

Appendix D
Travel Demand Factors Memorandum



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Memorandum

To: Project File
From: AKRF, Inc.
Date: June 27, 2016
Re: Forest Avenue and South Avenue Retail Site—Travel Demand Analysis
cc: NYCDOP EARD; Forest Avenue and South Avenue Project Team

A. INTRODUCTION

This memorandum details the trip generation assumptions and travel demand estimates for the *City Environmental Quality Review* (CEQR) analysis of the proposed Forest Avenue and South Avenue Retail Development (“the proposed project”). The proposed project would result in the construction of a retail development at 534 South Avenue (Block 1707, Lots 1 and 5) in the Mariners Harbor area of Staten Island Community District 1. The 28-acre project site is currently undeveloped and contains an approximately 6.55-acre wetland area that is bounded by Forest Avenue and Wemple Street (which is not built) to the north, South Avenue to the east, Amador Street (which is mapped but not built) to the south, and Morrow Street (which is partially built and partially unbuilt) to the west. The proposed project would include approximately 226,000 gross square feet (gsf) of new retail uses, including approximately 92,000 gsf of wholesale warehouse space, 67,000 gsf of supermarket space, 16,000 gsf of restaurant space, 50,000 gsf of destination retail space, approximately 1,000 gsf of gas station and automated bank teller space, and 838 accessory parking spaces.

In the future No Action scenario, the project site could be redeveloped As-of-Right (AOR) to include approximately 228,000 gsf of destination retail space. **Table 1** provides a comparison of the development program assumptions under the future No Action and With Action conditions.

Table 1
Future No Action and With Action Development Program Assumptions

Components	Future No Action (AOR)	Future With Action	Increment
Destination Retail and Gas Station/Automated Bank Teller (gsf)	228,000	51,000	-177,000
Wholesale Warehouse (gsf)	0	92,000	92,000
Supermarket (gsf)	0	67,000	67,000
Restaurant (gsf)	0	16,000	16,000
Total (gsf)	228,000	226,000	-2,000

Figure 1 provides an illustration of the site plan for the proposed project. The proposed project would have three vehicular access/egress locations, a signalized entrance/exit with all movements permitted on Forest Avenue, an unsignalized two-way, right-in/right-out only driveway on Forest Avenue, and a two-way driveway on South Avenue. The South Avenue driveway would be unsignalized with only right-in/right-out movements permitted in the No Action condition and signalized with all movements permitted in the With Action condition.

B. TRANSPORTATION PLANNING ASSUMPTIONS

Trip generation factors for the proposed project were developed based on information from the 2014 *CEQR Technical Manual*, the 2011 *Brooklyn Bay Center FEIS*, the 2009 *Gateway Estates II FEIS*, and the 2013 *St. George Waterfront Redevelopment FEIS*, as summarized in **Table 2**.

WHOLESALE WAREHOUSE

The daily person trip rate, temporal distribution, vehicle occupancies, and modal splits for the wholesale warehouse component are from the 2011 *Brooklyn Bay Center FEIS*. The directional distributions are based on the 2011 *Brooklyn Bay Center FEIS* and the 2009 *Gateway Estates II FEIS*. The daily delivery trip rate and temporal and directional distributions are from the 2014 *CEQR Technical Manual* and the 2011 *Brooklyn Bay Center FEIS*.

DESTINATION RETAIL

The daily person trip rate and temporal distribution for the destination retail component are from the 2014 *CEQR Technical Manual*. The directional distributions are based on the 2011 *Brooklyn Bay Center FEIS* and the 2009 *Gateway Estates II FEIS*. The vehicle occupancies and modal splits are from the 2011 *Brooklyn Bay Center FEIS*. The daily delivery trip rate, temporal distribution, and directional distribution are from the 2014 *CEQR Technical Manual*.

SUPERMARKET

The daily trip generation rate for the supermarket component is from the 2014 *CEQR Technical Manual*. Consistent with typically accepted assumptions for purposes of environmental review under CEQR and taking into consideration the other adjacent uses in this retail development, a 25-percent linked trip credit was applied to the supermarket trip generation estimates. The modal splits and vehicle occupancies were obtained from the 2011 *Brooklyn Bay Center FEIS*. The temporal and directional distributions were obtained from the 2014 *CEQR Technical Manual* and the 2011 *Brooklyn Bay Center/2009 Gateway Estates II FEIS*, respectively. The daily delivery trip rate and temporal and directional distributions are from the 2014 *CEQR Technical Manual*.



Notes: Building footprints, floor area, and Use Groups reflect the authorized site plan and are subject to CPC approval. Tenant use types and internal delineation are shown for illustrative RWCDs purposes. The UG 16 gas station and UG 6 automated bank teller shown on the plan are as-of-right. Gross square feet (gsf) numbers are approximate and based on a 3 percent adjustment to zoning square feet (zsf).

Illustrative RWCDs Site Plan (With Action Scenario)
Figure 1

**Table 2
Travel Demand Assumptions**

Use	Wholesale Warehouse			Destination Retail			Supermarket			Quality Restaurant		
Total Daily/Peak Hour Person Trip Rates	(3) Weekday Saturday 5.03 4.89 11.38 Trips / KSF			(1) Weekday Saturday 78.2 92.5 Trips / KSF			(1) Weekday Saturday 175.0 231.0 Trips / KSF			(4) Weekday Saturday 173.0 181.0 Trips / KSF		
Trip Linkage	0% 0%			0% 0%			25% 25%			0% 0%		
Net Daily/Peak Hour Person Trip Rates	Weekday Saturday 5.03 4.89 11.38 Trips / KSF			Weekday Saturday 78.2 92.5 Trips / KSF			Weekday Saturday 131.25 173.25 Trips / KSF			Weekday Saturday 173.0 181.0 Trips / KSF		
Temporal Dist.	MD	PM	Sat	MD	PM	Sat	MD	PM	Sat	MD	PM	Sat
	(3)			(1)			(1)			(4)		
	100%	100%	100%	9%	9%	11%	6%	10%	9%	8.7%	10.4%	6.0%
Directional Dist.	(2)(3)			(2)(3)			(2)(3)			(4)		
In	53.6%	51.8%	53.6%	53.6%	51.8%	53.6%	53.6%	51.8%	53.6%	50%	50%	50%
Out	46.4%	48.2%	46.4%	46.4%	48.2%	46.4%	46.4%	48.2%	46.4%	50%	50%	50%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Modal Split	(3)			(3)			(3)			(3)		
	MD	PM	Sat	MD	PM	Sat	MD	PM	Sat	MD	PM	Sat
Auto	95.0%	95.0%	93.0%	95.0%	95.0%	93.0%	95.0%	95.0%	93.0%	95.0%	95.0%	93.0%
Taxi	3.0%	3.0%	5.0%	3.0%	3.0%	5.0%	3.0%	3.0%	5.0%	3.0%	3.0%	5.0%
Bus	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%	2.0%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Vehicle Occupancy	(3)			(3)			(3)			(4)		
Auto	Weekday	Saturday		Weekday	Saturday		Weekday	Saturday		Weekday	Saturday	
Taxi	1.40	1.72		1.40	1.72		1.40	1.72		2.00	2.00	
	1.64	1.75		1.64	1.75		1.64	1.75		2.00	2.00	
Daily Delivery Trip Rate	(1)(3) Weekday Saturday 0.35 0.04 Delivery Trips / KSF			(1) Weekday Saturday 0.35 0.04 Delivery Trips / KSF			(1) Weekday Saturday 0.35 0.04 Delivery Trips / KSF			(4) Weekday Saturday 0.68 0.03 Delivery Trips / KSF		
Delivery Temporal	MD	PM	Sat	MD	PM	Sat	MD	PM	Sat	MD	PM	Sat
	(1)			(1)			(1)			(4)		
	11%	2%	11%	11%	2%	11%	11%	2%	11%	7.6%	1.0%	7.6%
Delivery Directional	(1)			(1)			(1)			(4)		
In	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Out	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%	50%
Total	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%	100%
Notes:	The wholesale warehouse trip rates correspond with trip-making for the specific peak hours.											
Sources:	(1) 2014 CEQR Technical Manual (2) Gateway Estates II FEIS (2009) (3) Brooklyn Bay Center FEIS (2011) (4) St. George Waterfront Redevelopment FEIS (2013)											

QUALITY RESTAURANT

The daily trip generation rate for the quality restaurant component is from the 2013 *St. George Waterfront Redevelopment FEIS*. The modal splits were obtained from the 2011 *Brooklyn Bay Center FEIS* and the 2009 *Gateway Estates II FEIS*. The temporal and directional distributions, vehicle occupancies, and the daily delivery trip rate and temporal and directional distributions were obtained from the 2013 *St. George Waterfront Redevelopment FEIS*.

C. CEQR TRANSPORTATION ANALYSIS SCREENING

The *CEQR Technical Manual* identifies procedures for evaluating a proposed project’s potential impacts on traffic, transit, pedestrian, and parking conditions. This methodology begins with the preparation of a trip generation analysis to determine the volume of person and vehicle trips associated with the proposed project. The results are then compared with the *CEQR Technical Manual*-specified thresholds (Level 1 screening analysis) to determine whether additional screening and/or quantified analyses are warranted. If the proposed project would result in 50 or more peak hour vehicle trips, 200 or more peak hour transit trips (200 or more peak hour transit riders at any given subway station or 50 or more peak hour bus trips on a particular route in one

direction), and/or 200 or more peak hour pedestrian trips, a Level 2 screening analysis is undertaken.

For the Level 2 screening analysis, project-generated trips are assigned to specific intersections, transit routes, and pedestrian elements. If the results of this analysis show that the proposed project would generate 50 or more peak hour vehicle trips through an intersection, 50 or more peak hour bus riders on a bus route in a single direction, 200 or more peak hour subway passengers at any given station, or 200 or more peak hour pedestrian trips per pedestrian element, further quantified analyses may be warranted to evaluate the potential for significant adverse traffic, transit, pedestrian, and parking impacts.

TRIP GENERATION SUMMARY

As summarized in **Table 3**, the No Action development is estimated to generate approximately 1,599, 1,599, and 2,312 person trips during the weekday midday, PM, and Saturday peak hours, respectively. Approximately 1,151, 1,145, and 1,382 vehicle trips would be generated during the same respective peak hours.

**Table 3
Trip Generation Summary: Future No Action Condition**

Peak Hour	Person Trips					Vehicle Trips				
	In/Out	Auto	Taxi	Bus	Total	In/Out	Auto	Taxi	Delivery	Total
MD	In	814	26	17	857	In	581	29	4	614
	Out	705	22	15	742	Out	504	29	4	537
	Total	1,519	48	32	1,599	Total	1,085	58	8	1,151
PM	In	787	25	16	828	In	562	29	1	592
	Out	732	23	16	771	Out	523	29	1	553
	Total	1,519	48	32	1,599	Total	1,085	58	2	1,145
Saturday	In	1,152	62	25	1,239	In	670	66	0	736
	Out	998	54	21	1,073	Out	580	66	0	646
	Total	2,150	116	46	2,312	Total	1,250	132	0	1,382

As summarized in **Table 4**, the With Action development is estimated to generate approximately 1,583, 1,971, and 2,775 person trips during the weekday midday, PM, and Saturday peak hours, respectively. Approximately 1,088, 1,349, and 1,645 vehicle trips would be generated during the same respective time periods.

**Table 4
Trip Generation Summary: Future With Action Condition**

Peak Hour	Person Trips					Vehicle Trips				
	In/Out	Auto	Taxi	Bus	Total	In/Out	Auto	Taxi	Delivery	Total
MD	In	798	25	17	840	In	546	27	4	577
	Out	706	21	16	743	Out	480	27	4	511
	Total	1,504	46	33	1,583	Total	1,026	54	8	1,088
PM	In	965	31	20	1,016	In	660	35	0	695
	Out	907	30	18	955	Out	619	35	0	654
	Total	1,872	61	38	1,971	Total	1,279	70	0	1,349
Saturday	In	1,378	74	29	1,481	In	794	79	0	873
	Out	1,203	64	27	1,294	Out	693	79	0	772
	Total	2,581	138	56	2,775	Total	1,487	158	0	1,645

As summarized in **Table 5**, the net incremental trips subject to CEQR impact analyses would therefore be -16, 372, and 463 person trips and -63, 204, and 263 vehicle trips during the weekday midday, PM, and Saturday peak hours, respectively.

Table 5
Trip Generation Summary: Net Incremental Trips

Peak Hour	Person Trips					Vehicle Trips				
	In/Out	Auto	Taxi	Bus	Total	In/Out	Auto	Taxi	Delivery	Total
MD	In	-16	-1	0	-17	In	-35	-2	0	-37
	Out	1	-1	1	1	Out	-24	-2	0	-26
	Total	-15	-2	1	-16	Total	-59	-4	0	-63
PM	In	178	6	4	188	In	98	6	-1	103
	Out	175	7	2	184	Out	96	6	-1	101
	Total	353	13	6	372	Total	194	12	-2	204
Saturday	In	226	12	4	242	In	124	13	0	137
	Out	205	10	6	221	Out	113	13	0	126
	Total	431	22	10	463	Total	237	26	0	263

LEVEL 1 SCREENING

TRAFFIC

As shown in **Table 5**, the net incremental trips estimated for the future with the proposed project would be -63, 204, and 263 vehicle trips during the weekday midday, PM, and Saturday peak hours, respectively. As described above, site access and circulation would differ between the No Action and With Action conditions. Therefore, even though the number of net incremental vehicle trips for the weekday midday peak hour is estimated to be less than zero, a Level 2 screening assessment was conducted for all three analysis peak hours.

TRANSIT

As detailed in **Table 5**, the net incremental trips estimated for the future with the proposed project would be 1, 6, and 10 person trips by bus during the weekday midday, PM, and Saturday peak hours, respectively. Since these incremental bus trips do not exceed the *CEQR Technical Manual* analysis threshold of 50 or more peak hour bus riders on a bus route in a single direction, a detailed bus line-haul analysis is not warranted and the proposed project is not expected to result in any significant adverse bus line-haul impacts.

PEDESTRIANS

As detailed in **Table 5**, the net incremental trips estimated for the future with the proposed project would be -16, 372, and 463 person trips during the weekday midday, PM, and Saturday peak hours, respectively. All of the auto trips would park on-site and would not traverse any pedestrian elements (i.e., sidewalks, corners, and crosswalks) surrounding the development site. Patrons accessing the project site via taxi would also be expected to get picked up/dropped off on-site. As a result, only the incremental bus trips would traverse the surrounding pedestrian elements. Since these incremental bus trips do not exceed the *CEQR Technical Manual* analysis threshold of 200 or more peak hour pedestrian trips, a detailed pedestrian analysis is not warranted and the proposed project is not expected to result in any significant adverse pedestrian impacts.

LEVEL 2 SCREENING

As part of the Level 2 screening assessment, project-generated trips were assigned to specific intersections accessing and near the development site. Intersections expected to incur 50 or more peak hour vehicle trips may be subject to further quantified analyses of potential traffic impacts.

SITE ACCESS AND CIRCULATION

Currently, an unsignalized entrance roadway at the northwest corner of the development site provides access to the adjacent movie theater complex, which has an existing curb cut on the open and built portion of Morrow Street. The proposed project would enlarge and realign Morrow Street so that it would utilize the existing traffic signal located at the easterly curb cut for the Home Depot site on the northern side of Forest Avenue (see **Figure 1**). Primary access to the development site from Forest Avenue would be provided by this re-aligned roadway, which would continue to provide access to the movie theater zoning lot located on the west side of Morrow Street (which is proposed for de-mapping). Two-way, right-in/right-out only access/egress from Forest Avenue would also be provided from a proposed curb cut to the east of the main entrance, which would not be signalized. A third vehicular entrance would provide two-way access/egress from South Avenue along the eastern boundary of the project site. The South Avenue driveway would be unsignalized with only right-in/right-out movements permitted in the No Action condition and signalized with all movements permitted in the With Action condition. In addition to the realignment of Morrow Street, portions of Garrick Street, Amador Street, Albany Avenue, and Wemple Street (unbuilt streets) would be demapped.

As noted above, the project site contains approximately 6.55 acres of mapped wetland areas, which would be preserved in the future with the proposed project. The proposed project would provide a landscaped buffer between the retail center and the regulated/preserved wetland areas.

TRAFFIC

The projected vehicle trips for the three peak hours under the No Action and With Action conditions were assigned to area intersections based on likely travel routes to and from the development site, prevailing travel patterns, population density of the surrounding neighborhoods, configuration of the roadway network, and the anticipated locations of site access and egress. Auto and taxi trips were assigned to the accessory parking lot located within the project site. All delivery trips were assigned to the development site via New York City Department of Transportation (NYCDOT) designated truck routes. Traffic assignments for autos, taxis, and deliveries for the various development uses are further discussed below.

Traffic Assignments

The destination retail, wholesale warehouse, supermarket, and quality restaurant components of the proposed project are expected to draw patrons primarily from Staten Island, within 2-3 miles of the project site. Therefore, auto trips were generally assigned from local origins within the neighborhood and adjacent residential areas. Overall, the vehicle trips generated by the proposed project were distributed to the study area roadway network in the following manner: approximately 45 percent assigned to points east and northeast of the development via Forest Avenue, 30 percent to points southeast and northeast via South Avenue, 20 percent via I-278, and 5 percent via the West Shore Expressway.

Taxis

Taxi pick-ups and drop-offs for all project components were assigned to the accessory parking lot located within the project site.

Deliveries

Truck delivery trips for all project components were assigned to NYCDOT-designated truck routes. The roadways used by trucks to access the project site, which includes Forest Avenue, South Avenue, Willow Road West, and Glen Street, are all designated truck routes.

Summary

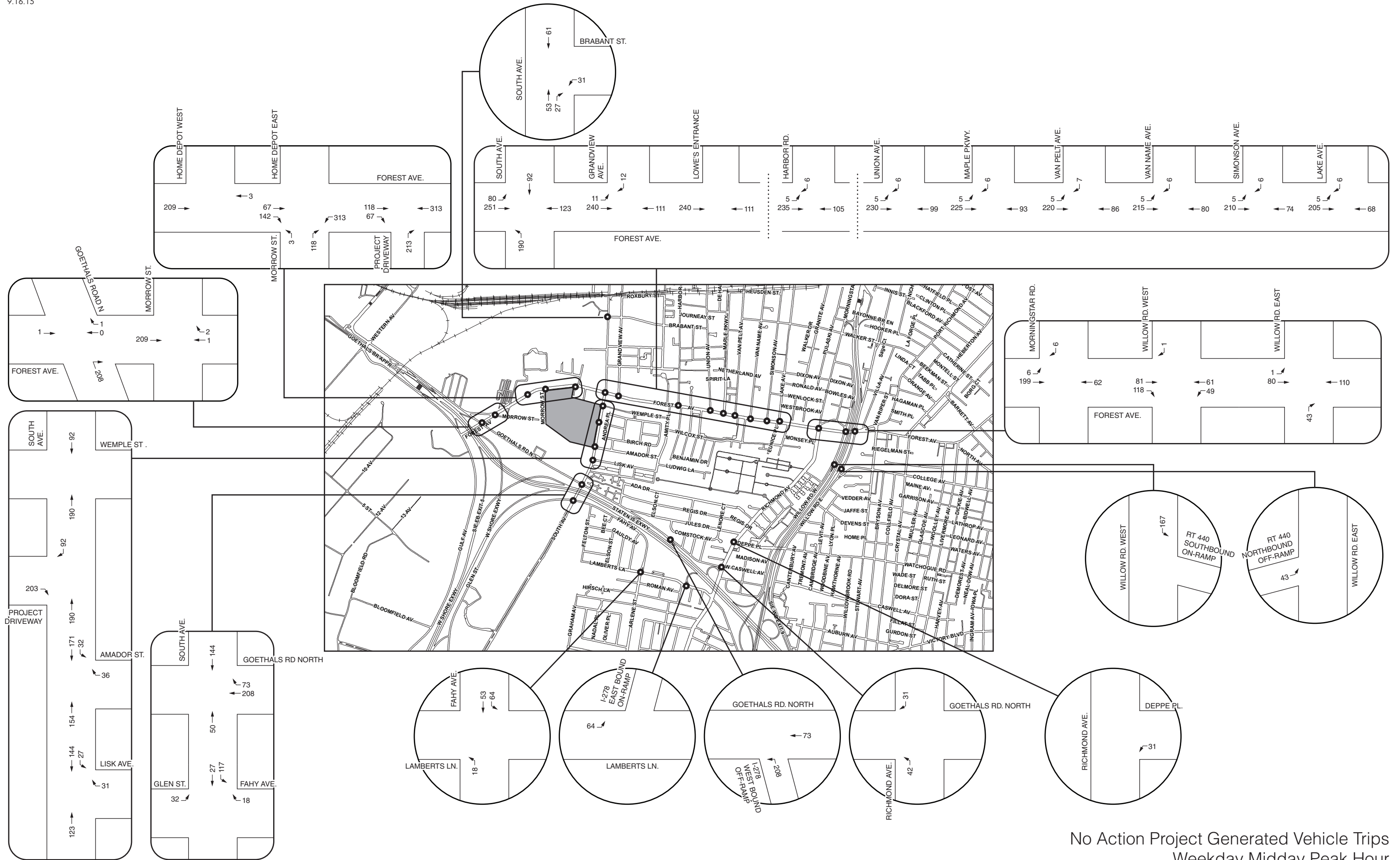
The No Action project generated vehicle trips are shown in **Figures 2 through 4**, and the With Action project generated vehicle trips are shown in **Figures 5 through 7**. The net incremental vehicle trips are shown in **Figures 8 through 10** and summarized in **Table 6**. The negative increments at the site access intersections along Forest Avenue and at the Forest Avenue and South Avenue intersection are results of the full access/egress facilitated by the proposed signalized South Avenue driveway under the With Action condition. East of South Avenue, in consultation with the lead agency and NYCDOT, six intersections were selected for inclusion in the recommended study area shown in **Figure 11**.

Table 6
Traffic Level 2 Screening Analysis Results—Recommended
Analysis Locations

Intersection	Incremental Vehicle Trips			Recommended Analysis Locations
	Weekday Midday	Weekday PM	Saturday	
Forest Avenue and Goethals Road North	-139	-119	-146	
Forest Avenue and Morrow Street (West of Home Depot West Driveway)	-139	-120	-146	
Forest Avenue and Home Depot West Driveway	-139	-120	-146	
Forest Avenue and Morrow Street (Realigned Project Driveway)	-402	-338	-411	
Forest Avenue and Project Driveway (Unsignalized)	-317	-215	-261	
Forest Avenue and South Avenue	-218	-85	-101	
Forest Avenue and Grandview Avenue	-19	68	87	✓
Forest Avenue and Lowe's Driveway	-17	64	81	
Forest Avenue and Harbor Road	-17	64	81	
Forest Avenue and Union Avenue	-16	63	77	✓
Forest Avenue and Maple Parkway	-16	60	73	✓
Forest Avenue and Van Pelt Avenue	-16	58	70	
Forest Avenue and Van Name Avenue	-15	56	67	
Forest Avenue and Simonson Avenue	-15	54	66	
Forest Avenue and Lake Avenue/Eunice Place	-14	53	63	✓
Forest Avenue and Morningstar Road	-14	50	61	✓
Forest Avenue and Willow Road West	-17	57	70	✓
Forest Avenue and Willow Road East	-13	43	53	
South Avenue and Brabant Street	-9	31	38	
South Avenue and Wemple Street	-135	-90	-114	
South Avenue and Project Driveway	159	317	396	✓
South Avenue and Amador Street	104	224	282	✓
South Avenue and Lisk Avenue	109	212	267	✓
South Avenue and Goethals Road North	-26	84	108	✓
South Avenue and Glen Street/Fahy Avenue	-10	37	45	
Lamberts Lane and Fahy Avenue	-6	26	32	
Richmond Avenue and Goethals Road North	-4	12	16	
Richmond Avenue and Deppe Place	-2	4	7	

Notes: ✓ denotes intersections recommended for detailed traffic analysis.

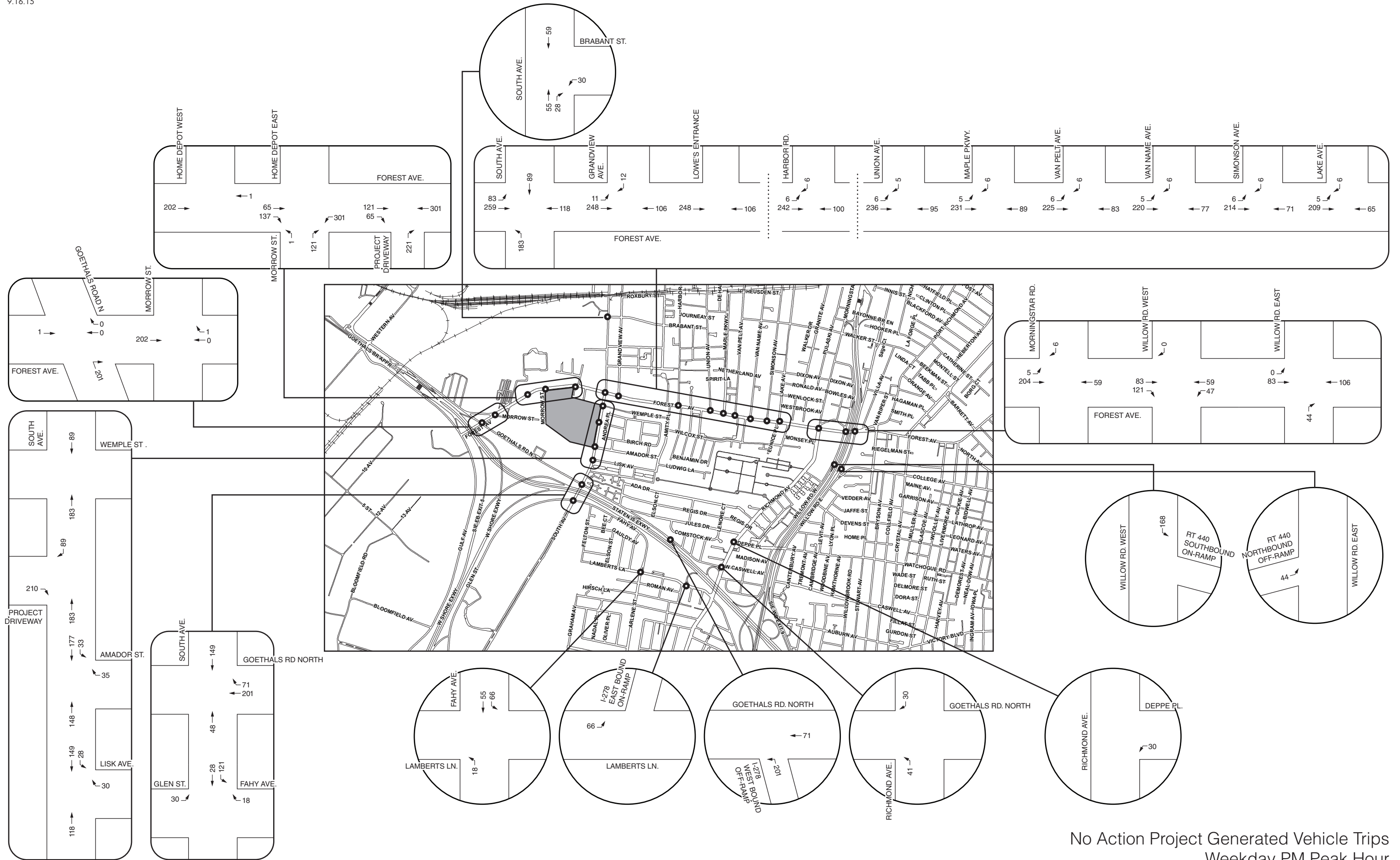
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South Avenue Retail Development

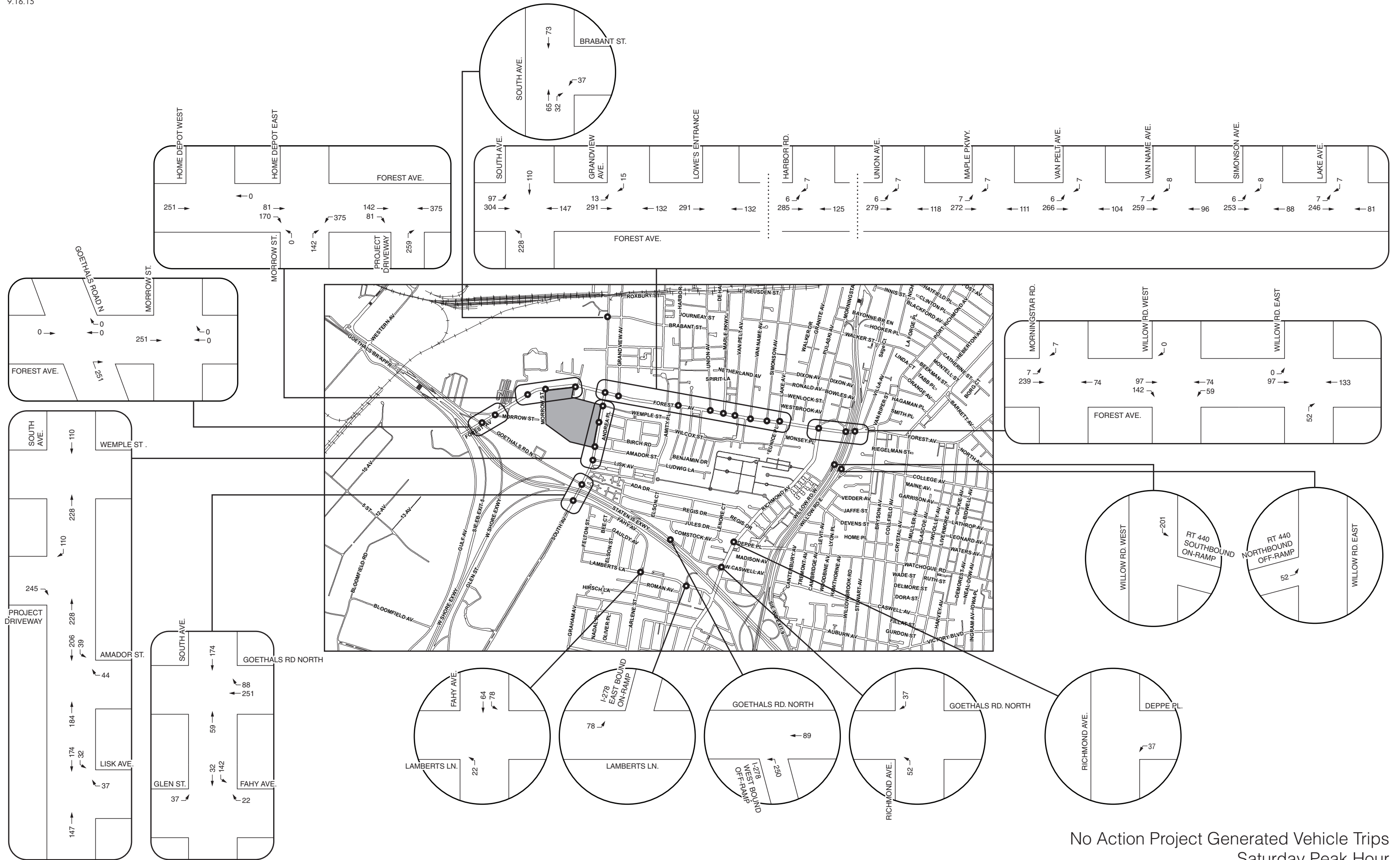
No Action Project Generated Vehicle Trips
Weekday Midday Peak Hour

Figure 2



South Avenue Retail Development

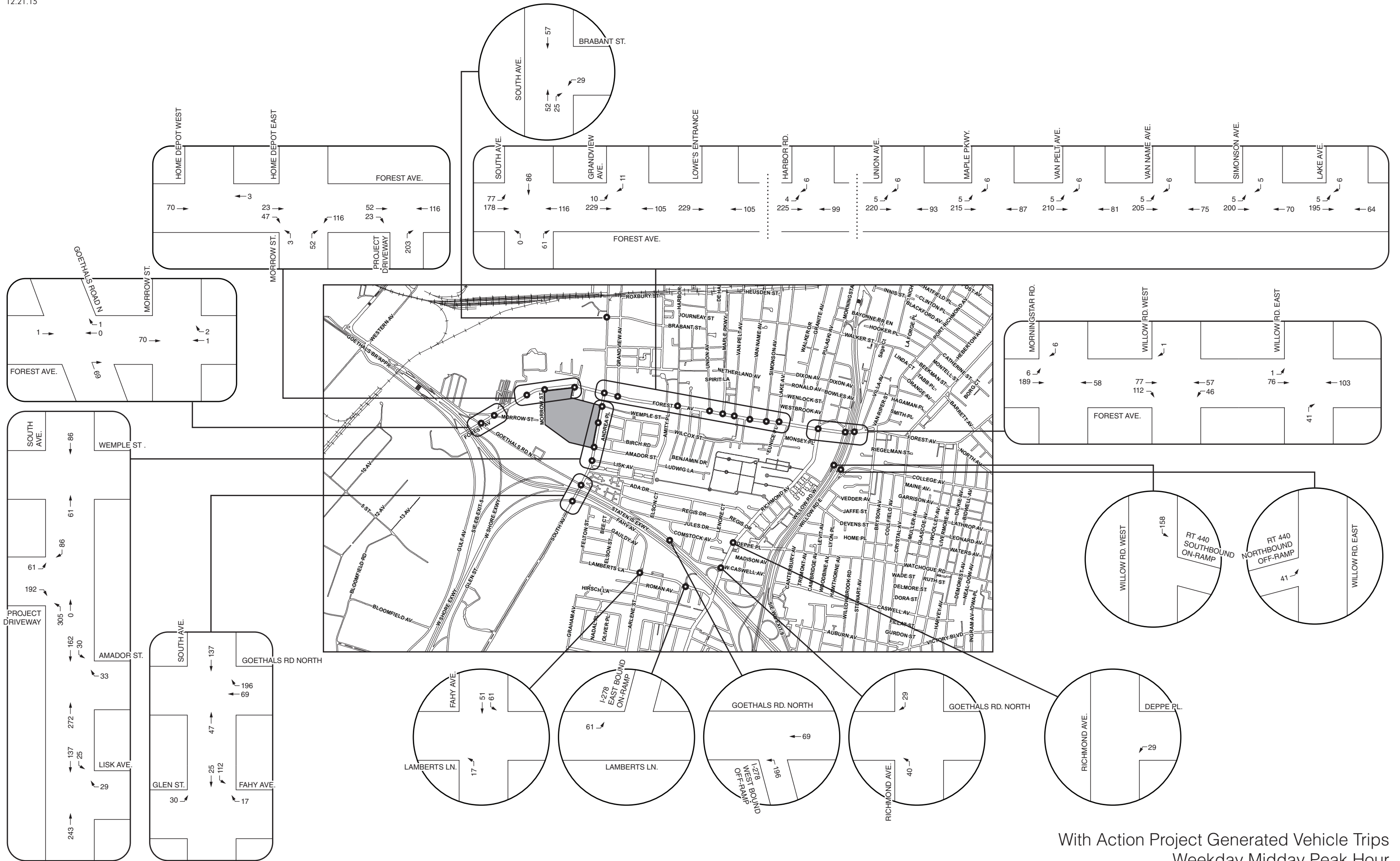
No Action Project Generated Vehicle Trips
Weekday PM Peak Hour
Figure 3



South Avenue Retail Development

No Action Project Generated Vehicle Trips
Saturday Peak Hour

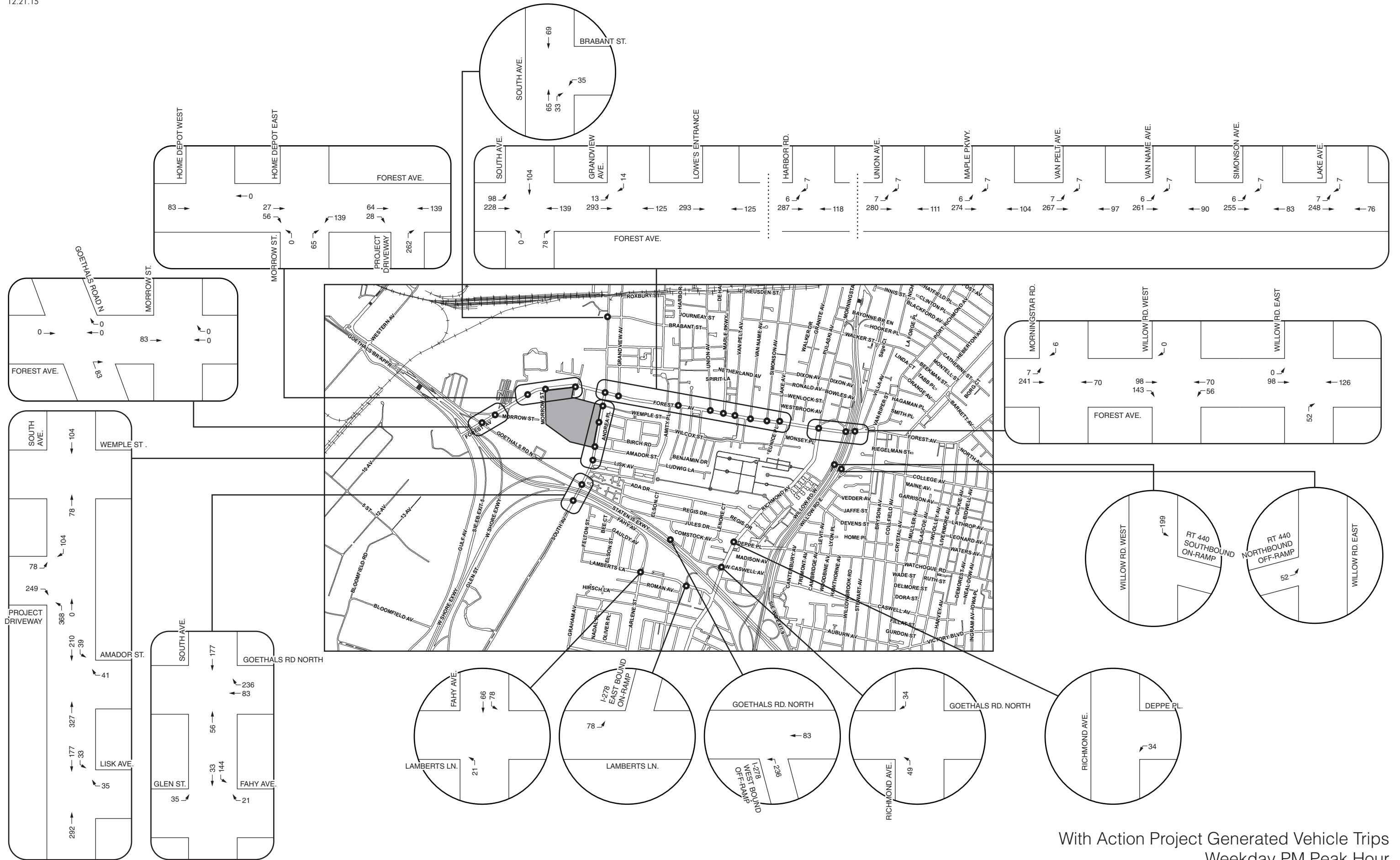
Figure 4



South Avenue Retail Development

With Action Project Generated Vehicle Trips
Weekday Midday Peak Hour

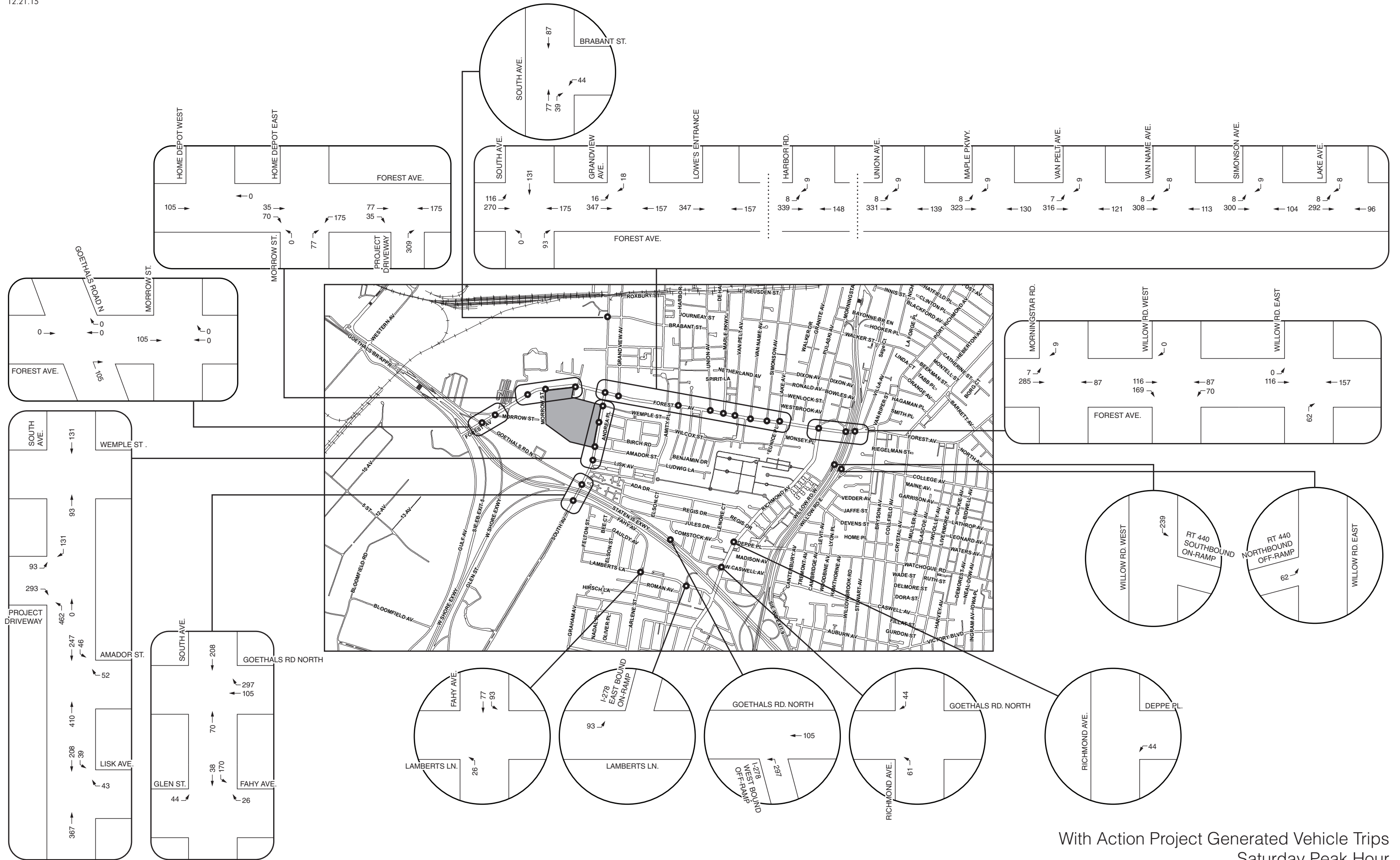
Figure 5



South Avenue Retail Development

With Action Project Generated Vehicle Trips
Weekday PM Peak Hour

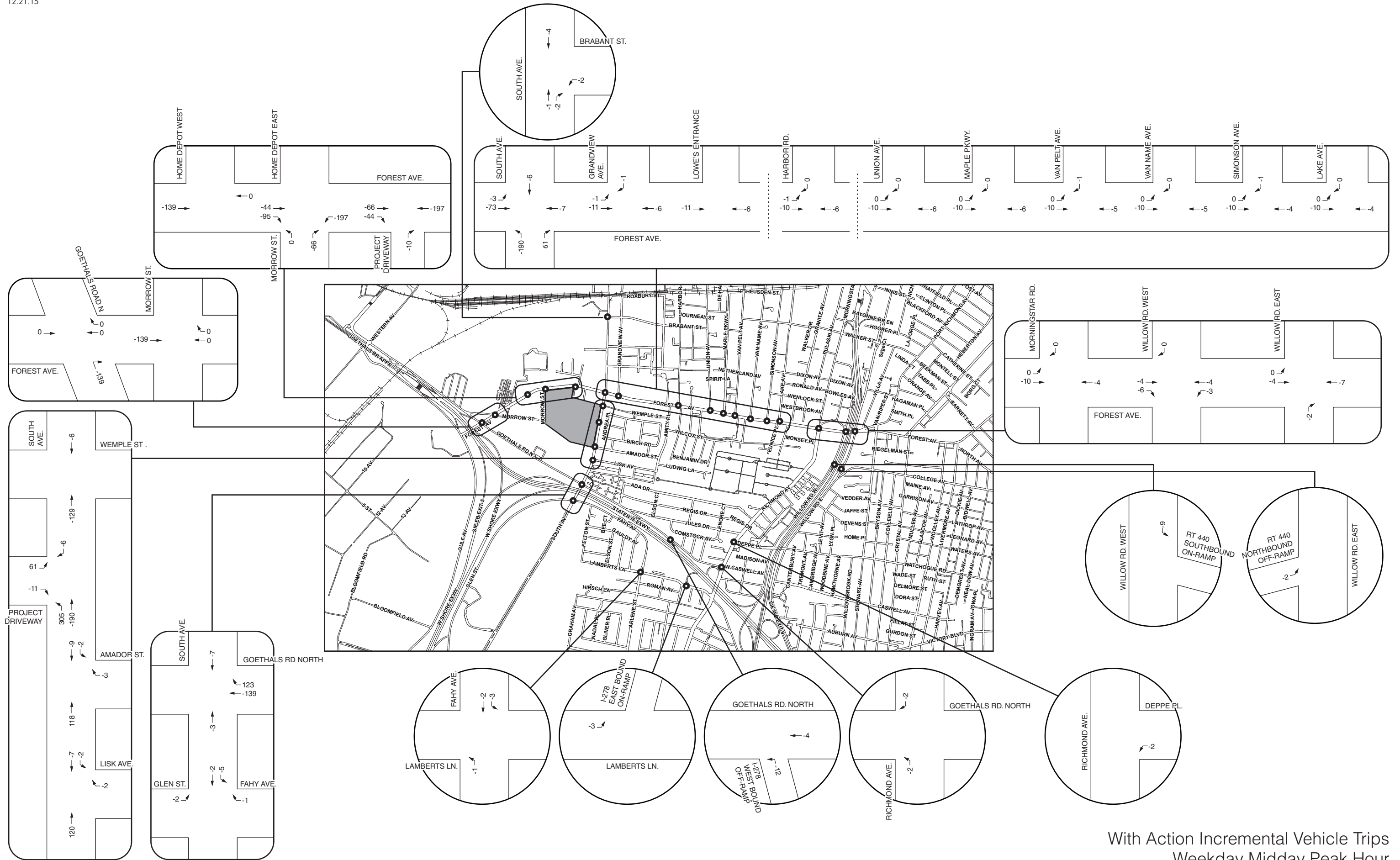
Figure 6



South Avenue Retail Development

With Action Project Generated Vehicle Trips
Saturday Peak Hour

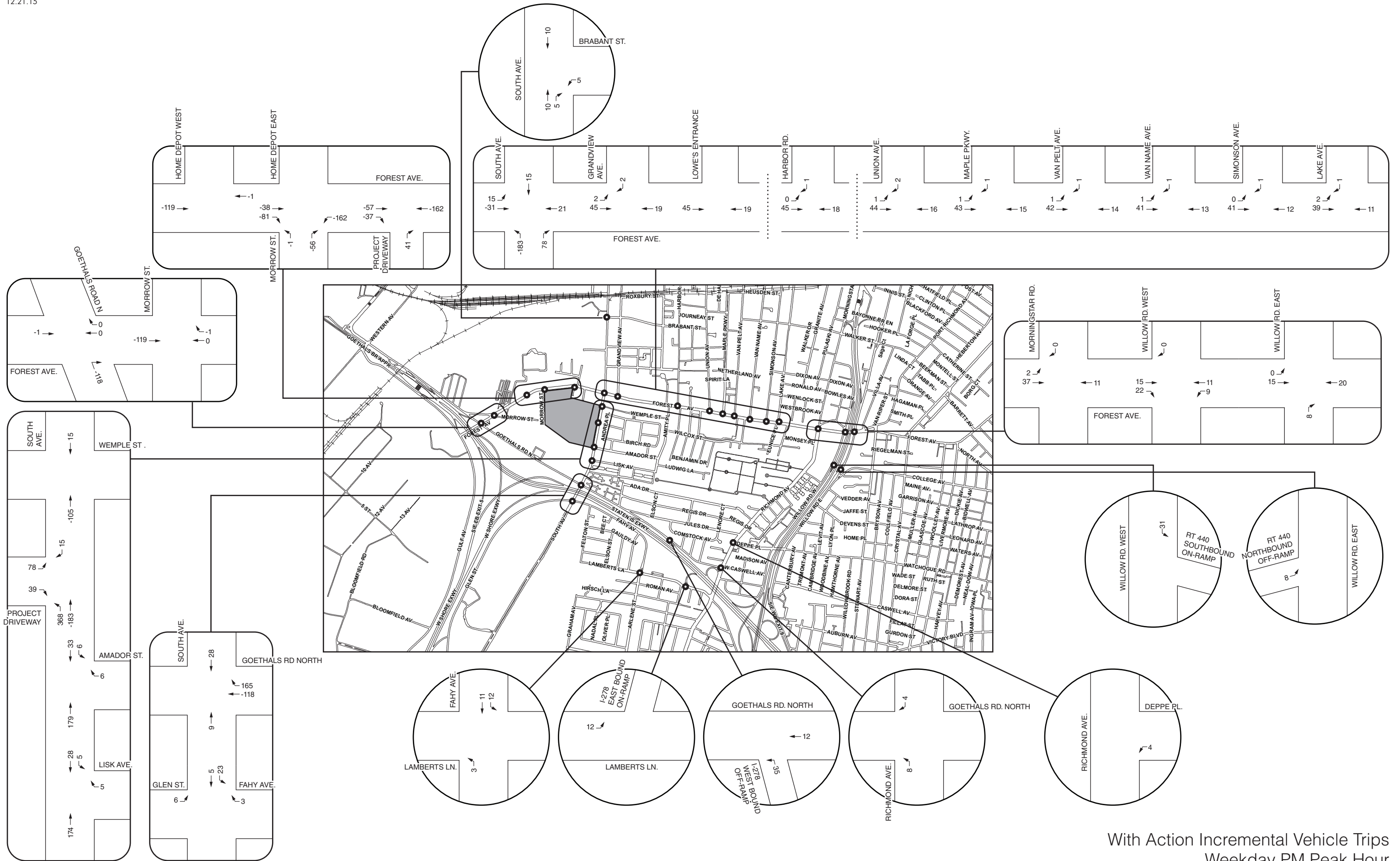
Figure 7



South Avenue Retail Development

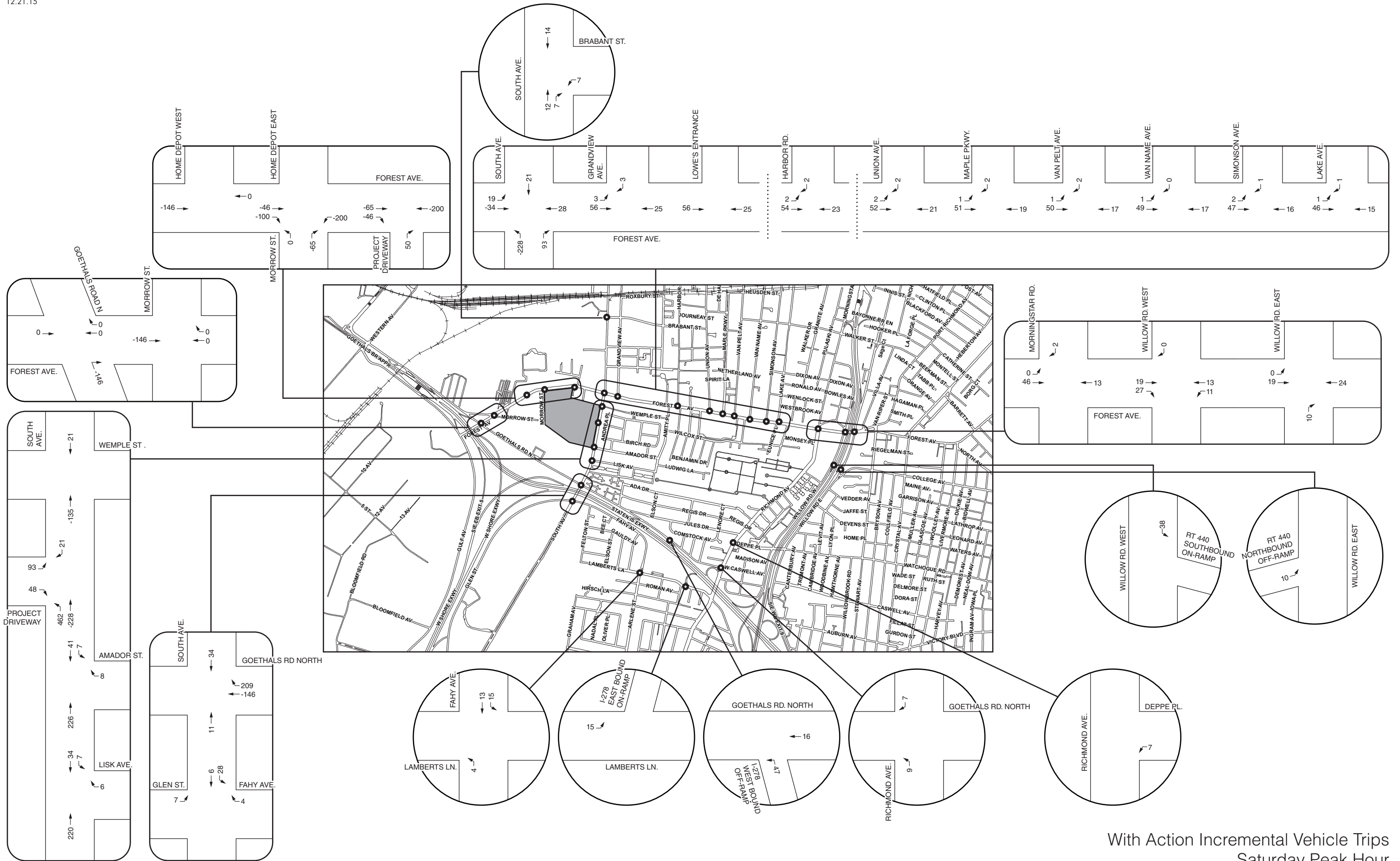
With Action Incremental Vehicle Trips
Weekday Midday Peak Hour

Figure 8



South Avenue Retail Development

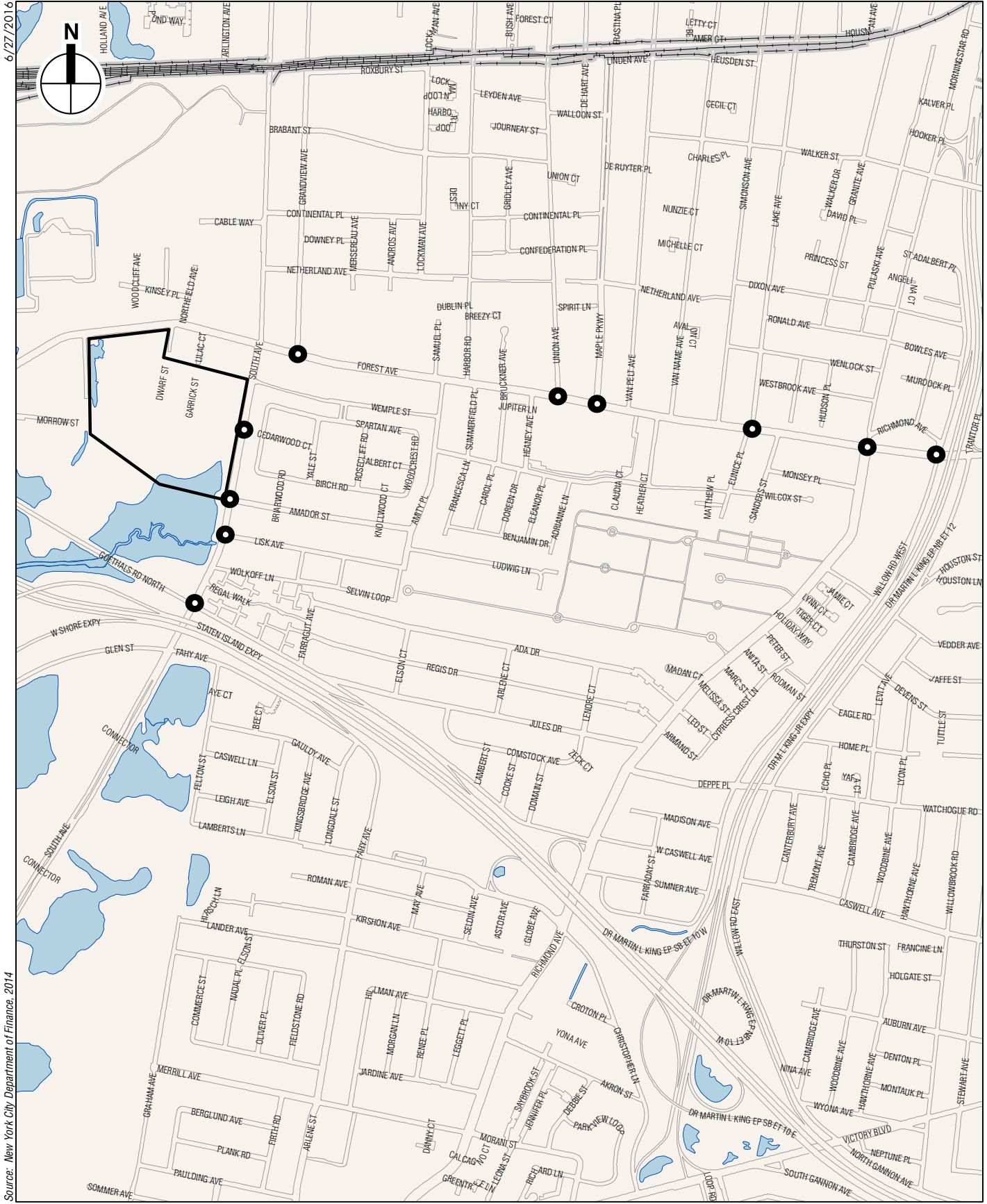
With Action Incremental Vehicle Trips
Weekday PM Peak Hour
Figure 9



South Avenue Retail Development

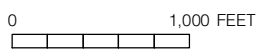
With Action Incremental Vehicle Trips
Saturday Peak Hour
Figure 10

6/27/2016



Source: New York City Department of Finance, 2014

- Project Site
- Traffic Analysis Intersection



South Avenue Retail Development

Recommended Traffic Analysis Locations Figure 11