Central Business District North

Transportation Study

May 2017

GBNRTC

NFTA

Prepared by

C&S COMPANIES®

Greater Buffalo-Niagara Regional Transportation Council

Buffalo, New York

Central Business District North Transportation Study

Prepared by:
C&S Companies

Final—May 2017

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Section 1—Introduction

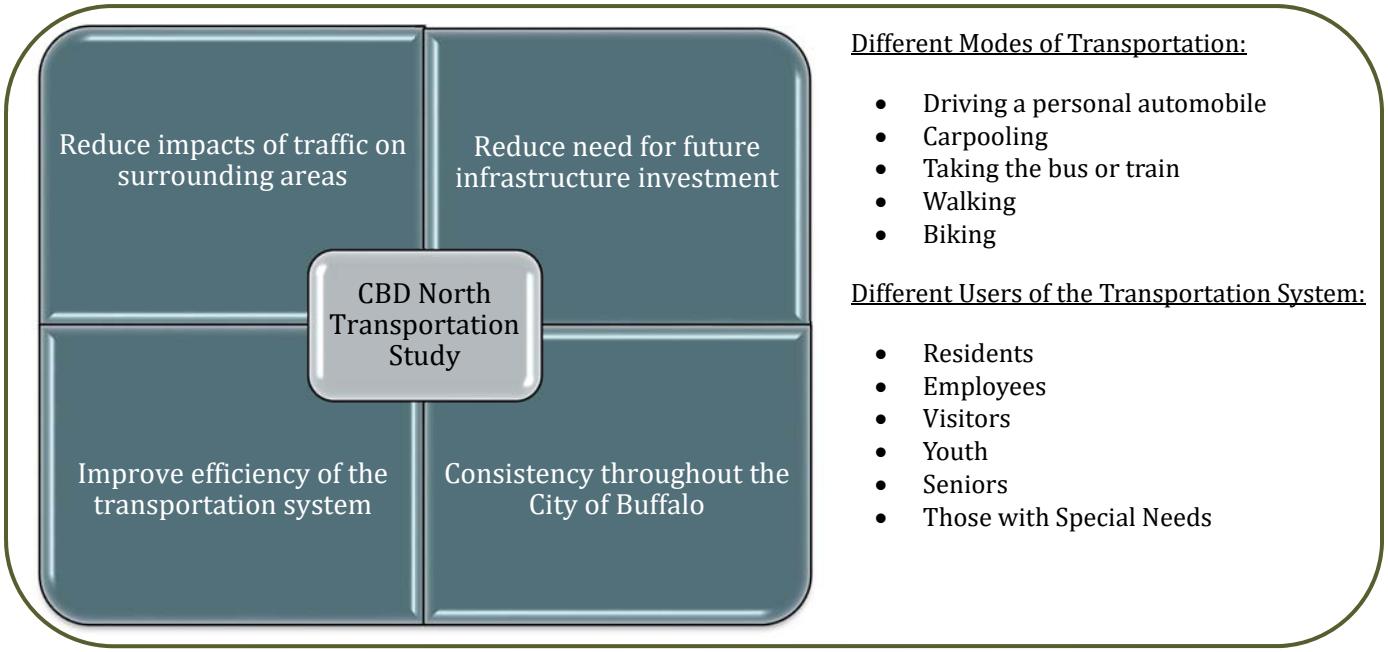
1.1 Study Objectives

The Central Business District (CBD) North Transportation Study is a collaborative effort in the area to implement a transportation system for the future that will support a widespread, diverse, and growing population with multi-modal options for mobility. The purpose of the study is to examine the impacts of existing and proposed development on the Buffalo Niagara Medical Campus (BNMC) and in the surrounding neighborhoods on sub-regional and local vehicular access and circulation, pedestrian and bicycle mobility, and connections to transit services. The study will produce an action plan that will provide local decision-makers the tools they need to reach the study objectives to improve the transportation network while minimizing impacts, improving access for all modes and users, and supporting adjacent communities.

The primary study objectives include:

- Improve the efficiency of the transportation system through improvements to arterials and freeway interfaces which provide direct access to and from the BNMC and northern portion of the CBD, as well as create greater connections between transit and other various modes;
- Reduce the impacts of traffic on the surrounding urban and residential environment by alleviating congestion, facilitating the use of alternative modes, and enhancing the landscape/greenery of the corridors – all of which will work together to reduce potential air and noise pollution from increased traffic;
- Reduce the need for costly future investments in public infrastructure by taking a proactive approach to traffic impact mitigation while major developments continue to take place on the BNMC; and
- Provide consistency in how the transportation system addresses the needs of all of its users throughout Buffalo.

Figure 1.1 —Study Objectives



The study area includes the BNMC, the Fruit Belt and Allentown Neighborhoods, and surrounding areas. The study area is bounded by Genesee Street/West Chippewa Street to the south, Best Street/Summer Street to the north, Elmwood Avenue to the west, and New York State Route 33/Kensington Expressway to the east. **Figure 1.1** shows the project study area.

1.2 Project Team Organization

This study was guided by a Study Team, led by the Greater Buffalo-Niagara Regional Transportation Council (GBNRTC), consisting of the BNMC, City of Buffalo, the New York State Department of Transportation (NYSDOT), the Niagara Frontier Transportation Authority (NFTA), and the Buffalo Urban Development Corporation (BUDC). Along with consultant support and public participation, the Study Team worked together to ensure the project tasks were completed efficiently, providing available data and insight, and that the project objectives were considered throughout the development of the project.

Figure 1.3 —Project Team Organization

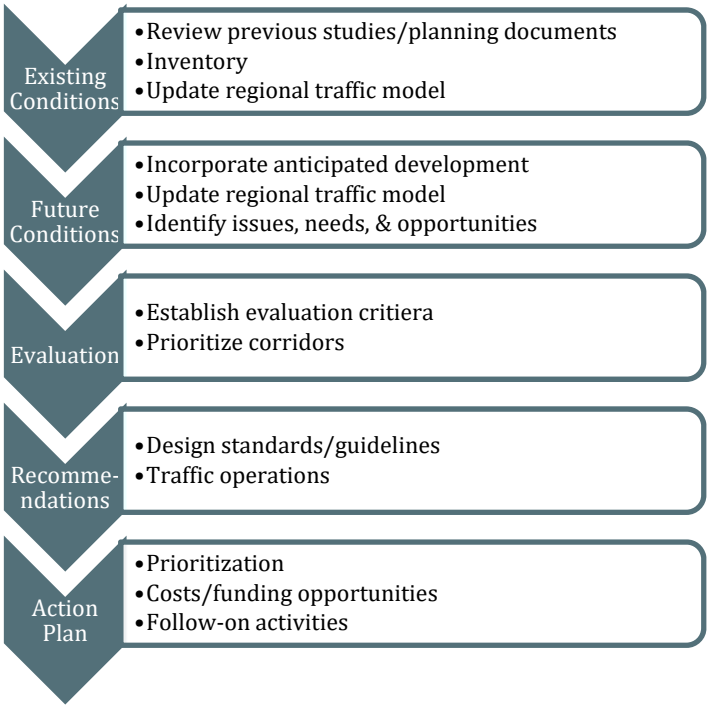
Study Team	Consultant Team	Public Involvement
•GBNRTC •City of Buffalo •NYSDOT •NFTA •BNMC •BUDC	•C&S Companies •Watts Architecture & Engineering	•Stakeholders •General Public

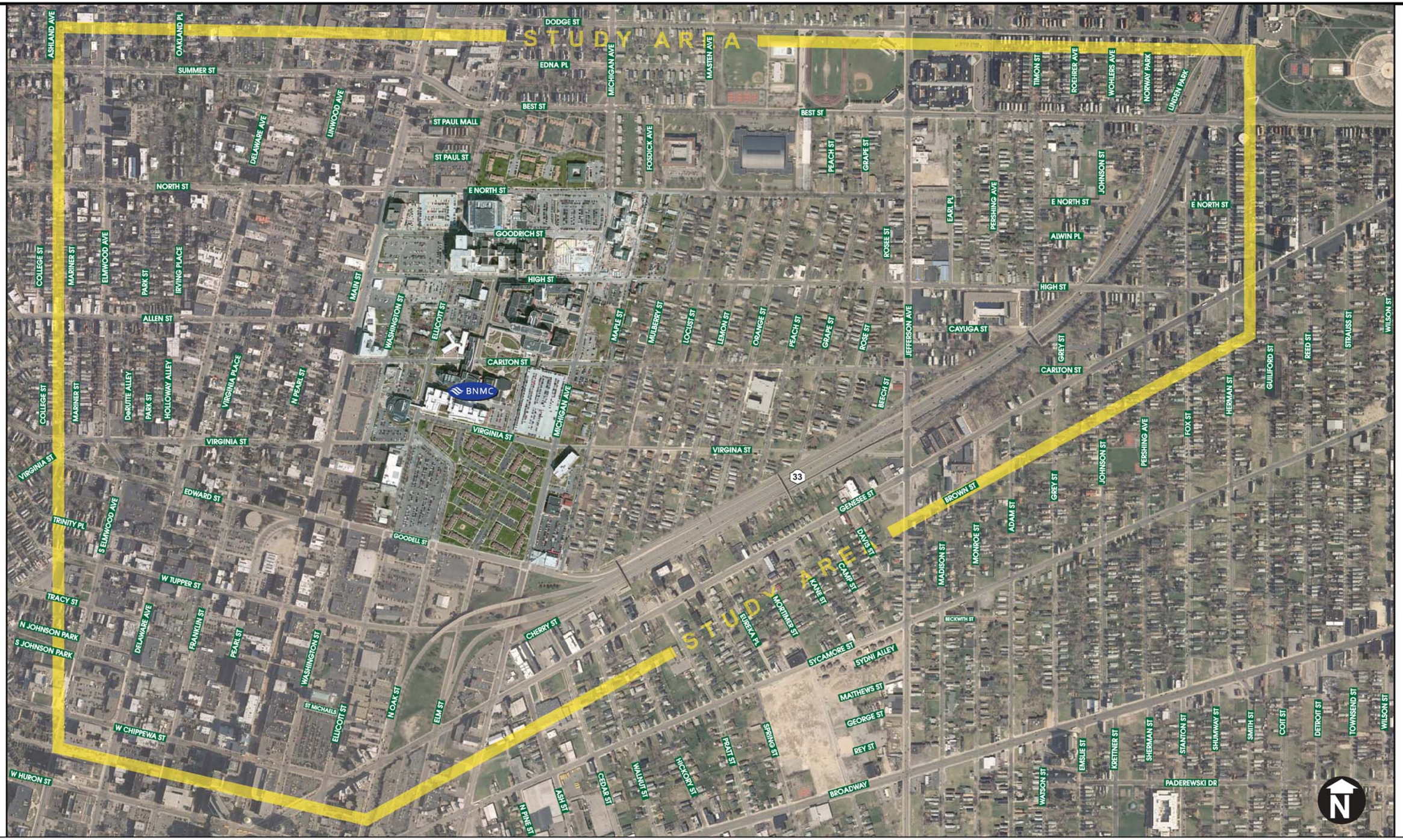
Stakeholder engagement and public outreach occurred via meetings and a public website throughout the project. Meetings were held with the BNMC Parking & Transportation Project Management Group, BNMC Transportation Demand Management Group, the Downtown Buffalo Infrastructure & Public Realm Master Plan Group, and the consultants and representatives for the Bicycle Master Plan to encourage consistency in the transportation planning efforts in the area. A public meeting was held in conjunction with a Four Neighborhoods, One Community meeting to gather feedback on the transportation system in the study area and a stakeholder open house was conducted once the priority corridors were identified to ensure their issues, needs, and opportunities were captured before proceeding into alternatives analysis. See **Appendix A** for more documentation of the public involvement efforts.

1.3 Study Tasks

The study was defined by a number of tasks that were meant to ensure the recommended actions are based on technical data collection and analyses, prioritized based on need and benefits to the area, and supported by the community.

Figure 1.4 —Study Tasks Summary





Study Area

Figure 1.2

Section 2—Existing and Future Conditions Inventory

The existing conditions baseline analysis included a review and verification of information provided and assembled through relevant plans and documents, inventory data gathered from existing sources or gathered in the field, and the regional traffic model. The future condition analysis included the development of an estimated full-build out scenario for the study area, trip generation and distribution estimates, and an update to the regional traffic model for anticipated 2020 conditions.

2.1 Existing Conditions

2.1.1 Relevant Documents and Planning Efforts

Numerous transportation planning and traffic impact studies have been conducted since 2008 documenting development plans throughout the BNMC. These studies provide development information and recommendations to mitigate impacts to parking or traffic operations in the area. Neighborhood planning documents such as the Allentown and Fruit Belt Neighborhood Strategies highlighted strategic areas for improvement or development. The Downtown Buffalo Infrastructure & Public Realm Master Plan, the Bicycle Master Plan, and Buffalo's Green Code, that were being developed at the same time as this study, were prioritizing capital improvement projects and identifying design guidelines and zoning criteria as well.

All of these studies were reviewed and recommendations that were applicable to the study area were identified and carried through the process. **Appendix B** identifies all of the documents reviewed and summarizes the type of information provided. Most documents are available to the public online or if requested.

2.1.2 Existing Inventory

For the 26 most heavily used corridors in the study area, information was gathered and sorted by motor vehicle, pedestrian, bicycle, or transit modes, as well as general demographic or other characteristics of each corridor. The information was gathered via available databases or collected in the field. The corridors analyzed are shown in **Table 2.1** on the following page.

The inventory included the following data:

- Land use and demographic information, BNMC employee residents along corridors
- Functional classification
- Traffic volumes & operations
- Accident history
- Pavement conditions
- On-street parking
- Pedestrian volumes
- Sidewalk condition
- Pedestrian amenities
- On-street bicycle facilities
- Transit boarding/alighting
- Transit stop locations & amenities

Appendix C includes the inventory information summarized for the study area corridors as well as any raw data that may have been available.

Table 2.1 – Study Area Corridors

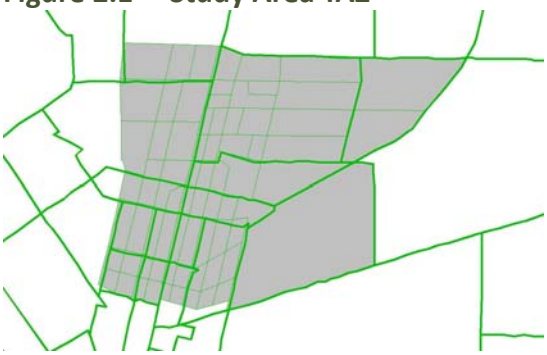
Name	From	To
1. Best St	Main St	RT 33
2. North St	Elmwood Ave	Main St
3. E North St	Main St	Jefferson Ave
4. High St	Main St	Genesee St
5. Allen St	Elmwood Ave	Main St
6. Virginia St	Elmwood Ave	Ellicott St
7. Virginia St	Ellicott St	RT 33
8. Edward St	Elmwood Ave	Main St
9. Goodell St	Main St	RT 33
10. E Tupper St	Elmwood Ave	RT 33
11. Chippewa St	Elmwood Ave	Genesee St
12. Genesee St	Chippewa St	High St
13. Main St	Edward St	Best/Summer St
14. Washington St	Chippewa St	High St
15. Michigan Ave	Genesee St	Best St
16. Pearl St	Chippewa St	Goodell St
17. Ellicott St	Chippewa St	Goodell St
18. N Oak St	Genesee St	Ellicott St
19. Elm St	Genesee St	Goodell St
20. Jefferson Ave	Genesee St	Best St
21. RT 33		
22. Summer St	Elmwood Ave	Main St
23. Delaware Ave	Chippewa St	Summer St
24. Elmwood Ave	Chippewa St	Summer St
25. Carlton St	Main St	Michigan Ave
26. Franklin St	Chippewa St	Best St

2.1.3 Existing Traffic Operations

To model existing traffic conditions for the study area, a subarea model was created using GBNRTC's Travel Demand Model (TDM). Using GBNRTC's base year TDM, a subarea comprised of 13 traffic analysis zones (TAZs) was extracted along with the coinciding road network to create a subarea model for the study.

From the extracted TAZs, GBNRTC staff created 109 smaller zones, to represent individual city blocks within the subarea. Having smaller zones enables the simulation of travel to specific parking locations within the subarea model. Such movements cannot be modeled at the macroscopic level (regional model). In the figure below, the thick green lines illustrate GBNRTC's original TAZ structure which has been overlaid on top of the newly created subarea zone structure (thin green lines), comprising of 109 TAZs for the study.

Figure 2.1 —Study Area TAZ



Source: GBNRTC

There were a number of projects completed by 2013 but not included in the regional TDM. Therefore, the estimated volumes associated with these projects needed to be added to the traffic models. Based on information provided by the Study Team, the list of projects shown in **Table**

2.2 and shown in **Figure 2.2** was compiled to be included in the existing conditions traffic models.

The traffic associated with these projects to be added to the traffic models was estimated based on the latest edition of the Institute of Transportation Engineers Trip Generation Manual, 9th Edition and the known mode share for the area. The daily trips for each project was estimated then reduced by 13% to account for a local mode share reduction, based on recent data provided by the BNMC. These vehicle trips were then directed to the assigned or anticipated parking locations for each project within the traffic model using trip tables to produce hourly volumes. The model was calibrated to match field observed counts within acceptable tolerances.

The TDM trip table, representing base year (2013) trips, was exported to the TransModeler microsimulation model for detailed analysis.

See **Appendix D** for modeling methodology, detailed trip generation, mode share, and trip destination information.

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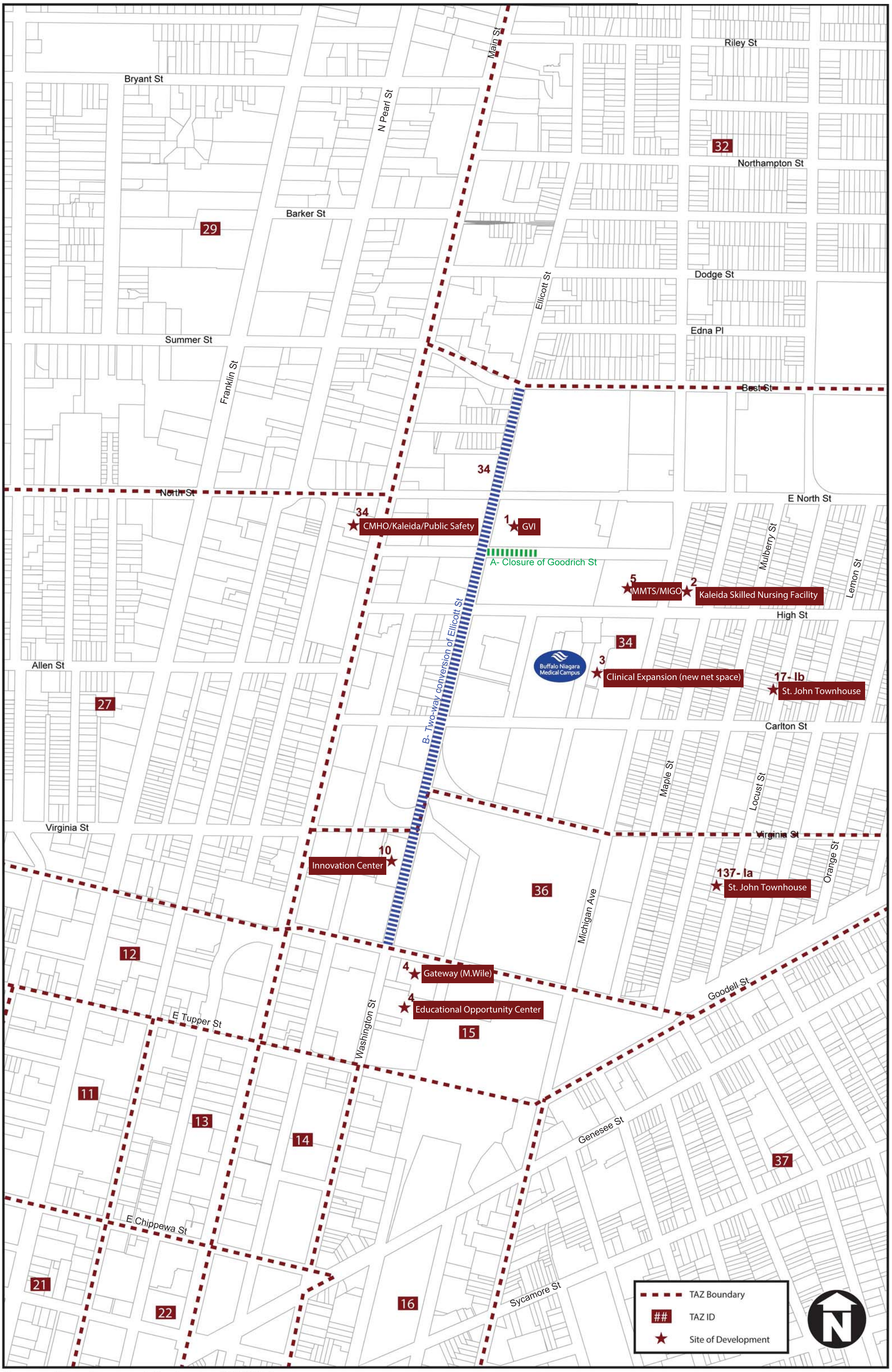


Known Development Projects - BNMC Area

As of January 7, 2014

Figure 2.2 Existing Conditions Projects

Table 2.2 – Existing Condition Projects

Ref #	TAZ	Project Description		Land Use
4	15	Educational Opportunity Center		Academic
		Gateway (M.Wile)		
34	27	CMHC/Kaleida/Public Safety		Outpatient
1	34	GVI	GVI/ED	Clinical Care
			UB/Jacobs Institute	Research
			UB Clinical Research	Clinical Office
			BGH - Relocated from Gates	Clinical Care
			Emergency Department (Removed)	Clinical Care
			Cardiac Arrest (Removed)	Clinical Care
2	34	Kaleida Skilled Nursing Facility		Nursing Home
3	34	Clinical Expansion (new net space)		Outpatient
				Offices
5	34	MIGO/MMTS		Parking
17-Ib	34	St John Townhouse - Phase I		Residential
A	34	Closure of Goodrich St		Infrastructure
B	34/36	Two-way conversion of Ellicott St		Infrastructure
10	36	Innovation Center		Research
17-Ia	36	St John Townhouse - Phase I		Residential

As shown in **Table 2.3,** the microsimulation model provides the following measures of effectiveness (MOEs) associated with the volumes, roadway and intersection geometries, and traffic control information within the study area: total trips, total travel time in minutes, total vehicle miles traveled, total delay in minutes, total stops, and total stopped time in minutes for the entire study area. This information can be used for comparison when evaluating the future condition and recommendations.

The peak hours for the study area are from 8-9 AM and from 4-5 PM and the overall peak period is the PM.

For the initial analysis of the entire study area, the level of service (LOS) for the 26 corridors was evaluated by segment, not intersection lane groups. The LOS for each direction for the 26 corridors is provided as part of **Appendix C**, but any segments with a LOS E or F noted in the existing condition model is shown in **Table 2.4**.

Table 2.3 – Existing Condition Measures of Effectiveness

Interval	Total Trips	Total Travel Time (Min)	Total Vehicle Miles Traveled	Total Delay (Min)	Total Stops	Total Stopped Time (Min)
7-8 AM	15,100	32,584	16,371	15,928	30,587	7,717
8-9 AM	19,253	47,114	20,702	25,868	46,286	13,378
9-10 AM	14,525	32,287	15,108	16,636	32,506	8,618
Total AM Period	*48,879*	*111,984*	*52,181*	*58,432*	*109,379*	*29,713*
3-4 PM	17,266	36,687	17,075	18,708	37,201	9,536
4-5 PM	20,322	45,950	20,333	24,564	46,817	12,868
5-6 PM	19,364	43,714	19,701	23,097	43,260	11,782
Total PM Period	*56,952*	*126,351*	*57,109*	*66,369*	*127,278*	*34,185*

Table 2.4 – Study Area Corridors – Existing Level of Service

Name	Direction	Level of Service
9.Goodell St	Westbound	AM – LOS E
10.E Tupper St	Eastbound	PM – LOS E
11.Chippewa St	Eastbound Westbound	AM–LOS F/PM–LOS E AM–LOS E/PM-LOS F
12.Genesee St	Eastbound	AM – LOS E
17.Ellicott St	Northbound	PM – LOS E
19.Elm St	Northbound	AM – LOS F
23.Delaware Ave	Northbound	PM – LOS E

In addition to the LOS results, queuing was observed in the models to identify areas where LOS may not provide a complete picture in terms of traffic operations. Major queuing was noticed at the intersection of Goodell Street and Michigan Avenue on Route 33 westbound from the Goodell Street and Michigan Avenue intersection during the AM peak period and on Michigan Avenue southbound at Goodell Street during the PM peak period, as shown in the **Figures 2.3 and 2.4**.

During the AM peak period, all 4 lanes on Goodell Street are backed up, almost impacting mainline operations on Route 33. During the PM peak period, the queuing on Michigan Avenue at Goodell Street can be seen impacting operations at the intersection of Michigan Avenue and Virginia Street.

Figure 2.3 —2013 AM Queuing at Goodell Street & Michigan Avenue

Source: GBNRTC

Figure 2.4 —2013 PM Queuing at Goodell Street & Michigan Avenue

Source: GBNRTC

2.2 Future Traffic Conditions

Due to the number of known development projects expected to occur, a future year (2020) was also considered to ensure that any recommendations for the area would also address the impacts based on these anticipated projects.

As with the projects included in the existing conditions model, available information was gathered for projects expected to be completed by 2020. **Table 2.5** and **Figure 2.5** show the development projects included in the 2020 future condition.

The same methodology used for existing conditions was applied to estimate the trips associated with the future projects. Based on the types of future development and the anticipated efforts by the BNMC and the city to decrease the drive alone share for the area, additional reductions were used:

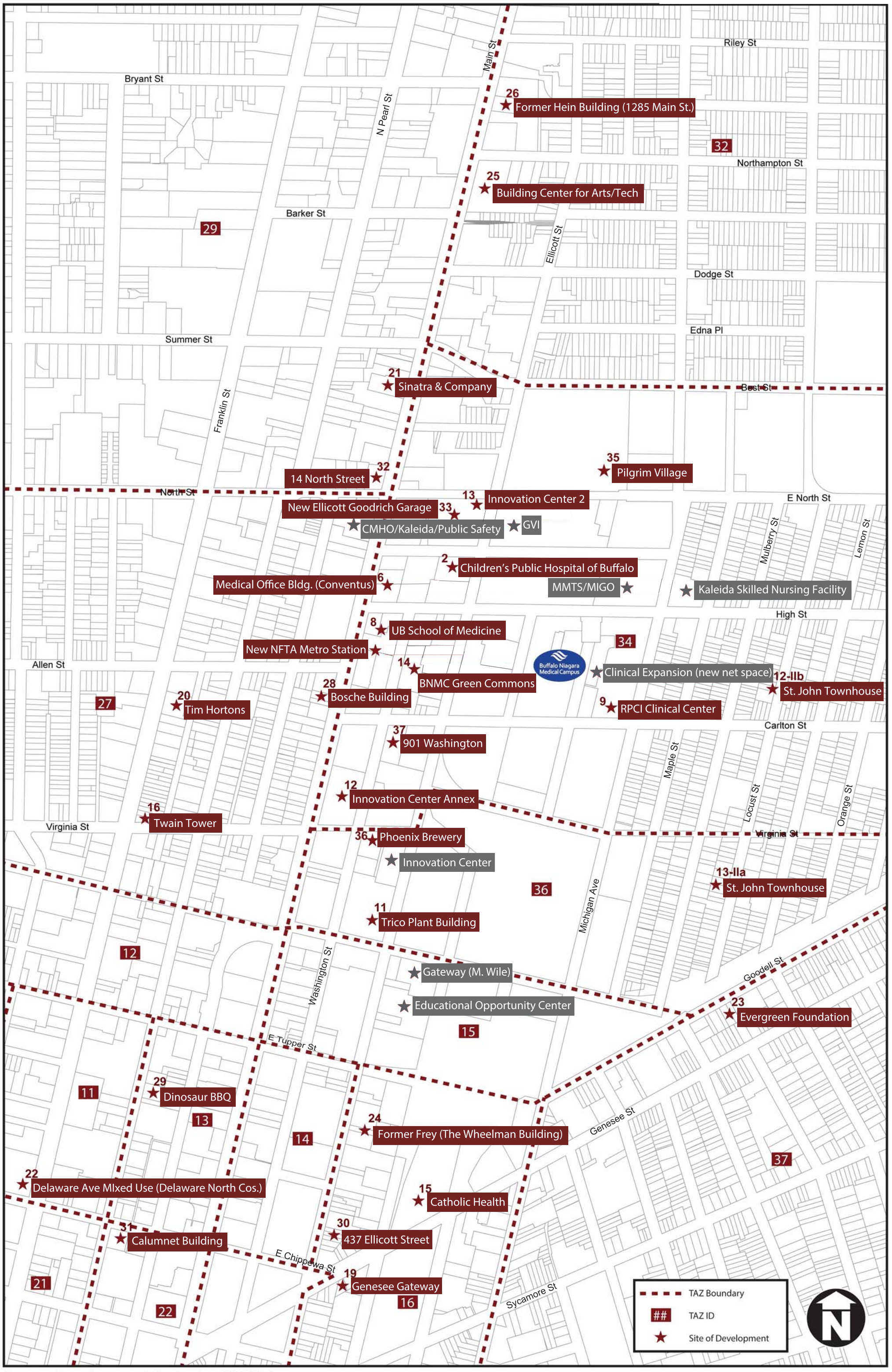
- Mode share reduction was increased to 20% in 2020 from 13% in 2013
- All commercial/retail spaces throughout the study area in mixed-use developments were combined to estimate the trips associated with them as a whole, reduced by 75% to account for internal capture, then redistributed to each location based on the percentage of the total square foot of commercial/retail space in the area
- Trips associated with the following residential development projects were reduced by 30% as opposed to the 20% to account for a higher alternative mode share based on the assumption that their residents are working on the BNMC campus: 901 Washington Street, Pilgrim Village, and the Trico Building.

As with the 2013 model, the new project trips were distributed throughout the study area based on anticipated parking locations and added to GBNRTC's 2020 forecast TDM trip table. Trip tables from the study area were then imported into TransModeler for simulation.

See **Appendix D** for detailed trip generation, mode share, and trip destination information for the 2020 future condition.

Table 2.5 – Future Condition Projects

Ref #	TAZ	Project Description	Land Use
22	11	Delaware Ave Mixed Use	Mixed-Use
29	13	Dinosaur BBQ	Food
15	16	Catholic Health	Offices
19	16	Genesee Gateway	Mixed-Use
24	16	Former Frey the Wheelman Building	Office
30	16	437 Ellicott St	Food
31	22	Calumnet Building	Mixed-Use
16	27	Twain Tower	Mixed-Use
20	27	Tim Hortons	Food
28	27	Bosche Building	Mixed-Use
21	29	Sinatra & Company	Residential
32	29	14 North St	Residential
25	32	Buffalo Center for Arts/Tech	School/Training
26	32	Former Hein Building (1285 Main St)	Mixed-Use
6	34	Medical Office Bldg (Conventus)	Mixed-Use
7	34	Children's Hospital of Buffalo	Clinical Care
8	34	UB School of Medicine	Academic
9	34	RPCI Clinical Center	Clinical Office
12	34	Innovation Center Annex	Research
13	34	Innovation Center 2	Research
14	34	BNMC Green Commons	Mixed-Use
33	34	New Ellicott Goodrich Garage	Parking
37	34	901 Washington	Mixed-Use
17-IIb	34	St John Townhouse - Phase II	Residential
35	34	Pilgrim Village	Mixed-Use
11	36	Trico Plant Building	Mixed-Use
17-IIa	36	St John Townhouse - Phase II	Residential
36	36	Phoenix Brewery	Residential
23	37	Evergreen Foundation	Residential



Known Development Projects - BNMC Area
As of January 7, 2014

Figure 2.5 Future Condition Projects

For the initial future condition model, the traffic network remained the same except any changes associated with known capital improvement projects expected in the study area: Allen Street extension, Cars on Main Street, and improvements along Allen, Carlton, Genesee, and Pearl Streets.

Table 2.6 shows the total trips, total travel time in minutes, total vehicle miles traveled, total delay in minutes, total stops, and total stopped time in minutes for the 2020 future condition for the entire study area. **Table 2.7** compares the total AM and PM peak period results between the 2013 existing and 2020 future conditions.

Table 2.6 – Future Condition Measures of Effectiveness

Interval	Total Trips	Total Travel Time (Min)	Total Vehicle Miles Traveled	Total Delay (Min)	Total Stops	Total Stopped Time (Min)
7-8 AM	16,263	36,599	17,603	18,540	34,931	9,260
8-9 AM	21,670	63,043	23,038	38,811	64,459	19,001
9-10 AM	17,026	48,799	17,928	29,977	49,102	13,109
Total AM Period	*54,959*	*148,441*	*58,569*	*87,328*	*148,492*	*41,370*
3-4 PM	18,636	40,287	18,481	20,670	41,319	10,517
4-5 PM	23,849	61,638	24,413	35,683	66,983	19,290
5-6 PM	20,928	55,634	22,040	32,353	55,890	16,331
Total PM Period	*63,413*	*157,559*	*64,934*	*88,706*	*164,192*	*46,138*

Table 2.7 – Existing/Future Condition MOE Comparison

Year	Period	Total Trips	Total Travel Time (Min)	Total Vehicle Miles Traveled	Total Delay (Min)	Total Stops	Total Stopped Time (Min)
2013	Total AM Period	48,879	111,984	52,181	58,432	109,379	29,713
2020		54,959	148,441	58,569	87,328	148,492	41,370
	Increase	*6,080*	*36,457*	*6,388*	*28,896*	*39,113*	*11,657*
	% Increase	*12%*	*33%*	*12%*	*49%*	*36%*	*39%*
2013	Total PM Period	56,952	126,351	57,109	66,369	127,278	34,185
2020		63,413	157,559	64,934	88,706	164,192	46,138
	Increase	*6,461*	*31,208*	*7,825*	*22,337*	*36,914*	*11,953*
	% Increase	*11%*	*25%*	*14%*	*34%*	*29%*	*35%*

While the total trips within the study area increased by 11-12%, the total travel time, delay, stops and stopped time all increased by 25% or more, depending on the MOE, for both peak hours. The LOS for a number of corridors changed to a LOS E or F compared to the 2013 existing condition model as shown in **Table 2.8**.

Table 2.8 - Study Area Corridors – Existing/Future Condition LOS Comparison

Name	Direction	Level of Service
2. North St	WB	PM – LOS D to LOS E
5. Allen St	EB	PM – LOS D to LOS E
	WB	PM – LOS E
6. Virginia St	EB	PM – LOS D to LOS E
9. Goodell St	WB	AM – LOS E
10. E Tupper St	EB	AM – LOS D to LOS E
		PM – LOS E
11. Chippewa St	EB	AM – LOS F PM – LOS E
	WB	AM – LOS E PM – LOS E
13. Main St	NB	PM – LOS D to LOS E
14. Washington St	NB	PM – LOS D to LOS E
15. Michigan Ave	SB	PM – LOS D to LOS F
17. Ellicott St	NB	PM – LOS E
19. Elm St	NB	AM – LOS F PM – LOS D to LOS E
21. RT 33	WB	AM - LOS D to LOS F
23. Delaware Ave	NB	PM – LOS E

According to the 2013 models, seven corridors experience a LOS E or F and only Chippewa Street westbound during the PM peak hour and Elm Street northbound during the AM peak hour were operating at a LOS F. With anticipated 2020 volumes, 13 corridors will experience a LOS E or F during one peak period or the other. Chippewa Street eastbound during the AM peak hour, Michigan Avenue southbound during the PM peak hour, and RT 33 westbound during the AM peak hour will experience a LOS F by 2020.

The queues observed within the 2013 model based at the intersection of Goodell Street and Michigan Avenue are exacerbated by 2020 to impact the mainline of Route 33 westbound during the AM peak period and on Michigan Avenue up to High Street during the PM peak period. In addition, queues will be noticeable on the westbound approach of Best Street at Jefferson Avenue (possibly up to 700 ft), as shown in **Figure 2.6**. Queues are also expected to reach the mainline at the Route 33 westbound off-ramp at Jefferson Avenue during the AM peak period, as shown in **Figure 2.7**. During the PM peak period, the southbound approach on Jefferson Avenue at Route 33 will also experience queuing, possibly up to Cayuga Street.

Figure 2.6 —2020 AM Queuing at Best Street & Jefferson Avenue

Source: GBNRTC

Figure 2.7 —2020 AM Queuing at RT 33 WB Off-ramp at Jefferson Avenue

Source: GBNRTC

Section 3—Corridor Evaluation and Prioritization

The inventory and capacity analysis results for each of the study area's 26 corridors was evaluated in order to prioritize the 10 corridors that will be the focus for capital improvement recommendations. This section provides a summary of the evaluation criteria, the results of the analysis, and the issues and needs associated with each of the priority corridors.

3.1 Evaluation Criteria

The inventory information, as discussed in Section 2.1.2, was evaluated and compared for the 26 study area corridors. The inventory and other data was organized into the following categories:

- Miscellaneous
- Motor Vehicles
- Pedestrians
- Bicycles
- Transit

The details for each category are shown in **Table 3.1** on the following pages. While some criteria are yes/no questions with simple answers, most of the criteria required a detailed review of data provided for the corridor. For criteria where ratings were involved, a weighted point scale was developed such that those corridors with worse conditions, lack of infrastructure, or more pressing needs received higher points than others.

For example, when pedestrian volumes were considered, the number of pedestrians walking along each corridor was totaled. Then a weighted point scale was created that gave the corridors with the most pedestrian activity 3 points and decreased point values as corridor pedestrian counts decreased. There were a number of corridors with no pedestrian volumes therefore no points for pedestrian activity were applied.

All of the evaluation criteria focus on existing conditions except traffic operations. While points were given to any corridors with existing LOS E or F and queuing concerns, points were also given to those corridors where the 2020 future conditions analysis resulted unacceptable LOS and queuing as noted in **Sections 2.1.3 and 2.2**.

Appendix C contains all of the inventory data and the corridor evaluation sheets that summarize their score per criteria and their overall ranking. The detailed inventory data sheets contain the weighted point rankings as well.

3.2 Priority Corridors

Once the corridor evaluations and rankings were complete, the findings were reviewed with the Study Team. **Table 3.2** on Page 3-4 shows the top 10 corridors based on their evaluation scores.

While Chippewa, Elm, and Genesee Streets were within the top 10 corridors based on the initial evaluation scoring, portions of these corridors are already planned for improvements that will affect these corridors. Therefore, adjustments were made to remove these three corridors and to include Best Street, Washington Street, and Jefferson Avenue due to their connections to Route 33 and the BNMC, as shown in **Table 3.3** and **Figure 3.1**.

Table 3.1 – Evaluation Criteria

MISCELLANEOUS
Stakeholder/Community Input
Has the location been previously identified as an issue?
Consistency with Planning Efforts
Is the location identified as a focus area in the Downtown Infrastructure Plan?
Is the location recommended for improvement in the 2010 BNMC Transportation Study?
Is the location planned for improvements in the next 5 years?
Land Use Considerations
What is the primary land use and zoning in the corridor (commercial, residential, mixed use)?
Is the location adjacent or leading to a planned development project?
Is the location adjacent to a major parking facility?
Demographic Analysis
BNMC employment data along corridor
Connectivity
Does the location provide direct connections to RT 33 or adjacent neighborhoods?
TOTAL - MISCELLANEOUS (Maximum possible points - 13)
MOTOR VEHICLE CONSIDERATIONS
What is the functional classification (arterial, collector, local, etc...)?
Are queuing issues present at any intersections along the corridor?
Is there an acceptable level of service (LOS D) during AM and PM peaks – existing and future?
Is there a significant increase in average travel time in the future condition?
Is the location a High Accident Location (or include a HAL)?
Accident rate ranking
Are the pavement conditions adequate?
Does clear wayfinding and signage to guide drivers to/from their destination exist?
Is on-street parking congestion an issue?
TOTAL - MOTOR VEHICLE (Maximum possible points - 16)

Table 3.1 – Evaluation Criteria cont.

PEDESTRIAN CONSIDERATIONS
What are the AM and PM peak pedestrian volumes?
Are sidewalks continuous throughout the corridor?
Are sidewalks meeting the standard width of 5'-0"
Rate sidewalk condition
Rate pedestrian environment
Does clear and comprehensible pedestrian scale wayfinding signage exist?
Do intersections contain pedestrian aids?
Are pedestrian crossings adequately marked, signed and/or signalized?
TOTAL - PEDESTRIAN (Maximum possible points - 14)
BICYCLE CONSIDERATIONS
Are there on-street bicycle facilities? If yes, what type (lane, sharrow, cycle track, etc)?
Is there room available to install future bike lanes?
Rate bicyclist environment
Do vehicle volumes and/or speeds prohibit a safe environment for bicycles?
Is the location part of the overall City bike network (existing or planned)?
Does the location help to close a gap of the overall City bike network (existing or planned)?
Is bike parking available?
TOTAL - BICYCLE (Maximum possible points - 2)
TRANSIT CONSIDERATIONS
What is the average weekday metro bus passenger volume along the corridor?
How many transit stops are located in the corridor?
Are stops easily accessible to pedestrians/bicyclist (bike lockers/storage)?
Do the stops include a shelter, street amenities, and/or furniture?
TOTAL - TRANSIT (Maximum possible points - 3)
TOTAL SCORE (MAXIMUM POSSIBLE POINTS - 48)

Table 3.2 – Top 10 Corridors Based on Score

Ranking	Corridor #	Name	From	To	Score
1	15	Michigan Ave	Genesee St	Best St	31
2	13	Main St	Edward St	Best/Summer St	29
3	6	Virginia St	Elmwood Ave	Ellicott St	28
3	11	Chippewa St	Elmwood Ave	Genesee St	28
5	17	Ellicott St	Chippewa St	Goodell St	27
5	4	High St	Main St	Genesee St	27
5	9	Goodell St	Main St	RT 33	27
5	12	Genesee St	Chippewa St	High St	27
9	19	Elm St	Genesee St	Goodell St	26
10	2	North St	Elmwood Ave	Main St	25

Table 3.3 – Final Prioritized Corridors

Ranking	Corridor #	Name	From	To	Score
1	15	Michigan Ave	Genesee St	Best St	31
2	13	Main St	Edward St	Best/Summer St	29
3	6	Virginia St	Elmwood Ave	Ellicott St	28
5	17	Ellicott St	Chippewa St	Goodell St	27
5	4	High St	Main St	Genesee St	27
5	9	Goodell St	Main St	RT 33	27
10	2	North St	Elmwood Ave	Main St	25
11	1	Best St	Main St	RT 33	24
12	14	Washington St	Chippewa St	High St	23
24	20	Jefferson Ave	Genesee St	Best St	17

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Priority Corridors

Figure 3.1

GBNRTC

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With input from the inventory, existing and future condition analyses, and input from the Study Team and public, the key attributes, issues, and needs for each of the priority corridors have been summarized below and are shown in graphics in **Appendix E**.

Michigan Avenue – Genesee Street to Best Street

- Poor pavement conditions
- Poor sidewalk condition
- Poor pedestrian environment
- Identified as a bicycle gap
- Existing/future queuing and delays at numerous intersections during PM peak hour
- Increase in travel time by more than 60% by 2020
- Decreased LOS to E/F by 2020
- Direct access to structured parking at BNMC

Main Street – Edward/Goodell Street to Best Street

- Noted as a priority corridor by other planning documents
- High BNMC employment along corridor
- Perceived barrier
- Poor pavement conditions
- High on-street parking density
- Accident rate approximately 7 times statewide rate for similar locations
- Need pedestrian aids at some intersections
- Moderate bus passenger volume
- Identified as a bicycle gap
- Decrease LOS to E/F by 2020
- Direct access to NFTA Metro Rail and serves as a gateway between the BNMC and CBD

Virginia Street – Elmwood Avenue to Ellicott Street

- High BNMC employment along corridor
- Accident rate approximately 12 times statewide rate for similar locations
- Poor pavement conditions
- Sidewalks are less than 5ft wide and/or are in poor condition
- Need pedestrian aids at most intersections
- Poor pedestrian environment
- Perceived barrier
- Increase in travel time by 35% by 2020
- Approach delays northbound on Delaware Avenue and southbound on Ellicott Street by 2020
- Decreased LOS to E/F by 2020

Ellicott Street – Chippewa Street to Goodell Street

- Poor pavement conditions
- Increase in travel time by 22% by 2020
- Existing/future LOS at E/F
- Serves as a gateway between the BNMC and CBD

High Street – Main Street to Genesee Street

- Strong connector between the BNMC and adjacent neighborhoods
- High peak period pedestrian counts
- Portions of poor sidewalk conditions
- Need pedestrian aids at most intersections

- Future queuing and approach delays at Michigan Avenue during PM peak
- Increase in travel time by 35% by 2020

Goodell Street – Main Street to Route 33

- High peak period pedestrian counts at Main Street
- Poor pedestrian environment
- Perceived barrier
- Existing/future queuing off Route 33 @ Michigan during AM peak hour
- Existing/future LOS at E/F
- Direct access from Route 33 and serves as a gateway between the BNMC and CBD

North Street – Elmwood Avenue to Main Street

- High BNMC employment along corridor
- Need pedestrian aids at some intersections
- Poor pavement conditions
- Accident rate approximately 6 times statewide rate for similar locations
- Identified as a bicycle gap
- Decreased LOS to E/F by 2020

Best Street – Main Street to Route 33

- Need pedestrian aids at some intersections
- Poor pavement conditions
- Sidewalks are less than 5ft wide and/or are in poor condition
- Identified as a bicycle gap
- Moderate bus passenger volumes
- Future queuing and approach delays at Jefferson Avenue during AM peak
- Increase in travel time by almost 30% in 2020
- Direct access to/from Route 33, the NFTA Metro Rail, and the BNMC

Washington Street – Chippewa Street to High Street

- High peak period pedestrian counts at Chippewa Street
- Poor pavement conditions
- Poor sidewalk conditions
- Increase in travel time by 20% by 2020
- Decrease LOS to E/F by 2020

Jefferson Avenue – Genesee Street to North Street

- Poor pedestrian environment
- Identified as a bicycle gap
- Future queuing and approach delays at RT 33 during PM peak hours
- Direct access to/from Route 33

There were also a number of general comments regarding issues and needs within the study area or comments regarding policy and program improvements as well:

- Consider how the proposed Green Code may affect development, traffic, parking, and the pedestrian realm
- Provide better wayfinding for all modes
- Education/'rules of the road' training is needed for all users

Section 4—Study Area Considerations

4.1 Design Standards/Guidelines

Before recommendations could be developed for the 10 prioritized corridors, a variety of design standards, including those established for the Buffalo area specifically, were reviewed and consolidated for consideration in this effort. Design standards set forth in the latest versions of AASHTO's A Policy on Geometric Design of Highways and Streets (2011, 6th Edition) and the NYSDOT Highway Design Manual were used unless Buffalo-based standards were identified. The standards set forth in the Downtown Buffalo Infrastructure and Public Realm Master Plan, the Green Code Unified Development Ordinance, and the Design Guidelines described in Buffalo's Bicycle Facility Master Plan took precedence over the overall state and/or national guidelines.

The design standards include guidelines for a number of elements including, but not limited to

- Travel and parking lane width minimums,
- Design minimums for bike infrastructure, and
- Sidewalk widths and crosswalk striping.

See **Appendix F** for more detailed design standards and guidelines considered for this project.

4.2 Traffic Operations Recommendations

As corridor specific recommendations are considered based on documented needs and gaps, there are also traffic operation improvements that can be made at an intersection or along a corridor that may impact operations in the surrounding areas. Signal optimization and road diets on select corridors were considered on a study area-wide basis to ensure positive changes in one area did not negatively impact others.

4.2.1 Signal Optimization Only

As noted in Section 2.2, with anticipated 2020 volumes, traffic operations within the study area will decline. Most notably, delays and queues along Goodell Street, Michigan Avenue, Best Street, and Jefferson Avenue are expected to impact operations beyond a single intersection to adjacent signals and the mainline of Route 33. Focusing on the prioritized corridors with delay or queuing concerns in 2020, the improvements noted in **Table 4.1** on the following page are expected to alleviate all major delay and queuing concerns noted in the 2020 future model.

While the detailed intersection approach delay and LOS were not documented, the overall study area MOEs were compared to the 2020 future model. With the noted recommendations, total delay for vehicles within the study area can be expected to decrease 24% during the AM peak period and 13% during the PM period. A visual review of the model also indicates that the significant queuing issues observed in the 2020 future model were alleviated by the signal modifications. **Table 4.2** shows the MOE comparison for the study area between the 2020 future model and the signal modification plan model.

Estimated costs associated with the signal upgrades are discussed in the details for each of the prioritized corridors.

Table 4.1 – Signal Optimization Recommendations

Location	Recommendation
Intersection of Michigan Avenue & Goodell Street	Full actuation, optimized for peak period volumes
Elm Street & Goodell Street	Install new signal: AM - coordinated with intersection at Michigan Avenue during the AM peak period PM - semi-actuated on Elm Street or set to flashing with stop control on Elm Street
Best Street Corridor - Route 33 to Ellicott Street	Pre-timed-coordinated plan, signal progression with direction travel for each peak period (AM - westbound/ PM - eastbound)
Intersections (2) with Jefferson Avenue & Route 33	Optimized to peak period volumes (exiting Route 33 during AM period and entering during PM period)
North Street Corridor - Elmwood Avenue to Main Street	Optimized to peak period volumes, protected left turn phase added to southbound approach at Delaware Avenue intersection
Intersection of Ellicott Street & Tupper Street	Restriping & realignment to install dedicated left turn & shared thru/right turn lane on southbound (Ellicott Street) approach

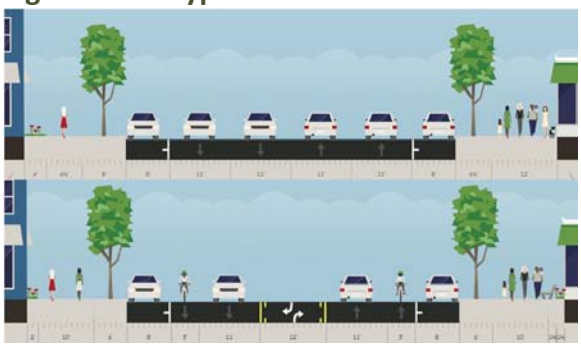
Table 4.2 – Future/Signal Modification Condition MOE Comparison

Year	Period	Total Trips	Total Travel Time (Min)	Total Vehicle Miles Traveled	Total Delay (Min)	Total Stops	Total Stopped Time (Min)
2020 Future No-build	Total AM Period	54,959	148,441	58,569	87,328	148,492	41,370
2020 Future Signal Modification Plan		55,046	127,789	58,672	66,616	124,156	32,254
	Difference	87	-20,652	103	-20,712	-24,336	-9,116
	% Difference	0%	-14%	0%	-24%	-16%	-22%
2020 Future No-build	Total PM Period	63,413	157,559	64,934	88,706	164,192	46,138
2020 Future Signal Modification Plan		63,492	145,901	64,259	77,556	150,110	40,095
	Difference	79	-11,658	-675	-11,150	-14,082	-6,043
	% Difference	0%	-7%	-1%	-13%	-9%	-13%

4.2.2 Road Diets

In addition to signal timing and phasing adjustments, road dieting a corridor would also have an impact on surrounding roadways that need to be evaluated and addressed throughout the study area. A road diet reduces the number of vehicle travel lanes on a roadway in order to provide room for alternative modes of transportation or parking lanes within the existing right-of-way. **Figure 4.1** shows how a typical road diet would look – an existing undivided, 4-lane roadway with parking lanes becomes two lanes with a center left turn lane, parking lanes, and two dedicated bike lanes.

Figure 4.1 —Typical Road Diet



Source: C&S and streetmix.net

Of the prioritized corridors, only Main Street, Jefferson Avenue, Michigan Avenue, and Goodell Street are currently four lanes and could be considered for a road diet. Due to peak hour volumes on Michigan Avenue, it was determined a road diet would not be feasible along this corridor. See Section 5.8 for recommendations on how bicycle users could be incorporated into Michigan Avenue.

Goodell Street Road Diet

Goodell Street currently consists of four westbound travel lanes from east of Michigan Avenue to Main Street. With 2020 future condition volumes and optimized signal operations (including a signal at Elm Street), three westbound lanes between Elm Street and Main Street can be expected to operate with acceptable delays and queuing. Specifically, with the road diet configuration and signal timing and phasing optimization, the LOS at the intersection of Goodell Street and Michigan Avenue is expected to improve from LOS F with no improvements to LOS D or better during the peak periods. The proposed signal at Goodell Street and Elm Street is expected to result in approaches that operate at a LOS C or better during peak periods, even with the lane reduction on Goodell Street.

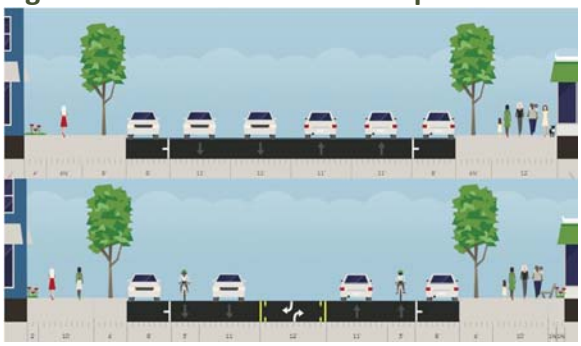
It is recommended that the most northern lane be striped with hatching or as a parking lane between Michigan Avenue and Elm Street. At this time, it is not recommended to physically remove the pavement to construct additional sidewalk or snow storage area, or to install bicycle infrastructure. Other reconfigurations of Goodell Street should be considered as follow-on activities to this project before permanently changing the pavement cross section. Specifically, converting Goodell Street and Tupper Street to 2-way roadways have been discussed but the analysis to determine their feasibility is not a part of this project. Therefore, it would not be prudent to make significant changes to these roadways before all options have been vetted. See Section 5.5 for more information regarding Goodell Street recommendations.

Main Street Road Diet

A road diet of Main Street from Edward/Goodell Street to Best/Summer Street with a cycle track on its west side was a recommendation from the City's Bicycle Master Plan. Main Street south of Goodell Street currently has one lane in each

direction sharing the right-of-way with parking lanes, bike lanes, and rail in some blocks. The model with a road diet along this section of Main Street indicates that its intersections can be expected to continue to operate with acceptable delays and minimal queuing during the peak periods. The current roadway consists of four travel lanes and two parking lanes, as shown in **Figure 4.2** and the proposed configuration would include two travel lanes, a center two-way left turn lane, two bicycle lanes, and two parking lanes.

Figure 4.2 —Main Street Concept



Source: C&S and streetmix.net

While the City's Bicycle Master Plan proposed a cycle track on the west side of Main Street, to provide consistency with Main Street south of Goodell Street and easier bicycle connections at the cross streets, this study recommends separated, dedicated bike lanes in each direction. The parking lanes could be bound by curbed bulb-outs at the intersections to facilitate shorter pedestrian crossings and promote slower travel speeds. See Section 5.2 for more information regarding Main Street recommendations.

Jefferson Avenue Road Diet

Jefferson Avenue between Genesee Street and Best Street currently consists of a travel lane in each direction with an additional travel lane in each direction that is used as a parking lane depending on the time and day of the week. The City's Bicycle Master Plan noted that Jefferson Avenue was identified as a desirable north-south connection, but the existing pavement width does not allow for two travel lanes, two bikes lanes, and two parking lanes. While the modeling conducted as part of this project shows that a road diet is possible without significantly impacting delays and queues, a detailed parking analysis was not a part of this project in order to determine the impacts of removing one or both lanes of parking. Therefore, both the Bicycle Master Plan and this study recommend that a road diet of Jefferson Avenue include two marked shared use lanes and two parking lanes pending further parking studies. See Section 5.10 for more information regarding Jefferson Avenue recommendations.

Modeling Results

Since lane reductions on one roadway may impact adjacent roadways and intersections, the overall study area MOEs were compared to the 2020 future signal modification model. With the noted road diet modification recommendations on Goodell, Main, and Jefferson Avenues including a revised signal optimization plan, total delay for vehicles within the study area can be expected to remain unchanged during the AM peak period and increase by only 6% during the PM period. A visual review of the model indicates that no areas of significant queuing were created by the road diet modifications. **Table 4.3** on the following page shows the MOE comparison for the study area between the 2020 future model and the road diet modification plan model.

Estimated costs associated with the road diet plans are discussed in the details for each of the prioritized corridors.

Table 4.3 – Future Signal Modification/Road Diet Modification Condition MOE Comparison

Year	Period	Total Travel Time (Min)	Total Vehicle Miles Traveled	Total Delay (Min)	Total Stops	Total Stopped Time (Min)
2020 Future Signal Modification Plan	Total AM Period	127,789	58,672	66,616	124,156	32,254
2020 Future Road Diet Modification Plan		127,249	58,010	66,806	126,964	32,995
	Difference	-540	-662	190	2,808	741
	% Difference	0%	-1%	0%	2%	2%
2020 Future Signal Modification Plan	Total PM Period	145,901	64,259	77,556	150,110	40,095
2020 Future Road Diet Modification Plan		151,413	64,960	82,339	160,968	42,938
	Difference	5,512	701	4,783	10,858	2,843
	% Difference	4%	1%	6%	7%	7%

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Section 5—Action Plan

This section includes a summary of the recommendations associated with each priority corridor. They are listed in the order of their evaluation scoring noted in Section 3 but it should be noted that circumstances such as available funding, new development, or other infrastructure projects might impact when corridor improvements should or could be considered. The report includes a description of the recommendations and cost estimates. At the end of the section, drawings that graphically depict the plan view and cross sections of each corridor are included.

Costs for improvements along each corridor are based on 2016 dollars and include assumptions regarding specifics such as pavement section, necessary drainage work, sidewalk/snow storage area improvements, signal work, striping/signage, etc. To be conservative, if pavement condition was an issue, it was assumed reconstruction was necessary versus a pavement mill and overlay. Estimates include assumptions for work zone traffic control, survey, and mobilization. Due to the planning-level estimating, a 30% contingency buffer was also included in each estimate. More detailed cost estimating assumptions and information for each corridor is included in **Appendix G**.

5.1 Michigan Avenue – Genesee Street to Best Street

Description

As a major connection between the BNMC, adjacent neighborhoods, the CBD, and Route 33, improving a number of existing issues and concerns along Michigan Avenue will be a priority. Current and projected vehicular delays along Michigan Avenue are expected to be mitigated through signal timing and phasing changes at its intersection with Goodell Street. Other recommendations are shown on Drawings 9-1 and 9-2 and include:

- Pavement reconstruction
- Widen and improve sidewalk/pedestrian realm along portions of the corridor
- Install road sharing signs (MUTCD W11-1 with NYSW5-32P) along corridor, as shown in **Figure 5.1**. Since two lanes of travel in each direction will be maintained during peak periods, shared use lane markings in either the inside or outside travel lanes may lead to driver/bicyclist confusion.
- Install street trees in various locations along corridor
- Install new curb ramps, crosswalks, and pedestrian indications at High Street as well as new crosswalks at Goodell Street and Carlton Street

Figure 5.1—Shared Use Signage

Source: 2009 MUTCD/NYS TSMI 13-07

Owner

The jurisdiction responsible for Michigan Avenue is the City of Buffalo.

Costs

Michigan Avenue is a federal aid eligible local road. Costs for the improvements along Michigan Avenue are estimated at approximately $4.5 million.

5.2 Main Street – Edward/Goodell Street to Best Street

Description

A road diet is recommended for Main Street consistent with the lane configurations south of Edward/Goodell Street. The roadway would include two travel lanes, a two-way center left-turn lane, two bicycle lanes, and two parking lanes. As stated in Section 4, while the City's Bicycle Master Plan proposed a cycle track on the west side of Main Street, to provide consistency with Main Street south of Goodell Street and easier bicycle connections at the cross streets, this study recommends separated, dedicated bike lanes in each direction. Curb bulb-outs would be installed at intersections to help define parking lanes, narrow pedestrian crossing widths, and calm traffic. Other improvements shown on Drawing 6-1 include:

- Pavement reconstruction
- Install street trees in various locations along corridor
- Install new curb ramps, crosswalks, and pedestrian indications at Virginia Street, High Street, North Street, and Best/Summer Street, as well as new crosswalks and curb ramps at a number of side streets along the corridor
- Actuated/optimized signal plans for each peak period along corridor
- Install 'buffalo' bicycle racks as seen on other portions of Main Street and Elmwood Avenue in the city
- Install a new bus shelter at the northbound approach to North Street

Due to the expected changes along Goodell Street as well as Main Street, a closer look at their intersection with Edward/Pearl Street was taken. As shown in Drawing 6-1a, the recommendation is to better define the travel lanes to Edward/Pearl Street with the reduction of lanes approaching the intersection via Goodell and Main Streets. With better defined lanes and less pavement, pathways will be more clear, calm traffic, and pedestrian crossing widths will be reduced.

Owner

This portion of Main Street is NYS Route 5 but under the jurisdiction of the City of Buffalo. Coordination with the NYSDOT is required.

Costs

Main Street is a federal aid eligible state route. Costs for the improvements along Main Street are estimated at approximately $4.0 million.

5.3 Virginia Street – Elmwood Avenue to Ellicott Street

Description

The City's Bicycle Master Plan recommended Virginia Street become a one-way street eastbound between Main Street and Elmwood Avenue. Evaluating the traffic operations associated with converting Virginia Street to one-way operations is not a part of this effort. Therefore, recommendations noted here maintain two-way operations and two lanes of parking but provide two potential options for accommodating bicycle

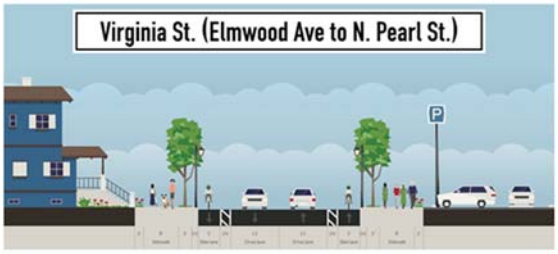
infrastructure. The potential impacts of removing one or both parking lanes on this portion of Virginia Street was not analyzed as part of this study. Further study and additional community outreach should be considered before finalizing the recommendations for this corridor.

Drawing 4-1 shows the recommendation to include sharrows in the travel lanes and maintain two parking lanes until further parking analyses are completed. **Figure 5.2** shows two potential options that could be considered once parking impacts have been determined and mitigated. The options are described in more detail below:

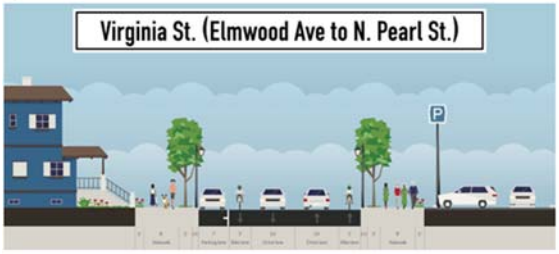
- Option 1
  - Remove both lanes of on-street parking
  - Install two 5 foot bicycle lanes with striped buffer area
- Option 2
  - Remove parking lane on north side
  - Install two 5 foot bicycle lanes

Figure 5.2—Virginia Street Options

Option 1



Option 2



Source: C&S/Streetmix

Besides the lane usage on Virginia Street, Drawing 4-1 depicts corridor recommendations including:

- Pavement reconstruction
- Widen and improve sidewalk/pedestrian realm
- Install street trees in various locations along corridor
- Install new curb ramps, crosswalks, and pedestrian indications at Delaware Avenue, Franklin Street, Main Street and Washington Street, as well as new crosswalks and curb ramps at a number of side streets along the corridor

The cross sections shown on Drawing 4-2 depicts a narrow sidewalk next to an embankment adjacent to a surface parking lot on the north side of Virginia Street between Main Street and Ellicott Street. In order to widen the sidewalk to the 5 foot minimum width, a retaining wall would need to be constructed.

Owner

The jurisdiction responsible for Virginia Street is the City of Buffalo.

Costs

Virginia Street is not a federal aid eligible roadway. Costs for the improvements along Virginia Street are estimated at approximately $2.8 million.

5.4 Ellicott Street – Chippewa Street to Goodell Street

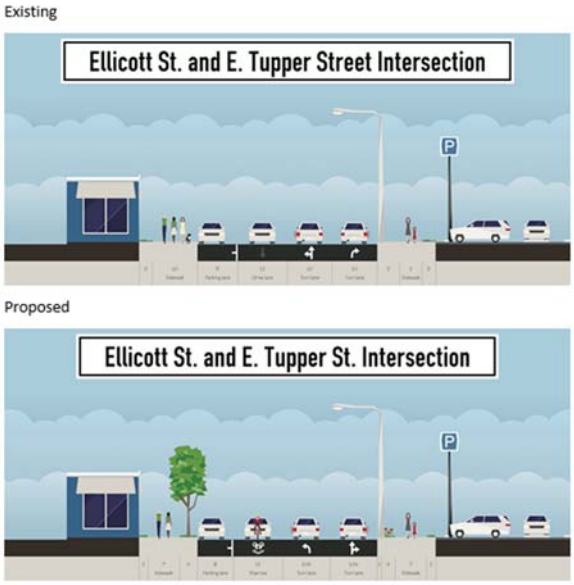
Description

Ellicott Street is a main connector from the BNMC to the CBD and Route 33 during the PM peak period via Tupper Street. Poor pavement

conditions and traffic operations at the intersection with Tupper Street are among the needs for this corridor. Drawing 8-1 highlights the recommendations:

- Pavement reconstruction
- Widen and improve sidewalk/pedestrian realm
- Install shared use markings within existing travel lanes
- Install crosswalks and curb ramps at Goodell Street
- Reconfigure the southbound approach at Tupper Street to include dedicated left turn only lane and shared through/right turn lane (see **Figure 5.3**)

Figure 5.3—Ellicott Street Cross Sections



Source: C&S/Streetmix

Owner

Ellicott Street from Chippewa Street to Goodell Street is Route 5 and under the jurisdiction of the City of Buffalo. Coordination with the NYSDOT is required.

Costs

This portion of Ellicott Street is a federal aid eligible state route. Costs for the improvements along Ellicott Street are estimated at approximately $1.8 million.

5.5 High Street – Main Street to Genesee Street

Description

A major east-west connector through BNMC campus, High Street pedestrian activity is high and future traffic delays and queues are anticipated at its intersection with Michigan Avenue. Operations on High Street are expected to be impacted in the future as operations at the intersection of Michigan Avenue and Goodell Street decrease. Operations improvements at that intersection are discussed as a part of the Michigan Avenue and Goodell Street corridors.

As Drawings 3-1 and 3-2 show, recommended improvements for High Street include:

- Pavement reconstruction from Jefferson Avenue to Genesee Street
- Widen and improve sidewalk/pedestrian realm
- Install street trees in various locations along corridor
- Install shared use markings within existing travel lanes
- Install new curb ramps, crosswalks, and pedestrian indications at Main Street, Michigan Avenue, and Jefferson Avenue

Owner

The jurisdiction responsible for High Street is the City of Buffalo.

Costs

High Street from Main Street to Jefferson Avenue is a federal aid eligible local road. Costs for the improvements along High Street are estimated at approximately $3.5 million.

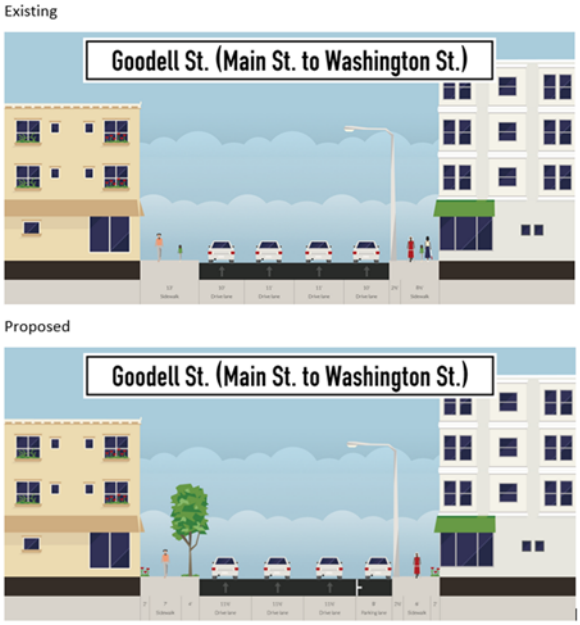
5.6 Goodell Street – Main Street to Route 33

Description

As discussed in Section 4.2.2, a road diet is recommended for Goodell Street that would eliminate a westbound travel lane through striping from Elm Street to Main Street (see **Figure 5.4**). This would reduce the number of active travel lanes for pedestrians to cross and calm traffic. This is a short-term measure until further studies are completed and final recommendations can be made for the corridor. The segment between Michigan Avenue and Elm Street would be used to merge traffic from the northernmost lane.

At this time, the recommendations show the northernmost lane becoming a parking lane. It is possible, that due to adjustments made at the intersection of Main/Goodell/Pearl/Edward Streets, the area will best be served by removing the south lane. These decisions will be made during final design when alignments and physical attributes of the roadways and intersection are more completely analyzed.

Figure 5.4—Goodell Street Cross Sections



Source: C&S/Streetmix

A new traffic signal at Elm Street coordinated with optimized timings at Michigan Avenue will reduce delays and queuing for existing and anticipated future conditions. Drawing 5-1 depicts the following corridor recommendations:

- Pavement reconstruction
- Widen and improve sidewalk/pedestrian realm
- Install traffic signal at the intersection with Elm Street including crosswalks, curb ramps, and pedestrian indications
- Optimized signal timing/phasing at intersection with Michigan Avenue and pre-timed/coordinated signal plan optimized for each peak period for rest of the corridor
- Install crosswalks and/or curb ramps at Michigan Avenue and Ellicott Street

Owner

Goodell Street is Route 5 between Main Street and Ellicott Street. This section and the remainder between Route 33 and Ellicott Street are under the jurisdiction of the NYSDOT. Coordination with the City of Buffalo will be required.

Costs

The portion of Goodell Street that is considered Route 5 between Main Street and Ellicott Street is a federal aid eligible state route. The remainder of the corridor is a federal aid eligible local road. Coordination with the NYSDOT is required. Costs for the improvements along Goodell Street are estimated at approximately $2.2 million.

5.7 North Street – Elmwood Avenue to Main Street

As of 2015, the pavement on North Street from Richmond Avenue to Delaware Avenue was milled and overlaid with sharrows installed. Recommendations noted below are still relevant to address long-term pavement reconstruction, the continuation of sharrows along the entire roadway segment, as well as the other recommendations noted.

Description

With a number of BNMC employees living along the corridor, bicycle and pedestrian improvements to North Street will encourage active transportation uses. Pavement reconstruction and optimized signal timing plans will improve traffic operations and safety. As shown in Drawing 2-1 and highlighted in **Figure 5.5**, recommended improvements to this corridor include:

- Pavement reconstruction
- Widen and improve sidewalk/pedestrian realm, especially the north side between Linwood Avenue and Main Street to reinforce/add curbing
- Install shared use markings within existing travel lanes
- Install new curb ramps, crosswalks, and pedestrian indications at Delaware Avenue, Pearl Street, and Main Street
- Optimize signal plans for each peak period from Elmwood Avenue to Main Street
- Add protection left turn phase to southbound approach at Delaware Avenue signal

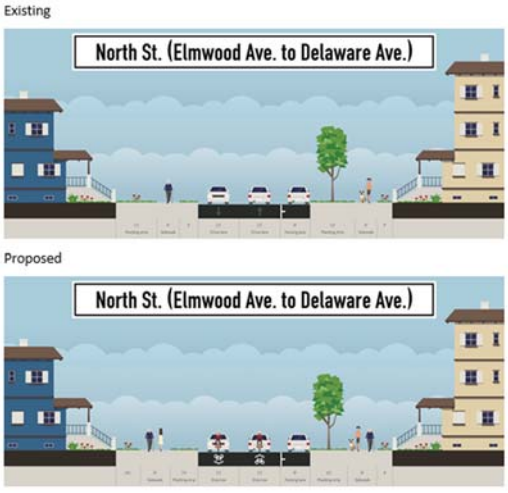
Owner

The jurisdiction responsible for North Street is the City of Buffalo.

Costs

This portion of North Street is a federal aid eligible local road. Costs for the improvements along North Street are estimated at approximately $2.0 million.

Figure 5.5—North Street Cross Sections



Source: C&S/Streetmix

5.8 Best Street – Main Street to Route 33

Description

Best Street provides an alternative connection between Route 33 and the BNMC. Pavement reconstruction, signal optimization, and wayfinding could increase the corridor's feasibility as a desirable route to the BNMC. As shown in Drawings 1-1 and 1-2, recommended improvements to this corridor include:

- Pavement reconstruction from Main Street to Jefferson Avenue
- Widen and improve sidewalk/pedestrian realm
- Install street trees in various locations along corridor
- Install shared use markings within existing travel lanes
- Install new curb ramps, crosswalks, and pedestrian indications at Main Street and Jefferson Avenue intersections
- Install a new bus shelter at the southeast corner of the intersection at Main Street
- Install pre-timed/coordinated signal plan, optimized directionally for peak periods
- Install wayfinding signage to/from Route 33 consistent with existing BNMC wayfinding signage
- Improve safety and pedestrian connectivity at Route 33 access points and the intersection with West Parade Avenue/Circle

Owner

The jurisdiction responsible for Best Street is the City of Buffalo but coordination with the NYSDOT will be required due to connections to Route 33.

Costs

This portion of Best Street is a federal aid eligible local road. Costs for the improvements along Best Street are estimated at approximately $3.8 million, not including improvements at the Route 33 connection or intersection with West Parade Avenue/Circle.

5.9 Washington Street – Chippewa Street to High Street

Description

Poor pavement and sidewalk conditions with high pedestrian volumes and anticipated increases in vehicle delays need to be addressed on Washington Street from Chippewa Street to High Street. Recommended improvements are shown on Drawings 7-1 and 7-2 and include:

- Pavement reconstruction
- Widen and improve sidewalk/pedestrian realm
- Install street trees in various locations along corridor
- Install new curb ramps, crosswalks, and pedestrian indications at Virginia Street, new crosswalks and curb ramps at Carlton Street, and new curb ramps at Tupper Street

Owner

The jurisdiction responsible for Washington Street is the City of Buffalo but coordination with the NYSDOT will be required due to connections to Goodell Street.

Costs

Washington Street is a federal aid eligible local road. Costs for the improvements along Washington Street are estimated at approximately $3.5 million.

5.10Jefferson Avenue – Genesee Street to North Street

Description

As stated in Section 4.4.2., both the Bicycle Master Plan and this study recommend that a road diet of Jefferson Avenue include two marked shared use lanes and two parking lanes until further parking studies can be completed. For the parking lanes to be reduced or replaced to accommodate dedicated bicycle lanes, further study and additional community outreach should be considered.

The shared use travel lanes would widen to 12 feet and the parking lanes would be 8 feet. Signal timing changes will improve future operations at Route 33 and the entire corridor. Drawing 10-1 shows other recommendations:

- Install shared use markings within existing travel lanes
- Sidewalk and pedestrian realm improvements
- Install street trees in various locations along corridor
- Install new curb ramps, crosswalks, and pedestrian indications at High and Best Streets, as well as new pedestrian crossing infrastructure at a number of side streets
- Actuated/optimized signal plans for each peak period for the corridor
- Optimized/pre-timed signal plans at the Route 33 ramp intersections

Owner

The jurisdiction responsible for Jefferson Avenue is the City of Buffalo but coordination with the NYSDOT will be required due to connections to Route 33.

Costs

Jefferson Avenue is a federal aid eligible local road. Costs for the improvements along Jefferson Avenue are estimated at approximately $650,000.

5.11Funding Options

This section provides information on potential funding sources for the implementation of the recommendations for each corridor. It is not meant to be an all-inclusive list, but provide a starting point for funding consideration and research.

Beyond the typical or standard funding options for roadway improvements, a more creative look at funding options for projects is required to maximize potential opportunities. There are a number of different types or categories of funding sources besides transportation such as environmental, community, advocacy, and health-based grants and programs.

The Fixing America's Surface Transportation (FAST) Act, signed into law December 2015, maintains the majority of the previous act's process for apportioning Federal-aid highway funds with a few changes. The FAST Act programs include:

- National Highway Performance Program (NHPP)
- Surface Transportation Block Grant Program (STBG)
- Highway Safety Improvement Program (HSIP)
- Congestion Mitigation and Air Quality Improvement Program (CMAQ)
- Metropolitan Planning
- The new National Highway Freight Program (NHFP)

State and federal funding for transportation improvements are allocated through GBNRTC, the region's metropolitan planning organization. Projects approved for funding are listed in the GBNRTC's Transportation Improvement Program.

For the construction and maintenance of streets, roads, highways, and bridges that are not part of the federal aid network, municipalities are allocated funds from New York State through the programs such as:

- Consolidated Local Street & Highway Improvement Program (CHIPS)
- Transportation Enhancement Program (TEP)
- Consolidated Funding Application (CFA)

Thinking about transportation infrastructure in terms of benefits to the area beyond transportation operations opens the door to numerous other funding options. Agencies such as the Environmental Protection Agency (EPA), the New York State Energy Research and Development Authority (NYSERDA), the Partnership for Sustainable Communities (HUD/DOT/EPA), Centers for Disease Control and Prevention (CDC), and advocacy organizations like Bikes Belong Coalition should all be considered as potential funding sources. Since recommendations to the priority corridors include improvements to the pedestrian realm, the addition of bicycle infrastructure, bus stop amenities, the reduction in traffic delays and congestion, and the overall development of more complete streets, funding opportunities based on active transportation, the improvement of air quality, and community development may all be applicable and should be considered.

5.12 Follow-On Activities

While the scope of this study was defined to account for certain development and projects over a certain number of years, there are a number of opportunities, potential projects, and programs that could impact the study area. This section notes identified follow-on activities that should be conducted to continue improving the multi-modal infrastructure in the area.

Maintain Traffic Models

The analysis and modeling conducted as part of this project was created to be fluid, to change as infrastructure and development projects change, in order to continuously evaluate impacts to the study area. The GBNRTC should coordinate with the BNMC, BUDC, and other agencies to ensure the proposed project list is maintained and updated. The models should also be maintained and updated with recent volume data to be used as a tool to evaluate potential impacts as they change or are proposed, check against analysis done by others, and to compare operations after proposed recommendations are implemented.

Transportation Management Association

The GO BNMC transportation management association (TMA) was formed in 2012 to coordinate projects and advance transportation demand strategies on the BNMC. The objective of the TMA is to provide patients, visitors, employees, students and neighbors with efficient access to the medical campus while improving the mobility of the overall community through coordinated planning, timely implementation, and effective management of a comprehensive, multi-modal, and customer-focused transportation and parking system.

The GO BNMC TMA includes nine member institution representatives from the medical campus; local mobility stakeholders including NFTA, GBNRTC, GO Bike Buffalo, City of Buffalo, NYSDOT, and City of Buffalo Department of Public Works; neighborhood representatives; and organized labor representatives from the medical campus. Through partnerships, the TMA has helped facilitate, manage, and implement more than $2,000,000 in transportation projects over the last three years, including circulator shuttles, secure bike storage facilities, and 4,404 off-street parking spaces.

The TMA's primary goals for 2017 include the following:

1. Build the necessary on-campus parking supply to accommodate the new 2017-2018 population
2. Implement transportation demand management (TDM) strategies across campus organizations and expand upon existing GO BNMC programs to help increase employee and student alternative commuting mode shares
3. Support the development and expansion of regional TDM programs through GO Buffalo Niagara
4. Work with the City and State to implement multi-modal streetscape enhancements that improve Campus access, promote health and safety, and support our place-making efforts
5. Advocate for ride-hailing services (Uber & Lyft) being offered in Western New York

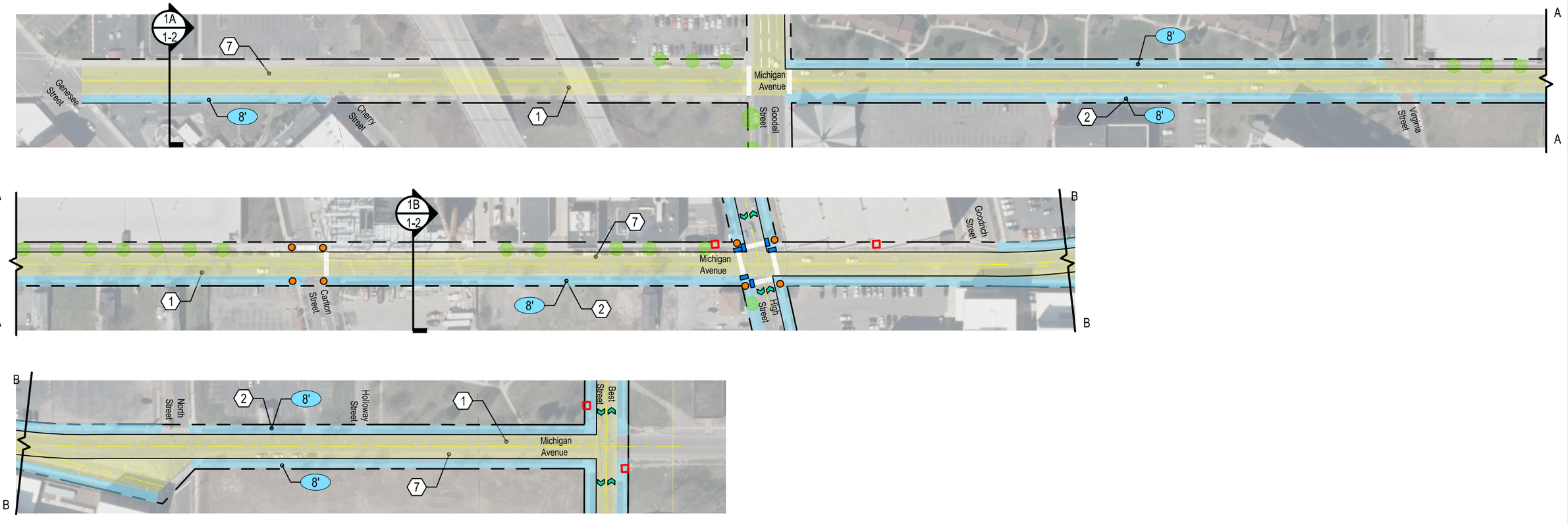
BNMC, Inc., and the TMA partners are also working with the GBNRTC on a funding strategy and implementation plan for a broader regional TMA, GO Buffalo Niagara. GO Buffalo Niagara will function as an umbrella organization to expand TDM initiatives into other major commercial centers throughout the region and support micro TMAs like BNMC's. The GO Buffalo Niagara TMA is expected to be implemented by October 2017.

Continued coordination with the TMA(s) is recommended to ensure that all users are considered, issues and needs associated with alternative modes are incorporated, and recommendations are consistent with their goals and objectives as they are progressed.

Goodell Street/Tupper Street Evaluations – 2-way Conversion

As stated in Section 4.2.2., the conversion of Goodell Street and Tupper Street from one-way to two-way roadways was discussed but not included are part of this study and evaluation. The GBNRTC, City of Buffalo, and the NYSDOT should conduct a study of the impacts, benefits,

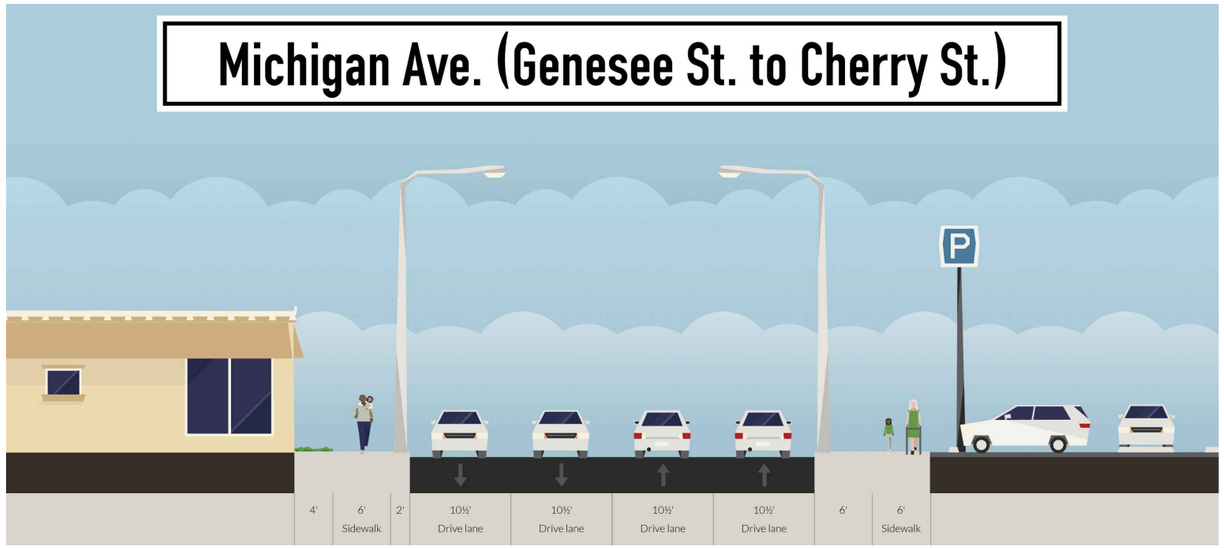
and disadvantages to these conversions with a focus on improved multi-modal connections while maintaining reasonable traffic operations. Once a decision is made on the final configuration of Goodell Street, more permanent improvements can be made.



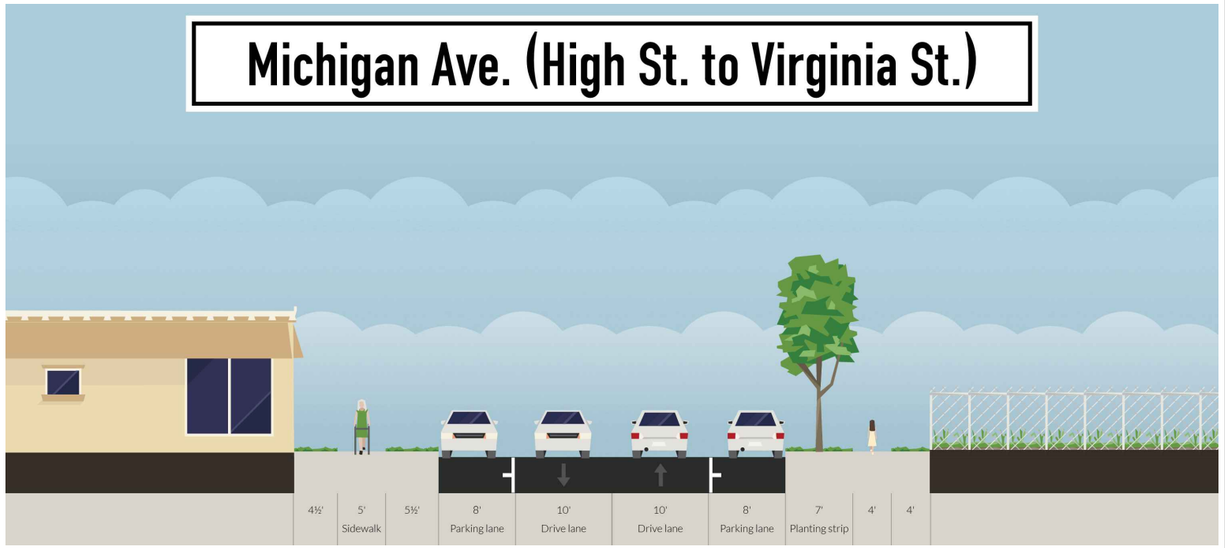
Notes:
Install road sharing signs (MUTCD W11-1 with NYSW5-32P) along corridor.

Michigan Avenue
Drawing 1-1

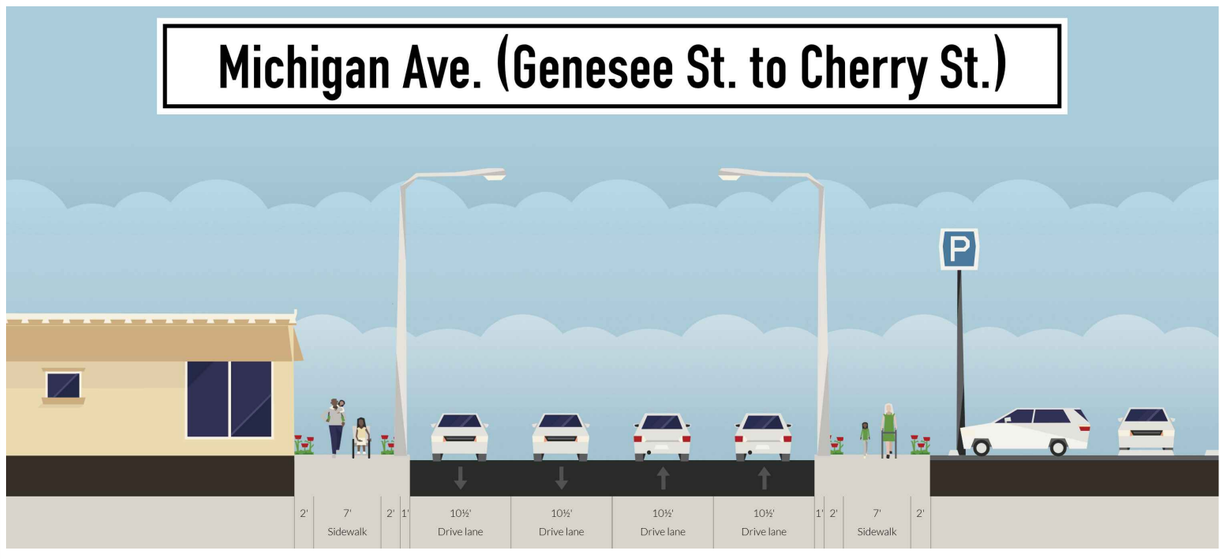
Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk
5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees
X'		Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
		Bus Shelter (Existing/Proposed)
		Right of Way
XX / X-X		Section Reference (section number/drawing number)



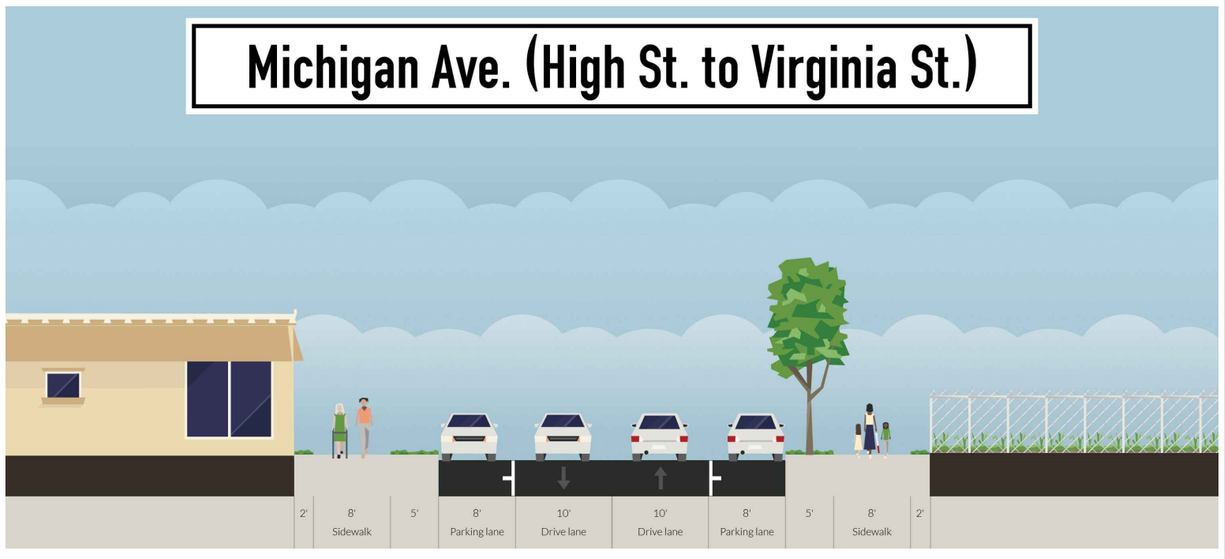
1A Existing



1B Existing



1A Recommended



1B Recommended

Michigan Avenue
Drawing 1-2

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk
5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees
X'		Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
		Bus Shelter (Existing/Proposed)
		Right of Way
XX X-X		Section Reference (section number/drawing number)

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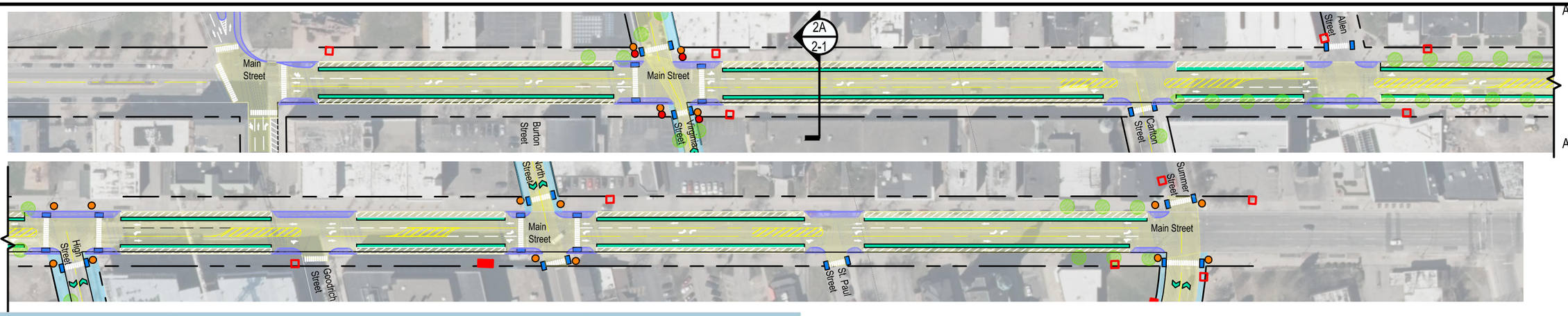
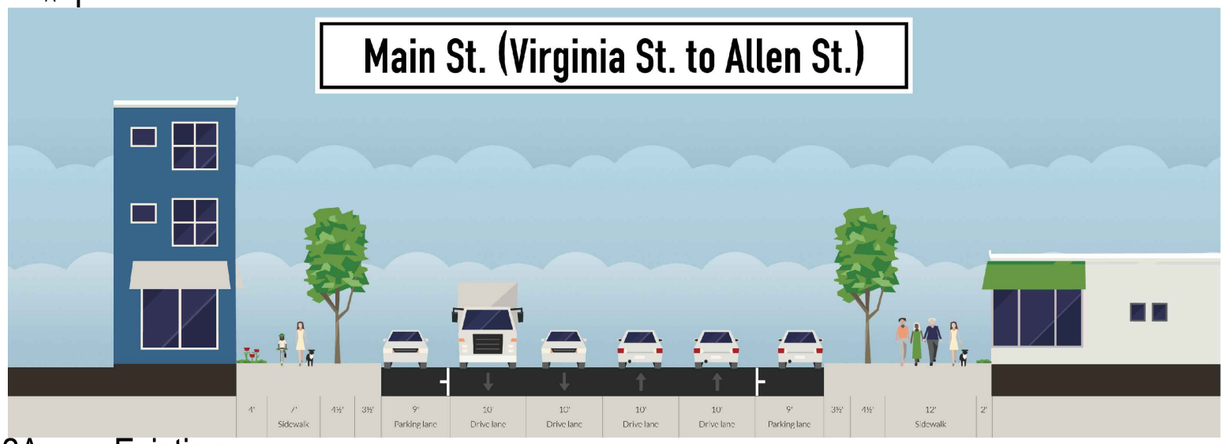
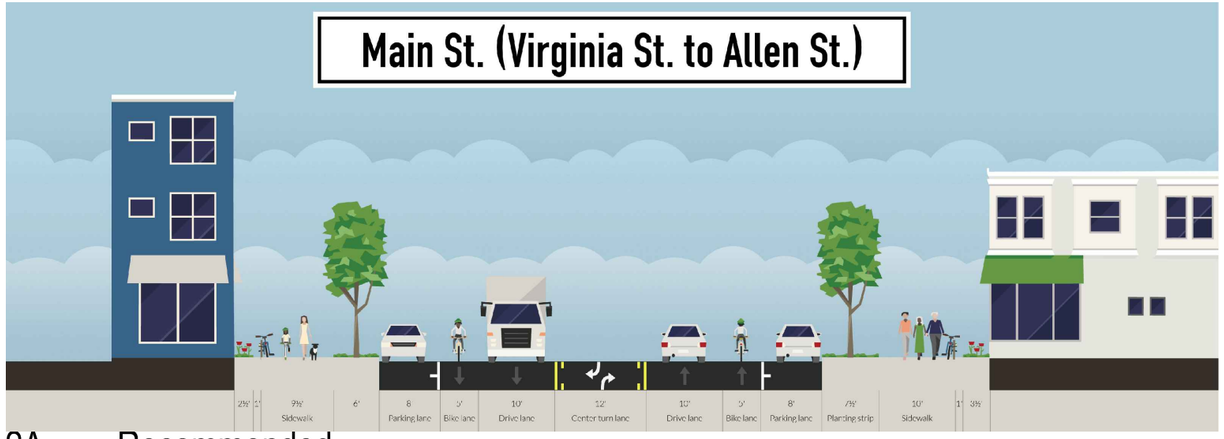




2A Existing



2A Recommended

Notes:
Install City of Buffalo bike racks along corridor.

Main Street
Drawing 2-1

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk

5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees

X'	Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
	Bus Shelter (Existing/Proposed)
	Right of Way
XX X-X	Section Reference (section number/drawing number)

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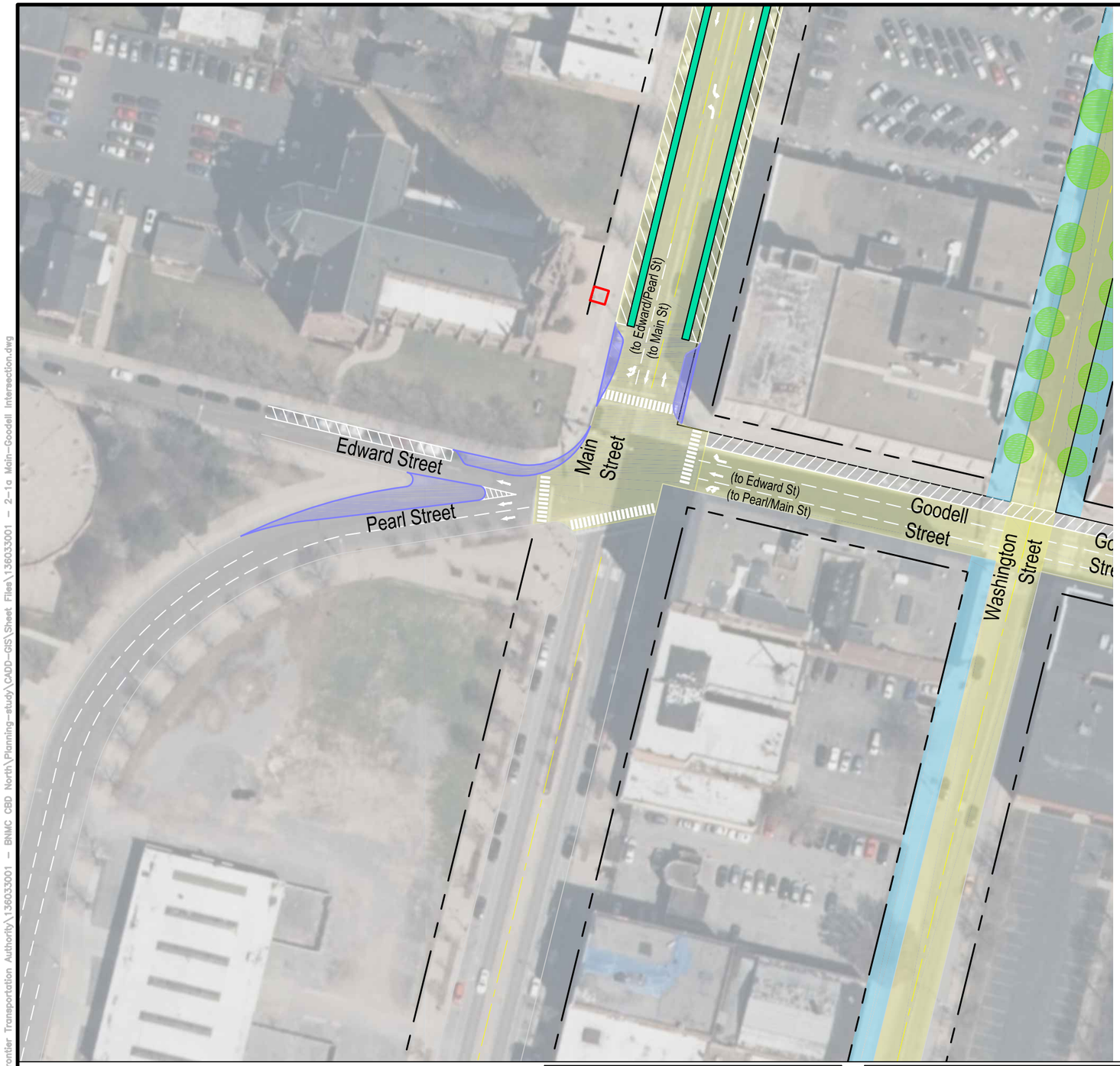

Main/Goodell Intersection

Drawing 2-1a

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk
5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees

- X' — Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
- Bus Shelter (Existing/Proposed)
- Right of Way
- XX / X-X — Section Reference (section number/drawing number)

GBNRTC

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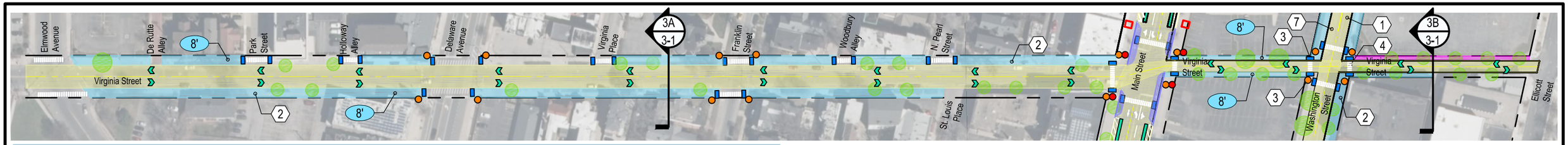
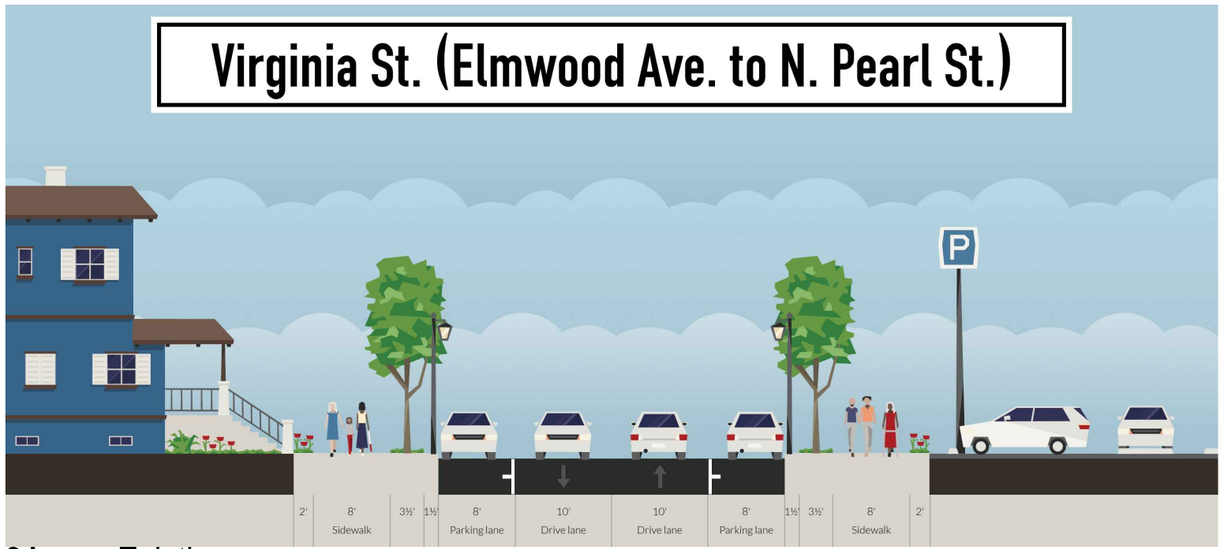


Note:
Includes sidewalk improvements and retaining wall installation



3A Existing

3B Existing

3A Recommended

3B Recommended

N
W
E
S

Virginia Street
Drawing 3-1

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk
5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees
X'		Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
		Bus Shelter (Existing/Proposed)
		Right of Way
XX X-X		Section Reference (section number/drawing number)

GBNRTC

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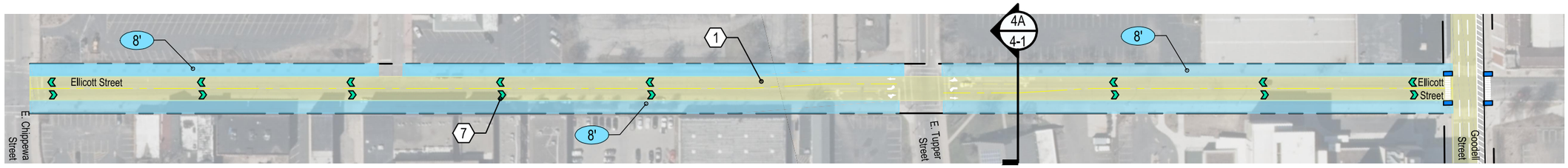
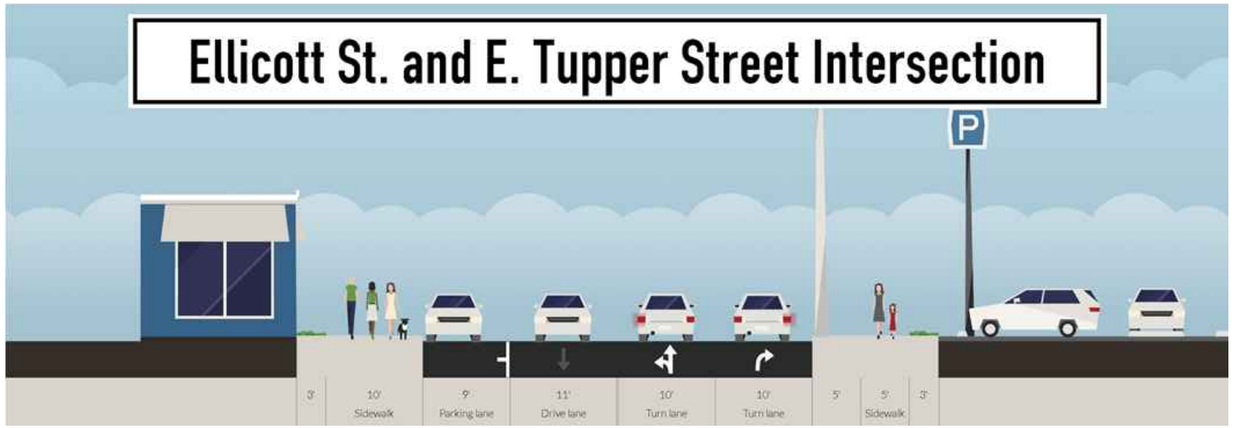
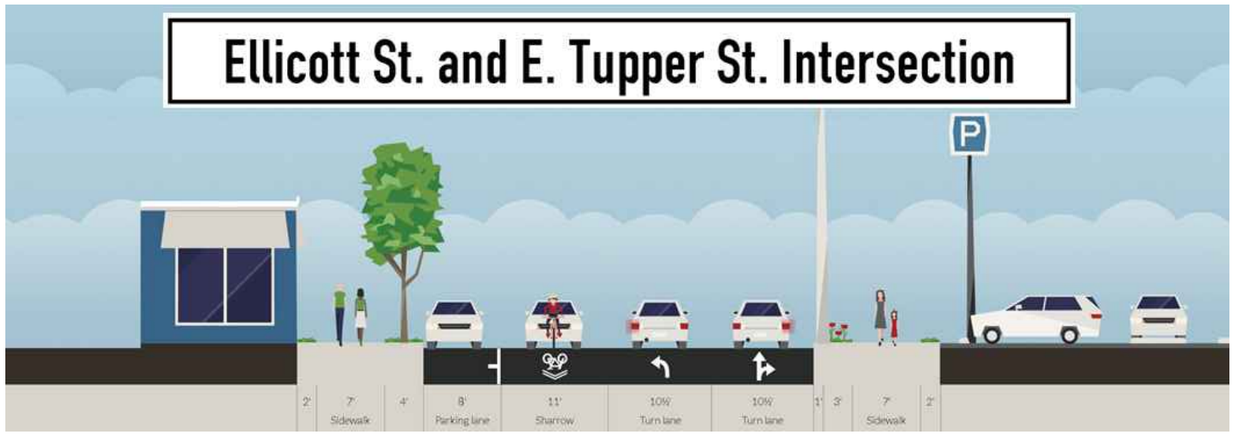




4A Existing



4A Recommended

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk

5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees

X'	Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
	Bus Shelter (Existing/Proposed)
	Right of Way
XX X-X	Section Reference (section number/drawing number)

Ellicott Street
Drawing 4-1

GBNRTC

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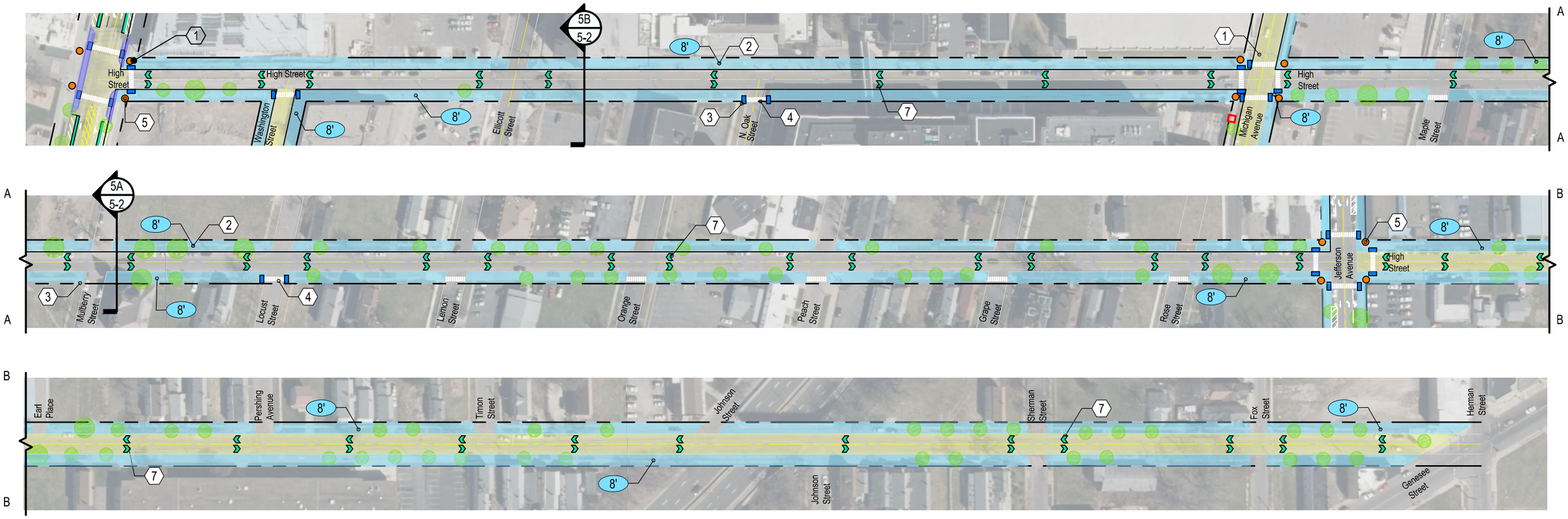
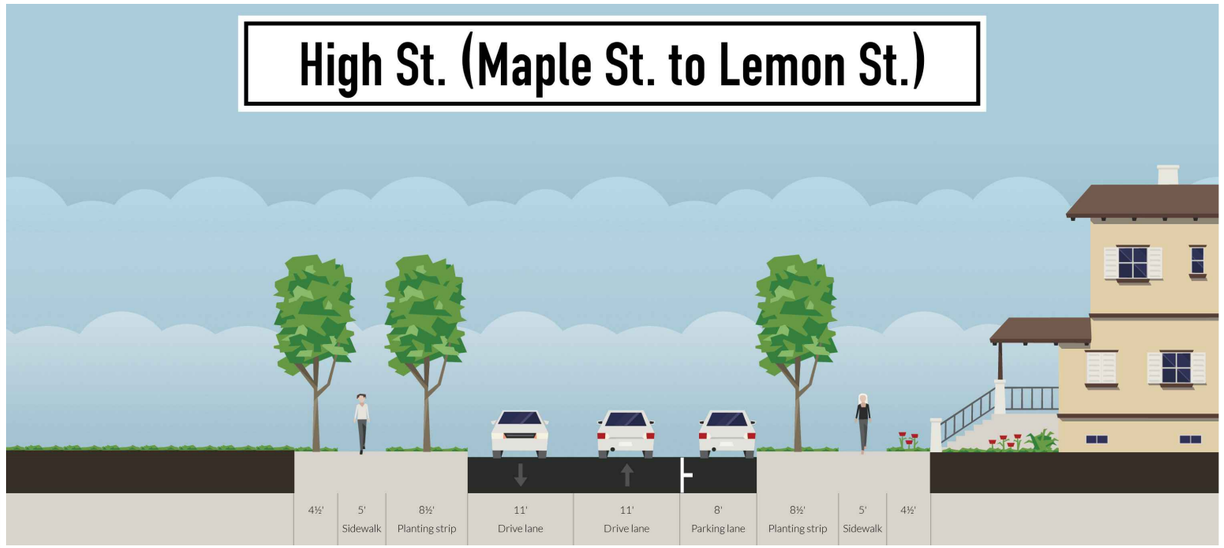


High Street
Drawing 5-1

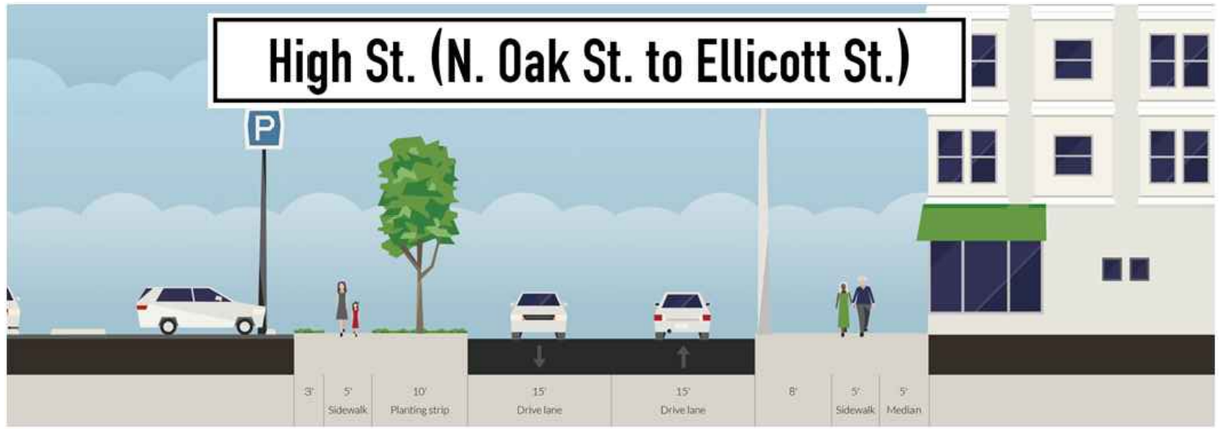
Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk
5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees
X'		Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
		Bus Shelter (Existing/Proposed)
		Right of Way
XX / X-X		Section Reference (section number/drawing number)

GBNRTC

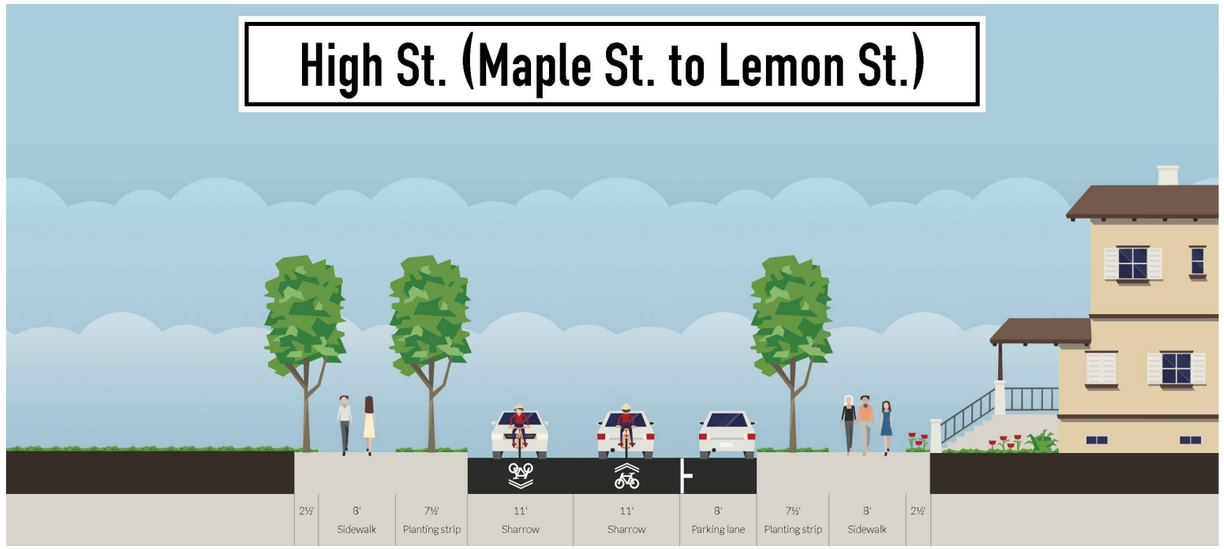
C&S COMPANIES®



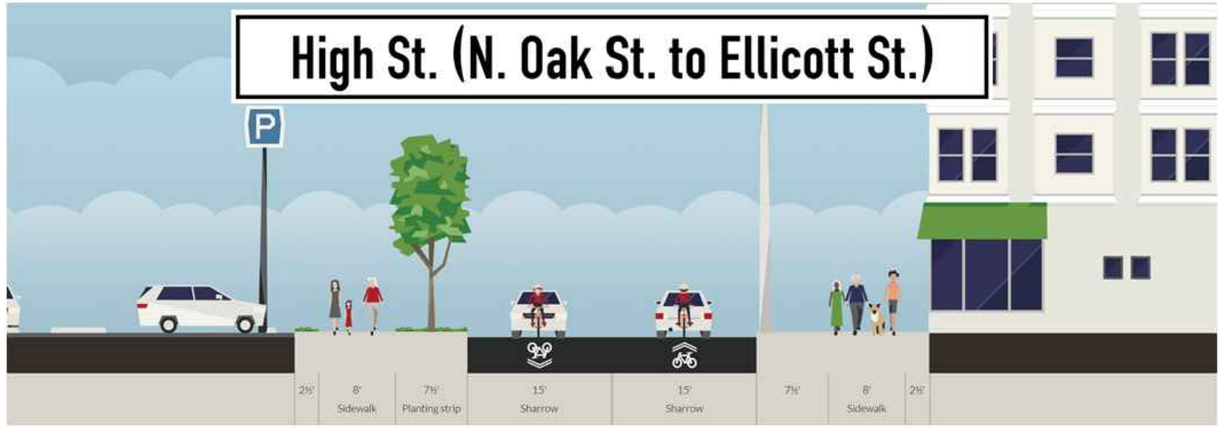
5A Existing



5B Existing



5A Recommended



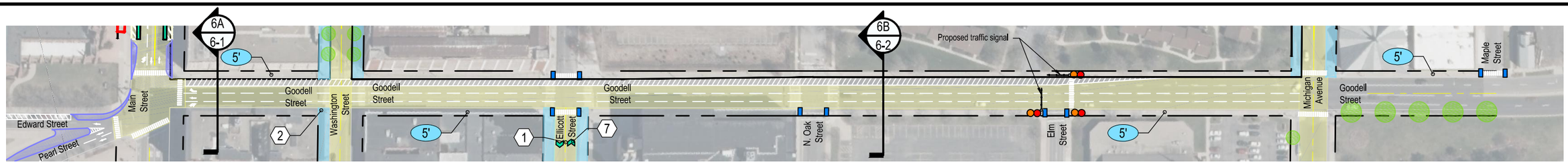
5B Recommended

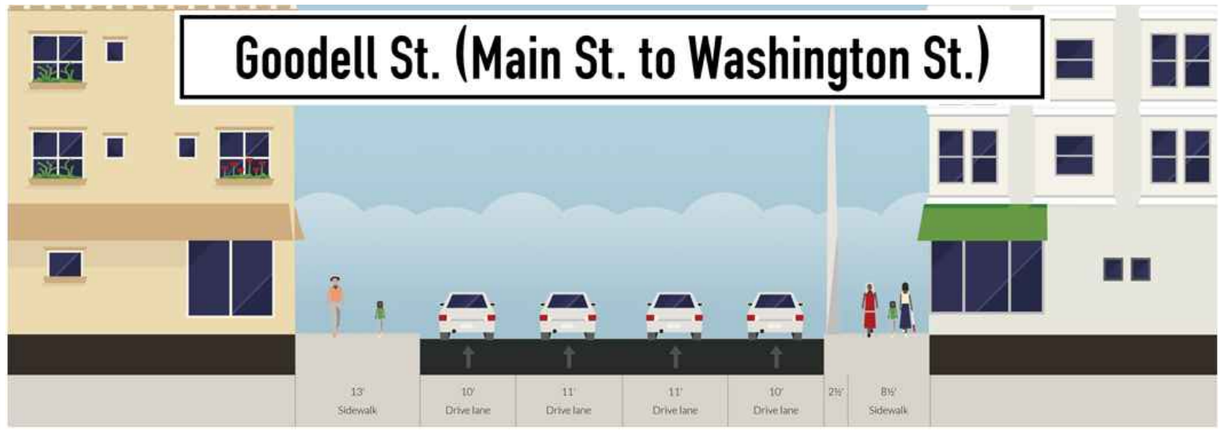
High Street
Drawing 5-2

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk
5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees
X'		Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
		Bus Shelter (Existing/Proposed)
		Right of Way
XX X-X		Section Reference (section number/drawing number)

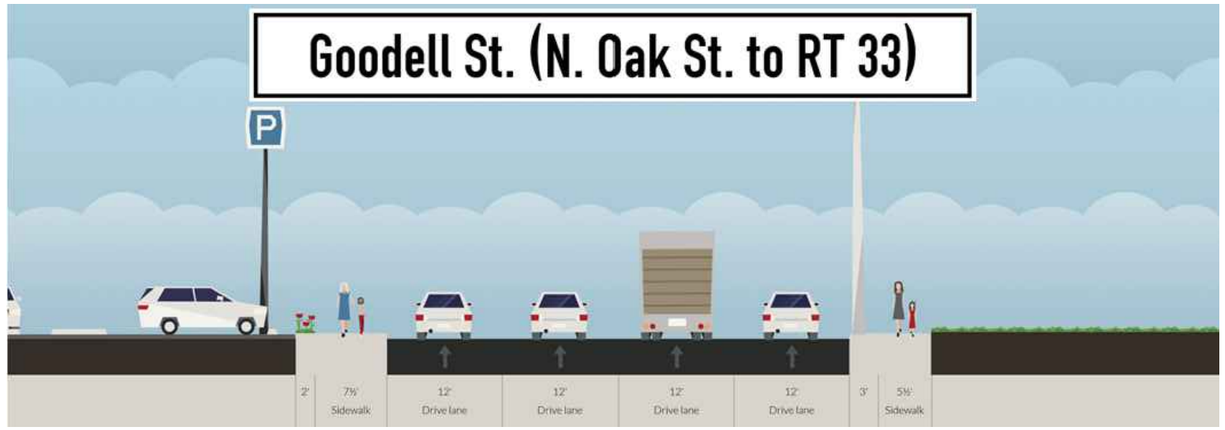
GBNRTC

C&S COMPANIES®

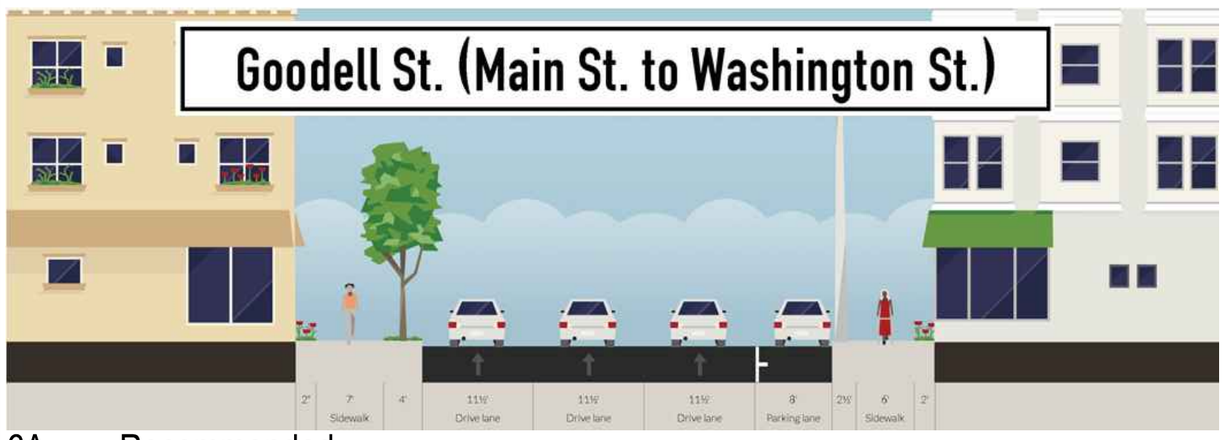




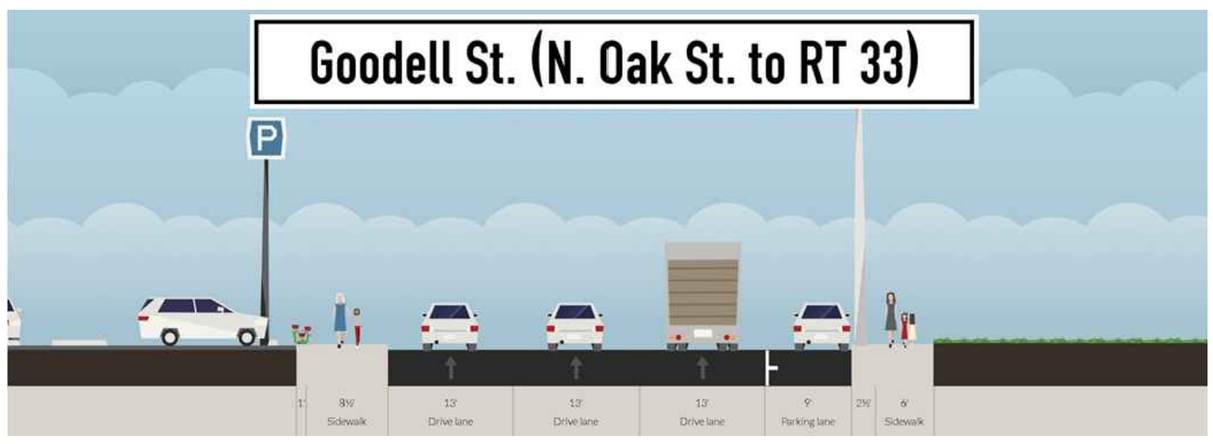
6A Existing



6B Existing



6A Recommended



6B Recommended

N W E S

Goodell Street
Drawing 6-1

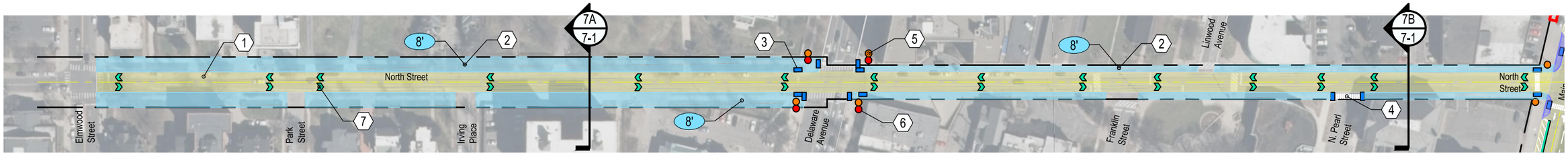
Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk

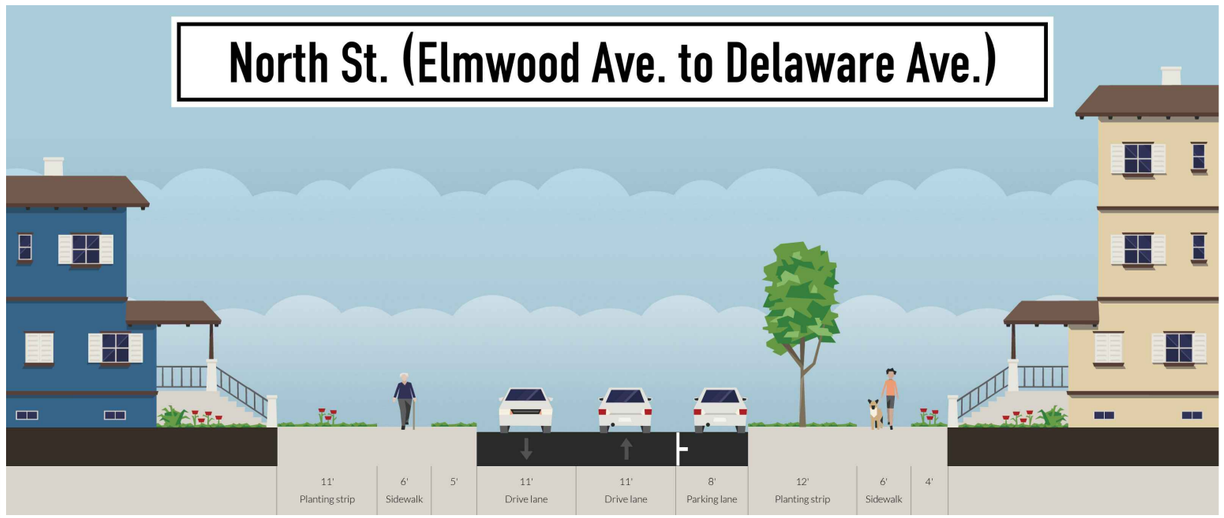
5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees

X'	Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
	Bus Shelter (Existing/Proposed)
	Right of Way
XX / X-X	Section Reference (section number/drawing number)

GBNRTC

C&S COMPANIES®

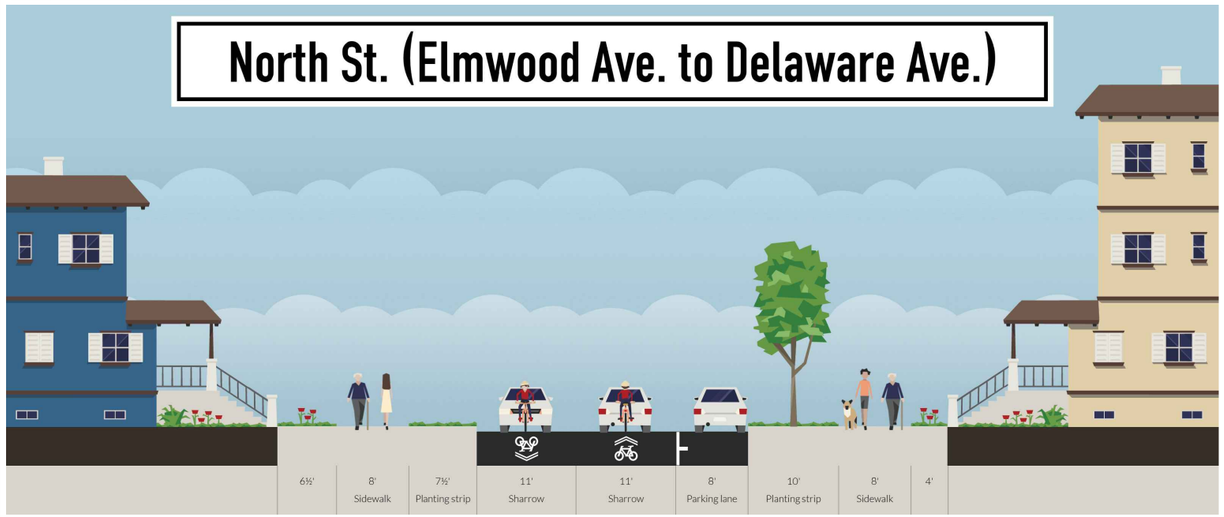




7A Existing

7B Existing

Note:
A pavement mill and overlay project was completed on North Street from Richmond Avenue to Delaware Avenue in 2015, which included the addition of sharrows, while this study was in progress. All recommendations are shown along corridor to ensure consistency.



7A Recommended

7B Recommended

N
W
E
S

North Street
Drawing 7-1

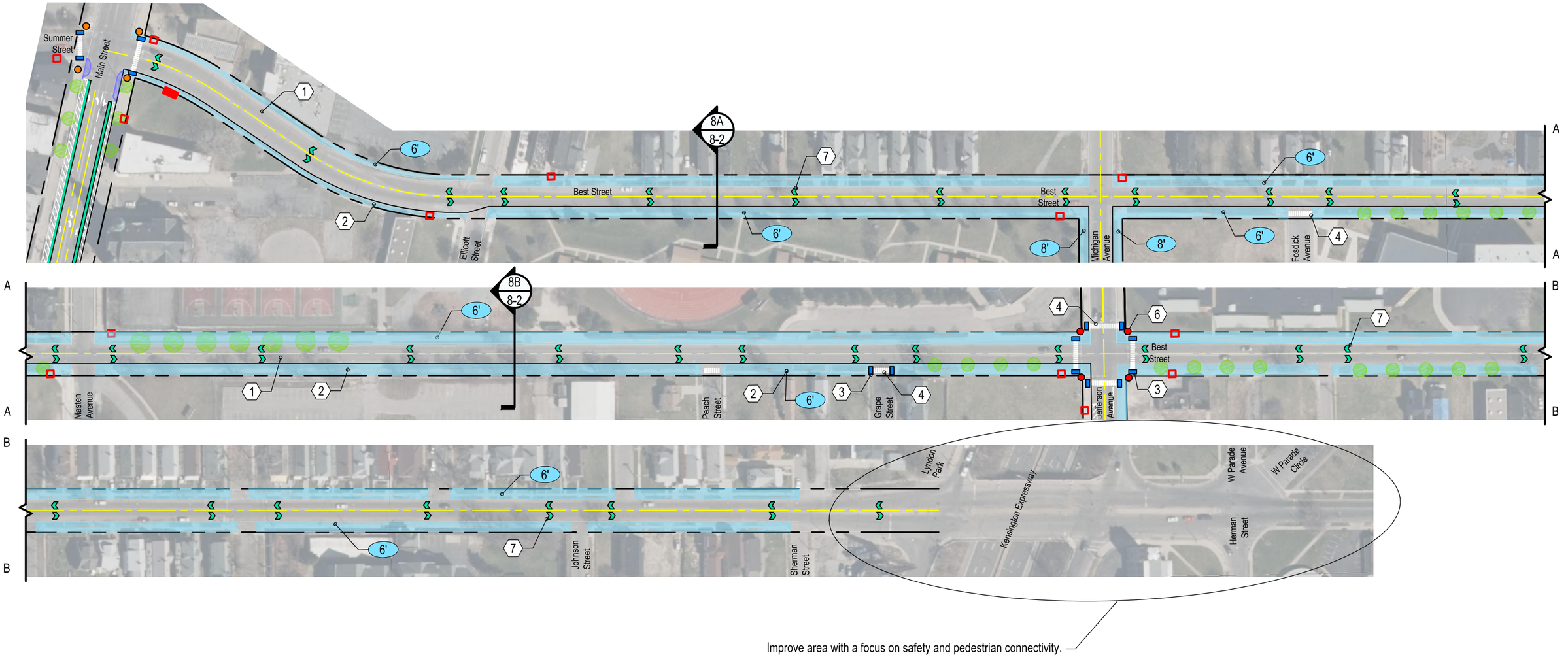
Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk

5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees

X'	Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
	Bus Shelter (Existing/Proposed)
	Right of Way
XX X-X	Section Reference (section number/drawing number)

GBNRTC

C&S COMPANIES®



Note:
Improvements to include wayfinding signage from Route 33 to the BNMC campus. Signage should be consistent with existing BNMC signage.

N
W E
S

Best Street
Drawing 8-1

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk

5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees

X'	Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
	Bus Shelter (Existing/Proposed)
	Right of Way
XX / X-X	Section Reference (section number/drawing number)

GBNRTC

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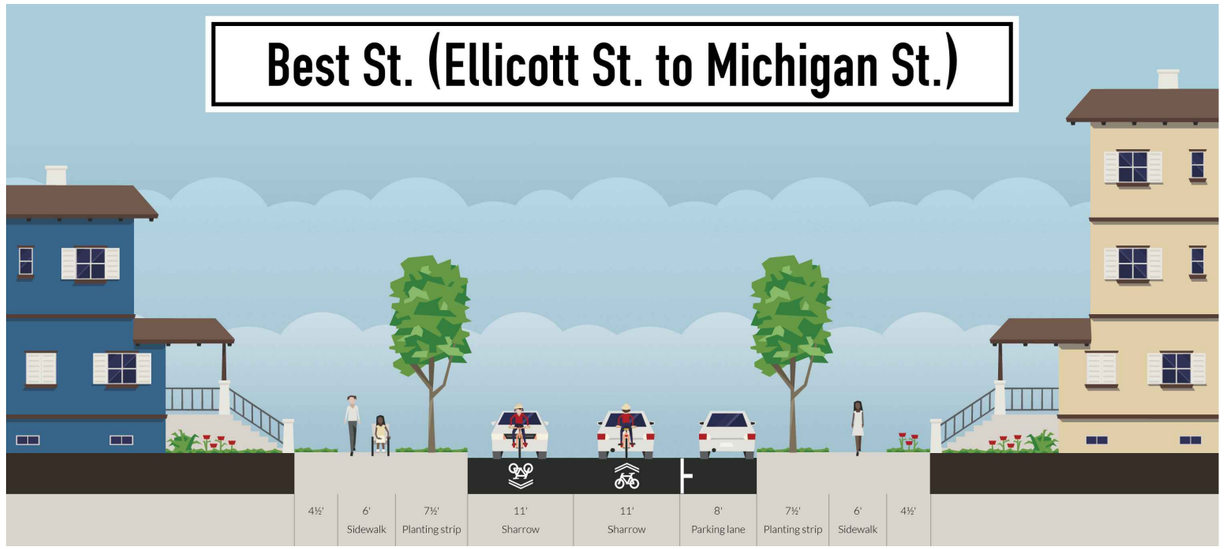
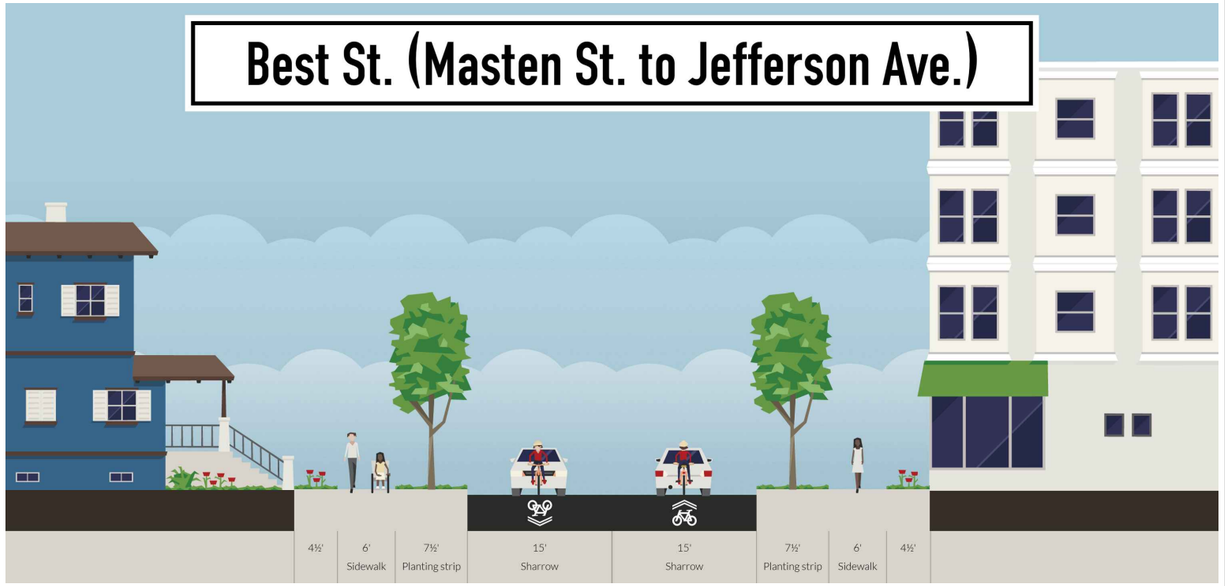
8A Existing

8B Existing



8A Recommended



8B Recommended

Best Street
Drawing 8-2

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk
5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees
X'		Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
		Bus Shelter (Existing/Proposed)
		Right of Way
XX X-X		Section Reference (section number/drawing number)

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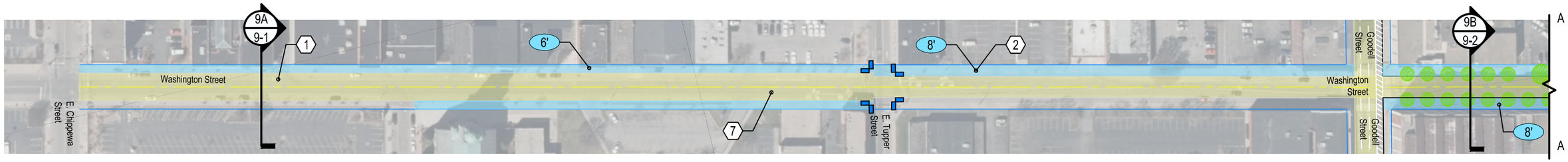
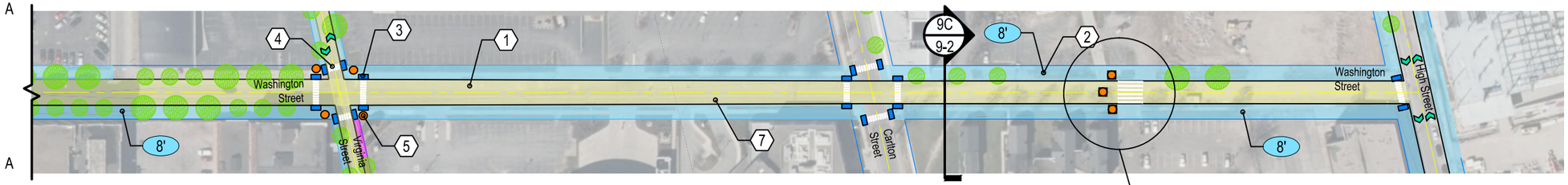
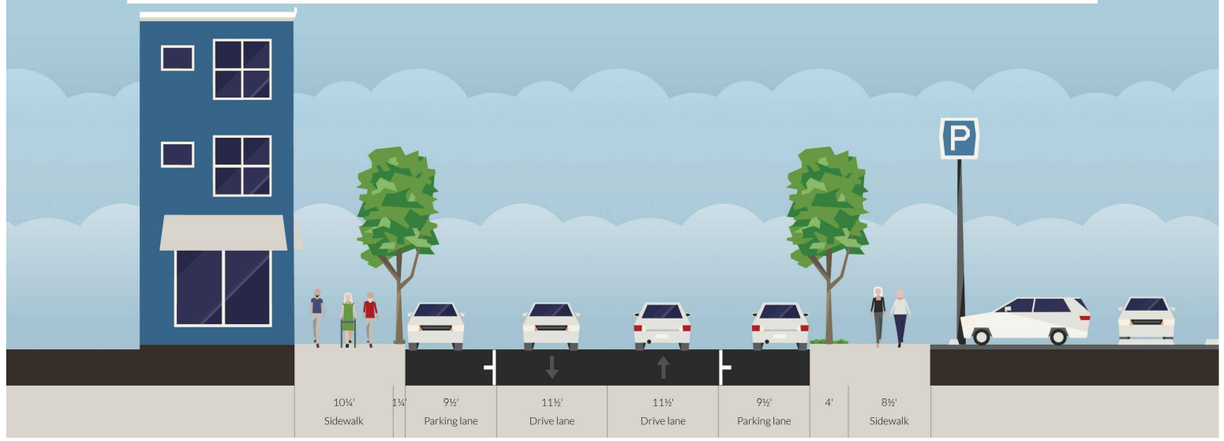


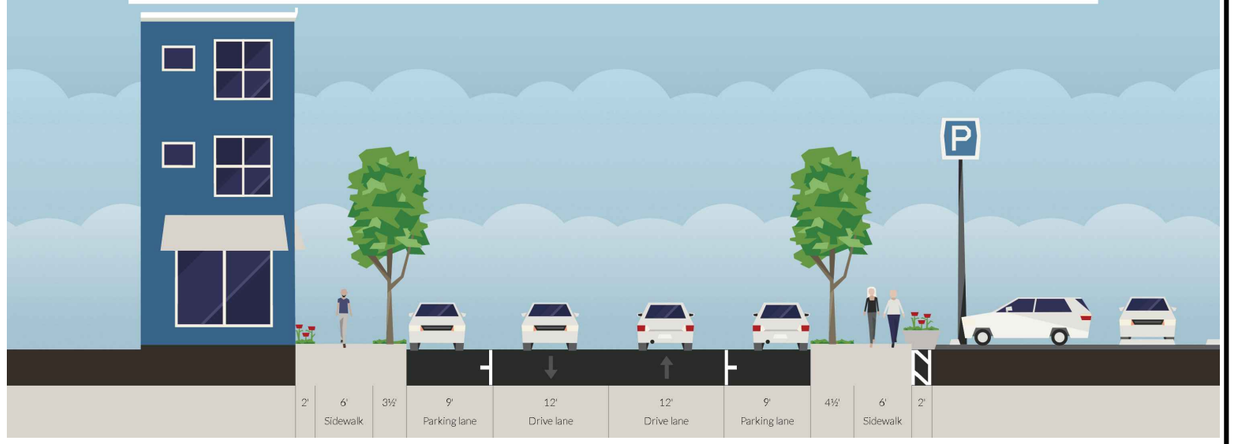


Washington St. (E Chippewa to St. Michaels)



9A Existing

Washington St. (E Chippewa to St. Michaels)



9A Recommended

Washington Street
Drawing 9-1

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk

5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees

X'	Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
	Bus Shelter (Existing/Proposed)
	Right of Way
XX X-X	Section Reference (section number/drawing number)

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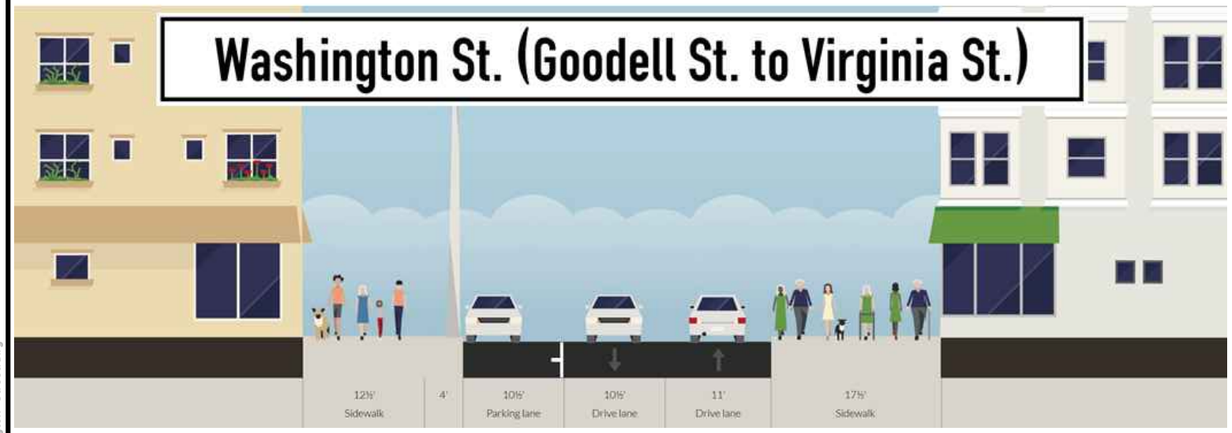
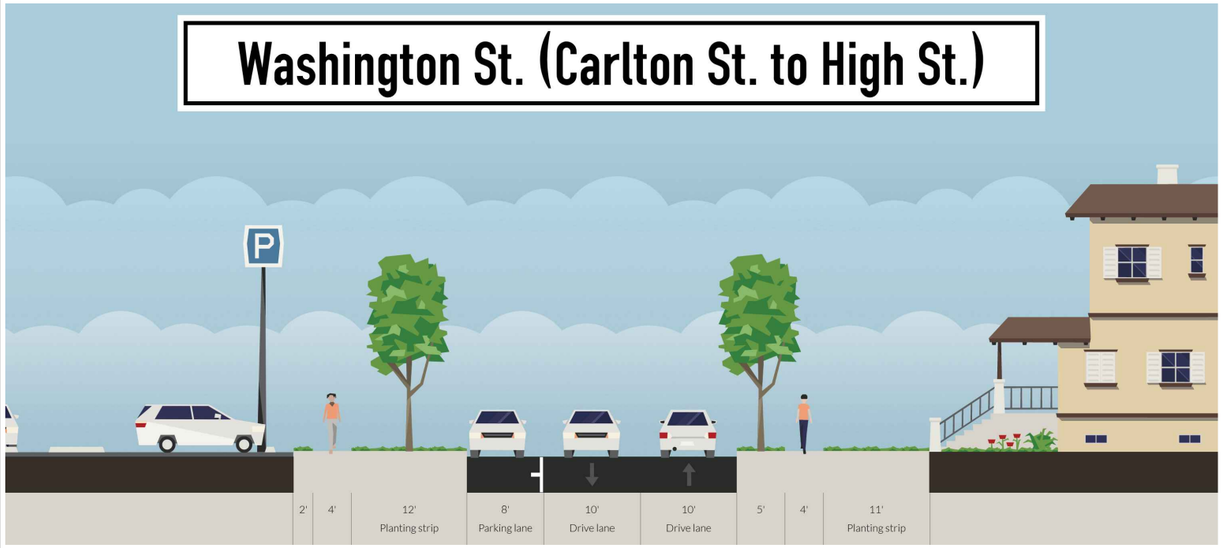
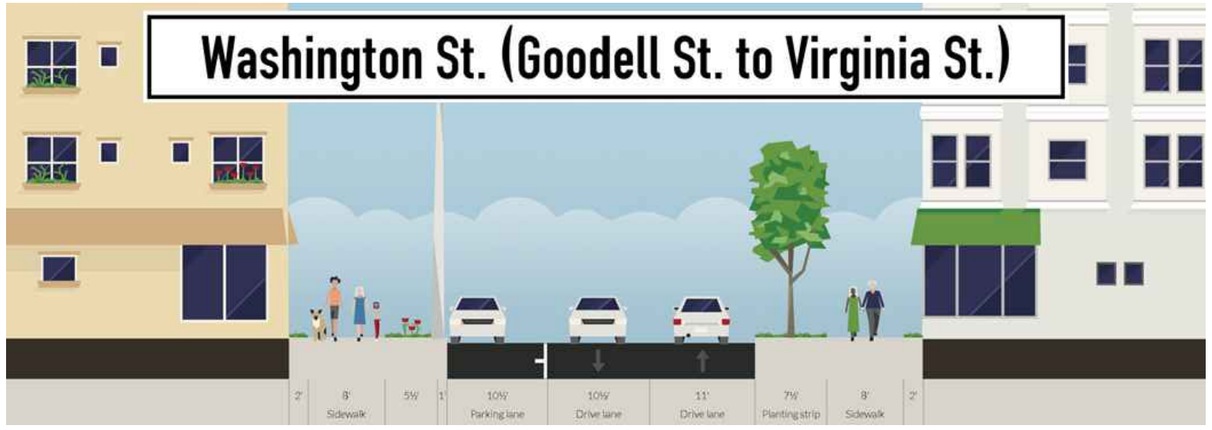


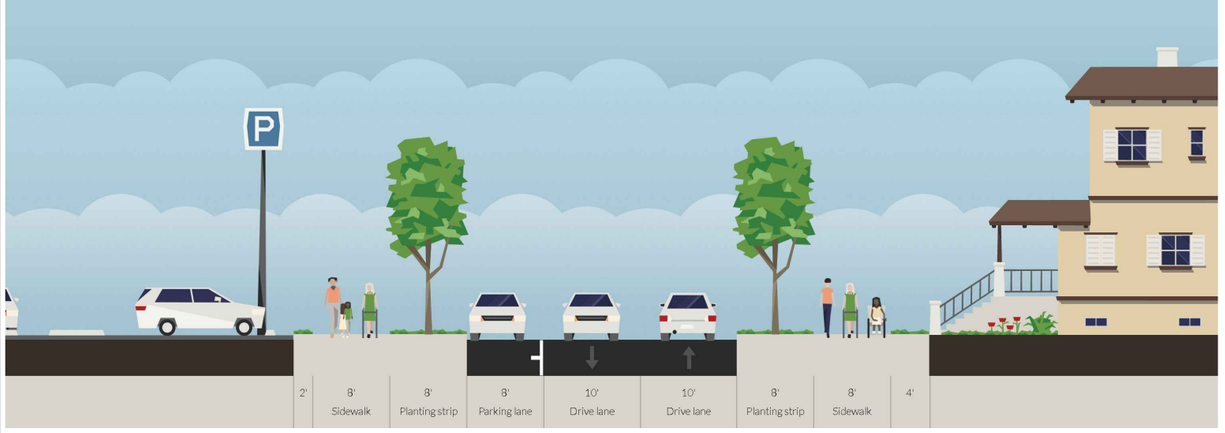
9B Existing



9C Existing



9B Recommended



9C Recommended

Washington Street
Drawing 9-2

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk

5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees

X'	Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
	Bus Shelter (Existing/Proposed)
	Right of Way
XX / X-X	Section Reference (section number/drawing number)

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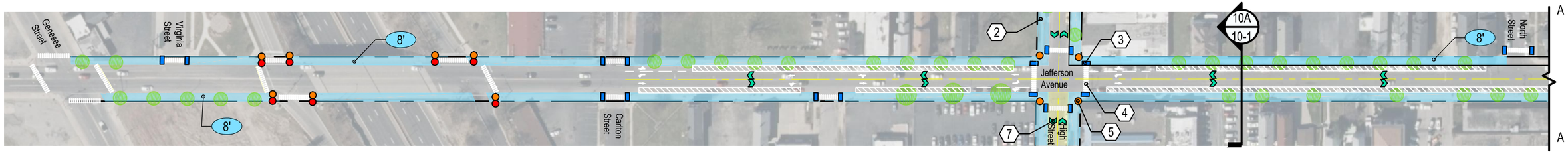
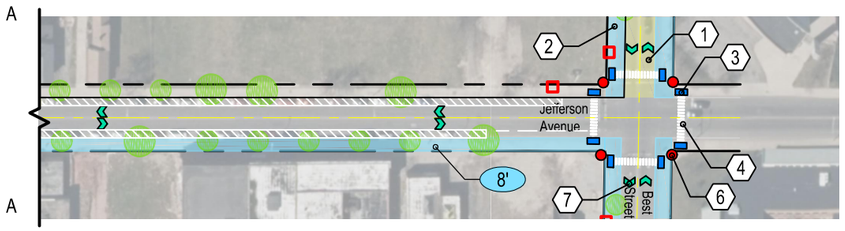
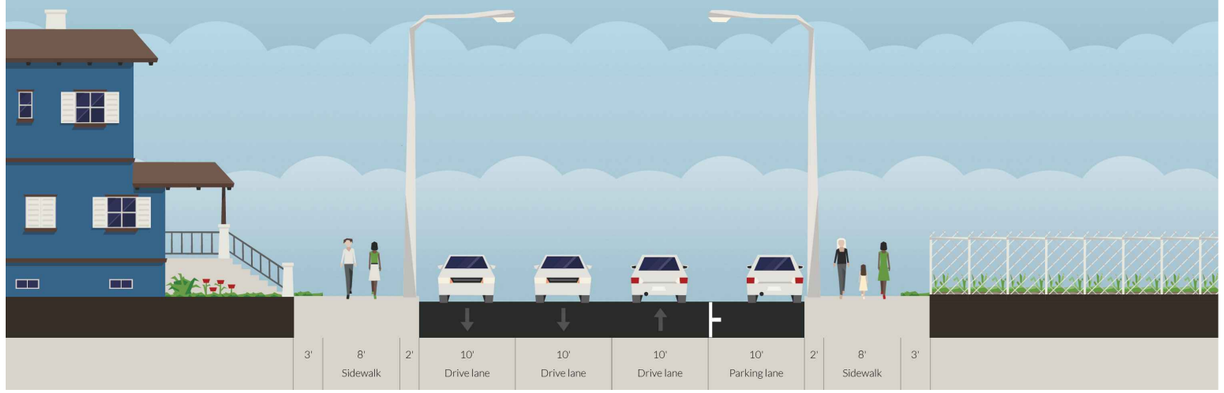


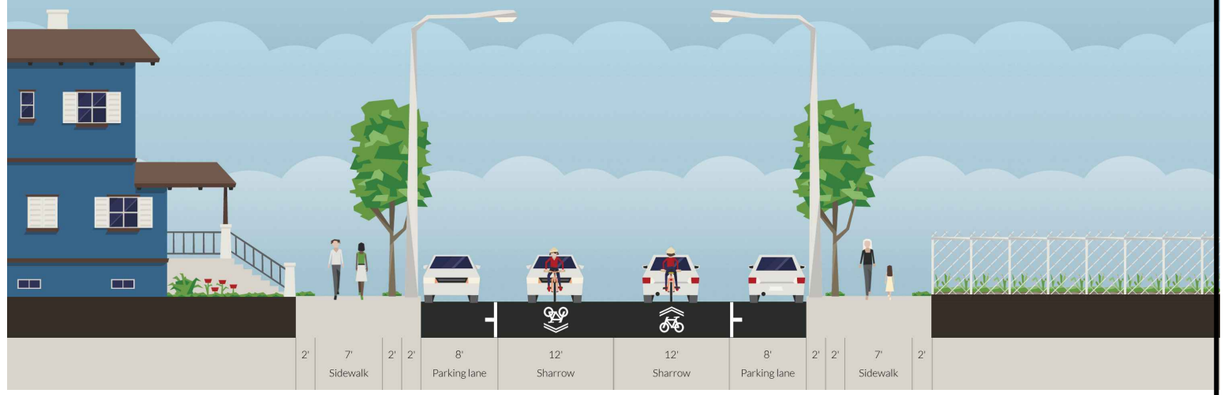


Jefferson Ave. (Carlton St. to Best St.)



10A Existing

Jefferson Ave. (Carlton St. to Best St.)



10A Recommended

N

E

S

W

Jefferson Avenue
Drawing 10-1

Legend		
Key Note	Symbol	Description
1		Reconstructed Road Pavement
2		New or Reconstructed Sidewalk & Snow Storage
3		New or Repaired Curb Ramp
4		New or Repainted Crosswalk

5		New Countdown Timer
6		New Pedestrian Signal
7		New Sharrow Marking
8		New Bike Lane
9		Reconfigured Parking Lane
		Reconfigured Sidewalk
		Street Trees

X'	Preferred Sidewalk Width (from Green Code, based on ROW). Final design width may vary.
	Bus Shelter (Existing/Proposed)
	Right of Way
XX X-X	Section Reference (section number/drawing number)

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