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TECHNICAL MEMORANDUM

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From: Erwin Andres, PE
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Date: September 25, 2013

Subject: DC Water Occupied Sites PUD TIS Revised Addendum

Introduction

This memorandum presents a revised addendum to the traffic impact study dated August 23, 2013 and prepared for the DC Water Occupied Sites PUD in Southeast Washington, D.C. The site is located on First Street between N Place and the Anacostia River. Based on a September 13, 2013 meeting with DDOT, additional analyses were requested for the AM and PM peak periods in the interim 2016 phase. This analysis examines only the 2016 Phase I AM and PM conditions without the extension of Canal Street between N Street and N Place, per DDOT request. Two additional analysis scenarios were requested as follows:

- Scenario 1 - Accounts for any induced office trip demand that may be created by the availability of additional parking spaces in the parcel F1 garage
- Scenario 2 – Accounts for the induced office trip demand in addition to an adjusted PM peak period analysis to reflect the peak hour of the generator for the theater as opposed to the trip generation for the peak hour of the adjacent street as presented in the TIS and in Scenario 1.

The previous TIS assumed that trips destined for parking lots immediately adjacent to the site would be relocated to the Parcel F1 parking garage upon its opening and the subsequent redevelopment of the parking lots that those trips now utilize. For the purpose of this analysis, these trips were assumed to remain in their existing alignment.

Existing and Background Conditions

As described above, this analysis presents an analysis of the added impacts that any potential demand induced by the availability of additional parking in the parcel F1 garage as well as the theoretical impact of the theater operating at typical weekday evening levels during the PM peak period. Based on DDOT's request, the following study intersections were examined for this analysis:

- M Street/1st Street
- M Street/New Jersey Avenue
- N Street/1st Street
- N Street/1½ Street
- N Street/New Jersey Avenue
- N Place/1st Street
- N Place/1½ Street
- N Place/Parcel F1 Driveway
- Parcel F1 Driveway/1½ Street

Existing 2013 and background 2016 AM and PM traffic volumes were taken from the August 23, 2013 revised traffic study and are shown on Figure 1 and Figure 2, respectively. Capacity analysis results for the existing and background conditions are shown in Table 6.

2016 Phase I Traffic Impact Study Update – Scenario 1

Updated Trip Generation

Based on discussions with DDOT, it was requested that new trips be generated to account for induced office parking demand that may occur with the opening of the F1 parcel garage in 2016. In the September 13 meeting it was assumed that the new trips generated by the parking garage by nearby office users would be approximately one third of the overall vehicle occupancy of the garage with the AM and PM peak hours. Thus, based on the 337 space parking garage as presented in the August 23 revised TIS, this addendum assumes that 113 AM inbound trips and 113 PM outbound trips would be assigned to the F1 parcel garage in 2016. The total trip generation for the 2016 AM and PM scenarios with the additional parking garage trips is shown on Table 1.

It should be noted that a typical garage dedicated solely to office parking would see one third of its inbound and outbound trips during the AM and PM peak hours, respectively, as discussed with DDOT. Since the parcel F1 parking garage will be designed to serve the theater and other retail uses within the PUD and will not be solely dedicated to office parking, this analysis should be considered to present a conservative scenario.

Table 1: Total Trip Generation - Scenario 1

Land Use/Phase	AM Peak Hour			PM Peak Hour		
	In	*Out*	*Total*	*In*	*Out*	*Total*
Revised Phase 1 (Theater/2,000 SF Retail)	0	0	0	45	79	124
Parking Garage Demand	113	0	113	0	113	113
Total Trips	**113**	**0**	**113**	**45**	**192**	**237**

Future 2016 Conditions – Scenario 1

Trips generated by any potential induced demand created by the availability of additional parking in the parcel F1 garage were added to the number of trips generated by the theater and retail uses planned to utilize the parcel F1 garage upon its opening in 2016. The additional trips generated by the parking were distributed through the study area intersections, consistent with the trip distribution determined in the previous study and shown on Figure 3. The additional trips generated by the garage, shown on Figure 4, were added to the site-generated traffic volumes as determined in the August 23, 2103 revised study, shown in Figure 5. The resulting total site-generated traffic volumes are shown on Figure 6. The total site-generated traffic volumes were then added to the 2016 background traffic volumes resulting in the 2016 total future traffic volumes shown on Figure 7.

Analysis Results

Intersection capacity analyses were performed for the 2016 total future scenario at the intersections outlined above within the study area during the morning and afternoon peak hours. Table 6 summarizes the results of the capacity analyses, giving the LOS and average delay per vehicle (in seconds) for the 2016 Total Future (Scenario 1) conditions. The results reveal that the levels of service are similar to those presented in the August 23 revised TIS.

2016 Phase 1 Traffic Impact Study Updated – Scenario 2

Updated Trip Generation

At the request of DDOT, the trip generation for Phase I of the site was revised to account for any induced travel demand due to the availability of potential office parking as well as a revision to the theater trip generation to assume the number of trips generated during the peak hour of the generator of the theater rather than the peak hour of the adjacent street, as assumed in the previous TIS. Since the observed PM peak hour of the streets surrounding the development was noted to be from 4:30 to 5:30 PM, it was determined that the trip generation rate for the peak hour of the adjacent street would be appropriate to use for the TIS. By using the peak hour of the generator of the theater, this revised analysis presents a more conservative scenario since the peak hour of a theater typically occurs in the 7:00 PM hour, after most the commuter traffic has dissipated.

The trip generation tables for the previously submitted TIS were revised to assume the peak hour of the generator for the theater. The base vehicle- and person-trip generation for Phase I is shown below on Table 2. Consistent with the previously submitted TIS, these base trip generation rates were adjusted for the mode split assumption shown on Table 3 to result in the Trip Generation for Phase I shown on Table 4. These trips were added to the trips generated by the induced office parking demand resulting in the total trip generation shown on Table 5.

Table 2: Base Vehicle- and Person-Trips Generated

Land Use	Size		AM Peak Hour			PM Peak Hour		
			In	*Out*	*Total*	*In*	*Out*	*Total*
Vehicle Trips								
Retail – Parcel F1	2,026	Square Feet	1	1	2	4	4	8
Cinema	2,500	Seats	--	--	--	357	343	700
Total Vehicle-Trips			**1**	**1**	**2**	**361**	**347**	**708**
Person-Trips								
Retail	1.78	Persons/Vehicle	2	2	4	7	7	14
Cinema	2.20	Persons/Vehicle	--	--	--	785	755	1,540
Total Person-Trips			**2**	**2**	**4**	**792**	**762**	**1,554**

Table 3: Mode Split Assumptions

Land Use	Mode Split				Average Vehicle Occupancy
	Vehicle	*Transit*	*Walk*	*Bike*	
Retail	40%	40%	15%	5%	1.78
Theater	60%	30%	5%	5%	2.20

Table 4: Revised Trip Generation for Phase I

Land Use/Mode	AM Peak Hour			PM Peak Hour		
	In	*Out*	*Total*	*In*	*Out*	*Total*
Vehicle Trips						
Cinema	-	-	-	214	206	420
Retail	0	0	0	2	2	4
Total New Vehicle Trips	**0**	**0**	**0**	**216**	**208**	**424**

Table 5: Total Trip Generation - Scenario 2

Land Use/Phase	AM Peak Hour			PM Peak Hour		
	In	*Out*	*Total*	*In*	*Out*	*Total*
Revised Phase 1 (Theater/2,000 SF Retail)	0	0	0	216	208	524
Parking Garage Demand	113	0	113	0	113	113
Total Trips	**113**	**0**	**113**	**216**	**321**	**537**

Future 2016 Conditions – Scenario 2

As described previously, trips generated by any potential induced demand created by the availability of additional parking in the parcel F1 garage were added to the number of trips generated by the theater and retail uses planned to utilize the parcel F1 garage upon its opening in 2016. Additionally the Scenario 2 analysis incorporates a revised theater trip generation to assume the number of trips generated during the peak hour of the generator of the theater rather than the peak hour of the adjacent street, as assumed in the previous TIS.

Scenario 1 discusses the distribution of the additional trips generated by the induced office parking demand, with the parking garage generated volumes shown in Figure 4. The additional trips generated by the theater were distributed through the study area intersections the same way, using the same trip distribution as the previous study as shown in Figure 3. The additional trips generated by the garage were added to the site-generated traffic volumes shown on Figure 8. The resulting total site-generated traffic volumes are shown on Figure 9. The total site-generated traffic volumes were then added to the 2016 background traffic volumes resulting in the 2016 total future traffic volumes shown on Figure 10.

Analysis Results

Intersection capacity analyses were performed for the 2016 total future scenario at the intersections outlined above within the study area during the morning and afternoon peak hours. Table 6 summarizes the results of the capacity analyses, giving the LOS and average delay per vehicle (in seconds) for the 2016 Total Future (Scenario 2) conditions. The results reveal that the levels of service are overall similar to those presented in the August 23 revised TIS with one exception.

The PM peak hour levels of service for the intersection of N Place and 1st Street are slightly higher than those presented in the August 23 TIS, but not such that additional mitigation is necessary. Although a level of service "E" is experienced on the eastbound approach of the N Place/1st Street intersection during the PM peak hour, this approach provides access for the loading facilities for Nationals Park and was observed to accommodate only a single outbound trip during the PM peak hour. The levels of service realized on the other approaches of the intersection show operations within acceptable levels. Therefore, no improvements are recommended at the N Place/1st Street intersection or at any of the other study intersections as a result of the analysis reviewed in this addendum.

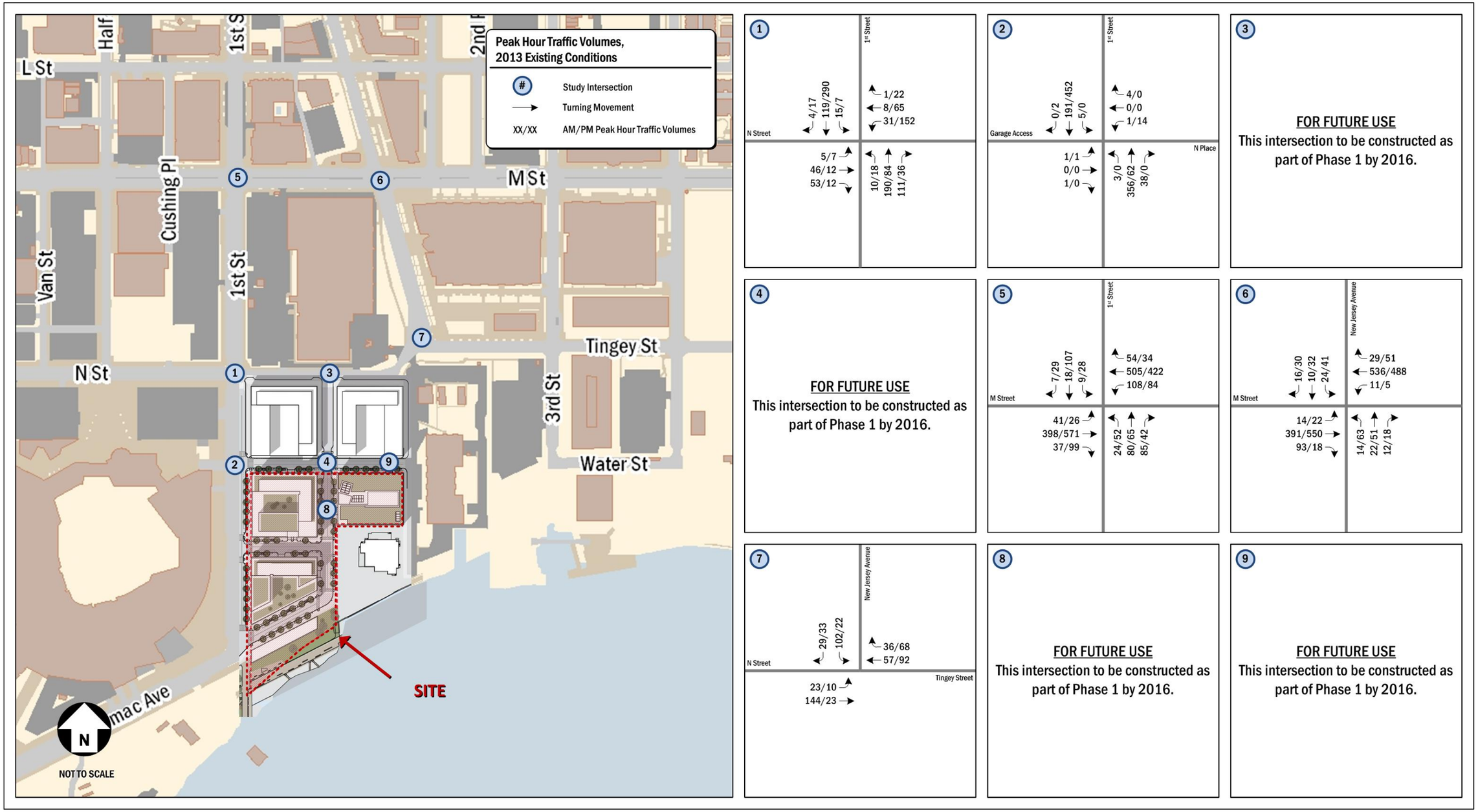

Figure 1: Existing 2013 Traffic Volumes

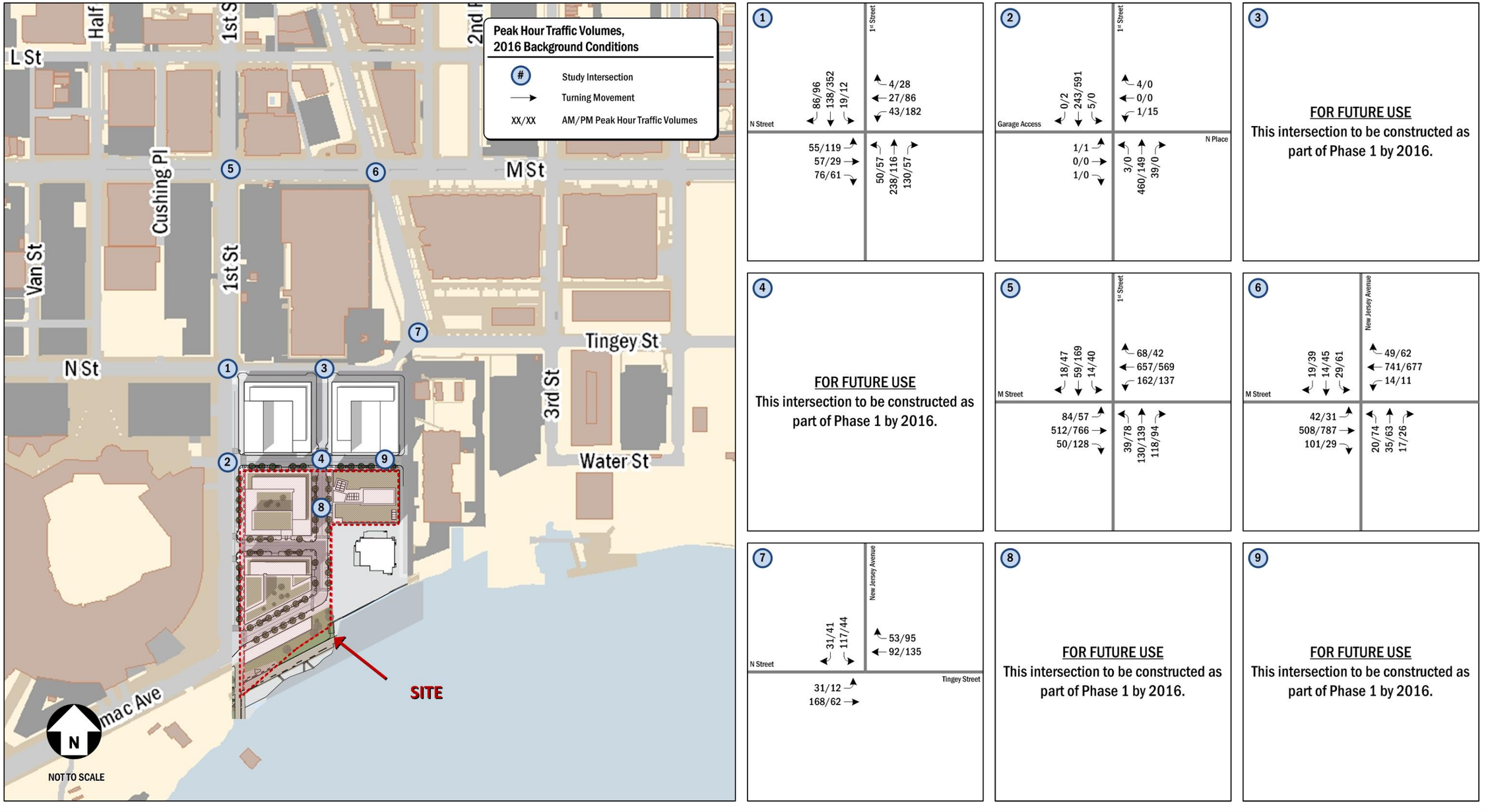

Figure 2: 2016 Background Traffic Volumes

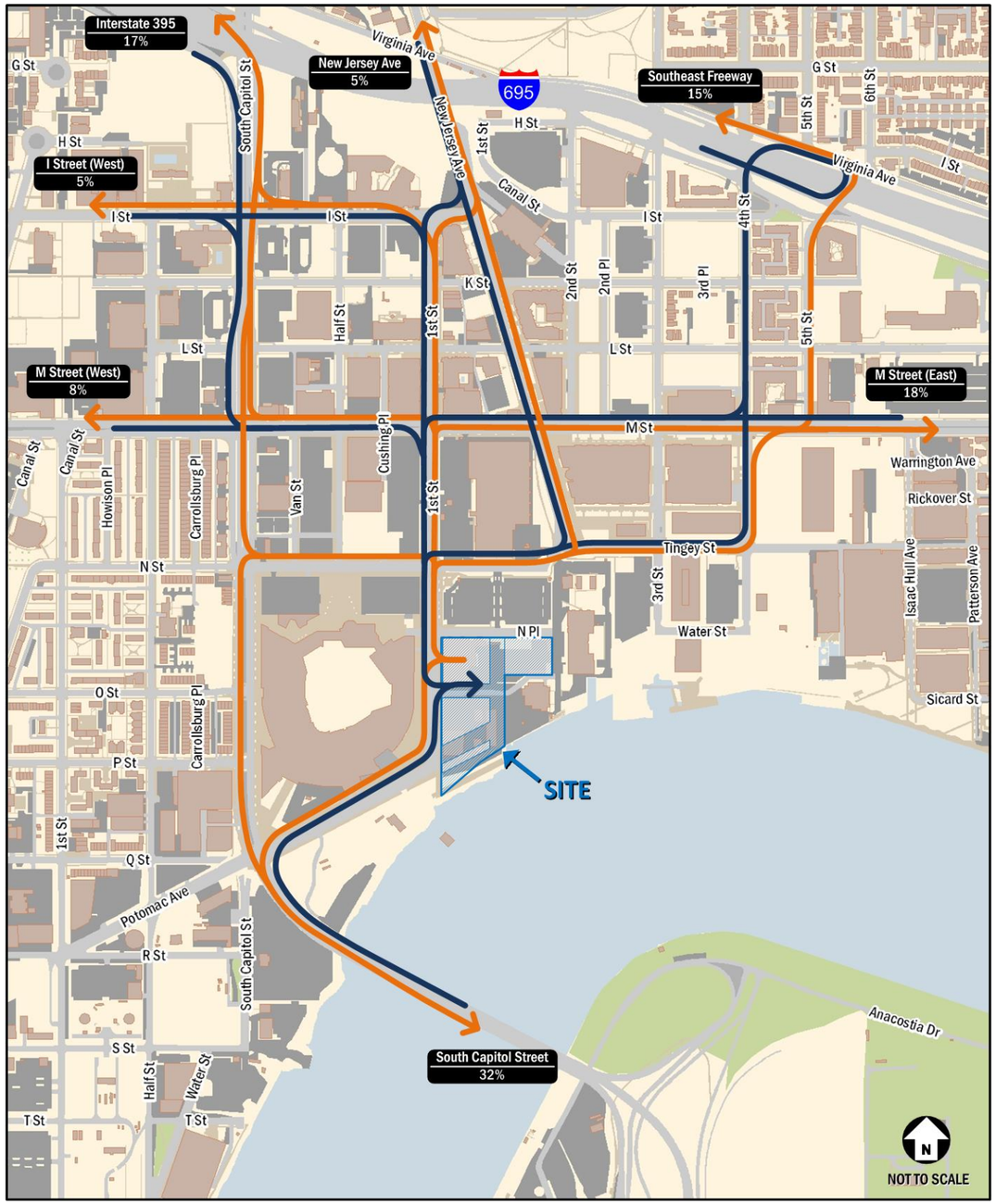

Figure 3: Direction of Approach for Site-Generated Traffic Volumes

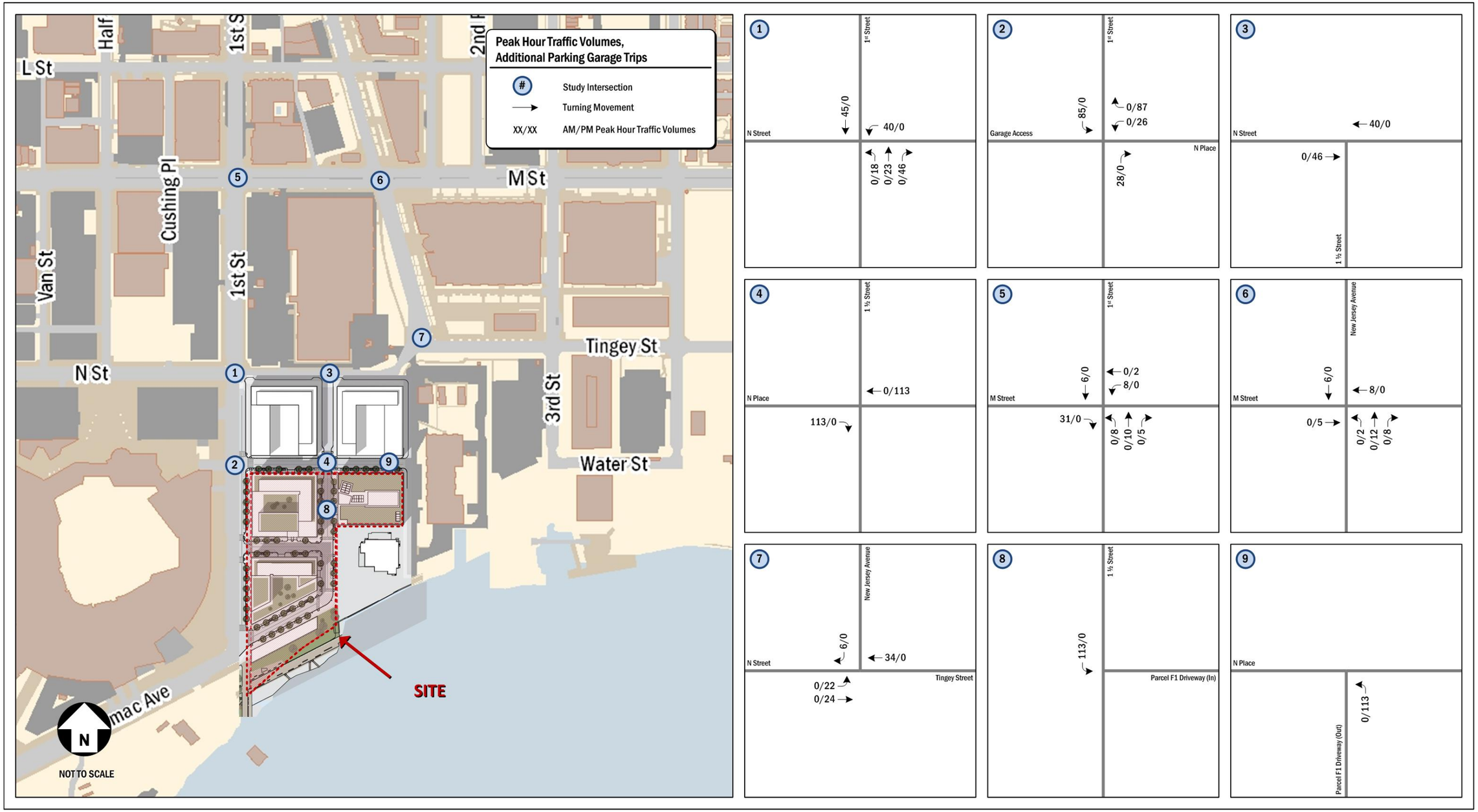

Figure 4: Additional Parking Garage Generated Traffic Volumes

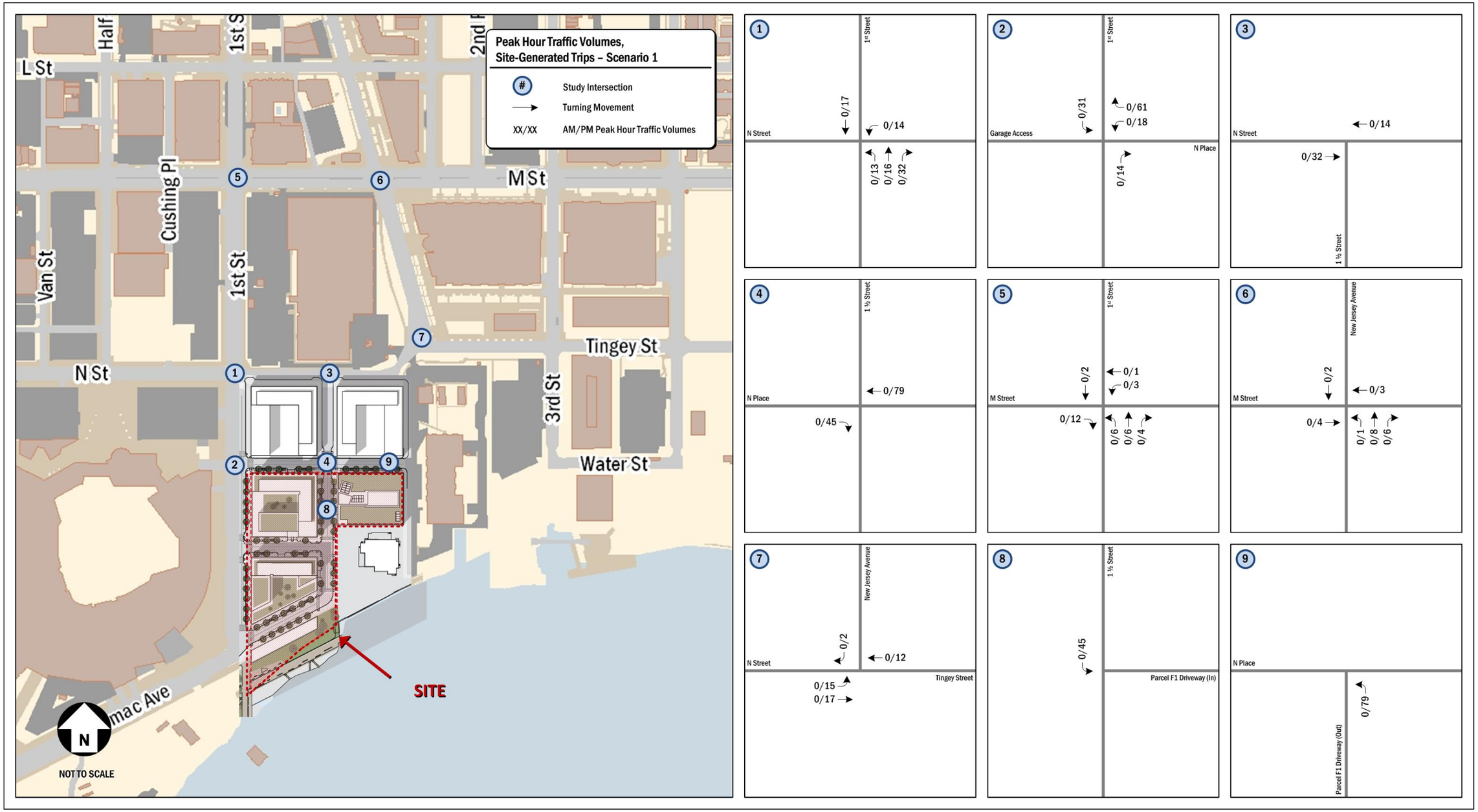

Figure 5: Site-Generated Traffic Volumes – Scenario 1

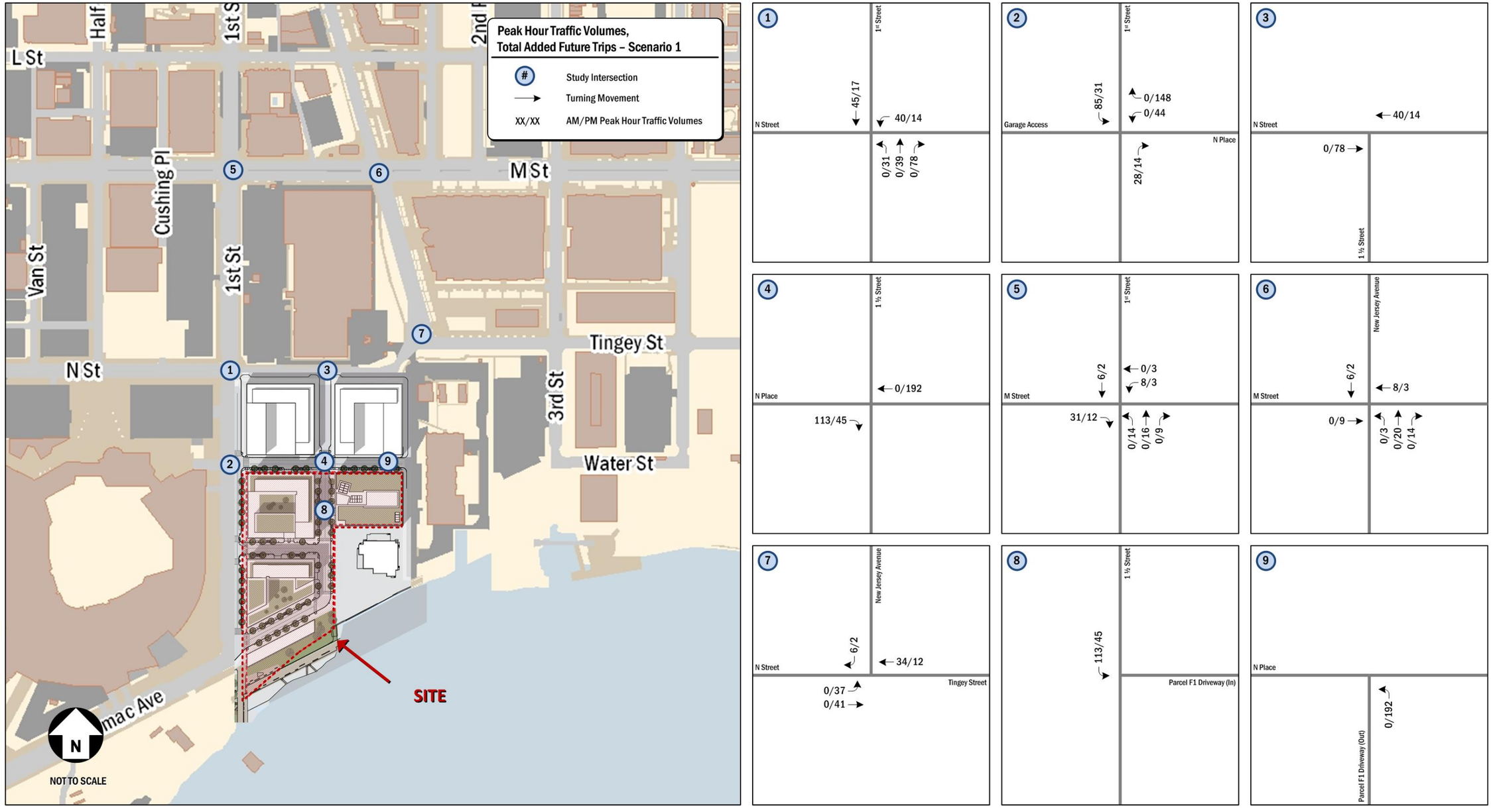

Figure 6: Total Site-Generated Traffic Volumes – Scenario 1

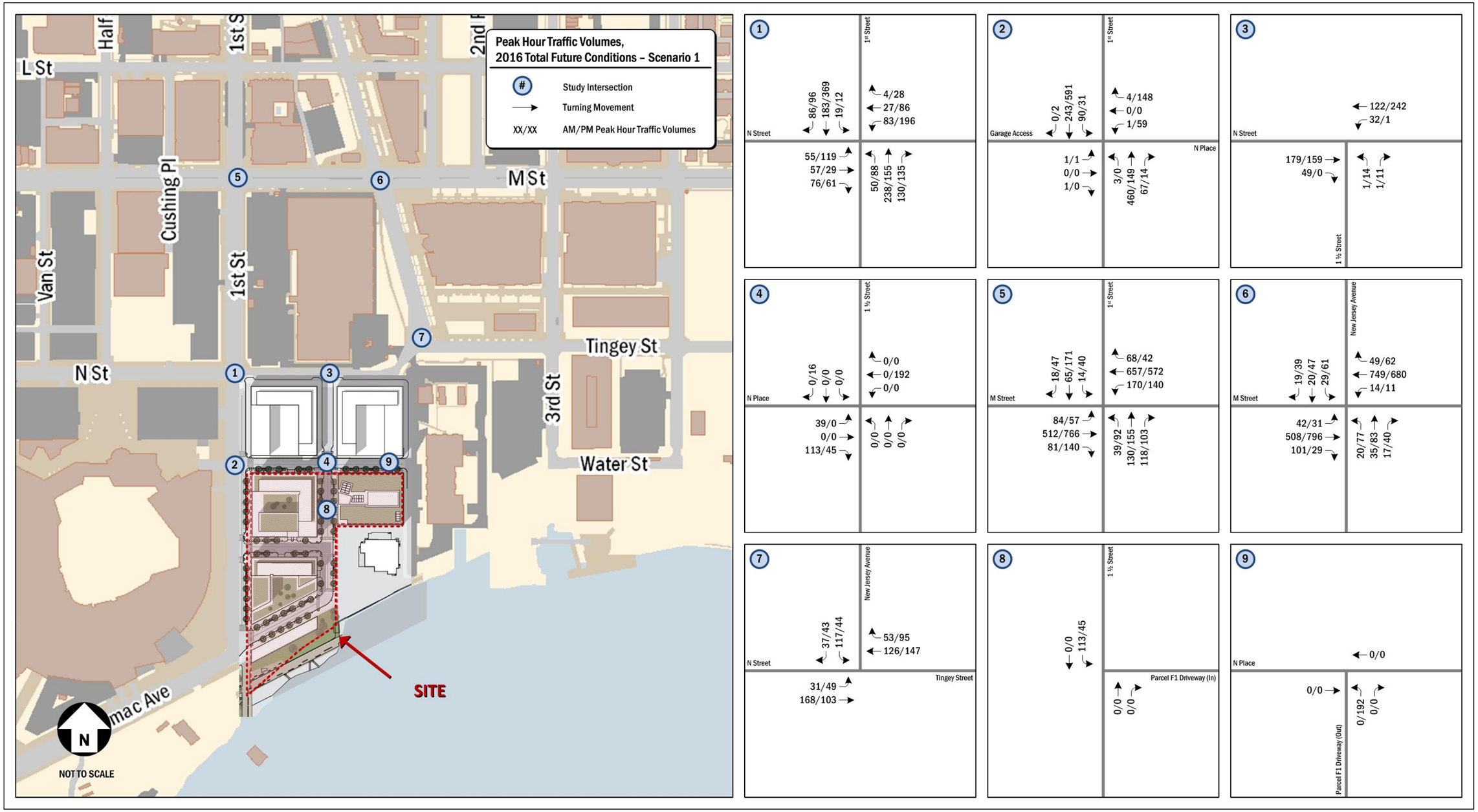

Figure 7: 2016 Total Future Traffic Volumes – Scenario 1

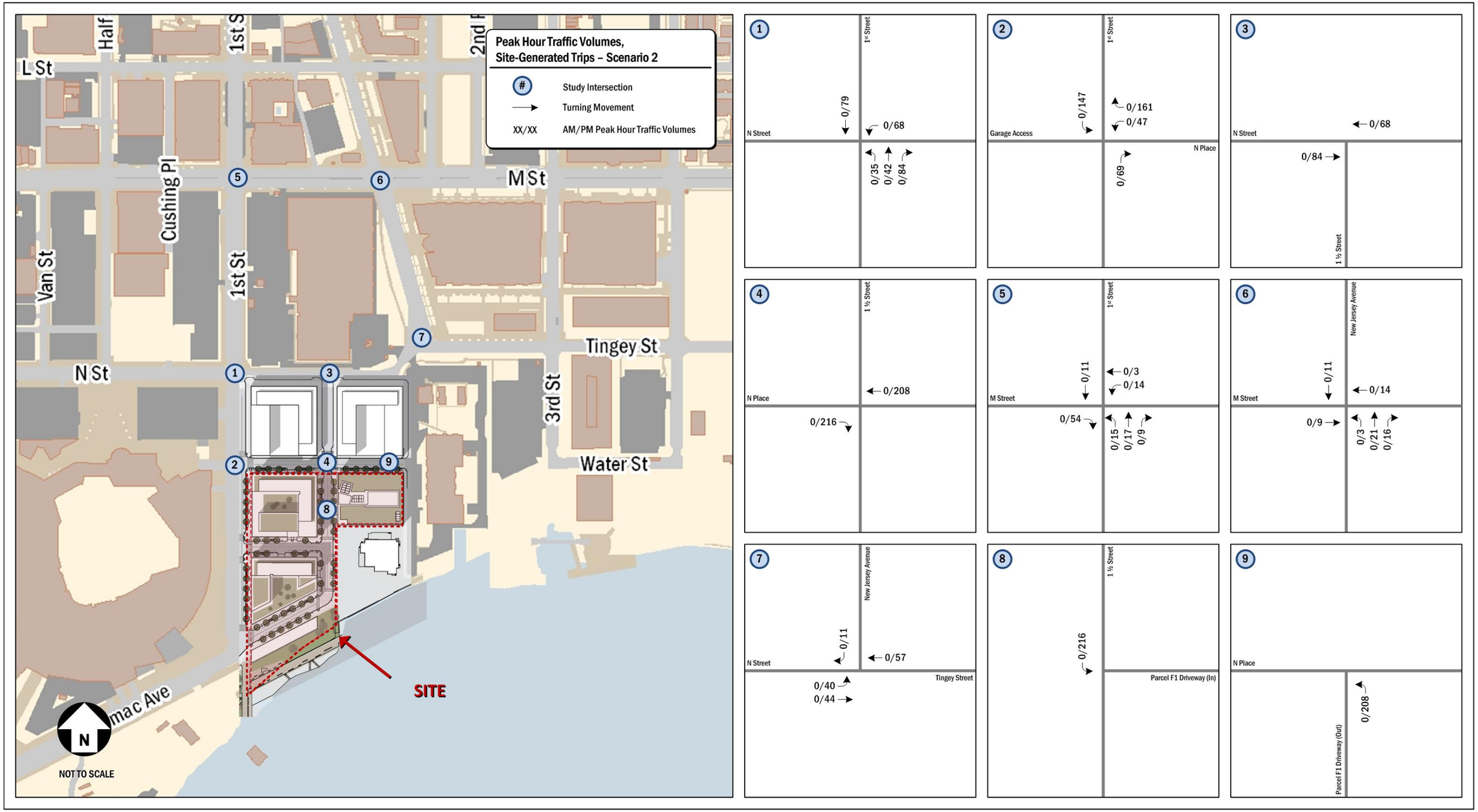

Figure 8: Site-Generated Traffic Volumes - Scenario 2

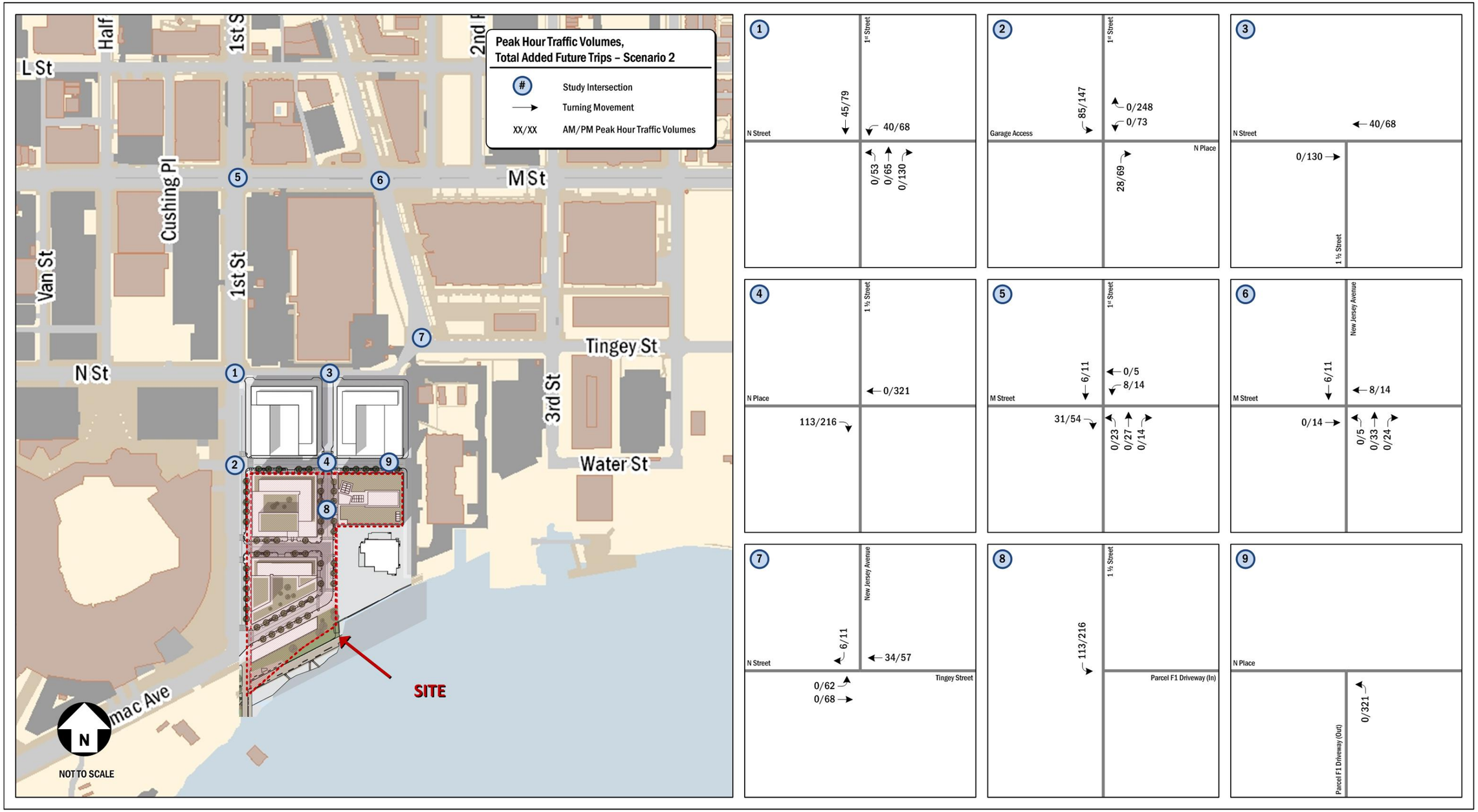

Figure 9: Total Site-Generated Traffic Volumes - Scenario 2

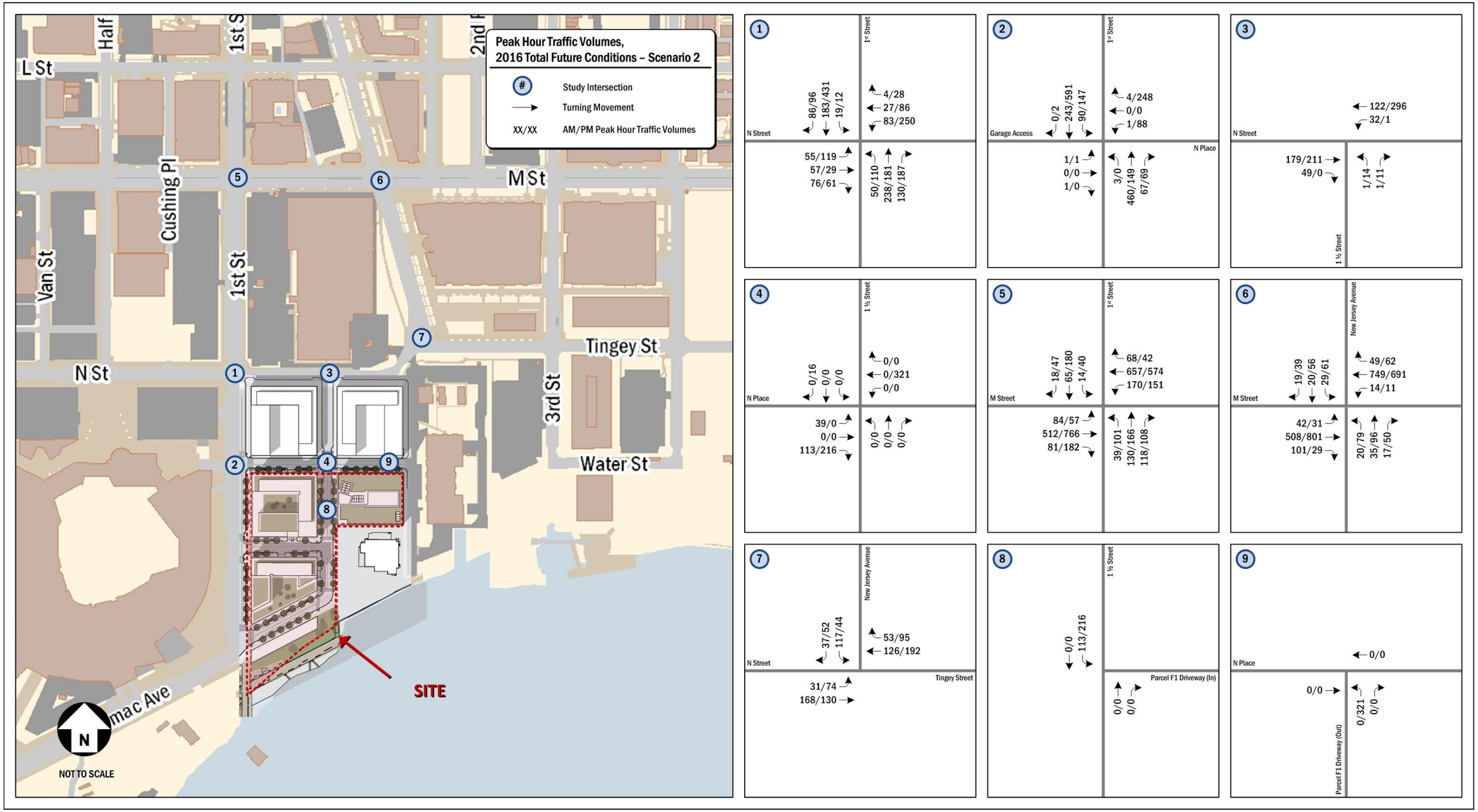

Figure 10: 2016 Total Future Volumes - Scenario 2

Table 6: Detailed Vehicular Level of Service Results

Intersection	Approach	Existing Conditions (2013)				Background Conditions (2016)				Total Future Conditions – Scenario 1 (2016)				Total Future Conditions – Scenario 2 (2016)			
		AM Peak Hour		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*		*AM Peak Hour*		*PM Peak Hour*	
		Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS	Delay	LOS
N Street & 1st Street	**Overall**	**20.8**	**C**	**19.2**	**B**	**23.0**	**C**	**21.8**	**C**	**22.9**	**C**	**22.0**	**C**	**22.9**	**C**	**23.6**	**C**
	Eastbound	15.1	B	15.5	B	16.9	B	20.7	C	16.9	B	20.7	C	16.9	B	20.9	C
	Westbound	14.7	B	20.4	C	15.3	B	24.4	C	16.5	B	25.4	C	16.5	B	30.6	C
	Northbound	19.5	B	17.1	B	21.1	C	18.2	B	21.1	C	20.0	C	21.1	C	22.0	C
	Southbound	29.9	C	19.7	B	33.4	C	22.3	C	21.7	C	22.0	C	21.7	C	21.3	C
N Place & 1st Street	Eastbound	10.6	B	21.4	B	11.5	B	14.9	B	13.4	B	23.1	C	13.4	B	47.8	E
	Westbound	10.5	B	10.2	B	11.3	B	11.5	B	11.8	B	11.8	B	11.8	B	20.6	C
	Northbound Left	0.1	A	0.0	A	0.1	A	0.0	A	0.1	A	0.0	A	0.1	A	0.0	A
	Southbound Left	0.2	A	0.0	A	0.2	A	0.0	A	2.6	A	0.5	A	2.6	A	2.1	A
N Street & 1 1/2 Street	Westbound Left	--	--	--	--	--	--	--	--	1.8	A	0.0	A	1.8	A	0.0	A
	Northbound	--	--	--	--	--	--	--	--	10.4	B	10.6	B	10.4	B	11.4	B
N Place & 1 1/2 Street	Eastbound Left	--	--	--	--	--	--	--	--	2.0	A	0.0	A	2.0	A	0.0	A
	Westbound Left	--	--	--	--	--	--	--	--	0.0	A	0.0	A	0.0	A	0.0	A
	Northbound	--	--	--	--	--	--	--	--	0.0	A	0.0	A	0.0	A	0.0	A
	Southbound	--	--	--	--	--	--	--	--	0.0	A	9.4	A	0.0	A	10.4	B
M Street & 1st Street	**Overall**	**12.9**	**B**	**10.4**	**B**	**15.2**	**B**	**17.8**	**B**	**15.1**	**B**	**18.1**	**B**	**15.1**	**B**	**18.3**	**B**
	Eastbound	6.2	A	7.1	A	8.2	A	16.0	B	8.2	A	16.3	B	8.2	A	16.4	B
	Westbound	1.9	A	3.7	A	2.1	A	5.1	A	2.2	A	5.2	A	2.2	A	5.3	A
	Northbound	65.2	E	27.5	C	66.2	E	42.3	D	66.3	E	41.1	D	66.3	E	40.3	D
	Southbound	30.1	C	29.6	C	30.9	C	31.5	C	31.0	C	31.6	C	31.0	C	31.9	C
M Street & New Jersey Avenue	**Overall**	**12.8**	**B**	**14.0**	**B**	**14.6**	**B**	**17.1**	**B**	**14.9**	**B**	**17.4**	**B**	**14.9**	**B**	**17.7**	**B**
	Eastbound	15.7	B	9.0	A	17.3	B	13.6	B	17.7	B	16.3	B	17.7	B	16.4	B
	Westbound	7.8	A	13.8	B	10.2	B	13.6	B	10.3	B	13.6	B	10.3	B	13.6	B
	Northbound	27.7	C	26.7	C	28.2	C	27.3	C	28.2	C	28.1	C	28.2	C	28.7	C
	Southbound	27.5	C	26.8	C	27.8	C	28.0	C	27.8	C	28.1	C	27.8	C	28.2	C
N Street & New Jersey Avenue	**Overall**	**8.5**	**A**	**7.5**	**A**	**9.1**	**A**	**8.2**	**A**	**9.3**	**A**	**8.8**	**A**	**9.3**	**A**	**9.5**	**A**
	Eastbound	8.9	A	7.5	A	9.5	A	8.0	A	9.6	A	8.7	A	9.6	A	9.5	A
	Westbound	8.0	A	7.8	A	8.6	A	8.6	A	9.0	A	9.0	A	9.0	A	9.8	A
	Southbound	8.3	A	6.8	A	8.8	A	7.4	A	9.5	A	8.4	A	9.5	A	8.7	A
1 1/2 Street & Site Driveway	Southbound Left	--	--	--	--	--	--	--	--	7.4	A	7.3	A	7.4	A	7.6	A
N Place & Site Driveway	Northbound	--	--	--	--	--	--	--	--	0.0	A	9.4	A	0.0	A	10.4	B