City of Rochester
Comprehensive Access and Mobility Plan

Transit Ready City Report

NELSON
NYGAARD

Cover photo from patrickashley via wikimedia

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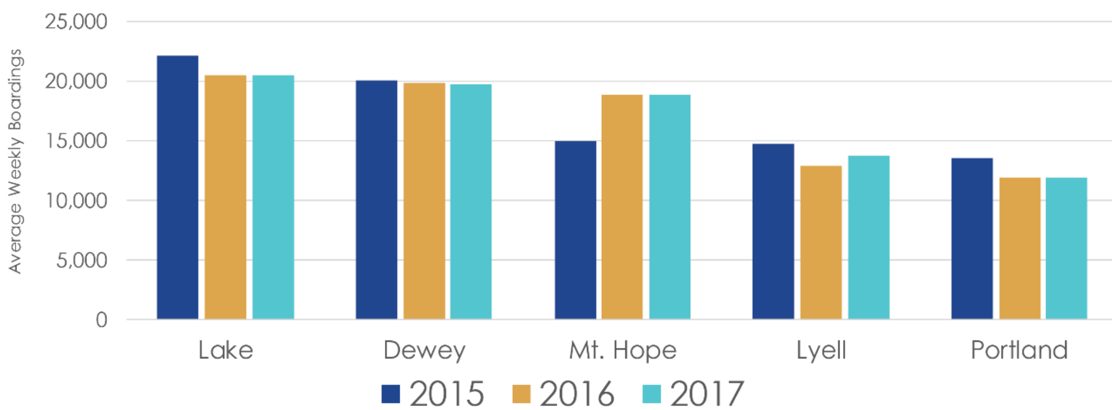
1 Introduction

Hundreds of bus transit trips carry tens of thousands of Rochester residents throughout the City every weekday. Service frequency and service day span are inconsistent, however, leading to a loss of personal time for users, a lack of competitiveness with other transportation modes, and decreasing ridership on non-express corridors. At most stops within the network, users must also wait for and board buses in spaces lacking urban programming, burdened by weather extremes during all seasons.

Figure 1 Average Weekly Boardings on Highest Ridership Corridors



Source: Regional Transit Service

Efforts are underway by the local transit agency, Regional Transit Service (RTS), to fundamentally transform the transit network through reassignments of service to high priority corridors from those that are currently underperforming. This reallocation of resources that allows for more frequent transit service also creates an opportunity for the City to advance development policies and invest in additional infrastructure along these corridors.

The Transit Ready City Report endeavors to identify a standard inventory of transit-supportive streetscape enhancements for different stop typologies in order to prioritize supportive investments. A stop hierarchy based on intersection points of newly proposed crosstown routes and high frequency corridors is suggested while supportive right-of-way configurations are explored. Supportive technologies such as first/last mile connections and real time coordination are identified along with corresponding collaborative agencies. Finally, a peer review of best practices, coupled with a concurrent assessment of transit-supportive development potential, identifies priority investment locations for the deployment of supplemental transit-supportive infrastructure by the City of Rochester.Previous and Ongoing Studies

Studies currently in progress are supported by past work that attempts to create an environment that prioritizes the movement of transit users along and across city streets. The following excerpts provide brief descriptions of select plans and policies led by both the City and RGRTA, focused on the ways each impacts or creates a need for transit supportive infrastructure.

Reimagine RTS – 2018

- A refocusing of the transit system to deliver a comprehensive frequent transit network
- Alignment changes focused on creating a more connected network that reduces the need for customers to transfer at the Downtown Transit Center
- Areas that are not fixed-route transit supportive due to low densities, disconnected development patterns, or poor road network structure and have existing RTS service are proposed as Community Mobility Zones to pilot more cost-effective mobility solutions

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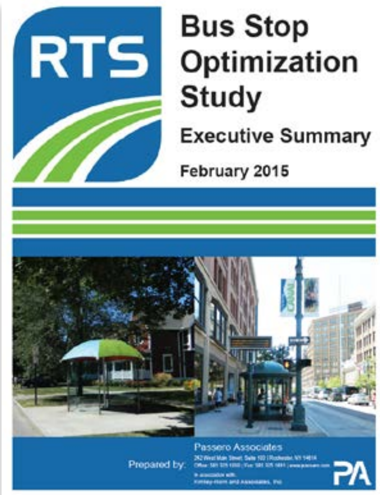
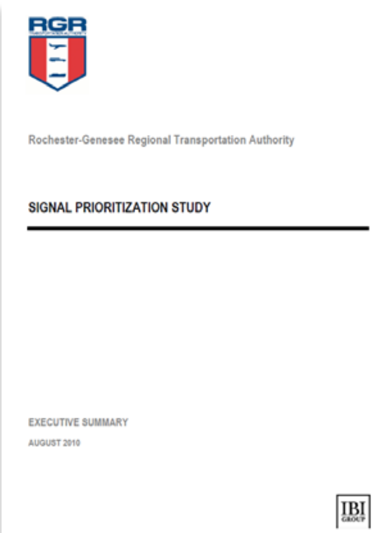
Transit Supportive Corridors Study – 2018

- Identifies corridors for transit supportive development where transportation, land use, development policy, planning, and decision-making are better coordinated, and where resulting development makes it easier for people to use transit, walk, or bike as their preferred method of local travel
- Identifies supportive land use, development, and zoning strategies for these corridors



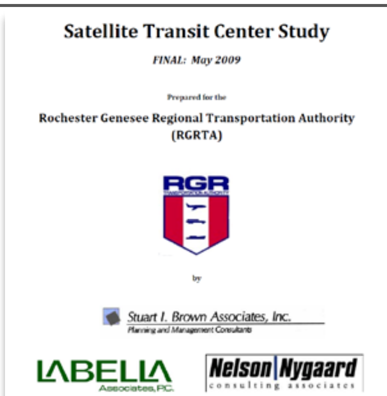
Bus Stop Optimization Study – 2015

- Evaluates approximately 3,400 bus stops in the RTS Monroe County service area
- Provides recommendations to improve the placement of stops



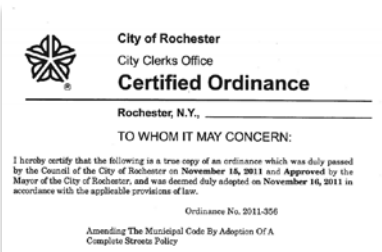
Signal Prioritization Study – 2010

- Identifies two corridors (Lake and Dewey Avenues) that would benefit most from transit priority implementation measures
- Assesses traffic signal control systems and provides a market comparison of alternative systems
- Examines the concept of applying a Center-to-Center approach to transit signal priority implementation



Satellite Transit Centers Study – 2009

- Evaluates the viability of 19 potential sites to serve as a satellite transit center
- Selects four sites for further consideration, one site for transit supportive development in conjunction with economic development, and six sites for enhancements



City of Rochester
City Clerks Office
Certified Ordinance

Rochester, N.Y., ______

TO WHOM IT MAY CONCERN:

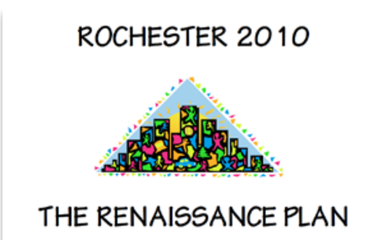
I hereby certify that the following is a true copy of an ordinance which was duly passed by the Council of the City of Rochester on **November 15, 2011** and **Approved** by the Mayor of the City of Rochester, and was deemed duly adopted on **November 16, 2011** in accordance with the applicable provisions of law.

Ordinance No. 2011-356

Amending The Municipal Code By Adoption Of A Complete Streets Policy

Complete Streets Policy – Adopted 2011

- Ensures that all future street design efforts will fully consider the needs of pedestrians, bicyclists, transit users and persons with disabilities
- Helps to improve safe access for transit riders by installing and maintaining crosswalks and ADA-compliant ramps as well as reducing crossing distances for those making transit connections



Rochester 2010: The Renaissance Plan

- Outlines the City's goals, principles, and implementation actions related to areas including economic development, environmental management, infrastructure, land use/zoning, and mobility/transportation
- Outlines a Vital Urban Village concept, which includes providing infrastructure and streetscape amenities to facilitate increased transit use

2 Priority Corridors

The Reimagine RTS initiative represents the largest set of transit system changes in decades. The recommendations provided in draft reports at the time of this writing, are guiding all other studies related to supportive economic and infrastructure development. Central to priority corridor identification is the new frequent network proposed by RTS, consisting of 10 major corridors, and featuring 15-minute frequency from the AM peak through the PM peak. The frequent network allows transit to truly compete as an urban transportation mode, promoting less car-dependent lifestyles and denser development patterns.

Identification

Frequent network corridors make up ten of the twelve corridors considered and evaluated by the Transit Supportive Corridors study. These corridors represent a logical starting point for transit enhanced infrastructure and priority technology investment.

Figure 2 Recommended Future Frequent Network Corridors

Corridor	Start	Stop
Lake Avenue/State Street	Main Street	Eastman Avenue
Genesee Street/Elmwood Avenue	West Main Street	Mount Hope Avenue
West Main Street/Chili Avenue	Transit Center	City Limit
Dewey Avenue/Broad Street	West Main Street	Eastman Avenue
Hudson Avenue	North Street	City Limit
East Main Street	Transit Center	Winton Road
North Street/Portland Avenue	East Main Street	City Limit
Joseph Avenue	Transit Center	Hudson Avenue
Monroe Avenue	East Main Street	Highland Avenue
Lyell Avenue	Lake Avenue	City Limit

Figure 3 Reimagine RTS – Recommended Future Transit Network

Source: Rochester-Genesee Regional Transit Authority

Street Design and Public Realm

The priority corridors (Frequent Network) identified in Figure 3 are lined by a mix of neighborhood business districts, recreational facilities, schools, and family homes. Transit supportive enhancements within these corridors should be designed to contribute to and enhance corridor character while supporting typical corridor activities.

The following paragraphs describe the ideal characteristics of the building blocks of transit-supportive infrastructure installed adjacent to the roadway. While certain elements, such as bus stop sign design, are the responsibility of the transit authority, the City should use its relationship as well as its representatives on the Board of Commissioners to encourage the application of these practices.

Bus Stop Sign

Bus stops should all include consistently updated and attractive signage conveying essential information to increase customer satisfaction and understanding of the bus system. Basic information includes route numbers and names, stop ID number, the direction of the routes, a phone number and/or website for additional assistance, and often destination(s) and times served. A stop ID number is often used to access real-time schedule information via text message, web/app, or an automated phone system. These details help to reduce visitor confusion and increase rider comfort at stops. All bus stops should have a consistently maintained bus stop sign on the far side of the boarding area and be placed on a pole at a height that conforms to the Americans with Disabilities Act (ADA) and does not get in the way of pedestrian movement on the sidewalk.

Figure 4 Basic Bus Stop Sign

Source: Nelson\Nygaard

Shelter

Shelters offer a prominent and safe protective waiting area for bus passengers, traditionally including informational signage about the bus service and surrounding land uses. Shelters protect transit riders from the elements and help to identify stop locations by defining a sense of place along a roadway or at a transit center. Shelters should be placed at stops with higher ridership or those that serve as transfer points.

Figure 5 Shelter with Seating

Source: RTS

Numerous suppliers provide off-the-shelf bus stop shelter designs and the City of Rochester can choose to customize shelter designs to fit specific stop locations and needs. Shelters typically have at least two walls, a roof, seating, and a clear space for customers using a wheelchair. Bus shelters should provide a clear line of sight to approaching buses. Many shelter designs incorporate glass or plastic walls in order to provide multiple lines of sight.

Seating

Benches can be freestanding or part of a shelter design. They provide seating for passengers waiting for the bus, particularly at locations where service is less frequent (headways longer than 15 minutes) or near sites that attract riders who may have difficulty walking and standing. Seating should be provided at every stop where it would not compromise safety or obstruct sidewalk access or access to customer information. Benches should be fabricated of durable materials resistant to vandalism and weather conditions.

Figure 6 Basic Bus Stop Seating

Source: Nelson\Nygaard

Lighting

Adequate lighting at bus stop facilities allow bus drivers and approaching traffic to see waiting passengers at night. Lighting also provides added security for those waiting at the stop, in addition to illuminating route and schedule information for patrons. Lighting can be provided by a nearby streetlight, ambient light from the adjacent businesses, lighting installed within the shelter, or a standalone light pole. Transit stops without sheltered lighting should be located within 30 feet of an overhead light source. Where this is not possible, solar-powered actuated lights are available that not only light the waiting area for a timed duration, but also notify oncoming buses that a stop is requested. Light installed within the shelter should not be so bright as to create a spotlight effect that makes it difficult for waiting passengers to see outside.

Figure 7 Indirect and Direct Stop Lighting

Source: Nelson\Nygaard

Waste and Recycling

Bus stops, both those with and without shelters, can offer both trash and recycling receptacles to help keep the stop area free of debris, food scraps, or other refuse generated by waiting bus passengers on a daily basis. Receptacles should be durable, visible, and placed conveniently without blocking major pedestrian movements. Bus stops that have a problem with litter and those in proximity to fast food establishments should have trash receptacles. Receptacles should be of a standard type, closed at the top to prevent rain, snow, or other precipitation from entering, and easy for maintenance workers to access and empty. Maintenance can be completed through a private

Figure 8 Bus Stop with Waste and Recycling

Source: Nelson\Nygaard

maintenance agreement. Design should be consistent, but receptacles can be customized with artwork or advertising specific to stop locations.

Bicycle Parking

Permanently and individually installed bicycle racks bearing an "upside-down U" shape provide an opportunity for bus passengers arriving by bicycle to securely park their bike during the length of their bus trip. Groups of bicycle racks may be covered and secured in lockers or a shelter with gated access to provide an additional benefit to long-term bicycle parkers by protecting bicycles and related gear from weather or theft. Lockers should be clearly labeled as bicycle parking and signs should be posted with directions for use. Larger bicycle parking stations can have vertical hanging racks, typically require a unique maintenance plan, and are often operated as a concession or contract service.

Figure 9 Bicycle Parking at Bus Stop

Source: Nelson\Nygaard

Sufficient spacing between racks enables two bicycles to fit comfortably on each rack. Installations should be consistent with the Association of Pedestrian and Bicycle Professionals (APBP) Bicycle Parking Guidelines.

Real Time Information

An electronic display at bus stops showing the number of minutes until the next arrival of each operating bus route at that very stop can help improve the passenger experience. Knowledge of how long a passenger must wait until the next bus is important for rider comfort, especially at stops where the average waiting time is longer than every 10-15 minutes.

Fare Vending Equipment

At major bus stops and transfer stations, the installation of fare payment/purchase equipment can improve customer convenience and service reliability by reducing on-board cash transactions and bus stop dwell times. Off-board fare payment vending machines and associated instructional signage typically require a 10' by 10' footprint for two machines and should be semi-enclosed. The potential need for wired connections for power or communications can restrict the number of potential deployment sites.

Figure 10 Real Time Information at Transfer Point

Source: Nelson\Nygaard

Figure 11 Remote Fare Vending Equipment

Source: Nelson\Nygaard

3 Stations and Stops

Given limited resources, improvements made to passenger facilities across the system should be prioritized by both the type of improvement being made and locations most in need of that improvement. A set of well-defined bus stop typologies can help the City target the most appropriate locations. When deciding the desired typology of each bus stop, consider the total number of daily boardings at the location, the number of routes serving the corridor, and any special populations served by the stop. The City of Rochester should be directly involved in the stop improvement process as the easement providing entity in the public right-of-way.

Basic Bus Stops

The Basic Bus Stop represents the lowest level of service within the stop hierarchy. The bus stop sign is included as a matter of course in identifying the stop location while other amenities described in Figure 15 should be provided to improve the overall level of comfort of users interfacing with the system.

The boarding area at a basic stop should be made of concrete or other paving material. The stop should be well lit, potentially taking advantage of nearby street lighting. Simple seating on site is optional, but recommended.

Enhanced Bus Stops

Enhanced Bus Stops are ideal for locations along a corridor that experience a high number of boardings. All elements included at a basic stop should be present as well as a well-lit shelter with seating and waste/recycling receptacles.

Optional elements at enhanced bus stops include bicycle parking to promote last mile connections, a real-time information display listing anticipated bus arrival times, and a temporary heat source that can be actuated by waiting passengers in cold temperatures.

Transfer Points

In addition to recommending frequent network corridors, the Reimagine RTS initiative describes a number of crosstown routes, listed in Figure 13, that fundamentally change the nature of the network by filling in service gaps created by the geometry of Rochester's radial street grid. A route including the South Goodman Street corridor bridges a wide gap between the diverging South Clinton Avenue and East Main Street corridors. Likewise, crosstown service along Upper Falls Boulevard connects the heavily traveled, but divergent Hudson and Lake Avenue corridors.

Figure 12 Proposed Crosstown Corridors

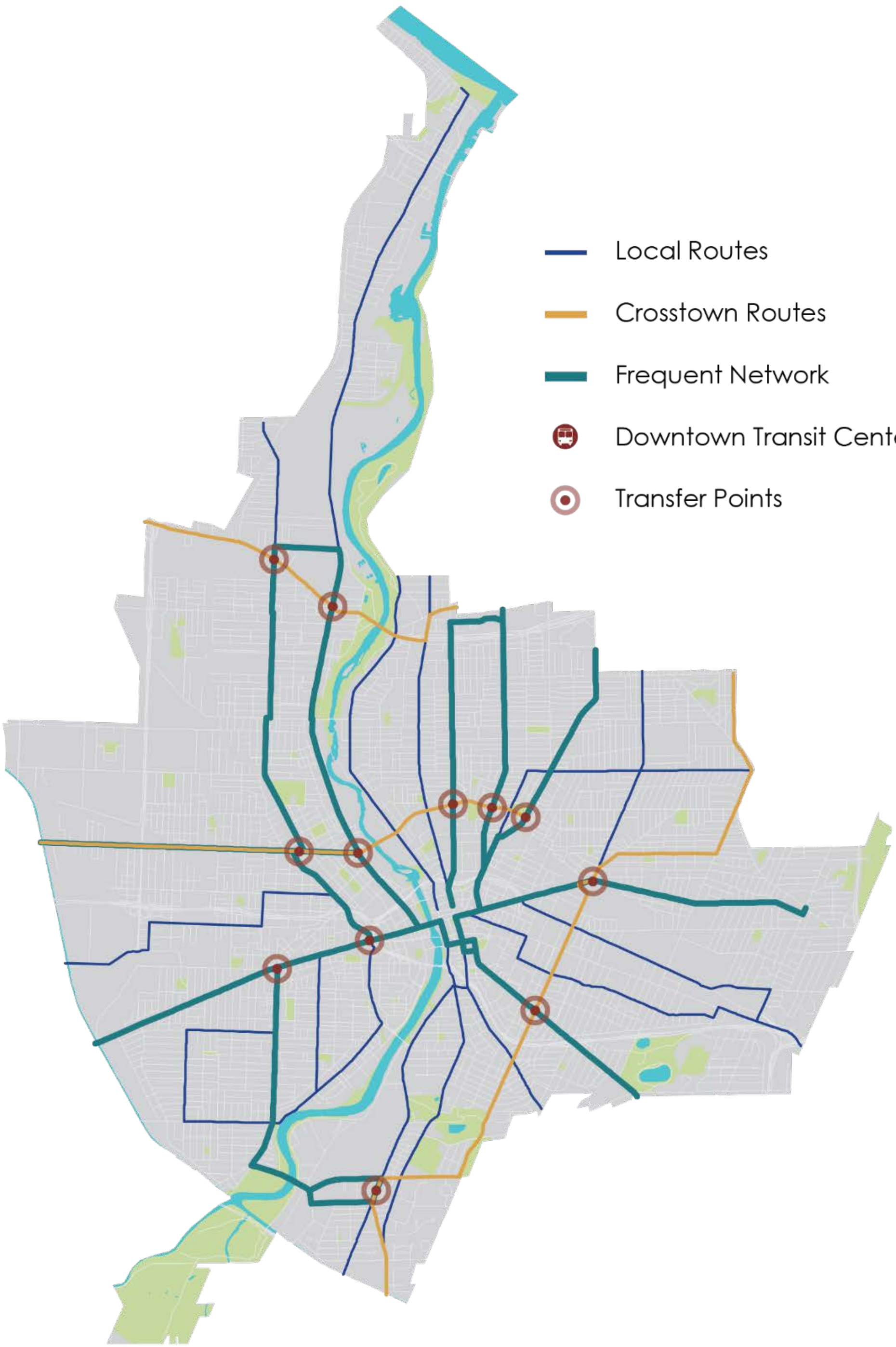
Corridor	Start	Stop
Ridge Road/NY-104	Elmridge Center, Greece	Skyview on the Ridge, Irondequoit
East Henrietta Road/Mount Hope Avenue/ Elmwood Avenue/South Goodman Street/ Parsells Avenue/Culver Road	Marketplace Mall, Henrietta	Skyview on the Ridge, Irondequoit
Lyell Avenue/Upper Falls Boulevard	Howard Road, Gates	Portland Avenue

A previous study conducted by RTS in 2009 identified candidate locations for Satellite Transit Centers. The preferred site for a large format transit center identified in the report was to be locatied along Mt. Hope Avenue between Crittenden Boulevard and Elmwod Avenue. While not constructed as part of the development of Collegetown, the location remains a point of emphasis in the Reimagine RTS plan. Connection Hubs are proposed throughout the revised service area at key network connection points, such as the University of Rochester Medical Campus, Eastman Business Park, and North Winton Village.

The Transit Ready City report revisits this concept with a scaled-back version by proposing a new bus stop typology. Transfer Points where either crosstown routes intersect the frequent network, or where multiple frequent network routes serve a single intersection before diverging, are primary candidates for the full suite of stop amenities. Transfer Points may feature multiple stop locations on intersecting streets surrounding an intersection.

Transfer Points should feature all compulsory and optional amenties at basic and enhanced stops in addition to fare vending equipment such as machines currently used at the Downtown Transit Center. While cognizant that RTS has no current plans to install fare vending machines at location other than the Transit Center, the City should encourage RTS to consider installation in appropriate remote locations as a long-term planning goal. Shelters should be larger and real-time fare information displays more robust. Bicycle parking should be immediately adjacent to the enhanced shelter.

Figure 13 Reimagine RTS – Recommended Crosstown Routes and Proposed Transfer Points



Source: Rochester-Genesee Regional Transit Authority

Figure 14 Proposed Transfer Point Locations

Frequent Network Corridor	Intersecting Corridor(s)
East Main Street	Goodman Street (Culver Road Crosstown)
Portland Avenue	Draper Street (Lyell/Upper Falls Crosstown)
Hudson Avenue	Upper Falls Boulevard (Lyell/Upper Falls Crosstown)
Joseph Avenue	Upper Falls Boulevard (Lyell/Upper Falls Crosstown)
Lake Avenue	Lyell Avenue (Lyell/Upper Falls Crosstown)
Lake Avenue	Ridge Road (Ridge Road Crosstown)
Dewey Avenue	Ridge Road (Ridge Road Crosstown)
Dewey Avenue	Lyell Avenue (Lyell/Upper Falls Crosstown)
West Main Street	Broad Street (Dewey Short and Long Lines, Jay/Maple, Plymouth)
West Main Street	Genesee Street (Genesee)
Mount Hope Avenue	Elmwood Avenue, East Henrietta Road (Genesee, Marketplace, Thurston/MCC, South, Culver Road Crosstown)
Monroe Avenue	Goodman Street (Culver Road Crosstown)

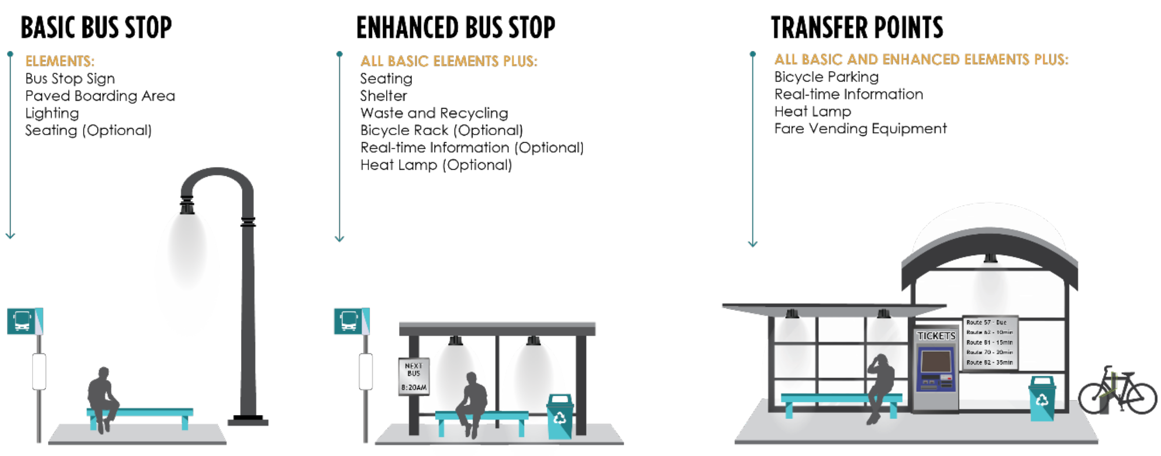
Stop Hierarchy and Requirements

The table and graphic below provide a guide for the inclusion of the streetscape and stop infrastructure elements described in Chapter 2 for each bus stop typology described in this chapter. While RTS maintains its own amerity placement criteria, the City may choose to maintain a set of guidelines in order to supplement those provided by RTS as opportunities arise. For all presented typologies, some features may be omitted where the primary observed stop activity is alighting passengers rather than boarding passengers.

Figure 15 Suggested Stop Hierarchy

Bus Stop Element	Basic Stop	Enhanced Stop	Transfer Points
Bus Stop Sign	Yes	Yes	Yes
Seating	Yes	Yes	Yes
Lighting	Yes	Yes	Yes
Shelter	No	Yes	Yes
Waste and Recycling	No	Yes	Yes
Bicycle Parking	No	Optional	Yes
Real-Time Information	No	Optional	Yes
Heat Lamp	No	Optional	Yes
Fare Vending Equipment	No	No	Yes

Figure 16 Stop Hierarchy Visual Representation



Source: Nelson\Nygaard

Supportive Right-of-Way Considerations

The City has a more direct level of control over transit network enhancements within non-state owned roadways. The physical interface between the bus and curb can be altered to support transit service objectives. On street bus stops like those described earlier may locate the bus loading area in a travel lane, a parking lane, or the shoulder depending on the characteristics of the roadway. While on-street bus stops are the most common and the easiest to establish, there are some site considerations in location evaluation. Parked cars must not block bus access to acceleration/deceleration areas or the curb, rendering the stop inaccessible to customers who use wheelchairs.

Intersection sight distance is an additional consideration whenever structures such as shleters with non-transparent walls housing information and fare equipment are recommended for installation near an intersection. Closest allowable proximity to the curb and crosswalk should be computed in accordance with the latest revision of AASHTO's (American Association of State Highway and Transportation Officials) *A Policy on Geometric Design of Highways and Streets*. Alternately, intersections with insufficient visibility can be reconfigured to be more compact. Compact intersections reduce the size of the sight triangle, giving all users better view of potential conflicts.

The City may choose to implement one of a pair of roadway configurations, curb extensions and bus turnouts, to address some of these issues while accomplishing other service goals. Note that a public comment period and City Council approval are required to alter pavement widths on City-owned roadways.

Curb Extension

A curb extension, also known as a bulb out, is a widening of the sidewalk to extend the bus stop loading and waiting area into the parking lane which is directly adjacent to the travel lane. Curb extensions are most effective in denser environments with high pedestrian activity or areas where the sidewalk is too narrow to accommodate a bus stop. In these locations, curb extensions provide a larger bus stop footprint that can accommodate shelters, benches, and other transit customer improvements as well as reduce interference with pedestrian activity on the sidewalk. Curb extensions also reduce the need to displace parking spaces since a bus serving a stop on a curb extension will stop in the traffic lane instead of traveling into the parking lane as they do at curbside bus stops. Finally, curb extensions work well in conjunction with crosswalks by reducing the crossing distance for pedestrians.

Figure 17 Shelter at Curb Extension

Source: Nelson\Nygaard

Curb extensions should be considered at sites with the following characteristics:

- High pedestrian activity
- Crowded and/or narrow sidewalks
- A need to reduce pedestrian crossing distances
- Bus already stops in travel lane
- The need to minimize loss of street parking
- There are multiple travel lanes, enabling vehicles to bypass a stopped bus

Bus stops on curb extensions require different footprints than curbside bus stops. Since a bus serving a stop on a curb extension will stop in the traffic lane instead of traveling into the parking lane, the required length of the loading area is shorter.

Stops located along a curb extension should be designed to the following minimum dimensions:

- 30' bus stop length (46' bus stop length for stops served by articulated buses)
  - Based on 22' (40' bus) and 36' (articulated) centerline front door to rear door distance
- 5' by 8' concrete landing pad
- 4' by 10' rear door clear zone

Bus Turnout

A bus turnout, or bus bay, is a stop with a pull-out for buses that is constructed as an inset into the curb. The bus bay allows buses to pull out of traffic for loading and unloading, allowing general traffic to pass the loading bus. Bus turnouts are most effective in areas where the impact of a bus blocking a travel lane creates significant traffic delays or where long dwell times are common. In these locations, bus turnouts allow buses to service the stop while minimizing traffic delays and conflicts with traffic. Bus turnouts also clearly define the bus stop and allow customer loading and unloading to be conducted in a more relaxed manner.

Figure 18 Bus Stop at Bus Turnout

Source: Nelson\Nygaard

However, bus turnouts can make it difficult for buses to re-enter traffic, which can increase bus delays, decrease service reliability, and increase average bus travel time. Bus turnouts may also require right-of-way acquisition. Additionally, bus turnouts may reduce sidewalk width and impact pedestrian traffic.

Bus turnouts should be considered where any of the following conditions exist:

- Average peak period dwell time exceeds 30 seconds per bus
- There is a high frequency of accidents involving buses and/or pedestrians
- Bus volumes exceed 10 or more buses per hour
- Where stops in the curb lane are prohibited
- Where sight distances prevent traffic from stopping safely behind a stopped bus
- At stops where there are frequent wheelchair boardings
- Where buses are expected to layover at the end of a trip

Bus stops located along bus turnouts require slightly different footprints than typical curbside bus stops. Since a bus serving a stop in a turnout will pull out of the general travel lane into a tapered pull-in area, a longer bus stop length (60’) is required, as the bus will use the pull-in area for its approach as well as a similar tapered pull-out area to rejoin the travel lane.

Stops located in a bus turnout should be designed to the following minimum dimensions:

- 60’ bus stop length (80’ on corridors employing articulated buses)
- 5’ by 8’ concrete landing pad
- 4’ by 10’ rear door clear zone

Evolution of the Transit Center

As the frequent and crosstown networks change, operational demands on the Downtown Transit Center will change. While these changes are primarily the concern and responsibility of RTS, the City should be prepared to play a supportive role.

Current functional limitations of the Downtown Transit Center require the use of adjacent Mortimer Street to accommodate articulated buses and other select routes. Passengers must exit the transit center, cross an exit driveway and an additional city street to access that secondary boarding area, which is not climate controlled like the main Transit Center.

Currently, the City allows stops on Mortimer Street, across from the Transit Center building, as an extension of the Transit Center. A small number of shelters are built against the exterior wall of the Mortimer Street Garage while the public sidewalk and curbside are used as waiting and staging areas. At the time of this writing, the City had recently reached an agreement to sell the Mortimer Street Garage to a private operator. The City should assess the terms of the sale, paying special attention to any surviving easements to better understand its ability to continue to support RTS' goal to convert a portion of the Mortimer Street Garage into an extension of the Transit Center that focuses on connections to non-fixed route mobility services.

Connections to Intercity Services

Transit service between the new Louise M. Slaughter Rochester Intermodal Station and the Downtown Transit Center is currently uncoordinated. The inclusion of the Joseph Avenue corridor in the frequent network creates an opportunity to integrate this transportation gateway into the regional transit system that would not require a special shuttle service or additional dedicated vehicle.

The Intermodal Center is currently owned by Amtrak, while New York State owns the current Greyhound/Trailways site immediately south. As such, the City should advocate for and provide any required roadway configuration support for a minor routing adjustment of the Joseph Avenue frequent corridor. Inbound buses would turn right from Joseph Avenue, travel the block of Central Avenue immediately in front of the Intermodal Center, then turn left onto Clinton Avenue while outbound buses would continue on Clinton Avenue beyond its split with Joseph Avenue, turn right onto Central Avenue, then turn left to join the Joseph Avenue corridor.

The City should reserve land for and work with RTS to create bus stops on each side of Central Avenue that are comparable to those appropriate for the Transfer Points described in Chapter 3. These stops would serve both the current intercity transportation setup, where Greyhound/Trailways is located across Central Avenue from the Intermodal Station, as well as the envisioned joining of the two facilities on the north side of Central Avenue.

Neither the recommended transit network nor proposed mobility hub extensions retain connections to the Greater Rochester International Airport. In addition to its role as a major intercity transportation facility, the airport site serves as the region's primary rental car center. Noting the airport's capacity to serve as an intermodal mobility hub, the City should encourage RTS to maintain a system connection to the airport, not necessarily direct to Downtown, but at minimum directly linked to the frequent network via alternative mobility options.

4 Facility Support

The City can further support the transit system through the configuration of other physical facilities. Travel lane and roadway treatments, strategic active transportation investments, expanding the geographical reach of curbside management policies, employing technology to increase efficiency, recognizing specialized operating needs, and attention to unique maintenance issues are ways the City can make the most of planned regional transit investments.

Operational Network Features

In addition to roadway improvements related to stops, there are roadway improvements that can be made to the transit system through management of travel lanes along identified transit corridors. These improvements attempt to prioritize transit as a more efficient way to move more people, rather than vehicles, through a transportation corridor.

Dedicated Transit Lanes

Dedicated transit lanes are used to speed up frequent bus services on busy streets, especially those corridors with frequent service. Owing to the high passenger capacity of transit, a dedicated transit lane can drastically increase the amount of people that can move along a street during congested times of day. Since dedicated transit lanes reduce traffic delay for transit users, they are an important part of encouraging transit use by making the service faster, more reliable, and more enjoyable. Pavement markings, signage, and enforcement are important to maintain the integrity of dedicated lanes.

Dedicated lanes can be:

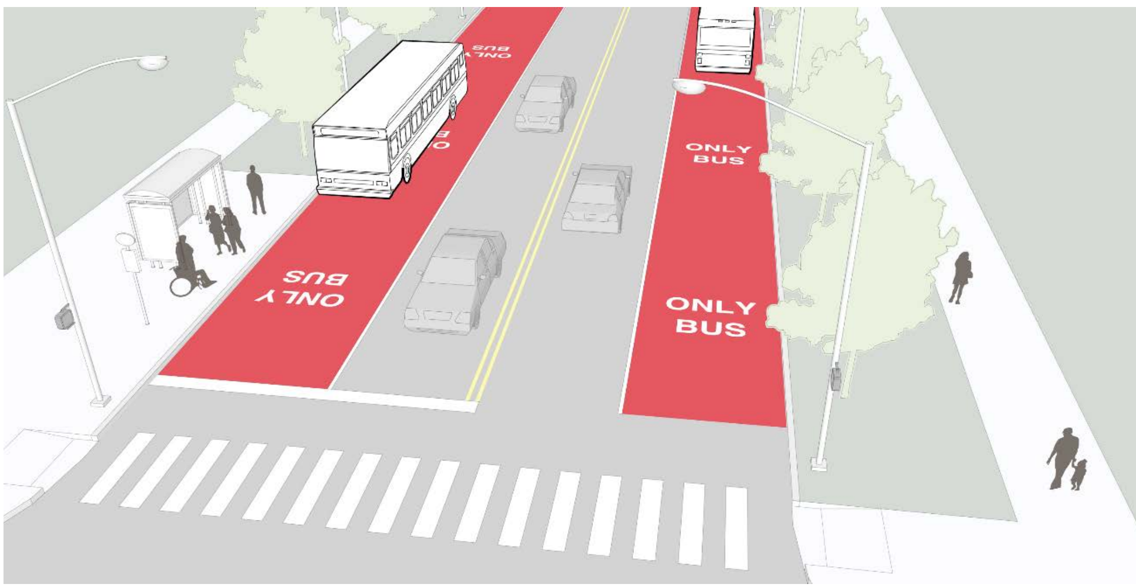
- **Curbside** – Best on streets with no on-street parking at designated operating hours, few driveways and limited right-turning traffic
- **Offset** – On multi-lane roads next to a parking lane with bulb-outs
- **Median** – Operating in the center lanes separated from general traffic with median islands for boarding
- **Contraflow** - Transit operates bi-directionally on a one-way street for efficient connectivity

Transit lanes are used only on corridors where transit service is very frequent, ridership is high, and traffic congestion significantly and routinely impedes transit operations. Transit lanes may be permanent or time restricted—reserved for transit vehicles only at peak hours of the day and permitted for other uses at other times.

Transit lanes can be marked by red colored pavement as a visual cue to drivers to obey rules regarding bus lanes. This practice reduces unauthorized bus lane use, especially illegal parking and/or standing. Currently, the use of red colored pavement to denote a bus lane requires approval from the FHWA's Office of Transportation Operations. Applicants should be able to demonstrate that increased public transit vehicle travel speeds and reduced overall corridor service time would be expected. Also, the application of the colored pavement to what was previously a general purpose lane should not adversely affect the traffic flow in the remaining general purpose lanes.[1]

Epoxy street paints on new asphalt are proven to last the longest of bus lane red paint treatments; three to five years without failing while wearing faster at bus stop locations.[2] The same epoxy street paints applied to existing asphalt typically fail in less than one year.

Figure 19 Dedicated Transit Lanes



Source: Nelson\Nygaard

Shared Transit Lanes

A shared lane reserved for transit vehicles and bicyclists can provide improved accommodation for both road users to maneuver together as transit vehicles start and stop along a corridor. Shared lanes are most appropriate on streets where bus volumes are high, but where headways exceed four minutes, where bicycle volumes and vehicular speeds are not very high (20 miles per hour or less), and where space constraints preclude exclusive facilities for each. Further, shared transit lanes are only

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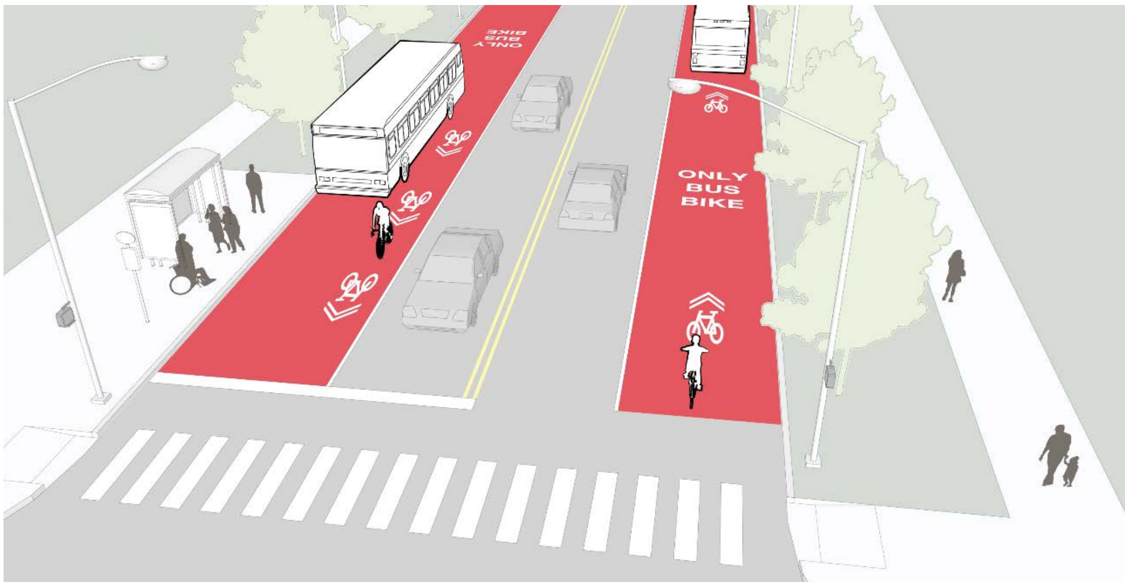
[1] Federal Highway Administration. MUTCD Interpretation Ltter 3(09)-24(I) – Application of Colored Pavement. https://mutcd.fhwa.dot.gov/resources/interpretations/3_09_24.htm

[2] New York City DOT. Red Bus Lane Treatment Evaluation. https://nacto.org/docs/usdg/red_bus_lane_evaluation_nycdot.pdf

recommended along corridors for which a bicycle facility cannot be provided on a nearby parallel street.

The shared lane is typically wider than a dedicated transit lane. They should be located in the outermost lane adjacent to a curb to reduce conflict.[3]

Figure 20 Shared Transit Lanes



Source: Nelson\Nygaard

Bus Queue Jump Lanes

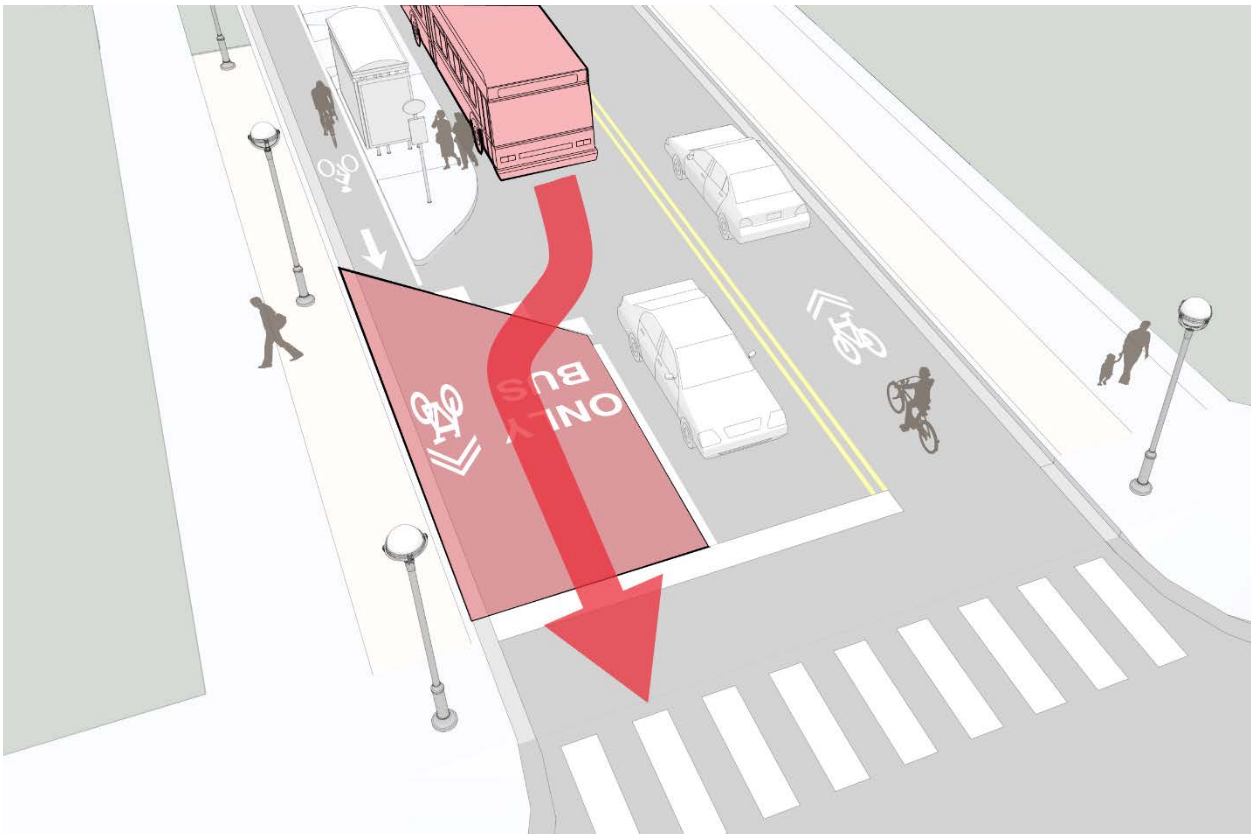
A short bus lane located at the approach to a traffic signal allows buses to bypass waiting traffic, significantly improving transit travel time. They are best used at congested intersections on primary transit routes and where stops can be placed at the far-side of an intersection. Space on the far side of an intersection should exist for the bus to reenter traffic. Bus queue jumps may be:

- **Transit Exemption for Right-Turn Lanes**: The bus queue jump lane shares space with a right-turn lane, but transit vehicles are allowed to proceed straight through the intersection.
- **Advanced Stop Bar**: The main stop bar is pushed back several car lengths and a transit-only or "right and transit" lane is placed along the curb at least two car lengths ahead of the stop line, so that a transit vehicle can pull ahead of other traffic.
- **Shared Right-Turn/Bus Lane**: The entire curbside lane is reserved for transit vehicles, but drivers are allowed to use it for right turns at intersections. An example of this configuration can be seen on Main Street between Plymouth Avenue and the Genesee River.

[3] NACTO Transit Street Design Guide 2016

RGRTA's 2010 Signal Prioritization study included queue jump locations on selected transit priority corridors. The City should update this work on a wider scale in coordination with RTS and the Monroe County DOT in order to create a priority table containing appropriate network locations at which to apply queue jump lanes.

Figure 21 Bus Queue Jump Lane



Source: Nelson\Nygaard

First/Last Mile Connections

Bikeshare

Bicycle sharing systems have been shown to extend the reach of public transportation across the country. According to the Bureau of Transportation Statistics, 77% of bikeshare stations in 2016 connected to another transportation mode within one block.

Once a stop hierarchy is identified and locations chosen, the City should work with Zagster/Pace to compare the locations of current bikeshare stations with the locations of enhanced stops and transfer points. Planned additions to the bikeshare station network should take mismatches between these intermodal connection points into account.

Curbside Management

As the demand for drop-off areas has increased due to private ride hailing activity, cities are seeing an imbalance in the amount of curbside space required to properly support these uses. An internet-based ride hailing service behaves differently than traditional quick pick-up taxi service. In the absence of available curbside space, rideshare vehicles are inclined to use bus loading zones, or to simply double park, creating impediments to traffic flow and safety.

The City of Rochester may choose to change the dynamics of on-street parking spaces immediately adjacent to Transfer Points and Enhanced Bus Stops. During certain times of day, typically the peak hours for ride hailing activity, these spaces would not allow private vehicle parking. Outside of these defined hours, these spaces would revert to their original general public parking use.

Pre-implementation steps would require an assessment of passenger pick-up/drop-off activity by time of day. Spaces chosen would ideally be following far-side bus stops and preceding near-side stops to allow drivers of both transit and private vehicles to easily pull in and out. In-place implementation would minimally require signage, but could include dynamic programming of parking meters associated with selected spaces.

Real Time Coordination

Transit Signal Priority (TSP) schemes allow for variable traffic signal timing at intersection to give priority to transit movements, thereby reducing rider delay and improving schedule reliability. No longer predicated on preemption of the signal cycle due to synchronization and pedestrian crossing safety issues, the practice has evolved to provide transit priority based on calculations performed from a systems perspective.

In contemporary “active” TSP implementations, buses communicate with the traffic signal system to provide a green signal indication to an approaching bus, reducing average corridor delay by up to 10%.[4] The feature is generally less effective when signals are operating at capacity. The City should partner with RTS and the Monroe County Department of Transportation to assess up-to-date technical and capital requirements of providing transit signal priority with interconnected traffic controllers and vehicle detection. A further implementation location assessment, referencing and updating the work done as part of the 2010 Signal Prioritization Study, should be performed to determine where TSP is needed along transit corridors to provide transit vehicles with precedence. Cross-street pedestrian and traffic demand should continue to be considered in location identification.

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[4] TRB Transit Capacity Quality of Service Manual 2013

The following paragraphs describe the operational attributes of some common signal systems compatible with the the application of Transit Signal Priority.

Actuated-Uncoordinated "Free" Signal Timing: Each intersection in a corridor responds to its own need with no regard to traffic operations at adjacent intersections. The traffic signal controller adjusts the amount of time served to each phase of the intersection based on the number of vehicles detected by detector loops or video detection at that intersection.

Adaptive Signal Timing: Adaptive signal control systems continually refine the timings at every intersection within a corridor or network, cycle-by-cycle, as traffic conditions change. Adaptive systems monitor traffic conditions using vehicle detectors for all approaches, and often for all movements, of the intersections within the corridor. These systems adjust the signal timing based on the real-time traffic flow in the corridor.

Local Application

Transit priority has been explored locally. Monroe County has done preparatory work by purchasing and testing a limited number of compatible traffic signal controllers, and has explored the use of the existing fire preemption system for the detection of approaching buses. Primary obstacles to implementation include the need to equip the RTS bus fleet with on-board transceivers required to trigger compatible signals.

Layover and Staging Facilities

More efficient, high-frequency services depend heavily on layover locations for idle buses/operators that ensure reliable access to the route starting point. While non-moving buses create obstacles to other mobility modes, they are a very necessary part of transit operations. Bus layover should be accommodated in a way that meets urban design and mobility goals without locating them so far away from passenger activity areas that it increases operating costs or decreases reliability.

The recommended network of the Reimagine RTS initiative identifies the following locations where routes are planned to terminate inside city limits:

- Hudson at Walmart
- Eastman Business Park
- Main/Winton/Merchants
- East and Winton
- Monroe/Highland
- URMC/Collegetown

Accommodating quality layover locations will requires the City to revisit the authority to use curbspace, or otherwise permit bus turnouts described in Chapter 3. Layover locations should be purposely designed to avoid conflict with bike facilities and on-street parking. Driver amenities, such as restrooms, should be considered, and if not constructed on-site, the City should help RTS to facilitate agreements with nearby property owners for use of those facilities where necessary. Layover locations co-located with the first stop of a return trip should feature all amenities associated with Enhanced Bus Stops.

Climate Considerations

Bus Stops

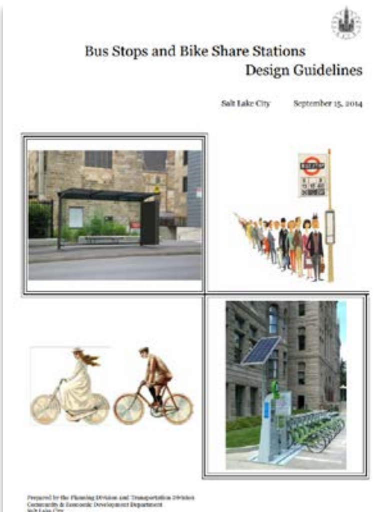
The landing zones at transit stops should be cleared of snow and ice and clear pathways provided to cleared sidewalks. A pathway from the landing zone to the cleared roadway space must be maintained at a width sufficient to enable deployment of wheelchair lifts. This can be particularly challenging as roadway plowing tends to pile snow up at the curb line. This berm of snow should be cut through to enable a clear path for passenger boarding and alighting. As mentioned in the bus stop hierarchy definitions of Chapter 3, user-actuated heat lamps should be installed in bus shelters where possible.

Loading Areas and Travel Lanes

Curb extensions and bus turnouts should not be used for snow storage and should have a maintenance plan for snow clearance. Likewise, transit lanes and bus queue jumps should not be used for snow storage. In winter, access to transit lanes should be kept clear for transit vehicles. Physically separated transit lanes may require special equipment for snow removal.

5 Benchmarks

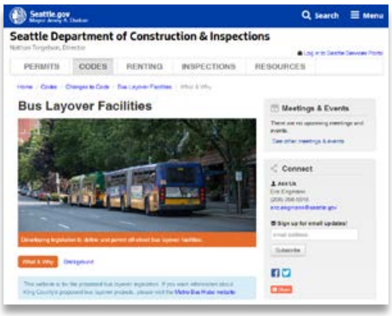
A group of peer cities were identified for use in all Focus Area Reports. The cities were chosen based on ratios of city and urbanized populations, their role as regional centers as opposed to a satellite city in a larger metropolitan region, and their general timeline of establishment and growth in an attempt to include many with comparably designed transportation networks and regional considerations such as climate. Best practice examples from these and other Rochester-comparable locations are summarized below.



Bus Stop Hierarchy and Design Guidelines
The Planning and Transportation Divisions of the Community & Economic Development Department of Salt Lake City prepared a set of bus stop and bikeshare station design guidelines for their City Council in 2014.[5] The guidelines address stop location, a design element inventory, and minimum element provisions as well as bikeshare guidelines that emphasize location near transit access points.

Supportive Right-of-Way Considerations
Envision Downtown, a public/private partnership between the Mayor's Office and the Pittsburgh Downtown Partnership, has deployed a series of pilots along Liberty Avenue, including a dedicated red bus lane to prioritize outbound travel for buses and a rubber bus bumpout to reduce sidewalk congestion. The pilot is a result of findings from Envision Downtown's Public Space Public Life survey.

[5] Council Staff Report, City Council of Salt Lake City
http://slcdocs.com/council/agendas/2014agendas/November/Nov4/110414A5.pdf



Layover and Staging Support

The Seattle Departments of Construction & Inspections and Transportation are working with King County Metro on joint legislation that would define bus layover facilities in the land use code, provide a permitting process, and include standards for inclusion in non-downtown neighborhoods.

Real-time Coordination

The Niagara Frontier Transportation Authority's Niagara Street project in Buffalo included equipping part of the vehicle fleet with traffic signal prioritization equipment. The buses communicate with traffic lights, giving the buses a green light when necessary. Funding comes from a Federal Transportation Administration Livability grant, along with assistance from New York State.

Climate Considerations

The City of Madison, WI currently takes responsibility to clear bus stops as necessary. City crews clear bus stops with concrete pads as part of general plowing operations. Snow removal from other Madison Metro Bus stops begins when the priority snow removal is complete.

6 Summary

The City's direct opportunities to create a transit ready city may be limited to intervention within the roadway, but the City can be a leader in facility design standards and in facilitating partnerships. Locating and requesting targeted and coordinated investments by partners will reinforce the value of those and prior investments and result in a more coherent and usable transit network for residents of the City of Rochester.

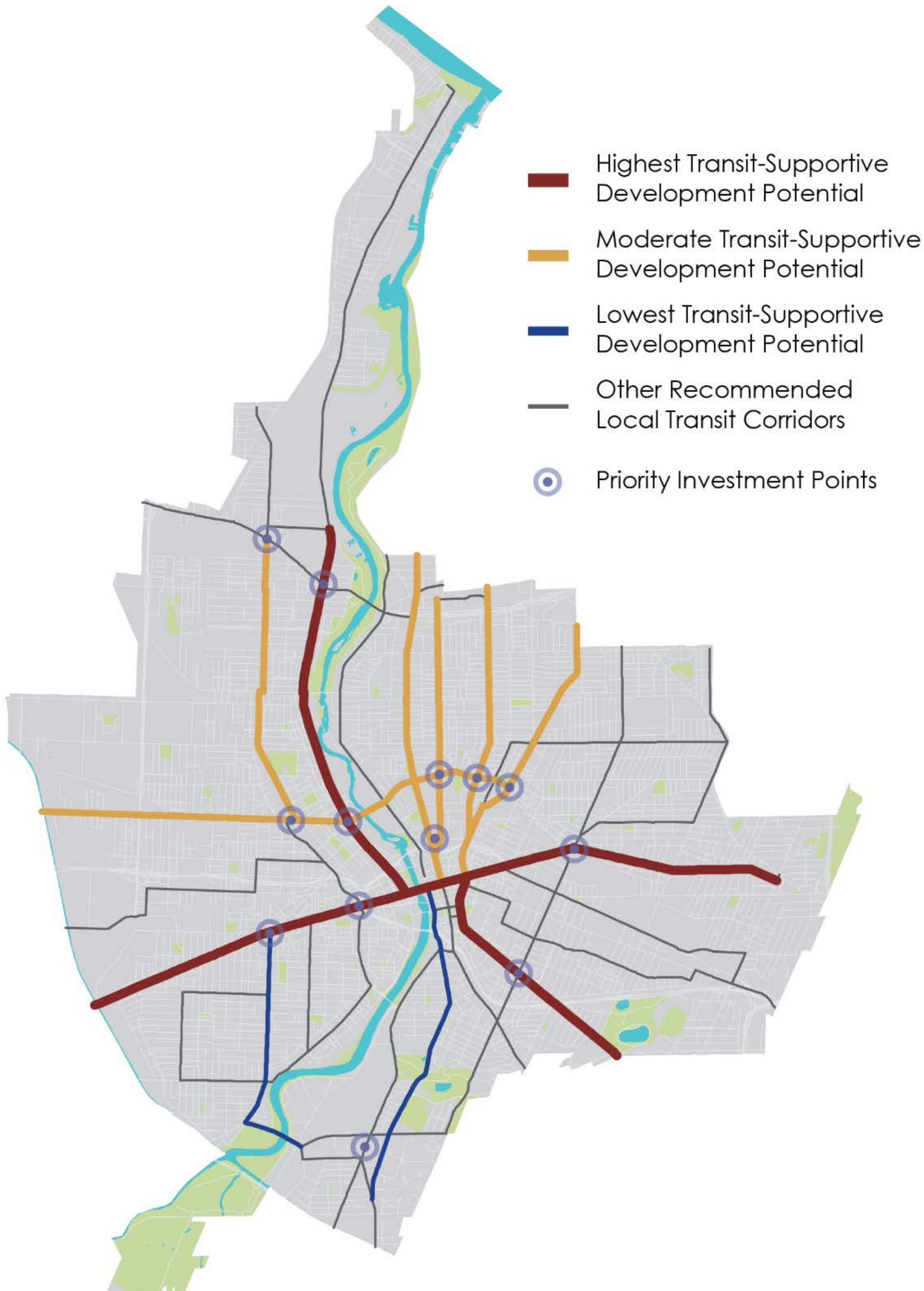
The following projects and programs represent steps forward that the City can take to begin building a more robust core of the regional transit system.

Priority Recommendations

- Working with RTS, develop a stop hierarchy including amenity inventory and inclusion standards
- In an effort to solidify the new transit network, and noting corridors where transit-supportive development potential is high (Figure 22), help RTS to identify options for Transfer Point installation at the following intersections:
  - East Main Street and North Goodman Street
  - Portland Avenue and Draper Street
  - Hudson Avenue and Upper Falls Boulevard
  - Joseph Avenue and Upper Falls Boulevard
  - Lake Avenue and Lyell Avenue
  - Lake Avenue and Ridge Road
  - Dewey Avenue and Ridge Road
  - Lyell Avenue and Dewey Avenue/Broad Street
  - West Main Street and Broad Street
  - West Main Street and Genesee Street
  - Mount Hope Avenue between Elmwood Avenue and Crittenden Boulevard
  - Monroe Avenue and South Goodman Street
- Assess locations along the frequent network where right-of-way treatments such as curb extensions, bus turn outs, transit lanes, and queue jumps would have the greatest positive effect for transit riders in terms of safety as well as travel delay.
- Continue to support RTS' goal to convert a portion of the Mortimer Street Garage into an improved extension of the Transit Center focusing on connections to non-fixed route mobility services.

- Work with RTS to create a pair of Transfer Point stops on Central Avenue between Clinton and Joseph Avenues to serve intercity ground transportation stations as part of the frequent transit network.
- Assess technical and capital requirements of providing transit signal priority with interconnected traffic controllers and vehicle detection. Work with RTS to determine locations where transit signal priority implementation has the greatest potential benefit for operations.
- Accommodate bus layover and staging areas by reallocating curbspace authority, permitting bus turnouts, and/or assisting with on-site driver and rider amenities near
  - Hudson Avenue Walmart
  - Eastman Business Park
  - Main Street, Winton Road, and Merchants Road
  - East Avenue and Winton Road
  - URMC/Collegetown
- Compare the locations of current bikeshare stations with the proposed locations of enhanced stops and transfer points. Subsequently add stations to the bikeshare network where mismatches between these intermodal connections occur.
- Assume responsibility for snow removal at bus stops within the city. Consider an adoption program similar to fire hydrant adoption to ensure that stops are kept clear of snow and remain accessible.

Figure 22 Supportive Development Potential and Priority Investment Locations



Source: City of Rochester, Rochester-Genesee Regional Transit Authority