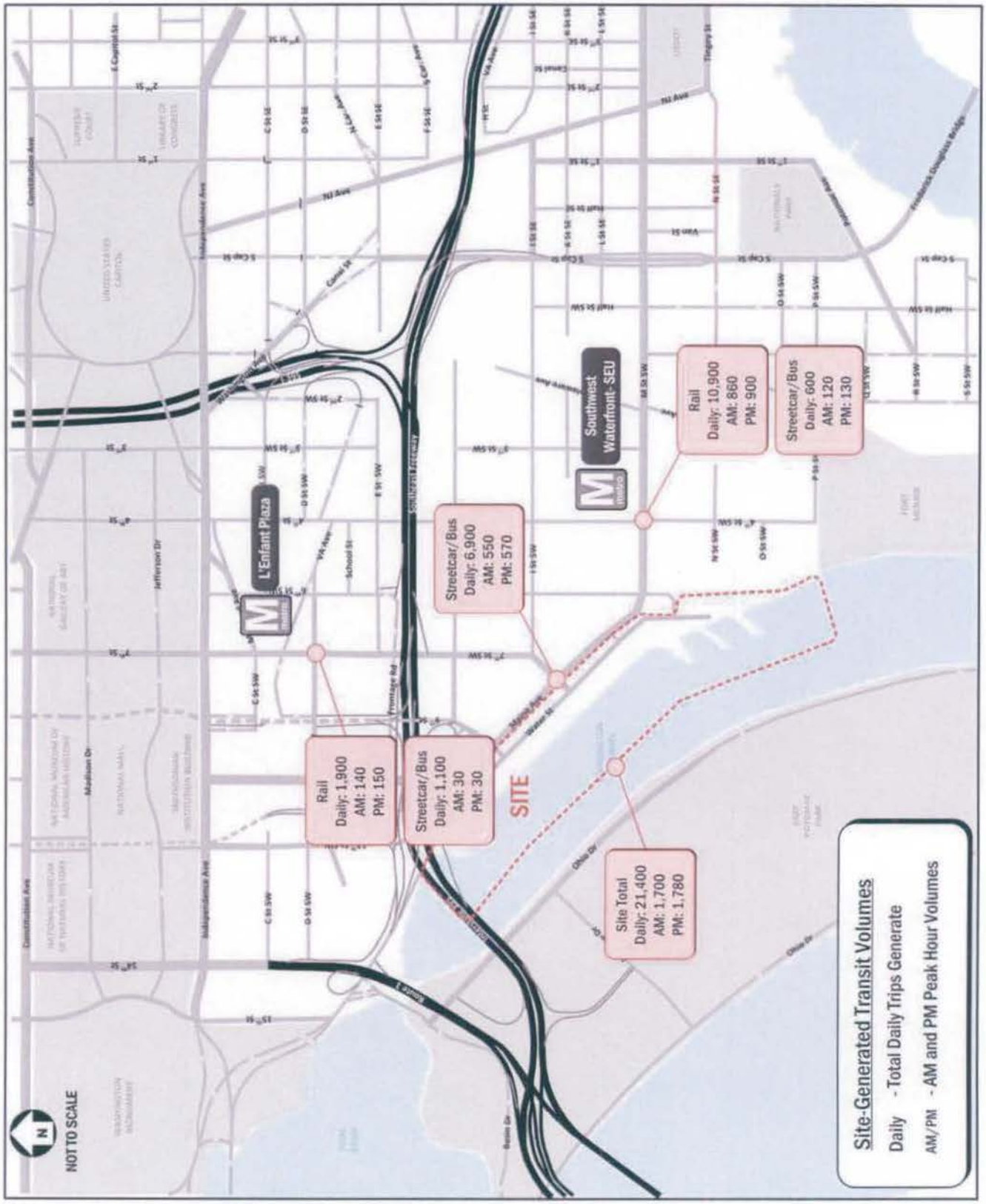

Figure 14: Site Generated Transit Passenger Trip Volumes

3.3 Bicycle Impacts

This section details the bicycle trip generation rates for the site, identifies primary cycling routes and route volumes, evaluates the quality and condition of cycling routes, and makes recommendations for improvements where needed.

3.3.1 Volumes

The bicycle person-trips were listed Table 9 and are listed again below in Table 11. As the non-automobile demand estimates are provided in this report to provide a general estimate of future demand, the bicycle trip numbers listed in Table 11 were rounded to simplify the table and figures contained in this section.

Table 11: Bicycle Trips

Mode	Trip Generation by Mode						
	AM Peak Hour			PM Peak Hour			Daily
	In	*Out*	*Total*	*In*	*Out*	*Total*	Total
Bicycle Total	120	130	250	160	200	360	4,000

3.3.2 Routing and Route Condition and Quality

- *I (Eye) Street and 4th Street*

  Assignment: Approximately 45% of all bicycle trips will be to the east along I Street SW and to the north along 4th Street SW. Both streets have or will have bicycle lanes. This route provides north/south access between the site and destinations along the National Mall and north of the Mall and to the east along I Street SW. I Street SW is a more likely option for cyclists than M Street SW for traveling between the site and destinations to the east, such as the Navy Yard and the Yards, because I Street has bicycle lanes while M Street SW does not (although experienced cyclist may prefer M Street if it is a shorter route). 7th Street is a more direct north-south route for site bicycle traffic but it does not have any bicycle facilities, while 4th Street does. Traffic may grow along 7th Street if conditions improve, or confident riders choose this route for traveling north rather than diverting to the east because 7th Street is the most direct route.

  Volumes: On a typical day, 1,800 trips are forecasted to be made by bicycle along this route with 110 during the morning peak hour and 160 during the afternoon peak hour.

  Bicycle Route and Quality: Generally, conditions along this route provide for a good cycling environment: there bicycle lanes in many locations, traffic volumes and speeds are low, and intersections are signalized to accommodate turns and through traffic. One location that poses some challenge for novice cyclists is the intersection of I Street and South Capitol Street. There are high turning volumes and dedicated turn right-turn lanes for east-west traffic, which conflicts with through bicycle traffic.

- *Maine Avenue, 15th Street, and the 14th Street Bridge*

  Assignment: Approximately 40% of all bicycle trips will be between the site and Maine Avenue and 15th Street SW. This route provides access to the north along 15th Street, to the northwest along the National Mall, and to Virginia via the 14th Street Bridge.

  Volumes: On a typical day, 1,600 trips are forecasted to be made by bicycle along this route with 100 during the morning peak hour and 140 during the afternoon peak hour.

Bicycle Route and Quality: Conditions along this route are not currently attractive for cycling though it is possible to bicycle between the site and Maine Avenue and to points beyond. The primary issues are the lack of dedicated bicycle facilities, poor roadway conditions beneath the freeway overpass, narrow travel lanes in several locations, high traffic volumes, and speeds and conditions at several intersections that make it difficult to turn or travel through. Some of these issues will be addressed during the redevelopment of the site, such as the multi-use trail and improved conditions along Maine Avenue that will result from changes to the cross-section. Additionally, planned improvements by DDOT will alter the alignment of 12th Street and make improvements to sidewalks and crossings.

- *P Street*

  Assignment: Approximately 15% of all bicycle trips will be between the site and P Street SW, which provides access to the east along the Anacostia Riverwalk Trail, areas east of South Capitol Street, and to Anacostia via the Fredrick Douglas Bridge. The Riverwalk Trail is a multi-use trail, and P Street is a residential street with low traffic volumes that is conducive to cycling. The DDOT Bicycle Master Plan indicates that the Riverwalk Trail will be expanded and that cycling conditions will be improved along this route. Similar to the I Street routing of east-west traffic, P Street is a more attractive option for cyclists than M Street SW for traveling between the site and destinations to the east.

  Volumes: On a typical day, 600 trips are forecasted to be made by bicycle along this route with 30 during the morning peak hour and 60 during the afternoon peak hour.

  Bicycle Route and Quality: Generally, conditions along this route provide for a good cycling environment; the multi-use trail provides a route for cycling with no vehicle traffic or conflicts, and P Street is a residential street with low traffic volumes and speeds. South Capitol Street is the one location along this route that may pose a challenge to some riders given its width and the volume of traffic. Most crossings are signalized but pedestrian and bicycle traffic must request signal priority from a call box located on the sidewalk or wait for traffic to trigger the signal.

3.3.3 Recommendations

Based on the trip generation and assignment assumptions, the bicycle trips associated with the SWW PUD will not have an adverse impact on the bicycle transportation network. In fact, the site improvements will facilitate, encourage and enhance bike ridership. A review of the trip generation did lead to the following general recommendations:

- Implement *DC Bicycle Master Plan* improvements to accommodate PUD bicycle trips, with a focus on locations where deficiencies were identified; and
- In addition to improvements already identified in the Bicycle Master Plan, DDOT should determine if additional bicycle facilities and improvements are warranted to accommodate future demand. For example, 7th Street SW is a more direct north-south connection for SWW traffic than 4th Street SW. With the District's installation of streetcar, 7th Street SW will likely need to be redesigned, providing an opportunity to install better accommodations for bicycle traffic.

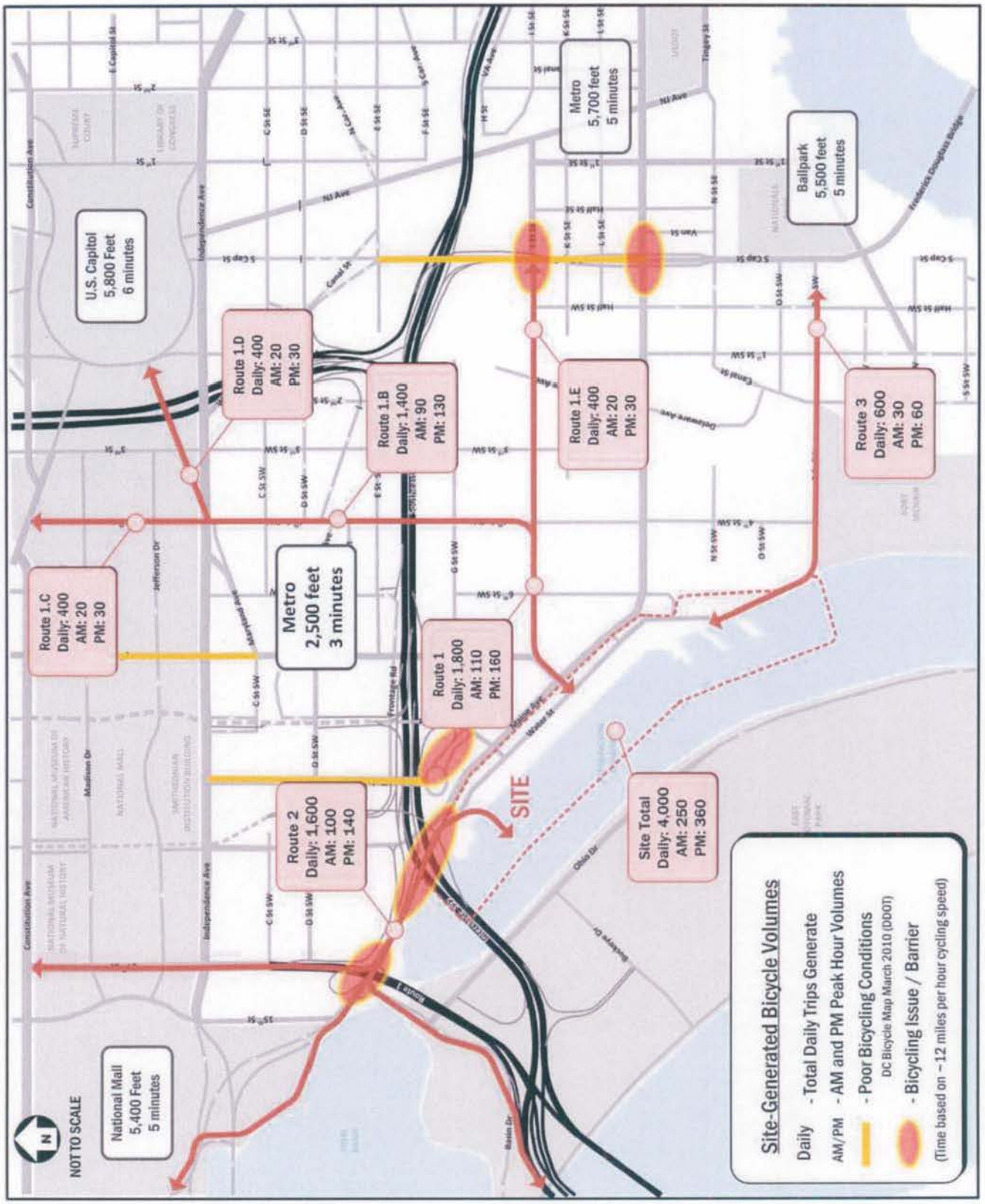

Figure 15: Site Generated Bicycle Trip Volumes and Routing

3.4 Pedestrian

This section details the pedestrian trip generation rates for the site, identifies primary walking routes and route volumes, evaluates the quality and condition of walking routes, and makes recommendations for improvements where needed. The purpose of the pedestrian analysis is to review whether pedestrians traveling within the study area are accommodated. The components of the network evaluated include the existing sidewalk width and the accommodations provided to pedestrians at crosswalks on existing walking routes.

The existing sidewalk volume capacity is good. Overall, the width of sidewalks in the immediate study area meets the District standard of a 6-foot minimum. According to methodologies contained in the HCM, the LOS grade on a 6- foot wide sidewalk does not reach LOS D until the sidewalk volumes reach 2,000 pedestrians per hour. Similarly, LOS E is not reached until volumes reach 3,000 pedestrians per hour. The existing pedestrian counts adjacent to the site do not approach these thresholds. Thus, the sidewalk capacity is not exceeded. Detailed information on walking conditions and quality are described below for the primary walking routes identified in the study area. Pedestrian LOS was calculated at intersections using HCM methodologies. More information on this analysis and the findings are provided below in the Capacity Analysis section.

3.4.1 Volumes

The pedestrian person-trips listed in Table 9 forecast the number of walking trips only and do not include transit passengers walking between the site and stations. Table 12 shows the number of pedestrian trips generated by the site and the number of pedestrian trips generated between the site and transit stations located at the Southwest Waterfront-SEU and L'Enfant Metrorail stations. As the non-automobile demand estimates are provided in this report to provide a general estimate of future demand the pedestrian trip numbers listed in Table 12 were rounded to simplify the table and figures contained in this section. The total of the pedestrian trips provides a more detailed forecast of site pedestrian trips and assists with better forecasting the impact of pedestrian traffic.

Table 12: Pedestrian Trips

Mode	Trip Generation by Mode						
	AM Peak Hour			PM Peak Hour			Daily
	In	*Out*	*Total*	*In*	*Out*	*Total*	**Total**
Pedestrian Total	860	1,000	1,860	1,040	1,180	2,220	33,300
Walk Only	330	370	700	490	520	1,010	11,900
Rail (Metro & VRE)	470	550	1,020	490	580	1,070	12,800
Street Car + Bus	60	80	140	60	80	140	8,600

3.4.2 Routing and Route Condition and Quality

Person-trips listed in Table 12 were distributed throughout the study area based on walking distances between the site and transit stations and stops, the direction of approach developed for vehicle traffic, the location of residential and commercial nodes, and other factors. Figure 16 identifies the walking routes and volumes. The following details trip assignment assumptions, identifies major destinations, provides an overview of walking routes, and makes recommendations for improvements where needed.

- *4th and M Streets SW*

  Assignment: Approximately 42% of all pedestrian trips will be between the site and the intersection of 4th and M Streets SW. The vast majority of these pedestrians will board and alight transit services at this location.

Others will visit commercial and residential uses in the vicinity of this intersection or continue walking east along M Street SW towards commercial and residential uses east of South Capitol Street, such as The Yards and the Capitol Riverfront.

Volumes: On a typical day, 14,000 pedestrians are forecasted to walk between the site and 4th and M Streets SW with 1,070 during the morning peak hour and 1,170 during the afternoon peak hour.

Walking Route and Quality: This route generally provides good walking conditions and has adequate street crossings that can accommodate future pedestrian volumes. Generally, conditions along this route provide for a good walking environment; there are sidewalks along the entire route, sidewalks are a minimum of six feet wide and wider in some locations, crossings have marked crosswalks, and all crossings are signal controlled (there are unsignalized crossings on Maine Ave between 6th and 7th). East of 4th Street, conditions along M Street are somewhat degraded by traffic conditions along M Street SW. Additionally, in some locations, sidewalks narrow and some crossing are not marked, such as the area around M Street and South Capitol Street.

- *7th and D Street SW*

  Assignment: Approximately 20% of all pedestrian trips will be between the site and the intersection of 7th and D Streets SW. The vast majority of these pedestrians will board and alight transit services in this area. Others will visit commercial uses in the vicinity of this intersection or continue walking to the north and northeast along 7th Street SW and Maryland Avenue SW towards commercial and cultural uses north of Independence Avenue, such as the National Mall and the Capitol.

  Volumes: On a typical day, 6,600 pedestrians are forecasted to walk between the site and 7th and D Streets SW with 450 during the morning peak hour and 550 during the afternoon peak hour.

  Walking Route and Quality: This route generally provides good walking conditions and has adequate crossings that can accommodate future pedestrian volumes. Generally, conditions along this route provide for a good walking environment; there are sidewalks along the entire route, sidewalks in most locations are a minimum of six feet wide and wider in some locations, crossings have marked crosswalks, and many crossings are signal controlled. Two locations along this route provide adequate facilities but may have issues for pedestrians. The freeway crossing has narrow sidewalks, and there are several access ramps reduce the quality of walking conditions. Another potential issue is at the intersection of 7th and I Streets SW. The northbound right turn is channelized, which allows for vehicles to turn at higher speeds and requires pedestrians to walk a greater distance.

- *L'Enfant Plaza and Independence Avenue SW*

  Assignment: Approximately 8% of all pedestrian trips will be between the site and L'Enfant Plaza, which has a concentration of office uses. Additionally, L'Enfant Plaza provides good access to cultural attractions on the National Mall, which is located north along Independence Avenue.

  Volumes: On a typical day, 2,600 pedestrians are forecasted to walk between the site and L'Enfant Plaza with 150 during the morning peak hour and 220 during the afternoon peak hour.

  Walking Route and Quality: Currently, the walking route between the site and L'Enfant Plaza has some segments with diminished walking conditions primarily near Benjamin Banneker Park. Improvements are

planned for this park, so the major barrier to walking between the site and L'Enfant Plaza will be removed. P Street and South Capitol Street

Assignment: Approximately 4% of all pedestrian trips will be between the site and the intersection of P Street and South Capitol Street, which provide access to residential areas west of South Capitol Street and commercial and residential uses east of South Capitol Street.

Volumes: On a typical day, 1,400 pedestrians are forecasted to walk between the site and South Capitol Street with 80 during the morning peak hour and 120 during the afternoon peak hour.

Walking Route and Quality: Generally, conditions along this route provide for a good walking environment; there are sidewalks along the entire route, sidewalks in most locations are a minimum of six feet wide and wider in some locations, crossings have marked crosswalks, and many crossings are signal controlled.

- *15th and Maine Avenue SW*

  Assignment: Approximately 2% of all pedestrian trips will be between the site and the intersection of 15th Street and Maine Avenue, which provides access to some office buildings and the National Mall.

  Volumes: On a typical day, 600 pedestrians are forecasted to walk between the site and 15th Street with 35 during the morning peak hour and 50 during the afternoon peak hour.

  Walking Route and Quality: Conditions along this route are not currently attractive for walking though it is possible to walk between the site and Maine Avenue and 15th Street. The primary issues are the increase in walking distances created by the wide freeway right-of-way, conditions beneath the overpass, narrow sidewalks, lack of buffers between sidewalks and vehicle traffic, traffic volumes and speeds, and poor conditions at several intersections. Some of these issues will be addressed during the redevelopment of the site and by planned improvements by DDOT, which will alter the alignment of 12th Street and make improvements sidewalks and crossings.

3.4.3 Recommendations

Based on the trip generation and assignment assumptions, the pedestrians trips associated with the SWW PUD will not have an adverse impact on the transportation network. In fact, the pedestrian experience will be enhanced along Maine Avenue because the buildings are setback from the property line to provide a wider and more gracious sidewalk for the length of the project site. A review of the trip generation did lead to the following general recommendations:

- Implement *DC Pedestrian Master Plan* improvements to accommodate PUD pedestrian trips, with a focus on locations where deficiencies were identified.

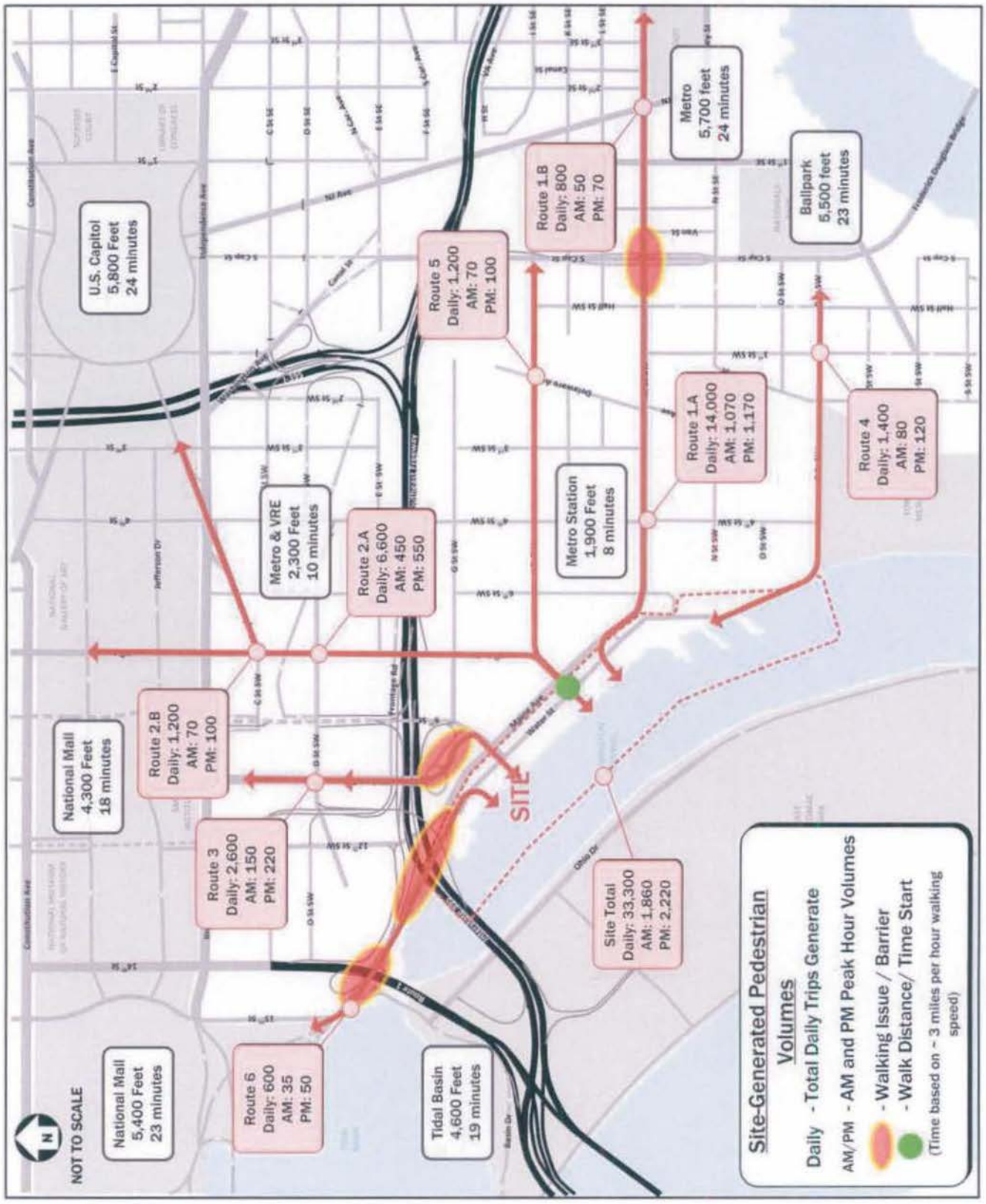

Figure 16: Site Generated Pedestrian Trip Volumes and Routing

3.4.4 Crosswalk Analysis Results

Crosswalk analyses were performed for the existing and future with development conditions at the intersections contained within the study area during the morning and afternoon peak hours. The analysis was based on "Chapter 18: Pedestrians" of the Highway Capacity Manual (HCM).

The methodology for signalized intersections was used in order to estimate the average delay experienced by a pedestrian at a signalized crosswalk (the amount of time waiting for a "Walk" sign). As stated in the HCM, pedestrian delay is not constrained by capacity, even when pedestrian flow rates reach 5,000 pedestrians per hour (pph). This calculation is based on the effective green time programmed for pedestrians and the cycle length, and it is rated by the amount of delay experienced.

The results of the signalized intersection analyses are expressed in level of service (LOS) and delay (seconds) for each crosswalk. LOS results range from "A" being the best to "F" being the worst. The delay and LOS show the likelihood that a pedestrian will not comply with a traffic-control device (i.e. jaywalking). According to the HCM, when pedestrians experience more than a 30-second delay, they become impatient and may engage in risk-taking behavior. The likelihood of non-compliance reflects low to moderate conflicting volumes. At intersections with high conflicting vehicle volumes, pedestrians have little choice but to wait for the walk signal. Therefore, observed non-compliance is reduced at these locations.

The methodology for unsignalized intersections was used in order to estimate the average delay experienced by a pedestrian at an uncontrolled crosswalk. This methodology applies to unsignalized intersections with a pedestrian crossing against a free-flowing traffic stream or an approach not controlled by a stop-sign. The unsignalized intersection methodology does not apply to zebra-striped crossings at unsignalized intersections or at crossings against a traffic stream controlled by a stop-sign because pedestrians have the right-of-way and therefore experience no delay. It should be noted that in the District, pedestrians have the right-of-way at all crosswalks, including those against a free-flowing traffic stream, and therefore, theoretically, experience no delay. However, the analysis was performed at pedestrian crossings against free-flowing traffic streams and yield-controlled approaches in order to evaluate the theoretical delay experienced by pedestrians. The calculation for average pedestrian delay at an unsignalized crossing is based on the average pedestrian walking speed, crosswalk length, assumed pedestrian lost time (start-up and end clearance time), and conflicting vehicular flow rate.

The results of the unsignalized intersection analyses are expressed in level of service (LOS) and delay (seconds) for each crosswalk. LOS results range from "A" being the best to "F" being the worst. The delay and LOS show the likelihood that a pedestrian will engage in risk-taking behavior (i.e. accepting a short gap between vehicles). Pedestrians expect and generally tolerate smaller delays at unsignalized intersections than at signalized intersections.

Table 13 and Table 14 show the results of the capacity analyses, including LOS and average delay (in seconds). The analysis results indicate that the majority of signalized crosswalks in the study area operate at a level of service of D or better during both the morning and afternoon peak hours for the existing and future conditions. This indicates a low (LOS A and B) to moderate (LOS C and D) likelihood of non-compliance by pedestrians, which is reflected by pedestrians jaywalking across the intersection. The study intersections with crosswalks operating at LOS E will experience a moderate to high likelihood of non-compliance.

The analysis results also indicate that the majority of the unsignalized crosswalks in the study area operate at a level of service of F during the morning and afternoon peak hours for the existing and future conditions. A few study intersections

operate at a level of service of C or better. This indicates a moderate (LOS C) likelihood of risk-taking behavior for pedestrians, which is reflected in occasional pedestrians dashing between vehicles during short gaps in traffic. However, the LOS E and F calculated indicate an unfriendly and intimidating environment for pedestrians. As stated previously, pedestrians have the right-of-way in all crosswalks in the District, so vehicles must yield to pedestrians in the crosswalk at the study intersections listed in Table 14.

As shown in Table 13 and Table 14, the proposed PUD will not have a detrimental impact to pedestrian level of service at signalized intersections in the study area. The study intersections will operate at the same or better level of service for the majority of the crosswalks. A few crosswalks will see a deterioration of level of service due to signal timing changes in the future conditions. However, as outlined below, signal timing improvements are assumed in the future conditions without the proposed development due to a large increase in vehicular volumes due to background developments located in the vicinity of the site. The proposed PUD will have a detrimental impact to the calculated pedestrian levels of service at the unsignalized crosswalks in the study area. However, as stated previously, pedestrians have the right-of-way in all crosswalks in the District, so vehicles must yield to pedestrians in the crosswalk at the study intersections.

	Parallel Approach	Approximate Length^	Cycle Length	[illegible]			[illegible]			[illegible]		
				"Walk" Time	Delay	LOS	"Walk" Time	Delay	LOS	"Walk" Time	Delay	LOS
	Westbound	91.0	100.0	8.0	38.7	D	8.0	38.7	D	8.0	38.7	D
	Northbound	59.0	100.0	37.0	17.4	B	20.0	28.9	C	41.0	15.1	B
	Eastbound	65.0	100.0	12.0	35.3	D	12.0	35.3	D	26.0	24.5	C
	Westbound	59.0	100.0	12.0	35.3	D	12.0	35.3	D	26.0	24.5	C
	Northbound	55.0	100.0	50.0	10.6	B	50.0	10.6	B	36.0	18.0	B
	Southbound	59.0	100.0	19.0	29.6	C	22.0	27.4	C	10.0	37.0	D
	Eastbound	60.0	100.0	7.0	39.6	D	7.0	39.6	D	31.0	21.1	C
	Westbound	60.0	100.0	7.0	39.6	D	7.0	39.6	D	31.0	21.1	C
	Northbound	25.0	100.0	58.0	7.2	A	58.0	7.2	A	34.0	19.2	B
	Southbound	39.0	100.0	46.0	12.5	B	46.0	12.5	B	28.0	23.1	C
	Eastbound	20.0	100.0	58.0	7.2	A	72.0	2.9	A	63.0	5.4	A
	Westbound 1	34.0	100.0	22.0	27.4	C	40.0	15.7	B	60.0	6.5	A
	Westbound 2	48.0	100.0	54.0	8.8	A	36.0	18.0	B	16.0	32.0	D
ay #5	Eastbound	71.0	100.0	19.0	29.6	C	17.0	31.2	D	22.0	27.4	C
	Westbound	68.0	100.0	27.0	23.8	C	12.0	35.3	D	23.0	26.6	C
	Northbound	87.0	100.0	9.0	37.8	D	17.0	31.2	D	8.0	38.7	D
	Southbound	87.0	100.0	9.0	37.8	D	17.0	31.2	D	23.0	26.6	C
xit Ramp	Westbound	76.0	100.0	14.0	33.6	D	14.0	33.6	D	32.0	20.5	C
	Northbound	23.0	100.0	58.0	7.2	B	58.0	7.2	B	40.0	15.7	B
	Southbound	37.0	100.0	47.0	12.0	B	47.0	12.0	B	29.0	22.4	C
	Eastbound	74.0	100.0	51.0	10.1	B	34.0	19.2	B	36.0	18.0	B
	Westbound	74.0	100.0	51.0	10.1	B	34.0	19.2	B	36.0	18.0	B
	Northbound	44.0	100.0	14.0	33.6	D	31.0	21.1	C	29.0	22.4	C
	Southbound	44.0	100.0	14.0	33.6	D	31.0	21.1	C	29.0	22.4	C
	Westbound	70.0	100.0	8.0	38.7	D	8.0	38.7	D	18.0	30.4	D
	Northbound	41.0	100.0	12.0	35.3	D	12.0	35.3	D	17.0	31.2	D
ay #8	Eastbound	74.0	100.0	30.0	21.8	C	12.0	35.3	D	24.0	25.9	C
	Westbound	79.0	100.0	7.0	39.6	D	18.0	30.4	D	15.0	32.8	D
	Northbound	88.0	100.0	10.0	37.0	D	17.0	31.2	D	6.0	40.5	E
	Southbound	88.0	100.0	10.0	37.0	D	17.0	31.2	D	25.0	25.2	C
ay #14	Eastbound	48.0	100.0	53.0	9.2	A	52.0	9.7	A	54.0	8.8	A
	Westbound	53.0	100.0	53.0	9.2	A	52.0	9.7	A	54.0	8.8	A
	Northbound	89.0	100.0	5.0	41.4	E	6.0	40.5	E	4.0	42.3	E
	Southbound	89.0	100.0	5.0	41.4	E	6.0	40.5	E	4.0	42.3	E
	Eastbound	64.0	100.0	18.0	30.4	D	16.0	32.0	D	39.0	16.2	B
	Westbound	57.0	100.0	18.0	30.4	D	16.0	32.0	D	39.0	16.2	B
	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]

Approach	Length	Length	Walk Time	Delay	LOS	"Walk" Time	Delay	LOS	"Walk" Time	Delay	LOS
Eastbound	43.0	100.0	10.0	37.0	D	10.0	37.0	D	39.0	16.2	B
Westbound	58.0	100.0	10.0	37.0	D	10.0	37.0	D	39.0	16.2	B
Northbound	51.0	100.0	10.0	37.0	D	10.0	37.0	D	17.0	31.2	D
Southbound	48.0	100.0	10.0	37.0	D	10.0	37.0	D	17.0	31.2	D
Eastbound	55.0	100.0	24.0	25.9	C	16.0	32.0	D	27.0	23.8	C
Westbound	52.0	100.0	24.0	25.9	C	16.0	32.0	D	27.0	23.8	C
Northbound	89.0	100.0	13.0	34.4	D	21.0	28.1	C	5.0	41.4	E
Southbound	91.0	100.0	6.0	40.5	E	6.0	40.5	E	6.0	40.5	E
Westbound	52.0	100.0	37.0	17.4	B	27.0	23.8	C	34.0	19.2	B
Northbound	85.0	100.0	7.0	39.6	D	7.0	39.6	D	10.0	37.0	D
Southbound	85.0	100.0	7.0	39.6	D	7.0	39.6	D	10.0	37.0	D
Eastbound	52.0	100.0	33.0	19.8	B	33.0	19.8	B	45.0	13.0	B
Westbound	28.0	100.0	33.0	19.8	B	33.0	19.8	B	45.0	13.0	B
Northbound	96.0	100.0	18.0	30.4	D	18.0	30.4	D	10.0	37.0	D
Southbound	82.0	100.0	18.0	30.4	D	18.0	30.4	D	10.0	37.0	D
Eastbound	29.0	100.0	24.0	25.9	C	23.0	26.6	C	35.0	18.6	B
Westbound	107.0	100.0	38.0	16.8	B	37.0	17.4	B	47.0	12.0	B
Southbound	84.0	100.0	11.0	36.1	D	14.0	33.6	D	7.0	39.6	D
Eastbound	43.0	100.0	53.0	9.2	A	53.0	9.2	A	53.0	9.2	A
Westbound	34.0	100.0	53.0	9.2	A	53.0	9.2	A	53.0	9.2	A
Northbound	85.0	100.0	6.0	40.5	E	6.0	40.5	E	6.0	40.5	E
Southbound	84.0	100.0	6.0	40.5	E	6.0	40.5	E	6.0	40.5	E
Eastbound	25.0	100.0	--	--	--	--	--	--	40.0	15.7	B
Northbound	75.0	100.0	--	--	--	--	--	--	7.0	39.6	D
Southbound	75.0	100.0	--	--	--	--	--	--	7.0	39.6	D
Eastbound	25.0	100.0	--	--	--	--	--	--	49.0	11.0	B
Northbound	65.0	100.0	--	--	--	--	--	--	7.0	39.6	D
Southbound	65.0	100.0	--	--	--	--	--	--	7.0	39.6	D
Eastbound	15.0	100.0	--	--	--	--	--	--	58.0	7.2	A
Southbound	50.0	100.0	--	--	--	--	--	--	7.0	39.6	D
Eastbound	25.0	100.0	--	--	--	--	--	--	58.0	7.2	A
Northbound	75.0	100.0	--	--	--	--	--	--	7.0	39.6	D

ips

	Parallel Approach	Approximate Length^	Critical Gap	Vehicular Volume	Delay	LOS	Vehicular Volume	Delay	LOS	Vehicular Volume	Delay
	Northbound	58.0	--	N/A - Stop controlled crossing, no pedestrian delay, LOS A							
	Eastbound	28.0	--	N/A - Stop controlled crossing, no pedestrian delay, LOS A							
	Eastbound	14.0	--	N/A - Stop controlled crossing, no pedestrian delay, LOS A							
np	Northbound	32.0	--	N/A - Stop controlled crossing, no pedestrian delay, LOS A							
	Eastbound	15.0	--	N/A - Stop controlled crossing, no pedestrian delay, LOS A							
	Westbound 1	16.0	7.6	131	1.1	A	245	2.3	A	137	1.2
	Westbound 2	38.0	13.9	377	17.3	C	660	49.9	F	651	48.4
	Northbound 1	35.0	13.0	788	61.1	F	1,053	136.8	F	1,400	387.9
	Northbound 2	32.0	12.1	938	74.8	F	970	82.0	F	1,293	203.2
	Southbound 1	32.0	12.1	938	74.8	F	970	82.0	F	1,293	203.2
	Southbound 2	35.0	13.0	783	60.1	F	1,036	130.0	F	1,425	418.3
	Eastbound	25.0	--	N/A - Stop controlled crossing, no pedestrian delay, LOS A							
	Eastbound	25.0	--	N/A - Stop controlled crossing, no pedestrian delay, LOS A							
	Eastbound	25.0	--	N/A - Stop controlled crossing, no pedestrian delay, LOS A							
	Eastbound	25.0	--	N/A - Stop controlled crossing, no pedestrian delay, LOS A							

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3.5 Vehicular Impacts

This section details the vehicular trips generated in the study area along the vehicular access routes, defines the analysis assumptions, analyses the vehicular impacts of the proposed PUD, and makes recommendations for improvements where needed.

3.5.1 Scope of Analysis

The purpose of the vehicular capacity analysis is to determine the existing conditions of the intersections located in the immediate vicinity of the proposed PUD. The set of intersections was chosen to help determine the impacts consist of the nearest intersections along Maine Avenue, M Street, and I Street near the site, and several significant signalized intersections several blocks from the site. Based on prior studies and the influence analysis, approximately twenty-four intersections were chosen for analysis.

As shown on Figure 17, the following intersections were selected for analysis:

1. C Street SW & 14th Street SW
2. C Street SW & 12th Street SW
3. D Street SW & 14th Street SW
4. D Street SW & 12th Street SW
5. Maine Avenue SW & Route 1 Off-Ramp
6. Maine Avenue Ramp & 12th Street SW
7. Maine Avenue SW & Site Driveway #1
8. Maine Avenue SW & Site Driveway #2
9. G Street SW & 9th Street SW
10. L'Enfant Promenade & 9th Street SW
11. Maine Avenue SW & 9th Street SW
12. Frontage Road/I-395 Off-Ramp & 7th Street SW
13. G Street SW & 7th Street SW
14. I Street SW & 7th Street SW
15. Maine Avenue SW & 7th Street SW
16. Maine Avenue SW & Site Driveway #3
17. Maine Avenue/M Street SW & 6th Street SW
18. G Street SW & 4th Street SW
19. I Street SW & 4th Street SW
20. M Street SW & 4th Street SW
21. M Street SW & 3rd Street SW
22. M Street SW & Delaware Avenue
23. M Street SW & 1st Street SW
24. M Street SW & Half Street SW

Intersection capacity analyses were performed for the existing conditions at the intersections contained within the study area during the morning and afternoon peak hours, as well as the future conditions with and without the proposed development. In addition to the intersections listed above, the site driveways are also evaluated in the future with development scenario in order to confirm that they will operate under acceptable conditions.

The *Synchro, Version 7.0* software package was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology. The *Synchro* model was compiled using signal timings provided by DDOT and with lane configurations and traffic volumes collected by Gorove/Slade. The scope of analysis and proposed analysis methodology was confirmed by DDOT in a scoping meeting held on Tuesday, August 24, 2010.

Figure 17: Study Intersections

3.5.2 Analysis Assumptions

The following section reviews the assumptions made and methodologies used in the roadway capacity analyses, summarized in Table 15.

Existing Conditions (2010)

The overall purpose of this study is to show what affect the SWW PUD will have on the transportation system in the study area. The existing conditions in and around the site are characterized in order to provide a foundation for assessing the transportation implications of the PUD. This is determined by examining the peak traffic hours, which are directly associated with the peaking characteristics of the area transportation system. The peaking characteristics of the adjacent transportation system are determined through analysis of existing count data.

DDOT and National standards require that traffic counts be conducted on a weekday, not including Monday or Friday, when traffic conditions can be described as "typical". This includes the consideration for adjacent uses, such as retail, special events, and recreation facilities and for major traffic generators, such as the area public school system or any large public or private institutions. Weekend and other off-peak periods are also often reviewed if the study area includes other uses that may be relatively inactive during the "typical" weekday.

The traffic counts conducted on "typical" day are used to determine the AM and PM "peak hour" of traffic within the study area. According to the Highway Capacity Manual (HCM) methodologies, a one-hour analysis period is preferred. Analysis periods that exceed one hour are not usually used because traffic conditions are typically not stead for long time periods and because the adverse impact of short peaks in traffic demand may not be detected in a long time period. The "peak hour" represents the worst-case scenario, when the system traffic volumes are the highest. The use of a "typical" weekday and AM and PM peak hours are used to ensure that conclusions regarding adverse impacts and their respective mitigation measures would apply to the vast majority of time roadways are used in the study area. Although there may be times when volume flows exceed these conditions, such as during special events, holiday weekends, or other times depending on the study area and site location, it is the industry standard to design transportation infrastructure for the peak times during "typical" weekdays.

In order to ensure that the data collected contains the peak hour, traffic counts are taken for a period of several hours during the morning and afternoon peak periods. From these peak periods, a peak hour is derived for both the AM and the PM. According to the Transportation Impact Analyses for Site Development manual published by the Institute of Transportation Engineers (ITE), data is generally collected during the weekday morning (7:00 to 9:00 AM) and afternoon (4:00 to 6:00 PM) peak hours. Although this is the standard, Gorove/Slade usually collects data for a three-hour long period to ensure that the peak hour is contained within the data collection timeframe.

The peak period counts are analyzed to determine the one hour during the morning and afternoon periods that contains the highest cumulative directional traffic demands. From each peak period count, the morning and afternoon "peak hours" are determined by summing up the four fifteen-minute consecutive time periods in the study area that experience the highest cumulative traffic volumes. These morning and afternoon "peak hours" are analyzed for the system of intersections investigated, choosing the "peak hour" of the entire system instead of each individual intersection.

Table 15: Summary of Vehicular Capacity Analysis Assumptions

Existing Conditions

- Dates of data collection: Tuesday-Thursday, September 14-16, 2011 (count sheets in Appendix)
- System Peak: 7:45-8:45 AM, 4:30-5:30 PM
- Geometries and lane configurations based on existing conditions[3]
- Signal timings/phasings/offsets provided by DDOT (including update to M Street /4th Street SW intersection)

2018 Future without Development (Background Conditions)

- Background developments:
  - Developments assumed completed by 2018 listed in report Section 1.7.2.[4]
  - Mode split & assignment assumptions taken from individual transportation studies for each development, where possible. If no study was on record, mode split assumptions and assignment methodologies were similar to those used for the site.
  - Total AM peak hour trips assigned: 6,003 ; Total PM peak hour trips assigned: 7,166
- Background growth percentage:
  - None assumed due to comprehensive list of background developments[5]
- Signal timings updated, using existing DDOT timing parameters.

2018 Future with Development (Total Future Conditions)

- Site trip generation and mode split assumptions are detailed in Section 3.1 of report
- Total AM peak hour trips: 1,834 ; Total PM peak hour trips: 1,835
- Trip distribution based on analysis of MWCOG model origin/destination data[6], results shown on Figure 18
- Geometry & operations changes:
  - Intersections along site frontage with access to/from site were altered to match the SWW site plan, including proposed traffic signals. Timings for new signals were based on DDOT standards and operations at existing intersections in study area.
  - Assumptions for Maine Avenue adjacent to PUD (see Figure 19):
    - Eastbound: two travel lanes and one permanent parking lane, and
    - Westbound: two travel lanes between 6th Street and 7th Street SW and three travel lanes between 7th Street SW and the Fish Market.

2018 Future with Development, with Adjusted Existing Volumes (Future Adjusted)

- 2018 with Development scenario with existing volumes decreased approximately 10-15% along Maine Avenue
  - Approximately 75 vehicles/hour removed from Maine Avenue/M Street in the AM peak hour
  - Approximately 150 vehicles/hour removed from Maine Avenue/M Street in the PM peak hour
- Geometry & operations changes:
  - Assumptions for Maine Avenue adjacent to PUD (see Figure 19):
    - Eastbound: two travel lanes and one permanent parking lane, and
    - Westbound: two travel lanes and one permanent parking lane

2028 Future with Development (Horizon Year)

- 2018 with Development scenario with added background development traffic
- Background developments:
  - Developments assumed completed between 2018 and 2028 listed in report Section 1.7.2.
  - Mode split & assignment assumptions taken from individual transportation studies for each development, where possible. If no study was on record, mode split assumptions and assignment methodologies were similar to those used for the site.
  - Total AM peak hour trips assigned: 1,697 ; Total PM peak hour trips assigned: 1,826
- Background growth percentage:
  - None assumed due to comprehensive list of background developments
- No signal timing or operations changes assumed.

[3] Southbound approach of 9th Street at Maine Avenue assumed as one left turn lane, one through lane and one shared through/right turn lane (as it is signed), not as one left turn lane, one shared left turn lane/through lane, and one shared through/right turn lane (as it is striped).

[4] List of background developments submitted to DDOT at August 24th, 2010 scoping meeting for review

[5] Assumption confirmed with DDOT at August 24th, 2010 scoping meeting

[6] Methodology developed with DDOT at August 24th, 2010 scoping meeting, results of MWCOG analysis and resulting distributions presented for DDOT's review during October 2010

Following the above guidelines, traffic counts were performed on Tuesday-Thursday, September 14-16, 2010 from 6:30 to 9:30 AM and from 4:00 to 7:00 PM. The existing traffic volumes for the intersections contained within the study area are shown on Figure 20, Figure 21, and Figure 22 and on Figure 23, Figure 24, and Figure 25 for the morning and afternoon peak hours, respectively. Analysis of the existing traffic data determined that morning peak hour is from 7:45 to 8:45 AM, and the afternoon peak hour is from 4:30 to 5:30 PM. The existing turning movement counts are included in the Technical Appendix.

Gorove/Slade conducted field reconnaissance to confirm the existing lane configurations and traffic controls at the intersections within the study area, shown on Figure 26, Figure 27, and Figure 28. Existing signal timings were obtained from DDOT and confirmed during the field reconnaissance.

Future Conditions (2018) without Development

The full build-out of the proposed Southwest Waterfront PUD is anticipated to be complete in 2018. The traffic projections for the future condition without the development consist of the traffic generated by background developments with planned completion by 2018, listed in the section 1.7.2 of this report, added to the existing traffic volumes.

Available background development traffic studies were used to determine the number of trips added for the background developments. This included the "Maritime Plaza Traffic Impact Study" performed by Gorove/Slade in October 2005, the "Florida Rock Properties, Inc. Planned Unit Development (PUD) Traffic Impact Analysis" performed by Gorove/Slade in November 2006, the "Monument Ballpark – Square 700 & 701 Transportation Impact Study" performed by Wells & Associates in December 2006, the "Waterfront Development Traffic Impact Study" performed by Gorove/Slade in May 2007, the "Florida Rock Revised Plans Transportation Analysis" memorandum performed by Gorove/Slade in September 2007, and the "Square 700 Development Traffic Impact Assessment" performed by Gorove/Slade in January 2009. These documents were used to determine the number of trips generated by the aforementioned background developments, the mode split percentages, and the trip routing.

Trip generation for the other background developments was calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 8th Edition. For developments consisting of a mix of retail uses with office, residential, or hotel uses, a 20% internal capture reduction was applied for retail trips originating from within the proposed development. The Shopping Center trip rate was applied in lieu of individual trip rates, such as bank, pharmacy and supermarket, for the retail uses because applying individual rates would not account for interaction between the retail uses (shoppers visiting more than one store), and the Shopping Center trip rate does account for these uses and interactions. Additionally, the General Office Building, Residential Apartments, and Residential Condominiums/Townhomes rates were applied for office and residential uses to estimate trips generated by the background developments.

For this report, the methodology was supplemented to account for the urban nature of the site (Trip Generation provides data for non-urban, low transit use sites). The WMATA Ridership Survey was used to determine transit reduction rates in order to account for trips taken by walking, bicycling, and transit. The mode split assumptions were based on the patterns and general findings from that document, observations of existing traffic, and the type and density of surrounding land uses. It was assumed that retail uses would generate a lot of local demand and therefore, have the highest assumed percentage of walking and biking trips. Residential based trips would be the most likely to use public transit, since they will be regular users that will be able to figure out and take advantage of the various routes and schedules. Although the location of the site near several major highways could lead to driving mode splits, the Metrorail, Metrobus, and DC Circulator service will be utilized to reach destinations in downtown areas of the District and to surrounding areas.

Table 8, shown previously, summarizes the mode split assumptions. Table 16 shows the total number of trips generated by the background developments. The trips generated for each background development are shown in the Technical Appendix.

Table 16: Year 2018 Background Development Trip Generation

Land Use	Size		Trip Generation						
			AM Peak Hour			PM Peak Hour			Weekday Total
			In	*Out*	*Total*	*In*	*Out*	*Total*	
Vehicle Trips									
Retail	809,462	Square Feet	326	205	531	873	828	1,702	19,369
Residential	6,579	Dwelling Units	214	924	1,138	901	461	1,361	14,745
Office	4,678,900	Square Feet	3,430	465	3,895	622	3,032	3,654	26,903
Hotel	1011	Rooms	268	155	423	213	232	445	3,871
Church	17,213	Square Feet	9	7	16	3	1	4	134
Total Vehicle-Trips			**4,247**	**1,756**	**6,003**	**2,612**	**4,554**	**7,166**	**65,022**

These trips were then distributed and assigned to the network. Both the background developments and site generated traffic was distributed using an analysis based on Metropolitan Washington Council of Governments (MWCOG) transportation planning models. Data from Traffic Analysis Zones (TAZs), including home-based and non-home-based trips, were used to determine the inbound and outbound vehicular trip distribution. The data used encompassed trips to and from the Southwest Waterfront development in 2010 and 2030. The data obtained from the MWCOG model was used in order to estimate the directions of approach for the study area. The major routes originate from the Francis Case Memorial Bridge/Southwest Freeway (I-395) and the George Mason Memorial Bridge/14th Street Bridge (Route 1) from the west, Maine Avenue SW from the west, 9th Street/12th Street from the north, 7th Street from the north, I-395 from the north, the Southeast Freeway/John Philip Sousa Bridge from the south and east, the 11th Street Bridges (I-295) from the south and east, and the Frederick Douglas Bridge/South Capitol Street from the south. Some trips will also originate from the local area roadways as well. One trip distribution was assumed for all land uses because the MWCOG data for Southwest Waterfront aggregated all land uses for each TAZ. Figure 18 shows the direction of approach for the proposed PUD.

The traffic volumes generated by the background developments were added to the existing (2010) traffic volumes in order to establish the future (2018) traffic volumes without the proposed developments. The traffic volumes added by the background developments are shown on Figure 20, Figure 21, and Figure 22 and on Figure 23, Figure 24, and Figure 25 for the morning and afternoon peak hours, respectively.

Typically, a percent growth rate is applied to the existing traffic volumes in order to account for other traffic increases, including inherent growth in the roadway network. However, due to the number of background developments included in the analysis, no additional percent growth was added. It was assumed that the growth added to the study area would be generated by the background developments and that including an inherent growth rate would overestimate the future traffic volumes without the proposed development.

The roadway network for the future conditions without development is based on the existing roadway network, as shown on Figure 26, Figure 27, and Figure 28. No roadway infrastructure changes were assumed for the future conditions without development. However, signal timing improvements were assumed, including retiming the signals to optimize their operation, adjusting signal offsets, and removing the pedestrian phase at the intersection of 4th Street SW and I Street SW, as confirmed with DDOT to be included in the scenario.

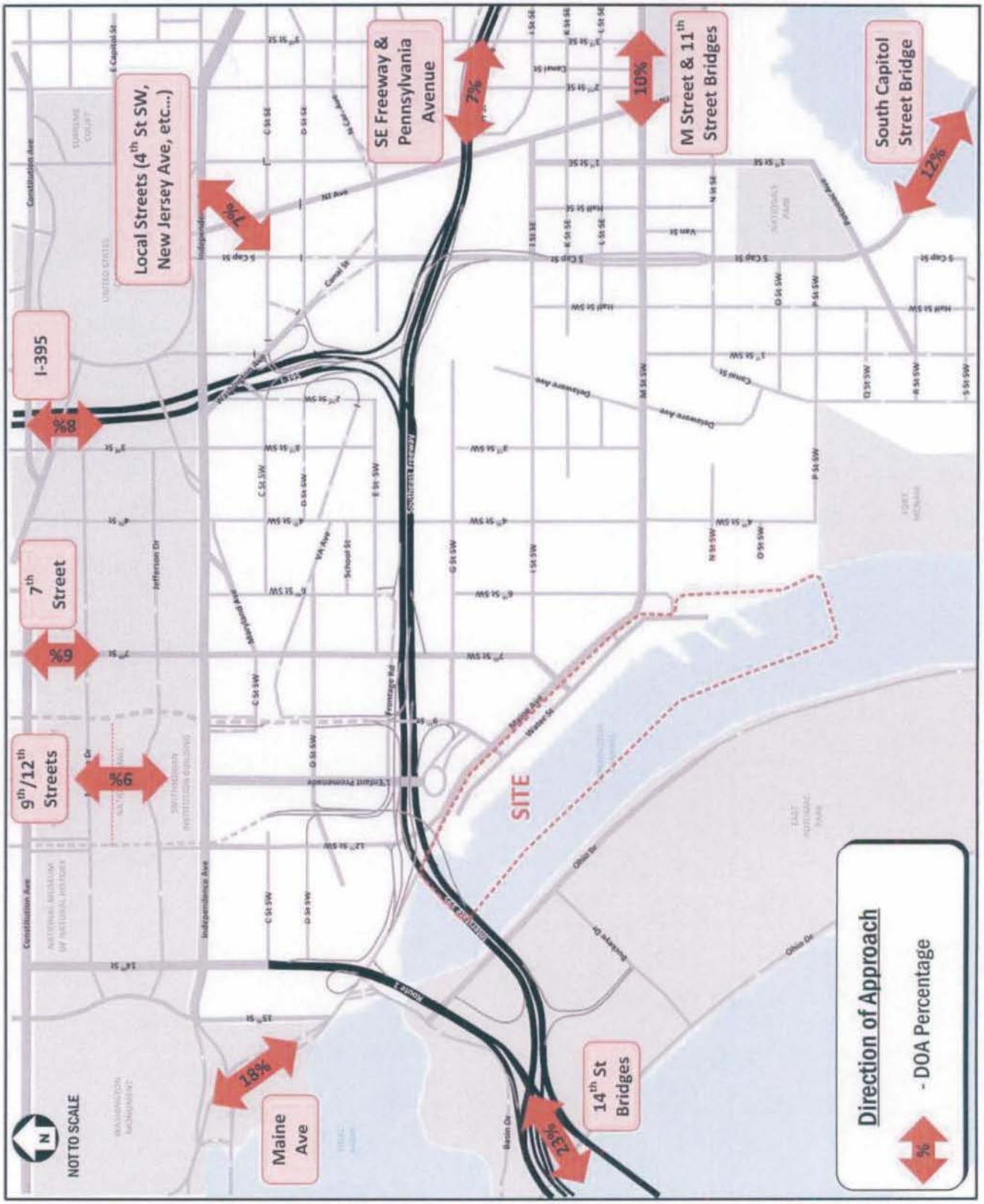


Figure 18: Direction of Approach

Future Conditions (2018) with Development

The traffic volumes for the future conditions with development scenario were generated by adding the site generated traffic volumes and the retail pass-by trips to the 2018 future traffic volumes without development (the trip generation and mode split assumptions are discussed in section 3.1 of this report). The traffic volumes added by the proposed PUD for the total future scenario are shown on Figure 20, Figure 21, and Figure 22 and on Figure 23, Figure 24, and Figure 25 for the morning and afternoon peak hours, respectively.

The future roadway network is based on the existing configuration of the roadways in the study area with the addition of the site access points previously described. As stated previously the operations of the circle feature have been designed to mimic those of a traditional T-intersection. The circle is proposed to operate with two signal phases, one for the mainline traffic, and one for the side-street traffic and crosswalks. The lanes of the circle within the Maine Avenue median are designed to operate much like left-turn pockets, with the added ability to process U-turns. These analyses model the operations of the circle feature as a T-Intersection with U-turn movements, mimicking the expected operations of the traffic signal that will control the circle (the circle feature is represented as intersections 31 and 32).

Additionally, the future conditions with development include the reconfiguration Maine Avenue due to the introduction of the streetcar to the corridor, which will likely operate in the right-most travel lanes on either side of the roadway. Streetcars cannot operate in the same lanes as peak hour restricted on-street parking, and currently, the on-street parking on the north side of Maine Avenue adjacent to the PUD operates as peak-hour restricted west of Arena Stage.

Thus, it is likely that the on-street parking lanes on Maine Avenue (where future streetcar routes are planned) will need to be converted to either permanent parking lanes without peak-hour restrictions (as they are currently on the southern side of Maine Avenue adjacent to the PUD or permanent travel lanes). Although DDOT will make the final decision on the cross-section of Maine Avenue adjacent to the PUD, this study made the following assumptions in order to proceed with its assessment of future traffic impacts generated by the PUD project:

- *Eastbound*: two travel lanes and one permanent parking lane, and
- *Westbound:* two travel lanes between 6th Street and 7th Street SW and three travel lanes between 7th Street SW and 9th Street SW. If the future streetcar lanes do not extent west beyond 7th Street, the rightmost travel lane on the northern side of Maine Avenue can operate with peak hour restricted on-street parking (between 7th and 9th Streets).

The assumptions on Maine Avenue on-street parking and through lanes are summarized on Figure 19. The lane configurations for the future conditions with development, including the site driveways, are shown on Figure 29, Figure 30, and Figure 31.

In addition to the roadway infrastructure changes outlined above, the following improvements are included in the future conditions with the proposed PUD in order to mitigate the impacts of the site-generated trips:

- Maine Avenue and 9th Street SW
  - Add protected left-turn arrow to southbound movement.
  - Retime signal and adjust offsets.
- 7th Street SW and I Street SW
  - Add protected left-turn arrow to southbound movement.

- Remove northbound right-turn arrow.
- Retime signal and adjust offsets.

- Maine Avenue and 7th Street SW
  - Add protected left-turn arrow to southbound movement.
  - Retime signal and adjust offsets.

These operational improvements can be installed as each phase of the SWW is implemented. Two of the intersections are site driveways, and traffic signal improvements will be necessary based on the changes anticipated on the SWW approach to the intersection. Thus, the improvements can be installed in conjunction with the anticipated traffic signal modifications the will accompany the adjacent phases. The improvements to 7th Street and I Street can be installed at the same time the associated phase of SWW PUD makes adjustments to the Maine Avenue and 7th Street traffic signals.

The analysis described above was performed using traditional methodologies, where all traffic is added in layers without adjustment for future traffic conditions. This analysis includes the assumption that the existing commuter traffic along M Street/Maine Avenue would be the same in the future conditions as it is in the existing conditions. However, the assumption that existing vehicles traveling to and from the Navy Yard or Fort MacNair will follow the same traffic patterns in a future scenario is infeasible. This analysis also includes the assumption that the existing vehicular traffic would remain on the roadway in spite of the introduction of the new streetcar system and other growth in non-automobile modes.

During the scoping meeting with DDOT, an agreement was made to test the roadway capacity of the study area assuming that some existing commuter traffic would change patterns in the future. One of the purposes of this analysis was to determine what the capacity results would be under a scenario where Maine Avenue had a roadway configuration with two-lanes in each direction. Therefore, a second analysis was performed using the future volumes described previously but with an adjustment to east- and westbound vehicular traffic along M Street/Maine Avenue. The adjustments are equal to an approximate ten to fifteen percent reduction in east- and westbound vehicles traveling along the corridor in the existing conditions. (This is equal to approximately 75 vehicles removed from Maine Avenue during the morning peak hour and 150 vehicles during the afternoon peak hour.) For the purpose of this analysis, it was assumed that the Maine Avenue corridor would operate as two travel lanes east- and westbound with one permanent parking lane between the site and 6th Street SW. East of 6th Street SW, the corridor would operate under its existing configuration. The assumptions for this scenario regarding Maine Avenue on-street parking and through lanes are summarized on Figure 19, under "Alternative Scenario".

The lane configurations for the future conditions with development and volume reductions, including the site driveways, are shown on Figure 29, Figure 30, and Figure 31. In addition to the roadway infrastructure changes, the signal timing changes outlined above are also included in this analysis.

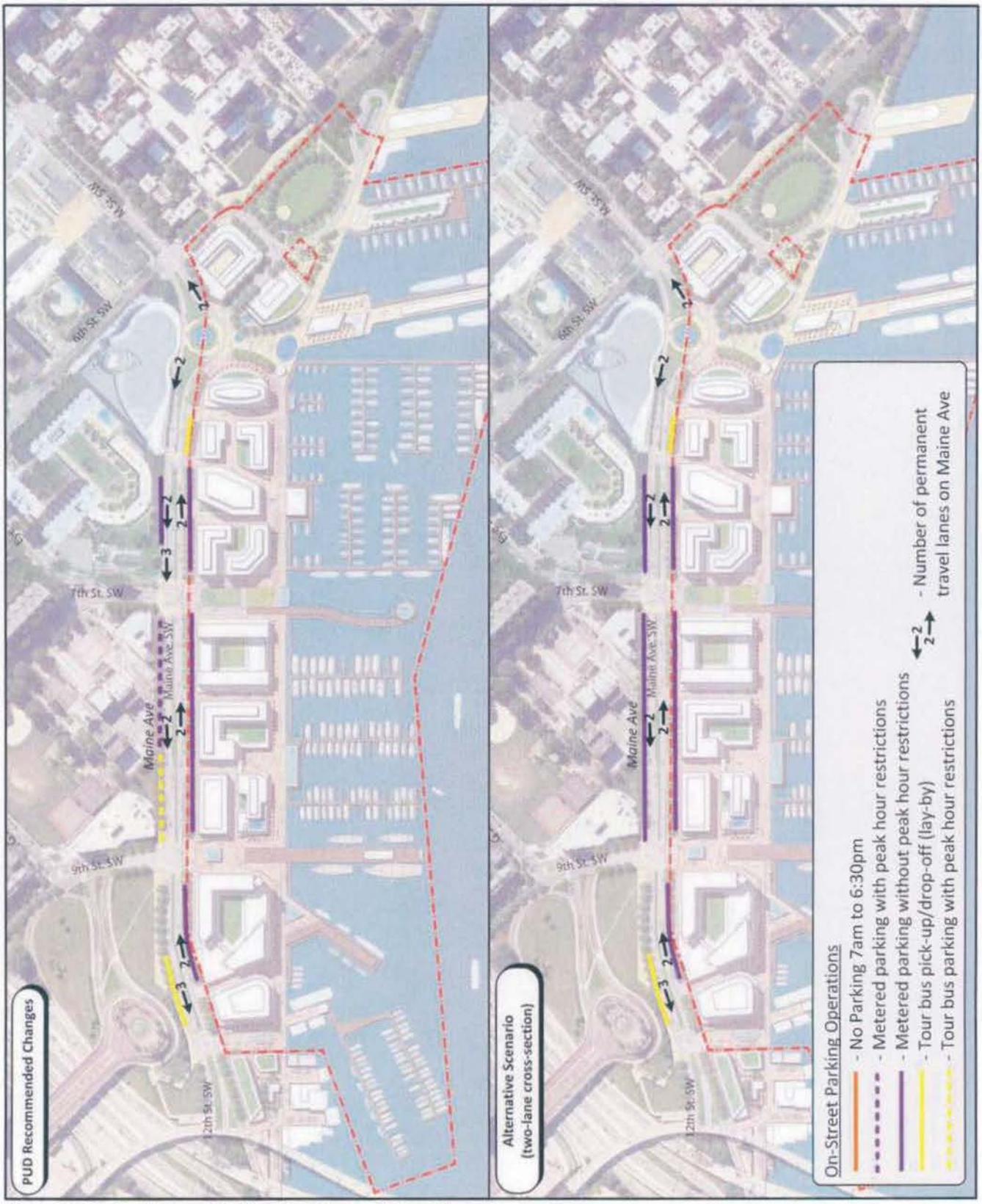


Figure 19: Maine Avenue On-Street Parking and Travel Lane Assumptions

Future Conditions (2028) without Development

In addition to the full build-out year, an additional horizon year analysis was performed to project the potential traffic conditions ten years after the proposed PUD is completed. The traffic projections for the horizon year condition consist of the traffic generated by background developments with planned completion after 2018, listed in the section 1.7.2 of this report, added to the future with development traffic volumes.

As stated previously, trip generation for the other background developments was calculated based on the methodology outlined in the Institute of Transportation Engineers' (ITE) *Trip Generation*, 8th Edition. For developments consisting of a mix of retail uses with office, residential, or hotel uses, a 20% internal capture reduction was applied for retail trips originating from within the proposed development. The Shopping Center trip rate was applied in lieu of individual trip rates, such as bank, pharmacy and supermarket, for the retail uses because applying individual rates would not account for interaction between the retail uses (shoppers visiting more than one store), and the Shopping Center trip rate does account for these uses and interactions. Additionally, the General Office Building, Residential Apartments, and Residential Condominiums/Townhomes rates were applied for office and residential uses to estimate trips generated by the background developments.

For this report, the methodology was supplemented to account for the urban nature of the site (Trip Generation provides data for non-urban, low transit use sites). The WMATA Ridership Survey was used to determine transit reduction rates in order to account for trips taken by walking, bicycling, and transit. The mode split assumptions were based on the patterns and general findings from that document, observations of existing traffic, and the type and density of surrounding land uses. It was assumed that retail uses would generate a lot of local demand and therefore, have the highest assumed percentage of walking and biking trips. Residential based trips would be the most likely to use public transit, since they will be regular users that will be able to figure out and take advantage of the various routes and schedules. Although the location of the site near several major highways could lead to driving mode splits, the Metrorail, Metrobus, and DC Circulator service will be utilized to reach destinations in downtown areas of the District and to surrounding areas.

Table 8, shown previously, summarizes the mode split assumptions. Table 17 shows the total number of trips generated by the background developments. The trips generated for each background development are shown in the Technical Appendix.

Table 17: Year 2028 Background Development Trip Generation

Land Use	Size		Trip Generation						
			AM Peak Hour			PM Peak Hour			Weekday Total
			In	*Out*	*Total*	*In*	*Out*	*Total*	
Vehicle Trips									
Retail	120,121	Square Feet	48	30	78	122	110	232	2,538
Residential	1,260	Dwelling Units	24	118	142	117	54	171	1,914
Office	2,584,000	Square Feet	1,297	180	1,477	242	1,181	1,423	9,998
Total Vehicle-Trips			**1,369**	**328**	**1,697**	**481**	**1,345**	**1,826**	**14,450**

The traffic volumes generated by the background developments were added to the future with development (2018) traffic volumes in order to establish the horizon year (2028) traffic volumes. The traffic volumes added by the background developments are shown on Figure 20, Figure 21, and Figure 22 and on Figure 23, Figure 24, and Figure 25 for the morning and afternoon peak hours, respectively.

Typically, a percent growth rate is applied to the existing traffic volumes in order to account for other traffic increases, including inherent growth in the roadway network. However, due to the number of background developments included in

the analysis, no additional percent growth was added. It was assumed that the growth added to the study area would be generated by the background developments and that including an inherent growth rate would overestimate the future traffic volumes without the proposed development.

The roadway network for the horizon year is based on the roadway network with the proposed development, as shown on Figure 26, Figure 27, and Figure 28. No roadway infrastructure changes or signal timing improvements were assumed for the horizon year.

3.5.3 Vehicular Analysis Results

As stated previously, intersection capacity analyses were performed at the intersections contained within the study area during the morning and afternoon peak hours. The *Synchro, Version 7.0* software package was used to analyze the study intersections based on the Highway Capacity Manual (HCM) methodology. The HCM employs a measure of quality known as Level of Service (LOS), which describes operational conditions for the transportation element being evaluated. LOS is provided as a letter grade; six LOS grades are defined for each type of facility (intersection, sidewalk, crosswalk, etc...) the HCM provides a methodology to evaluate. The grades range from LOS "A" to LOS "F" with LOS "F" representing the worst conditions. For the purpose of this analysis, LOS "E" or better is considered an acceptable condition during the morning and afternoon peak hours.

The results of the capacity analyses are expressed in level of service (LOS) and delay (seconds per vehicle) for each approach. An average delay (of each approach) and LOS for the signalized intersections is also shown for an overall intersection LOS grade. The HCM does not give guidelines for calculating the average delay for a two-way stop-controlled intersection, as the approaches without stop signs would technically have no delay. The detailed analysis worksheets are contained in the Technical Appendix.

The existing, future without development, future with development, future with development and volume adjustments, and horizon year capacity analyses are based on the traffic volume and roadway network assumptions described previously. The results of the intersection capacity analyses are presented in Table 18 and shown on Figure 32, Figure 33, and Figure 34 and on Figure 35, Figure 36, and Figure 37 for the morning and afternoon peak hours, respectively. All study intersections operate at acceptable conditions during the morning and afternoon peak hours for the existing, future without development, future with development, and horizon year scenarios.

However, during the afternoon peak period of the existing conditions, a few approaches operate under unacceptable conditions. This includes the westbound approach of 14th Street SW at C Street SW, the northbound approach of the Route 1 Off-Ramp at Maine Avenue SW, and the northbound approach of 4th Street SW at I Street SW due to existing signal timings and traffic volumes at these locations. Retiming these intersections during the future conditions without development, as described previously, allows these approaches to operate under acceptable conditions. Additionally, in the horizon year conditions, the southbound approach of 9th Street at Maine Avenue is projected to operate under unacceptable conditions during the morning and afternoon peak period.

As shown in Table 18, all study intersections operate under acceptable conditions during the future conditions with the proposed PUD. Both of the analyses presented—the traditional methodology and the volume adjustments—show that, with the assumed Maine Avenue cross-section, all study intersections operate under acceptable conditions, with the exception of the intersection of Maine Avenue and 9th Street, which is projected to operate under unacceptable conditions during the afternoon peak hour. Although DDOT will make the final decision on the cross-section of Maine Avenue adjacent to the proposed PUD, it is recommended that DDOT choose the cross-section that contains two travel lanes in

each direction and one parking lane. The analysis presented shows that this cross-section, with an approximate ten percent reduction in existing commuter volumes, will accommodate future traffic volumes. Additionally, the urban design benefits and quality to pedestrian travel provided by the recommended cross-section outweigh the traffic capacity benefits that the additional travel lanes along Maine Avenue would provide.

In addition to the capacity analyses presented above, a queuing analysis was performed at the study intersections that include a freeway ramp as an approach. DDOT requested this analysis to examine if any of the freeway ramps that end in approached to traffic signals would back-up to the freeway mainlines in the future traffic models. Within the study area there are four freeway off-ramps that end at intersections:

1. D Street SW & 12th Street SW
2. Maine Avenue SW & Route 1 Off-Ramp
3. G Street SW & 9th Street SW
4. Frontage Road/I-395 Off-Ramp & 7th Street SW

Queuing at these intersections was investigated in order to determine the impacts of the proposed PUD on the operation of the freeway ramps. Table 19 shows the results of the queuing analysis. However, queuing results are not presented for the intersection of G Street and 9th Street because *Synchro* does not produce queuing analysis for all-way-stop controlled intersections.

The results of the queuing analyses show that the queues projected by the traffic models do not exceed the length of the ramp on the approach to the traffic signal, for all scenarios modeled. Thus, the projected future traffic growth from the background developments and the SWW PUD will not have an adverse impact to these freeway ramps.

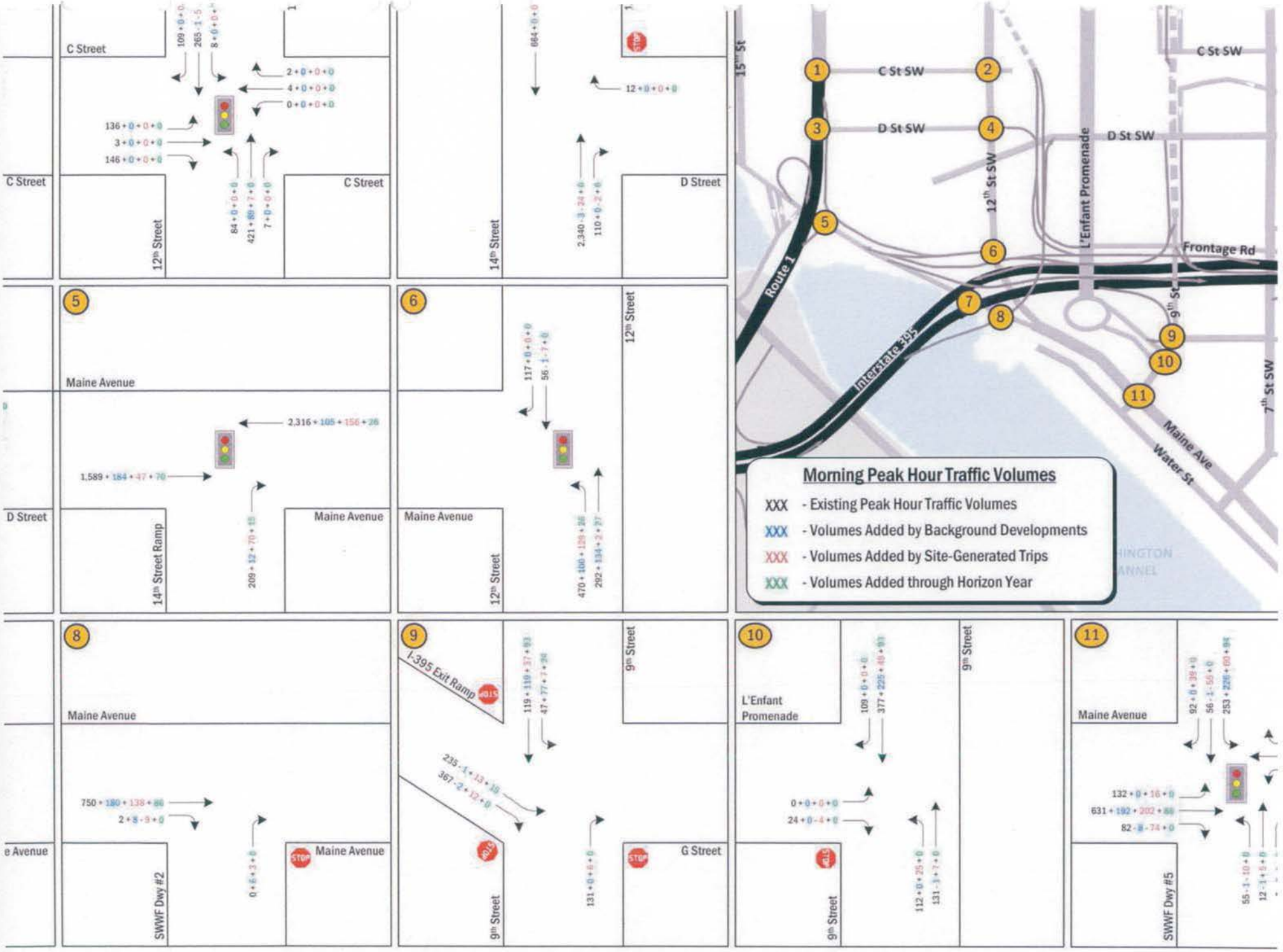
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
	Overall	**23.5**	**C**	**39.0**	**D**	**19.2**	**B**	**23.9**	**C**	**18.6**	**B**	**23.2**	**C**	**18.6**	**B**	**23.2**	**C**
	Westbound	51.1	D	89.9	F	53.8	D	23.6	C	45.6	D	23.6	C	46.0	D	23.6	C
	Northbound	26.5	C	34.8	C	20.5	C	22.7	C	20.1	C	21.7	C	20.1	C	21.7	C
	Southbound	8.7	A	19.1	B	8.8	A	25.1	C	8.8	A	24.3	C	8.8	A	24.3	C
	Overall	**17.1**	**B**	**19.3**	**B**	**13.1**	**B**	**13.9**	**B**	**16.5**	**B**	**13.9**	**B**	**16.6**	**B**	**13.9**	**B**
	Eastbound	29.8	C	44.0	D	17.4	B	30.2	C	17.4	B	30.3	C	17.4	B	30.3	C
	Westbound	28.2	C	28.6	C	18.7	B	20.2	C	18.7	B	20.2	C	18.7	B	20.2	C
	Northbound	4.1	A	5.3	A	4.6	A	4.2	A	5.4	A	4.2	A	5.4	A	4.2	A
	Southbound	25.0	C	25.9	C	24.2	C	25.0	C	35.0	D	25.0	C	35.0	D	25.0	C
	Westbound	16.9	C	14.2	B	16.9	C	14.1	B	15.0	B	13.7	B	15.0	B	13.7	B
	Overall	**18.6**	**B**	**19.7**	**B**	**15.9**	**B**	**28.0**	**C**	**22.3**	**C**	**27.1**	**C**	**24.1**	**C**	**25.7**	**C**
	Eastbound	33.4	C	62.0	E	16.6	B	19.8	B	16.6	B	19.7	B	16.6	B	19.7	B
	Westbound	44.2	D	35.1	D	18.5	B	16.3	B	19.2	B	16.3	B	19.2	B	16.3	B
	Northbound	14.5	B	5.9	A	13.5	B	28.9	C	8.5	A	27.6	C	12.1	B	25.5	C
	Southbound	7.8	A	7.3	A	17.9	B	38.1	D	44.5	D	37.7	D	44.5	D	37.7	D
	Overall	**11.1**	**B**	**21.4**	**C**	**8.6**	**A**	**9.7**	**A**	**10.5**	**B**	**10.7**	**B**	**10.0**	**B**	**9.6**	**A**
	Eastbound	24.5	C	6.1	A	15.1	B	19.6	B	16.0	B	20.8	C	14.7	B	17.9	B
	Westbound	0.3	A	0.3	A	0.4	A	0.4	A	0.4	A	0.5	A	0.4	A	0.4	A
	Northbound	28.6	C	272.6	F	45.8	D	37.0	D	64.9	E	43.1	D	64.9	E	43.1	D
	Overall	**8.6**	**A**	**19.7**	**B**	**2.7**	**A**	**4.6**	**A**	**4.9**	**A**	**5.1**	**A**	**5.1**	**A**	**5.2**	**A**
	Northbound	1.6	A	22.6	C	0.9	A	1.6	A	1.3	A	1.9	A	1.3	A	1.5	A
	Southbound	39.1	D	12.4	B	12.9	B	16.6	B	29.3	C	19.7	B	29.3	C	20.1	C
	Northbound	--	--	--	--	--	--	--	--	21.0	C	17.8	C	19.3	C	15.1	C
	Northbound	0.0	A	10.9	B	12.2	B	11.6	B	20.8	C	19.4	C	19.1	C	16.2	C
)	**Overall**	**11.2**	**B**	**16.5**	**C**	**14.8**	**C**	**27.3**	**D**	**16.5**	**C**	**30.4**	**D**	**16.5**	**C**	**30.4**	**D**
	Eastbound	10.3	B	12.7	B	11.4	B	13.0	B	11.8	B	13.2	B	11.8	B	13.2	B
	Southbound	9.5	A	19.8	C	14.3	B	35.3	E	15.8	C	40.4	E	15.8	C	40.4	E
	Southeast	11.8	B	10.4	B	16.0	C	11.0	B	18.0	C	11.8	B	18.0	C	11.8	B
	Eastbound	9.7	A	10.2	B	10.3	B	10.8	B	10.4	B	10.8	B	10.4	B	10.8	B
	Northbound Left	3.9	A	9.9	A	9.5	A	10.9	B	9.9	A	11.4	B	9.9	A	11.4	B
y #5	**Overall**	**25.6**	**C**	**29.1**	**C**	**25.2**	**C**	**45.5**	**D**	**37.0**	**D**	**43.8**	**D**	**50.4**	**D**	**103.5**	**F**
	Eastbound	23.1	C	26.0	C	28.0	C	26.8	C	47.5	D	48.1	D	47.8	D	30.9	D
	Westbound	17.1	B	20.1	C	17.4	B	51.9	D	8.6	A	31.1	C	45.0	D	147.0	F
	Northbound	31.7	C	27.0	C	16.8	B	18.9	B	31.5	C	34.2	C	31.5	C	40.8	C
	Southbound	48.6	D	49.8	D	36.1	C	63.1	E	75.9	E	65.9	E	66.6	E	122.4	F
t Ramp	**Overall**	**28.1**	**C**	**19.1**	**B**	**21.2**	**C**	**14.8**	**B**	**22.3**	**C**	**16.3**	**B**	**22.3**	**C**	**16.3**	**B**

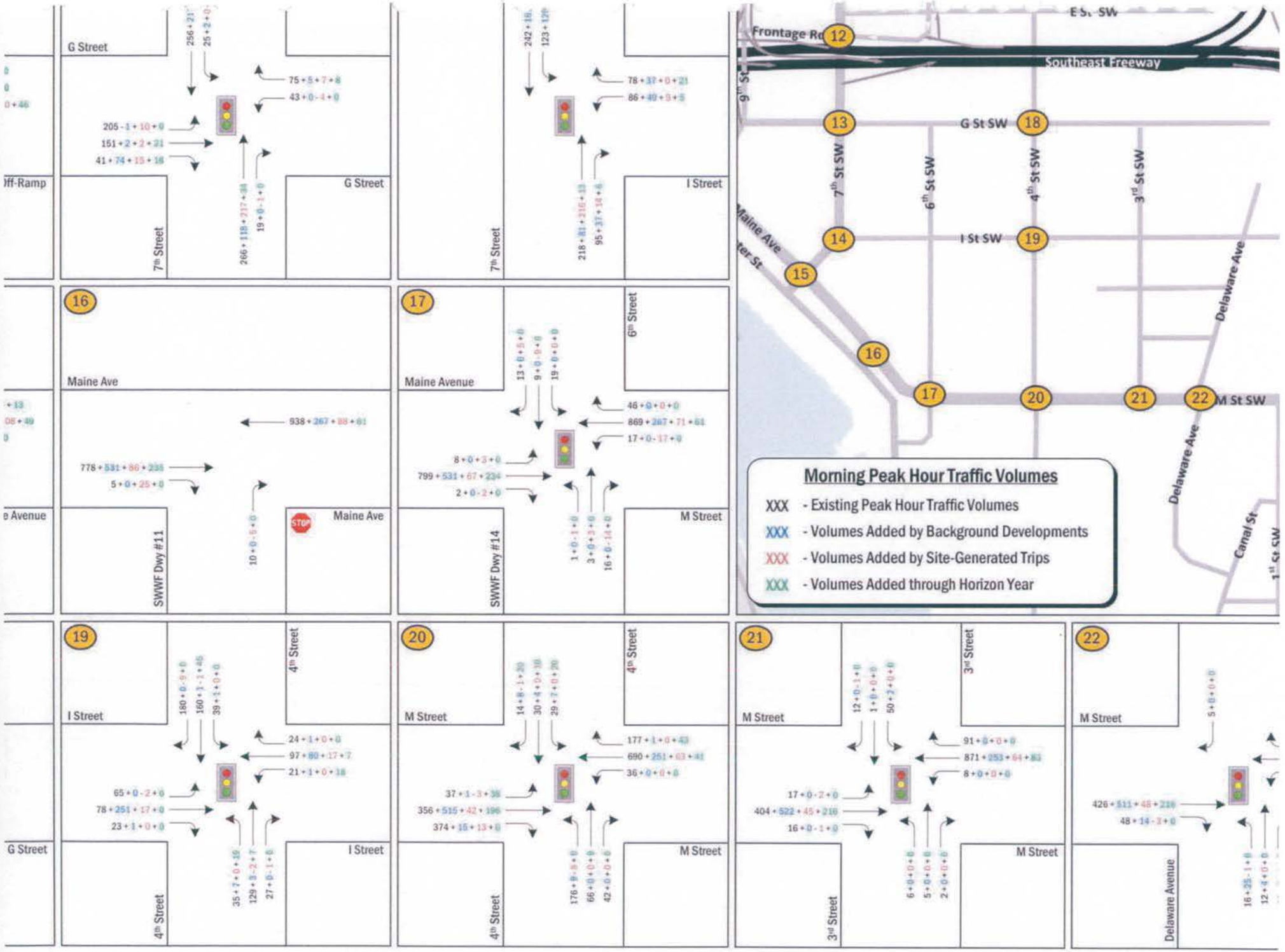
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
	Northbound	16.4	B	17.2	B	17.8	B	1.9	A	20.1	C	2.2	A	20.1	C	2.2	A
	Southbound	13.0	B	14.4	B	25.9	C	18.2	B	26.0	C	18.3	B	26.0	C	18.3	B
	Overall	**27.1**	**C**	**17.2**	**B**	**13.9**	**B**	**19.2**	**B**	**14.8**	**B**	**17.2**	**B**	**14.2**	**B**	**17.3**	**B**
	Eastbound	7.0	A	14.6	B	15.0	B	16.8	B	15.3	B	16.8	B	15.3	B	16.8	B
	Westbound	12.6	B	11.9	B	10.0	B	8.3	A	9.6	B	9.6	A	9.6	A	9.6	A
	Northbound	46.7	D	24.5	C	11.2	B	29.0	C	11.1	B	20.2	C	8.9	A	20.3	C
	Southbound	41.7	D	16.1	B	15.9	B	13.2	B	19.0	B	15.3	B	19.0	B	15.3	B
	Overall	**21.7**	**C**	**12.5**	**B**	**12.1**	**B**	**19.4**	**B**	**12.7**	**B**	**20.0**	**B**	**13.2**	**B**	**21.6**	**C**
	Westbound	50.4	D	45.9	D	22.4	C	8.4	A	26.7	C	21.7	C	26.6	C	21.7	C
	Northbound	12.5	B	3.2	A	7.4	A	24.9	C	15.1	B	24.8	C	16.7	B	29.1	C
	Southbound	16.6	B	4.8	A	11.2	B	23.2	C	6.4	A	14.5	B	6.4	A	14.5	B
y#8	**Overall**	**23.9**	**C**	**17.8**	**B**	**9.8**	**A**	**17.6**	**B**	**34.8**	**C**	**23.7**	**C**	**43.6**	**D**	**45.2**	**D**
	Eastbound	4.7	A	16.8	B	7.1	A	9.8	A	19.1	B	15.1	B	13.5	B	18.5	B
	Westbound	41.3	D	20.6	C	7.9	A	21.5	C	53.8	D	20.0	B	78.0	E	70.9	E
	Northbound	28.3	C	23.8	C	26.8	C	31.4	C	34.3	C	39.3	D	32.8	C	37.3	D
	Southbound	21.2	C	10.2	B	19.1	B	22.4	B	28.0	C	45.2	D	40.9	D	48.7	D
	Northbound	9.7	A	9.6	A	9.8	A	10.1	B	10.3	B	10.8	B	10.1	B	10.2	B
y #14	**Overall**	**11.9**	**B**	**14.0**	**B**	**5.8**	**A**	**7.1**	**A**	**3.4**	**A**	**9.2**	**A**	**5.9**	**A**	**7.1**	**A**
	Eastbound	5.2	A	13.6	B	6.6	A	9.3	A	2.2	A	12.5	B	6.7	A	8.3	A
	Westbound	16.6	B	12.9	B	3.6	A	3.6	A	3.8	A	5.0	A	3.9	A	4.8	A
	Northbound	29.1	C	28.6	C	29.9	C	30.1	C	29.8	C	29.8	C	29.8	C	29.8	C
	Southbound	30.0	C	30.3	C	30.9	C	32.1	C	30.6	C	31.9	C	30.6	C	31.7	C
	Overall	**25.0**	**C**	**13.4**	**B**	**21.5**	**C**	**15.4**	**B**	**21.3**	**C**	**15.3**	**B**	**21.2**	**C**	**15.3**	**B**
	Eastbound	47.5	D	29.1	C	17.1	B	27.5	C	14.9	B	28.6	C	14.8	B	28.6	C
	Westbound	28.3	C	28.6	C	14.3	B	22.0	C	14.2	B	22.0	C	14.2	B	22.0	C
	Northbound	18.4	B	7.3	A	28.4	C	8.6	A	29.6	C	9.0	A	29.4	C	9.0	A
	Southbound	8.2	A	8.5	A	20.5	C	13.4	B	20.2	C	13.2	B	20.2	C	13.2	B
	Overall	**36.7**	**D**	**54.3**	**D**	**13.9**	**B**	**19.3**	**B**	**17.6**	**B**	**19.2**	**B**	**17.6**	**B**	**19.5**	**B**
	Eastbound	6.9	A	33.9	C	2.3	A	8.5	A	15.6	B	8.6	A	15.4	B	10.0	B
	Westbound	20.5	C	20.6	C	11.9	B	12.0	B	12.1	B	12.1	B	12.1	B	12.1	B
	Northbound	48.7	D	89.4	F	16.7	B	32.8	C	16.6	B	33.7	C	16.6	B	33.4	C
	Southbound	49.8	D	50.7	D	23.7	C	28.9	C	23.7	C	27.7	C	23.7	C	27.7	C
	Overall	**22.6**	**C**	**34.8**	**C**	**12.5**	**B**	**40.9**	**D**	**13.0**	**B**	**40.7**	**D**	**11.1**	**B**	**36.5**	**C**
	Eastbound	20.0	B	50.5	D	13.6	B	36.4	D	13.7	B	37.2	D	11.6	B	34.6	C
	Westbound	20.0	C	19.3	B	6.8	A	43.5	D	8.1	A	46.0	D	6.4	A	37.0	D
	Northbound	27.6	C	28.1	C	30.2	C	54.8	D	30.4	C	45.7	D	30.4	C	45.7	D
	Southbound	61.2	E	20.5	C	11.7	B	28.4	C	12.9	B	27.1	C	13.0	B	27.2	C

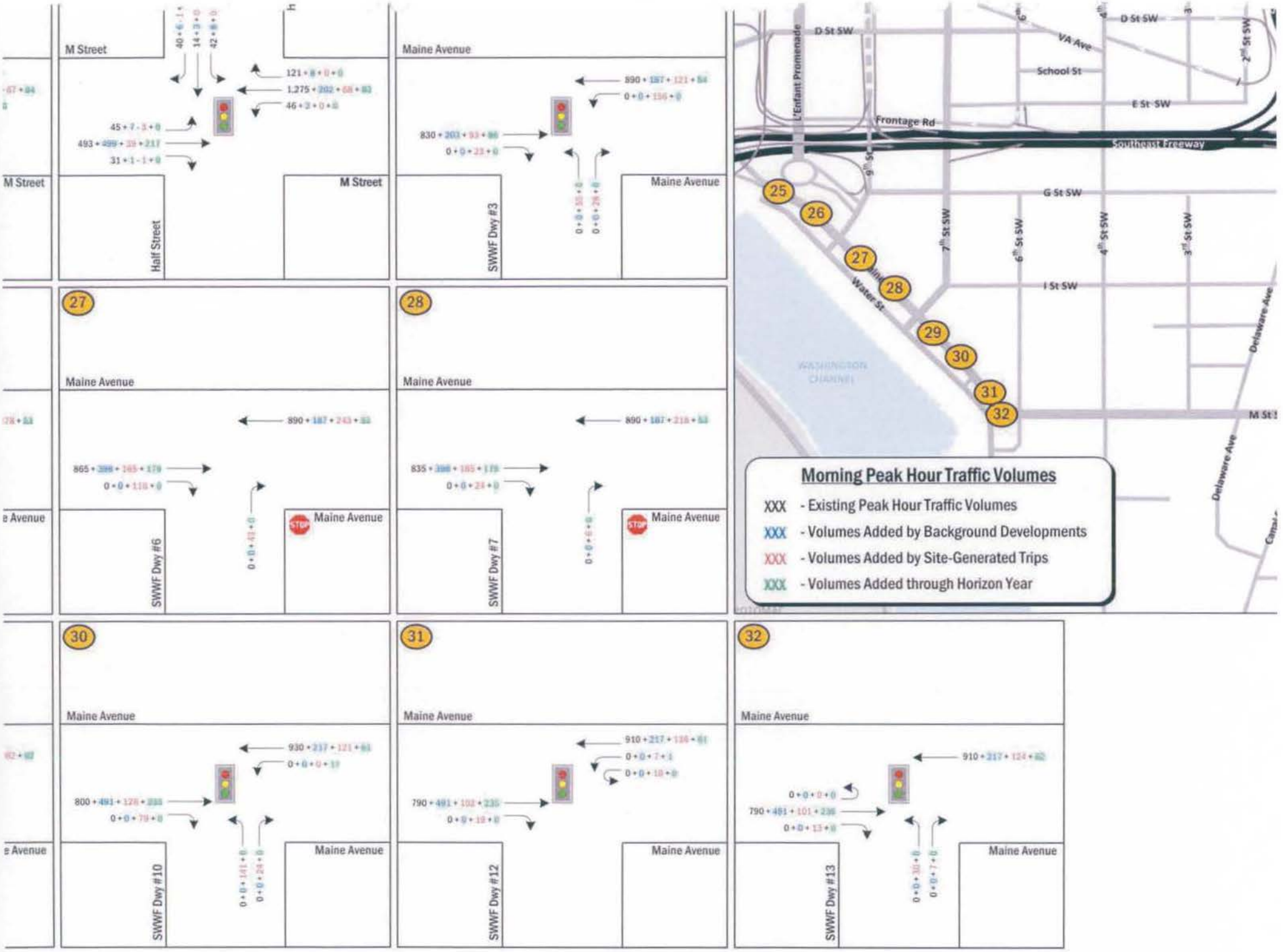
	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
Westbound	14.4	B	33.4	C	32.0	C	18.1	B	25.8	C	21.6	C	24.3	C	17.6	B
Northbound	30.0	C	29.8	C	27.7	C	25.3	C	27.7	C	25.3	C	27.7	C	25.3	C
Southbound	32.2	C	41.2	D	29.7	C	33.0	C	29.7	C	32.9	C	29.7	C	32.9	C
Overall	**1.9**	**A**	**2.5**	**A**	**2.9**	**A**	**3.3**	**A**	**2.8**	**A**	**3.3**	**A**	**3.0**	**A**	**3.6**	**A**
Eastbound	0.3	A	0.7	A	2.4	A	1.1	A	2.5	A	1.3	A	2.7	A	1.3	A
Westbound	0.4	A	0.2	A	0.3	A	2.5	A	0.3	A	2.6	A	0.3	A	2.8	A
Northbound	46.1	D	48.7	D	47.5	D	46.5	D	46.7	D	46.4	D	46.7	D	46.4	D
Southbound	43.5	D	45.1	D	42.0	D	43.2	D	42.2	D	43.2	D	42.2	D	43.2	D
Overall	**14.5**	**B**	**14.5**	**B**	**13.0**	**B**	**10.5**	**B**	**13.2**	**B**	**12.9**	**B**	**13.3**	**B**	**12.9**	**B**
Eastbound	23.2	C	16.7	B	9.0	A	8.2	A	13.7	B	10.9	B	13.7	B	11.3	B
Westbound	9.8	A	8.6	A	13.9	B	6.4	A	11.0	B	9.6	A	11.1	B	8.4	A
Northbound	23.7	C	21.4	C	28.8	C	32.1	C	28.7	C	31.6	C	28.7	C	31.5	C
Southbound	38.4	D	42.9	D	43.6	D	48.3	D	43.6	D	48.3	D	43.6	D	48.3	D
Overall	**12.2**	**B**	**13.2**	**B**	**8.0**	**A**	**15.3**	**B**	**7.8**	**A**	**18.4**	**B**	**7.7**	**A**	**17.0**	**B**
Eastbound	4.1	A	6.2	A	2.1	A	15.8	B	2.4	A	22.6	C	2.3	A	20.4	C
Westbound	14.3	B	17.6	B	10.2	B	12.5	B	9.8	A	12.1	B	9.6	A	11.0	B
Southbound	29.6	C	32.9	C	30.3	C	30.6	C	30.4	C	30.6	C	30.3	C	30.6	C
Overall	--	--	--	--	--	--	--	--	**13.4**	**B**	**8.9**	**A**	**14.7**	**B**	**13.1**	**B**
Eastbound	--	--	--	--	--	--	--	--	21.8	C	13.9	B	24.8	C	11.9	B
Westbound	--	--	--	--	--	--	--	--	5.1	A	4.2	A	5.1	A	12.3	B
Northbound	--	--	--	--	--	--	--	--	32.9	C	34.3	C	32.9	C	34.3	C
Northbound	--	--	--	--	--	--	--	--	10.0	A	9.8	A	9.8	A	9.5	A
Northbound	--	--	--	--	--	--	--	--	10.0	A	10.7	B	9.8	A	10.6	B
Northbound	--	--	--	--	--	--	--	--	9.6	A	9.9	A	9.5	A	10.1	B
Northbound	--	--	--	--	--	--	--	--	10.1	A	10.1	A	9.8	A	9.6	A
Overall	--	--	--	--	--	--	--	--	**15.2**	**B**	**16.2**	**B**	**12.2**	**B**	**14.5**	**B**
Eastbound	--	--	--	--	--	--	--	--	9.3	A	17.6	B	11.5	B	11.0	B
Westbound	--	--	--	--	--	--	--	--	19.2	B	13.4	B	9.5	A	16.6	B
Northbound	--	--	--	--	--	--	--	--	37.5	D	34.0	C	37.5	D	34.0	C
Overall	--	--	--	--	--	--	--	--	**2.0**	**A**	**7.9**	**A**	**2.7**	**A**	**2.4**	**A**
Eastbound	--	--	--	--	--	--	--	--	1.4	A	14.4	B	2.2	A	3.1	A
Westbound	--	--	--	--	--	--	--	--	2.7	A	1.8	A	3.4	A	1.7	A
Overall	--	--	--	--	--	--	--	--	**3.2**	**A**	**15.3**	**B**	**8.1**	**A**	**3.9**	**A**
Eastbound	--	--	--	--	--	--	--	--	1.1	A	1.7	A	1.5	A	1.0	A
Westbound	--	--	--	--	--	--	--	--	4.6	A	27.8	C	14.7	B	5.3	A
Northbound	--	--	--	--	--	--	--	--	31.5	C	32.3	C	31.5	C	32.3	C

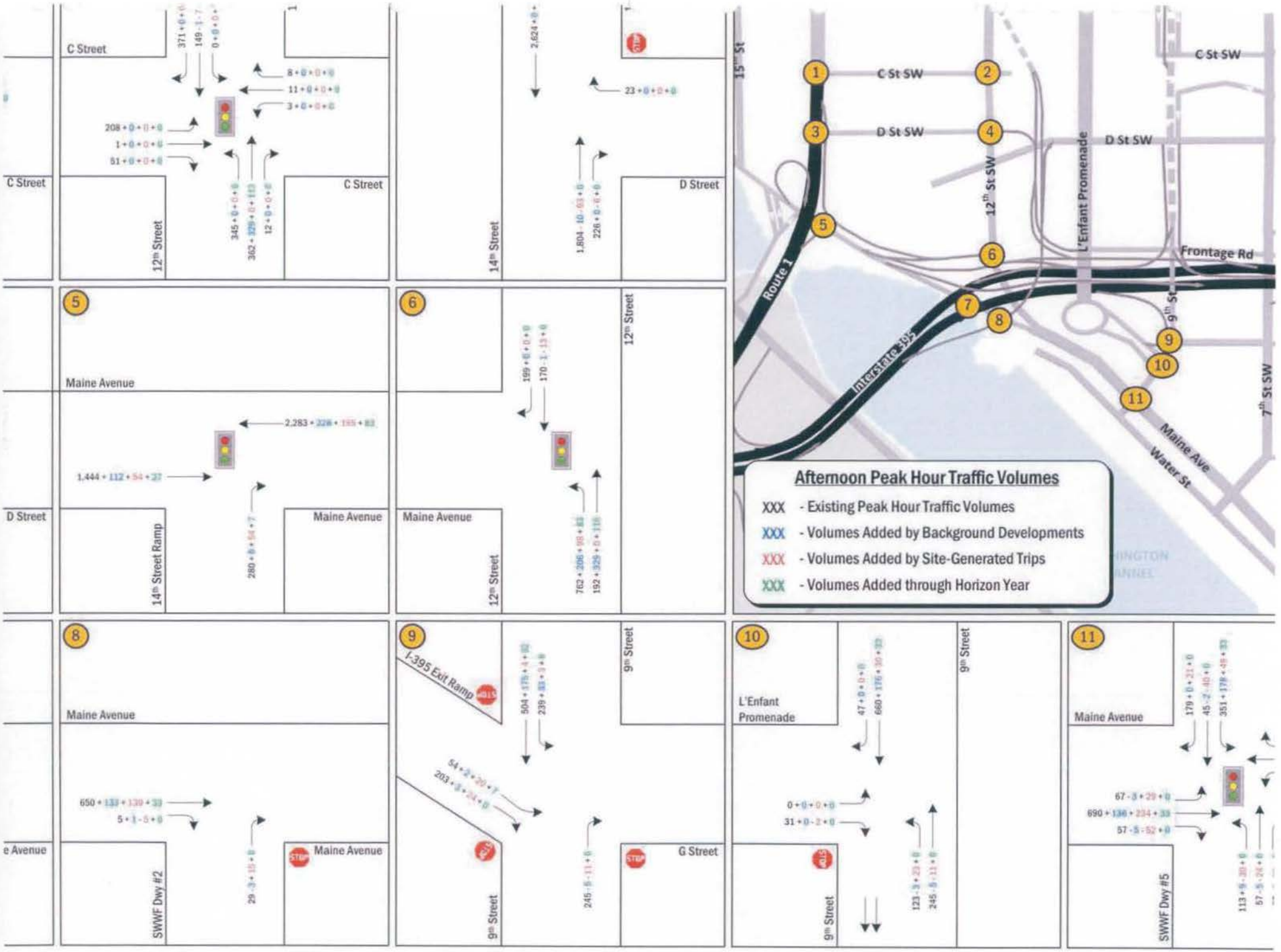
		Approach																
			50%	95%	50%	95%	50%	95%	50%	95%	50%	95%	50%	95%	50%	95%	50%	9
	Eastbound	965 feet	4	54	141	#302	2	36	66	138	2	36	65	136	2	36	65	1
erminus)	Westbound	450 feet	88	167	21	63	49	99	27	55	76	130	27	55	76	130	27	
	Northbound	130 feet	76	101	74	87	122	136	257	305	63	85	258	305	89	121	258	3
	Southbound	275 feet	28	48	14	27	49	71	50	79	98	136	49	77	98	136	49	
	Eastbound	300 feet	469	585	186	232	417	525	415	517	442	558	443	554	404	506	367	4
	Westbound	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N
erminus)	Northbound	505 feet	112	181	~266	#431	141	227	173	268	197	#353	215	#353	197	#353	215	#
t Ramp	Eastbound	525 feet	4	24	11	61	3	17	10	56	3	17	10	55	3	17	10	
erminus)	Westbound	975 feet	239	#414	40	90	165	258	52	99	165	259	135	227	165	259	135	2
	Northbound	180 feet	31	42	41	57	116	149	5	5	150	186	10	10	150	186	10	
	Southbound	65 feet	31	48	79	105	92	123	117	150	96	128	120	153	96	128	120	1

ty, queue may be longer. Queue shown is maximum after two cycles.
eoretically infinite. Queue shown is maximum after two cycles.


C Street
12th Street
14th Street
D Street
Maine Avenue
14th Street Ramp
I-395 Exit Ramp
9th Street
G Street
L'Enfant Promenade
SWWF Dwy #2
SWWF Dwy #5
15th St
C St SW
D St SW
12th St SW
L'Enfant Promenade
Frontage Rd
9th St
7th St SW
Route 1
Interstate 395
Maine Ave
Water St
Morning Peak Hour Traffic Volumes
XXX - Existing Peak Hour Traffic Volumes
XXX - Volumes Added by Background Developments
XXX - Volumes Added by Site-Generated Trips
XXX - Volumes Added through Horizon Year


Frontage Rd
Southeast Freeway
9th St
G St SW
I St SW
7th St SW
6th St SW
4th St SW
3rd St SW
Maine Ave
Delaware Ave
M St SW
Canal St
12
13
14
15
16
17
18
19
20
21
22
Morning Peak Hour Traffic Volumes
XXX - Existing Peak Hour Traffic Volumes
XXX - Volumes Added by Background Developments
XXX - Volumes Added by Site-Generated Trips
XXX - Volumes Added through Horizon Year
G Street
7th Street
I Street
Maine Ave
SWWF Dwy #11
STOP
Maine Avenue
6th Street
SWWF Dwy #14
M Street
4th Street
3rd Street
Delaware Avenue


M Street
Half Street
Maine Avenue
SWWF Dwy #3
27
28
SWWF Dwy #6
SWWF Dwy #7
30
31
32
SWWF Dwy #10
SWWF Dwy #12
SWWF Dwy #13
STOP
D St SW
VA Ave
School St
E St SW
Frontage Rd
Southwest Freeway
L'Enfant Promenade
G St SW
I St SW
7th St SW
6th St SW
4th St SW
3rd St SW
2nd St SW
Water St
Delaware Ave
WASHINGTON CHANNEL
Morning Peak Hour Traffic Volumes
XXX - Existing Peak Hour Traffic Volumes
XXX - Volumes Added by Background Developments
XXX - Volumes Added by Site-Generated Trips
XXX - Volumes Added through Horizon Year


C Street
12th Street
C Street
14th Street
D Street
5
Maine Avenue
14th Street Ramp
D Street
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6
12th Street
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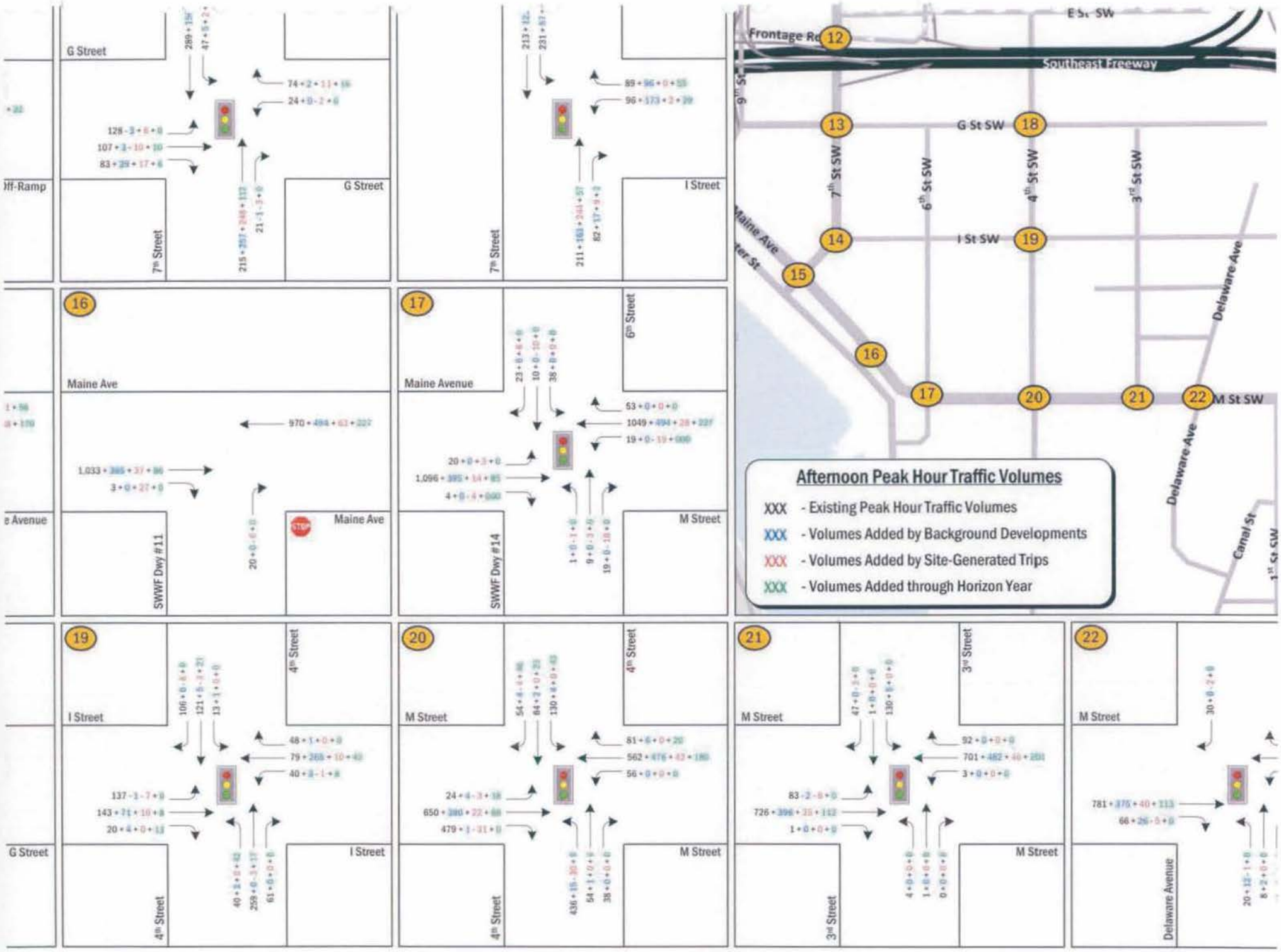
12th Street
8
Maine Avenue
SWWF Dwy #2
e Avenue
Maine Avenue
9
I-395 Exit Ramp
9th Street
9th Street
G Street
10
L'Enfant Promenade
9th Street
11
Maine Avenue
SWWF Dwy #5
15th St
C St SW
D St SW
12th St SW
L'Enfant Promenade
Frontage Rd
Route 1
Interstate 395
9th St
7th St SW
Maine Ave
Water St
Afternoon Peak Hour Traffic Volumes
XXX - Existing Peak Hour Traffic Volumes
XXX - Volumes Added by Background Developments
XXX - Volumes Added by Site-Generated Trips
XXX - Volumes Added through Horizon Year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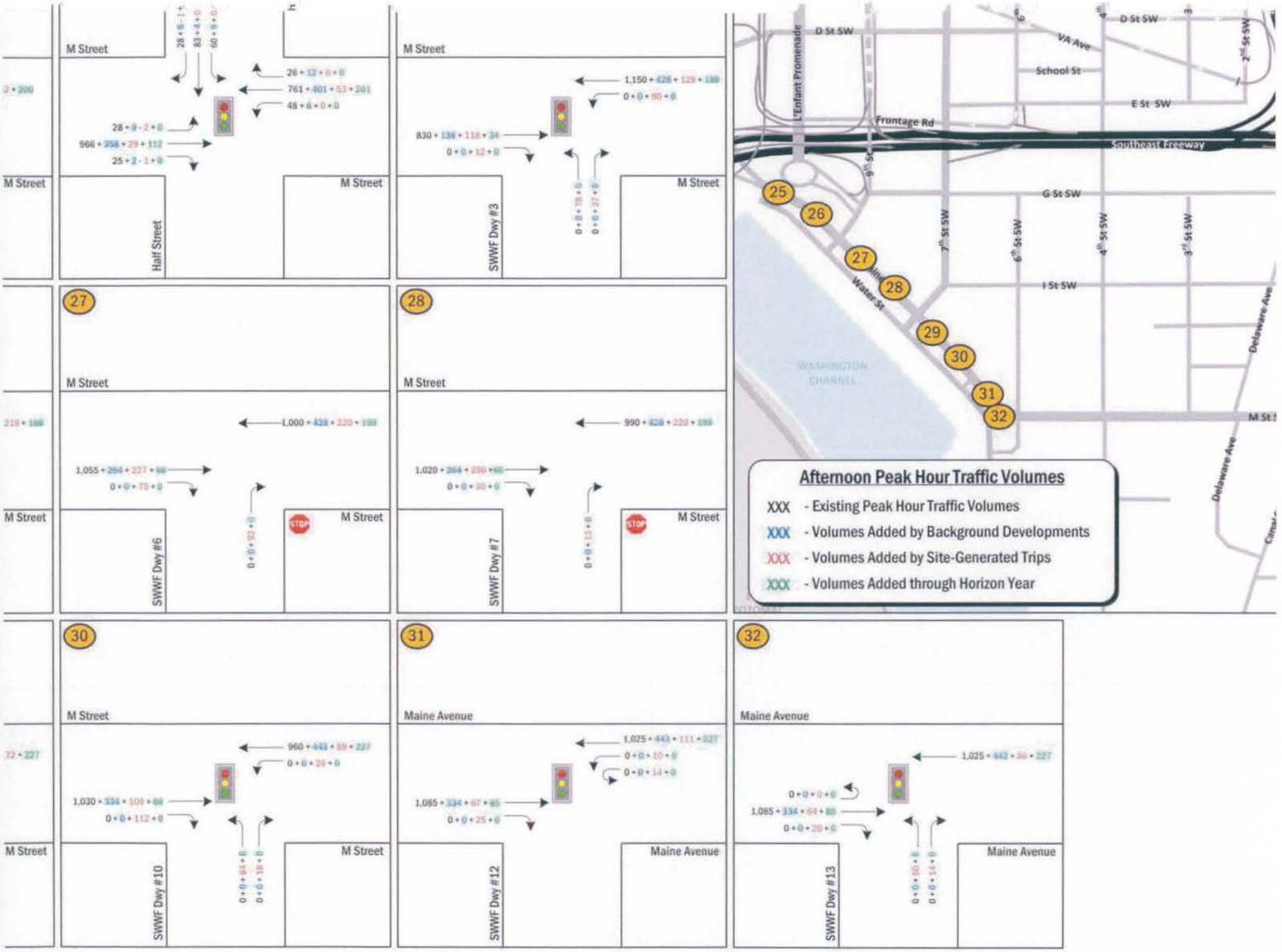
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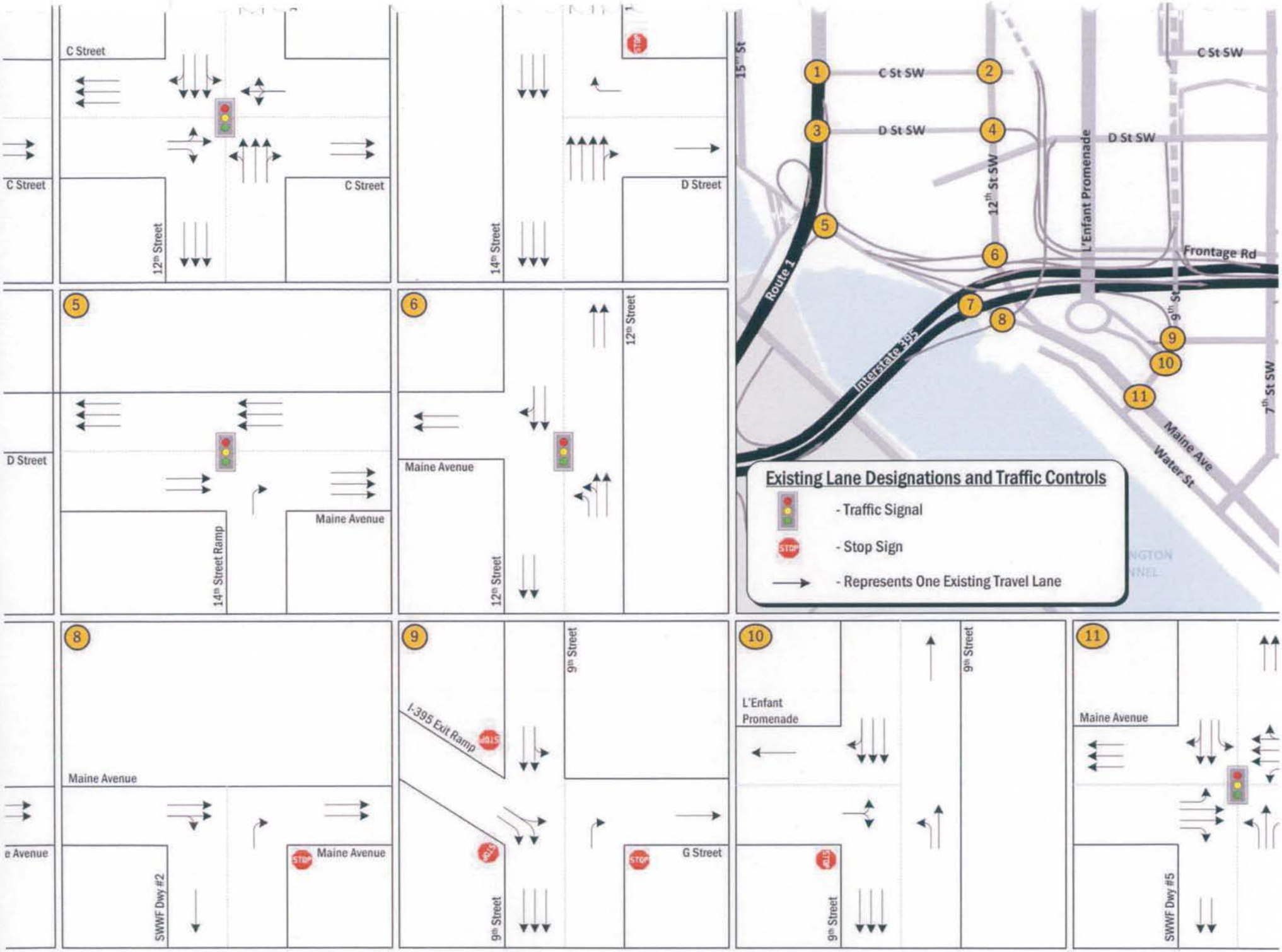
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Existing Lane Designations and Traffic Controls
- Traffic Signal
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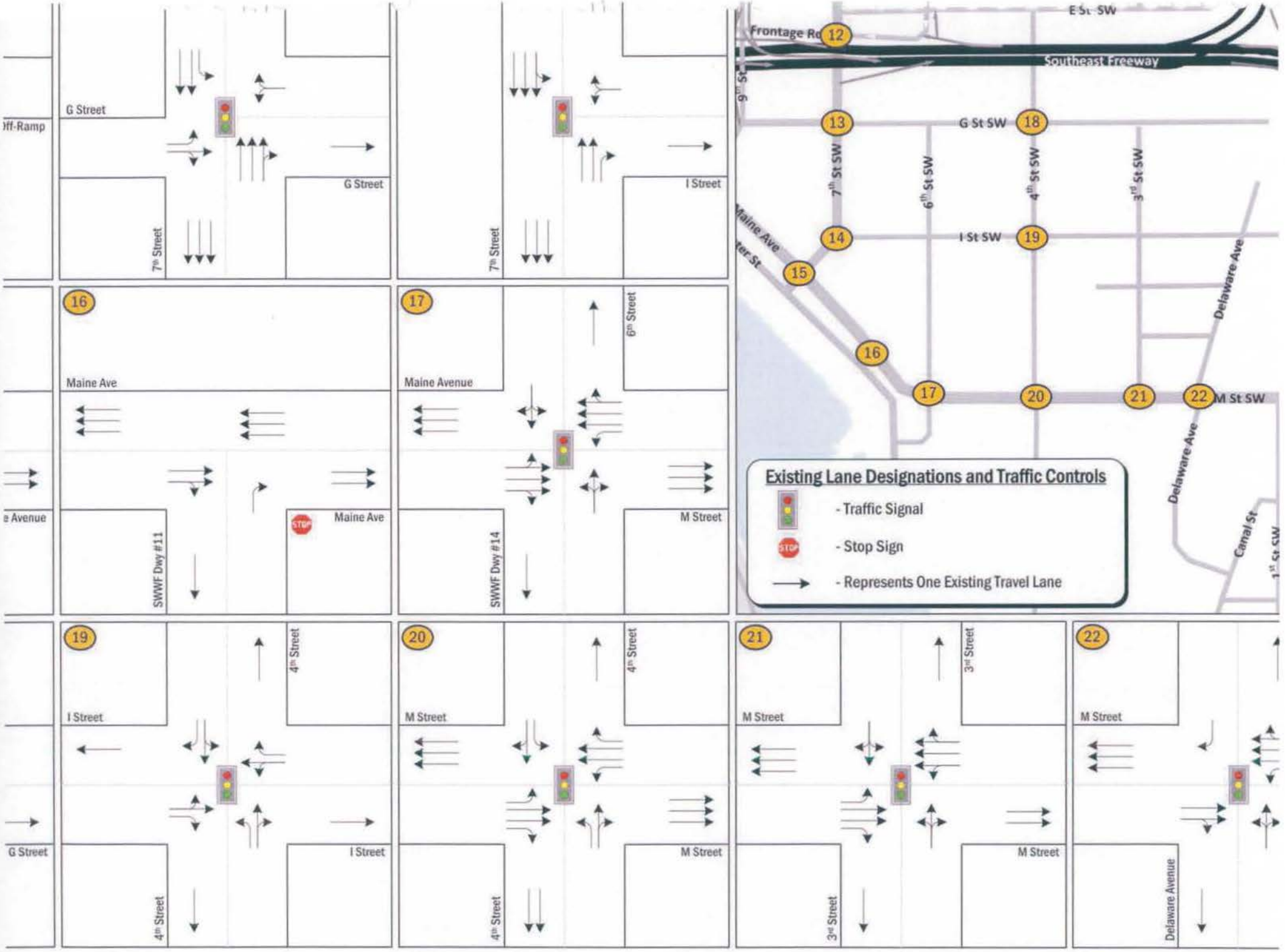
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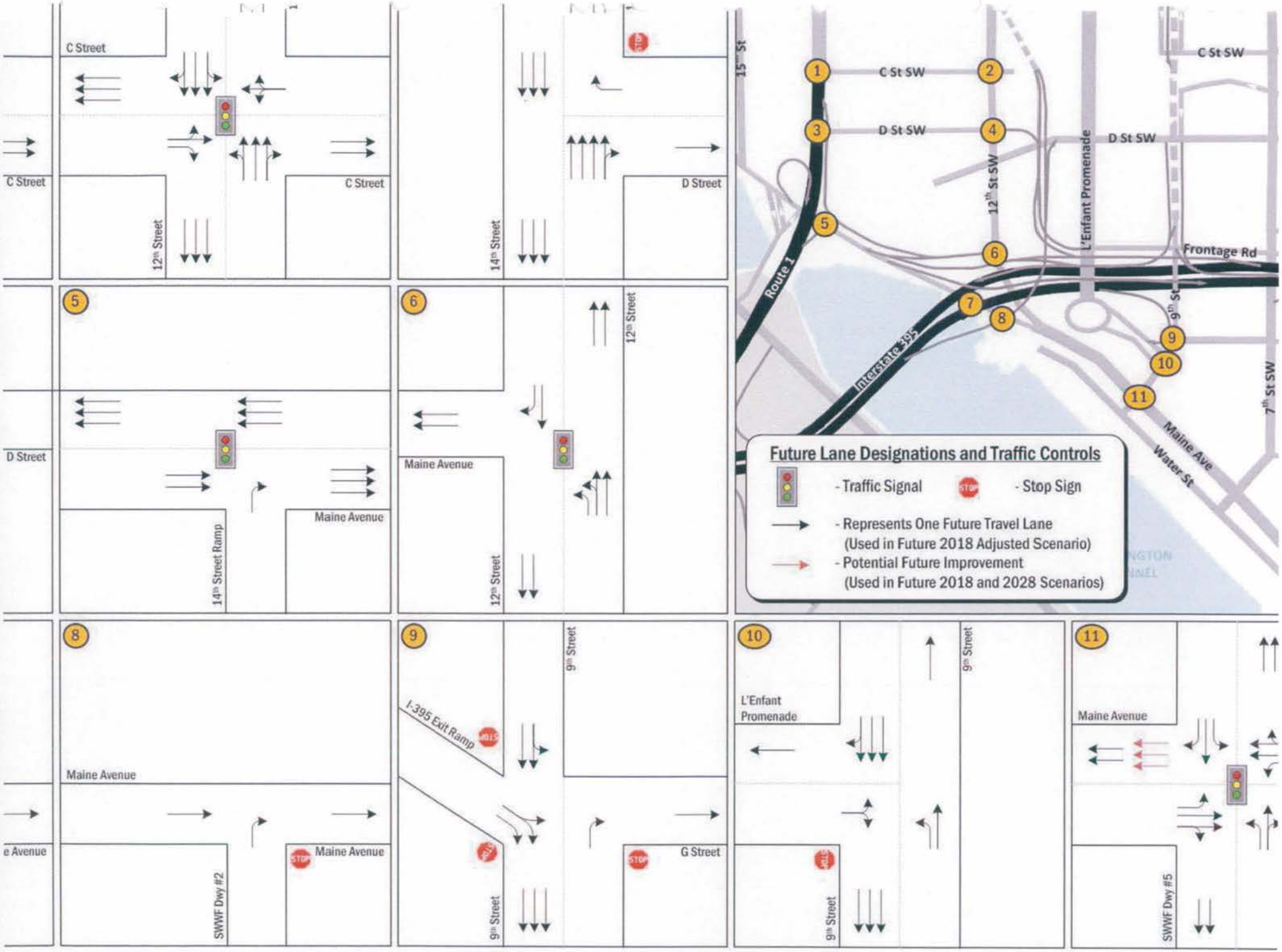
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Future Lane Designations and Traffic Controls
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- Potential Future Improvement
(Used in Future 2018 and 2028 Scenarios)
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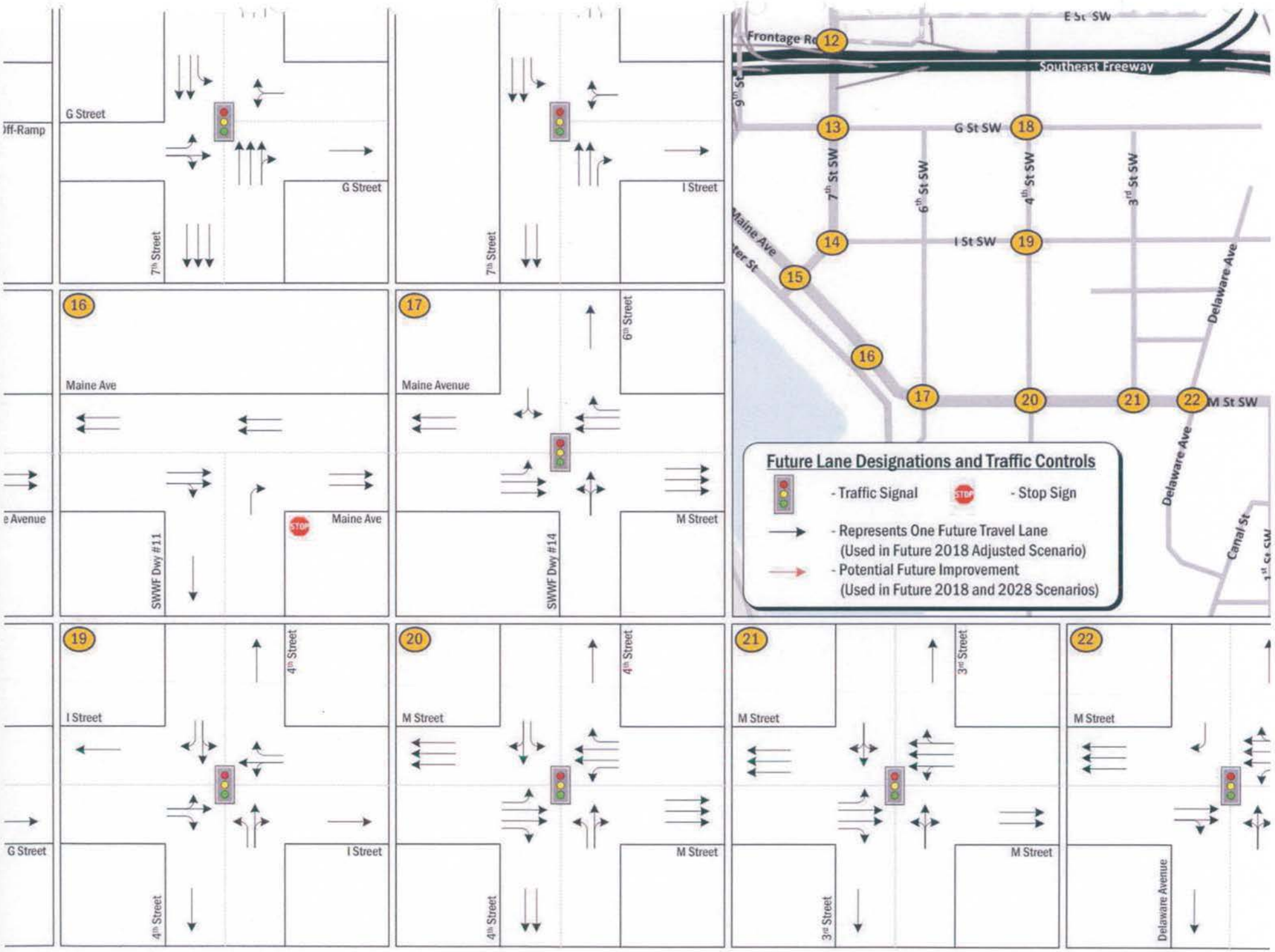
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(Used in Future 2018 and 2028 Scenarios)
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Future Lane Designations and Traffic Controls
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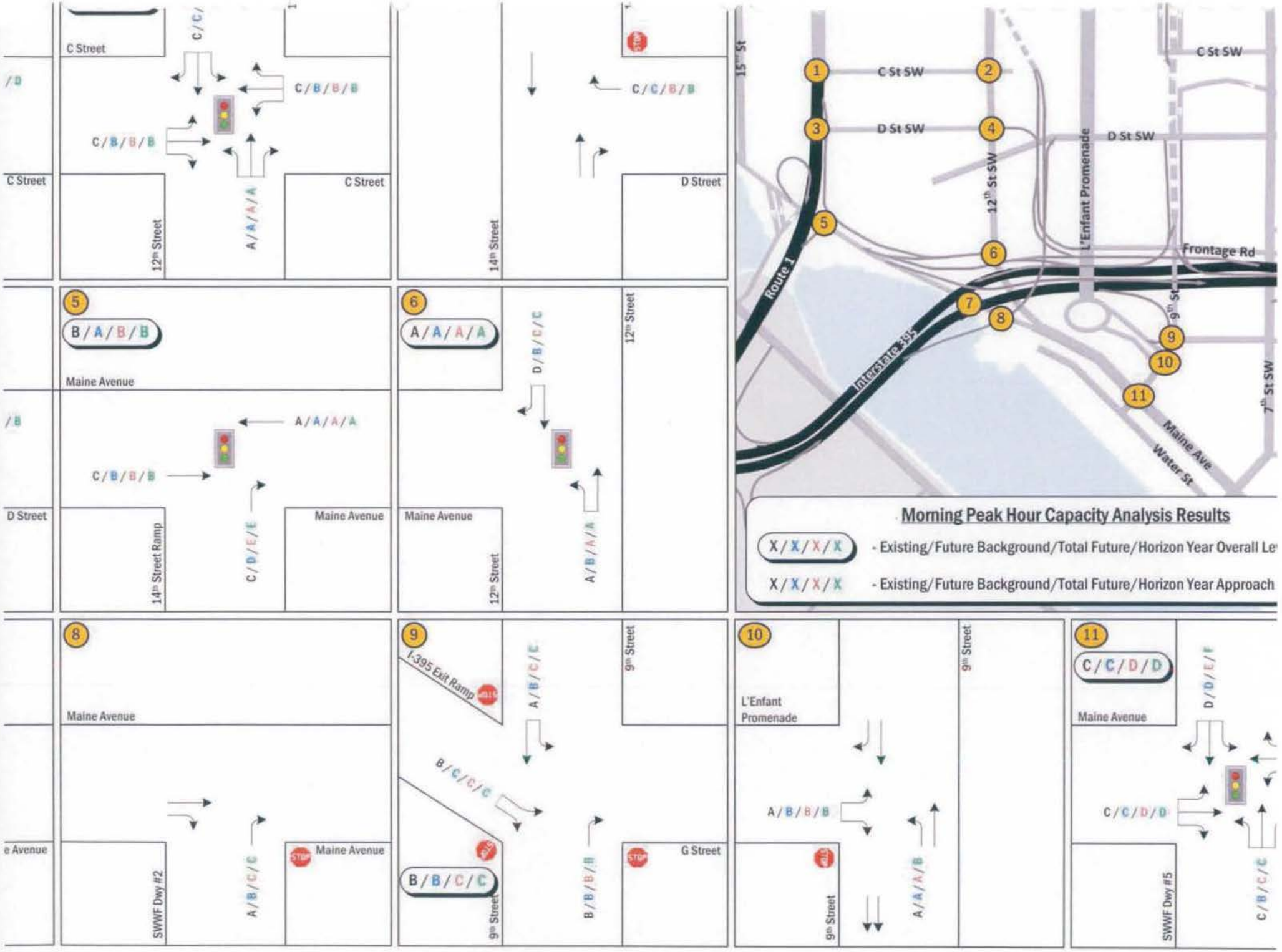
- Potential Future Improvement (Used in Future 2018 and 2028 Scenarios)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Morning Peak Hour Capacity Analysis Results
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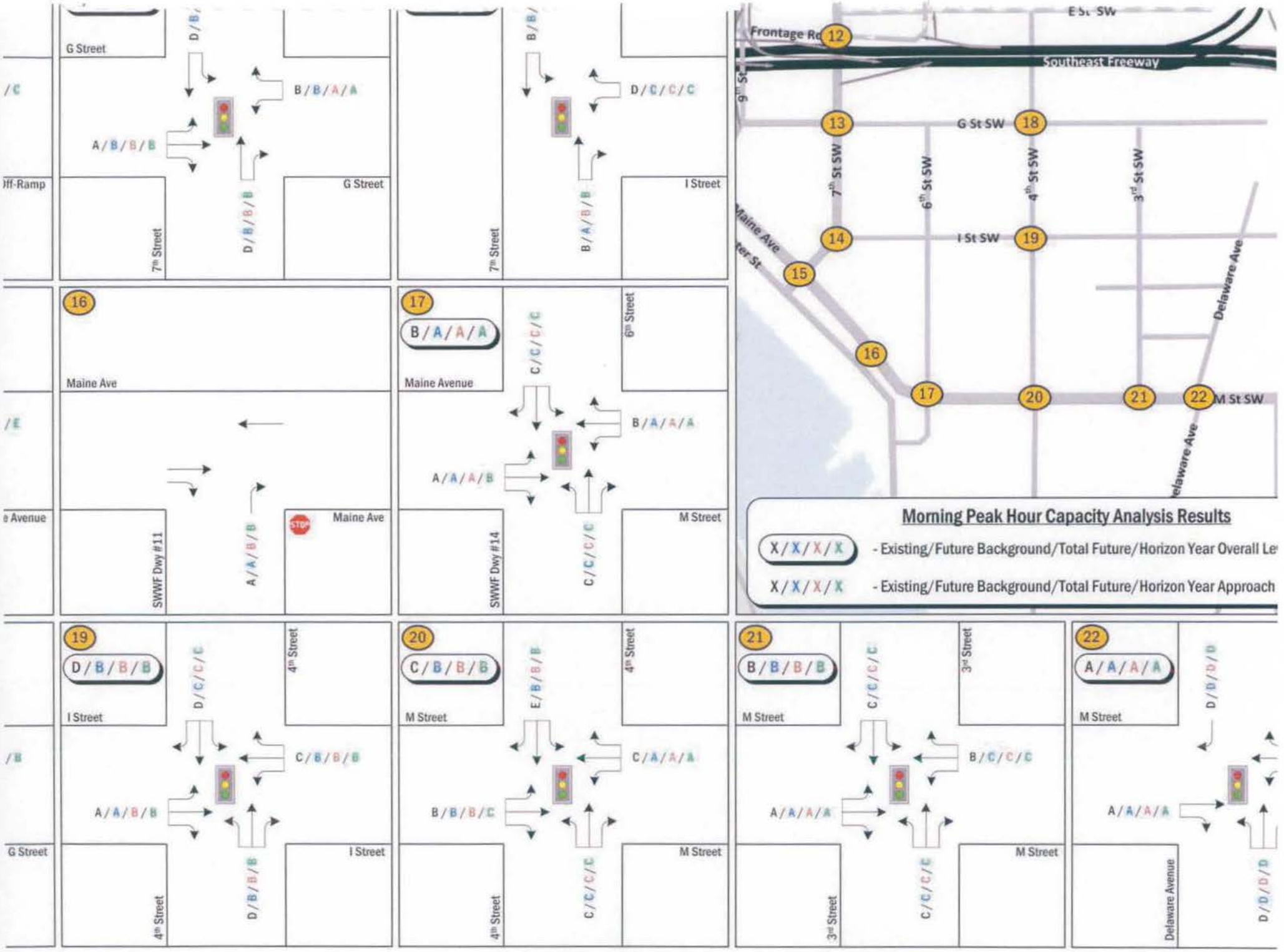
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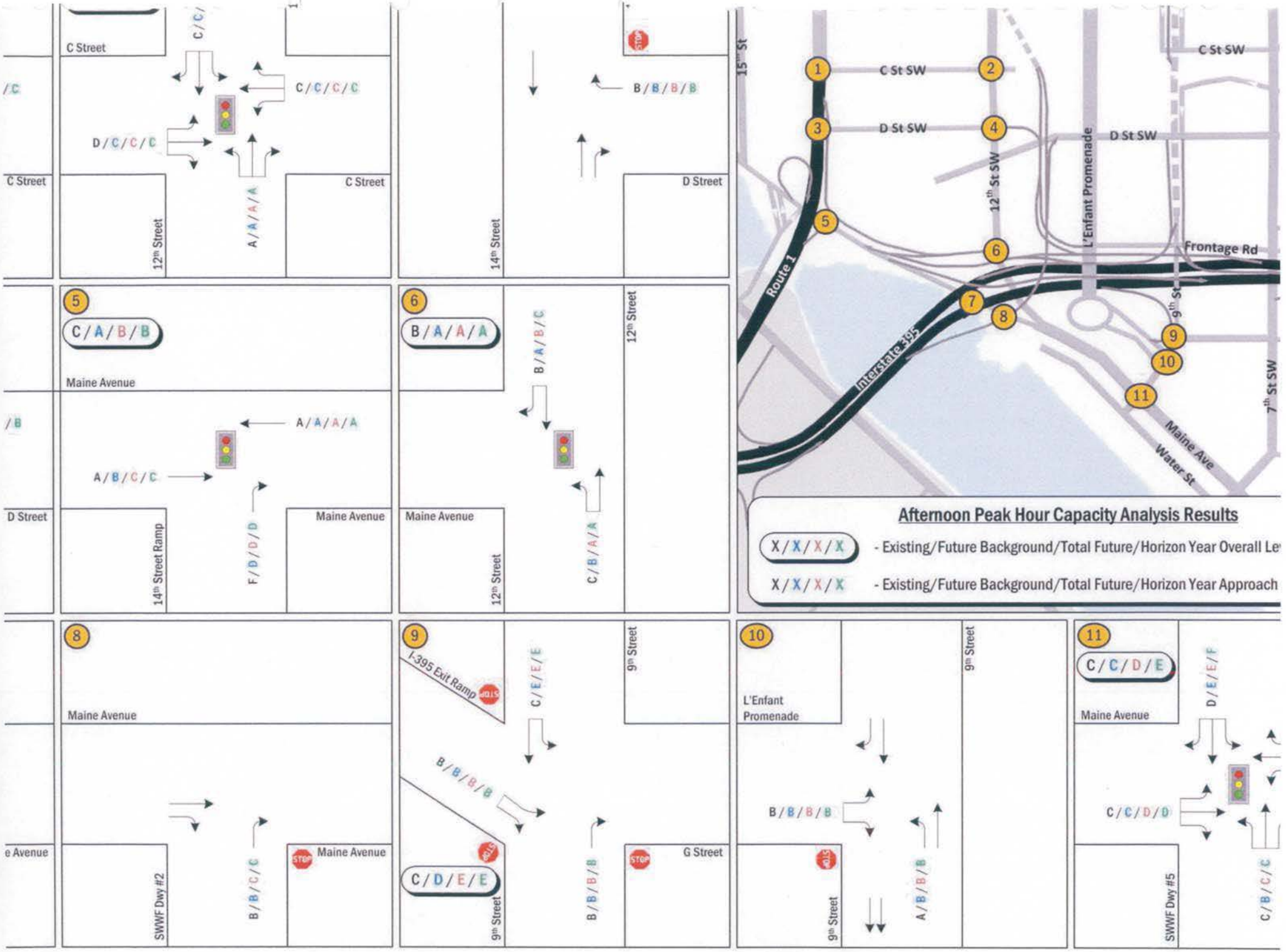
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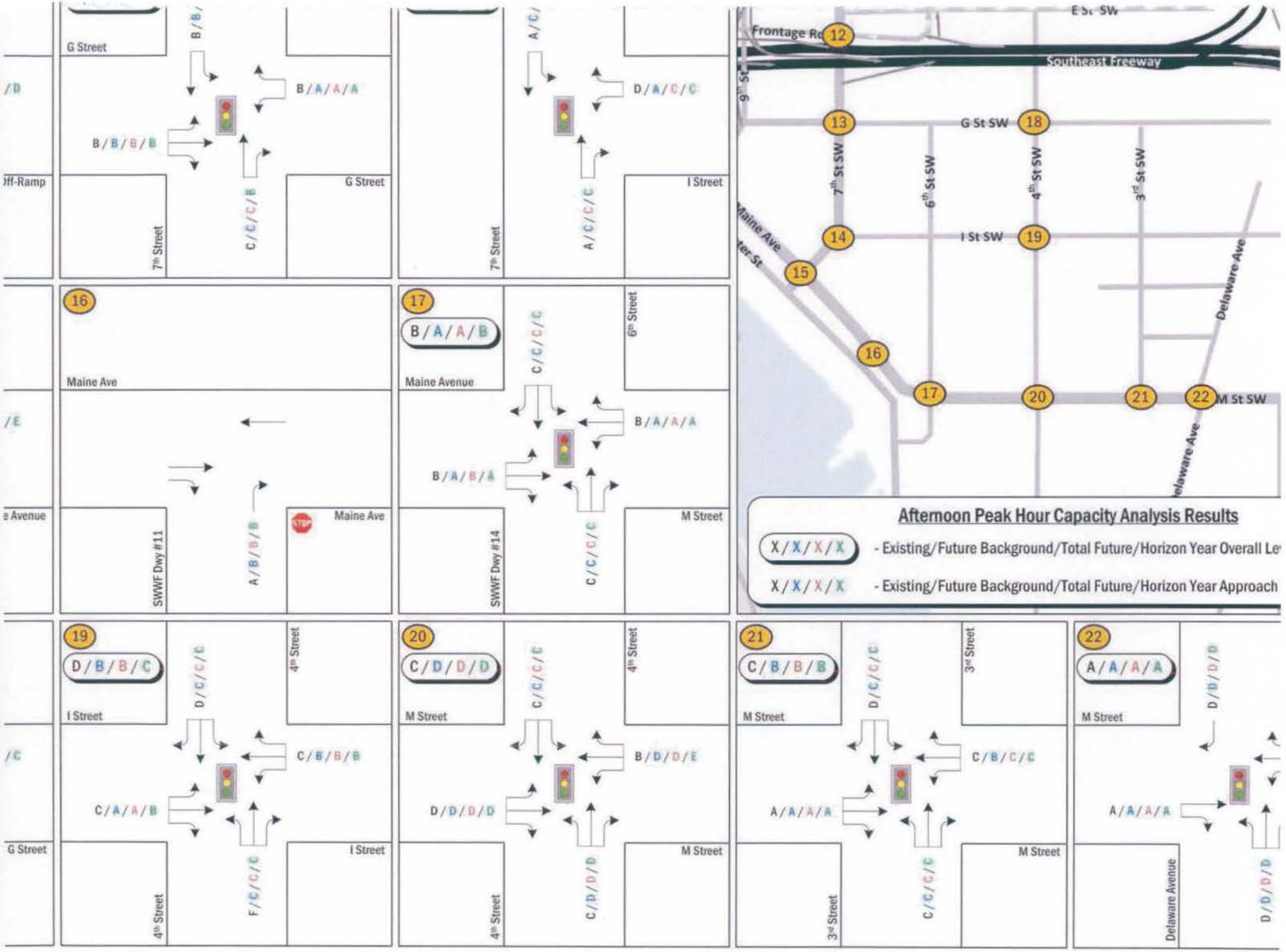
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Afternoon Peak Hour Capacity Analysis Results
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3.6 Summary of Impacts

This section of the report focused on the influence and impact site generated traffic will have on the local transportation network, with the following purposes:

(1) To provide information to the District Department of Transportation (DDOT) and other agencies on how the development of the PUD will influence the local transportation network.

The multi-modal trip generation and assignment calculations provided in this report show how a potential 53,530 vehicle- and person-trips will be generated by the SWW PUD and how they will influence the local transportation network. Based on these projections, this report came to the following general recommendations:

- SWW transit riders will primarily use the two Metrorail stations within walking distance, along with the DC Circulator/future streetcar service. Based on the entirety of developments planned for the SWW area and the Capitol Riverfront, DDOT and WMATA will need to coordinate closely to ensure a high quality of service is provided to these riders.
- Pedestrian and bicycle accommodations that serve the SWW PUD are generally of high quality, although some mobility barriers exist. These barriers include traveling east-west across South Capitol Street at the eastern edge of the site and traveling east-west under the freeway at the western edge of the site. Current DDOT initiatives, including the Bike and Pedestrian Master Plans, already, to an extent, address these concerns. Future plans and projects in the area should investigate additional ways to solve these mobility barriers.
- The 7th Street corridor was shown as a potential multi-modal corridor used by many SWW trips, including transit, bicycle, and pedestrian as it is a very direct route for these three modes. DDOT should consider a future planning study of the corridor anticipating changes due to the implantation and installation of streetcar service, tracks, and stations. Pedestrian and bicycle improvements should be incorporated into the future design of the corridor.

(2) To determine if development of PUD will lead to adverse impacts on the local transportation network.

This report reviews potential adverse impacts by projecting future conditions with and without the proposed development and performing analyses of pedestrian and vehicular delays. These delays are compared to the acceptable levels of delay set by DDOT standards to determine if the site will negatively impact the study area. The pedestrian and vehicular analyses came to follow conclusions:

- This crosswalk delay analyses showed that the addition of pedestrians and vehicles generated by the PUD and the implementation of future changes to signal timing and operations will not have an adverse impact to delays at signalized or unsignalized crosswalks in the study area.
- The vehicular analysis generated and assigned trips attributed to the PUD to the roadway network, building on the analyses that included all of the other planned developments in the vicinity of the PUD. The results of this study showed that no unacceptable levels of roadway congestion exist in study area intersections as long as the Maine Avenue cross-section adjacent to the PUD is the following:
  - *Eastbound*: two travel lanes and one permanent parking lane, and

- *Westbound*: two travel lanes between 6th Street and 7th Street SW and three travel lanes between 7th Street SW and 9th Street SW. If the future streetcar lanes do not extent west beyond 7th Street, the rightmost travel lane on the northern side of Maine Avenue can operate with peak hour restricted on-street parking (between 7th and 9th Streets).
- This cross-section represents a very similar configuration of travel lanes onto existing operations, with only slight modifications to accommodate planned streetcar routes (where westbound Maine Avenue approaches 7th Street SW).

- These vehicular analysis results are contingent on a set of traffic signal operations mitigation measures, which include future updates to signal timings, modifications to signal phasings, and potential signal upgrades at three locations.
- The traffic study used to generate these results used a traditional methodology, where all traffic was added in layers without adjustments for future conditions. Thus, the existing commuter traffic was assumed to be the same in the future as it was the day of the traffic counts. It is infeasible to assume that traffic going to and from the Navy Yard or Fort MacNair will keep to the same travel patterns in the future once the surrounding planned developments are built out. In addition, this traditional methodology does not take into account a reduction in traffic volumes based on the use of the new streetcar system, expansion of the Circulator system, projected increases in bicycle commuting, improved pedestrian access to the Metrorail system, other growth in non-automobile modes, and/or the future roadway infrastructure projects planned in the study area.
- Considering these factors, the traffic study performed a second analysis of future traffic conditions with the proposed development. Under this scenario, adjustments were made to account for changes in commuting patterns of existing traffic and use of the streetcar. The results of this analysis showed that only one intersection would reach unacceptable levels of traffic in the study area assuming the following cross-section of Maine Avenue adjacent to the SWW PUD (Maine Avenue and 9th Street SW):
  - Eastbound: two travel lanes and one permanent parking lane; and
  - Westbound: two travel lanes and one permanent parking lane
- Although DDOT will make the ultimate decision on the cross-section of Maine Avenue adjacent to the proposed PUD, the SWW applicant recommends the cross-section with two travel lanes eastbound, and two travel lanes between 6th Street and 7th Street SW and three travel lanes between 7th Street SW and 9th Street SW westbound. The traffic study results show that this cross section will accommodate future volumes without objectionable impacts.
- The applicant also recommends that DDOT maintain flexibility in the future plans for Maine Avenue to allow for the alternate cross-section with only two travel lanes in each direction, so it can be implemented if in the future traffic volumes do not meet this study's projections, or other variables change that would make the alternative cross-section viable for all modes.
- This report concludes that, as long as the traffic signal mitigation measures are installed and the Maine Avenue cross-section operates as recommended above, the SWW PUD will have no adverse transportation impacts.