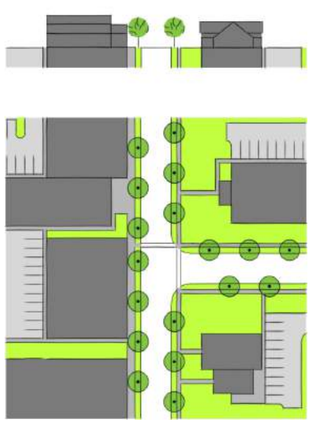
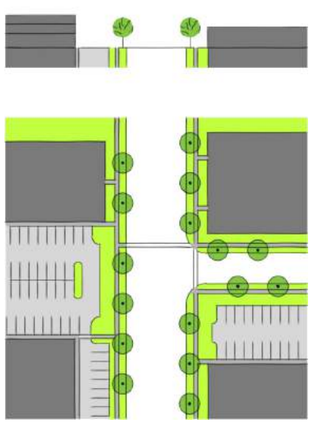
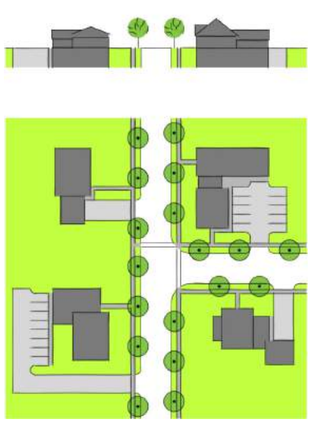
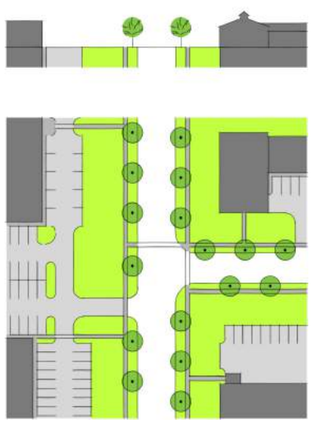
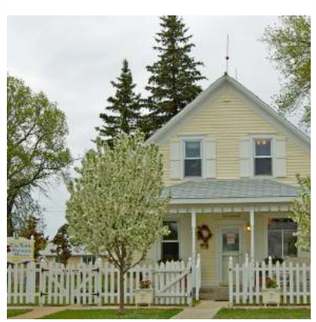
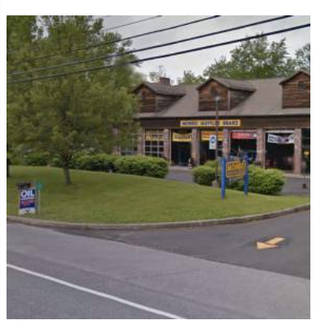
The pre-existing small lots in the immediate vicinity of the Columbia Turnpike and Troy Road intersection are a particular concern. One option for addressing the challenge of redeveloping those small lots in accordance with this concept plan and design guidelines would be to provide more flexibility to waive some of the dimensional requirements in the T5 zone for small lots (less than an acre in area). Site assembly or consolidation of these small lots with adjoining larger parcels could also facilitate redevelopment, which the town or economic development organization could assist with. Encouraging or requiring shared parking, developing municipal parking and/or reducing on-site parking requirements for those small lots would also provide relief and make it more feasible to redevelop in accordance with these guidelines.

The other challenge that became apparent as this plan was developed relates to the long history of the Columbia Turnpike corridor in particular as a commercial highway strip, and the perceptions and expectations of the type of development that is appropriate and possible in that setting that have formed over that time. Nearly a decade worth of planning efforts have made it clear that residents want to see the character of the corridor transform and improve. The challenge for the town moving forward is to forge strong partnerships with private developers interested in seizing the opportunity created by a higher-density, mixed-use, pedestrian-friendly approach to redevelopment and infill.

04 SUMMARY TABLE

The table that follows concisely describes and summarizes the recommended form and character of development for each transect zone discussed in the design guidelines.

SUMMARY TABLE

	T5			T4			T3
	TOWN CENTER	**COUSE CORNERS**	**NEW NEIGHBORHOODS**	**HAMLET**	**CLINTON HEIGHTS**	**RESIDENTIAL NEIGHBORHOODS**	
CHARACTER	This highly developed area has evolved with a mix of land uses and building types into an auto-oriented highway commercial strip. It has the potential to be redeveloped into a more attractive and coherent town center that is linked to nearby residential neighborhoods. Higher-density, higher-quality, mixed-use redevelopment and infill development is encouraged. Over time, the area should become less auto-oriented and more pedestrian-friendly as an interconnected network of vehicle and pedestrian ways takes shape.	The new roundabout is the focal point of this area that is developing. It has the potential to become an attractive and vital center of activity that is linked to nearby residential neighborhoods. Higher-density, higher-quality, mixed-use development is encouraged that incorporates smart growth and new urbanist development concepts. Over time, the area should grow into a pedestrian-friendly center with an interconnected network of vehicle and pedestrian ways.	There are several large properties fronting on Columbia Turnpike or Troy Road that are currently undeveloped or underdeveloped. These properties provide an opportunity for higher-density, compact, multi-family housing in close proximity to transit, shopping, schools, and other services. Over time, these properties should be developed or redeveloped into new neighborhoods whose residents will improve the viability of nearby businesses by expanding their customer base.	The historic hamlet features traditional block commercial buildings on the east side of the Columbia Turnpike, most of which are built to the edge of the sidewalk and are two stories. On the west side, there are a number of historically significant civic buildings and larger residences with deeper front yards. The hamlet's historic fabric has frayed over time, but the area has potential for revitalization through streetscape and building facade improvements. New development should respect and reinforce the hamlet's historic character.	This existing neighborhood is defined by a mix of one- and two-story residential and commercial uses that are in close proximity to the roadway and connected by an existing sidewalk network. Over time, the area should be revitalized and redeveloped as a mixed-use, moderate-density, pedestrian-friendly neighborhood center by replicating and extending the traditional development still evident in the area. This area has the potential to once again become a vital center of commerce and activity for residents of nearby neighborhoods.	A number of single-family residential neighborhoods front on Columbia Turnpike and Troy Road. Over time, road widening, commercial development and traffic has reduced the desirability of living in a single-family home directly on the highway, and increased interest in converting these properties to multi-family rentals and small businesses. As this conversion continues, the residential scale, appearance and character of these properties should be maintained and the neighborhood's quality of life should be protected.	There are areas along Columbia Turnpike that are dominated by lower-density agricultural, industrial, commercial, utility and municipal land uses. On these properties, the frontage is not intensively developed and there are stretches of naturally vegetated open land. These uses or properties do not lend themselves to the forms of mixed-use or higher-density development envisioned for other highway segments. They do have potential to provide attractive open space and to host land uses not well suited to a higher-density, more mixed-use area.
STREETSCAPE							
DESCRIPTION	**A. FRONT SETBACK** 10 ft to 70 ft **B. SIDE SETBACK** 10 ft min **C. REAR SETBACK** 10 ft min **D. BUILDING HEIGHT** 20 ft to 4 story **E. ST-BLDG RATIO** 3:1 max **F. FRONTAGE** 60% min	**A. FRONT SETBACK** 10 ft to 75 ft **B. SIDE SETBACK** 15 ft min **C. REAR SETBACK** 15 ft min **D. BUILDING HEIGHT** 20 ft to 3 story **E. ST-BLDG RATIO** 3:1 max **F. FRONTAGE** 50% min	**A. FRONT SETBACK** 10 ft to 80 ft **B. SIDE SETBACK** 20 ft min **C. REAR SETBACK** 20 ft min **D. BUILDING HEIGHT** 20 ft to 3 story **E. ST-BLDG RATIO** 3:1 max **F. FRONTAGE** 40% min	**A. FRONT SETBACK** 0 ft to 20 ft (east side) 20 to 50 ft (west side) **B. SIDE SETBACK** 0 ft min (east side) 20 ft min (west side) **C. REAR SETBACK** 10 ft min **D. BUILDING HEIGHT** 2 story to 3 story **E. ST-BLDG RATIO** 3:1 max **F. FRONTAGE** 70% min (east side) 30% min (west side)	**A. FRONT SETBACK** 10 ft to 40 ft **B. SIDE SETBACK** 10 ft min **C. REAR SETBACK** 10 ft min **D. BUILDING HEIGHT** 20 ft to 3 story **E. ST-BLDG RATIO** 3:1 max **F. FRONTAGE** 50% min	**A. FRONT SETBACK** 15 ft to 40 ft **B. SIDE SETBACK** 15 ft min **C. REAR SETBACK** 20 ft min **D. BUILDING HEIGHT** 2 story max **E. ST-BLDG RATIO** 4:1 max **F. FRONTAGE** 60% max	**A. FRONT SETBACK** 30 ft to 90 ft **B. SIDE SETBACK** 20 ft min **C. REAR SETBACK** 20 ft min **D. BUILDING HEIGHT** 2 story max **E. ST-BLDG RATIO** 4:1 max **F. FRONTAGE** 50% max
EXAMPLE							

Note: The numeric standards presented in this table are recommended guidelines. Refer to the East Greenbush Zoning Law for the specific dimensional requirements that apply within each zoning district.

01 APPENDIX

Transportation Systems Assessment and
Existing Conditions Report

Existing Conditions Report: US Route 4 and Route 9 & 20

East Greenbush Site Design Guidelines

September 2013

TABLE OF CONTENTS

INTRODUCTION

Purpose

The aim of this assessment is to assist the Town of East Greenbush and its residents in developing Site Design Guidelines by presenting the current demographic data and the condition of the transportation features in the Town's two main commercial corridors. Both of these corridors have been previously studied and summaries of those studies, including recommended transportation improvements are described in the report. This report identifies and generally describes changes to the study area, particularly the transportation system that may have occurred since the previous studies were completed.

Understanding how all modes of travel (motor vehicles [including trucks, public transit and school buses], bicycles, and pedestrians) are currently being accommodated along these corridors will be helpful information in understanding the current and potential future relationship of the transportation system to current and potential future land use activities along each corridor. Land use and demographic data can help support this and guide future development.

Below are highlights from the main findings from the Existing Conditions Report. It describes the current characteristics of the two commercial corridors and includes information on population, housing, employment, industry, traffic volumes; roadway characteristics; level of compatibility between major roadways, their access characteristics and surrounding land uses; and a description of system elements in terms of ability to accommodate pedestrians and bicyclists comfortably and safely. The full Existing Conditions Report that follows provides full details, illustrations, and data to support these main themes.

Highlights

- Population has grown steadily since 1980s but is projected to grow much slower over next forty years.
- Most new construction activity occurred between 1980 and 2010.
- The majority of homes in the Town are single-family and owner-occupied.
- The residential vacancy rate is low.
- The median age of the Town's residents is 41.9
- Unemployment is low.
- The Study Area is zoned mostly B-1 General Business Mixed-Use

- Dedicated facilities for pedestrian and bicycle travel are either intermittent or non-existent, creating an unfriendly environment for walking and/or cycling.
- Speeds limits range from 30 to 45 mph throughout the two corridors in the Study Area.
- Public transit to downtown Albany serves Route 9 & 20 and the northern part of Route 4.
- Average annual daily traffic on Route 9 & 20 ranges from 15,000-27,400 and on Route 4 ranges from 14,165 to 24,550 with traffic volumes increasing in the northern sections of the corridor.

Location

The Town of East Greenbush is situated along the Hudson River immediately south of the City of Rensselaer in Rensselaer County, New York. It is just across the Hudson River from New York State's Capital and a major regional population and job center, the City of Albany. It is close to major regional transportation centers including the Rensselaer Rail Station, the Amtrak passenger train station and Albany International Airport. With its easy access to I-90 and other major regional commuting routes, East Greenbush has grown as an attractive place to live to Capital Region residents.

As an attractive place to live, demand for new retail and commercial services within the town have grown over the years. As institutions and the growing tech industry have expanded, East Greenbush has become home to these additions as well with the University at Albany East Campus and East Greenbush Technology Park. These developments have occurred in different areas of the Town, creating several new nodes of development, rather than a contained Town Center-type development. These nodes have taken shape mostly along the US Route 4 and Route 9 and 20 Corridors.

US Route 4, runs north-south from the North Greenbush line until it intersects with Route 9 and 20. It varies from residential to large apartment complexes to office parks to intense large-format retail development. Route 4 is a key commercial corridor and has been the location for the most intense retail development within East Greenbush and its neighboring towns. This development has brought traffic growth and change and demand by the community to contain the growth and develop a multi-modal corridor that provides safe and efficient access for all road users.

Due to the developments in the Us Route 4 and Route 9 and 20 Corridors, the Town has chosen two "demonstration sites" to focus on in this Study. The first demonstration site, illustrated as "Priority Area A" in Figure 1, is located at the intersection of US Route 4 and Route 151 and often referred to by residents as "Couse

Corners." The Town's Land Use Plan Update and Zoning Study identified this area as a node of development that should offer commercial, retail and professional mixed uses that compliment and serve the residential uses. Past Linkage Studies in this area have recommended improvements to the surrounding transportation system, including pedestrian and bicycle facilities, medians, narrowed travel lanes, streetscaping/landscaping, access management, transit accommodations, signal coordination and intersection changes like a roundabout which was recently constructed. This area, especially with the new roundabout, is attractive to significant future private development.

Figure 1. Study Area

Map prepared by The Chazen Companies

The Town's Land Use Plan Update and Zoning Study built upon the Route 4 Corridor Study and identified a land use vision for the Route 4 corridor to the north of NY 151 and to the south of NY 151. The Route 4 North vision includes protecting existing residential uses, enhancing commercial and office development and creating new development that is a community asset. Development should be concentrated, walkable, of mixed use and interconnected and site designs should account for natural, historic and cultural features. The Route 4 South vision includes strengthening and enhancing the residential core as a walkable place. Redevelopment and new growth should strengthen this character, particularly with the numerous civic and institutional uses in the area. The plan recommended mitigating traffic impacts of future development, creating development design guidelines for commercial development, creating an interconnected path system, updating the cluster zoning regulations and/or developing new zoning tools that protect sensitive environmental features and developing a master plan for Couse Corners.

Aerial view of Couse Corners

Source: Google

The second demonstration site is located at the intersection of US Route 9 and 20 at US Route 4 and labeled "Priority Area B" in Figure 1. The Town's Land Use Plan Update and Zoning Study identified this area as one of the "four key nodes" along the Route 9 and 20 Corridor that were zoned as "Mixed Use Districts." The intent is to focus redevelopment and growth in these key nodes to encourage mixed use development, access management, interconnected parcels, pedestrian paths and sidewalks, and denser residential and commercial development.

The other major corridor in the Town is Route 9 and 20 which runs north-south from the City of Rensselaer line to the Schodack town line. As one travels north to south on the road it transitions from residential to commercial, small commercial and large commercial strip development. This corridor has transformed since the construction of Interstate 90, which removed much of the through-traffic from Route 9 and 20 and in turn business declined along the corridor. In past studies residents have defined the corridor as a "sterile, non-descript automobile-oriented environment" that is "unfriendly to pedestrians." Residents have voiced concerns of the corridor becoming another "Wolf Road" as the Town experiences development pressures. A construction

project 10+ years ago removed valuable trees from the streetscape, widened the road, and added a turning lane. While the project intended to improve safety, it removed much of the Town's sense of place. Since then the Town has tried to polish the corridor, proposing minor changes that could serve as a catalyst for the future and make it a "community street."

This area is currently characterized by shopping plazas, auto oriented businesses, restaurants and services on small parcels, and a variety of entertainment services (i.e. bowling alley, funplex, etc.). The roadway has a four lane cross section, a center two way left turn lane, continuous sidewalks on both sides with crosswalks at major signalized intersections, narrow or no shoulders, and numerous driveways. The Capital District Transportation Authority (CDTA) has one bus route, the 233, that serves the corridor. Though sidewalk and bus stop improvements have been constructed in recent years, this area is still auto-oriented and lacking in pedestrian-friendly design. In addition, adjacent lands to the southwest of the US 9 & 20 and US Route 4 intersection provide an opportunity to depict how sensitive environmental areas, mining reclamation, existing single-family neighborhoods, mixed uses, and recently approved development along Phillips Road can be developed separately, over time, to constitute an overall sustainable, well-integrated community designed within a network of complete streets.

Aerial view of the US Route 4 and Route 9 and 20 Intersection

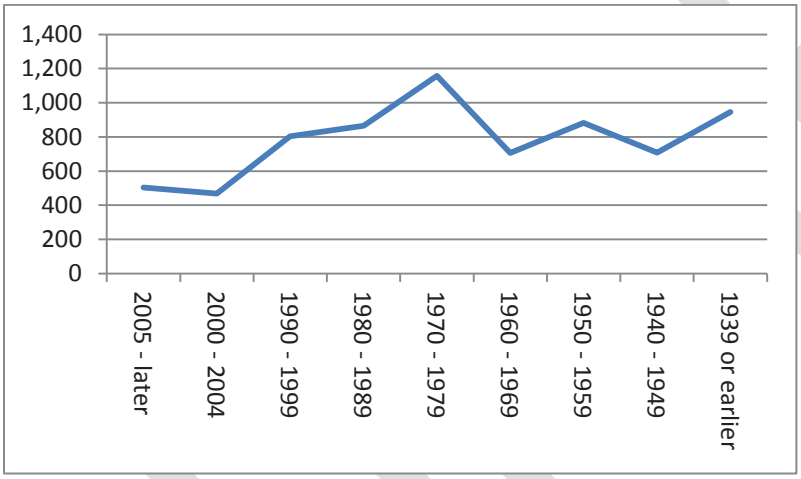
Source: Google

DEVELOPMENT AND LAND USE

Housing

Generally, housing in East Greenbush can be characterized as largely single-family, owner-occupied homes. Some older homes in the Study Area have been converted to commercial uses or function as both a residence and business. There are older hamlet areas along Route 9 and 20 that follow the former trolley line and have older, denser, village-scale housing. The area around the US Route 4 and Route 151 intersection is much less dense but is in close proximity to an apartment complex, the YMCA, Library and High School. There is a low vacancy rate throughout the Town and the median home value is $199,800, higher than the Rensselaer County median home value of $177,300.

Figure 2. Housing Units Built



Source: U.S. Census Bureau

The Town of East Greenbush has experienced the highest increase in population of any of Rensselaer County's municipalities. The second greatest population increase was in North Greenbush, which leads the County in residential building permits. These towns have had the most population growth and development activity in Rensselaer County, but this growth and development has not occurred in Priority Area A or B. Figure 3 shows where new residential development has gone between 1991 and 2011. Additional information and tables on population growth can be found later in the report.

Table 1. Housing

	Estimate	%
Total housing units	7,040	7,040
Occupied housing units	6,674	94.8
Vacant housing units	366	5.2
Homeowner vacancy rate	1.1	(X)
Rental vacancy rate	5.1	(X)

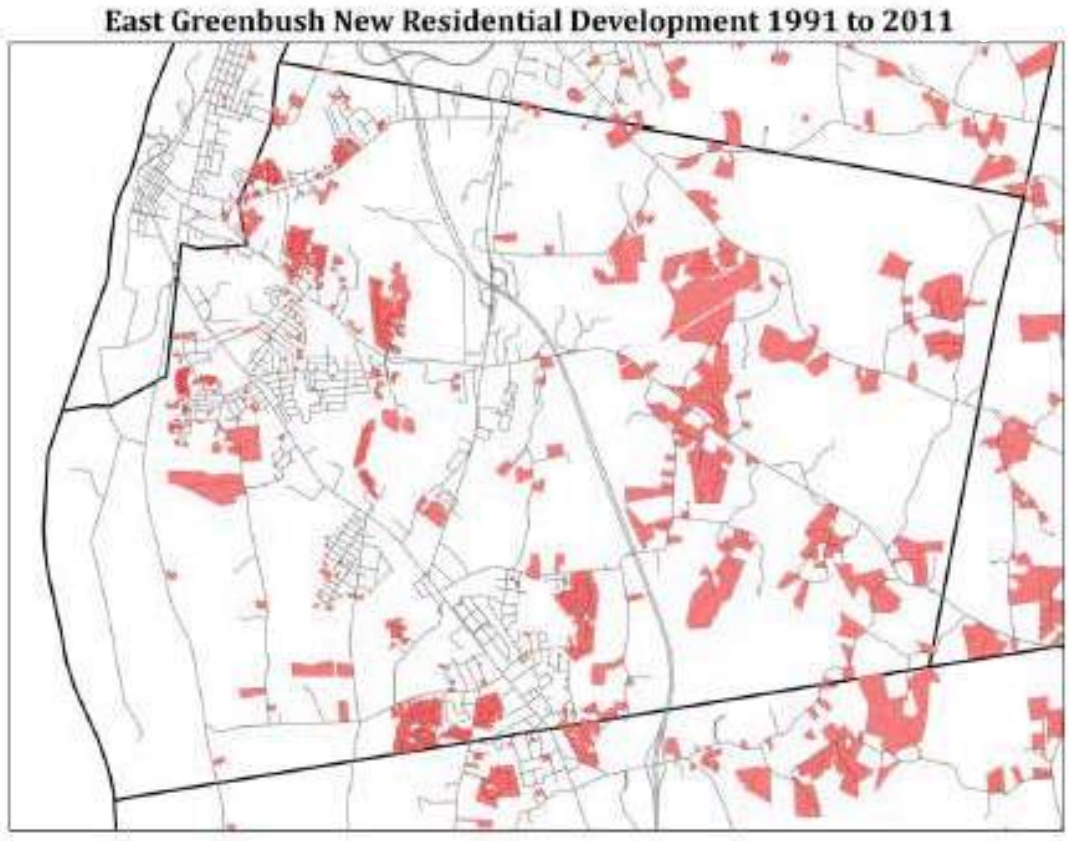
Source: U.S. Census Bureau

Table 2. Housing Type

Units in structure	Estimate	%
1-unit, detached	4,722	67.1
1-unit, attached	657	9.3
2 units	339	4.8
3 or 4 units	236	3.4
5 to 9 units	712	10.1
10 to 19 units	246	3.5
20 or more units	111	1.6
Mobile home	17	0.2
Total	**7,040**	**7,040**

Source: U.S. Census Bureau

Figure 3. New Residential Development in East Greenbush



Source: Creating Healthy Places in Rensselaer County report by the Capital District Regional Planning Commission

Zoning

To promote orderly physical development in accordance with The Comprehensive Land Use Plan, the Town of East Greenbush is divided into zoning districts. The intent of zoning is to regulate the land and buildings as to use, occupancy, location, construction and alteration for the purpose of protecting and promoting public health, safety, morals, comfort, convenience, economy, urban aesthetics, general welfare, amongst other things. The Town of East Greenbush updated its zoning map, found below in Figure 4, most recently in November 2010.

Priority Areas A and B are predominantly zoned B-1 which is General Business Mixed Use. The intent of the B-1 district is to promote redevelopment with high-density, mixed-use structures, which help define a coherent village atmosphere and create a pedestrian-friendly environment linking residential neighborhoods to local business and community services. Other zoning districts in the study area include R-1, -1A, -2, and -3 which represent a series of medium to higher density housing districts. These districts allow between 4 and 12 units per acre.

As can be seen from Figure 3, most of the new residential development has occurred outside of these districts in either the R-B or R-OS districts which are meant to be Residential-Buffer and Residential-Open Space Districts. The intended purpose of creating these residential zones was to maintain the character of the Town – both the historic hamlet type of development along the main corridors and the rural agricultural character in the northeastern part of the Town – but the reality is they are doing neither.

Land Use

As illustrated in Figure 5, the land uses in Priority Area A are mostly low-density residential with some light commercial and community services. This site may have the most potential for redevelopment as a B-1 district because of the recent construction of the roundabout here and proximity of residences to existing businesses such as Stewarts and Dunkin Donuts and the nearby YMCA, public library and High School. Previous studies have made recommendations for this area that include sidewalks, bike lanes, lower speed limits and the roundabout, in order to transform it to a “community street.”

Priority Area B is the largest B-1 District but is predominantly chain fast-food restaurants and retail, auto-body shops, gas stations, drive-through banks, parking and auto dealerships. As mentioned previously, the roadway has a 4-lane cross section, a center 2-way turn lane and lacks pedestrian-friendliness. There are few connections to adjacent residential neighborhoods or the elementary school.

Figure 4. East Greenbush Zoning Map

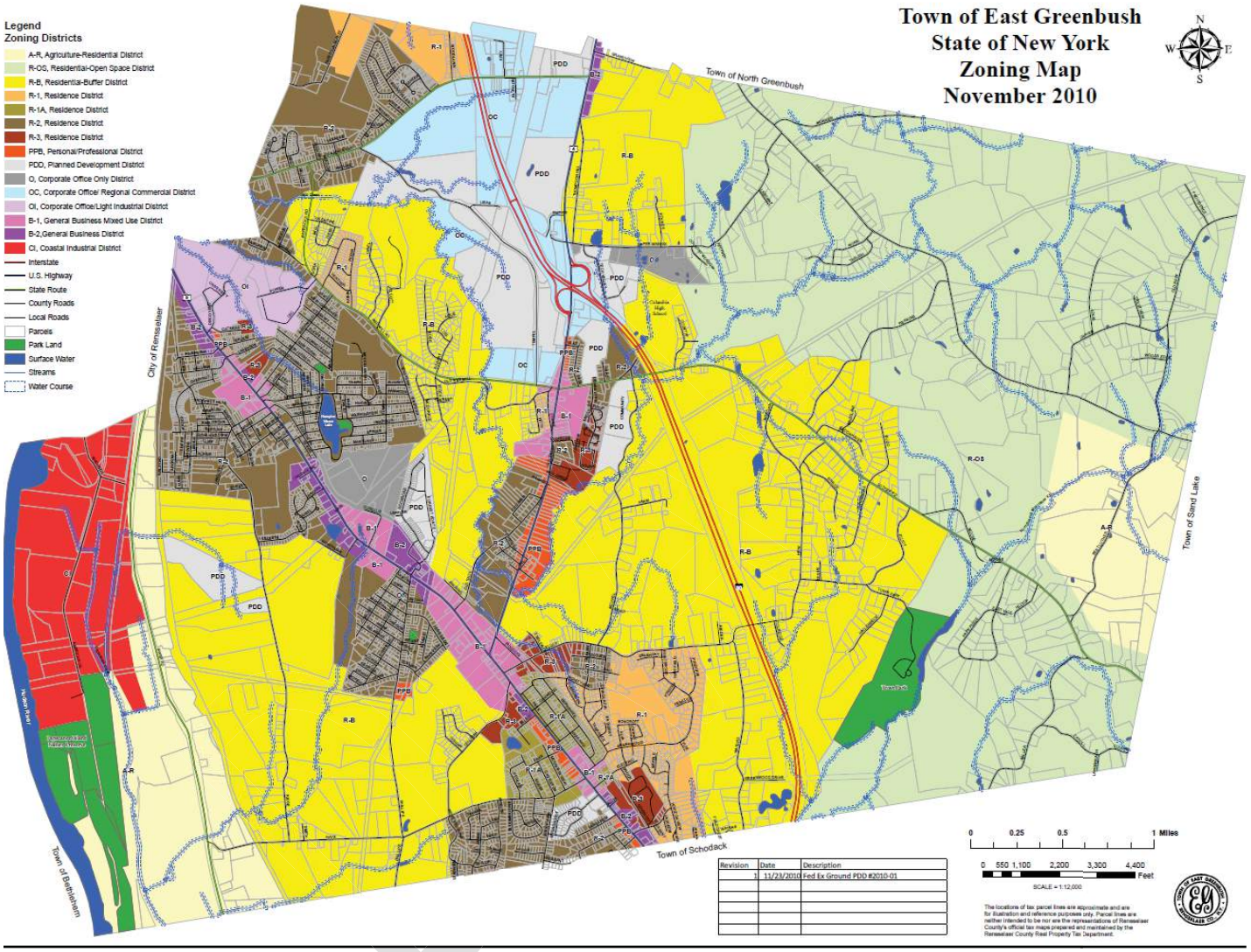
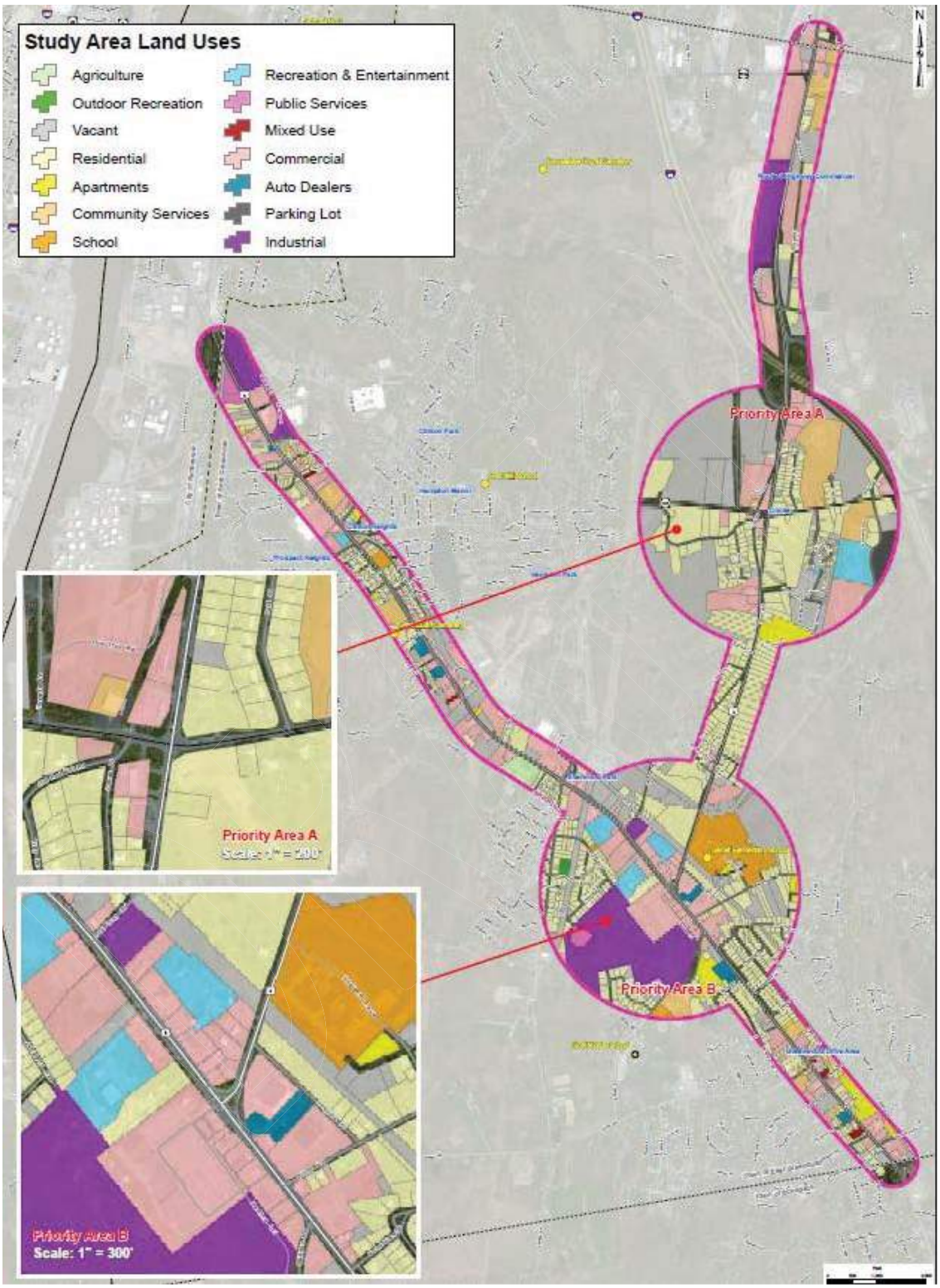


Figure 5. Land Use



Map prepared by The Chazen Companies

DEMOGRAPHICS

Population

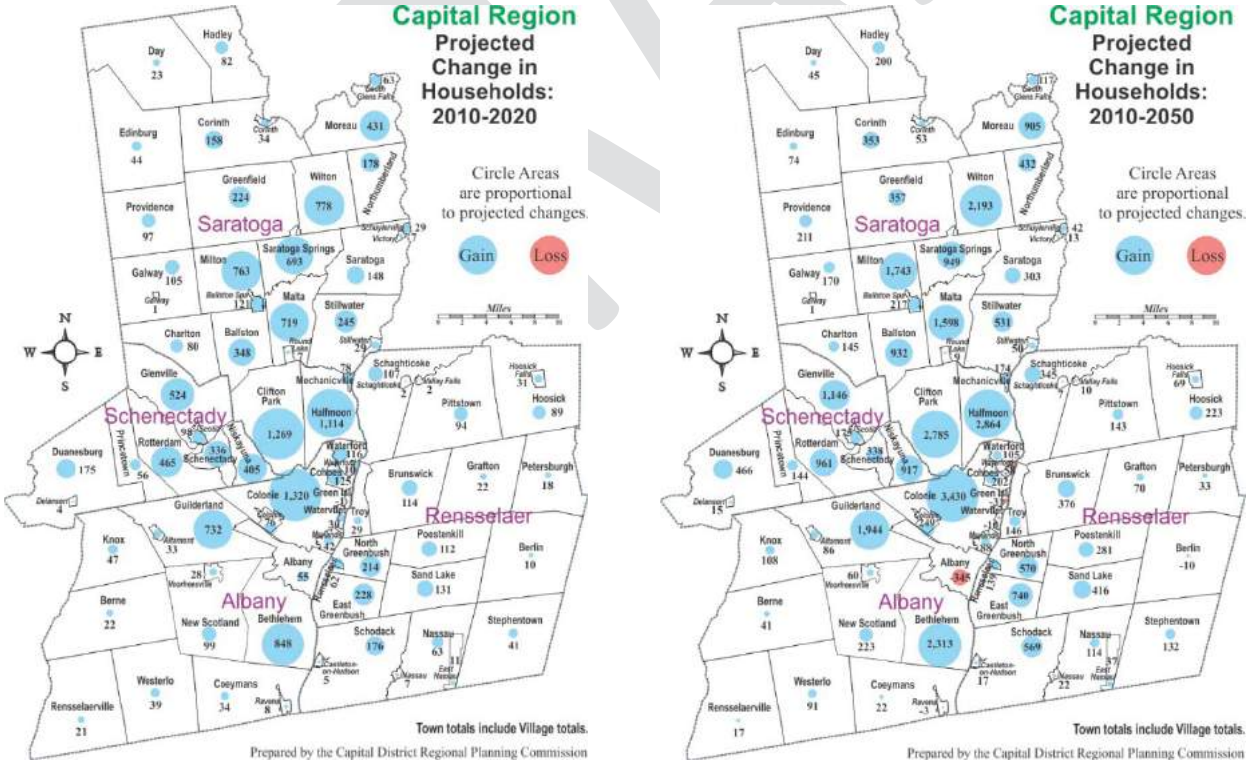
As mentioned previously, the Town of East Greenbush has had the highest increase in population of any Rensselaer County municipality since the 1980s, as shown in Table 3. However, the Capital District Regional Planning Commission (CDRPC) projects a much slower growth rate over the next forty years, according to regional growth trends. CDRPC's 10- and 40-year population projections can be seen in Figure 6. While the larger suburbs throughout the region are projected to continue to grow, these numbers are relatively modest compared to population growth in Capital Region suburbs over the last 20+ years.

Table 3. Population Change

	Land Area (sq. mi.)	Water Area (sq. mi.)	Total Area (sq. mi.)	1980 Census Population	1990 Census Population	2000 Census Population	2010 Census Population
Rensselaer County	653.964	11.426	665.390	151,966	154,429	152,538	159,429
East Greenbush	24.095	0.252	24.347	12,913	14,076	15,560	16,473

Source: U.S. Census Bureau

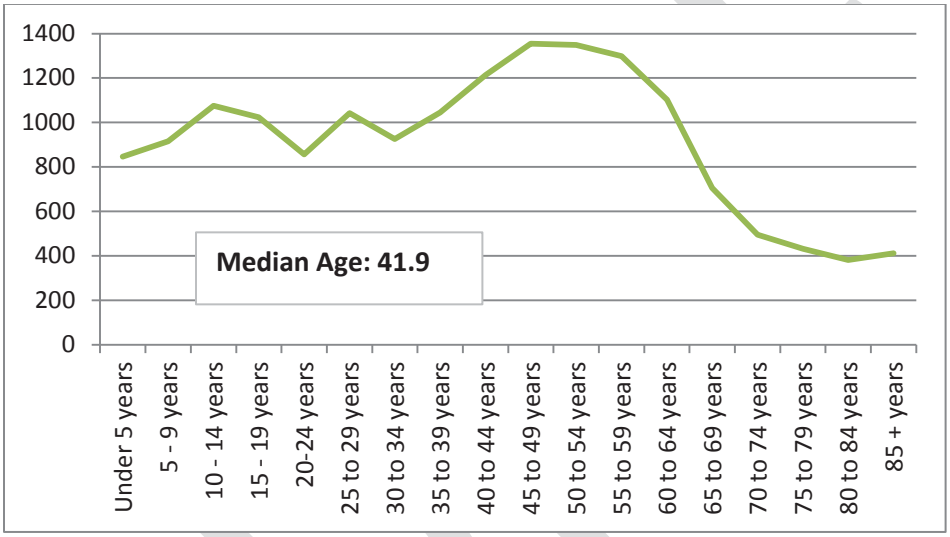
Figure 6. Population Projections: 2010-2020 and 2010-2050



Source: Capital District Regional Planning Commission

The median age of the Town's population is 41.9. The graph in Figure 7 illustrates the age distribution of the population and there is a noticeable arc in the 40 to 60 age range. This age group, often referred to as the "Baby Boomers" is the fastest growing segment of the U.S. population. According to the Census Bureau, 64 million people will be over 65 by 2025. In the Capital Region, the baby boom generation accounts for about 27% of residents. These figures are important for future community planning, as the need to improve the transportation system for senior mobility is urgent. Older drivers find roadways difficult to navigate and increasingly become dependent on transit and walking. Meanwhile, trends show the Millennial Generation, or those born between the early 1980s and early 2000s, are moving to cities with good public transportation and amenities like bike trails and car sharing. For Towns to be sustainable they must consider and accommodate both of these growing populations in future planning and development.

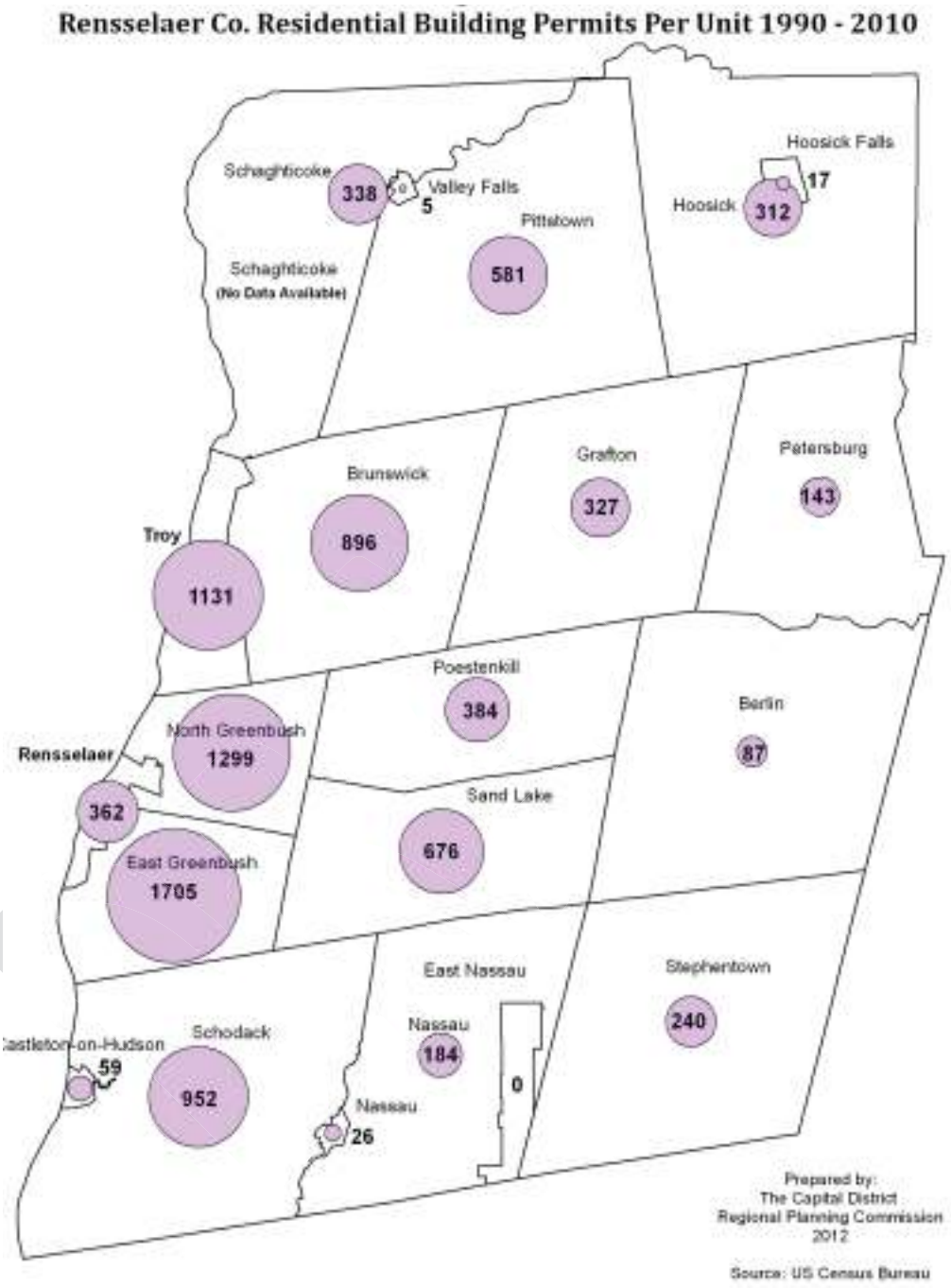
Figure 7. Age Distribution



Source: U.S. Census Bureau

East Greenbush issued more residential building permits than any other Rensselaer County municipality between 1990 and 2010. However, Census data indicates that much fewer permits have been issue in recent years, most likely due to the economy. There is a grouping of historic craftsman bungalows built before 1940 in the Hampton Lake area north of the US Route 4 and Route 9 and 20 intersection. Previous studies have recommended this area form a historic district to maintain its character and avoid being demolished for commercial uses as development pressures increase.

Figure 8. Building Permits Issued between 1990-2010



Commercial Activity and Employment

East Greenbush has a low unemployment rate of 3.7% compared with Rensselaer County's rate of 5.1% and the National unemployment rate of 7.6% (See Table 4). Almost half of residents hold jobs in the management, business, science, and arts occupations (See Table 5) and commute data suggests most residents commute to work by car, alone. According to the U.S. Census Bureau, the median household income in the Town of East Greenbush is $71,679 which is higher than the County's median household income of $56,271. Employment, occupation, industry and income data portray a pretty strong economy in the Town, despite significant economic struggles elsewhere in the County and Nation.

Table 4. Employment

	Civilian Labor Force	Employed	%	Unemployed	%	Armed Forces	%
Rensselaer County	87,042	80,402	62.3%	6,640	5.1%	274	0.2%
East Greenbush	9,179	8,689	66.3%	490	3.7%	40	0.3%

Source: U.S. Census Bureau

Table 5. Occupation

Occupation		
Civilian employed population 16 years & over	**8,689**	**100.0%**
Management, business, science, & arts occupations	4,269	49.1%
Service occupations	1,074	12.4%
Sales & office occupations	2,310	26.6%
Natural resources, construction & maintenance occupations	621	7.1%
Production, transportation & material moving occupations	415	4.8%

Source: U.S. Census Bureau

Table 6. Industry

Industry		
Civilian employed population 16 years & over	**8,689**	**100.0%**
Agriculture, forestry, fishing & hunting, & mining	40	0.5%
Construction	531	6.1%
Manufacturing	472	5.4%
Wholesale trade	207	2.4%
Retail trade	754	8.7%
Transportation & warehousing, & utilities	398	4.6%
Information	278	3.2%
Finance & insurance, & real estate & rental & leasing	330	3.8%
Professional, scientific, & management, & administrative & waste management services	1,183	13.6%
Educational services, & health care & social assistance	2,246	25.8%
Arts, entertainment, & recreation, & accommodation & food services	573	6.6%
Other services, except public administration	296	3.4%
Public administration	1,381	15.9%

Source: U.S. Census Bureau

Table 7. Commuting to Work

	Estimate	%
Workers 16 & older	8,569	8,569
Drove alone	7,334	85.6
Carpooled	634	7.4
Public transportation	119	1.4
Walked	193	2.3
Other means	0	0
Worked at home	289	3.4
Mean travel time to work (mins.)	17.9	(X)

Source: U.S. Census Bureau

PREVIOUS STUDIES

Summary

Growth and development pressures throughout the Town of East Greenbush have motivated the Town to take on various land use and transportation planning studies. These studies have ranged from specific corridor-focused studies to townwide long range planning studies. Regardless of each study scope and budget, there are many recurring themes and long-term goals. Some of these include:

- Creating a safe, walkable and bike-friendly built environment throughout the Town.
- Encourage alternative transportation through design.
- Improve traffic safety.
- Concentrate commercial development to focus areas.
- Maintain traditional neighborhood character.
- Attract quality commercial and supporting retail development.

Through a quality planning process and series of public workshops, valuable public input has been collected to shape the Town's land use and transportation vision. Recommendations from each study have been evaluated and implemented as opportunities have risen – mainly through partnerships and state and federal funding programs. This study is born out of the recommendations of past studies and will provide an integral step in implementing the Town's land use and transportation vision.

The past studies reviewed and included in this report are the Route 9 & 20 Corridor Master Plan (2003), the Route 151 Corridor Study (2004), the Route 4 Corridor Study (2006), East Greenbush Comprehensive Land Use Plan and Zoning Update (2006), and the Town of East Greenbush Amenities Plan (2012). Below are summaries of past studies, their purpose, and the highlights of their implementation plans.

Route 9 & 20 Corridor Master Plan (2003)

The Route 9 and 20 Corridor Master Plan was also funded by the Capital District Transportation Committee's (CDTC) Community and Transportation Linkage Planning Program. The study area included the entire Route 9 and 20 corridor in East Greenbush from the Rensselaer city line to Schodack. The Town was motivated to do this study in response to a NYS Department of Transportation reconstruction of Route 9 and 20 that eliminated street trees and widened the roadway. The community expressed concern that the corridor had become a "sterile, non-descript automobile oriented environment" and wanted to develop a plan to enhance the corridor's sense of place.

The overall goals of the Master Plan were:

- Improve the aesthetics of the corridor, making it more attractive to business and new residents.
- Install additional street trees, medians, textured pavements, architectural lighting, pedestrian amenities and architectural signage.
- Bury overhead wires.
- Improve safety for pedestrians and create an environment that encourages pedestrians and bicycling throughout the corridor.
- Create clearly defined gateways, activity centers and other unique features along the corridor to develop a sense of place.
- Limit commercial uses between activity centers.
- Implement traffic calming throughout the corridor through the use of physical changes and driver perception changes that will cause vehicular traffic to slow down.
- Improve the maintenance of the corridor to reduce the impact of maintenance on landowners.
- Reduce the local traffic on the corridor by interconnecting isolated neighborhoods through a grid network of parallel streets.
- Reduce the left turn traffic movements on the turnpike.
- Encourage alternative transportation methods on the turnpike.
- Develop a bicycle trail system utilizing the utility corridor that parallels the highway corridor.
- Make changes to land use regulations that will encourage setbacks, yards, height, bulk, access and circulation that will enhance the character of the corridor and avoid the creation of another 'Wolf Road' in East Greenbush.

To achieve these goals the following short- and long-term actions were recommended:

Short-term:

The following actions are recommended for the ***New York State Department of Transportation***:

- Add a length of sidewalk to the current contract from Bruen Court to the University at Albany East Campus.
- Make changes to the current planting design that include new large caliper street trees from a local source planted between the sidewalk and curb in the areas identified on concept plans. Use the species and spacing recommended in the Conceptual Design Manual for the 9 and 20 Corridor
- Install short runs of landscaped medians at the Northern Gateway near the East Campus, in the Hampton/Sherwood area, and near the cemetery south of Town Hall
- Modify the pavement striping plans by reducing lane widths to allow for bicycle lanes. Provide crosswalks in specific additional locations shown on concept plans.
- Modify the current plans for parking, open space and circulation as shown on the concept drawings for Hampton Square.
- Develop snow removal plans that will reduce the impact on local residents and businesses.
- Modify grading to improve visibility at the intersections of Homestead, Orchard and Grove Streets.
- Modify signalization plans to add signals at Barber, Homestead, the University at Albany Entrance, and Old Troy Road.
- Modify signage plans to include better identification of significant pedestrian crossings.
- Initiate a public dialog regarding the redesign of Route 9 and 20 south of Route 4 to discuss expanding the planning beyond the corridor right-of-way.
- Install architectural lighting instead of 'cobra lights' along the corridor.

The following short term actions are recommended for the ***Capital District Transportation Committee***.

- Complete segment analysis for the Route 9 and 20 Corridor south of Route 4 to evaluate the reduction of the highway to 3 lanes (2 lanes with a center turning lane).
- Complete a linkage study of the Route 4 Corridor that responds to the goals and implementation measures of this plan.

The following short-term measures are recommended for the ***Town of East Greenbush.***

- Explore Historic District Status for the Bungalows between Onderdonk and Maple Avenues. Assess the potential to create a historic district at the Hayes Road Historic Village Center.
    - Complete a Nomination for the Bungalow District and Hayes Road Center.
    - Apply for Historic Preservation funding
    - Complete the Certified Local Government process with the OPRHP.
- Adopt zoning revisions to require build-to development as illustrated in the concept plans in the Historic Village Center, Route 4 Town Center, Hampton Square, and Clinton Heights Village. Consider adopting the same zoning revisions for Phillips Road, and the Ames Plaza intersection.
- Evaluate and update the Town of East Greenbush Comprehensive Plan to ensure that new growth in the community will be in character with this master plan. (***See Comprehensive Plan p.XX)***
- Explore the use of the trolley right-of-way by working with the utility company and the public to develop a trail corridor plan. Apply for trails funding to complete the study and develop priority segments of the trail. ***(See Albany-Hudson Electric Trail Feasibility Study p.XX)***)
- Initiate a 'Main Street' beautification program that dedicates public funds and seeks private, state and federal grant assistance to make yearly streetscape improvements on the Route 9 and 20 Corridor.
- Develop architectural streetscape and façade improvement guidelines to further detail the Town's desired approach to aesthetic improvements on the Route 9 and 20 Corridor.
- Undertake a study of pedestrian linkages between the University at Albany East Campus and commercial development in the Hampton Square area.
- Undertake a marketing study along the Route 9 and 20 Corridor to analyze potential commercial opportunities assess the need of developers and business owners and project future trends that could benefit the Route 9 and 20 Corridor and the Town.
- Obtain funding under the Governor's Office of Small Cities to advance the Town's goals for commercial and economic development on the Route 9 and 20 Corridor

Long-term:

The following long range actions are recommended for the ***New York State Department of Transportation.***

- Continue implementation of streetscape improvements in the corridor including street tree planting, medians, walks, trail crossings, public transit facilities, architectural lighting and pedestrian safety improvements.

- Redesign the Route 4 intersection to minimize the turning radii, enhance the intersection for pedestrian crossings and streetscape improvements utilizing signage, street trees, architectural lighting and pedestrian amenities.
- Evaluate the creation of a new arterial that will make a connection between Route 151 and the Route 9 and 20 Corridor.

The following long range actions are recommended for the ***Town of East Greenbush:***

- Develop a program of street light replacement, throughout the Town, replacing cobra lights with architectural light fixtures, poles and bases.
- Encourage new development to accomplish cross-connections.
- Encourage and incorporate community input to the design of improvements to the Route 9 and 20 Corridor south of Route 4, utilizing the public workshop approach employed in this study.

The following long range actions are recommended for ***others***:

- Niagara Mohawk should begin to remove overhead wires from the corridor, incrementally burying them.
- The University at Albany Foundation should consider assisting the Town of East Greenbush in an analysis of pedestrian connections between the East Campus and Sherwood Avenue, Hampton Manor and Clinton Heights as well as the future Trolley Trail.
- The Rensselaer Gateway Development Corporation and the Rensselaer County Industrial Development Agency should consider assisting the Town in undertaking a Marketing Analysis of the Route 9 and 20 Corridor.
- Concerned citizens could consider forming a “not-for-profit” organization to assist local and state government units with the implementation of this plan.

Route 151 Corridor (2004)

The Route 151 Corridor Study was initiated in 2003 through the CDTC Community and Transportation Linkage Planning Program. The study area stretched from the intersection with U.S. Route 4 to Columbia High School. The main purpose of this study was to provide safe and efficient circulation of pedestrians, bicyclists, and motor vehicles in order to improve the quality of life within the area. The primary concerns of pedestrian safety were between Columbia High School, the Public Library and YMCA facilities.

The goals of this study were the following:

- Improve pedestrian, bicycle and vehicular safety and mobility in the corridor.
- Prioritize recommendations to help achieve vision for the Route 151 corridor.
- Identify funding opportunities and implementation strategies.

Below are the short- and long-term actions recommended to the Town to achieve their vision.

Short-term

- Install flashing beacons on the school child advisory signs located on Route 151.
- Provide two (2) ingress lanes and one (1) egress lane north of the High School access road intersection with Route 151 via re-striping the pavement.
- Replace speed bumps with speed humps on the High School access road. A study should be conducted to determine where and the number of humps needed to reduce vehicular speed.
- Monitor traffic volumes at the Route 151/Michael Road intersection. If traffic volume on Michael Road increases due to future developments in the area, then a signal system may be warranted.
- Clear brush along the northeast side of Route 151/Glaz Street intersection to improve sight distance.
- Town of East Greenbush adopt residential and commercial driveway design standards. Future developments along or adjacent to the corridor would be required to conform to standards.
- The Town of East Greenbush future planning approval process should include provisions for secondary access roads in the Study Area to improve pedestrian and vehicular mobility.
- Monitor traffic volumes, flow and crashes at the Route 151/High School access road.

- Aggressively seek funding opportunities that may be available to implement short and long-term action recommendations.

Long-term:

Pedestrian Access Improvements:

- Provide sidewalks with non-mountable curbing along Route 151, High School access road, Michael Road and Community Way.
- Provide a buffer zone between the curb and the sidewalk.
- Provide a pedestrian connection from Donna Lynn Drive area to Community Way.
- Utilize high visibility crosswalks at all intersections.
- Provide a pedestrian countdown signals at signalized intersection(s).
- Develop snow removal plans associated with providing the sidewalks.

Bicycle Access Improvements:

- Provide bicycle lanes along Route 151 and shared lanes along Michael Road, High School access road and Community Way.

Vehicular Access and Safety Improvements:

- Reconstruct Route 151 to include improving sight distance at the crest vertical curves adjacent to Glaz Street and the High School access road.
- Install a traffic signal at Route 151/Michael Road Intersection. Remove or realign the westbound right turn "slip lane" to the High School access road.
- Provide a secondary access road to the High School from Mannix Road, including a connection to the technology park.
- Provide a secondary access road from Donna Lynn Drive area to Community Way and Michael Road.
- Remove a portion of Newkirk Road and thus eliminate the skewed intersection with Route 151.
- Provide a high visibility flush or a raised median on Route 151 east and west of the intersection of the High School access road.
- Provide a high visibility flush or a raised median on the High School access road once a secondary access road is constructed.
- Provide landscaping treatments that would improve the visual character of the area and calm traffic.
- Provide pedestrian scale lighting to enhance pedestrian safety, activity and calm traffic.
- Utilize a decorative retaining wall where needed to minimize right-of way impacts associated with several of the long-term action recommendations.

Route 4 Corridor (2006)

U.S. Route 4 in East Greenbush is a key commercial corridor. Its northern portion in the Town has been the home of large format retail develop, which brought concerns about traffic growth and change. Additionally, the East Greenbush Tech Park was built on Mannix Road, which intersects U.S. Route 4 just north of Couse Corners. In light of these developments, the Route 4 Corridor Study was proposed and awarded funding through the CDTC Community and Transportation Linkage Program. In addition, this study was coordinated with the Town's Land Use and Zoning Update that was done during the same time.

The primary goal of this study was to develop conceptual transportation improvements and management actions for the U.S. Route 4 corridor that would help the Town reach its land use and transportation goals. This included facilitating a multi-modal future and preserve and improve the capacity and safety of Route 4 through:

- Access management
- Raised and flushed medians
- Inter-parcel connections and shared driveways
- Innovative intersection treatments
- Signal coordination and roundabout designs
- Signalized crosswalks
- Sidewalks and bike lanes
- Bus stops
- Traffic calming

Regarding land use, the goals were:

- Commercial design guidelines and form based design standards
    - Building orientation and layout
    - Parking placement, number of spaces and layout
    - Vehicle access and circulation
- Walkable, transit-oriented high quality commercial development

Below are the recommendations for achieving the above goals for specific segments along U.S. Route 4:

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

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

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

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

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

- Designate the existing shoulders as 5-foot striped bike lanes along each side of Route 4.
- Narrow travel lanes, if possible.

- Install a flush median that has a "street print" application of contrasting texture and color or raised landscaped median where possible. (Left turn bays or TWLTL (two way left turn lane) arrows would most likely also need to be incorporated into any median treatment). This will provide space for left turning vehicles into adjacent residences while also serving to somewhat calm traffic.
- Install sidewalks along both sides of Route 4.
- In conjunction with the addition of sidewalks, paired bus stop installation should be considered in conjunction with signalized crosswalks.
- Along the edge of the roadway, install either continuously spaced tree plantings the length of the segment or alternatively consider clustering trees and other landscaping at intersections/other desired areas to calm traffic. This will also provide dampening of roadway sounds and enhance the look of the corridor.
- Where properties have access to side streets, access should be restricted to side streets only, which is already the case for some properties around Columbia Drive. Within the limited commercially zoned area along this segment, any commercial development or redevelopment should be required to provide inter-parcel connections and/or shared driveways where possible as well as appropriate pedestrian access ways into these sites.
- Redesign access in the future when redevelopment occurs in the vicinity of the southwest corner of the roundabout intersection of NY 151/Rte 4. This redesign should result in consolidated driveways with turn restrictions (rights in/out only) and adequate corner clearance. Specific access changes to address Couse Place turning issues were explored but none are proposed at this time.
- Future access to newly developed parcels near the southeast quadrant of the NY 151/Rte 4 roundabout should also be designed with turn limitations (rights in/out only), adequate corner clearance and in a manner that limits the number of access points.
- In short term, Town should work with NYSDOT to explore lowering the 45 mph speed limite along the corridor with the first priority being the residential section.

Comprehensive Plan - Land Use and Zoning Update (2006)

In 2006 the Town took on a one-year planning process to update the land-use element of their Comprehensive Plan. The growth trend at the time served as the impetus for this study and it was tasked with reviewing existing land use patterns and provide recommendations for both land use and zoning the reflect the town-wide vision for the future. The main goal for the Town is achieving a high-quality built environment that enhances and supports the community's special attributes and unique qualities.

The Townwide land use concepts born out of this study process are:

- Provide for and focus new growth and redevelopment in areas where infrastructure exists and within infrastructure means.
- Conserve and enhance the town's unique assets and places, including natural features, scenic views androads, historic features, residential neighborhoods, public amenities, etc.
- Conserve the town's rural character and natural resources, and develop at a low intensity, particularly in the areas of Ridge Road, River Road vicinity and the eastern portion of town, primarily east of Interstate 90.
- Enhance and create walkable places with unique, identifiable character throughout town: such as at four, focused places along Columbia Turnpike (Route 9 & 20) a focused,connected place at the intersection of Route 4 and 151 at Couse Corners -- to connect the increasing civic and institutional activities in this area to the existing neighborhoods; and to ensure that new workplace centers such as the future Mill Creek Commerce Park offer a unique, attractive sense of place to sustain the interests and investment of future employers and employees and the community over the long run.
- Strengthen Route 9 & 20 as the premier "Main Street" for East Greenbush and hold the line on Route 4 commercial expansion so that it will not increase south of Route 151. Route 9 & 20 will be the number one location for shopping and local businesses and unique experiences for the community and for visitors to the region. Further, instead of perpetuating the pattern of one long strip of commercial development along the entire length of 9 & 20, the long-term vision is to create four focused, mixed-use places that help define unique character along 9 & 20, building on the framework of currently existing distinctive areas. The idea is to build on the gems of a sense of unique character that exist, and as one drives along 9 & 20, to strengthen the experience of coming across unique, distinctive locations to stop and visit, go to work, shop, or even live. And over time, a goal would be to increase and enhance the pedestrian opportunities and experience to connect these places along 9 & 20 for the pedestrian

experience as well. Below are the approximate locations/framework for the opportunities for the focused places:

- The area in and near the existing Kmart plaza, which could be called "The Heights" and connect in better ways to the GenYSis, Regeneron biotechnology research and development and manufacturing businesses, and the University of Albany institutions nearby. This area could be enhanced for pedestrians from the immediate neighborhoods, as well as enhanced to attract pedestrians from the University at Albany area.
- The former Ames plaza currently back in re-use, in connection with the neighboring open lands and disturbed lands, could be designed to be a more cohesive, well-designed place in the future, through conducting a master plan for the greater area that is respectful and complementary of the existing, traditional neighborhoods. This area could pay homage to the former use of the Columbia Turnpike as a major farm to market route to downtown Albany, as "Farm-to-Market Way" with its remaining Beckers Farm nearby – as inspiration for future refinements to this area.
- The existing Hannaford plaza area and environs at the intersection of Route 4 and Route 9 & 20 could be known as the "Central Marketplace" through future re-planning and re-design to make improvements of the traffic flow and interconnections among this existing major commercial area, as well as other use and layout considerations to encourage a mix of compatible uses and to be sensitive to minimizing or even improving traffic generation issues that already exist in this vicinity
- Finally, the historic, traditional "center" of East Greenbush was once exhibited approximately in the vicinity of Hayes Road and Route 9 & 20. This area currently maintains older era buildings and traditional neighborhoods, and a pleasing "main street" quality with street trees and traditional architecture, and as such, this area offers an opportunity to be enhanced as "Old East Greenbush" or "Historic East Greenbush" to help support this unique character without limiting future needs. However, paying homage to the traditional character and history of this area would only help support this focused area in becoming better identified as a unique place.

- Focus and enhance high-quality commercial development along the northern portion of Route 4 while protecting the existing surrounding neighborhoods.
- Develop attractive corporate places that are connected and relate to the rest of town.
- Within corporate, office and institutional growth areas, design with sensitivity to the natural setting and residential neighborhood setting.

- Throughout the town, protect existing neighborhoods and connect them to places of activities and community assets.
- Conserve the unique character of East Greenbush along scenic landscape corridors.
- Conserve the town's historic settlements and hamlets including East Greenbush, Couse Corners, Luther, and Best.
- Look to the future of River Road and the Hudson River waterfront for alternative uses that include increased opportunities for public access and a greener vision of the waterfront.
- Encourage the redevelopment and restoration of formerly mined or cleared lands or other disturbed lands on an accelerated basis.
- Maintain the current scale of Route 4 South and Route 9 & 20. Foster additional local road connections between existing and new neighborhoods as part of a rich network with a diversity of travel options.

The study identified several "character areas" and laid out recommendations for them. The character areas that fall within the Study Area for this study and their recommendations are below:

Route 9 & 20 (Columbia Turnpike)

- Develop commercial design guidelines that reflect the character of the four focused distinctive places along Route 9 & 20.
- Develop a marketing package and incentives for redevelopment of underutilized sites.
- Conduct site-specific cooperative planning with landowners to redevelop key parcels that can serve as catalysts for future redevelopment.
- Revise parking requirements for commercial uses within the zoning code and allow for reduced parking and shared parking options.

Land Use Vision: Columbia Turnpike (Route 9 & 20)

- "Focus" growth in a few key places along Route 9 & 20. Focus redevelopment of existing commercial buildings and new growth as part of identifiable, distinct, "destinations" or "places." Define/enhance distinct destination-places that each have a mix of uses, with green buffers (as "pauses" or "relief" between the distinctive developments) in between, along 9 & 20.
- Within these four focused mixed-use places; apply the following guiding principles:
    - Encourage the tradition of mixed-use buildings (with appropriate design).

  - Development should create internal road systems, pedestrian paths and sidewalks and cross-connections to adjacent parcels and side streets off of Route 9 & 20.
  - Allow for moderate increases in density of residential and commercial development (up to a cap) only through an incentive zoning process and the exchange for community amenities of comparable value. New development could help pay for upgrades to existing infrastructure. Some additional density in balance with amenities will help create the sense of place within the destinations.
- Locate well-designed, attractive, senior housing and attractive multi-family dwellings in and near these distinct places/destinations.
- Conserve portions of key open lands, key environmental resources as designed, meaningful parts of development of distinctive places.

Route 4

Route 4 North:

- Create design guidelines for commercial development along the northern portion of Route 4, and for Mill Creek Commercial Park.
- Revise allowed uses in existing zoning to reflect the vision for Route 4 North.
- Develop trail connections between existing and new residential and commercial development and important natural features such as Mill Creek.

Route 4 South:

- Revise allowed uses in existing zoning to reflect the vision for this area.
- Create an interconnected greenway system linking neighborhoods along Route 4 to important civic features (schools, library, YMCA) and natural features such as Mill Creek.
- Create a focused neighborhood-scaled gateway at Couse Corners, including traffic/safety improvements, a public park and trail connection and neighborhood-scaled street amenities.
- Develop a streetscape improvement plan to realize the vision of Route 4 as a commercial avenue in the north and neighborhood avenue in the south with an appropriate transition at the Couse Corners gateway area. Integrate potential public transit connections and bus shelters into this plan.

Albany-Hudson Electric Trail Feasibility Study (2011)

This Study was initiated by the Towns of East Greenbush, Schodack, Nassau and the Village of Nassau to study the feasibility of interconnecting the various municipalities with a multi-use recreational trail. The proposed trail would follow the old electric trolley line alignment which is currently owned by National Grid and is used for electric transmission lines.

The proposed 15-mile recreational trail would begin where Route 203 enters into Rensselaer County and would extend north through the Town and Village of Nassau where it would then begin to head west through the Town of Schodack eventually ending in the Town of East Greenbush near the City of Rensselaer line in close proximity to Routes 9/20. This study has been prepared to provide the trail sponsors and local officials with additional information of the trail specifics and the actions to be completed to advance the project. The following are the studies key findings:

- The current cost estimate to complete the entire 15 mile trail ranges between $5.5 - $9.4 million dollars.
- There does not appear to be any significant historical or environmental obstacles to the completion of the trail.
- The completion of the trail will require 29 minor road crossings, 8 major road crossings and 4 bridges.
- Building the trail in segments is recommended to allow for phased implementation, funding purposes and to gain public support for the eventual completion of the entire vision.
- Advancing Segment 2 (from US Route 4 to the Schodack town line) as the first segment is recommended.

Amenities Plan (2012)

This Study was initiated with the intent of advancing some of the recommendations from the 2002 Parks and Recreation Master Plan and the 2006 Land Use Plan. An idea emerged that future development projects could help fund recreational amenities within the Town, including a trail network. This Amenities Plan is a "blueprint" for such amenities. A brief summary of the key recommendations from the study are as follows:

- Work in cooperation with future development projects around town to establish local segments of a larger town-wide multi-use path and trail network which will eventually link many neighborhoods and destinations together for walking, biking, jogging or cross-country skiing.
- Establish and prepare an official "East Greenbush Parks Day" where once a year town staff and volunteers come together with donated materials prepared to make a significant improvement on a different neighborhood park, culminating in a local festival of food, music and community pride.
- Develop, with grant funding, select segments of the proposed Albany-Hudson Electric Trolley line as a multi-use trail which will serve as the primary spine to the larger multi-use path network through town.
- Secure grant funding for the replacement of the restroom facilities at the Town Park beach, and the associated water contamination cleanup.
- Begin formal discussions and workshops with residents around Hampton Lake to discuss the creation of a pedestrian loop path around the water, and how it may be designed.
- Infill missing sidewalk gaps and provide new sidewalk connections, particularly along Columbia Turnpike and Route 4, to link residential neighborhoods with schools, library and each other.
- Develop a multi-use path connection into the southern end of the Town Park.
- Work with property owners in select opportunity areas such as Tempel Lane and along the Hudson River to develop plans which integrate attractive public spaces, walking paths or other recreational activities for the enjoyment of all.

Creating Healthy Places in Rensselaer County (2012)

This report was funded by a grant awarded to the Capital District Community Gardens from the New York State Department of Health and prepared by the Capital District Regional Planning Commission. The report looks at the community-level factors, such as land use and transportation patterns, and how they affect the form and use of the built environment and how this encourages or inhibits walkability or "healthy communities." The report focuses on East and North Greenbush because of the significant growth and development that has taken place here over the last 20+ years. The report recommends how the Towns can create more walkable communities through Complete Streets , Safe Routes to School programs, and revisions to the Town's zoning code.

Transportation Assessment of the

US 4 and Route 9 and 20 Corridors

INTRODUCTION

Purpose

The aim of this assessment is to assist the Town of East Greenbush and its residents in developing Site Design Guidelines by presenting the current demographic data and the condition of the transportation features in the Town's two main commercial corridors. Both of these corridors have been previously studied and summaries of those studies, including recommended transportation improvements are described in the report. This report identifies and generally describes changes to the study area, particularly the transportation system that may have occurred since the previous studies were completed.

Understanding how all modes of travel (motor vehicles [including trucks, public transit and school buses], bicycles, and pedestrians) are currently being accommodated along these corridors will be helpful information in understanding the current and potential future relationship of the transportation system to current and potential future land use activities along each corridor. Land use and demographic data can help support this and guide future development.

This Transportation System Assessment describes the current characteristics of the two commercial corridors and includes information on traffic volumes; roadway characteristics; level of compatibility between major roadways, their access characteristics and surrounding land uses; and a description of system elements in terms of ability to accommodate pedestrians and bicyclists comfortably and safely. This assessment is meant to highlight changes to the transportation system that have occurred since more in depth transportation studies were completed and to identify upcoming transportation projects. Information was collected from a variety of sources including: the New York State Department of Transportation (NYSDOT) Traffic Data Viewer (http://gis.dot.ny.gov/tdv/), Google maps/street view, NYSDOT Pavement Data Report 2010 (https://www.dot.ny.gov/divisions/engineering/technical-services/technical-services-repository/pavement/2010%20pdr%20reg1.pdf), the Capital District Transportation Authority's Route Maps (http://www.CDTA.org), and field verification.

Highlights

Below are highlights of the main findings from the Transportation System Assessment.

NYS 9/NYS 20 (Columbia Turnpike)

- Route 9 and 20 is a 4 to 5 lane Principal Arterial owned and maintained by the New York State Department of Transportation (NYSDOT) extending from the City of Rensselaer to the west to the Town of Schodack to the east.
- This important regional corridor provides access to adjacent residential and commercial properties and serves both "local" and "through" trips. Due to the number and location of commercial driveways in some sections of the corridor, there is some "conflict" between these two types of trips.
- This roadway serves motor vehicle traffic well as there is ample vehicle capacity on the mainline and signalized intersections include turn lanes to process turning vehicles efficiently. Current Traffic volumes (ranging from 15,000 to 27,400 average annual daily trips) and hourly traffic counts illustrate its importance as a regional commuting route. Posted Speed limits range from 30 to 40 mph.
- Public transit is available on Route 9 and 20 via CDTA Bus Route 233 which runs from the Town of Schodack to downtown Albany; service is focused on peak morning and evening commuting hours. Bus stops are clustered in several areas along the corridor near Sherwood Ave, Route 4/Hannaford Plaza and in the East Greenbush Hamlet area near Hayes Road.
- While motor vehicle travel is served well, dedicated facilities for pedestrian and bicycle travel, such as sidewalks, bicycle lanes or striped shoulders, and reasonably spaced signalized crosswalks, are either intermittent or non-existent resulting in lower "levels of service" or accommodation for these modes of travel.
- Upcoming transportation projects include a plan by NYS Department of Transportation to repave and restripe the section of Route 9 and 20 from Route 4 south and eastward through the Town of Schodack.

Demonstration Site: Route 9 and 20 (Columbia Turnpike) and Route 4 (Troy Road):

- The intersection of Route 4 and Columbia Turnpike is surrounded by commercial uses and is the transition point for a significant drop in vehicular traffic east of the intersection. Sidewalks are located on the west side (eastbound approach) of the intersection on both the north and south sides of Route 9 and 20. The intersection itself has dedicated left turn lanes and right turn slip ramps on the Route 4 side

and on the Route 9 and 20 eastbound approach. Pedestrian buttons are available at each crosswalk and pedestrians are instructed to proceed on the green light.

- The Town's previous Route 4 Corridor Study (adopted by the Town in 2006) included several recommendations for changes at this intersection in response to the crash statistics at the time and to improve the pedestrian environment. These included:
    - Remove the westbound right turn slip ramp (identified as high crash location) and make it a signal controlled right turn lane. Consider either removing the northbound right turn slip ramp to make it a signal controlled right turn lane or redesigning the northbound right turn slip ramp.
    - Install WALK/DON'T WALK count down signals at intersection crosswalks.

US Route 4 (Troy Road)

- In contrast to Route 9 and 20, Route 4 (Troy Road) has seen more recent changes to its configuration as a result of recent (and upcoming) major intersection improvement projects and other changes installed as mitigation for development/redevelopment projects in the northern portion of the corridor.
- Route 4 is a 2 to 5 lane Principal Arterial also owned and maintained by NYSDOT. This main route begins at the southern end at the intersection with Route 9 and 20 (Columbia Turnpike) and extends through the Town of East Greenbush northward to the Town of North Greenbush line, through Troy and beyond. With its function as a principal arterial, Route 4 serves both "local" and "through" trips. In some sections where commercial driveways are frequent, conflict exists between these two types of trips.
- The posted speed limit is 45 miles per hour (mph) for the entire length of Route 4 within the Town of East Greenbush and transitions to 40 mph in North Greenbush.
- The character of Route 4 changes from south to north reflecting the character, density and intensity and size of adjacent land uses and intersecting roadways. For example, at the Route 9 and 20 intersection moving north, Route 4 is a 2 lane roadway providing access to adjacent parcels which are primarily residential, with some commercial uses, as well as adjacent residential neighborhoods.
- The intersection of NY 151 (Couse Corners) with Route 4 was recently redesigned as a roundabout to address congestion, safety and community quality of life issues.
- With recent changes to Route 4 this roadway serves current and future forecasted motor vehicle traffic well. Motor vehicle traffic volumes range from approximately 14,165 vehicles per day on average (2010 NYSDOT traffic counts) from Route 9 and 20 to NY 151 and between 17,420 to 24,550 in the more northern sections.

- Public transit access is limited to the northern section of Route 4 through a CDTA neighborhood bus route: Route 214 provides service to downtown Albany and the Rensselaer Amtrak Station.

- Because Route 4 includes striped shoulders along its entire length within the Town and its pavement is in good condition, bicycle "level of service" is rated more highly than the ratings estimated for Route 9 and 20. However, bicycle "level of service" could be improved from the current estimated ratings of "C" to "D" found along the Route 4 Corridor.
- Pedestrian facilities along the more northern portion of Route 4 have been incrementally added as new commercial sites have been developed or redeveloped over the years. The resulting sidewalk network in the most northern portion of Route 4 is fairly complete. However, south of NY 151 there are no sidewalks and in most sections of the corridor, long distances remain between signalized crosswalks.
- Upcoming transportation projects include construction of a roundabout at Mannix Road and the NY 151 Transportation Enhancement project which will include sidewalks, curbing and bicycling accommodations along Luther Road to the High School. In addition a town-sponsored project in the post-5 year period of the region's federal Transportation Improvement Program or TIP covers the area of Route 4 from Mannix Road to NY 151 and includes sidewalks, crosswalks, ADA curb ramps, repaving, bike lanes, raised medians, driveway relocation, new curbing, and closed drainage and culverts.

Demonstration Site: NY 151/Route 4 (Couse Corners):

- Recent construction of the roundabout at this intersection and the upcoming NY 151 project, and potentially the larger Route 4 project between NY 151 and Mannix Road, will work to make this area more pedestrian and bicycle friendly and should result in a dampening of vehicle speeds and enhanced safety, helping to create opportunities to achieve the Town's vision for this area.

I. NYS 9/NYS 20 (Columbia Turnpike)

Route 9 and 20 is functionally classified as a Principal Arterial and is owned and maintained by the New York State Department of Transportation.

Note: Information described below is summarized in Table 1 on page 8**.**

Travel Lane Configuration and Traffic Volumes

Route 9 and 20, Columbia Turnpike is a 4 to 5 lane roadway extending north-south from the City of Rensselaer line, through East Greenbush, to the Town of Schodack boundary providing access to adjacent residential and commercial properties and as such serves both "local" and "through" trips.

At the City of Rensselaer line moving eastward, Route 9 and 20 transitions from a 4 lane roadway with 2 travel lanes in each direction to a 5 lane roadway with 2 travel lanes in each direction with a center median turn lane (often called a Two-Way Left Turn Lane) for most of its length within the Town. The roadway reverts back to a 4 lane highway east of Gilligan Road and through to the Town of Schodack boundary.

Due to its current configuration, Route 9 and 20, serves motor vehicle traffic well as there is ample vehicle capacity on the mainline and signalized intersections include turn lanes to process turning vehicles efficiently. Motor vehicle traffic volumes range from approximately 27,500 vehicles per day on average (2009 NYSDOT traffic counts) at the City of Rensselaer line to Route 4 and drop to approximately 15,000 average vehicles per day from Route 4 to Hayes Road (2010 NYSDOT traffic counts). From Hayes Road to Miller Road in the Town of Schodack traffic volumes of approximately 14,300 per day on average have been tallied.

These traffic volumes and a review of NYSDOT's hourly traffic counts illustrate the importance of Route 9 and 20 as a regional commuting route: traffic volumes are highest during the morning and evening commuting hours as workers head northwest toward the City of Albany and make the afternoon return commute trip home to the east (south). Route 9 and 20 provides connections to the broader regional transportation system through connections to the Dunn Memorial Bridge in Rensselaer, Interstate I-90 Exit 10 in Schodack and Interstate I-90 Exit 9 from Route 4 to the north.

Posted Speed Limits

Posted speed limits range from 30 miles per hour (mph) for a short section near the City of Rensselaer line to 35 mph to east of Onderdonk Avenue with the remaining section within the Town posted at 45 mph.

TABLE 1: Route 9 and 20: Roadway Information

Segment	Segment length (approx.)	Speed Limits	Travel lanes	Travel Lane Width (ft)	Shoulder Width (ft) or Bicycle Lane	Pavement Condition (2010)	Safety Infor-mation	Transit route(s)/stop(s)	Daily Traffic Volumes AADT	Traffic Signals* (Avg spacing (ft))	Side-walks	Bicycle LOS	Arterial LOC
Segment 1: City of Rensselaer to Sherwood Avenue	0.85 miles	30 mph to west of SUNY East Campus then 35 mph	2 each direction for 0.10 miles, then 2 each direction plus center two-way left turn lane	Mostly 12 ft. with some sections of 11 ft.	Narrow striped shoulder north side to SUNY East Campus, then 0	6 = Fair (surface distress visible)	*Summary data to be added*	CDTA Route 233 (Albany to Schodack) (3 stops w/in segment)	**27,400** NYSDOT TDV 2009 count	3 in segment. Avg spacing is 1,490 ft.	Sidewalk on north (east) side from Discovery Drive to Sherwood Avenue and beyond	E	Comm'l: E Resi'l: E
Segment 2: Sherwood Avenue to Troy Road/US 4	1.7 miles	35 mph to Onder-donk Avenue, then 40 mph to Route 4	2 each direction plus center two-way left turn lane	Mostly 12 ft. with some sections of 11 ft.	No striped shoulder or bicycle lane	7 = Good (surface distress beginning to show)	*Summary data to be added*	CDTA Route 233 (Albany to Schodack) (14 stops w/in segment)	**27,640** NYSDOT TDV 2009 count	4 in segment. Avg spacing is 2,920 ft.	Sidewalks on north side to Barber Drive then on both sides to Route 4	E	Comm'l: E Resi'l: D

Segment	Segment length (approx.)	Speed Limits	Travel lanes	Travel Lane Width (ft)	Shoulder Width (ft) or Bicycle Lane	Pavement Condition (2010)	Safety Infor-mation	Transit route(s)/stops	Daily Traffic Volumes AADT	Traffic Signals* (Avg spacing (ft))	Side-walks	Bicycle LOS	Arterial LOC
Segment 3: Troy Road/US 4 to Point View Drive	0.2 miles	40 mph	2 in each direction with intersection turn lanes and short section painted center median	12 ft.	No striped shoulder or bicycle lane	6 = Fair (surface distress visible)	*Summary data to be added*	CDTA Route 233 (Albany to Schodack) (2 stops w/in segment)	**15,025** NYSDOT TDV 2010 count to Hayes Rd	2 in segment. Avg spacing is 550 ft.	Short sidewalk piece on north side from Gilligan Road to Crown Cleaners	E	Comm'l: F Resi'l: NA
Segment 4: Point View Drive to Sunset/Miller Rd in Schodack	1.6 miles	40 mph	2 in each direction	Mostly 11 ft., some 11.5 ft. and short section of 12 ft. lanes	No striped shoulder or bicycle lane	6 = Fair (surface distress visible)	*Summary data to be added*	CDTA Route 233 (Albany to Schodack) (8 stops w/in segment)	**15,025** NYSDOT TDV 2010 count to Hayes Rd and **14,290** from Hayes Road to Sunset Rd	3 in segment. Avg spacing is 2,850 ft.	Short sidewalk piece north side. South side: short sections asphalt strip at curb and worn "goat paths"	F	Comm'l: D Resi'l: D

Public Transit

Public transit is available on Route 9 and 20 through a neighborhood bus route, Route 233 provided by the CDTA (Capital District Transportation Authority). Bus service runs along the corridor from the Town of Schodack through East Greenbush to the City of Albany's downtown where transfers are available to other transit routes. Route 233 busses currently run every hour to 65 minutes for most of the day, with increasing frequencies during the morning and afternoon commuting periods of about every 20 to 30 minutes. The service runs from 5:40 am to 7:45 pm.

Bus stops are located along the corridor within the Town but are clustered primarily in the sections between just west of Sherwood Ave to just east of Route 4/Hannaford Plaza and then in the Hayes Road area where there is a higher density of residential development within walking distance to the bus stops. Some bus stops are located where pedestrians/bus riders have access to a traffic signal which provides a protected crossing of the roadway as they are required to cross the street at some point to make an outgoing or return trip depending on the traveler's trip origin.

Pedestrian and Bicycling Environment (*Sidewalks, Signalized Crossing Opportunities, Striped Shoulders or Bicycle Lanes)*

While motor vehicle travel is served well, dedicated facilities for pedestrian and bicycle facilities are either intermittent or non-existent resulting in lower "levels of service" for these modes of travel as indicated from various measures or ratings described below.

Bicycle "Level of Service":

Currently there are no striped shoulders or bicycle lanes within the 9 and 20 Corridor within the Town of East Greenbush, requiring bicyclists to use the motor vehicle travel lanes in which vehicles are typically traveling the speed limit or above resulting in a poor level of comfort and feeling of safety for bicycling. As a result, current generalized *Bicycle Level of Service* ratings for the corridor range from "E" to "F".

The level of service (LOS) for bicycle travel within the study area was estimated for both Route 9 and 20 and Route 4. This measure is based on bicyclist perceived safety and comfort with respect to motor vehicle traffic while traveling along a roadway and is useful for evaluating bicycling conditions in a shared roadway environment. The most recent version of the Highway Capacity Manual 2010 includes a BLOS[1] measure adapted

[1] HCM2010, Highway Capacity Manual, Chapter 15/Two-Lane Highways, pp 15-36 to 15-38. Bicycle Mode, Transportation Research Board, Washington DC, 2010

from an earlier version of the model developed by Landis[2]. Various roadway characteristics such as travel lane and shoulder widths, motor vehicle speeds and volumes, including the amount of heavy vehicle traffic, and the condition of the pavement are used in the tested traveler-perception model to calculate a Bicycle LOS score. The resulting scores generally range from 0.5 to 6.5 and are broken down into ranges corresponding to LOS A to F, with F representing a roadway with the highest level of discomfort and perceived danger to cyclists.

See Table XX for Bicycle Level of Service ratings for Route 9 and 20 and Table XXX for Route 4 ratings. Input data was obtained from NYSDOT databases available via the internet. The BLOS evaluation indicates that within the study area, both of these state highways rate poorly in terms of bicyclist perceived safety and comfort.

Table 2: Route 9 and 20 Bicycle Level of Service (BLOS) Ratings Estimates

From	To	Lanes per direction	% Heavy Vehicles	Posted Speed Limit	Traffic Volumes	Travel Lane Width (ft)	Shoulder Width (ft)	BLOS Grade
City of Rensselaer Line	**Sherwood Avenue**	2+	6%	35	27,400	12	0	E
Sherwood Avenue	**Route 4**	2+	6%	40	27,640	12	0	E
Route 4	**Point View Drive**	2+	6%	40	15,025	12	0	E
Point View Drive	**Town of Schodack Line**	2	6%	40	15,025 to Hayes Rd 14,290 to Sunset Rd	11	0	F

Note: All data obtained from NYSDOT 2010 Pavement Data Report and Traffic Data Viewer.

[2] Landis, Bruce W. et. Al. "Real-Time Human Perceptions: Toward a Bicycle Level of Service" Transportation Research Board 1578, Transportation Research Board, Washington DC, 1997.

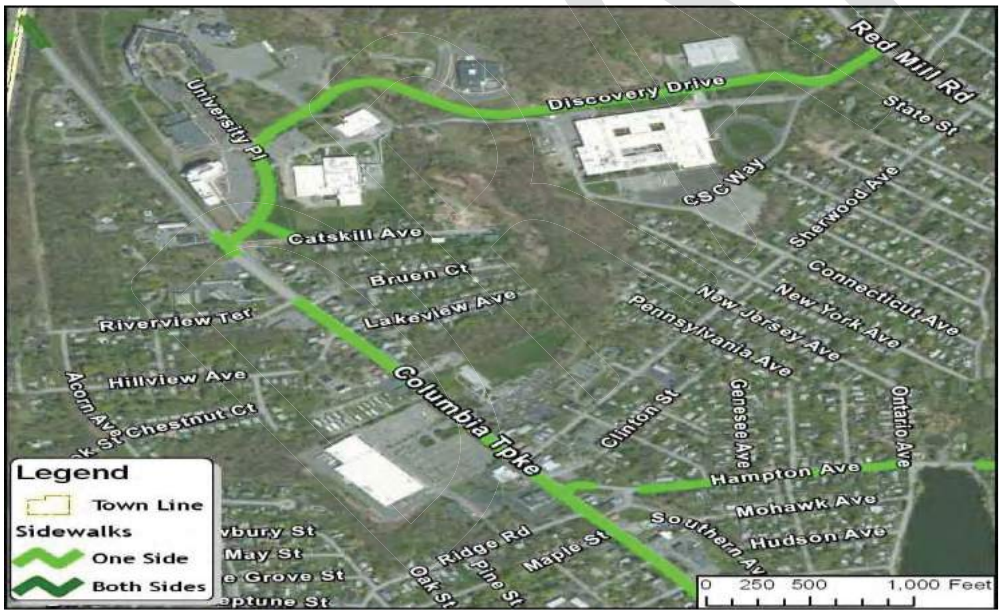
Like any model, the inputs dictate the results. Inputting data under a different scenario, for example, for the section of Route 9 and 20 from Point View Drive to the Town of Schodack Line such as one lane in each direction plus a center two way left turn lane and adding 5 foot striped shoulders would yield a BLOS estimate of "C".

Sidewalks and Pedestrian Crossing Opportunities:

Segments of sidewalk are located in various sections of the corridor providing dedicated space for walking. As new development or redevelopment of parcels has occurred over recent years, improvements to the pedestrian environment have been made. These include improvements both at the parcel level and at the street level through installation of new sidewalks along the arterial Right of Way and the installation of marked crosswalks and pedestrian signals in conjunction with new or reconfigured traffic signals that have been required by the Town as part of Site Plan Review or NYSDOT traffic impact review.

However, as noted in the Town's 2012 Amenities Plan with respect to sidewalks: "There are only about two miles of road in the entire Town of East Greenbush which currently have any sidewalks, providing for a total of about 3 miles of sidewalk (some roads have sidewalks on both sides). Approximately half of these sidewalks are located along Columbia Turnpike, and with the exception of two small areas—less than 500 feet each—along Route 4, the remaining sidewalks tie into or are very near Columbia Turnpike. There are, however, several gaps in areas where sidewalks do exist, most notably along Columbia Turnpike. The most notable gaps are from the intersection of Route 4, south to Elmwood Drive and from the Rensselaer border south to Riverview Terrace. These gaps are approximately 2/3rds and 1/2 of a mile, respectively. In general there are very few instances of sidewalks linking destinations with the exception of the businesses along Columbia Turnpike. Notably absent are connections between established residential neighborhoods." The two graphics below from the Amenities Plan shows the locations of these gaps along Route 9 and 20.

Columbia Turnpike Sidewalk Gaps: *This is the largest gap in sidewalks along Columbia Turnpike, at over 3,000 feet in length, extending south from the intersection with Route 4 to Elmwood Drive. The residential neighborhood centered on Highland Drive, however, has an abundance of sidewalks. (Existing sidewalk locations shown in green.)*



Another large sidewalk gap along Columbia Turnpike (top left of image) near the Rensselaer border. Existing segments do not connect to Discovery Drive or Hampton Avenue sidewalks.

In addition to sidewalks, walkability or pedestrian "friendliness" of a corridor and place is impacted by the ability or pedestrians to cross the roadway.

The current spacing of traffic signals or other protected pedestrian crossing opportunities is quite wide within most sections along the 9 and 20 Corridor. Wide spacing of signals requires long distances to be travelled between these crossings and likely results in some pedestrians crossing multiple lanes of traffic mid-block without the benefit of a traffic signal or crosswalk. In addition, some signalized intersections do not include marked crosswalks or pedestrian signals on all intersection crossing points. Pedestrian crossing opportunities are also important in relation to bus stops as on one leg of a transit rider's trip they will likely have to cross the roadway.

According to the 2010 Institute of Transportation Engineers (ITE) and Congress for the New Urbanism (CNU) report titled *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* "average intersection spacing for walkability (should be) a maximum distance of 660 feet; (with) desirable spacing is less than 400 feet." (page 29) For some sections of the corridor then it can be said that these would not be considered to be "walkable" or pedestrian or bicycle "friendly" at present as evidenced by the information in Table 3 which illustrates traffic signal locations and other related information along Route 9 and 20 within the study area.

Table 3: Route 9 and 20 Traffic Signal Spacing

Segment of US 20/ US 9	Link (From - To)	Approximate Link Length (ft)	Traffic Signal With Pedestrian Signals and Crosswalks	Traffic Signal WITHOUT Pedestrian Signals/Crosswalks
Segment 1: NY 9J/City of Rensselaer Line to Sherwood Avenue (Approximate Segment Length = 4476 Ft or 0.85 miles)				
1	NY 9J to Discovery Dr	2232	1	
1	Discovery Dr to Big K Mart	1772	1	
1	Big K Mart to Sherwood Ave	472	1	
Segment 1: Average Spacing between Traffic Signals = 1492 Ft				
Segment 2: Sherwood Avenue to Troy Road/US 4 (Approximate Segment Length = 8770 Ft or 1.7 miles)				
2	Sherwood Ave to Bass Ln	3766	1	
2	Bass Ln to Forrest Dr/Phillips Rd	1830	1	
2	Forrest Dr/Phillips Rd to Troy Rd/US 4	3172		1
Segment 2: Average Spacing between Traffic Signals = 2923 Ft				
Segment 3: Troy Road/US 4 to Point View Drive (Approximate Segment Length = 1100 Ft or 0.2 miles)				
3	Troy Rd to Elliot Rd	771		1
3	Elliot Rd to Gilligan Rd	326	1	
Segment 3: Average Spacing between Traffic Signals = 549 Ft				
Segment 4: Point View Drive to Sunset Rd/Miller Rd (Approx Segment = 8560 Ft or 1.6 miles; 1.1 miles to Town Line)				
4	Gilligan Rd to Greenwood Dr	3382		1
4	Greenwood Dr to Hays Rd	108		1
4	Hays Rd to Sunset Rd/Miller Rd	5067		1
Segment 4: Average Spacing between Traffic Signals = 2852 Ft				
Average of all Segment Averages Signal/Roundabout Spacing within Corridor = 1954 Ft				

NOTES:

1. **Link Endpoints represent locations of either a traffic signal or roundabout**
2. **Information obtained from Google: Earth, Maps and Street View (2011 and 2007 images) as supplemented by field observations**

Arterial Level of Compatibility

Level of Compatibility –The roadway network of a community is defined in terms of a street hierarchy. This hierarchy describes the principal use and/or intended function of each road. Roadways classified as arterials primarily, such as Route 9 and 20, serve the through movement of traffic between communities. Local streets provide access to abutting land, such as in residential neighborhoods. Collector streets funnel traffic between the two, and usually serve a secondary land access function. When a street begins to serve more than its principal function, conflicts can occur.

One type of conflict that can occur concerns access conflict with commercial traffic. Excess curb cuts and resulting driveway turn movements can interrupt traffic flow. As conflict between the primary function of a roadway as conveyor of through traffic and access to adjoining parcels increases, congestion and traffic crashes follow. This undesirable situation also limits the suitability of arterials for use by pedestrians, transit users, and bicyclists. Where problems either exist or are emerging, construction of too many more driveways could threaten the operational integrity of the corridor.

The point at which traffic levels are perceived as a detriment to residential quality or commercial access, however, is difficult to measure and depends on the expectations and past experience of each individual. Using objective criteria developed from a number of sources, and based on traffic volumes, roadway function, and land use characteristics, analysis of the highway network can identify areas along the arterial and collector streets where traffic volumes are clearly in conflict with residential land use or commercial access.

The CDTC has developed a Level of Compatibility (LOC) rating to measure these conflicts. This measure compares traffic volumes to the number of residential or commercial driveways per segment using the formula, AADT/average distance between driveways in feet to arrive at a residential or commercial conflict index.

This assessment focuses on commercial conflict index as the Route 9 and 20 corridor is primarily zoned for commercial uses. For commercial access conflicts, the scale ranges from A, for which the arterial function is not affected by access, to F, for which either the access or through movement of the roadway is not functional.

A generalized assessment of the spacing of commercial driveways along Route 9 and 20 compared to current traffic volumes yields Arterial Commercial LOC ratings of “D” to “E”. (See table 4)

Table 4	Route 9 and 20 Arterial Level of Compatability Index: Residential and Commercial							
Road Segment	Length (Miles)	AADT	Residential Dways per mile	Commercial Dways per mile	Residential Conflict Index (AADT/Avg Spacing)	Commercial Conflict Index (AADT/Avg Spacing)	Residential Level of Compatibility (LOC)	Commercial Level of Compatibility (LOC)
Segment 1: NY 9J/City of Rensselaer Line to Sherwood Avenue (Approximate Segment Length = 4476 Ft or 0.85 miles)								
Overall Segment	**0.85**	**27400**	**13**	**22**	**79**	**137**	**E**	**E**
Segment 2: Sherwood Avenue to Troy Road/US 4 (Approximate Segment Length = 8770 Ft or 1.7 miles)								
Overall Segment	**1.7**	**27640**	9	52	**28**	**165**	**D**	**E**
Segment 3: Troy Road/US 4 to Point View Drive (Approximate Segment Length = 1100 Ft or 0.2 miles)								
Overall Segment	**0.2**	15025	0	72	**NA**	**989**	NA	**F**
Segment 4: Point View Drive to Schodack Town Line (Approx Segment Length = 8560 Ft or 1.6 miles; 1.1 miles to Town Line)								
Overall Segment	**1.6**	**14580**	**15**	**30**	**25**	**50**	**D**	**D**
Segment 3 & 4 Combined: Troy Road/US 4 to Schodack Town Line (Approximate Segment Length = 1.8)								
Overall Segment	**1.8**	**14640**	**13**	**34**	**20**	**52**	**C**	**D**

NOTE: Level-of-Compatibility Thresholds Developed Through CDTC's Regional Highway System Review; Driveway Spacing Inventory Suggested Thresholds and Corresponding Descriptions

Residential LOC	
No conflict - no residential use or no traffic	A
Little conflict - little residential use or modest traffic	B
Concern - both traffic and residential use noticeable	C
Significant - conflict between traffic and residential use	D
Continued residential use may be unsatisfactory	E
Continued residential use may not be possible	F

Commercial LOC	
Arterial function not affected by access	A
Aware of turning traffic, but not an issue	B
Access traffic noticeable; a concern	C
Frequent conflict between access and through traffic	D
Persistent conflict between access and through traffic	E
Either access or through movement not functional	F

Summary of NYSDOT Crash Data:

Table 5 below summarized motor vehicle crashes that have occurred between 2008 and 2012 on segments along the Route 9 and 20 Corridor. This generalized summary shows that none of the segments of Route 9 and 20 exceed the statewide average crash rates for similar facilities. Of note is that there were three (3) crashes involving either a pedestrian or bicyclist along the segment between the City of Rensselaer and Sherwood Avenue.

Table 5 : Crashes 2008 to 2012: Route 9 and 20 Corridor

Route 9 and 20 Corridor Segments	Total Crashes: 2008 to 2012	Average Annual Crashes	Average Annual Crashes /Mile	Average Annual Daily Traffic (AADT)	Segment Length	Million Vehicle Miles (MVM) Per Year	Average Annual Crashes/ MVM	State Average Crash Rate for Similar Facility*	Total Crashes 2008 to 2012 by Severity					% of Total Segment Crashes by Collision Type					
									Fatal	Injury**	Property Damage Only	Non-Reportable	Bicyclist or Pedestrian Involved	Rear End	Right Angle	Left Turn	Over-taking	Other	Un-known
Rensselaer City Line to Sherwood Avenue	63	12.6	13.1	27400	0.96	9.60	1.31	3.61	0	20	41	2	3	19%	24%	3%	5%	22%	24%
Sherwood Avenue to Route 4	95	19	11.2	27640	1.70	17.15	1.11	3.61	0	36	53	6	1	17%	22%	11%	6%	22%	16%
Route 4 to just west of Point View Drive	25	5	23.8	15025	0.21	1.15	4.34	4.86	0	6	18	1	1	28%	16%	20%	0%	8%	20%
Point View Drive to Sunset Road	82	16.4	20.5	14555	0.80	4.25	3.86	4.86	0	28	52	2	1	37%	15%	4%	0%	24%	16%

lotes: NYSDOT Crash Data * Source: NYSDOT Average Accident Rates for State Highways by Facility Type April 2013. **Includes "Property Damage & Injury" & "Injury" crashes

Relevant Recommendations for Transportation Improvements from Previous Studies:

From the Route 9 and 20 Corridor Master Plan (Linkage Study) (insert date):

- Complete segment analysis for the Route 9 and 20 Corridor south of Route 4 to evaluate the reduction of the highway to 3 lanes (2 lanes with a center turning lane).
- Modify the pavement striping plans by reducing lane widths to allow for bicycle lanes. Provide crosswalks in specific additional locations shown on concept plans .
- Modify the current plans for parking, open space and circulation as shown on the concept drawings for Hampton Square.
- Modify signalization plans to add signals at Barber, Homestead, the University at Albany Entrance, and Old Troy Road.
- Modify signage plans to include better identification of significant pedestrian crossings.

From the Amenities Plan (2012):

- Fill in sidewalk gaps: As noted there are two large sections along Columbia Turnpike where no sidewalks exist. These segments should be of high priority as this is the primary corridor through the developed portion of East Greenbush and should serve as the spine for pedestrian connections both along the corridor and to surrounding neighborhoods.

Route 4 Corridor Study (2006): See recommendations below related to the Route 4/Route 9 and 20 intersection.

Planned Transportation Improvement Projects

Upcoming transportation projects include a plan by NYS Department of Transportation to repave and restripe the section of Route 9 and 20 from Route 4 south and eastward through the Town of Schodack. The current condition of the pavement in this section can be characterized as fair to poor. NYSDOT will complete design of this project in the fall of 2013 and intends to undertake the project in the 2014 construction season.

Demonstration Site: Route 9 and 20 (Columbia Turnpike) and Route 4 (Troy Road):

The intersection of Route 4 and Columbia Turnpike is surrounded by commercial uses and is the transition point for a significant drop in vehicular traffic east of the intersection. Sidewalks are located on the west side (eastbound approach) of the intersection on both the north and south sides of Route 9 and 20. The intersection itself has dedicated left turn lanes and right turn slip ramps on the Route 4 side and on the Route 9 and 20

eastbound approach. Pedestrian buttons are available at each crosswalk and pedestrians are instructed to proceed on the green light.

The Town's previous Route 4 Corridor Study (adopted by the Town in 2006) included several recommendations for changes at this intersection in response to the crash statistics at the time and the pedestrian environment. These included:

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

- Remove the westbound right turn slip ramp (identified as high crash location) and make it a signal controlled right turn lane.
- Consider either removing the northbound right turn slip ramp to make it a signal controlled right turn lane (approximately 78 right turns in the PM peak hour) or redesigning the northbound right turn slip ramp.
- Install WALK/DON'T WALK count down signals at intersection crosswalks.
- In conjunction with any intersection redesign efforts, bus stop placement and installation should be done in such a way as to safely allow people to transfer between CDTA's fixed route bus service available along Rtes 9 & 20 and CDTA's Route 4 shuttle service, and vice versa. *(UPDATE: The Route 4 shuttle is no longer in service)*

II. US Route 4 (Troy Road)

Route 4 is functionally classified as a Principal Arterial and is owned and maintained by the New York State Department of Transportation.

Note: Information described below is summarized in Table 6 on pages 21 and 22**.**

Travel Lane Configuration and Traffic Volumes

In contrast to Route 9 and 20, Route 4 (Troy Road) has seen more recent changes to its configuration as a result of recent (and upcoming) major intersection improvement projects and other changes installed as mitigation for development/redevelopment projects in the northern portion of the corridor.

Route 4 is a 2 to 5 lane roadway; its southern terminus begins at the intersection with Route 9 and 20 (Columbia Turnpike) and extends through the Town of East Greenbush northward to the Town of North Greenbush line, through Troy and beyond. With its function as a principal arterial, Route 4 serves both "local" and "through" trips.

The character of Route 4 changes from south to north reflecting the character, density and intensity/size of adjacent land uses and intersection roadways. For example, at the Route 9 and 20 intersection moving north, Route 4 is a 2 lane roadway providing access to adjacent primarily residential and some commercial parcels as well as adjacent residential neighborhoods. In this southern section of Route 4, south of NY 151 (Couse Corners) there is a section that includes 2 travel lanes and a center two way left turn lane where adjacent parcels include commercial uses.

The intersection of NY 151 (Couse Corners) with Route 4 was recently redesigned as a roundabout to address congestion, safety and community quality of life issues. North of this intersection, the cross section or configuration of Route 4 alternates between a 5 lane facility with 2 travel lanes in each direction and a center two way left turn lane, to a 4 lane roadway with 2 southbound travel lanes, a center two way left turn lane and 1 northbound travel lane, with some sections containing 2 travel lanes in each direction and no center left turn lane but with painted median striping. Signalized intersections typically include dedicated turn lanes.

With recent changes to Route 4 this roadway serves current and future forecasted motor vehicle traffic well. Motor Vehicle traffic volumes range from approximately 14,165 vehicles per day on average (2010 NYSDOT traffic counts) from Route 9 and 20 to NY 151 to 22,100 average vehicles per day (2010 NYSDOT traffic counts) from NY 151 to the Interstate 90 Exit 9 ramps. Volumes then drop between the I 90 ramps to Third Avenue Extension (17,420 average vehicles per day according to a 2010 NYSDOT traffic count). North of Third Avenue

TABLE 6: Route 4 Roadway Information

Segment	Segment length (approx.)	Speed Limits	Travel lanes	Travel Lane Width (ft)	Shoulder Width (ft) or Bicycle Lane	Pavement Condition (2010)	Transit route(s) /stop(s)	Daily Traffic Volumes AADT	Traffic Signals* (Avg spacing (ft))	Sidewalks	Bicycle LOS	Arterial LOC
1: Rte 9 and 20 to Rte 151 /Luther Road	1.5 miles	45 mph	1 each direction & TWLTL from approx. Mill Creek Dr to Couse Place	Mostly 12 ft., short section wider lanes near the 9 & 20 int.	Striped shoulders 2-3 ft to 4 ft; 5 ft at NY 151 roundbt	7 (Good) (as per 2010 PDR) field check = 9 (Excellent)	None	**14,165** NYSDOT TDV 2010 count	1 at Rte 9/20; roundbt at NY 151 w/markd crosswlks Spacing is 7,990 ft.	None within segment; sidewalks at NY 151 roundabout	D	Comm'l : C Resi'l: D
2: Rte 151/ Luther Road to Mannix Road	0.8 miles	45 mph	NY 151 to Glaz St: 2 SB and 1 NB, Glaz St to SEFCU dway: 2 each direction & TWLTL. SEFCU to Mannix : 2 each direction, sections w/wide painted center median	Mostly 12 ft. with some 11 ft.	Striped shoulders of 4 ft w/ up to 10 ft between I-90 and Mannix Rd	6 to 7 (Good) (NYSDOT PDR 2010), field check shows 9 (Excellnt)	None	NY 151 to I-90 ramps: **22,100** I-90 ramps to Mannix Rd: **17,415** NYSDOT TDV 2010 count	No ped signals or crosswlks at I-90 ramp signal; Mannix Rd roundabt to include crosswlks avg spacing btwn signal or roundabt is 2135 ft.	None within segment; sidewalks will be constructed at Mannix Rd roundabout	C	Comm'l : D Resi'l: D

Segment	Segment length (approx.)	Speed Limits	Travel lanes	Travel Lane Width (ft)	Shoulder Width (ft) or Bicycle Lane	Pavement Condition (2010)	Transit route(s) /stop(s)	Daily Traffic Volumes AADT	Traffic Signals* (Avg spacing (ft))	Sidewalks	Bicycle LOS	Arterial LOC
3:Mannix Road to Agway Drive (North Greenbsh line)	1.4 miles	45 mph	Mannix Rd to Empire Dr: 2 each direction w/ int turn lanes Empire Dr to FedEx dway: 1 NB and 2 SB, FedEx to North Agway Dr: mostly 1 NB, 2 SB lanes and right & left turn lanes at most signalized intersections	Mostly 12 ft. with some 11 ft.	Striped shoulders of 4 ft, limited section bicycle lane btwn Grandview Dr and Agway Dr	6 to 7 (Good) (according to NYSDOT PDR 2010, field check indicates 9 (Excellent))	CDTA Route 214 (service to Amtrak Station and Albany). Bus stops located near Target dway, Grand View Dr, and Thomp-son Ct	Mannix Rd to Third Ave Ext: **17,416** Third Ave Ext to NY 43: **24,549** NYSDOT TDV 2010 counts	5 in segment. Avg spacing is 1,430 ft.	Empire Drive to FedEx dway: 5 ft sidewalk on west side, north of Fed-Ex: future sidewalk to Rensselaer Plaza. Now,Fed Ex to Third Ave Ext: no sidewalks. North of Third Ave Ext: sidewalks on west side & some sidewalk on east side.	D	Comm'l : A Resi'l: C

Key: NB= northbound; SB=southbound; AADT= Annual Avg. Daily Traffic; TDV = Traffic Data Viewer; PDR = Pavement Data Report

Extension to NY 43 in the Town of North Greenbush daily average volumes increase to approximately 24,550 (2010 NYSDOT traffic counts).

Somewhat in contrast to traffic volume patterns found on Route 9 and 20, the 2010 NYSDOT counts show that travel on Route 4 is not concentrated just during commuting hours but sees many trips being made in both the mid-day period as well as the afternoon/evening commute hours as compared to the morning commuting period.

Route 4 also provides connections to the broader regional transportation system through connections to Interstate I-90 via Exit 9 and Exit 8 to the north in North Greenbush.

Posted Speed Limits

The posted speed limit is 45 miles per hour (mph) for the entire length of Route 4 within the Town of East Greenbush and transitions to 40 mph in North Greenbush.

Public Transit

Public transit access is limited to the northern section of Route 4 through a CDTA neighborhood bus route/Route 214 with both weekday and weekend service between downtown Albany, the Rensselaer Amtrak Station and this area of Route 4. During the weekday Route 214 busses currently run every hour to 30 minutes during the morning and afternoon commuting periods with mid-day and nighttime frequencies of about every 40 to 50 minutes, and runs from 5:50 am to 11:45 pm. Weekend service is less frequent (65 to 75 minutes apart) from around 9 am to 7: 30 pm. Route 214 bus stops are located at the Target/Home Depot driveway intersection with Route 4 and on at Grandview Drive and Thompson Court.

Pedestrian and Bicycling Environment (*Sidewalks, Signalized Crossing Opportunities, Striped Shoulders or Bicycle Lanes)*

Dedicated facilities for pedestrian and bicycle facilities are either intermittent or non-existent resulting in lower "levels of service" for these modes of travel as indicated from various measures or ratings described below.

Bicycle "Level of Service":

Similar to Route 9 and 20, Route 4 serves motor vehicle travel well. In terms of bicycle travel, because Route 4 includes striped shoulders along its entire length within the Town and its pavement is in better condition, bicycle "level of service" ratings are higher compared to those estimated for Route 9 and 20 (Route 4 ratings range from "C" to "D"). However, speeds of adjacent motor vehicle traffic and the volume of traffic result in impacts to bicyclist comfort and perceived safety. Pavement throughout the Route 4 corridor was improved fairly recently

through federal stimulus (ARRA) projects carried out by NYSDOT. Please see the explanation of the Bicycle Level of Service Model found above on Pages 10 and 11.

Table 7 below illustrates the Bicycle Level of Service (BLOS) for the Route 4 segments in East Greenbush. Data was obtained from NYSDOT's Traffic Data Viewer and Pavement Data Report.

Table 7: Route 4 Bicycle Level of Service (BLOS) Ratings Estimates

From	To	Lanes per direction	% Heavy Vehicles	Posted Speed Limit	Traffic Volumes	Travel Lane Width (ft)	Shoulder Width (ft)	BLOS Grade
Route 9 and 20	**Route 151/ Luther Road**	1+	6%	45	14,165	12	4	D
Route 151/ Luther Road	**Mannix Road**	2+	6%	45	NY 151 to I-90 ramps = 22,100 I-90 ramps to Mannix Rd = 17,415	12	4	C
Mannix Road	**Agway Drive**	1+/2+	6%	45	Mannix Rd to Third Ave Ext = 17,415 Third Ave Ext to NY 43 = 24,550	12	4	D/C

Sidewalks and Pedestrian Crossing Opportunities:

Segments of sidewalk are located primarily in the northern portion of the corridor and provide dedicated space for walking. As new development or redevelopment of parcels has occurred over recent years, improvements to

the pedestrian environment have been made at both the parcel level and at the street level through installation of new sidewalks along the arterial Right of Way and the installation of marked crosswalks and pedestrian signals in conjunction with new or reconfigured traffic signals that have been required by the Town as part of Site Plan Review or NYSDOT traffic impact review.

In terms of "walkability" of the corridor, in the southern end there are no sidewalks between Route 9 and 20 and Empire Drive, except for those located at the NY 151/Route 4 roundabout. In addition within this southern area there are no marked crosswalks or signalized intersections until you reach NY 151 which includes marked crosswalks across each leg of the roundabout; the future Mannix Road/Route 4 roundabout will also include marked crosswalks. Pedestrian travel in this section is limited to striped shoulders along the highway until you reach Empire Drive on the west side of Route 4; this sidewalk extends to the FedEx driveway which is signalized and includes crosswalks and pedestrian signals. In the future, a sidewalk or other pedestrian connection is envisioned between the FedEx site and the adjacent Rensselaer Plaza to the north. Both the section between Route 9 and 20 and NY 151 and the adjacent section to the north up to FedEx site, the distance between pedestrian crossings is quite long, ranging from 1.5 miles to 0.4 miles.

North of Third Avenue Extension there are fairly continuous sidewalks on the west side of Route 4 and some segments have been installed on the east side as new development has occurred. Signalized pedestrian crossings are included in most signalized intersections with marked crosswalks as well and the distance between signalized crossings is shorter (average spacing of 0.2 miles).

As mentioned above in the section on Route 9 and 20, according to the 2010 ITE Report on *Designing Walkable Urban Thoroughfares: A Context Sensitive Approach* "average intersection spacing for walkability (should be) a maximum distance of 660 feet; (with) desirable spacing is less than 400 feet." (page 29) Using this measure, some sections of the Route 4 corridor are considered to be "walkable" or pedestrian or bicycle "friendly" at present as evidenced by the information in Table 8 below which illustrates traffic signal locations and other related information along Route 4 within the Town.

TABLE 8: Route 4 Traffic Signal or Roundabout Spacing

Segment of US 4	Link (From - To)	Approxi-mate Link Length (ft)	Traffic Signal With Pedestrian Signals and Crosswalks	Traffic Signal WITHOUT Pedestrian Signals/Crosswalks	Roundabout or other Unsignalized Pedestrian Marked Crosswalk Locations
Segment 1: Route 9 and 20 to Route 151/Luther Road (Approximate Segment Length = 7988 Ft or 1.5 miles)					
1	US 9/US 20 to NY 151/ Luther Rd	7988			1
Segment 1 Average Spacing between Traffic Signal or Roundabout = 7988 Ft					
Segment 2: Route 151/Luther Road to Mannix Road (Approximate Segment Length = 4270 Ft or 0.8 miles)					
2	NY 151/ Luther Rd to I-90 E Ramps	2210		1	
2	I-90 E Ramps to Mannix Rd	2060			Future Roundabout
Segment 2 Average Spacing between Traffic Signal or Roundabout = 2135 Ft					
Segment 3: Mannix Road to Town of North Greenbush Line (Approximate Segment Length = 7150 Ft or 1.5 miles)					
3	Mannix Road to FedEx Site Driveway	2840	1		
3	FedEx Site Driveway to Walmart/ Mall Entrance	1230	**1**		
3	Walmart/ Mall Entrance to 3rd Ave Extension	771	**1**		
3	3rd Ave Extension to Grand View Dr	747	**1**		
3	Grand View Dr to Agway Dr/Bloomingrove Dr	1560	**1**		
Segment Average Spacing between Traffic Signal or Roundabout = 1430 Ft					

Note: In the commercial area between the FedEx driveway & Agway Dr the average spacing = 1077 Ft

Corridor Average Signal/Roundabout Spacing =	**3850 Ft**

NOTES:

1. **Link Endpoints represent locations of either a traffic signal or roundabout**
2. **Information obtained from Google: Earth, Maps and Street View (2011 and 2007 images) as supplemented by field observations**

Arterial Level of Compatibility

Level of Compatibility –The roadway network of a community is defined in terms of a street hierarchy. This hierarchy describes the principal use and/or intended function of each road. Roadways classified as arterials primarily, such as Route 4, serve the through movement of traffic between communities. Local streets provide access to abutting land, such as in residential neighborhoods. Collector streets funnel traffic between the two, and usually serve a secondary land access function. When a street begins to serve more than its principal function, conflicts can occur.

One type of conflict that can occur concerns access conflict with commercial traffic. Excess curb cuts and resulting driveway turn movements can interrupt traffic flow. As conflict between the primary function of a roadway as conveyor of through traffic and access to adjoining parcels increases, congestion and traffic crashes follow. This undesirable situation also limits the suitability of arterials for use by pedestrians, transit users, and bicyclists. Where problems either exist or are emerging, construction of too many more driveways could threaten the operational integrity of the corridor.

The point at which traffic levels are perceived as a detriment to residential quality or commercial access, however, is difficult to measure and depends on the expectations and past experience of each individual. Using objective criteria developed from a number of sources, and based on traffic volumes, roadway function, and land use characteristics, analysis of the highway network can identify areas along the arterial and collector streets where traffic volumes are clearly in conflict with residential land use or commercial access.

The CDTC has developed a Level of Compatibility (LOC) rating to measure these conflicts. This measure compares traffic volumes to the number of residential or commercial driveways per segment using the formula, AADT/average distance between driveways in feet to arrive at a residential or commercial conflict index.

The assessment for Route 4 includes both the commercial conflict index, applicable mostly north of NY 151/Luther Road, as well as residential conflict as the southern section of Route 4 is zoned for residential use. With the exception of the area adjacent to the Route 9 and 20 intersection and a shorter section south of NY 151, adjacent land uses are primarily residential.

For commercial access conflicts, the scale ranges from A, for which the arterial function is not affected by access, to F, for which either the access or through movement of the roadway is not functional.

For traffic/residential use conflicts, the scale ranges from A, for which there is no conflict between residential uses and the level of traffic on the roadway, to F, for which continued residential use may not be possible. A generalized assessment of the spacing of commercial and residential driveways along Route 4 compared to current traffic volumes yields Arterial Commercial LOC ratings of "A" to "D", and Arterial Residential LOC ratings of "C" to "D" as shown in Table 9 below.

Table 9 Route 4 Arterial Level of Compatability Index: Residential and Commercial

Road Segment	Length (Miles)	AADT	Residential Dways per mile	Commercial Dways per mile	Residential Conflict Index (AADT/Avg Spacing)	Commercial Conflict Index (AADT/Avg Spacing)	Residential Level of Compatibility (LOC)	Commercial Level of Compatibility (LOC)
Segment 1: Route 9 and 20 to Route 151/Luther Road (Approximate Segment Length = 7988 Ft or 1.5 miles)								
Overall Segment	**1.5**	14160	**24**	**13**	**43**	**23**	**D**	**C**
Segment 2: Route 151/Luther Road to Mannix Road (Approximate Segment Length = 4270 Ft or 0.8 miles)								
Overall Segment	**0.8**	**19840**	**10**	**15**	**46**	**69**	**D**	**D**
Segment 3: Mannix Road to Town of North Greenbush Line (Approximate Segment Length = 7150 Ft or 1.4 miles)								
Overall Segment	**1.4**	**19720**	**4**	**3**	**10**	**8**	**C**	**A**

NOTE: Level-of-Compatibility Thresholds Developed Through CDTC's Regional Highway System Review; Driveway Spacing Inventory Suggested Thresholds and Corresponding Descriptions

Residential LOC

No conflict - no residential use or no traffic	A
Little conflict - little residential use or modest traffic	B
Concern - both traffic and residential use noticeable	C
Significant - conflict between traffic and residential use	D
Continued residential use may be unsatisfactory	E
Continued residential use may not be possible	F

Commercial LOC

Arterial function not affected by access	A
Aware of turning traffic, but not an issue	B
Access traffic noticeable; a concern	C
Frequent conflict between access and through traffic	D
Persistent conflict between access and through traffic	E
Either access or through movement not functional	F

Summary of NYSDOT Crash Data:

Table 10 below summarized motor vehicle crashes that have occurred between 2008 and 2012 along the Route 4 Corridor. This generalized summary shows that the segment of Route 4 between Route 9 and 20 and NY 151 experiences a crash rate below the statewide average for similar facilities, while the other segments experience crash rates above the statewide average.

Table 10: Crashes 2008 to 2012: Route 4 Corridor

excluding new NY 151 Roundabout intersection

US 4 Corridor Segments	Segment Length (miles)	Total Crashes: 2008 to 2012	Average Annual Crashes	Average Annual Crashes /Mile	Average Annual Daily Traffic (AADT)	Segment Length	Million Vehicle Miles (MVM) Per Year	Average Annual Crashes/ MVM	State Average Crash Rate for Similar Facility*	Total Crashes 2008 to 2012 by Severity					% of Total Segment Crashes by Collision Type					
										Fatal	Injury**	Property Damage Only	Non-Reportable	Bicyclist or Pedestrian Involved	Rear End	Right Angle	Left Turn	Over-taking	Other	Un-known
North of US 9 & 20 to south of NY 151/Luther Road	1.29	65	13	10.1	14160	1.29	6.67	1.95	3.26	0	16	47	2	0	43%	6%	3%	5%	26%	14%
North of NY 151/Luther Road to south of I-90 area	0.25	38	7.6	30.4	22100	0.25	2.02	3.77	3.61	0	10	27	1	0	24%	21%	18%	0%	21%	8%
South of I-90 area to south of Mannix	0.41	87	17.4	42.4	17415	0.41	2.61	6.68	4.86	1	29	55	2	1	41%	9%	10%	6%	18%	13%
North of Mannix Rd to North Greenbush Town line	0.94	138	27.6	29.4	19720	0.94	6.77	4.08	3.61	0	45	90	3	2	36%	12%	10%	4%	16%	20%

Notes: NYSDOT Crash Data * Source: NYSDOT Average Accident Rates for State Highways by Facility Type April 2013. **Includes "Property Damage & Injury" & "Injury" crashes

Additional Relevant Recommendations for Transportation Improvements from Previous Studies:

From the Amenities Plan (2012):

Infill missing sidewalk gaps and provide new sidewalk connections, particularly along Columbia Turnpike and Route 4, to link residential neighborhoods with schools, library and each other.

Planned Transportation Improvement Projects

As mentioned above, a future project sponsored by the Town of East Greenbush using a combination of federal, state and local funds, is the construction of a roundabout at Mannix Road/Route 4.

In addition, the Town's NY 151 Transportation Enhancement project to include sidewalks, curbing and bicycling accommodations along Luther Road to the High School is anticipated to be completed over the next few years.

A project in the post-5 year period of the region's federal Transportation Improvement Program or TIP covers the area of Route 4 from Mannix Road to NY 151 and contains intended elements covering Sidewalks, crosswalks, ADA curb ramps, repaving, bike lanes, raised median, driveway relocation, new curbing, and closed drainage and culverts.

Demonstration Site: NY 151/Route 4 (Couse Corners):

With the recent construction of the roundabout at this intersection and the upcoming NY 151 project, and potentially the larger Route 4 project between NY 151 and Mannix Road, this area will be made more pedestrian and bicycle friendly and should result in a dampening of vehicle speeds and enhanced safety. These improvements will help create opportunities to help achieve the Town's vision for this area.

The Route 4 Corridor Study and the Town's Master Plan identified a land use vision for the Route 4 corridor to the north of NY 151 and to the south of NY 151. The Route 4 North vision includes protecting existing residential uses, enhancing commercial and office development and creating new development that is a community asset. Development should be concentrated, walkable, of mixed use and interconnected and site designs should account for natural, historic and cultural features. The Route 4 South vision includes strengthening and enhancing the residential core as a walkable place. Redevelopment and new growth should strengthen this character, particularly with the numerous civic and institutional uses in the area. The plan recommended mitigating traffic impacts of future development, creating development design guidelines for commercial development, creating an interconnected path system, updating the cluster zoning regulations and/or developing new zoning tools that protect sensitive environmental features and developing a master plan for Couse Corners.

02 APPENDIX

Public Workshop Summaries

Photo Preference Survey

Meeting participants were shown a series of four photographs and asked to select which they would prefer to see. The results of the instant poll were shown and discussed after each set of images. The results and discussion are summarized below.

Which shopping plaza would you prefer to see on Columbia Turnpike?

A - 24%

B - 0%

C - 38%

D - 38%

Positive elements the photos:

- Mixed use opportunities - whether within a building or a site
- Greenspace and landscaping

There was a consensus that Photo C seemed more practical given the existing land use patterns within the study area. Opportunities for the type of development shown include:

- K-Mart plaza (excess parking could be converted to greenspace like Photo C)
- Ames plaza (site could be redeveloped like Photo D)
- Vacant buildings throughout study area

Which gas station would you prefer to see on Columbia Turnpike?

A - 19%

B - 19%

C - 31%

D - 31%

Positive elements the photos:

- Landscaping in front
- Sidewalks
- Pumps to side or rear

People preferred:

- Photo A because it looked more attractive than a typical gas station and seemed convenient to use. It balanced the needs of autos and pedestrians, and could handle a lot of traffic. Similar to Cumberland Farms in North Greenbush.
- Photo B because it looks less cluttered.
- Photo C because of the landscaping in front and thought the arrangement with pumps on the side and the convenience store up closer to the sidewalk could work in the study area. Someone noted "looks like a town you want to stop and visit."
- Photo D because it was an attractive building that looks nothing like a typical gas station, but it might not be a practical or realistic option in the study area. Would other tennants want to share space in a mixed-use building with a gas station/ convenience store?

There was discussion that Sullivan's gas station was a good example within the corridor with pumps behind the building. A design that combined elements from photos A, B and C would be interesting (buffer landscaping with sidewalks, interesting architecture, and side or rear pumps). Some of these stations are small, and more pumps would be needed on Columbia Turnpike.

Which dealership would you prefer to see on Columbia Turnpike?

A - 38%

B - 25%

C - 19%

D - 19%

Positive elements the photos:

- Landscaping - buffer between inventory and street
- Sidewalks

People preferred:

- Photo A because of the landscaping, clean and attractive site. This seemed like a realistic option that balanced the needs of the dealership with maintaining an attractive and pedestrian-friendly corridor. Is the Toyota sign/branding necessary?
- Photo B because of the sidewalk and greenspace between the street and display area. Some felt that the inventory was too far from the road to meet the dealer's needs.
- Photo C because it is an attractive site and an example of a small dealership. There was discussion that car buying methods are changing as people shop online before visiting dealerships. Dealerships may become smaller like this over time and the need for having a lot of cars lined up along the street frontage may decline.
- Photo D because of the buffer between the sidewalk and the display area. Some felt that the inventory would not be visible enough to meet the dealer's needs.

Some also felt that there should not be any additional dealerships within the study area.

Which restaurant would you prefer to see on Columbia Turnpike?

A - 35%

B - 41%

C - 12%

D - 12%

Positive elements the photos:

- Re-use of existing buildings
- Architectural interest

People preferred:

- Photo A because it looked different/interesting, but there are not a lot of places in the study area where this type of "sidewalk cafe" would work.
- Photo B because of the architecture and because it is a larger restaurant. During the discussion, there was discussion of the type of "franchise architecture" represented by the Chili's. It has more architectural interest than earlier franchise designs, but could still be "Anywhere USA" and doesn't reflect local character.
- Photo C because it is similar to restaurants that did/still exist within the study area. There was discussion that the open frontage and lack of a sidewalk were undesirable.
- Photo D because it is an attractive reuse of an old building. It is well-designed and -maintained, looks like someplace you would want to stop. There are opportunities for this type of reuse in the study area.

Which retail building would you prefer to see on Columbia Turnpike?

A - 20%

B - 0%

C - 40%

D - 40%

Positive elements the photos:

- Landscaping
- Screening

People preferred:

- Photo A because it was a unique building with landscaping.
- Photo C because of the buffer and fencing between the parking lot and street. Also thought that a building that housed multiple businesses was better than a single business building. If one business fails, the entire property is not in danger of being vacant or abandoned (as has happened throughout the study area). This is what we have now, but with some enhancements.
- Photo D because it has more architectural interest than a typical chain pharmacy building and because the parking lot is screened with landscaping .

People did not prefer Photo B despite the building being on the sidewalk with the parking to the side and rear, because it appears to have minimal front interest or interaction with the street. Some did not like any of the options and didn't think that any of them would add value to the community.

There was discussion that there are many excessively large parking lots existing in the study area that could be converted to greenspace and landscaping as shown in Photos C and D.

Which repair garage would you prefer to see on Columbia Turnpike?

A - 56%

B - 44%

C - 0%

D - 0%

Positive elements the photos:

- Lack of clutter visible from street
- All are better than what currently exists in the corridor

After further discussion, some people expressed preferences that differed from their initial selection. People preferred:

- Photo A because it was well-screened and tidy. This photo and Photo D have easy access to the building, people know where they are going.
- Photo B because it was clearly a repair garage and would be recognizable to people driving by, but had some landscaping and was well-maintained.
- Photo D because it was a unique building and sign. People liked the idea of the bay doors facing the side rather than the front in this photo and in Photo C.

Which office/professional building would you prefer to see on Columbia Turnpike?

A - 50%

B - 21%

C - 14%

D - 14%

People preferred:

- Photo A because it was smaller, more residential in scale and design. There are existing buildings within the study area similar to this such as the office building near the bowling alley.
- Photo B because it is a large business and would provide a lot of employment .

There was discussion of scale - there are places in the study area where both Photo A and Photo D would be appropriate. People felt that East Greenbush should not attempt to become another Loudonville or Wolf Road with too much large-scale development. Route 4 is more conducive to larger office buildings, while smaller, more residential offices would be appropriate on Columbia Turnpike. The hamlet is different that the commercial part of Columbia Turnpike. Are businesses more important or identity?

Which type of housing would you prefer to see near Columbia Turnpike?

A - 4%

B - 46%

C - 25%

D - 25%

People preferred:

- Photo B because it was detached one- and two-family homes.

There was discussion that attached and multi-unit housing needs to provide off-street parking, which wasn't shown in the photos. Different housing types and higher densities could potentially be appropriate in parts of the study area depending on nearby land uses.

General Discussion

Other comments included:

- Mixed use properties are more interesting to look at and have more reasons for people to stop at them.
- Sidewalks and well-designed greenspace/landscaping along the frontage is strongly preferred.
- People would like to see the corridors become more walkable, and for buildings to be more pedestrian-friendly.
- Goal should be to enhance what already exists within the study area as opposed to fully redeveloping it.
- Need to focus on practical solutions.

EAST GREENBUSH ROUTES 4, 9 & 20 STUDY
2 Oct 2012 Community Meeting Notes

PlaceMap

Meeting participants split into four break-out groups. Each had a base map of the study area and were asked to identify assets (positive features) and opportunities (features to be improved), as well as connections between destinations, and the ways and routes people travel around the area.

The four resulting maps were compiled into a final PlaceMap (see separately attached map). The notes and discussion are summarized below:

Assets

- Selenas Cafe
- Beckers Farm (aesthetically pleasing)
- Hoffmans Car Wash (aesthetically pleasing)
- Elias and Sweater Venture, Country Trunk, the cannoli place and the hair salon - nice cluster of stores that people can walk between
- True Value (they fixed it up)
- Funplex and Lickity Split
- Friendlys
- Hannaford
- Town Hall
- Miracle League
- Little League fields
- Plaza with attorney's office and daycare across from Commons Drive - like the corporate plazas
- Vanderhouter Square (clean parking lot, should add some greenspace)
- Rensselaer Riverfront Park (not in town, but a nearby destintation, could be connected with a path)
- Historic area (hamlet) with many uses
- Albany Estates
- Hampton Lake
- Couse Corners & the roundabout
- Library (beautiful)
- YMCA
- Red Mill

Opportunities

- Former Teagans
- Weathervane (vacant)
- McDonalds (needs mowing and cleaning)
- Quigleys
- Pizza Hut
- Former Public Market
- Off Shore Pier (vacant)
- Adult store & car dealer (not necessarily the businesses just the aesthetics)
- Hudson River Carpet
- Sadoties garage
- Town Hall (needs some small improvements to be more aesthetically pleasing)
- Couse Place (garage roof fell in)
- Bates building has potential - across from Bates building is nice
- Former KFC/Taco Bell (vacant)
- Route 4, 9 & 20 intersection (needs improvement, was nice for a brief period of time)
- Huntswood Estates needs connections
- Forreste Point needs a connection to the Price Chopper
- Fucillo (decrepit)
- Target (pedestrian-vehicle conflicts in parking lot)
- Backed up traffic at OTB and the carwash
- Rite Aid (vacant)
- Sand pits
- Ames plaza
- Gravel lot

K-Mart plaza

- The building is old, in poor condition.
- The site is unattractive.
- The parking lot is unnecessarily large.
- It is centrally located.
- It needs more businesses or commercial density. There is nearby residential density.
- It could be a commercial center for the nearby neighborhood. There is a church across the street. It could have more of a community atmosphere.

EAST GREENBUSH ROUTES 4, 9 & 20 STUDY
2 Oct 2012 Community Meeting Notes

Former Weathervane property

- It is vacant. That doesn't help adjacent sites or the character of the corridor.
- Building needs to be demolished. Could be replaced with a mixed-use building.
- It is a good location for a restaurant or other commercial use.
- It is a larger parcel, which is a plus.
- Should connect to adjacent plaza.

Ace Hardware area

- Great hardware store
- Difficult to get into the hardware store property from the highway
- Focal point - a center for the east end. If you think about East Greenbush, you think about this area. Community meets here.
- Good grocery stores in this area.
- Sidewalks on Elliot Road

Columbia Plaza/Price Chopper

- Two exits are good
- Lack of businesses
- Planet Fitness
- Pedestrian-vehicle conflicts

Columbia Turnpike

- Lack of sidewalks and need to improve walkability. Some sidewalk improvements are difficult due to current building placement and site development.
- Needs more cross connections/crosswalks across highway
- Look at safety of the center turn lane (5th lane).
- Road width is an opportunity (especially if 5th lane eliminated)
- Some properties have difficult access (ex. hardware store)
- Need a safe walking/biking route from highway to Goff School - preferably off-street
- Need to connect area around Phillips Road to highway
- Need to connect Sherwood Park neighborhood to highway
- Safe walking route for people who live behind Hannafords to get to store
- Encourage walking and improve connections from nearby neighborhoods to highway so everyone doesn't have to drive everywhere.
- Want some nice restaurants like seafood - was nice when Weathervane was there
- East of Route 4 it can be more of a walking corridor. West of Route 4 it can be more like Wolf Road.
- Need bus shelters
- Increased traffic enforcement needed
- Nice balance between residential and commercial

Couse Corners

- People are making illegal left turns into Dunkin Donuts. Enforcement is needed.
- Speed is an issue.
- High school, YMCA, Library, Senior housing all need to be connected to traffic circle

Trails and Paths

- Strong support for the rail-trail on the former trolley route
- Path in utility corridor
- Formalize trails behind Price Chopper to Red Mill Road, off Michaels Road, behind Genet
- Use Temple Lane
- Connect town parks and ball parks
- Safe walking and biking routes to schools

Sherwood Park neighborhood

- Needs walking and biking routes to connect to Routes 9&20, and 4
- Connecting Jefferson Ave and Eckman Ave could create a parallel route behind 9&20

03 APPENDIX

Introduction to Complete Streets

Introduction to Complete Streets

January 2013

Smart Growth America
Making Neighborhoods Great Together

National Complete Streets Coalition

What are Complete Streets?

Complete Streets are streets for everyone, no matter who they are or how they travel.

What are Complete Streets?

Safe Comfortable Convenient

What are Complete Streets?

Safe Comfortable Convenient

Americans want choices

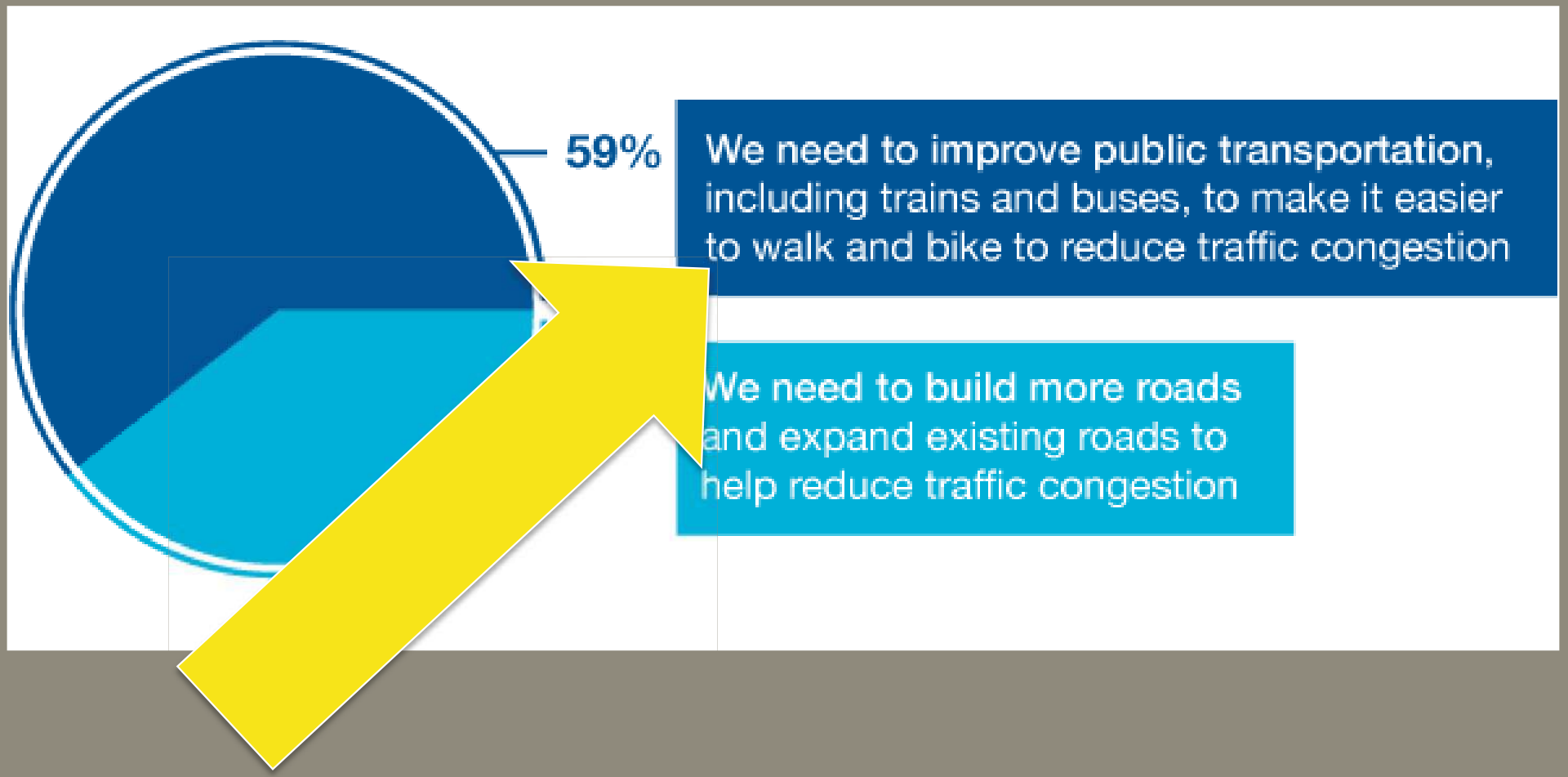
66% of Americans want more transportation options so they have the freedom to choose how to get where they need to go.

73% currently feel they have no choice but to drive as much as they do.

57% would like to spend less time in the car.

Future of Transportation National Survey (2010)

Getting Out of Traffic



Future of Transportation National Survey (2010)

The tremendous potential

Of all trips:

39%

are less than
3 miles

17%

are less than
1 mile

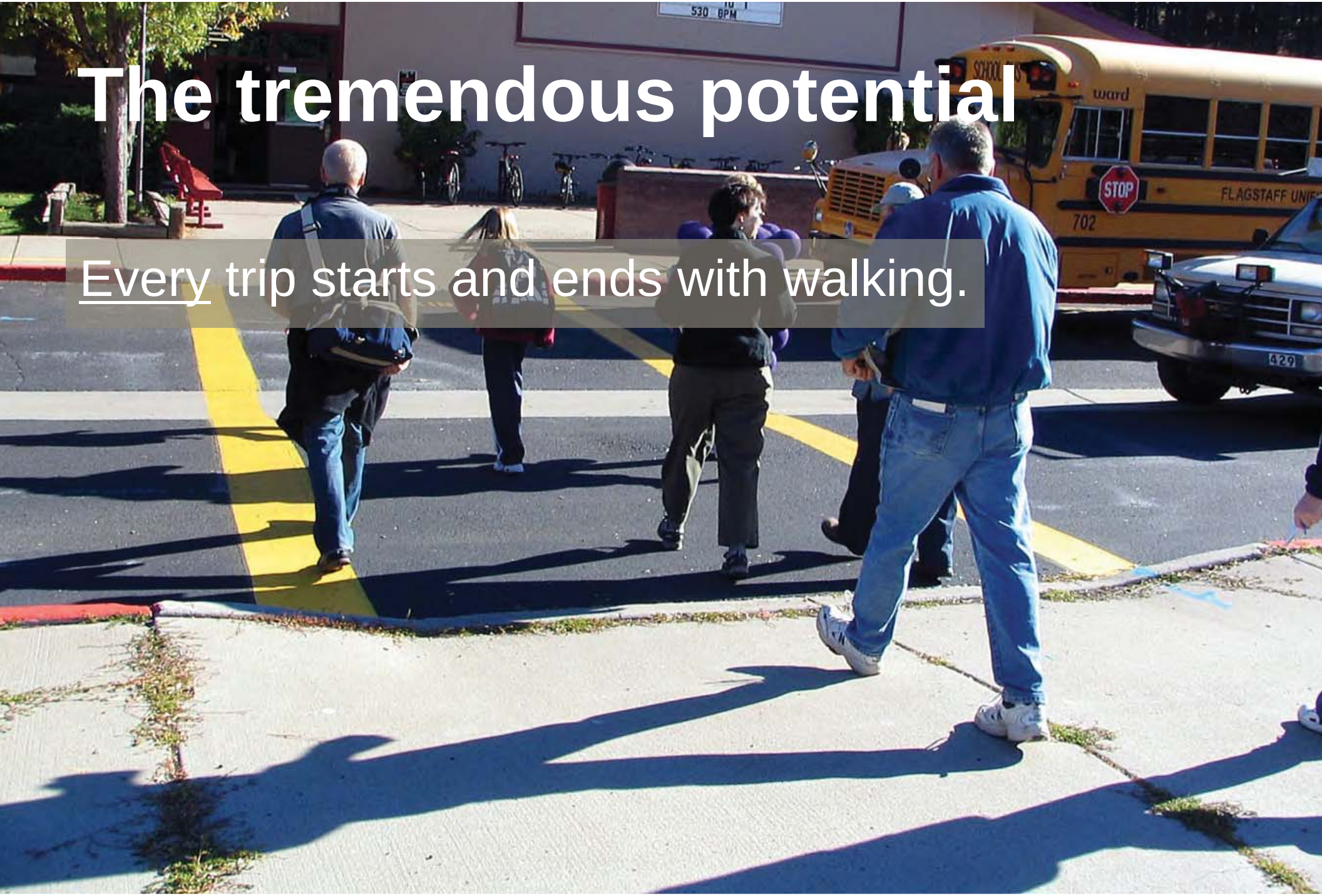
47%

are <u>driven</u>

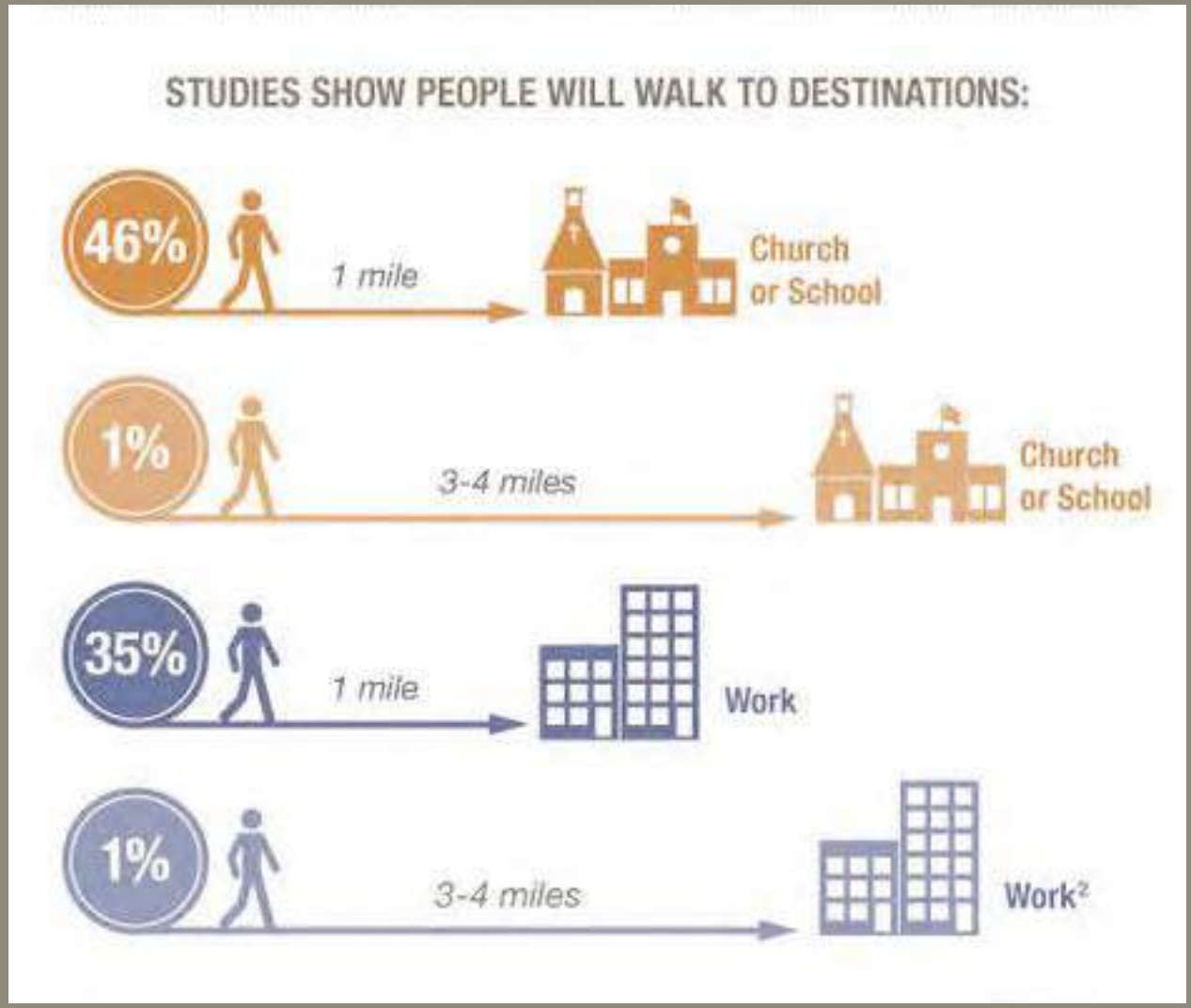
of these trips…

National Household Travel Survey (2009)

The tremendous potential



People will walk



Centers for Disease Control and Prevention 2012, newpublichealth.org

Who wants Complete Streets?

47%

of older Americans say it is unsafe to cross a major street near their home.

54%

of older Americans living in inhospitable neighborhoods say they would walk and bike more often if the built environment improved.

56%

express strong support for adoption of Complete Streets policies.

Planning Complete Streets for the Aging of America, AARP

Who wants Complete Streets?

Millennials are driving less and looking for other transportation options.

Smart Growth America
Making Neighborhoods Great Together

National Complete Streets Coalition

Incomplete streets are unsafe

More than 40% of pedestrian deaths in 2007 and 2008 occurred where no crosswalk was available.

National Highway Traffic Safety Administration's Fatality Reporting System

Smart Growth America
Making Neighborhoods Great Together

National Complete Streets Coalition

Incomplete streets are unsafe

Especially for:

- People of color
- Low-income communities
- Older adults

Streets are inadequate

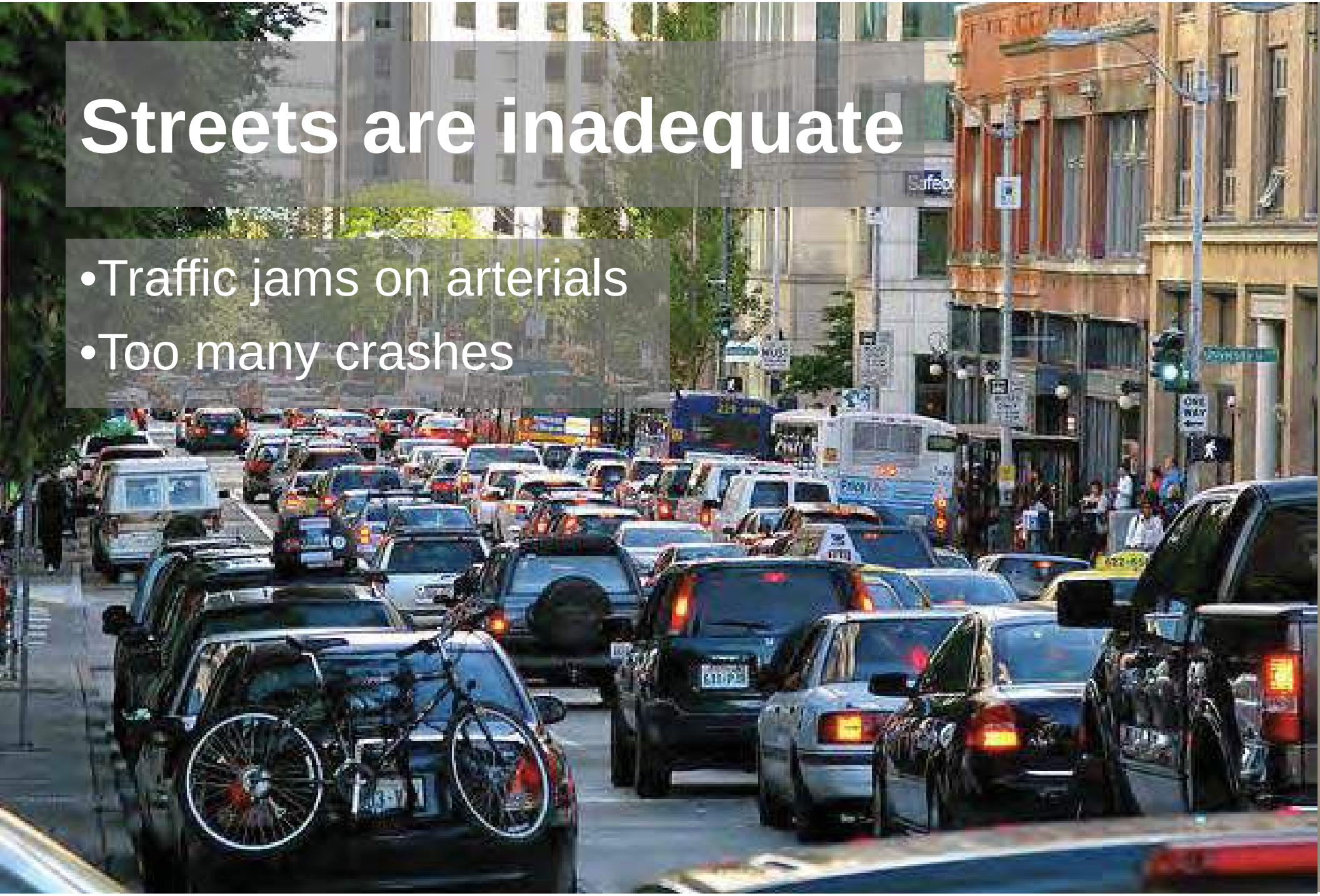
- No sidewalks
- Too dangerous to cross on foot

Streets are inadequate

- Unsafe for bicyclists

Streets are inadequate

- Traffic jams on arterials
- Too many crashes



Streets are inadequate

- Uninviting for bus riders

Streets are inadequate

- Inaccessible for wheelchair users

Streets are inadequate

- No room for people!

We know how to build right

Smart Growth America
Making Neighborhoods Great Together

National Complete Streets Coalition

We know how to build right

We know how to build right

Smart Growth America
Making Neighborhoods Great Together

National Complete Streets Coalition

Yet too many roads still turn out like this:

or this:


or this:
JUNCTION
OFFICE DEPOT
PETCO
PET SMART

The Solution:
Complete Streets Policies

Complete Streets policies

Ensure that the entire right-of-way is planned, designed, constructed, operated, and maintained to provide safe access for all users

Complete Streets means:

High-level policy direction

Change the everyday decision-making processes and systems

Incremental approach

Long-term results

Complete Streets does not mean:

One ‘special’ street project

A design prescription

A mandate for immediate retrofit

A silver bullet; other issues must be addressed:

- Land use (proximity, mixed-use)
- Environmental concerns
- Transportation Demand Management

Many types: rural streets

Many types: shared streets

Many types: skinny streets

Many types: main streets

Many types: urban streets

Many types: traffic circles

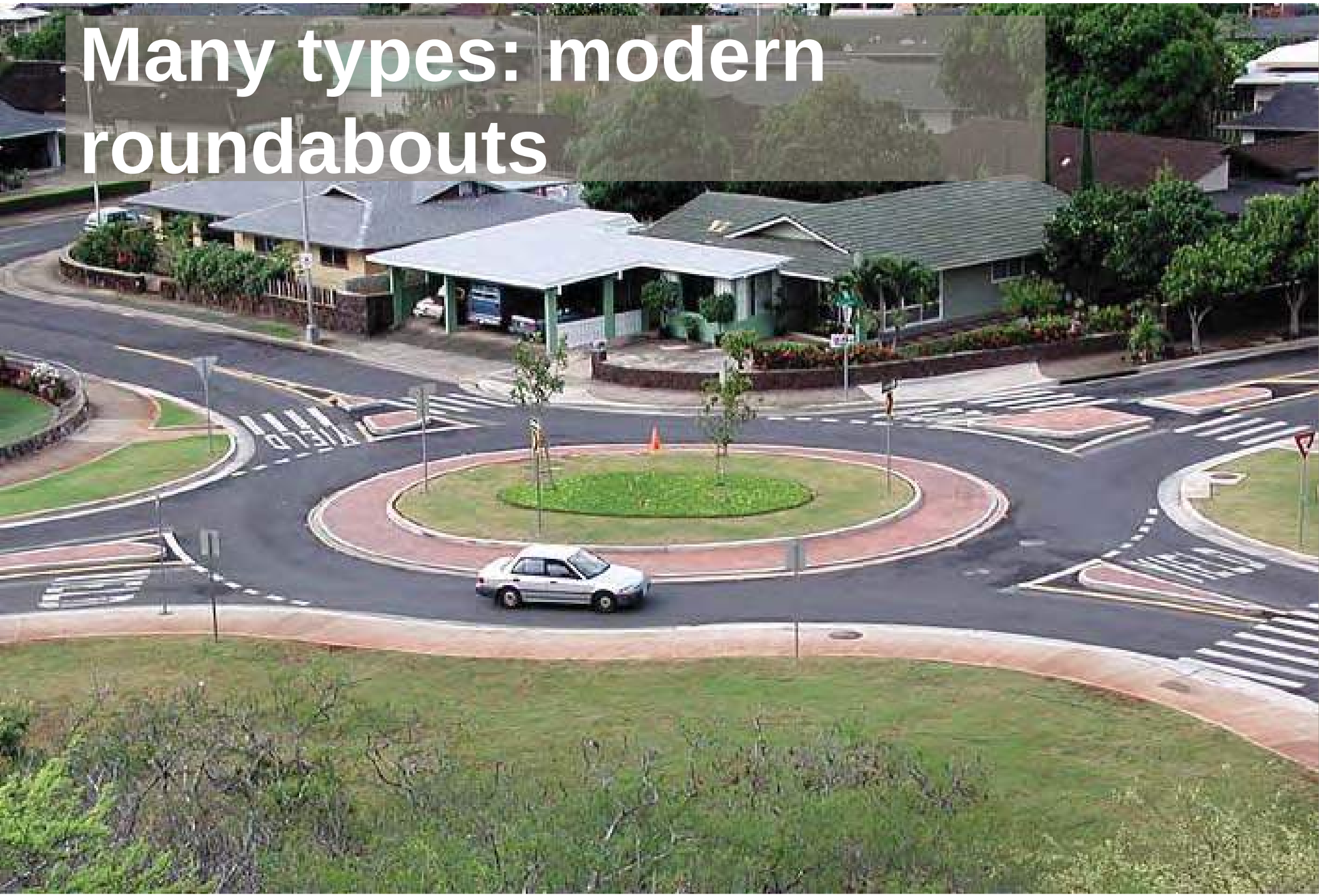
Many types: Bus Rapid Transit

Many types: neighborhood greenways

Many types: angled head-out parking

Many types: cycle tracks

Many types: modern roundabouts



Many types: paved shoulders

For more information

- Fact sheets, photos, hand outs
- Information on changing policy
- Policy tracking & examples
- Complete Streets blog & monthly newsletter
- Links to research & publications

www.completestreets.org

www.smartgrowthamerica.org

National Complete Streets Coalition Steering Committee

Benefactor

AARP

America Bikes

American Planning Association

American Public Transportation Association

Blue Cross and Blue Shield of Minnesota

National Association of REALTORS

Smart Growth America

Platinum

American Society of Landscape Architects

SvR Design Company

Bronze

Active Living by Design

Alliance for Biking & Walking

Association of Pedestrian and Bicycle Professionals

Supporter

America Walks

Institute of Transportation Engineers

League of American Bicyclists

National Association of City Transportation Officials

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Smart Growth America

Making Neighborhoods Great Together

Smart Growth America is the only national organization dedicated to researching, advocating for and leading coalitions to bring smart growth practices to more communities nationwide.

www.smartgrowthamerica.org

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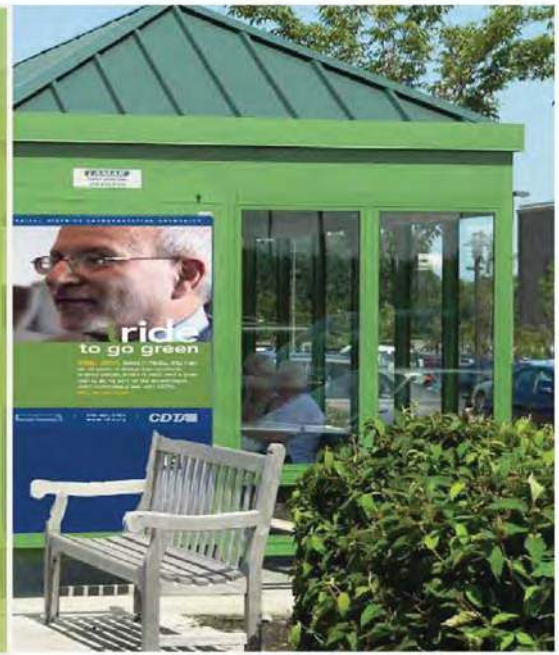
04 APPENDIX

Guide to Designing and Locating Bus Stops

CDTA BUS STOPCHECKLIST

Business Development

Facilities



Capital District
Transportation Authority
110 Watervliet Avenue
Albany, NY 12206
518-437-8300
www.cdta.org

Guide to designing and locating bus stops

CDTA iride

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www.cdta.org

2009 Edition

CDTA iride

5. BUS STOP SIGN PLACEMENT

Sign Placement

- Install in location adjacent to corner post or right front bumper when the bus comes to a full stop
- If practicable, install 8 feet from curb on far side of sidewalk
- Minimum distance should be 24 inches to ensure post does not conflict with bus mirror
- Should not block any traffic safety signs
- Should be on its own post unless explicit permission to use a shared pole exists

The placement of a bus stop sign is very important to the overall operation as it signals to the driver where to safely stop the bus and provides a consistent message to the transit user where to wait.

6. ACCESSIBILITY FOR THE DISABLED

Below are some key considerations crucial to accommodating people with disabilities:

- Non – slip finishes
- Eliminate hazards, mark dangerous areas
- Provide visual and tactile cues made through color contrast and texture
- Ensure area is well lit for orientation and security
- Make visible – ensure bus operator can see waiting passenger
- Make sure sidewalks are in good state of repair
- Concrete barrier curb 6 inches
- Transit stop waiting pad, minimum 7 x 6.5 inches
- 1-2 paved connections from pad to the sidewalk, width 5 inches
- Remove obstructions, provide a minimum clear width of 5 inches
- Waiting pad must have an accessible ramp on either side
    - slope 6 feet for 6 inches of curb
    - ramp must be minimum 5inches wide
- Installation of an elevated concrete pad on the shoulder of the road
- Install transition at each end of pad (see ramp details above)
- Corresponding inbound and outbound stops should be accessible
- Curb cuts:
    - installed as right angles to the street (if possible, 2 per corner)
    - flush at the top and bottom of the slope
    - joint free
    - include pavement markings for visually impaired
    - free draining
    - contrasting color/surface to surrounding area
    - provide for a continuous accessible route – no sudden barriers leaving traveler stranded

Contents

Capital District Transportation Authority (CDTA)

Bus Stop Checklist

This checklist summarizes CDTA's guidelines and criteria when locating bus stops. CDTA staff is available for consultation on practical application of these guidelines.

1. LAND USE - TRANSIT RELATIONSHIP

Coordination between transit and land use helps to create livable, sustainable communities. Several factors should be considered when developing site plans:

Intended Site Use - senior housing, medical centers or major shopping centers should be located along existing transit routes. Integrating transit into development site plan during early planning stages meets the proven high demand for transit service at such facilities. If transit is not considered in advance, it reduces to service options in the future.

It is a good practice to contact CDTA during the early stages of development to ensure transit integration.

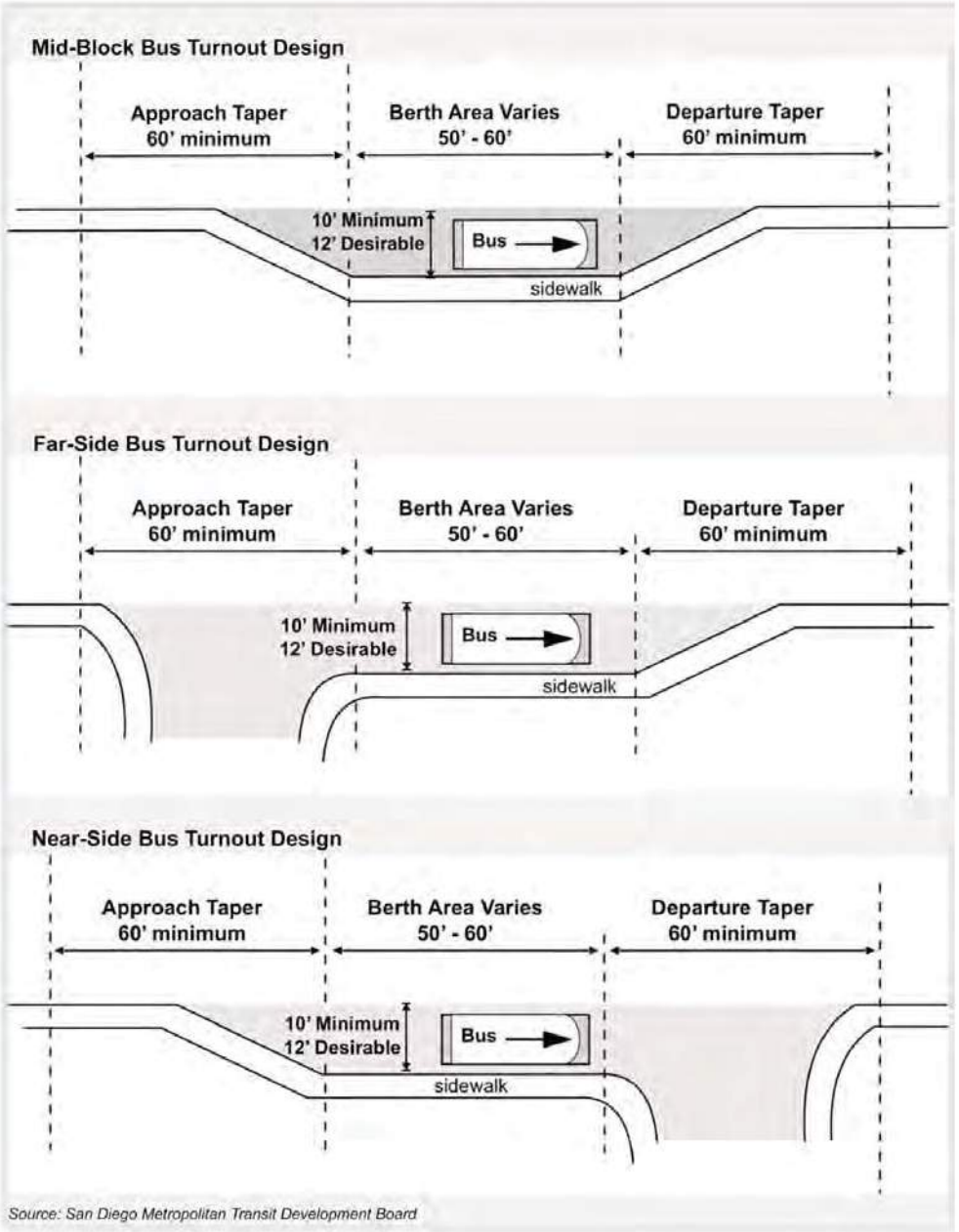
Site Layout – there are several general factors that make a development transit-friendly:

- Buildings are located close to street side
- Buildings face the street
- Façade features windows (no blank walls are facing the street)
- Good pedestrian infrastructure throughout the site connects to the street sidewalks
- Adequate lighting is provided
- Parking does not exceed minimum requirements (reduced or shared parking is encouraged when development is located along transit corridor)
- Bicycle parking should be provided some transit riders complete a portion of their trip by bike; all CDTA buses are equipped with bike racks
- Landscaping should be maintained – no overgrowth

2. LOCATION CONSIDERATIONS

Place Stop

- Convenient to major destinations, including employment sites, hospitals, shopping and entertainment venues
- Convenient for transfers between services
- In the public right-of-way, unless written permission to operate on private property exists
- Consider the impact of stops on adjacent properties
- Paired, or as close as possible, with the stop in the opposite direction
- Convenient for errand running and "trip linking" tasks
- Grade of road should not impede accessibility



Source: San Diego Metropolitan Transit Development Board

- Height of curb is minimum 6 inches
- Obstructions cleared in bus landing area to facilitate boarding and alighting for bus riders
- Length of bus turn out should be long enough to allow 40foot bus to accelerate and decelerate
- Approach: 46 feet Stop: 40 feet Pull out: 25 feet
- Desirable curb lane width: 11.5 feet
- Adequate curb space for the expected number of buses
- "No Parking" sign in a bus stop area

Bus Turnout Design:

Bus turnout can slow transit operations because of merging, but provide important safety benefits under specific conditions.

Install bus turnout only under the following circumstances:

- Traffic speed average is greater than 40 mph
- Traffic in the curb lane exceeds 250 vehicles/peak hour
- Passenger boarding during the peak exceeds 20-40 persons
- Past history of vehicle/pedestrian conflict
- Layovers are expected
- inadequate sight distances
- parking in curb lane is prohibited
- signal priority treatment exists at next intersection
- right turn lane is used by buses as queue jumper lane
- not too close to an intersection where waiting vehicles impede transit access/egress
- Design considerations are the same as Curb-Side with special attention to:
    - Turnout length must accommodate access/egress
    - Lane width - minimum 11.5 feet
    - Remove overhead obstructions - 16.5 feet
    - Remove lateral obstructions cleared within 3.2 feet of curb
    - Adequate curb space for number of buses expected at one time
- "No Parking" sign in a bus stop area
- Special pavement treatment is desirable *(see image below)*

Visibility

- Bus operators' sightlines should not be obscured by trees, shrubs, poles, buildings
- Where there are bike lanes: locate the bus stop to provide sufficient distance for cyclists to stop safely
- Buses should not restrict the visibility of traffic signals
- Do not place bus stops on curves – 495 foot sight line is required going into zone and coming out of bus stop zone
- Ensure clear sightlines on the right side of the bus - no obstructions between bus operator and boarding passengers
- Stop should be well lit

Driveways

- Place on far side of driveway
- Consider volumes and turning movements of other vehicles (discussed further in following sections)
- Adequate curb space in waiting area – avoid spillover to adjacent curb space
- Ensure loading zone is wide enough to accommodate passing pedestrians, alighting and waiting riders
- All weather, slip resistant surface (impervious), well drained - especially to step from/to the bus

3. AMENITIES AND ACCESS

Pedestrian Accommodations

It is very important to remember that every bus rider is a pedestrian for a part of the trip. That is why special attention should be given to providing adequate pedestrian accommodations like sidewalks and crosswalks.

- Connecting path and sidewalks should be clear of obstructions, made of a firm surface material, and well drained; ADA compliant
- Locate stops at traffic signals for safe street crossing wherever possible
- Bus stops should be located in close proximity to crosswalks
    - Intersection stops: if near side is necessary, ensure 15 inches distance between the stop line and the bus stop
    - Mid block stops: always locate stop on the far side of crosswalk so that pedestrians cross behind the bus, not in front
    - Avoid locating stops close to driveways, especially those with high traffic volumes

This is a bus stop located in the city of Schenectady. It features:

- Marked crosswalk
- Traffic control signals
- Wide sidewalk clear of obstacles
- Bench

Street Furniture

- Ensure minimum 3.5 foot lateral clearance (preferred 5 feet for wheelchair clearance) and 6.5 foot headroom
- Accommodate newspaper boxes if they are well maintained and do not impede mobility
- 3.5 foot separation from other street furniture
- Locate garbage receptacles away from landing pad. Garbage receptacles should be:
    - regularly maintained
    - animal/ vandal proof
    - bolted down
    - placed to avoid direct sunlight
    - designed to not allow pooling of liquids which attract insects

- *Maintained newspaper stands*
- *Garbage receptacle*
    - *Away from a pad*
    - *Clean*
    - *Out of direct sunlight*

Benches at Bus Stops

- Install when shelter is not feasible, but demographics warrant seating
- Install where there is evidence transit patrons are sitting or standing on nearby structures
- Avoid complete exposure to elements
- Coordinate with existing or new trees for shade, wind and rain protection
- Locate away from driveways
- Separate from curb by at least 6 feet
- Ensure adequate clearance for mobility especially near landing pad
- Allow room for through pedestrian traffic

Shelters

Shelter with seating

CDTA receives more requests for shelters than program funding availability for installation and maintenance. All requests are evaluated and prioritized annually based on the following criteria:

- Threshold of 50 passengers per day boarding at the stop is desirable
- Number of routes that transfer at a stop (priority to stops with transfer activity)
- Space is available for construction in the public right-of-way
    - no obstructions
    - level
    - sufficient clearance for wheelchair movements
- Consider demographics of area/riders – seniors, physically challenged
- Proximity to major destinations
- Frequency of transit service
- Adjacent land use compatibility
- Neighborhood requests and/or maintenance agreements

Shelter design

- CDTA procures standardized shelters to facilitate maintenance and to achieve bulk pricing advantages
- Four sided shelters require an opening that is a minimum width of 2.62 feet for compliance with the Americans with Disabilities Act (ADA)
- Transparent sides
- Seating oriented to view oncoming transit, pedestrians and adjacent buildings
- Lit shelters are preferred where practicable
    - Down lighting in shelter area improves safety and visibility
- Ad panels should be located far side so as not to obstruct the view of an arriving bus
- Shelter location and orientation should :
    - Be parallel and facing curb
    - Ensure bus operator can see waiting passengers
    - Should not impede landing area or pedestrian path
    - Should take into consideration snow clearance practices

This shelter is located in the Town of Colonie. It features both inside and outside sitting.

The bench is located along the sidewalk; it's set back not to obstruct pedestrian traffic flow. The sidewalk is in a good state of repair and clear of obstructions. Landscaping is well maintained.

For drawings of currently used bus shelters, please contact CDTA Streets Amenities Manager.

4. CURB SIDE STOPS AND TURNOUT DESIGNS

Curb Side Site Design

Curb side stops are typically installed on existing sidewalks. The length of the stop's curb maybe painted to make the stop more visible and discourage parking.

- Ensure condition of curb lane is without potholes; grates and storm drain covers are flush with surface

7. RURAL STOPS

- Adhere to as many stop location standards as is practicable
- Install a landing pad, brushed concrete, raised, to separate from traffic
- Install curb cuts at each end – for accessible transition onto shoulder pathway
- Cut back landscaping for sightlines and personal safety
- Consistent signage with urban/suburban stops

8. PERSONAL SAFETY CONSIDERATIONS

By addressing the needs of "vulnerable users" within the built environment, the entire community benefits from improved and well cared for facilities.

Location

- Site should "feel" safe a night
- Locate where adjacent land use offers "passive surveillance" or "eyes on the street"
- Neighboring houses looking on
- Commercial businesses open late
- Bus stop for same route in opposite direction, located within easy sight distance

Landscaping

- Low shrubbery or canopied trees
- No bushes or evergreen trees

Lighting

- Adequate lighting - shining directly on waiting and surrounding areas
- Coordinate location with existing street lights
- Coordinate with lighting from adjacent land uses (i.e.: consider lighting when choosing a location)

9. INFORMATION

For more information please contact:

- CDTA Streets Amenities Manager in the Facilities Department – Existing Bus Stops & Shelters
- CDTA Business Development Department – Requests for new or modified Bus Stops, Shelters or Site Plan review.

www.cdta.org, or 518-437-8300

05 APPENDIX

Bicycle Parking Guidelines

BICYCLE PARKING GUIDELINES

A set of recommendations from the Association of Pedestrian and Bicycle Professionals [apbp]

"I would ride to work if there was a safe place to lock my bike."

INTRODUCTION

The lack of a secure parking space keeps many people from using their bikes for basic transportation. Leaving a bicycle unattended, even for short periods, can easily result in damage or theft. Finding a bike rack that doesn't work or isn't conveniently located makes for a frustrating experience.

The purpose of this document is to assist with the selection and placement of appropriate bicycle racks for short-term parking. Four major components will be discussed.

1. The rack element. This device supports the bicycle.
2. The rack. It is important to understand how bikes interact with each other when rack elements are assembled together.
3. Combining of multiple racks into a bicycle parking lot.
4. Locating the rack, and the relationship of the rack to the building entrance it serves and the cyclists' approach to that entrance.

The discussion will focus on outdoor installations. The racks are intended to accommodate conventional, upright, single-rider bicycles. It is assumed the cyclist will use a solid, U-shaped lock, or a cable lock, or a combination of the two.

The apbp Task Force that developed this guide is also developing recommendations for other important bicycle parking-related issues including:

a. Assessing the appropriate number of bicycle parking spaces for different buildings and land uses, including the use of bicycle parking ordinances.
b. Long-term bicycle storage facilities such as lockers and bicycle parking garages.
c. Indoor bicycle parking and the carriage of bicycles in transit vehicles.

1. The Rack Element

Definition: **the rack element is the part of the bike rack that supports one bicycle.**

The rack element should:

- Support the bicycle upright by its frame in two places
- Prevent the wheel of the bicycle from tipping over
- Enable the frame and one or both wheels to be secured
- Support bicycles without a diamond-shaped frame with a horizontal top tube (e.g. a mixte frame)
- Allow front-in parking: a U-lock should be able to lock the front wheel and the down tube of an upright bicycle
- Allow back-in parking: a U-lock should be able to lock the rear wheel and seat tube of the bicycle

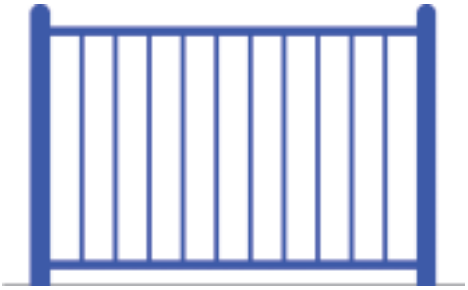
Comb, toast, school-yard, and other wheel-bending racks that provide no support for the bicycle frame are NOT recommended.

The rack element should resist being cut or detached using common hand tools, especially those that can be concealed in a backpack. Such tools include bolt cutters, pipe cutters, wrenches, and pry bars.

INVERTED "U"
One rack element supports two bikes.

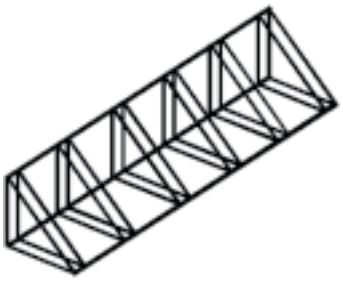
"A"
One rack element supports two bikes.

POST AND LOOP
One rack element supports two bikes.



COMB
One rack element is a vertical segment of the rack.

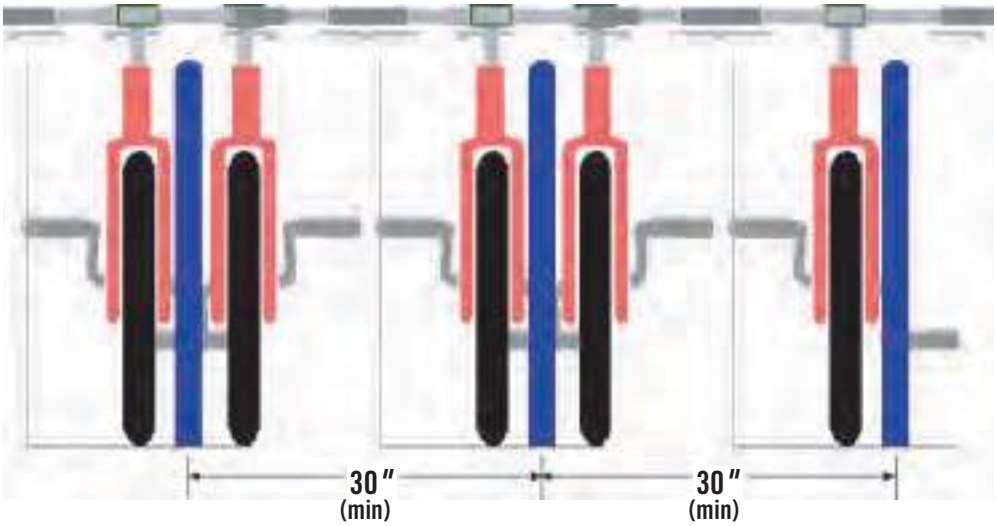
WAVE
One rack element is a vertical segment of the rack.



TOAST
One rack element holds one wheel of a bike.

2. The Rack

Definition: **a rack is one or more rack elements joined on any common base or arranged in a regular array and fastened to a common mounting surface.**



A rack is one or more rack elements joined on a common base or arranged in a regular array and fastened to a common mounting surface.

The rack should consist of a grouping of rack element. The rack elements may be attached to a single frame or remain single elements mounted within close proximity to each other. The rack elements should not be easily detachable from the rack frame or easily removed from the mounting surface. The rack should be anchored so that it cannot be stolen with the bikes attached—vandal-resistant fasteners can be used to anchor a rack in the ground. An exception is a rack that is so large and heavy that it cannot be easily moved or lifted with the bicycles attached.

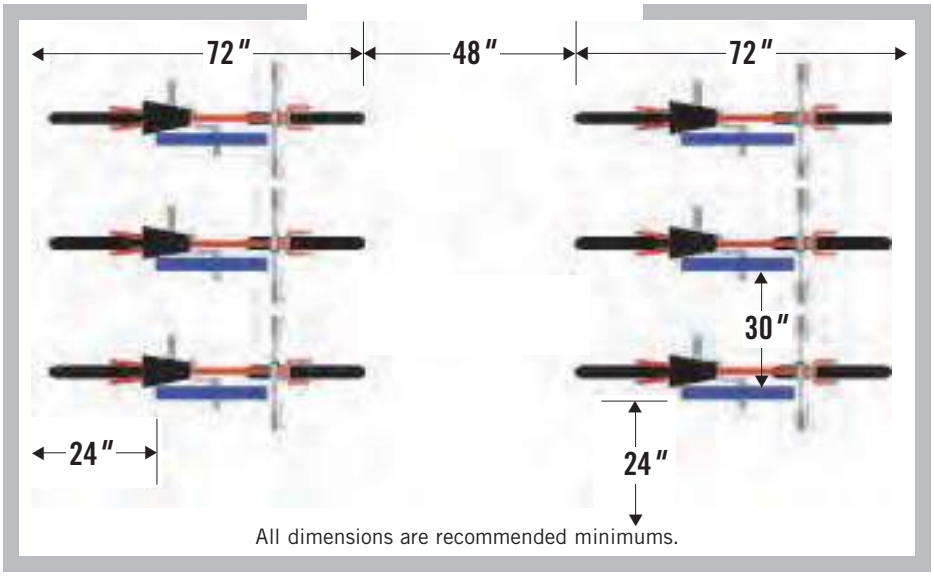
The rack should provide easy, independent bike access. Inverted "U" rack elements mounted in a row should be placed on 30" centers. This allows enough room for two bicycles to be secured to each rack element. Normally, the handlebar and seat heights will allow two bicycles to line up side-by-side if one of them is reversed. When there is a conflict, the bikes can be placed slightly offset from one another as shown. If the elements are placed too close together, it becomes difficult to attach two bikes to the same element. If it is too inconvenient and time consuming to squeeze the bikes into the space and attach a lock, cyclists will look for an alternative place to park or use one rack element per bike and reduce the projected parking capacity by 50 percent.

Wave style racks are not recommended. Bicyclists commonly use a "wave" rack as if it were a single inverted "U." This limits the actual capacity of the rack to two bikes regardless of the potential or stated capacity. Bicycles parked perpendicular to a wave rack (as intended by the manufacturer) are not supported in two places and are more likely to fall over in the rack. The advertised capacity of a wave rack is usually much higher than the practical capacity.

An empty rack should not create a tripping hazard for visually impaired individuals.

3. The Rack Area

Definition: **the rack area is a bicycle parking lot where racks are separated by aisles.**



The rack area is a bicycle parking lot where racks are separated by aisles.

A rack area or "bicycle parking lot" is an area where more than one rack is installed. Aisles separate the racks. The aisle is measured from tip to tip of bike tires across the space between racks. The minimum separation between aisles should be 48 inches. This provides enough space for one person to walk one bike. In high traffic areas where many users park or retrieve bikes at the same time, such as a college classroom, the recommended minimum aisle width is 72 inches.

72 inches (six feet) of depth should be allowed for each row of parked bicycles. Conventional upright bicycles are just less than 72 inches long and can easily be accommodated in that space. Some rack types will allow the racks to be mounted closer to the wall. This will not change the space required by the bicycles or the aisles.

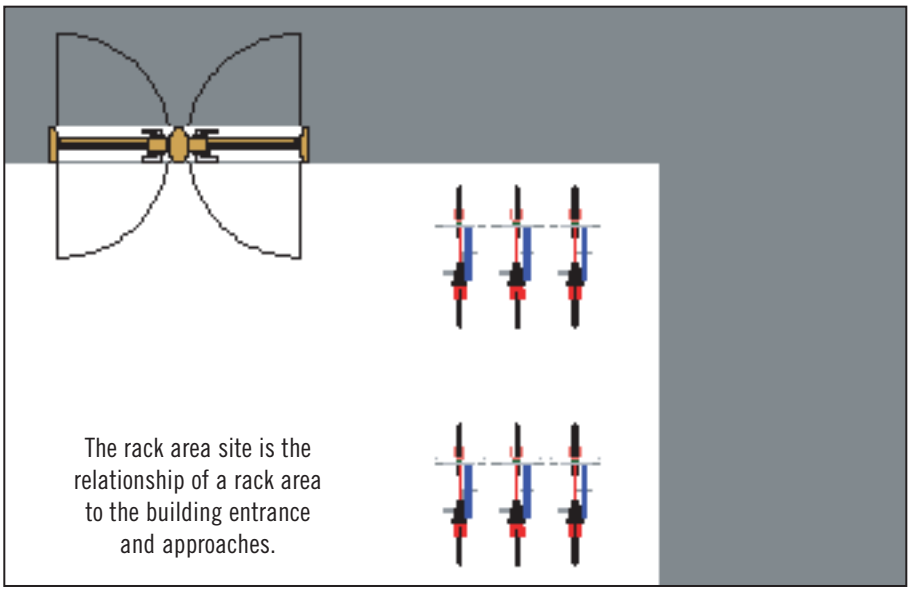
Large rack areas with a high turnover rate should have more than one entrance. This will help facilitate the arriving and departing of cyclists and pedestrians.

If possible, the rack area should be protected from the elements. Racks along building walls can be sheltered by an awning. Even though cyclists are exposed to sun, rain, and snow while en route, covering the rack area keeps the cyclist more comfortable while parking, locking the bike, and loading or unloading cargo. An awning will also help keep the bicycle dry, especially the saddle.

4. The Rack Area Site

Definition: **the rack area site is the relationship of the rack area to a building entrance and approach.**

The location of a rack area in relationship to the building it serves is very important. The best location for a rack area is immediately adjacent to the entrance it serves. Racks should not be placed so that they block the entrance or inhibit pedestrian flow in or out of the building. Racks that are far from the entrance, hard to find, or perceived to be vulnerable to vandalism will not be used by most cyclists.



The rack area site is the relationship of a rack area to the building entrance and approaches.

It is important to understand the transition a cyclist makes from vehicle to pedestrian. The cyclist approaches the building mounted on the bicycle. At some point, the cyclist stops, dismounts, and walks the bike to a rack. The bicycle is attached to the rack and any cargo is removed. The cyclist now walks into the building carrying the cargo. Adequate space must be provided to allow for this transition.

The rack area should be located along a major building approach line and clearly visible from the approach. The rack area should be no more than a 30-second walk (120 feet) from the entrance it serves and should preferably be within 50 feet.

A rack area should be as close or closer than the nearest car parking space. A rack area should be clearly visible from the entrance it serves. A rack area should be provided near each actively used entrance. In general, multiple buildings should not be served with a combined, distant rack area. It is preferred to place smaller rack areas in locations that are more convenient.

5. Creative Designs

The recommended practices above are not intended to stifle creativity. There are many creative, three-dimensional bicycle parking racks that work very well. Whether the rack is a type of "hanger", "helix" or another configuration, the critical issue is that the rack element supports the bike in two places and allows the bicycle to be securely locked.

Creative designs should carefully balance form with function. For example, the distinctive "croquet set" rack shown here likely has a smaller effective capacity than might be immediately apparent because one or more of the rack elements is not accessible. Similarly, the "hanger" racks shown below must be carefully manufactured and maintained to prevent weaknesses at the joints of the hanger and rack—such weakness might compromise the security of bicycles locked to the rack. In addition, the "coat hanger" elements should be spaced at least 30″ apart.

Conclusion

More information about bicycle parking is available from a wide variety of sources. Visit www.bicyclinginfo.org to access many of those sources, and to find a list of bicycle parking manufacturers.

More information about the Association of Pedestrian and Bicycle Professionals is available at www.apbp.org.

Bicycle Parking Guidelines

Adopted by the Association of Pedestrian and Bicycle Professionals
Spring 2002

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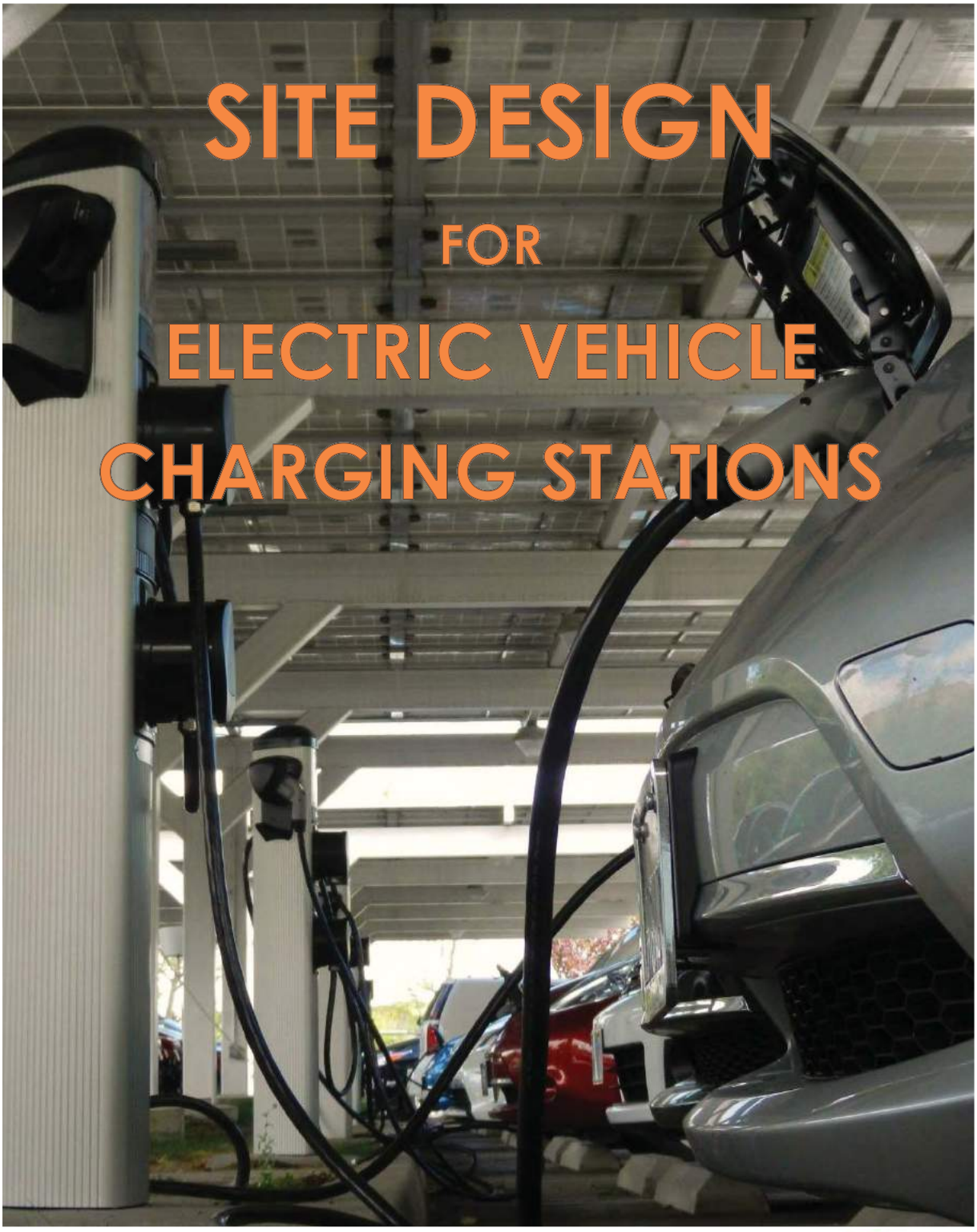
06 APPENDIX

Site Design for Electric Vehicle Charging Stations

SITE DESIGN FOR ELECTRIC VEHICLE CHARGING STATIONS



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Clean Cities U.S. Department of Energy

Prepared by: **Sustainable Transportation Strategies**

July 2012

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NOTICE

SITE DESIGN FOR ELECTRIC VEHICLE CHARGING STATIONS

VERSION 1.0

JULY 2012

Prepared by: **Sustainable Transportation Strategies**

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Editor: Carlotta Collette

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1 INTRODUCTION

Sustainable Transportation Strategies prepared this report to highlight best practices for designing electric vehicle (EV) charging stations – those parking spaces where EV supply equipment will be used to charge vehicles. Now that communities are ramping up with installations of EV supply equipment, designers are encountering a host of design issues that are generating creative solutions – and mistakes.

This report is intended to be used by persons who are responsible for safe and convenient design of EV charging stations. Many topics covered by this report are beyond the professional responsibility of electrical contractors. The report should be used alongside other resources, including those that cover electrical design standards for installation of EV supply equipment.

Now that communities are ramping up with installations of EV supply equipment, designers are encountering a host of design issues that are generating creative solutions – and mistakes.

Site Design for Electric Vehicle Charging Stations addresses the kind of equipment available and how parking facility design offers both opportunities and challenges for charging station installations. Several design scenarios are illustrated.

2 WHAT KIND OF EV SUPPLY EQUIPMENT IS AVAILABLE?

In the near term, EVs will use the following three categories of EV supply equipment classified according to power levels and circuit requirements:

- AC Level 1, up to 120-volt single-phase circuit with either 15-ampere (amp) or 20-amp configuration.
- AC Level 2, 208-volt to 240-volt single-phase circuit with an 80-amp maximum, but often using 40-amp rated circuits.
- DC fast charger, converts AC power levels rated at 208 volts to 480 volts (3-phase) to DC power to deliver up to 50 kilowatts at the EV's battery voltage.

Level 1 EV supply equipment

Level 2 EV supply equipment

DC fast charger

Both Level 1 and Level 2 EV supply equipment are sometimes called EV chargers – but technically speaking, they are not. Their main purpose is to deliver power to a vehicle's charging module, or charger. Electric cars all have charging modules on board that convert the EV supply equipment's AC power to DC and deliver it to the battery according to manufacturer-specified rates (typically expressed as kilowatts). In contrast, a DC fast charger bypasses a vehicle's on-board charger to directly deliver power to the vehicle's battery.

Neighborhood EV at Level 1 EV charging station

Level 1 EV supply equipment can recharge the battery of a standard electric car within 4 to 6 hours if it is driven less than 30 miles per day. For Level 1 charging, vehicles plug into a typical electrical outlet (NEMA 5-15R or 20R) using a portable cable set supplied by the vehicle manufacturer. Most new electric cars are equipped with a Level 1 cable outfitted with a J1772 connector that plugs into the vehicle. This is the same connector used for Level 2 charging. Since 120-volt circuits are so ubiquitous, Level 1 EV supply equipment is the easiest and least expensive type to install.

Level 1 charging is less useful for completely recharging large battery packs found in trucks and many electric cars. Fully depleted, a 24-kilowatt-hour battery could require

15 to 20 hours to charge using Level 1 EV supply equipment.[1] Level 2 EV supply equipment can fully recharge the same battery in less than 4 hours.[2]

Level 2 EV supply equipment operates on circuits with a capacity similar to those that run appliances, such as electric ovens and clothes dryers. Some Level 2 equipment used at commercial sites runs on circuits rated at up to 80 amps. Level 2 EV supply equipment and DC fast chargers have the charging cable and connector permanently affixed.

J1772 connector

Various designs of Level 2 EV supply equipment can attach to ground surfaces, walls, posts, poles, and ceilings.

Level 2 EV charging cable retracts

The majority of EV supply equipment being sold can charge one vehicle at a time but models are available that can connect with two to four vehicles at once. In some cases, single units have connectors for both Level 1 and Level 2 charging.

Most Level 2 EV supply equipment installed in the past few years utilizes simple cable storage where the cable is manually wound around a holder attached at the bottom or side of the unit. Some styles include cable management systems where the cable retracts back to the unit at a height where the cable can be suspended rather than lying on the ground during operation. Pedestal units that suspend the cable during use are necessarily taller than those that do not.

[1] Electric Transportation Engineering Corporation. (2010, April). Electric Vehicle Charging Infrastructure Deployment Guidelines for the Oregon I-5 Metro Areas of Portland, Salem, Corvallis and Eugene.

[2] This assumes the battery is connected to a charging module using a 6.5-kilowatt rate.

Level 2 EV charging cable automatically lowers from ceiling (photo courtesy of EVSE Ltd.)

Overhead systems drop the cable down level with the vehicle's charging inlet when triggered by local or remote control.

DC fast chargers will be important to drivers who need to quickly recharge their depleted batteries. Using DC fast chargers, most vehicles will recharge up to 80 percent of capacity in 30 minutes or less.

DC fast charging is just beginning to become available to consumers in the U.S., and it appears that two charging standards will be in use. Two companies offer fast charging inlets as an option on their vehicles imported to the United States: Nissan and Mitsubishi. Both use the Japanese CHAdeMO connector. The Society of Automotive Engineers is expected to adopt a different standard in 2012, a modification of the J1772 connector that will support DC charging as well as Level 1 and Level 2 AC. Three major U.S. automobile manufacturers and five manufacturers from Europe plan to use this "J1772 combo connector" starting in 2013.[3]

CHAdeMO connector (below) and J1772 connector (above)

Several brands of EV supply equipment offer advanced electrical metering that tracks power usage as well as communication network connections to transmit power usage and other data. Networked EV supply equipment can perform a number of services. Drivers are able to remotely check on the status of networked equipment, determine where units are available, and make reservations. Networked EV supply equipment with meters can support "smart grid" applications. As an example, utilities can send signals that reduce EV charging when grid loads are high or initiate charging when electricity costs are low. Better control of electrical flow by location and time is likely to make smart grid applications profitable for both utilities and consumers.

[3] Ponticel, Patrick. (2012, May). "J1772 'combo connector' shown at the 2012 Electric Vehicle Symposium." Prepared for SAE International. Found at: www.ev.sae.org.

3 DESIGN NEEDS FOR OPERATING EV SUPPLY EQUIPMENT

EV charging introduces equipment and a new set of activities into parking facilities. Safe and convenient operation of the EV supply equipment requires sufficient space. Designing EV charging stations also requires consideration of the parking facility design and the patterns of how it is being used. Adequate functioning of the parking area itself should not be compromised by poor EV charging station design.

Most public charging station installations are of Level 2 EV supply equipment. People who operate Level 2 EV supply equipment will normally plug in at places where they have scheduled activities. During charging, the vehicles will be unattended for several hours or overnight.

A person needs room to stand in front of the EV supply equipment and operate it – about a 3-foot by 3-foot space.

Level 1 charging, which requires more time, follows this same pattern of parking and leaving the vehicle. Use of DC fast chargers will differ. This high-powered equipment is designed for commercial and other public settings.

Because people will plug into DC fast chargers for only about 10 minutes to 30 minutes, most will either wait at their vehicle or walk a short distance to nearby services and shopping.

Charging station designers usually site EV supply equipment near the front of the vehicle so that the cable can reach charging inlets where they are located at the front and sides of vehicles. For these types of installations, a person needs room to stand in front of the EV supply equipment and operate it – about a 3-foot by 3-foot space. Public parking design generally does not include room for activities at the front of the vehicle. Retrofitting existing spaces with EV supply equipment requires finding parking stalls that are already long or have space in front that can be adapted for EV charging.

Striped pavement designates space to operate EV supply equipment

Persons with disabilities need additional room to maneuver while charging a vehicle[4]. A person in a wheelchair needs maneuvering room including space at or near the EV supply equipment to turn around.

Space is also needed to the sides of the vehicle to maneuver the charging cable. Unfortunately, cables placed on the ground do not always lie flat. Level 2 cables are about ¾ inches in diameter with a typical length of 18 feet to 20 feet (allowable up to 25 feet).

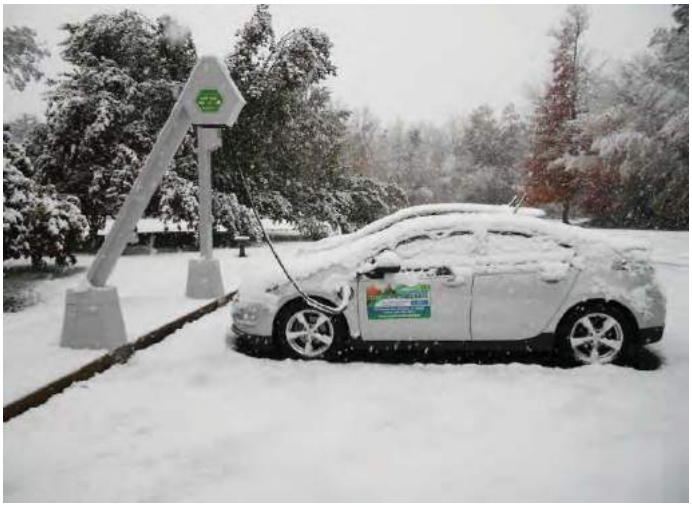
The portable Level 1 cables are smaller in diameter and more manageable. Designing additional space alongside the vehicles creates better conditions for using the cables and also helps pedestrians avoid tripping.

Cables can create tripping hazard

Suspending cable assists with handling

DC Fast charger cables using the CHAdeMO connector measure over 1 inch diameter, and in combination with the connector, are heavy. Consequently, several DC fast charger manufacturers are designing their equipment so that cables remain suspended and require little lifting.

Some EV supply equipment uses a combination of suspension and retraction of the cable to reduce exposure to weather and eliminate having cables lie on the ground. This equipment eliminates the tripping hazard and the cables do not become buried in accumulations of snow and ice.

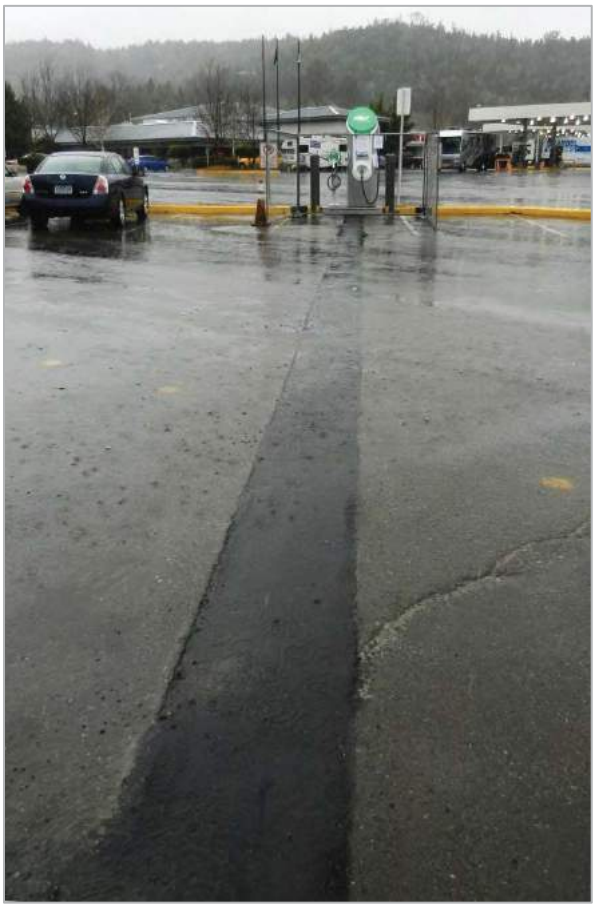


Suspended, retractable cable prevents the cable from being buried in snow or ice (photo courtesy of EVSE Ltd.)

[4] Mayfield, David. (2012, February). EV Charging for Persons with Disabilities. Found at: http://www.sustainabletransportationstrategies.com

4 PARKING FACILITY DESIGN

Municipally owned public parking often serves entire neighborhoods. This differs from parking that serves specific destinations like retail entrances, where property owners orient customers towards specific entrances. Routes from parking at multi-unit dwellings are designed in both manners and can be either diffuse or focused to specific building entrances. Where parking is focused towards specific destinations, parking near the destination entrance is the most frequented and popular. Charging station designers need to consider whether to avoid or use the most frequented parking spaces.



Trenching long distances to install electrical conduit raises costs

EV charging joins a number of activities that regularly occur in parking facilities other than just parking and walking. Parking facility designers have to address service, delivery, and transit vehicles mixing with other traffic in public parking areas. Parking fee collection can include entry payments or kiosks. Retail outlets require planning for shopping carts or other means for transferring goods. Parking lot maintenance activities include debris and snow removal.

Surface parking, which is very common in the United States, extends over a considerable area of developed sites. Designers orient surface parking to serve the one or more destinations by making it as convenient as possible to park and walk. Major layout elements include the parking stalls, traffic entrances and aisles, sidewalks, and landscaping.

Surface parking is typically paved with asphalt concrete, although brick, paving blocks, gravel, and other materials are encountered. Trenching through and then repairing pavement during electrical conduit installation can amount to a significant portion of total installation costs. Some hardscape surfaces cannot be repaired without a substantial change in the design of the facility. Disturbing these surfaces should be avoided where aesthetic considerations are important. Installations also should be avoided in areas subject to flooding.

4.1 PARKING SPACES

Angled, 90-degree, and parallel parking

The wider and/or longer parking spaces in a parking facility are usually best for installing EV charging stations. Extra space is needed to accommodate the new equipment and its operation. Finding adequate space plus factors such as power availability, ADA accessibility, and convenience helps identify potential EV charging sites.[5] As with all publicly available parking facilities, the first EV charging station should be ADA-accessible and similarly located as the site's designated accessible parking: near a building entrance with an accessible pathway. Obstacles such as curbs will affect the ability to reach operable parts of the EV supply equipment from a wheel chair. To make the site suitable for persons with disabilities, the ground surface should be firm, level (with a slope no more than 2 percent in any direction) and smooth (obstacles less than ¼ inch).[6]

The wider and/or longer parking spaces in a parking facility are usually best for installing EV charging stations.

[5] Mayfield, David. (2012, April). Siting EV Charging Stations. Found at: http://www.sustainabletransportationstrategies.com

[6] Mayfield, David. (2012, February). EV Charging for Persons with Disabilities. Found at: http://www.sustainabletransportationstrategies.com

Parking lot designers orient parking spaces either perpendicular, angled, or parallel to traffic flow. Of these, installations are easiest where the parking is perpendicular or angled. Many parking lot designers use perpendicular parking because of its spatial efficiency. Parking layouts with 60-degree and 70-degree angles are also common and effective choices used by designers. Parking stalls typically range from a "standard" 9-foot by 18-foot space to compact sizes that are 8 feet by 12 feet. Newer facilities usually include areas for bicycles and in some cases, parking stalls for motorcycles.

Some parking lot designers shorten parking stall length when it is assumed that the vehicle can overhang the curb. Where charging stations are added to this type of parking stall design, wheel stops or bollards may need to be added to prevent damage to the EV supply equipment – or existing wheel stops may need to be moved back. When moving back wheel stops, adequate parking aisle width will need to be preserved.

Moving wheel stops back can prevent vehicles from damaging EV supply equipment

Pedestal-mounted EV supply equipment well-located at angle parking

Angled parking often creates triangular unused spaces suitable for operating EV supply equipment. In many cases, the curb can be used as the barrier to protect the equipment and no bollards or wheel stops are necessary. Where parking is designed at angles less than 60 degrees, the EV supply equipment may need to be moved to the center of the parking space so that the cable can reach the back side panel of a vehicle.

Parallel parking presents the greatest challenge to safe EV charging station design. EV manufacturers have not standardized which side of the vehicle has the recharging inlet. With parallel parking, the J1772 connector and inlet can be exposed to traffic. Parking space and street width are important considerations because of moving vehicles.

Parking protected by painted stripes

Bike lane buffers EV charging from traffic

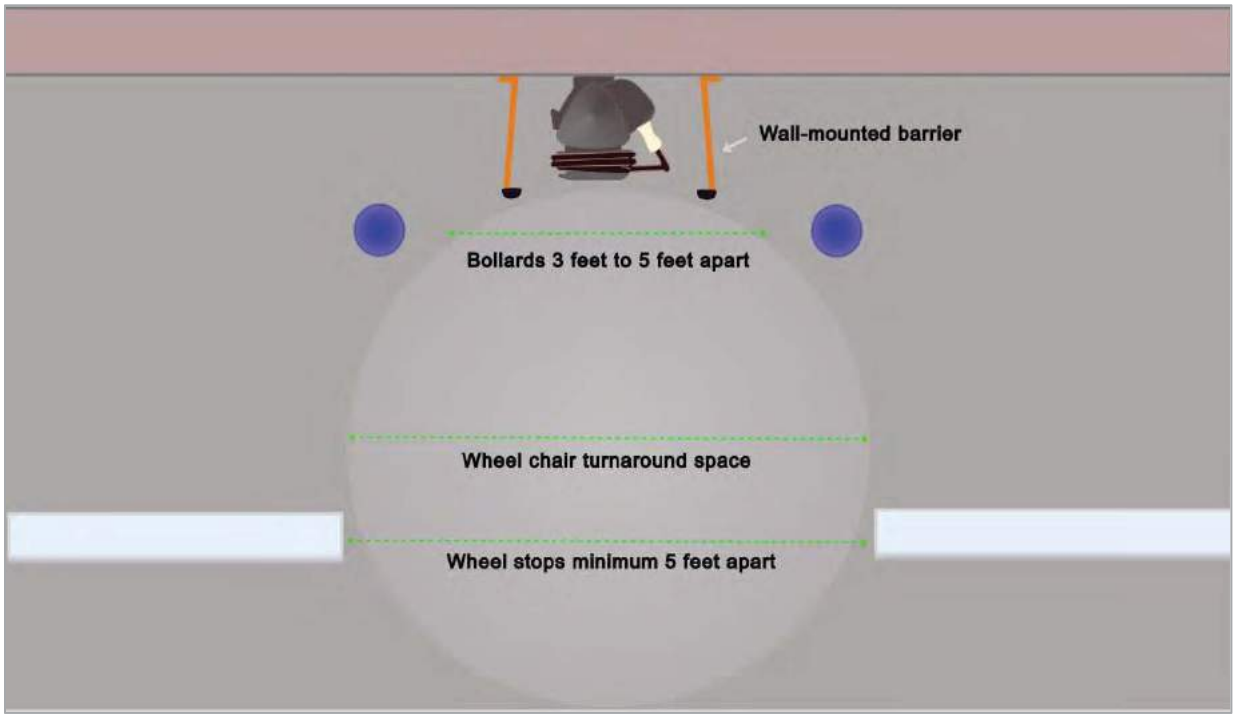
Bike lanes can buffer on-street charging stations from traffic lanes. However, a cable lying on the ground can contribute risk to passing bicycles and pedestrians. EV supply equipment with cable management is recommended to reduce risk in this situation.

On-street EV charging can be safely conducted where the parking is inset into a curbed area. In this example, additional pavement striping helps separate the vehicle from the traveled way.

Parking facilities use barriers such as curbs, wheel stops, railing, wall-mounted barriers, and bollards to protect property and equipment. These barriers also help define the separation between parking and other uses such as landscaping and pedestrian spaces.

Wheel stops are widely used barriers, especially along parking lot perimeters. Some EV charging stations introduce wheel stops to a parking facility to protect the EV supply equipment. They are economical to install but have disadvantages such as being a potential tripping hazard and adding to maintenance cost by making sweeping or snow removal more difficult.

During charging station installation, existing wheel stops may need to be removed or replaced by shorter wheel stops to create adequate access for persons using wheel chairs or walkers.



Barriers can be designed to provide turnaround space for wheel chairs

Parking facility designers minimize potential tripping hazards of all types both to protect the public but also to reduce liability claims. Compared to wheel stops, bollards create very little tripping hazard. However, they are comparatively more costly to install. Where bollards are used at charging stations, they should be placed a minimum of 3 feet apart – but less than 5 feet apart to block vehicles.

The City of Bellevue, Washington has installed wall-mounted barriers at a number of charging stations to provide an effective way to protect EV supply equipment without adding barriers at the floor level.[7]

Wall-mounted barriers offer an alternative to wheel stops and bollards

[7] Luettgen, Kim. (2012, June). Personal Communication. City of Bellevue Facilities Operations Specialist.

4.2 LANDSCAPING

The location and type of landscaping helps define pedestrian movements, and thus influences charging station siting and design. Shrubby landscaping to the front or side of a parking stall can orient pedestrian travel towards the rear of the vehicle. Conversely, lawns can attract activity.

Landscaping adjacent to surface parking offers places to install EV supply equipment without disrupting adjacent sidewalks and pavement. However an assessment should be conducted to select a site where roots vital to mature trees and bushes will not be damaged.

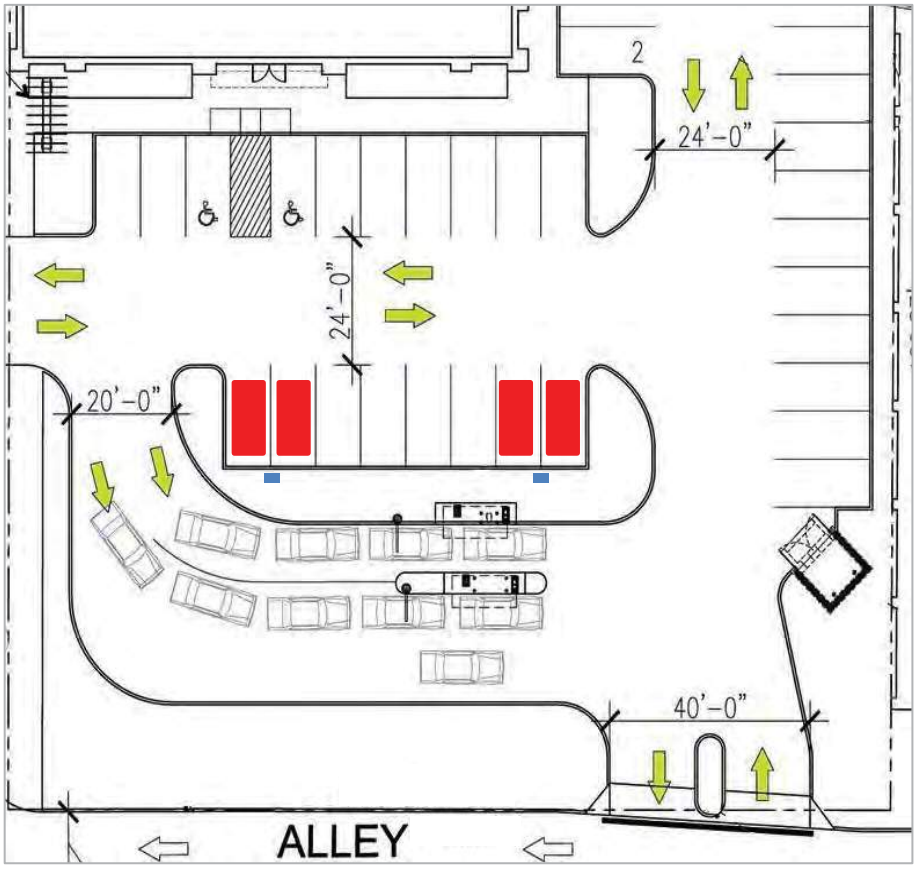
EV supply equipment can reach two parking stalls (Photo courtesy of Capital District Transportation Committee)

Where perpendicular parking stalls face into landscaping, some local development and zoning codes allow the first 2-3 feet beyond a continuous curb to be considered part of the parking space. In these cases, the appropriate setback for EV supply equipment needs to be modified. Bollards or wheel stops may be needed to protect the EV supply equipment from encroaching vehicles.

EV supply equipment placed in landscaping at Durham NC's south regional library
(Photo courtesy of Robert Shuler, North Carolina Department of Insurance).

4.3 PARKING AISLES

Once vehicles enter a parking facility, they circulate using parking aisles. To fit an EV charging station into existing parking, designers seek sites that avoid unsafe encroachments into parking aisles.



Charging stations for parking marked in red would preserve parking aisle width and not interfere with pedestrian circulation

Local code typically specifies acceptable widths for design of parking aisles. They are sized to create a safe space for drivers to safely back out of the stalls and provide adequate distance behind parked vehicles to reduce conflicts with traveling vehicles.

Parking aisles also serve as informal pathways for pedestrians and for loading and unloading activities. For this reason, factors such as site distance and aisle width need to be checked as part of designing EV charging stations.

Standard design widths for parking aisles are greatest where the parking angle is 90 degrees and traffic flows in both directions. Parking aisle width is narrowest for parking at acute angles (30 degrees, for example) where traffic is flowing in only one direction.

4.4 PEDESTRIAN FACILITIES

The best facility designs separate pedestrian activities from traffic to minimize conflict points and increase safety. Existing sidewalks, paths, and informal walking routes should be identified for protection prior to designing a charging station.

Some charging station installations site EV supply equipment and signs on an existing sidewalk. This can only be safely accomplished if the sidewalk is wide enough to accommodate the equipment and safe pedestrian clearance. The equipment, the attached cables, and the signs all need to be placed so that they are not unsafe obstacles or tripping hazards. Designs should never have cables cross designated walkways. Consideration should be given to tripping hazards for pedestrians moving from adjacent parking to the sidewalk.

Adequate sidewalk width should be maintained for passing pedestrians and wheel chairs. Federal guidelines specify that a minimum clear width for a wheelchair is 36 inches, pinching down where necessary to 32 inches for distances of less than 24 inches. Applicable building codes address sidewalk width standards that can be stricter than this federal rule.

Creating an ADA-accessible charging station requires identification of the shortest accessible route from EV charging to the destination. The identified route should try to take advantage of each site's design strengths and improve or avoid design flaws.

The best parking facility designs separate pedestrian routes from traffic

4.5 PARKING STRUCTURES

Parking structures stack parking in a compact footprint that often reduces the average distance from parking to a destination.

Parking structures not only protect EV charging stations from weather, but also create opportunities for cost-effective installations. Charging stations can be located near an electrical room, an existing electrical panel, or elevators where existing power and available conduits may be located. Installation of new conduit is most efficiently done by surface mounting onto walls, beams or ceilings. Wall-mounted charging stations with surface-mounted conduit tend to be the most cost-effective.

Ceilings offer some installation advantages. Ceiling beam-mounted conduit can avoid vehicular damage by being mounted near the wall. Ceiling-mounted EV supply equipment, as shown in Section 2, avoids tripping hazards that could be caused by cables lying on the floor.

Ceiling-mounted conduit located near wall

Parking structures typically have floors composed of reinforced concrete. Installation costs rise when new conduit requires boring through structural elements. Parking structures with structural steel embedded within the concrete can be evaluated by using ground penetrating radar to reveal locations of conduit, rebar, and post-tension cable.

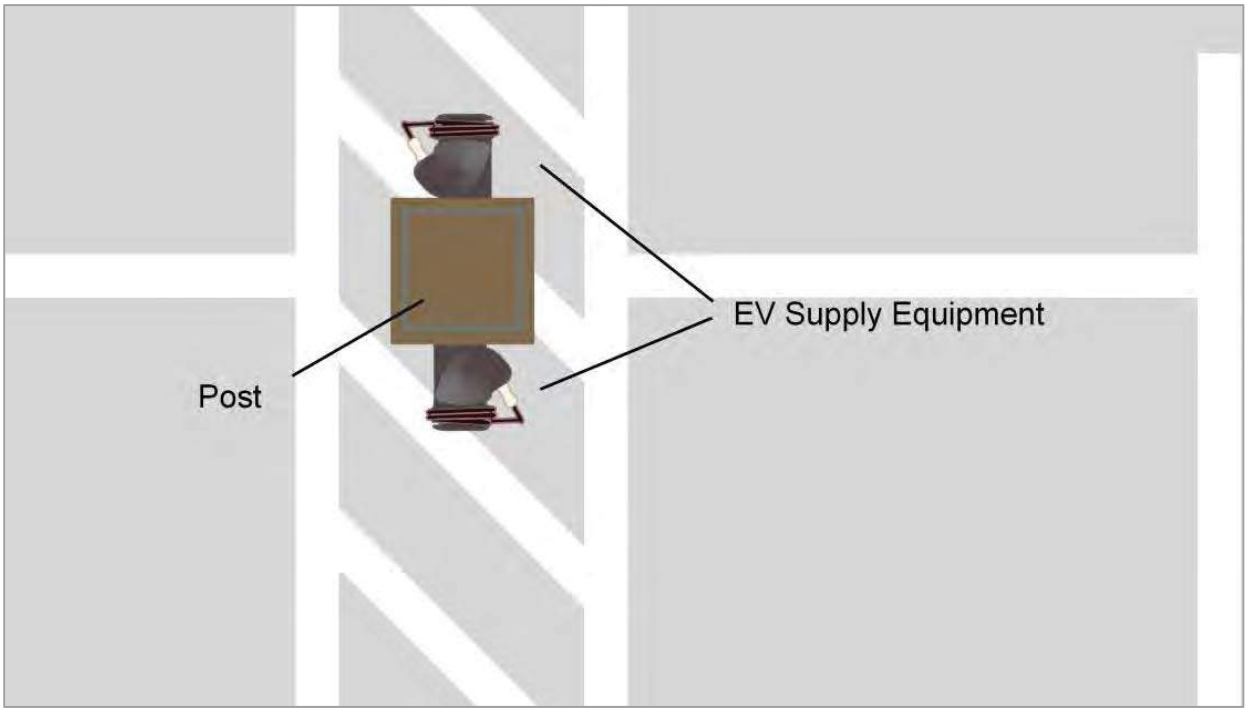
Existing ADA-compliant parking near elevators

Parking in basements creates the greatest difficulty for reliable communications for networked EV supply equipment because the surrounding structure blocks wireless signals.

Parking structures commonly have parking stalls on sloping ramps. If the charging station is intended to be accessible for persons with disabilities, it should avoid sloping areas and be installed at level parking spaces (less than 2 percent slope in all directions). Existing ADA-accessible parking is usually located in such spaces adjacent to elevators.

Posts and poles can provide good opportunities for mounting a charging station. Posts and poles often have buffer space or barriers that would also protect EV supply equipment attached to, or adjacent to them. The EV supply equipment should be oriented so that the post protects the equipment from adjacent parking. In some cases, there is no need for additional protection such as bollards or wheel stops.

This installation inset between posts includes no wheel stops or bollards



EV supply equipment oriented so that buffer between parking stalls protects both the post and the equipment

Functional needs of parking areas change over time. Parking structures older than the 1970s were created for larger vehicles and many now have underutilized areas within the facility where EV charging stations can be sited without interfering with other activities.

Former drive-up ATM converted to EV charging

Charging station added to hotel entrance
(Photo courtesy of Capital District Transportation Committee)

Structures that are not built as parking infrastructure can also be adapted for EV charging – places such as the covered entrance of a building or a free-standing solar canopy.

Solar canopy with EV supply equipment

4.6 ELECTRIC AND CELLULAR INFRASTRUCTURE

ELECTRIC INFRASTRUCTURE

From left to right: (1) pole-mounted transformers; (2) surface-mounted transformer and electrical panels; (3) circuit breakers in electrical panel

Electric infrastructure at a parking facility may consist of:

- Utility-owned electric distribution cables located underground in conduit or overhead on utility poles.
- Utility-owned and privately-owned transformers. Transformers are typically located at ground level or on utility poles.
- Utility-owned electrical meters.
- Electrical panels and electric cables that distribute electricity across the site.

Choices for connecting to electric power include opening a new service with the utility (including a new meter) or using an existing meter with a new or existing electrical panel. If a new electrical panel is not already being planned as part of the EV charging station installation, existing infrastructure will need an electrical load study to determine if it has adequate capacity for the EV supply equipment. A professional licensed electrician working with the local utility can evaluate the service load and adequacy of existing infrastructure to support the EV charging station installation. Upgrades could require a new electrical panel or transformer.

Installation of an EV charging station typically requires a dedicated cable in conduit from an electrical panel to the EV supply equipment. Level 1 and Level 2 EV supply equipment installations are most cost-effective if the service load evaluation supports using an existing electrical panel and the charging station can be located nearby.

COMMUNICATIONS

Parking facilities vary in terms of available communications. Many of the functions that EV supply equipment perform depend upon communications between the equipment and a network service. The three methods for communication relevant to EV charging stations are Wi-Fi, cellular, and Ethernet.

Cellular modem for group of EV charging stations

Most EV supply equipment are designed with a number of potential communication pathways since the equipment is be used in a variety of settings. Residential installations of Level 2 EV supply equipment can connect to the internet using Wi-Fi or a personal area network protocol that communicates with an existing home area network.

Public and commercial EV supply equipment can connect to an internet provider through a local area network; however, most of commercial charging stations use cellular technology to become networked. A cellular wireless modem can establish connections with many charging stations using either Wi-Fi or a personal area network technology and then route the data to a network service. Groups of EV supply equipment installed at the site can use mesh communication technologies to better ensure correct data transmission to the modem. With mesh, EV supply equipment located in the same area receive and re-transmit data among the group. Units farthest from the main cellular modem need only to transmit their data to other nodes that can communicate with the modem. As an example, the ChargePoint[8] network technology uses mesh technology to group up to 25 EV supply equipment with a single modem.[9]

Directional antenna sends data from remote parking location

Adequacy of signal strength can be readily checked in parking structures and in underground garages where effective transmission can be difficult. If impenetrable

[8] ChargePoint is a national EV charging network that offers a variety of services.

[9] DiNucci, Mike. (2012, April). Personal Communication. Coulomb Technologies.

surfaces interfere with the wireless signals, signal repeaters or amplifiers can be installed to extend the radio frequency signal. Ethernet cable might be necessary to extend the signal to a location with strong, reliable signal quality.

It may be desirable to communicate to a network from a remote outdoor location. Additional hardware such as a directional antenna and a repeater usually can improve reliability of data transfer in these situations.

Steps can be taken to minimize the need for signal repeaters, including:

- Test signal strength at several alternative charging station sites.
- Locate equipment where physical barriers such as concrete walls will not block wireless service.
- Avoid locations near other electrical equipment known to interfere with signals, such as electric motors and fluorescent lights, and
- Install away from other wireless devices emitting the same signal frequency.

LIGHTING

Almost all parking facilities are designed with lighting. For safety, a minimum luminance of 0.2 foot-candles is recommended.[10,11] Locations where charging stations will be installed should be checked for night-time illumination levels between parked cars especially if the style of EV supply equipment being used has cables that extend along the ground between the EV supply equipment and the charging port on the vehicle. Dim lights and cables along the ground could create a tripping hazard.

Adequate lighting may also reduce vandalism of the EV supply equipment and theft of small EVs such as electric-assisted bicycles.

Area lighting for parking safety

[10] 1 foot-candle is the luminance cast on a 1-foot square surface by 1 lumen (originally defined as the light of one common candle).

[11] Batinsey, John. (2006). Outdoor Lighting Ordinance Guide. Found at http://www.nj.gov/dep/opsc/docs/Sample_Lighting_Ordinance.PDF

Lighting installed above EV charging station

Codes and standards of most local jurisdictions describe illumination requirements and restrictions on public and private property. Some business practices and ordinances require dimming of area lighting after close of business. This should be a factor in designing charging stations planned for 24-hour public access.

Some EV supply equipment includes lighting. Adding supplementary lighting could be as expensive as installing the EV charging station.

EV supply equipment that utilizes vacuum florescent display screens offer readable messaging under almost any lighting condition, including bright sunlight. However, some charging station screen types cannot easily be read in direct sunlight and should be shaded or sited such that they are facing away from direct sunlight.

4.7 SIGNAGE

To help the public, signs need to be well located, recognizable, and readable. Federal and local standards seek clarity and uniformity in use of words, symbols and colors. Almost all signs follow the rule of "one concept per sign."

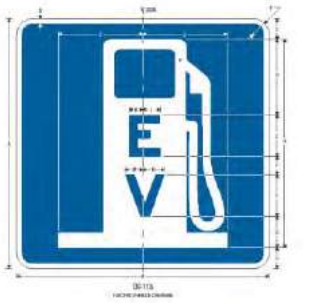
Uniform Sign Colors

Red:	***Stop or Prohibition***
Green:	***Guidance, Permissive Activities***
Blue:	***Services, Information***
Black/White:	***Regulatory***

"One concept per sign" installation

Federal Regulations specify the Manual on Uniform Traffic Control Devices (MUTCD)[12] as the national standard for signage used to inform people using public right-of-way and private roads open to public travel. MUTCD includes standards on lettering height, the size of the sign, and mounting heights based upon distance from the viewer and assumed traveling speed. These regulations are not required in parking areas including parking aisles. A number of EV-related signs in use are not consistent with MUTCD signage standards including color-coded messaging.

The MUTCD has a standard sign for identifying EV charging stations. In 2011, the Federal Highways Administration agreed to an interim alternate to that standard and will grant jurisdictions approval to use it upon written request. A state may request approval to use the alternate symbol for all jurisdictions in that state.[13]



charging station symbol

MUTCD alternate symbol

Way finding sign at freeway off-ramp

Way finding signs that direct drivers to EV charging stations are best placed where they are easily seen but will not cause safety issues by blocking an important view or creating a hazardous barrier.

Signage at a charging station helps identify parking stalls associated with EV charging and inform persons about the rules associated with parking there. Signs inform drivers on topics such as identification of EV charging stations, parking restrictions, and

[12] FHWA. (2009). Manual on Uniform Traffic Control Devices for Streets and Highways 2009 Edition.

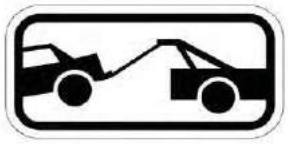
[13] Lindley, Jeffrey A. (2011, April). MUTCD – Interim Approval for Optional Use of an Alternative Electric Vehicle Charging General Service Symbol Sign. FHWA Memorandum to Federal Lands Highway Division Engineers and Division Administrators.

enforcement, such as towing. To avoid confusion, each parking stall should have signage. Local regulations often determine sign placement and other standards.

Signs from left to right: (1) Identifies EV charging station; (2) EV permit required; (3) restricts parking space to EVs only
(middle and right photos courtesy of Greater Long Island Clean Cities Coalition)

EV charging station marked with paint

While MUTCD sign standards are not required in parking facilities, the use of these readily recognizable symbols is recommended.



MUTCD standard for tow-away signage

Some designers of EV charging stations add to signage by painting the entire charging station space a separate color in order to distinguish it from regular parking.

An important factor with designing sign installations is to not place the sign in the path of pedestrians or ADA-accessible aisles where it could create a hazardous barrier. At pedestrian pathways in the street right-of-way, the MUTCD requires a vertical clearance of at least 7 feet to the bottom of a sign.

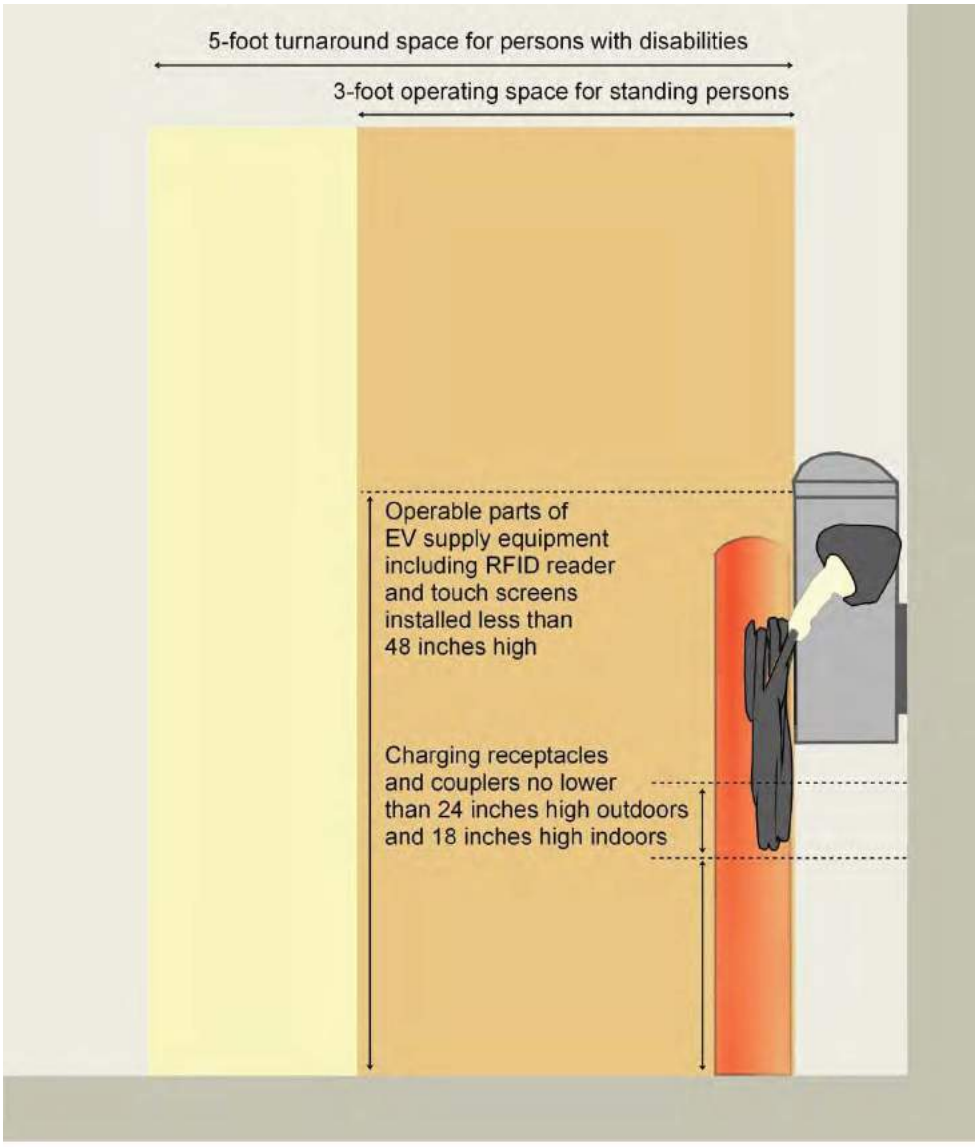
Directional sign in parking garage (Photo courtesy of Greater Long Island Clean Cities Coalition)

5 EV CHARGING STATION DESIGNS

The following section builds upon best practices from installations across the U.S. to provide sample layouts of EV charging stations. These designs, which use national standards, are available to be adapted to local specifications. Layouts that are accessible for persons with disabilities will be noted.

5.1 CHARGING STATION PROFILE

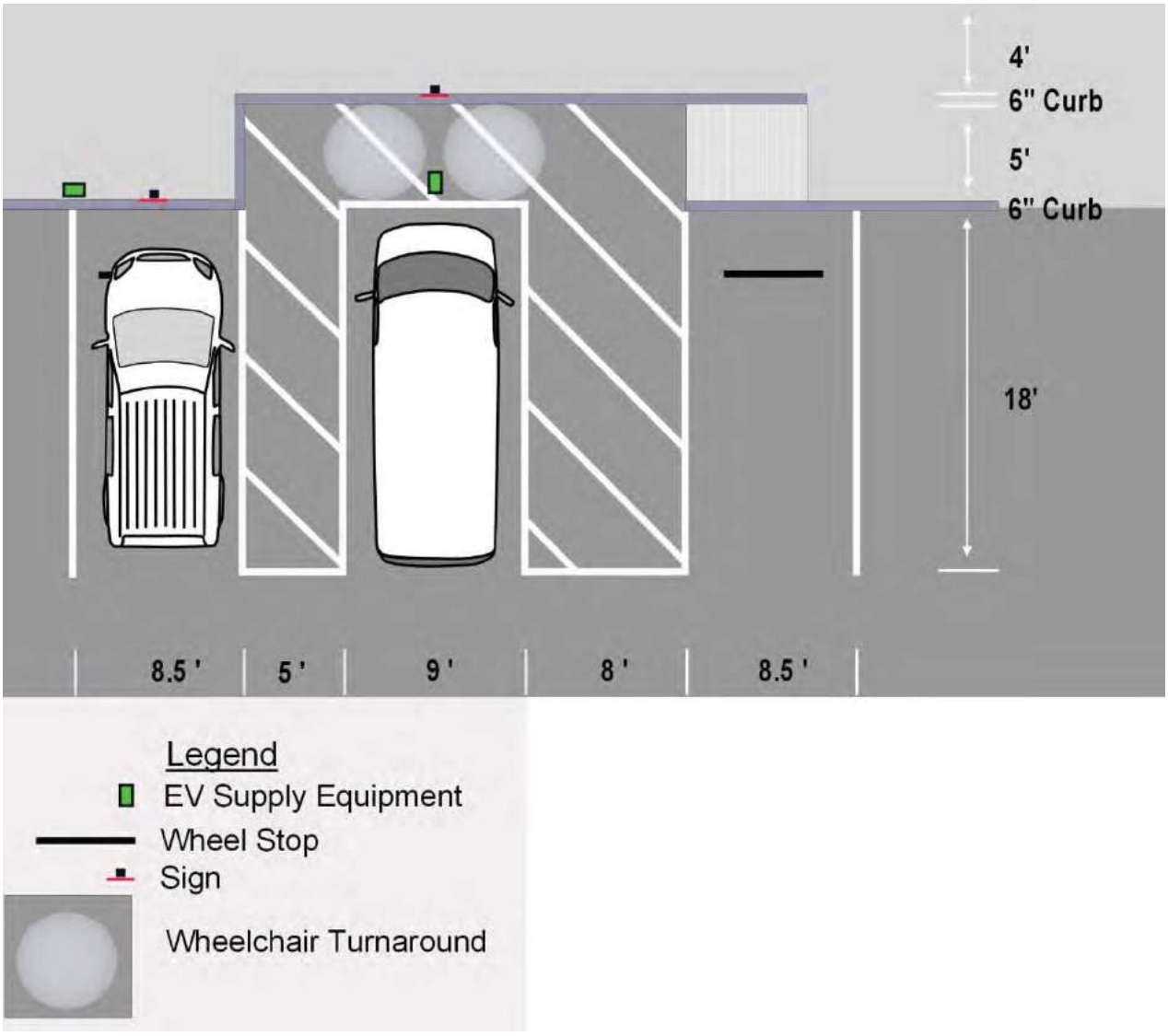
The side view of a charging station depicted below features wall-mounted EV supply equipment. Measurements are derived from federal ADA standards and the National Electric Code Article 625.



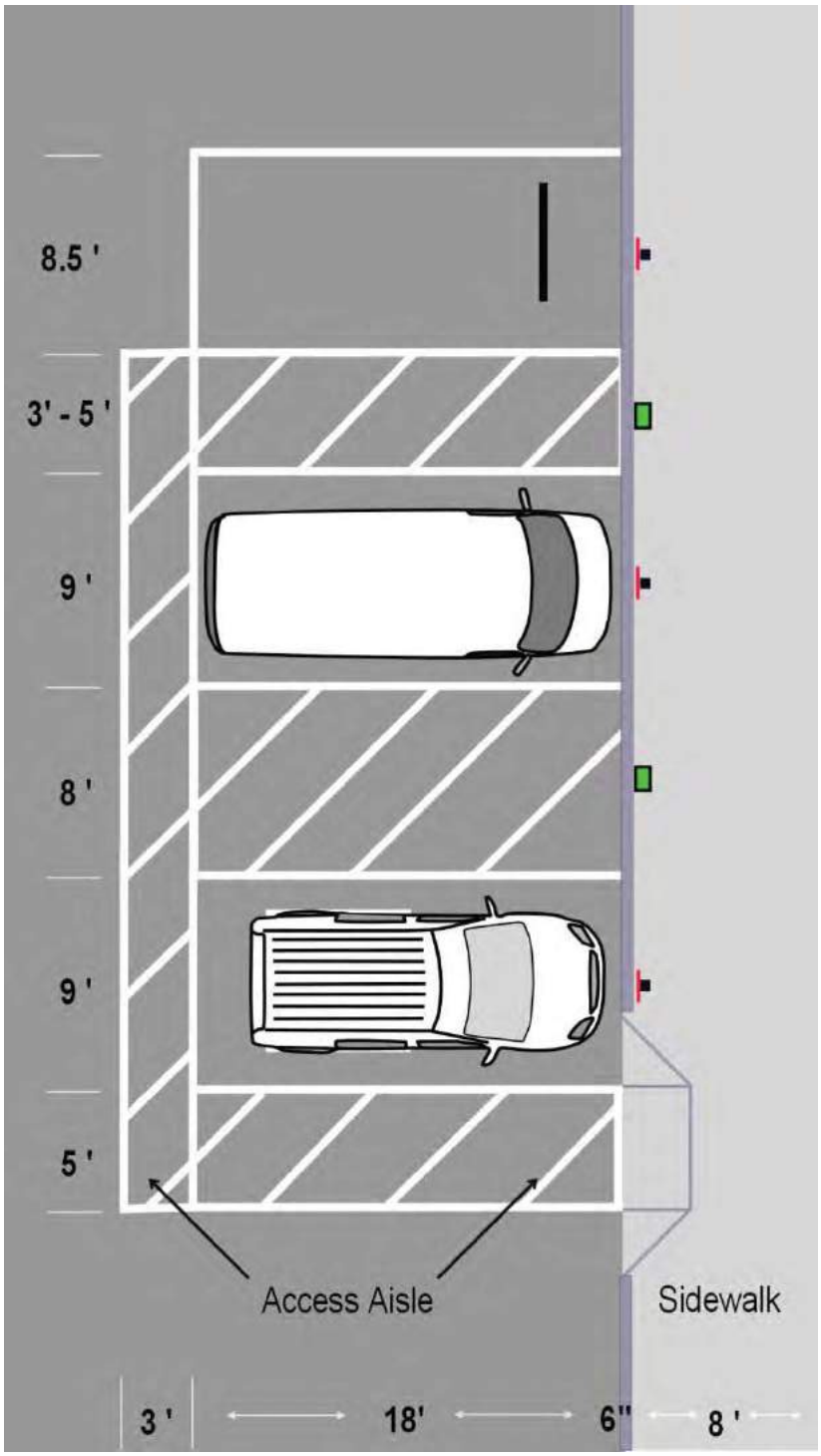
5.2 CHARGING STATION LAYOUTS

This design shows two charging stations. The charging station on the right is ADA-van accessible. The charging station left of the van space is not fully ADA-accessible.

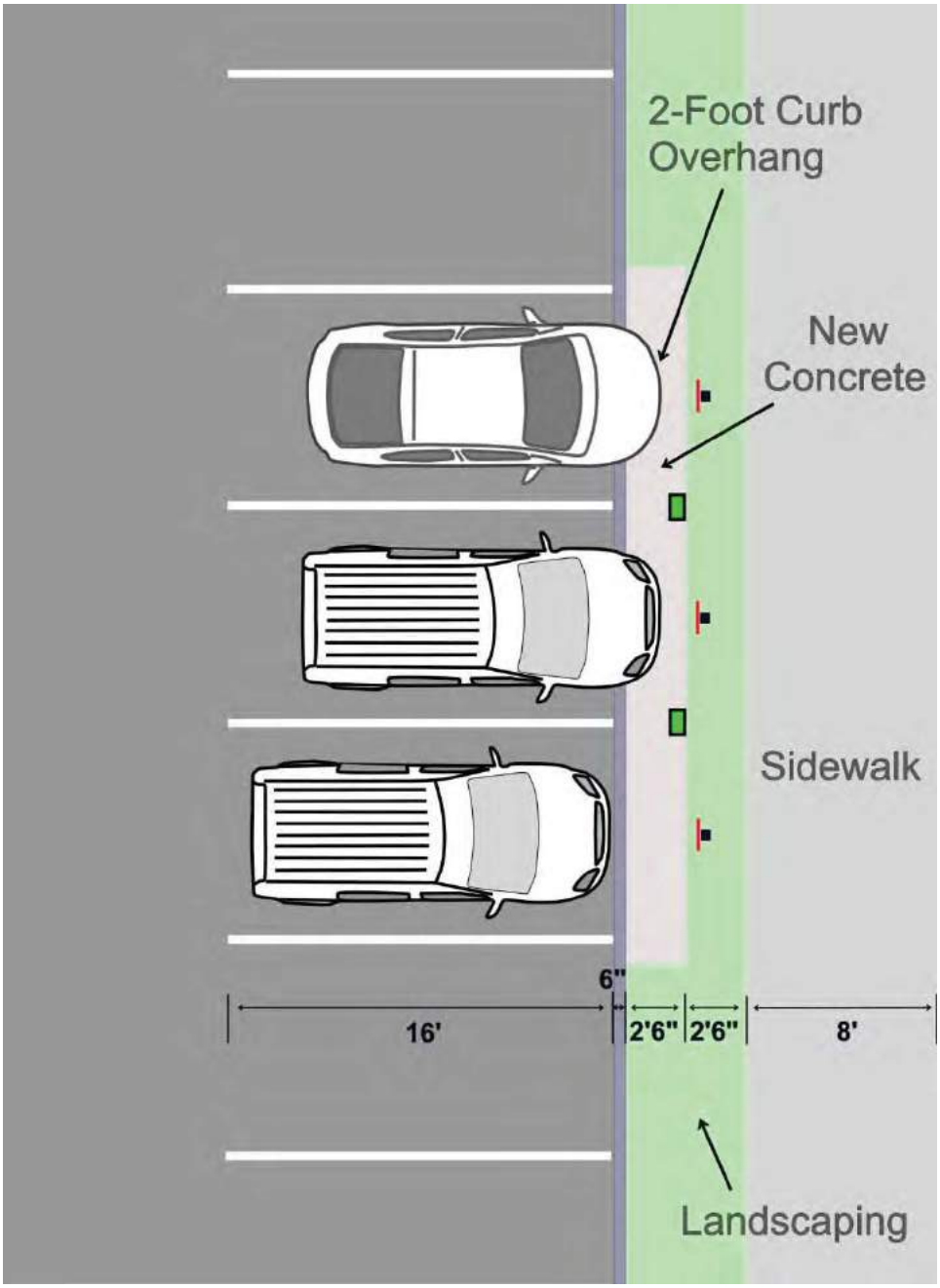
The van-accessible charging station has wheelchair access to the front and sides of the vehicle. An accessible ramp leads to the sidewalk. The EV supply equipment is oriented sideways in front of the parking stall to facilitate use by a person in a wheelchair. Circular turnaround space for a wheelchair is indicated on both sides of the EV supply equipment.



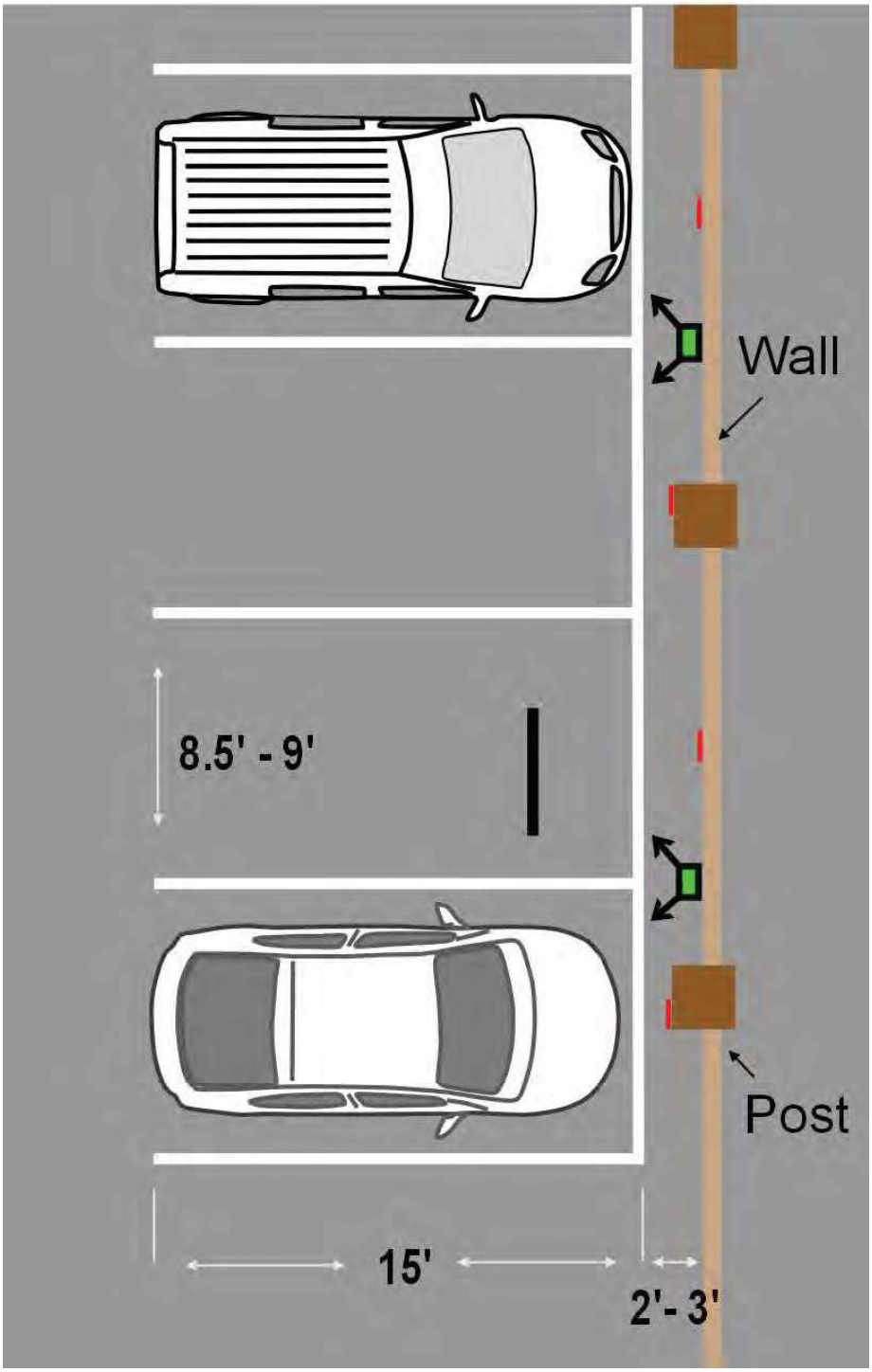
Wheelchair access to the rear of the parking stalls is illustrated in this ADA-accessible charging station layout. The access aisle is clearly marked and connects to the sidewalk by an accessible ramp. Striped areas at the sides of the vehicles are for moving in and out of the vehicle and using the charging cable. Curbs separate these areas from the sidewalk to discourage their use as access aisles connecting to the sidewalk.



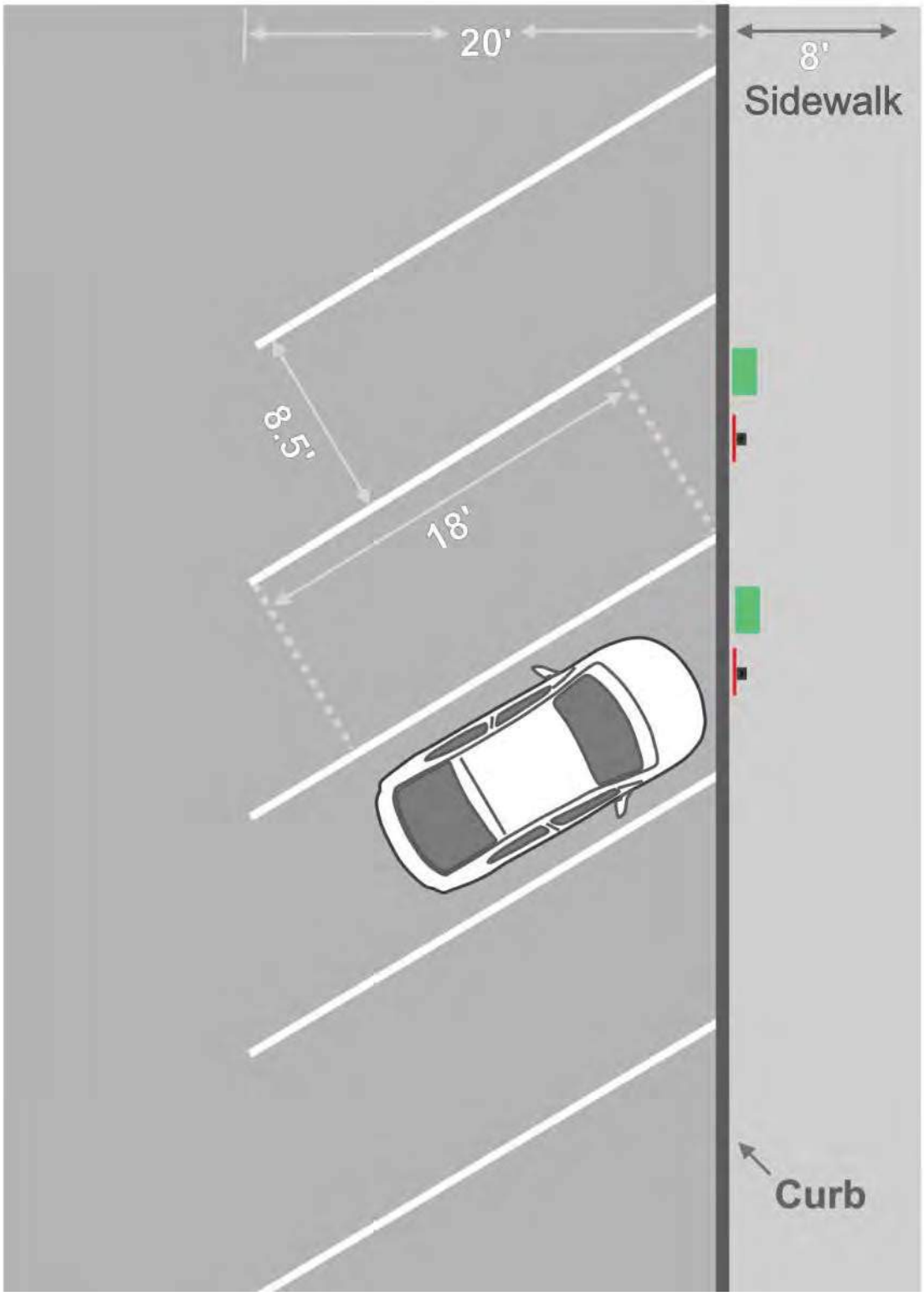
Multi-unit housing often has landsaping between parking and sidewalks. In the scenario shown below, the parking lot designer used short, 16-foot long parking stalls and assumed that vehicles would overhang the curb by up to 2 feet. This eliminates the need for wheel stops. The charging station includes a new concrete pad set behind the curb. Parking vehicles can avoid the EV supply equipment and users can safely maneuver in front of the vehicles. Electrical conduit to the charging station can be placed beneath the landsaping. Set the signs 7 feet high to reduce potential for injury.



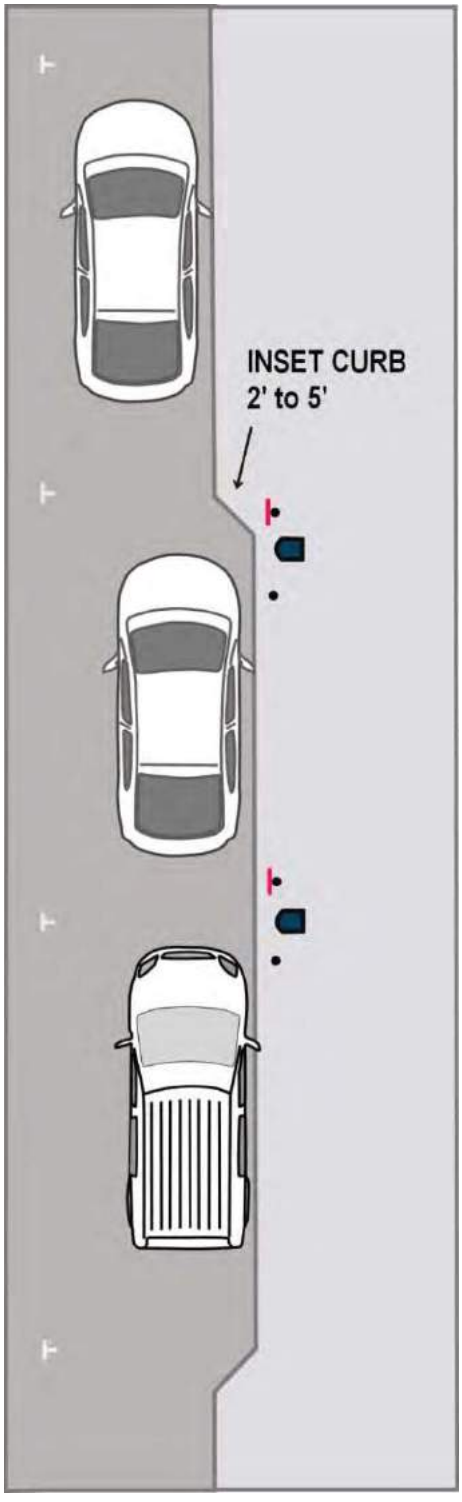
Parking structures constrain options for charging station installation. However, posts along walls sometimes create buffer areas for wall-mounted EV supply equipment. This design locates the equipment between parking stalls to maximize access and protection. Wheel stops are only needed where the posts do not adequately protect the EV supply equipment.



At angled parking, EV supply equipment should be placed where it can best take advantage of the triangular space in front of the parking stall. Wheel stops and bollards may not be necessary if the curb adequately functions as a barrier.



The following example for parallel parking creates a buffer between the parked EV and passing vehicles. This design can only be executed where sidewalk width is adequate. Behind the EV supply equipment, the sidewalk needs to maintain adequate width to accommodate use by persons with disabilities. This design shows bollards placed on both sides of the EV supply equipment so that it can be located close to the curb.



6 CONCLUSION

Site Design for Electric Vehicle Charging Stations offers context for how to design EV charging stations in a variety of parking facility types. It provides background on the underlying parking facility design and function. Additionally, it demonstrates how to create convenient and safe charging stations.

Every charging station design will offer a different set of issues. The design templates shown in Section 5 provide examples that can be adapted to address a range of physical conditions.

For further information regarding this report and access to other information on siting and designing charging stations, visit www.sustainabletransportationstrategies.com or contact David Mayfield at 503-701-0142.

07 APPENDIX

Ten Ways to Manage Roadway Access in Your Community

Ten Ways to Manage Roadway Access in Your Community

Ten Ways to Manage Roadway Access in Your Community

Costly improvements are not always the solution to safety and congestion problems. Roads, like other resources, also need to be carefully managed. Corridor access management strategies extend the useful life of roads at little or no cost to taxpayers. Following are ten ways that you can make the most out of your transportation system.

1

Lay the foundation for access management in your local comprehensive plan.

To assure that your roadways are managed properly, your comprehensive plan needs to address certain key issues. *First*, include goals, objectives, and policies related to access management in the plan. Tailor policy statements to advance the access management principles in this brochure. For example, a policy could be adopted promoting interconnection of adjacent developments along major roadways.

Second, make sure that your local transportation plan classifies roadways according to function and desired level of access control. This hierarchy of roadways is reinforced through roadway design and access standards in your land development code. For example, arterials require a much higher level of access control and different design standards than collectors or local streets. Some roadways require special attention because of their importance, the need for additional right-of-way, or due to significant access problems. These areas may be designated for special treatment in the comprehensive plan.

Third, provide for a greater variety of street types with varying design standards. Options could include access lanes, alleys, variations in on-street parking, and so on. This reduces development costs, promotes compact development, increases opportunities to interconnect streets, and helps save your major thoroughfare system. Many communities have only a few residential street design options that apply whether a subdivision has 8 homes or 80. Lack of design flexibility impedes infill development and results in a monotonous street layout. It can also cause a proliferation of substandard and inadequately maintained private streets.

2

Restrict the number of driveways per lot.

Establish a basic requirement that driveways are limited to one per parcel, with special conditions for additional driveways. Lots with larger frontages, or those with needs for separate right and left-turn entrances, could be permitted more than one driveway, in accordance with driveway spacing standards. Limitations on new driveways may be established using a "corridor overlay" approach, which adds new requirements onto the underlying zoning (see Figure1). It is necessary to first identify and map the boundaries of all existing lots and parcels along the corridor. Then you could assign one driveway to each mapped parcel by right. This land may be further subdivided, but all new lots would need to obtain access from the existing access point.

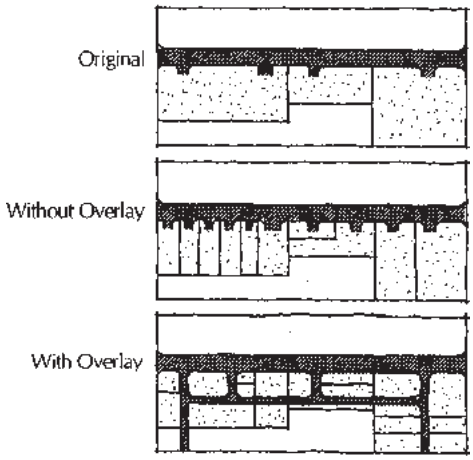


Figure 1. Corridor overlay

3

Locate driveways away from intersections.

Setting driveways and connections back from intersections reduces the number of conflicts and provides more time and space for vehicles to turn or merge safely across lanes. This spacing between intersections and driveways is known as corner clearance. Adequate corner clearance can also be assured by establishing a larger minimum lot size for corner lots. You could impose conditional use limitations where adequate corner clearance cannot be obtained. This helps assure that corner properties do not experience access problems as traffic volumes grow.

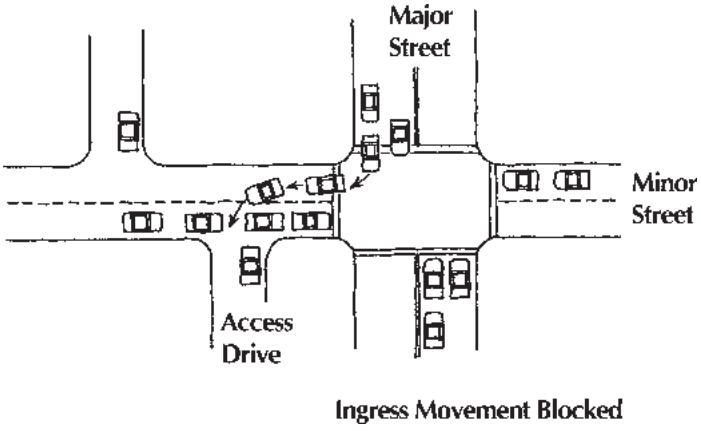


Figure 2. Inadequate corner clearance.

4

Connect parking lots and consolidate driveways.

Internal connections between neighboring properties allow vehicles to circulate between businesses without having to re-enter the major roadway (see Figures 3 and 4).Joint and cross access requirements in your land development code can help to assure connections between major developments, as well as between smaller businesses along a corridor.

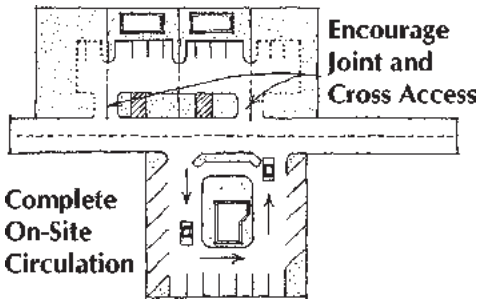


Figure 3. Joint and cross access.

Cross access also needs to be provided for pedestrians. Sidewalks are typically placed far away from buildings on the right-of-way of major roadways, or are not provided at all. Pedestrians prefer the shortest distance between two points and will walk if walkways are provided near buildings. Joint and cross access strategies help to relieve demand on major roadways for short trips, thereby helping preserve roadway capacity. They also help to improve customer convenience, emergency access, and access for delivery vehicles.

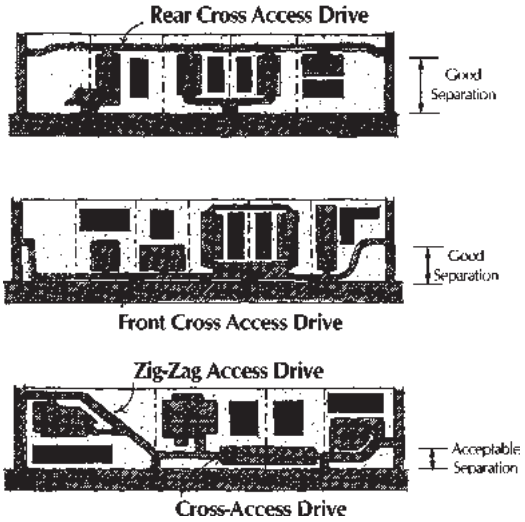


Figure 4. Cross access.

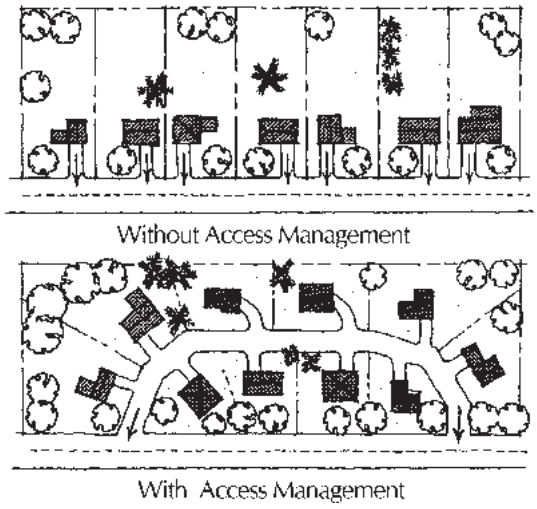


Figure 5. Shared access.

5

Provide residential access through neighborhood streets.

Residential driveways on major roadways result in dangerous conflicts between high-speed traffic and residents entering and exiting their driveway. As the number of driveways increase, the roadway is gradually transformed into a high speed version of a local residential street. Subdivisions should always be designed so that lots fronting on major roadways have internal access from a residential street or lane (also known as "reverse frontage"—see Figures 5 and 6). Minor land division activity can be managed by establishing a restriction on new access points and allowing land to be further subdivided, provided all new lots obtain access via the permitted access point. A variation of this approach is to allow lot splits on major roadways only where access is consolidated. Another step is to prohibit "flag lots" along major thoroughfares. Some property owners subdi-

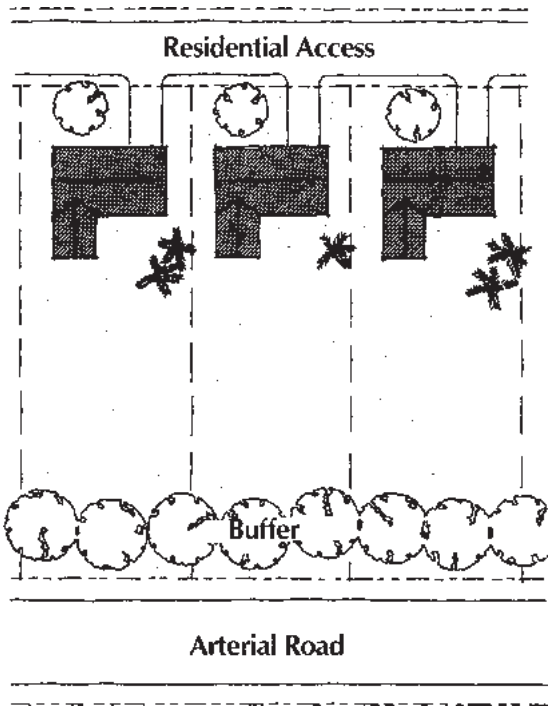


Figure 6. Reverse Frontage

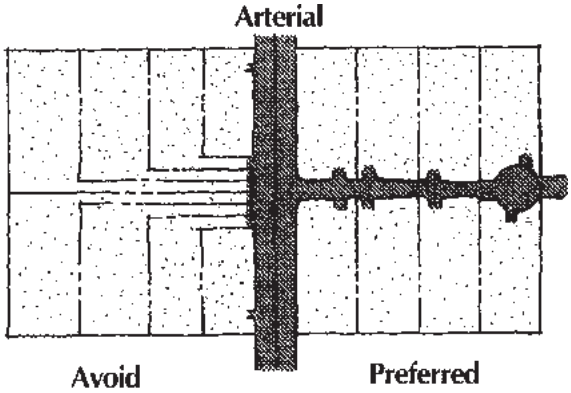


Figure 7. Avoid flag lots.

vide their land into lots shaped like flags to avoid the cost of platting and providing a road. Instead, the flag lots are stacked on top of each other, with the "flag poles" serving as driveways to major roads (see Figure 7). This results in closely spaced driveways that undermine the safety and efficiency of the highway. Eventually, residents may petition for construction of a local public road passing the cost of providing a subdivision road onto the community.

6

Increase minimum lot frontage on major roads.

Minimum lot frontages need to be larger for lots that front on major roadways, than those fronting on local roads. Narrow lots are a problem on major roads because they result in closely spaced driveways. Lots need to be deeper and wider along arterials to allow adequate flexibility in site design and to increase separation of access points (see Figure 8). Assuring an adequate lot size also protects the development potential and market value of corridor properties.

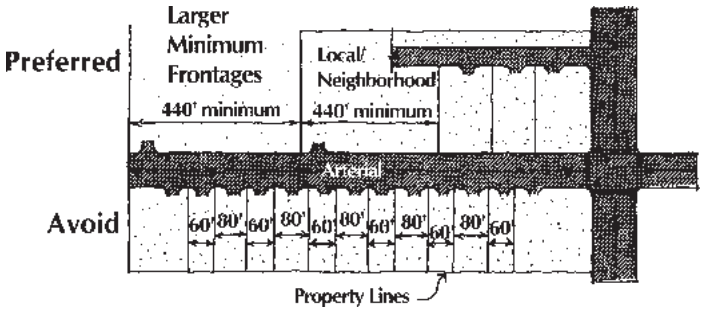


Figure 8. Lot frontage requirements.

7

Promote a connected street system.

As communities grow and land is subdivided for development, it is essential to assure continuation and extension of the existing local street system. Dead end streets, cul-de-sacs, and gated communities force more traffic onto collectors and arterials. Fragmented street systems also impede emergency access and increase the number and length of automobile trips. A connected road network advances the following growth management objectives:

- fewer vehicle miles traveled
- decreased congestion
- alternative routes for short, local trips
- improved accessibility of developed areas
- facilitation of walking, bicycling, and use of transit
- reduced demand on major thoroughfares
- more environmentally sensitive layout of streets and lots
- interconnected neighborhoods foster a sense of community
- safer school bus routes

Connectivity can be enhanced by a) allowing shorter blocks (600 ft.) and excluding cul-de-sacs from the definition of intersection; b) requiring stub streets to serve adjacent undeveloped properties; c) requiring street connections to nearby activity centers; d) requiring connections to

or continuation of existing or approved public streets; and e) requiring bicycle/pedestrian access-ways at the end of cul-de-sacs or between residential areas and parks, schools, shopping areas or other activity centers. It is also important to allow a greater variety of street types.

8

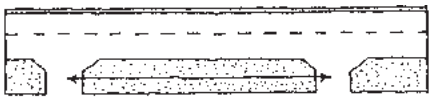
Encourage internal access to outparcels.

Shopping center developments often include separate lots or "outparcels" fronting on the major roadway. The outparcels are leased or sold to businesses looking for highly valued corridor locations. Access to these outparcels should be incorporated into the access and circulation system of the principal retail center. This reduces the need for separate driveways on the major road, while maintaining overall accessibility to the site. To accomplish this, establish that development sites under the same ownership or those consolidated for development will be treated as one site for the purposes of access management. Then require a unified traffic circulation and access plan for the overall development site.

9

Regulate the location, spacing, and design of driveways.

Driveway *spacing* standards establish the minimum distance between driveways along major thoroughfares (see Figure 9). These standards help to reduce the potential for collisions, as travelers enter or exit the roadway. They also encourage the sharing of access for smaller parcels, and can improve community character by reducing the number of driveways and providing more area for pedestrians and landscaping. The *location* of driveways affects the ability of drivers to safely enter and exit a site. If driveways do not provide adequate sight distance, exiting vehicles may be unable to see oncoming traffic. In turn, motorists on the roadway may not have adequate time to avoid a crash. Driveway *design* standards assure that driveways have an adequate design so vehicles can easily turn onto the site. Standards also need to address the depth of the driveway area. Where driveways are too shallow, vehicles are sometimes obstructed from entering the site causing others behind them to wait in through lanes. This blocks traffic and increases the potential for rear-end collisions.



Adopt minimum spacing standards for driveways

Reinforce with minimum lot frontage and joint access requirements

Figure 9. Driveway spacing standards.

10

Coordinate with the Department of Transportation.

The Florida Department of Transportation is responsible for access permits along state roadways. Local governments oversee land use, subdivision, and site design decisions that affect access needs. Therefore, State and local coordination is essential to effective access management. Lack of coordination can undermine the effectiveness of regulatory programs and cause unnecessary frustration for permit applicants.

Timely communication is key to an effective review procedure. Begin by establishing a coordinated process for review of access permits along state highways. The state per-

mitting official could have applicants send a copy of the complete permit application to the designated local reviewing official. Prior to any decision or recommendation, the state permitting official could then discuss the application with the local reviewing official.

Property owners also may be required to submit the necessary certificates of approval from other affected regulatory agencies, before a building permit is issued. In Florida, this should include a "notice of intent to permit" from the Florida Department of Transportation where access to the state highway system is requested.

An effective method of coordinating review and approval between developers and various government agencies is through a tiered process. The first stage is an informal meeting and "concept review" period, which allows officials to advise the developer about information needed to process a development application. This includes information on required state and local permits, and any special considerations for the development site.

The concept review provides the developer with early feedback on a proposal, before the preliminary plat or site plan has been drafted. Once the preliminary plan is drafted, it can be checked to determine if additional conditions are required for approval. The final plan that is formally submitted should then require only an administrative review.

Local governments could also request a response from the FDOT prior to approval of plats on the state highway system. Applicants could be required to send a copy of the subdivision application to the state access permitting official. This should occur early in the plat review process, preferably during conceptual review. Early monitoring of platting activity would allow the Department of Transportation an opportunity to identify problems and work on acceptable alternatives.

Intergovernmental agreements or resolutions can facilitate coordination between the state and local governments on access management. These tools can be used to clarify the purpose and intent of managing access along major thoroughfares, roadways that will receive special attention, and state and local responsibilities for advancing access management objectives.

Additional References

"Model Land Development Regulations that Support Access Management," Center for Urban Transportation Research, 1994.

Williams, K., Marshall, M. "Managing Corridor Development," Center for Urban Transportation Research, 1996.

Williams, K., Forrester, R., "NCHRP Synthesis 233: Land Development Regulations that Promote Access Management." Transportation Research Board, Washington, D.C.: National Academy Press, 1996.

Training Opportunities

"Access Management: Site Planning," FDOT 1997 (A Training Unit), available through Gary Sokolow.

"Land Development Regulations that Support Access Management," FDOT 1997 (A Training Unit), available through Gary Sokolow.

Visit our Web Page at:

http://www.cutr.eng.usf.edu

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08 APPENDIX

Benefits of Access Management

ACCESS SPACING

Signal Spacing

Signals Per Mile	Increase in Travel Time (%)
2	-
3	9
4	16
5	23
6	29
7	34
8	39

Increasing the distance between traffic signals improves the flow of traffic on major arterials, reduces congestion, and improves air quality for heavily traveled corridors. The appropriate spacing between signals for a particular corridor depends greatly upon the speed and flow of traffic, but anything greater than two signals per mile has a significant impact on congestion and safety.

A major synthesis of research on access management found that each additional signal over two per mile (i.e., a one-half mile signal spacing) increased travel time by over six percent. [4] A study of an intersection in Cincinnati where a signal was added found a 20 percent increase in peak travel times. [11]

A demonstration project in Colorado revealed that half mile signal spacing and raised medians on a five-mile roadway segment reduced total hours of vehicle travel by 42 percent and total hours of delay by 59 percent, compared to quarter mile signal spacing. [1]

Improved speeds and travel times translate directly into environmental benefits. An ongoing study in Texas found that a ten mile four-lane arterial with one-half mile signal spacing reduced fuel consumption by 240,000 gallons from increased speed and 335,000 gallons from reduced delay, compared to quarter mile signal spacing. [14]

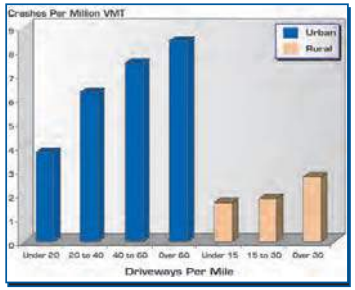
Signals Per Mile	Crashes Per Million VMT
Under 2	3.53
2 to 4	6.89
4 to 6	7.49
6 +	9.11

Increasing the distance between signals also reduces the incidence of crashes. A review of crash data from seven states demonstrated that the crash rate increased substantially with additional signals per mile. [4] This is partly related to access spacing, which is presented next.

Driveway Spacing

Appropriate driveway spacing presents another major access issue. Large numbers of driveways increase the potential conflicts on the road. Fewer driveways spaced further apart allow for more orderly merging of traffic and present fewer challenges to drivers.

The congestion impacts of reduced driveways are fairly clear. It is impossible for a major arterial or highway to maintain free flow speeds with numerous access points that add slow moving vehicles. A research synthesis found that roadway speeds were reduced an average of 2.5 miles per hour for every 10 access points per mile, up to a maximum of a 10 miles per hour reduction (at 40 access points per mile). [4] With higher numbers of access points, congestion will increase significantly.



An overabundance of driveways also increases the rate of car crashes. An examination of crash data in seven states indicated found a strong linear relationship between the number of crashes and the number of driveways. Rural areas had a similar, but less strong relationship. [4,7]

RELATED TECHNIQUES

Access management includes more techniques than can be discussed in a single brochure. Some of these techniques are newer and have been researched somewhat less. Frontage roads have been the subject of some debate in the literature, but there is no clear indication of their benefits. Other techniques, such as the relationship between highway interchange spacing and local traffic, are new topics that require more research.

Many cities and states develop access management programs to deal with existing issues of congestion and safety. An active access management program, however, would need to include changes to local land use policies that encourage the rational development of major roads. In newly developing areas, land use and zoning controls that limit the number of access points and leave space for median improvements can save money and effort as these areas develop.

TURNING LANES

Left Turns

Exclusive turning lanes for vehicles remove stopped vehicles from through traffic. Left-turn lanes at intersections substantially reduce rear-end crashes. A major synthesis of research on left-turn lanes demonstrated that exclusive turn lanes reduce crashes between 18 to 77 percent (50 percent average) and reduce rear-end collisions between 60 and 88 percent. [4]

Left-turn lanes also substantially increase the capacity of many roadways. A shared left-turn and through lane has about 40 to 60 percent the capacity of a standard through lane. [4]. A synthesis of research on this topic found a 25 percent increase in capacity, on average, for roadways that added a left-turn lane. [13]

Indirect Turns

Some of the biggest issues with managing access come at intersections where vehicles must cross traffic. Some states and cities have adopted indirect turns to reduce these conflicts. In New Jersey, the jug-handle left turn requires a right turn onto a feeder street, followed by a left onto a cross street. Detroit has extensively used an indirect U-turn that requires a U-turn past an intersection, followed by a right turn instead of a regular left turn.

Like dedicated left-turn lanes, indirect turns reduce crashes, improve congestion, and add capacity. Crashes decline by 20 percent on average, and 35 percent if the indirect turn intersection is signalized. Capacity typically shows a 15 to 20 percent gain. [4]

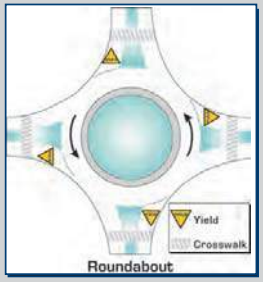
Right Turns

Right-Turning Vehicles Per Hour	Through Vehicles Impacted (%)
Under 30	2.4
31 to 61	7.5
61 to 90	12.2
90 and up	21.8

Right-turn lanes typically have a less substantial impact on crashes and roadway capacity than other types of turn strategies, because there are fewer limitations on right turns. Though there are fewer studies of these impacts, there is a clear relationship between the number of vehicles attempting a right turn in a through traffic lane and its delay to through traffic. This relationship is exponential – each additional car that must wait for a right turn will increase the delay more than the previous car. At intersections with substantial right-turn movements, a dedicated right-turn lane segregates these cars from through traffic and increases the capacity of the road.

Roundabouts

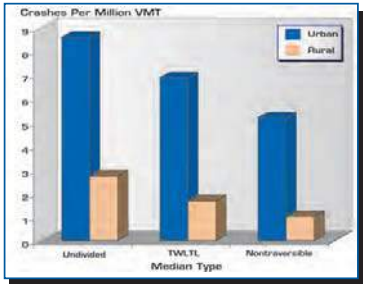
Roundabouts represent a potential solution for intersections with many conflict points. Though not appropriate for all situations, roundabouts reduce vehicle movements across traffic. Only a few studies have examined the safety benefits of roundabouts. One study of four intersections that were replaced with roundabouts in Maryland found a drop in crashes between 18 and 29 percent and a reduction in injury crashes between 63 and 88 percent. The cost of crashes at these locations – one measure of severity – was also reduced by 68 percent. Overall crashes on roundabouts were more minor than those at left turn locations. [9] Another study of roundabouts in several locations found a 51 percent reduction in crashes, including a 73 percent reduction in injury crashes and a 32 percent reduction in property-damage-only crashes for single-lane roundabouts. Multi-lane roundabouts only experienced a 29 percent reduction in crashes. [6]



MEDIAN TREATMENTS

Medians

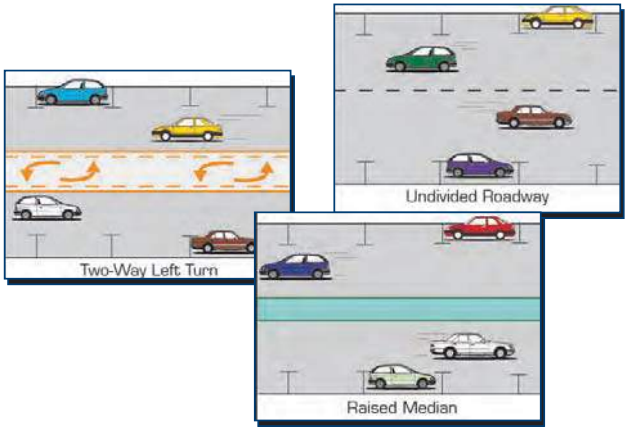
Median treatments for roadways represent one of the most effective means to regulate access, but are also the most controversial. The two major median treatments include two-way left turn lanes (TWLTL) and raised medians.



The safety benefits of median improvements have been the subject of numerous studies and syntheses. Studies of both particular corridors and comparative research on different types of median treatments indicate the significant safety benefits from access management techniques. According to an analysis of crash data in seven states, raised medians reduce crashes by over 40 percent in urban areas and over 60 percent in rural areas. [4]

A study of corridors in several cities in Iowa found that two-way left-turn lanes reduced crashes by as much as 70 percent, improved level of service by one full grade in some areas, and increased lane capacity by as much as 36 percent. [5]

Raised medians also provide extra protection for pedestrians. A study of median treatments in Georgia found that raised medians reduced pedestrian-involved crashes by 45 percent and fatalities by 78 percent, compared to two-way left-turn lanes. [12]



Business Concerns

Installing raised medians often raises serious concerns by the business community that local businesses that depend upon pass-by traffic (especially gas stations and fast-food restaurants [10]) will be adversely affected by medians. Though there are few studies of the actual impacts of medians on business sales, there are several surveys of business owner opinions. Surveys conducted in multiple corridors in Texas, Iowa, and Florida demonstrate that the vast majority of business owners believe there have been no declines in sales, with some believing there are actually improvements in business sales. [2,5,8] One study in Texas indicated that corridors with access control improvements experienced an 18 percent increase in property values after construction. [2]

Location	Owners Report No Decline in Business (%)
Texas (2)	93
Texas (3)	78 to 84
Iowa (5)	67 to 91

PURPOSE OF THE BROCHURE

This brochure serves as a guide to the major benefits of several access management techniques in use across the United States. The purpose of this brochure is to provide a comprehensive and succinct examination of the benefits of access management and address major concerns that are often raised about access management.

The benefits usually identified with access management include improved movement of through traffic, reduced crashes, and fewer vehicle conflicts. Most major concerns about access management relate to potential reductions in revenue to local businesses that depend on pass-by traffic.

This brochure does not describe the precise strategies that transportation departments should follow to implement an access management program, but rather provides an introduction to the key concepts. The brochure may also be a useful tool to distribute at public meetings for both general access management plans and specific applications of access management techniques.

This brochure describes the relevant benefits and issues with three key sets of access management techniques:

1. Access spacing, including spacing between signalized intersections and distance between driveways;
2. Turning lanes, including dedicated left- and right-turn lanes, as well as indirect left turns and U-turns, and roundabouts; and
3. Median treatments, including two-way left-turn lanes and raised medians.

WHAT IS ACCESS MANAGEMENT?

Access management is a set of techniques that state and local governments can use to control access to highways, major arterials, and other roadways. Access management includes several techniques that are designed to increase the capacity of these roads, manage congestion, and reduce crashes.

- Increasing spacing between signals and interchanges;
- Driveway location, spacing, and design;
- Use of exclusive turning lanes;
- Median treatments, including two-way left turn lanes (TWLTL) that allow turn movements in multiple directions from a center lane and raised medians that prevent movements across a roadway;
- Use of service and frontage roads; and
- Land use policies that limit right-of-way access to highways.

State, regional, and local governments across the United States use access management policies to preserve the functionality of their roadway systems. This is often done by designating an appropriate level of access control for each of a variety of facilities. Local residential roads are allowed full access, while major highways and freeways allow very little. In between are a series of road types that require standards to help ensure the free flow of traffic and minimize crashes, while still allowing access to major businesses and other land uses along a road,

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[12] Parsonson, P. S., M. G. Waters III, and J. S. Fincher, 2000, Georgia Study Confirms the Continuing Safety Advantage of Raised Medians Over Two-Way Left-Turn Lanes, presented at the Fourth National Conference on Access Management, Portland, Oregon.

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FOR MORE INFORMATION

http: / / www.accessmanagement.gov

FHWA Document Number FHWA-OP-03-066

Benefits of Access Management

U.S. Department of Transportation
Federal Highway Administration

09 APPENDIX

NY Route 5 Access Management Checklist

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C. Site Plan Review Access Management Checklist

The Site Plan Review Access Management Checklist (AM Checklist) is intended to be used to evaluate vehicular and pedestrian access during the site plan review process for all projects under review in the study area municipalities. Each question should be answered to determine whether the proposed project includes the necessary level of on-site access management. The practice of completing the AM Checklist will ensure that all aspects of pedestrian and vehicle access to a site will be considered. Continued use of the AM Checklist will also prioritize access management throughout the municipalities

while providing consistent reminders about the general and specific recommendations within the NY5 Access Management Plan. These consistent reminders will help with the implementation of the access management recommendations for the 10 opportunity sites and the corridor in general.

Site Plan Review Access Management Checklist

Topic		Question	Review Stage			Answer		
			Concept	Site Plan	Design	Yes	No	NA
Vehicle Access	V.1	Is there an opportunity to reduce the number of site driveways?	✓	✓				
	V.2	Can the proposed site provide a cross access connection to an abutting parcel?	✓	✓				
	V.3	Can the proposed site accommodate joint or shared access with an adjacent parcel?	✓	✓				
	V.4	Can the site be designed to provide an opportunity to allow joint access in the future?	✓	✓				
	V.5	Can the proposed project include a cross-access easement for future shared access or cross access?	✓	✓	✓			
	V.6	Can you achieve access from this parcel to an adjacent traffic signal?	✓	✓				
	V.7	Is the site driveway located within the influence area of an adjacent intersection?	✓	✓	✓			
	V.8	Are turning or access restrictions desirable for a proposed driveway located within the influence zone of an adjacent intersection?	✓	✓	✓			
	V.9	Is the site driveway located directly across from an existing driveway or at a location allowing for future shared use?	✓	✓	✓			
	V.10	Does the site plan show the property lines for properties to the rear, both sides, and across the street?	✓	✓	✓			
	V.11	Does the proposed project connect with the surrounding street system?	✓	✓	✓			
Pedestrian and Transit Accommodations	P.1	Does the site plan include a sidewalk connecting to adjacent properties, the adjacent roadway network, and ending at a logical terminus?	✓	✓	✓			
	P.2	Do sidewalks extend across the driveway opening?	✓	✓	✓			
	P.3	Is there an adequate pedestrian connection to a transit stop on both sides of the roadway?	✓	✓	✓			
	P.4	Is there an internal pedestrian connection to connect the building with the parking area?	✓	✓	✓			
	P.5	Are building entrances located and designed to be obvious and easily accessible to pedestrians?	✓	✓	✓			
	P.6	If there are multiple buildings on the parcel, is there an adequate pedestrian connection between the buildings?	✓	✓	✓			
	P.7	Are pedestrian accommodations sited along logical pedestrian routes?	✓	✓	✓			
	P.8	Does the site include pedestrian lighting where appropriate?		✓	✓			

Topic	Question		Review Stage			Answer		
			Concept	Site Plan	Design	Yes	No	NA
	P.9	Will snow storage disrupt pedestrian access or visibility?		✓	✓			
	P.10	Is the path clear from both temporary and permanent obstructions?		✓	✓			
	P.11	Are measures needed to direct pedestrians to safe crossing points and pedestrian access ways?		✓	✓			
	P.12	Are there any conflicts between bicycles and pedestrians?		✓	✓			
	P.13	Are pedestrian travel zones clearly delineated from other modes of traffic through the use of striping, colored and/or textured pavement, signing, and other methods?		✓	✓			
General Information and Agency Coordination	G.1	Has NYSDOT been identified as an interested or involved agency? If so, has NYSDOT been contacted?	✓	✓	✓			
	G.2	Has CDTA been identified as an interested or involved agency? If so, has CDTA been contacted?	✓	✓	✓			
	G.3	Has the County been identified as an interested or involved agency? If so, has the County been contacted?	✓	✓	✓			
	G.4	Has the Highway Work Permit application process been started?	✓	✓	✓			
	G.5	Is this one of the 10 opportunity sites noted in the Route 5 Access Management Guidelines?			✓			

10 APPENDIX

Land Use Planning for Safe, Crime-Free Neighborhoods

Focus on Livable Communities

Land Use Planning for Safe, Crime-Free Neighborhoods

Resources

Because law enforcement is often the biggest item in a city budget, neighborhoods should be designed to be self-policing. The following are some useful resources for communities:

Livable communities experts at the Local Government Commission: (800) 290-8202.

***Street Design Guidelines for Healthy Neighborhoods**, by Dan Burden, 1999, LGC.*

***Streets and Sidewalks, People and Cars; The Citizens' Guide to Traffic Calming**, by Dan Burden, 2000, LGC.*

***Defensible Space: Deterring Crime and Building Community**, by Henry G. Cisneros, 1995, U.S. HUD, HUD-1512-PDR. Available: (800) 245-2691.*

***Physical Environment and Crime**, U.S. Department of Justice, 1996, Order #NCJ 157311 at (800) 851-3420.*

***Creating Defensible Space**, by Oscar Newman, 1996, DIANE Publishing, Co.*

***Street Reclaiming, Creating Livable Streets and Vibrant Communities**, by David Engwicht, 1999, New Society Publishers.*

Local Government Commission
Center for Livable Communities

1414 K St., Suite 250
Sacramento, CA 95814-3966
tel (916) 448-1198
fax (916) 448-8246
web www.lgc.org

A sense of community is key to neighborhood safety.

A recent study published by the Harvard School of Public Health has confirmed earlier research: Community spirit and a willingness to get involved reduces violent crime by as much as 40 percent.

In this study, race and income were not factors in determining whether people were willing to watch out for one another. The key factor was whether or not there was a sense of community.[1]

In a community, neighbors have a shared sense of responsibility.

Neighbors need not be formally organized or have especially close relationships with one another to make an impact, according to University of Chicago sociologist Robert Sampson. "We're talking about people just having a shared sense of responsibility."

Mixing uses provides watchfulness day and night.

These two neighborhoods – Bainbridge, WA (l) and San Diego, CA (r) – are never deserted and are therefore much more safe.

Good Land Use Planning Facilitates Community.

Community "happens when people are in the street, when people are speaking to each other, and when there are activities that bring people together."

– Felton Earls, Professor,
Harvard School of Public Health

"The key is to provide places – and reasons – for people to come together as they go about their daily routines."

– Judy Corbett, Executive Director,
Local Government Commission;
Co-developer, Village Homes

◗ Community gardens

Seattle officials have noted a decrease in crime when a community garden is established. "Community grows in community gardens."[2]

◗ Corner stores

As far back as 1960, Jane Jacobs noted the importance of the neighborhood grocery to building a sense of community.[3]

◗ Pocket parks

In Village Homes, a 20-year old development in Davis, CA, homeowners share open space. Each also knows an average of 40 of their neighbors. The neighborhood is known for being safe.[4]

◗ Shared courtyards

Residents of St. Francis Square in San Francisco share a courtyard through membership in a cooperative. They also watch out for one another.[5]

When space is defined, neighbors can watch out for each other.

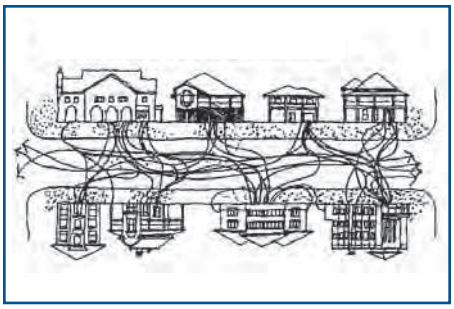
◗ Before: space belongs to no one.

◗ After remodel: space belongs to someone.

Outdoor space in the Diggs Town housing project in Norfolk, VA, was undefined, it belonged to no one.

Once the space was divided into private yards and front porches were added, police calls dropped dramatically.[8]

Streets Impact A Sense of Community.



Narrow street, little traffic

Research shows that on a small street with little traffic, neighbors tend to visit with one another.

High traffic volume

As traffic increases, contact among neighbors decreases. [6]

Traffic calming

Traffic calming projects increase community both by slowing and reducing traffic and by bringing people together to design the traffic measures. The result of these efforts can be a decease in crime rates. [7]

When a neighborhood owns the street…

In a high-crime neighborhood in Dayton, Ohio, high traffic volumes made the street a no man's land. The city helped neighbors reclaim the street by fencing it off at one end and providing an entry portal at the other. Pedestrians and bicyclists can pass through but cars can't. When through traffic was reduced, violent crime dropped in half.[9]

Tips for Policymakers

- Because law enforcement is often the biggest item in a city budget, neighborhoods should be designed to be self-policing.
- Require common space in new development – such as pocket parks, community gardens, community centers or neighborhood schools.
- Retrofit existing neighborhoods with community spaces such as community gardens and community centers. Share facilities with neighborhood schools.
- Mix uses and housing types.
- Make sure that windows face the street in residential and commercial projects.
- In dense multi-family housing, provide semi-private courtyards shared by no more than 20 or 30 people.
- Revive the downtown as a community gathering place and add housing (which puts people in the downtown at night).
- In proposed new neighborhoods, design streets that are narrow.
- In older neighborhoods, initiate traffic calming projects to slow traffic and make streets safer for pedestrians. Involve neighbors in the process.
- Enact ordinances and policies that encourage owners to build on vacant lots and revitalize vacated properties.
- Enact ordinances to require property clean-up and maintenance.

Poorly maintained properties say, "Nobody's watching."

Nobody cares about these spaces.

Neglected properties say to the potential assailant: This space belongs to no one, therefore no one is watching you.[10]

Windows help neighbors watch out for each other.

"Eyes on the street" are important.

On a wide street lined by garages and fences, no one is watching. Windows, on the other hand, discourage a potential assailant.

But don't forget the need for privacy.

Private courtyard

No private space

Studies show that when there is inadequate privacy, people draw into themselves.[12] Private or semi-private outdoor space and entrances, and good sound insulation between housing units, fosters neighborliness.

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Focus on Livable Communities

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