TRAFFIC PLANNING AND DESIGN, INC.

Est. 1989

Allentown Arena and City Center Development

Traffic Analysis

City of Allentown, Lehigh County, PA

For Submission To:

City of Allentown and PennDOT District 5-0

Last Revised: May 5, 2014

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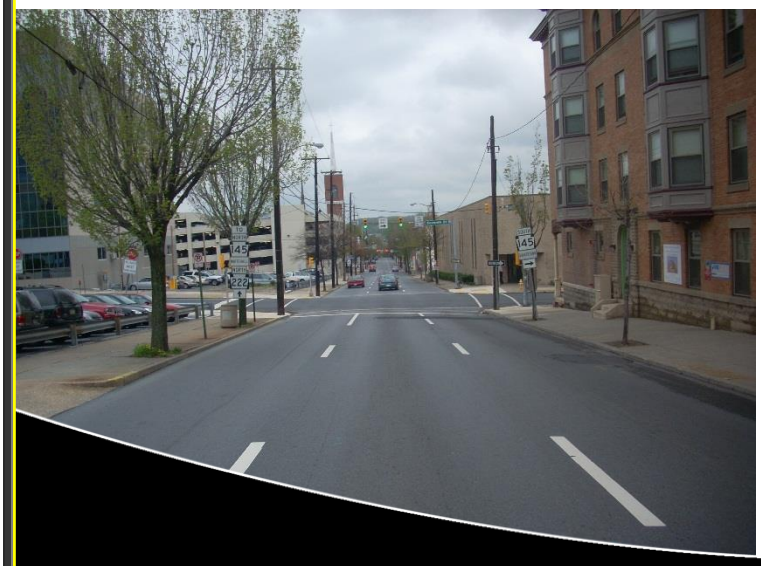


812 W. Hamilton Street | Suite 402 | Allentown, PA | 18101 | 610.625.4242 | TPD@TrafficPD.com

ALLENTOWN ARENA AND CITY CENTER DEVELOPMENT TRAFFIC ANALYSIS

For Submission to:

City of Allentown, Lehigh County, PA
& PennDOT District 5-0

Prepared For:

Allentown Neighborhood
Improvement Zone
Development Authority

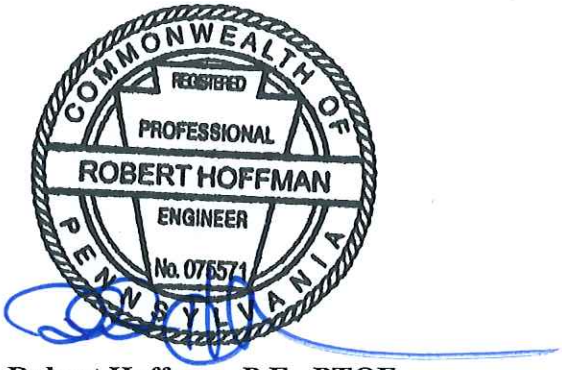
435 Hamilton Street
Allentown, PA 18101

May 5, 2014
TPD # HCSD.A.00001

Prepared By:

Traffic Planning and Design, Inc.
812 W. Hamilton Street, Suite 402
Allentown, Pennsylvania 18101

Phone: (610) 625-4242
Fax: (610) 625-4250
E-mail: TPD@TrafficPD.com
Web Site: www.trafficpd.com



Robert Hoffman, P.E., PTOE
Senior Project Manager
Pennsylvania License Number PE075571

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EXECUTIVE SUMMARY

The purpose of this study is to examine the potential traffic impact associated with the proposed Arena and City Center Development on the street network in the City of Allentown, Lehigh County, PA. Based on this evaluation, the following conclusions were reached:

1. This traffic analysis includes the following proposed developments:
   a. At the intersection of 7th Street & Hamilton Street, a new mixed-use complex on the northwest corner will include the following land uses:
      - Multi-use arena;
      - 164,657 s.f. general office space;
      - 65,863 s.f. health/fitness club;
      - 180-room hotel;
      - 8,820 s.f. restaurant;
      - 13,060 s.f. restaurant;
      - Two parking decks with a total of 867 parking spaces.
   b. At the intersection of 7th Street & Hamilton Street, a new office building ("Two City Center") on the northeast corner will include the following land uses:
      - 272,000 s.f. general office space;
      - 8,000 s.f. sit-down restaurant;
      - 20,000 s.f. retail space;
      - 56 below grade parking spaces.
   c. At the intersection of Hamilton Street and Law Street, a new office building ("Three City Center") on the northeast corner will include the following land uses:
      - 175,000 s.f. office space;
      - 106 below grade spaces.
   d. At the intersection of 7th Street & Linden Street, a new mixed-use complex ("Four City Center") on the southeast corner will include the following land uses:
      - 168 apartments;
      - 37,500 s.f. complementary first floor retail space;
      - 96 below grade parking spaces.
2. It is anticipated that all development outlined above will be completed in 2014. TPD analyzed traffic conditions for the opening year (2014) and design year (2019) of the proposed development.
3. The proposed arena will accommodate minor league hockey games, concerts and other events. The arena capacity for a hockey game will be 8,500 attendees and the capacity for concerts and other events will be 10,500 attendees.

4. In association with the proposed development, the Allentown Parking Authority's Linden Deck will be expanded to include an additional 225 parking spaces. The deck is located at the intersection of Linden Street & Church Street on the southeast corner.

5. The trip generation rates for the proposed development are based upon data published by the Institute of Transportation Engineers (ITE) and the Urban Land Institute (ULI). The total trip generation for each milestone is outlined below:

   a. The Arena Complex (including the attached hotel and office building) is expected to generate **485** new vehicle-trips in the weekday AM peak hour. During the weekday PM peak hour, the Arena Complex is expected to generate **744** new vehicle-trips on non-event days and **2,753** new vehicle-trips on event days. During the Saturday midday peak hour, the Arena Complex is expected to generate **542** new vehicle-trips on non-event days and **2,630** new vehicle-trips on event days.

   b. Two City Center is expected to generate **401** new vehicle-trips in the weekday AM peak hour, **422** new vehicle-trips in the weekday PM peak hour and **221** new vehicle-trips in the Saturday midday peak hour.

   c. Three City Center is expected to generate **269** new vehicle-trips in the weekday AM peak hour, **247** new vehicle-trips in the weekday PM peak hour and **67** new vehicle-trips in the Saturday midday peak hour.

   d. Four City Center is expected to generate **103** new vehicle-trips in the weekday AM peak hour, **182** new vehicle-trips in the weekday PM peak hour and **200** new vehicle-trips in the Saturday midday peak hour.

6. The following study area intersections are included in this Traffic Analysis:

   - 7th Street (S.R. 0145) & Turner Street;
   - 6th Street & Turner Street;
   - 9th Street & Linden Street ;
   - 8th Street & Linden Street;
   - 7th Street (S.R. 0145) & Linden Street;
   - 6th Street & Linden Street;
   - 5th Street & Linden Street;
   - 4th Street & Linden Street;
   - 9th Street & Hamilton Street;
   - 8th Street & Hamilton Street;
   - 7th Street (S.R. 0145) & Hamilton Street;
   - 6th Street & Hamilton Street;
   - 5th Street & Hamilton Street;
   - 4th Street & Hamilton Street;
   - 7th Street (S.R. 0145) & Walnut Street;
   - 6th Street & Walnut Street.

7. Levels of Service (LOS) for the study area intersections are summarized in **Table I** through **Table III**.

8. Based upon the results of this analysis, Traffic Planning and Design Inc. (TPD) offers the following recommendations:

    - Optimize traffic signal timing along the following key corridors based upon the projected traffic volumes: Hamilton Street, Linden Street, 6th Street, 7th Street and 8th Street. The new timing plans should utilize the existing signal equipment and time-based coordination.
    - Provide wayfinding signage on all major approach routes. Within the immediate vicinity of the arena, signage should direct motorists directly to the appropriate parking facilities.
    - Arena management should work with the City, the Allentown Parking Authority and a traffic engineer to create an event management plan. All attendees driving to the event should be guided efficiently to the various available parking opportunities. A variety of tools may be utilized, including flaggers, traffic cones and variable message signs. The event management plan should include strategies to reduce traffic volumes on 7th Street and Linden Street during the weekday P.M. peak hour by encouraging some event attendees to utilize one of the many alternate routes available.
    - The project team should coordinate with the Allentown Parking Authority to examine the existing methods of payment and determine if any improvements can be made to allow for maximum traffic flow into and out of parking facilities. An alternative payment system may allow for improved ingress and egress from the garage before and after events.

9. Under the 2014 and 2019 Projected Conditions, all intersections will operate at the same overall intersection level of service (ILOS) under Base Conditions and Projected Conditions on a typical weekday (non-event day), or fall within PennDOT's allowable 10-second variance between no-build and build condition scenarios.

10. The P.M. peak hour analysis for event days represents a highly conservative approach. Therefore, TPD also performed a supplemental analysis to examine a more realistic portrayal of traffic patterns associated with a sold-out hockey game. This analysis was focused on the intersection of Linden Street & 7th Street, which was identified as a critical intersection. Because the peak hour of event traffic is 6:00-7:00 PM, TPD conducted a supplemental traffic count for the intersection during this time period. This analysis resulted in an overall level of service C at the intersection of 7th Street & Linden Street. Therefore, it is our opinion that the conservative primary analysis overstates the potential for traffic congestion during peak periods of event traffic.

11. Based upon this Traffic Analysis, it is TPD's opinion that with the implementation of the recommended improvements and the development of an event management plan the existing street network can accommodate the new traffic generated by the proposed development.

TABLE I
LEVEL OF SERVICE/DELAY SUMMARY
WEEKDAY AM PEAK HOUR

Intersection	Movement	Existing	2014		2019	
			Base	Projected	Base	Projected
9th Street & Linden Street	WB L/T	B (16.2)	C (20.5)	C (20.3)	C (21.0)	C (20.8)
	SB T/R	C (20.9)	B (15.2)	B (17.9)	B (15.4)	B (18.1)
	ILOS	**B (18.0)**	**B (18.5)**	**B (19.5)**	**B (18.9)**	**B (19.9)**
8th Street & Linden Street	WB T/R	B (13.6)	B (11.9)	B (11.5)	B (12.2)	B (11.9)
	NB L/T	C (22.9)	C (25.2)	C (28.8)	C (25.7)	C (29.6)
	ILOS	**B (17.1)**	**B (16.9)**	**B (17.2)**	**B (17.3)**	**B (17.7)**
7th Street & Linden Street	WB L/T	C (23.9)	C (24.0)	C (33.1)	C (24.5)	C (32.4)
	SB T/R	C (21.7)	C (21.8)	C (23.2)	C (22.3)	C (25.0)
	ILOS	**C (22.4)**	**C (22.5)**	**C (26.3)**	**C (23.0)**	**C (27.4)**
6th Street & Linden Street	WB T/R	C (20.8)	C (20.7)	C (22.6)	C (21.0)	C (23.0)
	NB L/T	C (20.9)	C (21.6)	C (26.6)	C (21.9)	C (27.2)
	ILOS	**C (20.8)**	**C (21.1)**	**C (24.5)**	**C (21.4)**	**C (25.0)**
5th Street & Linden Street	WB L/T	B (19.6)	B (18.9)	B (19.5)	C (19.2)	C (19.8)
	SB T/R	B (13.1)	B (13.7)	B (16.1)	B (13.8)	B (16.3)
	ILOS	**B (17.3)**	**B (17.1)**	**B (18.0)**	**B (17.3)**	**B (18.3)**
4th Street & Linden Street	WB L/T/R	C (21.3)	B (12.1)	C (20.5)	C (20.2)	C (20.9)
	NB L	C (20.8)	A (8.1)	A (9.2)	A (8.6)	A (9.8)
	NB T	B (17.9)	A (6.3)	A (6.3)	A (6.5)	A (6.5)
	SB T	B (13.1)	B (14.6)	B (14.8)	B (14.8)	B (15.0)
	SB R	B (11.6)	B (12.9)	B (13.8)	B (12.9)	B (13.8)
	ILOS	**B (18.5)**	**B (10.8)**	**B (14.9)**	**B (14.5)**	**B (15.2)**
9th Street & Hamilton Street	EB T/R	B (17.4)	B (18.6)	B (19.8)	B (18.9)	C (20.0)
	SB L/T	C (21.0)	C (20.4)	C (21.0)	C (20.6)	C (21.2)
	ILOS	**B (18.7)**	**B (19.3)**	**C (20.2)**	**B (19.5)**	**C (20.4)**
8th Street & Hamilton Street	EB L/T	B (15.6)	C (20.9)	C (21.8)	C (21.2)	C (22.1)
	NB T/R	B (17.5)	C (20.6)	C (22.0)	C (20.9)	C (22.3)
	ILOS	**B (16.6)**	**C (20.8)**	**C (21.9)**	**C (21.0)**	**C (22.2)**
7th Street & Hamilton Street	EB L/T	A (9.7)	C (20.7)	B (15.0)	B (14.4)	B (15.2)
	SB L	A (8.7)	B (17.2)	B (19.0)	B (17.4)	B (19.2)
	SB T	B (12.4)	B (20.0)	C (20.2)	C (20.4)	C (20.6)
	ILOS	**B (11.0)**	**B (19.8)**	**B (18.2)**	**B (18.1)**	**B (18.5)**
6th Street & Hamilton Street	EB L/T	C (34.7)	B (14.0)	B (14.3)	B (11.6)	B (14.5)
	WB R	B (13.8)	A (7.5)	C (33.1)	A (7.5)	C (32.9)
	NB T/R	C (28.7)	A (5.9)	A (9.2)	A (6.0)	A (9.2)
	ILOS	**C (30.5)**	**B (10.0)**	**B (13.6)**	**A (8.9)**	**B (13.7)**
5th Street & Hamilton Street	EB T/R	D (42.6)	B (14.0)	B (13.6)	B (14.1)	B (13.8)
	WB L/T	B (19.9)	B (12.8)	B (18.5)	B (12.9)	B (18.7)
	SB L/T/R	B (15.6)	B (11.5)	B (12.1)	B (11.5)	B (12.2)
	ILOS	**C (31.3)**	**B (13.1)**	**B (14.0)**	**B (13.2)**	**B (14.1)**
4th Street & Hamilton Street	EB L/T	B (13.2)	B (18.7)	B (15.5)	B (18.9)	B (15.7)
	EB R	B (11.1)	B (16.4)	B (13.6)	B (16.4)	B (13.6)
	WB L/T/R	C (21.8)	B (13.0)	B (13.4)	B (13.5)	B (13.6)
	NB T	A (6.6)	B (13.3)	B (13.3)	B (13.5)	B (13.5)
	NB R	A (6.5)	B (13.1)	B (13.1)	B (13.3)	B (13.3)
	SB L	A (1.0)	A (9.7)	A (9.9)	B (10.3)	B (10.6)
	SB T/R	A (0.4	A (6.3)	A (6.3)	A (6.4)	A (6.4)
	ILOS	**A (9.5)**	**B (13.4)**	**B (12.7)**	**B (13.5)**	**B (12.9)**
6th Street & Turner Street	EB L/T	C (22.4)	B (19.8)	C (20.9)	C (20.1)	C (21.3)
	NB T/R	B (10.9)	B (13.8)	B (14.7)	B (13.9)	B (14.9)
	ILOS	**B (17.4)**	**B (17.1)**	**B (18.6)**	**B (17.4)**	**B (18.9)**
6th Street & Walnut Street	EB L	B (14.0)	B (17.7)	B (18.9)	B (17.8)	B (19.0)
	EB T	B (15.0)	B (18.7)	B (19.3)	B (18.9)	B (19.3)
	NB T/R	B (18.1)	B (13.1)	B (12.7)	B (13.2)	B (12.9)
	ILOS	**B (16.4)**	**B (15.9)**	**B (16.0)**	**B (16.0)**	**B (16.2)**
7th Street & Turner Street	EB T/R	C (20.5)	C (24.1)	C (25.4)	C (24.5)	C (25.8)
	SB L/T	B (17.1)	B (13.2)	C (29.5)	B (13.7)	C (31.1)
	ILOS	**B (17.9)**	**B (16.0)**	**C (28.6)**	**B (16.5)**	**C (29.9)**
7th Street & Walnut Street	EB T/R	B (15.9)	B (18.8)	B (19.1)	B (19.0)	B (19.3)
	SB L/T	B (17.0)	B (14.6)	B (14.7)	B (14.8)	B (14.9)
	ILOS	**B (16.5)**	**B (16.6)**	**B (16.8)**	**B (16.8)**	**B (17.0)**

TABLE II
LEVEL OF SERVICE/DELAY SUMMARY
WEEKDAY PM PEAK HOUR

Intersection	Movement	Existing	2014			2019		
			Base	Projected (Non-Event)	Projected (Event)	Base	Projected (Non-Event)	Projected (Event)
9th Street & Linden Street	WB L/T	B (17.5)	B (19.4)	C (27.8)	C (27.8)	C (20.0)	C (29.0)	C (29.0)
	SB T/R	C (21.7)	B (19.5)	B (16.4)	B (19.3)	B (19.7)	B (16.5)	B (19.6)
	ILOS	**B (18.6)**	**B (19.4)**	**C (25.3)**	**C (24.8)**	**B (20.0)**	**C (26.2)**	**C (25.7)**
8th Street & Linden Street	WB T/R	B (12.1)	A (9.2)	B (15.1)	C (23.4)	A (9.4)	B (15.7)	C (25.2)
	NB L/T	C (26.9)	C (33.8)	D (41.1)	D (44.3)	D (35.6)	D (41.9)	D (45.8)
	ILOS	**C (19.0)**	**C (20.6)**	**C (24.6)**	**C (30.2)**	**C (21.6)**	**C (25.2)**	**C (32.0)**
7th Street & Linden Street	WB L/T	C (24.1)	C (27.1)	D (41.7)	E (60.8)	C (27.9)	D (45.5)	E (69.4)
	SB T/R	B (19.2)	B (18.0)	B (19.2)	F (124.8)	B (18.3)	B (19.3)	E (74.3)
	ILOS	**C (21.7)**	**C (21.8)**	**C (30.3)**	**F (99.4)**	**C (22.3)**	**C (32.4)**	**E (72.2)**
6th Street & Linden Street	WB T/R	C (21.4)	C (27.1)	C (30.0)	C (32.8)	C (27.8)	C (31.8)	D (48.9)
	NB L/T	C (24.9)	C (20.2)	C (24.0)	D (43.3)	C (20.8)	C (24.4)	D (41.3)
	ILOS	**C (23.4)**	**C (23.3)**	**C (26.7)**	**D (39.4)**	**C (23.9)**	**C (27.9)**	**D (44.6)**
5th Street & Linden Street	WB L/T	B (18.2)	B (17.5)	B (18.5)	B (19.5)	B (17.8)	B (19.2)	C (22.3)
	SB T/R	B (14.9)	B (15.5)	B (16.1)	B (16.1)	B (15.7)	B (16.2)	B (16.2)
	ILOS	**B (17.2)**	**B (16.9)**	**B (17.8)**	**B (18.6)**	**B (17.2)**	**B (18.3)**	**C (20.9)**
4th Street & Linden Street	WB L/T/R	B (18.6)	B (19.2)	C (21.3)	C (21.3)	B (19.4)	C (22.0)	C (24.4)
	NB L	C (26.0)	A (5.3)	C (26.2)	C (28.1)	A (5.8)	C (27.1)	C (28.9)
	NB T	B (19.3)	A (2.9)	B (17.1)	B (17.1)	A (2.9)	B (17.3)	B (17.3)
	SB T	B (13.4)	B (12.7)	B (10.7)	B (10.9)	B (12.8)	B (10.9)	B (11.1)
	SB R	B (11.3)	B (10.7)	A (9.3)	B (10.3)	B (10.8)	A (9.2)	B (10.1)
	ILOS	**B (17.9)**	**B (12.0)**	**B (18.0)**	**B (17.6)**	**B (12.2)**	**B (18.6)**	**B (19.8)**
9th Street & Hamilton Street	EB T/R	B (17.3)	B (17.9)	B (16.9)	C (20.6)	B (18.1)	B (17.1)	C (20.9)
	SB L/T	C (22.1	C (22.1)	C (25.4)	C (28.0)	C (22.3)	C (25.8)	C (28.5)
	ILOS	**B (19.3)**	**B (19.7)**	**C (20.7)**	**C (23.5)**	**B (20.0)**	**C (21.0)**	**C (23.9)**
8th Street & Hamilton Street	EB L/T	C (26.4)	C (20.4)	B (20.0)	C (23.3)	C (20.8)	C (20.4)	C (23.8)
	NB T/R	B (19.6)	C (24.5)	C (27.6)	C (28.7)	C (25.1)	C (27.7)	C (28.9)
	ILOS	**C (22.5)**	**C (22.8)**	**C (24.3)**	**C (26.0)**	**C (23.2)**	**C (24.4)**	**C (26.3)**
7th Street & Hamilton Street	EB L/T	C (33.8)	B (13.7)	B (12.8)	B (14.1)	B (14.0)	B (13.0)	B (14.4)
	SB L	B (17.2)	C (20.6)	C (23.7)	C (24.8)	C (21.0)	C (24.1)	C (24.1)
	SB T	B (15.3)	C (20.9)	C (22.8)	C (22.8)	C (21.3)	C (23.2)	C (23.5)
	ILOS	**C (22.3)**	**B (18.3)**	**B (19.4)**	**B (19.6)**	**B (18.6)**	**B (19.7)**	**B (19.6)**
6th Street & Hamilton Street	EB L/T	D (36.3)	B (11.9)	B (13.2)	B (13.7)	B (12.1)	B (13.3)	B (13.0)
	WB R	C (26.9)	A (6.6)	C (30.3)	C (33.6)	A (6.9)	C (30.5)	C (33.5)
	NB T/R	C (27.2)	A (9.2)	A (9.3)	B (11.8)	A (9.3)	A (9.2)	B (12.1)
	ILOS	**C (31.4)**	**B (10.2)**	**B (13.5)**	**B (15.3)**	**B (10.3)**	**B (13.5)**	**B (15.1)**
5th Street & Hamilton Street	EB T/R	D (42.7)	B (13.5)	B (13.9)	B (14.2)	B (13.7)	B (14.3)	B (14.6)
	WB L/T	C (24.7)	B (18.5)	B (18.8)	C (20.3)	B (18.7)	B (19.0)	C (20.5)
	SB L/T/R	B (15.5)	B (12.9)	B (13.0)	B (13.0)	B (13.0)	B (13.0)	B (13.0)
	ILOS	**C (32.5)**	**B (14.2)**	**B (14.6)**	**B (15.4)**	**B (14.4)**	**B (14.8)**	**B (15.6)**
4th Street & Hamilton Street	EB L/T	B (13.7)	C (20.0)	A (4.2)	A (4.2)	C (20.7)	A (4.3)	A (4.3)
	EB R	B (10.3)	B (16.5)	A (3.0)	A (3.0)	B (16.6)	A (3.0)	A (3.0)
	WB L/T/R	C (21.7)	B (13.5)	B (13.9)	B (15.8)	B (13.7)	B (14.1)	B (16.1)
	NB T	A (6.6)	B (12.4)	A (6.3)	A (6.3)	B (12.5)	A (6.4)	A (6.4)
	NB R	A (8.1)	B (15.6)	A (8.4)	A (8.4)	B (16.0)	A (9.3)	A (9.3)
	SB L	A (3.5)	B (16.8)	D (36.0)	D (35.8)	B (19.9)	D (41.2)	D (40.7)
	SB T/R	A (2.3)	A (6.6)	B (19.6)	B (19.6)	A (6.7)	B (19.8)	B (19.8)
	ILOS	**A (9.7)**	**B (15.3)**	**B (13.6)**	**B (14.0)**	**B (16.0)**	**B (14.6)**	**B (14.9)**
6th Street & Turner Street	EB L/T	C (22.2)	C (23.8)	C (22.5)	C (22.4)	C (24.2)	C (22.9)	C (22.8)
	NB T/R	B (13.3)	B (11.8)	B (15.4)	B (15.4)	B (12.1)	B (15.9)	B (15.9)
	ILOS	**B (16.5)**	**B (16.2)**	**B (18.0)**	**B (18.0)**	**B (16.5)**	**B (18.5)**	**B (18.4)**
6th Street & Walnut Street	EB L	B (15.2)	B (16.3)	B (17.5)	C (20.1)	B (16.5)	B (17.6)	C (20.2)
	EB T	B (15.4)	B (16.6)	B (17.2)	B (17.2)	B (16.7)	B (17.6)	B (17.6)
	NB T/R	B (18.2)	B (17.3)	B (16.7)	B (18.0)	B (17.6)	B (17.0)	B (18.4)
	ILOS	**B (16.5)**	**B (16.8)**	**B (17.0)**	**B (18.3)**	**B (17.0)**	**B (17.3)**	**B (18.6)**
7th Street & Turner Street	EB T/R	B (15.6)	C (23.1)	C (23.4)	C (23.3)	C (23.4)	C (23.7)	C (23.6)
	SB L/T	B (19.2)	B (10.4)	B (19.6)	C (25.8)	B (10.5)	B (19.7)	C (24.3)
	ILOS	**B (18.0)**	**B (14.6)**	**B (20.7)**	**C (25.3)**	**B (14.8)**	**C (20.9)**	**C (24.0)**
7th Street & Walnut Street	EB T/R	B (15.4)	B (18.3)	B (19.3)	C (20.1)	B (18.4)	B (19.7)	C (20.5)
	SB L/T	B (17.2)	B (14.8)	B (14.2)	B (14.2)	B (15.0)	B (14.4)	B (14.4)
	ILOS	**B (16.5)**	**B (16.2)**	**B (16.4)**	**B (17.1)**	**B (16.4)**	**B (16.7)**	**B (17.4)**

TABLE III
LEVEL OF SERVICE/DELAY SUMMARY
SATURDAY MIDDAY PEAK HOUR

Intersection	Movement	Existing	2014			2019		
			Base	Projected (Non-Event)	Projected (Event)	Base	Projected (Non-Event)	Projected (Event)
9th Street & Linden Street	WB L/T	B (15.9)	A (8.9)	C (22.5)	C (22.8)	A (9.1)	C (23.1)	C (23.4)
	SB T/R	C (21.3)	B (19.7)	B (16.1)	B (18.8)	B (19.9)	B (16.2)	B (19.0)
	ILOS	**B (17.4)**	**B (11.9)**	**C (20.8)**	**C (21.2)**	**B (12.1)**	**C (21.2)**	**C (21.6)**
8th Street & Linden Street	WB T/R	B (12.7)	A (8.5)	B (13.0)	B (17.7)	A (8.7)	B (13.3)	B (18.4)
	NB L/T	C (23.9)	C (31.1)	C (29.6)	C (30.9)	C (32.2)	C (30.2)	C (31.4)
	ILOS	**B (17.9)**	**B (19.1)**	**B (19.7)**	**C (22.2)**	**B (19.7)**	**C (20.1)**	**C (22.9)**
7th Street & Linden Street	WB L/T	B (19.0)	C (23.8)	C (31.6)	D (38.3)	C (24.1)	C (32.6)	D (40.4)
	SB T/R	C (22.9)	B (18.3)	B (17.1)	F (90.2)	B (18.7)	B (17.2)	D (49.6)
	ILOS	**C (21.6)**	**C (20.1)**	**C (22.3)**	**E (74.8)**	**C (20.4)**	**C (22.8)**	**D (46.6)**
6th Street & Linden Street	WB T/R	B (19.0)	C (25.2)	C (26.1)	C (27.8)	C (25.5)	C (27.0)	C (33.9)
	NB L/T	C (21.8)	B (16.7)	B (19.5)	C (28.0)	B (17.0)	B (19.7)	C (27.2)
	ILOS	**C (20.7)**	**C (20.1)**	**C (22.2)**	**C (27.9)**	**C (20.4)**	**C (22.8)**	**C (29.9)**
5th Street & Linden Street	WB L/T	B (17.5)	B (16.8)	B (16.3)	B (17.2)	B (17.0)	B (16.7)	B (19.4)
	SB T/R	B (13.1)	B (13.6)	B (15.6)	B (15.6)	B (13.7)	B (15.6)	B (15.6)
	ILOS	**B (16.1)**	**B (15.8)**	**B (16.0)**	**B (16.7)**	**B (15.9)**	**B (16.4)**	**B (18.5)**
4th Street & Linden Street	WB L/T/R	B (17.8)	B (17.2)	B (18.0)	B (18.0)	B (17.4)	B (18.5)	C (20.4)
	NB L	C (21.3)	B (15.2)	C (22.1)	C (23.1)	B (15.4)	C (22.5)	C (23.4)
	NB T	B (18.0)	B (12.6)	B (18.1)	B (18.1)	B (12.6)	B (18.2)	B (18.2)
	SB T	B (12.2)	B (12.9)	B (12.4)	B (12.6)	B (13.0)	B (12.4)	B (12.7)
	SB R	B (11.1)	B (11.7)	B (11.4)	B (12.8)	B (11.7)	B (11.4)	B (12.4)
	ILOS	**B (16.6)**	**B (14.8)**	**B (16.7)**	**B (16.4)**	**B (14.9)**	**B (17.1)**	**B (18.0)**
9th Street & Hamilton Street	EB T/R	B (17.8)	B (17.8)	B (17.4)	C (21.0)	B (18.1)	B (17.6)	C (21.3)
	SB L/T	C (22.0)	B (16.7)	C (25.0)	C (27.4)	B (16.9)	C (25.3)	C (27.8)
	ILOS	**B (19.5)**	**B (17.4)**	**C (20.4)**	**C (23.3)**	**B (17.6)**	**C (20.7)**	**C (23.7)**
8th Street & Hamilton Street	EB L/T	B (17.6)	B (19.0)	B (19.7)	C (22.9)	B (19.3)	C (20.1)	C (23.3)
	NB T/R	B (17.4)	C (23.3)	C (23.8)	C (24.6)	C (23.7)	C (24.0)	C (24.7)
	ILOS	**B (17.5)**	**C (21.1)**	**C (21.7)**	**C (23.6)**	**C (21.5)**	**C (21.9)**	**C (23.9)**
7th Street & Hamilton Street	EB L/T	B (12.8)	B (11.9)	B (12.3)	B (13.6)	B (12.0)	B (12.5)	B (13.8)
	SB L	A (10.0)	C (20.4)	C (21.7)	C (22.5)	C (20.6)	C (21.8)	C (21.8)
	SB T	B (10.1)	C (21.3)	C (21.5)	C (21.5)	C (21.6)	C (21.8)	C (21.8)
	ILOS	**B (11.1)**	**B (17.6)**	**B (18.0)**	**B (18.1)**	**B (17.8)**	**B (18.2)**	**B (18.1)**
6th Street & Hamilton Street	EB L/T	D (37.2)	A (8.9)	B (12.4)	B (12.0)	A (8.9)	B (12.4)	B (10.9)
	WB R	B (17.8)	A (7.8)	C (30.7)	C (33.7)	A (7.9)	C (30.9)	C (33.8)
	NB T/R	C (29.7)	A (8.8)	A (8.0)	A (9.9)	A (9.0)	A (7.9)	A (9.9)
	ILOS	**C (32.2)**	**A (8.7)**	**B (13.2)**	**B (14.0)**	**A (8.8)**	**B (13.2)**	**B (13.6)**
5th Street & Hamilton Street	EB T/R	D (41.7)	B (12.5)	B (12.7)	B (12.9)	B (12.6)	B (12.8)	B (13.1)
	WB L/T	C (23.2)	B (11.7)	B (18.2)	B (19.6)	B (11.8)	B (18.4)	B (19.7)
	SB L/T/R	B (13.3)	B (12.3)	B (12.3)	B (12.3)	B (12.4)	B (12.4)	B (12.4)
	ILOS	**C (32.1)**	**B (12.3)**	**B (13.8)**	**B (14.7)**	**B (12.4)**	**B (13.9)**	**B (14.8)**
4th Street & Hamilton Street	EB L/T	B (13.7)	B (13.0)	A (3.7)	A (3.7)	B (13.1)	A (3.8)	A (3.8)
	EB R	B (11.1)	B (11.2)	A (2.9)	A (2.9)	B (11.2)	A (2.9)	A (2.9)
	WB L/T/R	C (20.8)	B (12.9)	B (12.9)	B (14.4)	B (13.0)	B (13.0)	B (14.6)
	NB T	A (5.9)	B (13.1)	B (11.8)	B (11.8)	B (12.8)	B (11.8)	B (11.8)
	NB R	A (6.2)	B (13.4)	B (12.4)	B (12.4)	B (13.5)	B (12.7)	B (12.7)
	SB L	A (7.1)	B (15.5)	B (14.5)	B (14.5)	B (15.8)	B (15.0)	B (15.0)
	SB T/R	A (5.7)	B (12.3)	B (11.4)	B (11.4)	B (12.3)	B (11.4)	B (11.4)
	ILOS	**B (11.5)**	**B (13.2)**	**A (9.4)**	**B (10.2)**	**B (13.4)**	**A (9.6)**	**B (10.4)**
6th Street & Turner Street	EB L/T	C (20.7)	B (19.5)	C (20.8)	C (20.8)	B (19.7)	C (21.0)	C (21.0)
	NB T/R	B (11.3)	B (12.7)	B (12.1)	B (12.1)	B (12.9)	B (2.3)	B (12.3)
	ILOS	**B (15.1)**	**B (15.5)**	**B (16.0)**	**B (16.0)**	**B (15.6)**	**B (16.1)**	**B (16.1)**
6th Street & Walnut Street	EB L	B (17.1)	B (16.0)	B (15.9)	B (18.1)	B (16.0)	B (16.0)	B (18.2)
	EB T	B (17.1)	B (15.9)	B (15.6)	B (15.4)	B (16.0)	B (15.6)	B (15.6)
	NB T/R	B (12.5)	B (14.5)	B (15.5)	B (16.5)	B (14.6)	B (15.7)	B (16.6)
	ILOS	**B (14.7)**	**B (15.2)**	**B (15.6)**	**B (16.7)**	**B (15.3)**	**B (15.7)**	**B (16.8)**
7th Street & Turner Street	EB T/R	C (21.6)	C (22.3)	C (22.4)	C (22.5)	C (22.5)	C (22.6)	C (22.6)
	SB L/T	B (10.5)	B (10.5)	C (20.0)	B (17.8)	B (10.7)	C (20.0)	C (24.8)
	ILOS	**B (13.6)**	**B (13.8)**	**C (20.6)**	**B (18.5)**	**B (14.0)**	**C (20.7)**	**C (24.4)**
7th Street & Walnut Street	EB T/R	B (15.1)	B (17.3)	B (18.2)	B (18.9)	B (17.4)	B (18.4)	B (19.1)
	SB L/T	B (15.8)	B (14.3)	B (13.6)	B (13.6)	B (14.5)	B (13.8)	B (13.8)
	ILOS	**B (15.6)**	**B (15.3)**	**B (15.3)**	**B (15.9)**	**B (15.4)**	**B (15.5)**	**B (16.1)**

INTRODUCTION

Traffic Planning and Design, Inc. (TPD) has completed the following Traffic Analysis for the proposed Arena and City Center Development in the City of Allentown, Lehigh County, Pennsylvania. The traffic analysis includes the following proposed developments:

1. At the intersection of 7th Street & Hamilton Street, a new mixed-use complex on the northwest corner will include the following land uses:
    - Multi-use arena;
    - 164,657 s.f. general office space;
    - 65,863 s.f. health/fitness club;
    - 180-room hotel;
    - 8,820 s.f. restaurant;
    - 13,060 s.f. restaurant;
    - Two parking decks with a total of 867 parking spaces.
2. At the intersection of 7th Street & Hamilton Street, a new office building ("Two City Center") on the northeast corner will include the following land uses:
    - 272,000 s.f. general office space;
    - 8,000 s.f. sit-down restaurant;
    - 20,000 s.f. retail space;
    - 56 below grade parking spaces.
3. At the intersection of Hamilton Street and Law Street, a new office building ("Three City Center") on the northeast corner will include the following land uses:
    - 175,000 s.f. office space;
    - 106 below grade parking spaces.
4. At the intersection of 7th Street & Linden Street, a new mixed-use complex ("Four City Center") on the southeast corner will include the following land uses:
    - 168 apartments;
    - 37,500 s.f. complementary first floor retail space;
    - 96 below grade parking spaces.

The proposed arena will accommodate minor league hockey games, concerts, and other events. The arena capacity for a hockey game will be 8,500 attendees, and the capacity for concerts and other events will be 10,500 attendees. It is anticipated that all development outlined above will be completed in 2014.

LAND USE CONTEXT

PennDOT's *Smart Transportation Guidebook* directs transportation engineers and public officials to consider the surrounding land use context when designing transportation improvements. The land use context refers to the surrounding land uses, building setbacks, architectural types, and other physical characteristics. The land use context within the study area is consistent with the description of the Urban Core designation in Chapter 4 of the guidebook:

***Urban Core**, "Downtown areas consisting of blocks of higher density, mixed use buildings. Buildings vary in height from 3 to 60+ stories…"* .

Design guidelines for an urban core area are provided in Chapter 6 of the *Smart Transportation Guidebook*. A map of the study area is shown in **Figure 1**.

EXISTING STREET NETWORK

A field review of the existing street network in the study area was conducted. The existing roadway characteristics within the study area are summarized in **Table 1**. The existing lane configuration and intersection controls for the study area intersections are shown in **Figure 2**. The Average Daily Traffic (ADT) volumes are based on data obtained from PennDOT's Internet Traffic Monitoring System (iTMS) in January 2014. Photographs of the study area intersections are included as **Appendix A.**

TABLE 1
STREET CHARACTERISTICS WITHIN STUDY AREA

Street	Ownership	PennDOT Functional Classification	Directional Orientation	Average Daily Traffic	Speed Limit
4th Street	City	Urban Collector	Bi-Directional	2,990	25 mph
5th Street	City	Urban Collector	Southbound	Not Available	Not Posted (35 mph)
6th Street	City	Urban Principal Arterial	Northbound	9,184	Not Posted (35 mph)
7th Street	State (S.R. 0145)	Urban Principal Arterial	Southbound	13,579	30 mph
8th Street	City	Urban Collector	Northbound	7,279	Not Posted (35 mph)
9th Street	City	Urban Collector	Southbound	6,986	Not Posted (35 mph)
Turner Street	City	Urban Collector	Eastbound	4,401	30 mph
Linden Street	City	Urban Principal Arterial	Westbound	8,512	25 mph
Hamilton Street	City	Urban Principal Arterial	Eastbound*	8,806	30 mph
Walnut Street	City	Urban Collector	Eastbound	5,670	Not Posted (35 mph)

*Hamilton Street accommodates bi-directional traffic east of 6th Street

For the signalized intersections within the study area, TPD requested the latest traffic signal diagrams from PennDOT. TPD also requested the latest traffic signal timing plans from the City of Allentown. The signal diagrams and latest timing plan for each intersection are included in **Appendix B**.

PEDESTRIAN ACCOMMODATIONS

Downtown Allentown has a wide range of business, residential, and recreational land uses in a compact, walkable area. The majority of available parking spaces are clustered in parking decks and municipal parking lots throughout the area. As a result, there is substantial pedestrian activity throughout the study area, especially along Hamilton Street. To accommodate the high level of pedestrian activity, sidewalks are provided on every block throughout the study area and crosswalks are provided at all study area intersections. Several traffic signals along Hamilton Street currently include pedestrian-only phases.

MASS TRANSIT SERVICE

Public transportation in Lehigh and Northampton Counties is provided by LANTA (Lehigh and Northampton Transportation Authority). LANTA operates a network of 23 fixed bus routes and 10 special routes throughout the Lehigh Valley. Based upon data published by LANTA, more than 380,000 people live within walking distance of a LANTA bus route. Twelve bus routes serve downtown Allentown, providing bus service to points throughout the region. The bus routes are summarized in **Table 2** below and a map of the routes is included as **Appendix C**.

The Allentown Transportation Center, built in 2007, is located at the intersection of 6th Street & Linden Street, within a two-block walk of the proposed development. All bus routes in the vicinity of the proposed development stop at the transportation center. Additionally, there are several bus stops along Hamilton Street and other streets throughout the study area.

TABLE 2
LANTA BUS ROUTES SERVING DOWNTOWN ALLENTOWN

Route Number	Route Description
102	Lehigh Valley Hospital (Cedar Crest) to Bethlehem
103	Northampton to South Bethlehem
104	Emmaus to Lehigh Valley Mall
107	Crest Plaza to Downtown Bethlehem
209	Allentown Transportation Center to Crest Plaza
210	South Mall to Lehigh Valley Mall
211	Allentown Transportation Center to Presidential Village
213	Allentown Transportation Center to Fogelsville
218	Allentown Transportation Center to LCCC/Walnutport
220	Allentown Transportation Center to Easton
322	Allentown Transportation Center to Trexlertown
323	Allentown Transportation Center to Penn State Lehigh Valley

EXISTING TRAFFIC CONDITIONS

Manual traffic counts were conducted on 15-minute intervals during the weekday morning (7:00 to 9:00 AM), weekday evening (4:00 to 6:00 PM) and Saturday midday (11:00 AM to 1:00 PM) peak periods. The peak hour of each traffic count consists of the four consecutive 15-minute intervals where the highest traffic volumes occur. Data pertaining to heavy vehicles, pedestrians and transit

vehicles were also observed during the manual counts. Peak hours and count dates for the study area intersections are identified in **Table 3**.

TABLE 3
MANUAL TRAFFIC COUNT INFORMATION

Intersection	Date of Traffic Counts	Time Period	Intersection Peak Hour
7th Street & Turner Street	Wednesday, April 27, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:15 to 5:15 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
6th Street & Turner Street	Wednesday, April 27, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:15 to 5:15 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
9th Street & Linden Street	Wednesday, April 27, 2011	Weekday AM	7:15 to 8:15 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
8th Street & Linden Street	Wednesday, April 27, 2011	Weekday AM	7:15 to 8:15 AM
		Weekday PM	4:15 to 5:15 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
7th Street & Linden Street	Wednesday, April 27, 2011	Weekday AM	7:15 to 8:15 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
6th Street & Linden Street	Wednesday, April 27, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
5th Street & Linden Street	Wednesday, April 27, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
4th Street & Linden Street	Wednesday, April 27, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	12:45 AM to 1:45 PM
9th Street & Hamilton Street	Thursday, April 28, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	11:30 AM to 12:30 PM
8th Street & Hamilton Street	Thursday, April 28, 2011	Weekday AM	7:45 to 8:45 AM
		Weekday PM	4:15 to 5:15 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
7th Street & Hamilton Street	Thursday, April 28, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
6th Street & Hamilton Street	Thursday, April 28, 2011	Weekday AM	7:45 to 8:45 AM
		Weekday PM	4:15 to 5:15 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
5th Street & Hamilton Street	Thursday, April 28, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	11:00 AM to 12:00 PM
4th Street & Hamilton Street	Thursday, April 28, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	11:45 AM to 12:45 PM
7th Street & Walnut Street	Thursday, April 28, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:30 to 5:30 PM
	Saturday, April 30, 2011	Saturday Midday	12:00 AM to 1:00 PM
6th Street & Walnut Street	Thursday, April 28, 2011	Weekday AM	7:30 to 8:30 AM
		Weekday PM	4:00 to 5:00 PM
	Saturday, April 30, 2011	Saturday Midday	11:45 AM to 12:45 PM

New traffic counts were conducted in October 2013 for many of the study area intersections. When compared to the 2011 traffic counts, the 2013 traffic counts were generally lower. A detailed summary is provided in **Table 4** below. Based on a review of traffic patterns, it is TPD's opinion that the reduction in traffic is related to long-term lane closures on Hamilton Street, Linden Street, and 7th Street. Therefore, the 2011 traffic data is more representative of post-construction traffic volumes in the study area. The 2011 data was utilized throughout the traffic analysis.

TABLE 4
MANUAL TRAFFIC COUNT COMPARISON

Intersection	Time Period	2011 Volumes	2013 Volumes	Percent Change
6th Street & Turner Street	Weekday AM	809	980	21%
	Weekday AM	1217	1178	-3%
	Saturday Midday	788	753	-4%
9th Street & Linden Street	Weekday AM	1097	1312	20%
	Weekday AM	1213	1080	-11%
	Saturday Midday	1008	900	-11%
8th Street & Linden Street	Weekday AM	1264	1157	-8%
	Weekday AM	1633	1445	-12%
	Saturday Midday	1342	1194	-11%
6th Street & Linden Street	Weekday AM	1022	1018	0%
	Weekday AM	1375	1187	-14%
	Saturday Midday	936	848	-9%
5th Street & Linden Street	Weekday AM	742	844	14%
	Weekday AM	796	832	5%
	Saturday Midday	501	550	10%
4th Street & Linden Street	Weekday AM	1112	1061	-5%
	Weekday AM	985	1042	6%
	Saturday Midday	659	710	8%
9th Street & Hamilton Street	Weekday AM	734	708	-4%
	Weekday AM	840	766	-9%
	Saturday Midday	904	619	-32%
8th Street & Hamilton Street	Weekday AM	911	865	-5%
	Weekday AM	1202	861	-28%
	Saturday Midday	993	802	-19%
6th Street & Hamilton Street	Weekday AM	909	795	-13%
	Weekday AM	1316	1064	-19%
	Saturday Midday	1048	798	-24%
5th Street & Hamilton Street	Weekday AM	618	618	0%
	Weekday AM	912	815	-11%
	Saturday Midday	664	545	-18%
4th Street & Hamilton Street	Weekday AM	1181	1452	23%
	Weekday AM	1676	1760	5%
	Saturday Midday	966	949	-2%
6th Street & Walnut Street	Weekday AM	868	854	-2%
	Weekday AM	1033	1044	1%
	Saturday Midday	630	493	-22%

Existing Condition traffic volumes for the weekday AM, weekday PM and Saturday peak hours are illustrated in **Figure 3** through **Figure 5**. Manual traffic count data sheets are provided in **Appendix D**.

BASE (NO-BUILD) CONDITIONS

A background growth factor for traffic in the study area was developed based on growth factors for September 2012 to July 2013 obtained from the PennDOT Bureau of Planning and Research (BPR). The growth rate accounts for potential increases in study area traffic due to development in the surrounding area. The PennDOT BPR suggests using a background growth trend factor of 1.13% per year in Lehigh County for urban non-interstate roadways. The background growth factor was applied annually to yield overall growth rates of 1.013 for the 2014 opening year and 1.070 (1.13% per year, compounded over six years) for the 2019 design year.

The additional traffic volumes due to background growth were added to the existing traffic data to produce 2014 Base Condition (no-build) and 2019 Base Condition (no-build) traffic volumes. 2014 Base Condition traffic volumes for the weekday AM, weekday PM and Saturday peak hours are shown in **Figure 6** through **Figure 8**. 2019 Base Condition traffic volumes for the weekday AM, weekday PM and Saturday peak hours are shown in **Figure 9** through **Figure 11**.

SCHEDULED ROADWAY IMPROVEMENTS

To identify roadway improvements that may affect traffic patterns in the vicinity of the proposed development, TPD reviewed the *Lehigh Valley Surface Transportation Plan 2011-2030,* prepared by the Lehigh Valley Planning Commission in October 2010. TPD also reviewed the 2013-2016 Transportation Improvement Program and coordinated with the Public Works Department for the City of Allentown. The following projects were noted:

American Parkway Extension – The proposed four lane extension of American Parkway from Front Street to the existing roadway on the east side of the Lehigh River will provide an additional Lehigh River crossing and should reduce congestion along the highest volume section of Route 22. The project is expected to be completed in 2015.

Route 22/MacArthur Road Interchange Improvements – The interchange is currently undergoing reconstruction. The interchange is being reconfigured to eliminate the merging movements on the Route 22 on/off ramps by constructing a partial diamond interchange. The project also includes new traffic signals at the interchange ramps and construction of a wider and taller PA 145/MacArthur Road Bridge over Route 22. The majority of work on the project is expected to be completed by the spring of 2014.

Hamilton Street Signal Modifications – It is TPD's understanding that the City of Allentown plans to upgrade the signal equipment at the intersection of Hamilton Street & 7th Street. In conjunction with the signal equipment upgrade, the city will be eliminating the pedestrian only signal phase at the following intersections: 8th Street & Hamilton Street, 7th Street & Hamilton Street, 6th Street & Hamilton Street, and 5th Street & Hamilton Street. At each intersection, the pedestrian only phase will be replaced with concurrent pedestrian phases.

TRIP GENERATION

The trip generation calculations for the traffic analysis are based upon data published by the Institute of Transportation Engineers (ITE) and the Urban Land Institute (ULI).

ITE Trip Generation Manual

The ITE *Trip Generation Manual*, Ninth Edition, 2012, is the primary source utilized by traffic engineers to determine the trip generation characteristics of a given land use. The statistics in *Trip Generation* are empirical data based on more than 4,800 trip generation studies. The data are categorized by Land Use Codes, with total vehicular trips for a given land use estimated using an independent variable and statistically generated rates or equations. For each land use, TPD calculated the number of vehicular trips the development will generate during the following time periods: (1) weekday A.M. peak hour; (2) weekday P.M. peak hour; and (3) Saturday midday peak hour. **Table 5** shows the rates/equations and directional percentages for the analyzed time periods.

TABLE 5
ITE TRIP GENERATION DATA

Land Use	ITE #	Time Period	Equations/Rates	Independent Variable	Entering %	Pass-By %
Apartments	220	Weekday A.M. Peak Hour	T = 0.49*(X) + 3.73	dwelling units	20%	--
		Weekday P.M. Peak Hour	T = 0.55*(X) + 17.65	dwelling units	65%	--
		Saturday Midday Peak Hour	T = 0.41*(X) + 19.23	dwelling units	50%	--
Hotel	310	Weekday A.M. Peak Hour	T = 0.53*(X)	rooms	59%	--
		Weekday P.M. Peak Hour	T = 0.60*(X)	rooms	53%	--
		Saturday Midday Peak Hour	T = 0.72*(X)	rooms	56%	--
Health/Fitness Club	492	Weekday A.M. Peak Hour	T = 1.41*(X)	ksf	50%	--
		Weekday P.M. Peak Hour	T = 3.53*(X)	ksf	57%	--
		Saturday Midday Peak Hour	T = 2.78*(X)	ksf	45%	--
General Office Building	710	Weekday A.M. Peak Hour	Ln(T) = 0.80*Ln(X) + 1.57	ksf	88%	--
		Weekday P.M. Peak Hour	T = 1.12*(X) + 78.45	ksf	17%	--
		Saturday Midday Peak Hour	T = 0.43*(X)	ksf	54%	--
Shopping Center	820	Weekday A.M. Peak Hour	T = 0.96*(X)	ksf	62%	24%
		Weekday P.M. Peak Hour	T = 3.71*(X)	ksf	48%	34%
		Saturday Midday Peak Hour	T = 4.82*(X)	ksf	52%	26%
Quality Restaurant	931	Weekday A.M. Peak Hour	T = 0.81*(X)	ksf	50%	0%
		Weekday P.M. Peak Hour	T = 7.49*(X)	ksf	67%	44%
		Saturday Midday Peak Hour	T = 10.82*(X)	ksf	59%	34%
High-Turnover (Sit-Down) Restaurant	932	Weekday A.M. Peak Hour	T = 10.81*(X)	ksf	55%	33%
		Weekday P.M. Peak Hour	T = 9.85*(X)	ksf	60%	43%
		Saturday Midday Peak Hour	T = 14.07*(X)	ksf	53%	33%

T = number of site-generated vehicular trips
X = independent variable

Characteristics of Retail Uses

The proposed retail uses consist of complementary street-level retail on the first floor of the proposed office and apartment buildings. The proposed retail uses are intended to serve people who are already walking through the neighborhood or working downtown, similar to the existing retail uses along Hamilton Street. TPD evaluated the trip generation characteristics of these uses based on the average rates and regression equations contained in the *Trip Generation* manual for Land Use Code 820. It is TPD's opinion that the regression equation substantially overestimates the trip generation of the proposed retail. TPD believes that the average rates represent a conservative trip generation estimate, and therefore these results were utilized for the capacity analysis.

Arena Trip Generation

The published data in the *Trip Generation* manual for arenas (ITE Land Use Code 460) is based upon a single site surveyed in California in 1970. The data is limited to the number of trips generated over the course of an average weekday. No peak hour trip generation data is included in the manual. Because the data is based upon a single study completed more than four decades ago, TPD determined this information was not a reliable indicator of the traffic that will be generated by the proposed arena.

Therefore, TPD researched applicable data for arenas, stadiums, and concerts. **Table 6** below summarizes the occupancy rates (persons per car) for vehicles arriving at arenas or similar facilities:

TABLE 6
VEHICLE OCCUPANCY DATA

Data Source	Vehicle Occupancy Rate
1994 ITE Report on Stadia and Arenas	3.0 to 3.5
ULI Shared Parking Manual (p. 62) - Arena (Concerts)	2.0
ULI Shared Parking Manual (p. 63) - Arena Public Parking	3.0
ULI Shared Parking Manual (p. 69) – Stadium (Football Game)	3.3
ITE Discussion Group – 2003 San Antonio Amphitheatre Study (9,000 attendees)	2.60 -2.75
Average	**2.88**

The proposed arena will be designed to seat 8,500 attendees for hockey games, and up to 10,500 attendees for concerts and other events. In order to provide a conservative analysis, TPD evaluated the trip generation for a sold-out event with 10,500 attendees, and estimated that the vehicle occupancy rate will be 2.75 persons per car. This would result in a total of 3,818 vehicles.

In 2002, The Traffic Group conducted a post-development study for a 6,000 seat minor league baseball stadium in Aberdeen, Maryland. The results of this study indicated that 61% of attendees arrived at the stadium during the hour prior to the event beginning. Additionally, a study published by the Transportation Research Board in 2001 found that for large special events approximately 60% of attendees will arrive within one hour of the start of the event.

Based upon these studies, it was assumed that 61% of the 3,818 vehicles generated by a sold-out event would arrive in the hour prior to the start of the event. This results in a total of 2,329 peak hour trips. This is equivalent to a peak hour trip generation rate of 0.222 trips per attendee. This rate was applied for the weekday PM peak hour and Saturday midday peak hour.

Comparison to Minor League Baseball Stadiums

In order to verify these results, TPD reviewed trip generation data for two minor league stadiums. The above-referenced study in Aberdeen, MD concluded that a typical sold-out minor league baseball game (6,000 attendees) generated a total of 1,607 additional trips when compared to a non-game day. As noted above, 61% of traffic (980 trips) arrived in the hour prior to the event. This results in a peak hour trip generation rate of 0.164 trips per attendee.

As a final comparison, TPD conducted trip generation counts at Coca-Cola Park in Allentown, Pennsylvania. Coca-Cola Park was constructed in 2008 and is home to the Lehigh Valley Iron Pigs, AAA-affiliate of the Philadelphia Phillies. The capacity of the stadium is 10,000 fans. The counts were conducted from 5:00-7:30 PM on Friday, May 13, 2011. The first pitch of the game was at 7:05, and the attendance for the game was 9,660. A total of 2,709 trips were generated by the stadium between 5:00-7:30. 1,651 trips (61% of traffic) arrived from 6:00-7:00, which is consistent with the studies outlined above. This results in a peak hour trip generation rate of 0.170 trips per attendee. A summary of data collected at Coca-Cola Park is included in **Appendix E**.

Table 7 below compares the trip generation calculations conducted by TPD to the trip generation rates observed at the minor league baseball stadiums. Based upon this data, TPD is confident that the trip generation calculations for the proposed arena represent a conservative estimate.

TABLE 7
TRIP GENERATION RATE COMPARISON

Data Source	Trip Generation Rate
Ripken Stadium (Aberdeen, MD)	T = 0.164*(X)
Coca-Cola Park (Allentown, PA)	T = 0.170*(X)
Vehicle Occupancy Data (Utilized for this Analysis)	T = 0.222*(X)

T = number of site-generated vehicular trips
X = independent variable (attendees)

Non-Event Peak Hours

Given that there are typically no events associated with the arena during the weekday AM peak hour, TPD utilized data published in the ITE *Trip Generation* manual for an office, as shown in **Table 8**. The office use accounts for arena employees and office staff. It is anticipated that the arena will have approximately 100 daytime employees. TPD also utilized data for this land use to evaluate weekday P.M. and Saturday midday peak hours on non-event days.

TABLE 8
ITE TRIP GENERATION DATA

Land Use	ITE #	Time Period	Equations/Rates	Entering %
General Office	710	Weekday A.M. Peak Hour	Ln(T) = 0.86*Ln(X) + 0.24	88%
		Weekday P.M. Peak Hour	T = 0.37*(X) + 60.08	17%
		Saturday Midday Peak Hour	T = 0.09*(X)	54%

T = number of site-generated vehicular trips
X = independent variable (employees)

Transit/Pedestrian/Bicycle Trips

The trip generation rates published in the ITE *Trip Generation* manual are based upon data collected at isolated suburban locations that are predominantly dependent on automobiles. For developments that accommodate alternative modes of transportation (i.e. rail, bus, bicycle and pedestrians), it is expected that a percentage of site-generated traffic will be non-automobile trips. As noted above, the proposed development will be located in an urban core area with high-quality pedestrian accommodations and access to mass transit provided by LANTA. Therefore, a 10 percent reduction factor was applied to the trip generation calculations.

The total trip generation of the proposed development is summarized in **Tables 9 through 12**.

TABLE 9A
TRIP GENERATION SUMMARY - ARENA COMPLEX
EVENT DAYS

Land Use	Total Trips	Non-Auto Trips	Total Auto Trips			Pass-By Trips			New Trips		
			Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Weekday A.M. Peak Hour											
Arena (100 employees)	67	-7	60	53	7	0	0	0	60	53	7
8,820 s.f. Casual Restaurant	--	--	--	--	--	--	--	--	--	--	--
13,060 s.f. Casual Restaurant	--	--	--	--	--	--	--	--	--	--	--
164,657 s.f. General Office	285	-29	256	225	31	0	0	0	256	225	31
65,863 s.f. Fitness Center	93	-9	84	42	42	0	0	0	84	42	42
180-Room Hotel	95	-10	85	50	35	0	0	0	85	50	35
Total	***540***	***-55***	***485***	***370***	***115***	***0***	***0***	***0***	***485***	***370***	***115***
Weekday P.M. Peak Hour											
10,500 seat Arena	2329	-233	2096	2096	0	0	0	0	2096	2096	0
8,820 s.f. Casual Restaurant	87	-9	78	47	31	32	16	16	46	31	15
13,060 s.f. Casual Restaurant	129	-13	116	70	46	48	24	24	68	46	22
164,657 s.f. General Office	263	-26	237	40	197	0	0	0	237	40	197
65,863 s.f. Fitness Center	232	-23	209	119	90	0	0	0	209	119	90
180-Room Hotel	108	-11	97	49	48	0	0	0	97	49	48
Total	***3148***	***-315***	***2833***	***2421***	***412***	***80***	***40***	***40***	***2753***	***2381***	***372***
Saturday Midday Peak Hour											
10,500 seat Arena	2329	-233	2096	2096	0	0	0	0	2096	2096	0
8,820 s.f. Casual Restaurant	124	-12	112	59	53	36	18	18	76	41	35
13,060 s.f. Casual Restaurant	184	-18	166	88	78	54	27	27	112	61	51
164,657 s.f. General Office	71	-7	64	35	29	0	0	0	64	35	29
65,863 s.f. Fitness Center	183	-18	165	74	91	0	0	0	165	74	91
180-Room Hotel	130	-13	117	66	51	0	0	0	117	66	51
Total	***3021***	***-301***	***2720***	***2418***	***302***	***90***	***45***	***45***	***2630***	***2373***	***257***

TABLE 9B
TRIP GENERATION SUMMARY - ARENA COMPLEX
NON-EVENT DAYS

Land Use	Total Trips	Non-Auto Trips	Total Auto Trips			Pass-By Trips			New Trips		
			Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Weekday A.M. Peak Hour											
Arena (100 employees)	67	-7	60	53	7	0	0	0	60	53	7
8,820 s.f. Casual Restaurant	--	--	--	--	--	--	--	--	--	--	--
13,060 s.f. Casual Restaurant	--	--	--	--	--	--	--	--	--	--	--
164,657 s.f. General Office	285	-29	256	225	31	0	0	0	256	225	31
65,863 s.f. Fitness Center	93	-9	84	42	42	0	0	0	84	42	42
180-Room Hotel	95	-10	85	50	35	0	0	0	85	50	35
Total	***540***	***-55***	***485***	***370***	***115***	***0***	***0***	***0***	***485***	***370***	***115***
Weekday P.M. Peak Hour											
Arena (100 employees)	97	-10	87	15	72	0	0	0	87	15	72
8,820 s.f. Casual Restaurant	87	-9	78	47	31	32	16	16	46	31	15
13,060 s.f. Casual Restaurant	129	-13	116	70	46	48	24	24	68	46	22
164,657 s.f. General Office	263	-29	256	225	31	0	0	0	256	225	31
65,863 s.f. Fitness Center	232	-9	84	42	42	0	0	0	84	42	42
180-Room Hotel	108	-10	85	50	35	0	0	0	85	50	35
Total	***916***	***-92***	***824***	***340***	***484***	***80***	***40***	***40***	***744***	***300***	***444***
Saturday Midday Peak Hour											
Arena (100 employees)	9	-1	8	4	4	0	0	0	8	4	4
8,820 s.f. Casual Restaurant	124	-12	112	59	53	36	18	18	76	41	35
13,060 s.f. Casual Restaurant	184	-18	166	88	78	54	27	27	112	61	51
164,657 s.f. General Office	71	-7	64	35	29	0	0	0	64	35	29
65,863 s.f. Fitness Center	183	-18	165	74	91	0	0	0	165	74	91
180-Room Hotel	130	-13	117	66	51	0	0	0	117	66	51
Total	***701***	***-69***	***632***	***326***	***306***	***90***	***45***	***45***	***542***	***281***	***261***

TABLE 10
TRIP GENERATION SUMMARY - TWO CITY CENTER

Land Use	Total Trips	Non-Auto Trips	Total Auto Trips			Pass-By Trips			New Trips		
			Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Weekday A.M. Peak Hour											
8,000 s.f. Quality Restaurant	6	1	5	3	2	0	0	0	5	3	2
20,000 s.f. Retail	19	2	17	11	6	4	2	2	13	9	4
272,000 s.f. General Office	426	43	383	337	46	0	0	0	383	337	46
Total	***451***	***46***	***405***	***351***	***54***	***4***	***2***	***2***	***401***	***349***	***52***
Weekday P.M. Peak Hour											
8,000 s.f. Quality Restaurant	60	6	54	36	18	22	11	11	32	25	7
20,000 s.f. Retail	74	7	67	32	35	22	11	11	45	21	24
272,000 s.f. General Office	383	38	345	59	286	0	0	0	345	59	286
Total	***517***	***51***	***466***	***127***	***339***	***44***	***22***	***22***	***422***	***105***	***317***
Saturday Midday Peak Hour											
8,000 s.f. Quality Restaurant	87	9	78	46	32	26	13	13	52	33	19
20,000 s.f. Retail	96	10	86	45	41	22	11	11	64	34	30
272,000 s.f. General Office	117	12	105	57	48	0	0	0	105	57	48
Total	***300***	***31***	***269***	***148***	***121***	***48***	***24***	***24***	***221***	***124***	***97***

TABLE 11
TRIP GENERATION SUMMARY - THREE CITY CENTER

Land Use	Total Trips	Non-Auto Trips	Total Auto Trips			Pass-By Trips			New Trips		
			Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Weekday A.M. Peak Hour											
175,000 s.f. General Office	299	30	269	237	32	0	0	0	269	237	32
Total	***299***	***30***	***269***	***237***	***32***	***0***	***0***	***0***	***269***	***237***	***32***
Weekday P.M. Peak Hour											
175,000 s.f. General Office	274	27	247	42	205	0	0	0	247	42	205
Total	***274***	***27***	***247***	***42***	***205***	***0***	***0***	***0***	***247***	***42***	***205***
Saturday Midday Peak Hour											
175,000 s.f. General Office	75	8	67	36	31	0	0	0	67	36	31
Total	***75***	***8***	***67***	***36***	***31***	***0***	***0***	***0***	***67***	***36***	***31***

TABLE 12
TRIP GENERATION SUMMARY - FOUR CITY CENTER

Land Use	Total Trips	Non-Auto Trips	Total Auto Trips			Pass-By Trips			New Trips		
			Total	Enter	Exit	Total	Enter	Exit	Total	Enter	Exit
Weekday A.M. Peak Hour											
168 Apartments	86	9	77	15	62	0	0	0	77	15	62
37,500 s.f. Retail	36	4	32	20	12	6	3	3	26	17	9
Total	***122***	***13***	***109***	***35***	***74***	***6***	***3***	***3***	***103***	***32***	***71***
Weekday P.M. Peak Hour											
168 Apartments	110	11	99	64	35	0	0	0	99	64	35
37,500 s.f. Retail	139	14	125	60	65	42	21	21	83	39	44
Total	***249***	***25***	***224***	***124***	***100***	***42***	***21***	***21***	***182***	***103***	***79***
Saturday Midday Peak Hour											
168 Apartments	88	9	79	40	39	0	0	0	79	40	39
37,500 s.f. Retail	181	18	163	85	78	42	21	21	121	64	57
Total	***269***	***27***	***242***	***125***	***117***	***42***	***21***	***21***	***200***	***104***	***96***

TRIP DISTRIBUTION

The distribution and assignment of new trips generated by the proposed development was based upon a gravity model analysis utilizing 2010 U.S. Census population data. TPD assumed that the majority of traffic would originate within a 45 minute drive of Allentown. Therefore, data for the following counties was included in the analysis: Lehigh, Northampton, Carbon, Monroe, Schuylkill, Berks, Montgomery, Bucks, Warren (NJ), and Hunterdon (NJ). Although Philadelphia is located outside of the 45-minute driving radius, TPD assumed a small number of trips would originate in Philadelphia due to the Lehigh Valley Phantoms association with the Philadelphia Flyers. For each county, the estimated population within a 45-minute drive of Allentown was multiplied by the inverse of the travel distance to determine the weighted population for use in the analysis. After determining the total traffic originating from each county, TPD assigned the traffic to nine primary routes to enter/exit downtown Allentown.

For traffic originating from Lehigh and Northampton Counties, TPD identified the primary travel routes from each local municipality and assigned traffic to each route based on the population of each municipality. The resulting trip distribution percentages for the proposed development are summarized in **Table 13** below. All gravity model calculations are included in **Appendix F**.

The American Parkway Bridge is expected to be completed in 2015. The completion of the bridge will impact the trip distribution percentages, as a portion of traffic from the east will utilize the newly completed bridge as an alternate route. Therefore, TPD determined the trip assignment for each development without the American Parkway Bridge (2014 Projected Conditions) and with the American Parkway Bridge (2019 Projected Conditions).

TABLE 13
TRIP DISTRIBUTION PERCENTAGES

Direction To/From	Route	Without American Parkway Bridge	With American Parkway Bridge
East	Route 22	29%	20%
	American Parkway	0%	10%
	Tilghman Street	6%	6%
	Hamilton Street	6%	6%
West	Route 22	15%	15%
	Tilghman Street	5%	5%
	Hamilton Street	13%	13%
North	Route 145	9%	9%
South	6th Street/7th Street/8th Street	12%	12%
	15th Street	5%	5%
TOTAL		**100%**	**100%**

The trip assignment for each development is illustrated on schematic figures, as summarized in **Table 14**.

TABLE 14
TRIP DISTRIBUTION FIGURES

Land Use	Time Period	Without American Parkway Bridge	With American Parkway Bridge
Arena Complex	AM Peak Hour	Figure 12	Figure 26
	PM Peak Hour – Non-Event Days	Figure 13	Figure 27
	PM Peak Hour – Event Days	Figure 14	Figure 28
	Saturday Peak Hour – Non-Event Days	Figure 15	Figure 29
	Saturday Peak Hour –Event Days	Figure 16	Figure 30
Two City Center	AM Peak Hour	Figure 17	Figure 31
	PM Peak Hour	Figure 18	Figure 32
	Saturday Peak Hour	Figure 19	Figure 33
Three City Center	AM Peak Hour	Figure 20	Figure 34
	PM Peak Hour	Figure 21	Figure 35
	Saturday Peak Hour	Figure 22	Figure 36
Four City Center	AM Peak Hour	Figure 23	Figure 37
	PM Peak Hour	Figure 24	Figure 38
	Saturday Peak Hour	Figure 25	Figure 39

For event attendees and other infrequent visitors downtown, directional signage can significantly impact route choice. Well-planned directional signage is critical to avoid unnecessary motorist confusion and unnecessary congestion that may result.

PROJECTED CONDITION TRAFFIC VOLUMES

The traffic generated by the proposed development was added to the Base Condition (no-build) volumes to develop Projected Condition (build) traffic volumes for the opening year (2014) and design year (2019). It is anticipated that traffic conditions in the study area will vary depending on whether there is a large event happening at the proposed arena. Therefore, TPD analyzed two scenarios for the weekday PM and Saturday midday peak hours: the peak hour on non-event days and the peak hour on event-days. It is anticipated that on average, there will be approximately 10 large events (10,500 capacity) per year. The analysis for event days was based upon this largest possible event attendance (10,500 attendees). It is important to note that these events will occur infrequently, therefore the analysis represents a worst-case scenario and does not represent typical traffic volumes.

The projected condition traffic volumes are shown on the following schematic figures:

- 2014 Projected Conditions (AM Peak Hour) – **Figure 40;**
- 2014 Projected Conditions (PM Peak Hour – Non-Event Days) – **Figure 41;**
- 2014 Projected Conditions (PM Peak Hour – Event Days) – **Figure 42;**
- 2014 Projected Conditions (Saturday Peak Hour – Non-Event Days) – **Figure 43;**
- 2014 Projected Conditions (Saturday Peak Hour – Event Days) – **Figure 44;**
- 2019 Projected Conditions (AM Peak Hour) – **Figure 45;**
- 2019 Projected Conditions (PM Peak Hour – Non-Event Days) – **Figure 46;**

- 2019 Projected Conditions (PM Peak Hour – Event Days) – **Figure 47;**
- 2019 Projected Conditions (Saturday Peak Hour – Non-Event Days) – **Figure 48;**
- 2019 Projected Conditions (Saturday Peak Hour – Event Days) – **Figure 49.**

The analysis for the PM Peak Hour on event days represents a highly conservative approach. This scenario assumes that the peak hour of traffic associated with the exiting office traffic will coincide with the peak hour of event traffic associated with the arena. In reality, the existing peak hour of traffic at most study area intersections is 4:00-5:00 PM. It is assumed that the peak hour of traffic for the proposed office uses will also be from 4:00-5:00 PM. For purposes of this analysis, the arena traffic was also superimposed on with these volumes to develop the PM Event Day traffic projections. Based on the studies previously discussed in the Trip Generation section of this report, the peak hour of traffic for a typical arena event will occur the hour prior to the event (typically 6:00-7:00 PM or later). By assuming that the peak hour of traffic for a large arena event will occur simultaneously with the street peak hour and peak hour of exiting office traffic, the resulting levels of service represent a very conservative, worst-case scenario.

Because the assumptions for the PM peak hour analysis were highly conservative, TPD also performed a supplemental analysis to examine a more realistic portrayal of traffic patterns associated with a sold-out hockey game. This analysis was focused on the intersection of Linden Street & 7th Street, which was identified as a critical intersection. Because the peak hour of event traffic is 6:00-7:00 PM, TPD conducted a supplemental traffic count for the intersection during this time period. This analysis resulted in an overall level of service C at the intersection of 7th Street & Linden Street. Therefore, it is our opinion that the conservative primary analysis overstates the potential for traffic congestion during peak periods of event traffic.

CAPACITY ANALYSIS METHODOLOGY

Capacity analyses were conducted for the weekday AM, weekday PM, and Saturday midday peak hours at the study area intersections. These analyses were conducted according to the methodologies contained in the 2010 *Highway Capacity Manual* (HCM) using *Synchro 8* software, a Trafficware product. The following conditions were analyzed:

- Existing Conditions;
- 2014 Base Conditions (Build-out year without development);
- 2014 Projected Conditions (Build-out year with development);
- 2019 Base Conditions (Design year without development);
- 2019 Projected Conditions (Design year with development).

It should be noted that the 2010 HCM requires standard NEMA phasing. Therefore, for intersections with an existing pedestrian-only phase, TPD utilized the *Synchro 8* Percentile Delay Methodology. For the Existing Conditions, this included four intersections on Hamilton Street.

- Hamilton Street & 8th Street;
- Hamilton Street & 7th Street;
- Hamilton Street & 6th Street;
- Hamilton Street & 5th Street.

TPD also utilized the Percentile Delay Methodology for the intersection of Hamilton Street & 6th Street for Base Conditions and Projected Conditions analysis because the traffic signal phasing is not standard NEMA phasing.

Traffic signal timings within the study area were optimized for all future conditions (Base Conditions and Projected Conditions) scenarios in accordance with PennDOT policy. TPD also assumed that the City will proceed with plans to eliminate pedestrian only signal phases and replace them with concurrent pedestrian phases prior to the opening of the arena.

Capacity analysis worksheets are included in **Appendix G**.

LEVELS OF SERVICE IN THE STUDY AREA

For analysis of intersections, level of service is defined in terms of delay, which is a measure of driver discomfort and frustration, fuel consumption, and lost travel time. LOS criteria is stated in terms of control delay per vehicle for a one-hour analysis period. Control delay includes initial deceleration delay, queue move-up time, stopped delay, and final acceleration delay. The criteria are shown in **Table 15**. Delay, as it relates to level of service, is a complex measure and is dependent upon a number of variables. For signalized intersections, these variables include the quality of vehicle progression, the cycle length, the green time ratio, and the volume/capacity ratio for the lane group in question. For unsignalized intersections, delay is related to the availability of gaps in the flow of traffic on the major street and the driver's discretion in selecting an appropriate gap for a particular movement from the minor street (straight across, left or right turn).

TABLE 15
LEVEL OF SERVICE CRITERIA
UNSIGNALIZED AND SIGNALIZED INTERSECTIONS[1]

Level of Service	Control Delay Per Vehicle (Seconds)	
	Signalized	**Unsignalized**
A	≤ 10	≤ 10
B	> 10 and ≤ 20	> 10 and ≤ 15
C	> 20 and ≤ 35	> 15 and ≤ 25
D	> 35 and ≤ 55	> 25 and ≤ 35
E	> 55 and ≤ 80	> 35 and ≤ 50
F	> 80	> 50

[1] Obtained from Exhibits 18-4 and 19-1 of the Transportation Research Board's *Highway Capacity Manual 2010*

Level of service (LOS) is a qualitative measure representing the driver's perception of the operating conditions. It should be noted that the level of service does not account for differences in driver expectation based on context. For instance, a driver may be frustrated by an average delay of 60 seconds at a rural intersection, but accepting of a 60-second delay, and in general lower levels of service within urban areas.

Level of service (LOS) matrices for the study area intersections are shown in **Tables 16** through **18** for the weekday AM, weekday PM, and Saturday midday peak hours.

TABLE 16
LEVEL OF SERVICE/DELAY SUMMARY
WEEKDAY AM PEAK HOUR

Intersection	Movement	Existing	2014		2019	
			Base	Projected	Base	Projected
9th Street & Linden Street	WB L/T	B (16.2)	C (20.5)	C (20.3)	C (21.0)	C (20.8)
	SB T/R	C (20.9)	B (15.2)	B (17.9)	B (15.4)	B (18.1)
	ILOS	**B (18.0)**	**B (18.5)**	**B (19.5)**	**B (18.9)**	**B (19.9)**
8th Street & Linden Street	WB T/R	B (13.6)	B (11.9)	B (11.5)	B (12.2)	B (11.9)
	NB L/T	C (22.9)	C (25.2)	C (28.8)	C (25.7)	C (29.6)
	ILOS	**B (17.1)**	**B (16.9)**	**B (17.2)**	**B (17.3)**	**B (17.7)**
7th Street & Linden Street	WB L/T	C (23.9)	C (24.0)	C (33.1)	C (24.5)	C (32.4)
	SB T/R	C (21.7)	C (21.8)	C (23.2)	C (22.3)	C (25.0)
	ILOS	**C (22.4)**	**C (22.5)**	**C (26.3)**	**C (23.0)**	**C (27.4)**
6th Street & Linden Street	WB T/R	C (20.8)	C (20.7)	C (22.6)	C (21.0)	C (23.0)
	NB L/T	C (20.9)	C (21.6)	C (26.6)	C (21.9)	C (27.2)
	ILOS	**C (20.8)**	**C (21.1)**	**C (24.5)**	**C (21.4)**	**C (25.0)**
5th Street & Linden Street	WB L/T	B (19.6)	B (18.9)	B (19.5)	C (19.2)	C (19.8)
	SB T/R	B (13.1)	B (13.7)	B (16.1)	B (13.8)	B (16.3)
	ILOS	**B (17.3)**	**B (17.1)**	**B (18.0)**	**B (17.3)**	**B (18.3)**
4th Street & Linden Street	WB L/T/R	C (21.3)	B (12.1)	C (20.5)	C (20.2)	C (20.9)
	NB L	C (20.8)	A (8.1)	A (9.2)	A (8.6)	A (9.8)
	NB T	B (17.9)	A (6.3)	A (6.3)	A (6.5)	A (6.5)
	SB T	B (13.1)	B (14.6)	B (14.8)	B (14.8)	B (15.0)
	SB R	B (11.6)	B (12.9)	B (13.8)	B (12.9)	B (13.8)
	ILOS	**B (18.5)**	**B (10.8)**	**B (14.9)**	**B (14.5)**	**B (15.2)**
9th Street & Hamilton Street	EB T/R	B (17.4)	B (18.6)	B (19.8)	B (18.9)	C (20.0)
	SB L/T	C (21.0)	C (20.4)	C (21.0)	C (20.6)	C (21.2)
	ILOS	**B (18.7)**	**B (19.3)**	**C (20.2)**	**B (19.5)**	**C (20.4)**
8th Street & Hamilton Street	EB L/T	B (15.6)	C (20.9)	C (21.8)	C (21.2)	C (22.1)
	NB T/R	B (17.5)	C (20.6)	C (22.0)	C (20.9)	C (22.3)
	ILOS	**B (16.6)**	**C (20.8)**	**C (21.9)**	**C (21.0)**	**C (22.2)**
7th Street & Hamilton Street	EB L/T	A (9.7)	C (20.7)	B (15.0)	B (14.4)	B (15.2)
	SB L	A (8.7)	B (17.2)	B (19.0)	B (17.4)	B (19.2)
	SB T	B (12.4)	B (20.0)	C (20.2)	C (20.4)	C (20.6)
	ILOS	**B (11.0)**	**B (19.8)**	**B (18.2)**	**B (18.1)**	**B (18.5)**
6th Street & Hamilton Street	EB L/T	C (34.7)	B (14.0)	B (14.3)	B (11.6)	B (14.5)
	WB R	B (13.8)	A (7.5)	C (33.1)	A (7.5)	C (32.9)
	NB T/R	C (28.7)	A (5.9)	A (9.2)	A (6.0)	A (9.2)
	ILOS	**C (30.5)**	**B (10.0)**	**B (13.6)**	**A (8.9)**	**B (13.7)**
5th Street & Hamilton Street	EB T/R	D (42.6)	B (14.0)	B (13.6)	B (14.1)	B (13.8)
	WB L/T	B (19.9)	B (12.8)	B (18.5)	B (12.9)	B (18.7)
	SB L/T/R	B (15.6)	B (11.5)	B (12.1)	B (11.5)	B (12.2)
	ILOS	**C (31.3)**	**B (13.1)**	**B (14.0)**	**B (13.2)**	**B (14.1)**
4th Street & Hamilton Street	EB L/T	B (13.2)	B (18.7)	B (15.5)	B (18.9)	B (15.7)
	EB R	B (11.1)	B (16.4)	B (13.6)	B (16.4)	B (13.6)
	WB L/T/R	C (21.8)	B (13.0)	B (13.4)	B (13.5)	B (13.6)
	NB T	A (6.6)	B (13.3)	B (13.3)	B (13.5)	B (13.5)
	NB R	A (6.5)	B (13.1)	B (13.1)	B (13.3)	B (13.3)
	SB L	A (1.0)	A (9.7)	A (9.9)	B (10.3)	B (10.6)
	SB T/R	A (0.4	A (6.3)	A (6.3)	A (6.4)	A (6.4)
	ILOS	**A (9.5)**	**B (13.4)**	**B (12.7)**	**B (13.5)**	**B (12.9)**
6th Street & Turner Street	EB L/T	C (22.4)	B (19.8)	C (20.9)	C (20.1)	C (21.3)
	NB T/R	B (10.9)	B (13.8)	B (14.7)	B (13.9)	B (14.9)
	ILOS	**B (17.4)**	**B (17.1)**	**B (18.6)**	**B (17.4)**	**B (18.9)**
6th Street & Walnut Street	EB L	B (14.0)	B (17.7)	B (18.9)	B (17.8)	B (19.0)
	EB T	B (15.0)	B (18.7)	B (19.3)	B (18.9)	B (19.3)
	NB T/R	B (18.1)	B (13.1)	B (12.7)	B (13.2)	B (12.9)
	ILOS	**B (16.4)**	**B (15.9)**	**B (16.0)**	**B (16.0)**	**B (16.2)**
7th Street & Turner Street	EB T/R	C (20.5)	C (24.1)	C (25.4)	C (24.5)	C (25.8)
	SB L/T	B (17.1)	B (13.2)	C (29.5)	B (13.7)	C (31.1)
	ILOS	**B (17.9)**	**B (16.0)**	**C (28.6)**	**B (16.5)**	**C (29.9)**
7th Street & Walnut Street	EB T/R	B (15.9)	B (18.8)	B (19.1)	B (19.0)	B (19.3)
	SB L/T	B (17.0)	B (14.6)	B (14.7)	B (14.8)	B (14.9)
	ILOS	**B (16.5)**	**B (16.6)**	**B (16.8)**	**B (16.8)**	**B (17.0)**

TABLE 17
LEVEL OF SERVICE/DELAY SUMMARY
WEEKDAY PM PEAK HOUR

Intersection	Movement	Existing	2014			2019		
			Base	Projected (Non-Event)	Projected (Event)	Base	Projected (Non-Event)	Projected (Event)
9th Street & Linden Street	WB L/T	B (17.5)	B (19.4)	C (27.8)	C (27.8)	C (20.0)	C (29.0)	C (29.0)
	SB T/R	C (21.7)	B (19.5)	B (16.4)	B (19.3)	B (19.7)	B (16.5)	B (19.6)
	ILOS	**B (18.6)**	**B (19.4)**	**C (25.3)**	**C (24.8)**	**B (20.0)**	**C (26.2)**	**C (25.7)**
8th Street & Linden Street	WB T/R	B (12.1)	A (9.2)	B (15.1)	C (23.4)	A (9.4)	B (15.7)	C (25.2)
	NB L/T	C (26.9)	C (33.8)	D (41.1)	D (44.3)	D (35.6)	D (41.9)	D (45.8)
	ILOS	**C (19.0)**	**C (20.6)**	**C (24.6)**	**C (30.2)**	**C (21.6)**	**C (25.2)**	**C (32.0)**
7th Street & Linden Street	WB L/T	C (24.1)	C (27.1)	D (41.7)	E (60.8)	C (27.9)	D (45.5)	E (69.4)
	SB T/R	B (19.2)	B (18.0)	B (19.2)	F (124.8)	B (18.3)	B (19.3)	E (74.3)
	ILOS	**C (21.7)**	**C (21.8)**	**C (30.3)**	**F (99.4)**	**C (22.3)**	**C (32.4)**	**E (72.2)**
6th Street & Linden Street	WB T/R	C (21.4)	C (27.1)	C (30.0)	C (32.8)	C (27.8)	C (31.8)	D (48.9)
	NB L/T	C (24.9)	C (20.2)	C (24.0)	D (43.3)	C (20.8)	C (24.4)	D (41.3)
	ILOS	**C (23.4)**	**C (23.3)**	**C (26.7)**	**D (39.4)**	**C (23.9)**	**C (27.9)**	**D (44.6)**
5th Street & Linden Street	WB L/T	B (18.2)	B (17.5)	B (18.5)	B (19.5)	B (17.8)	B (19.2)	C (22.3)
	SB T/R	B (14.9)	B (15.5)	B (16.1)	B (16.1)	B (15.7)	B (16.2)	B (16.2)
	ILOS	**B (17.2)**	**B (16.9)**	**B (17.8)**	**B (18.6)**	**B (17.2)**	**B (18.3)**	**C (20.9)**
4th Street & Linden Street	WB L/T/R	B (18.6)	B (19.2)	C (21.3)	C (21.3)	B (19.4)	C (22.0)	C (24.4)
	NB L	C (26.0)	A (5.3)	C (26.2)	C (28.1)	A (5.8)	C (27.1)	C (28.9)
	NB T	B (19.3)	A (2.9)	B (17.1)	B (17.1)	A (2.9)	B (17.3)	B (17.3)
	SB T	B (13.4)	B (12.7)	B (10.7)	B (10.9)	B (12.8)	B (10.9)	B (11.1)
	SB R	B (11.3)	B (10.7)	A (9.3)	B (10.3)	B (10.8)	A (9.2)	B (10.1)
	ILOS	**B (17.9)**	**B (12.0)**	**B (18.0)**	**B (17.6)**	**B (12.2)**	**B (18.6)**	**B (19.8)**
9th Street & Hamilton Street	EB T/R	B (17.3)	B (17.9)	B (16.9)	C (20.6)	B (18.1)	B (17.1)	C (20.9)
	SB L/T	C (22.1	C (22.1)	C (25.4)	C (28.0)	C (22.3)	C (25.8)	C (28.5)
	ILOS	**B (19.3)**	**B (19.7)**	**C (20.7)**	**C (23.5)**	**B (20.0)**	**C (21.0)**	**C (23.9)**
8th Street & Hamilton Street	EB L/T	C (26.4)	C (20.4)	B (20.0)	C (23.3)	C (20.8)	C (20.4)	C (23.8)
	NB T/R	B (19.6)	C (24.5)	C (27.6)	C (28.7)	C (25.1)	C (27.7)	C (28.9)
	ILOS	**C (22.5)**	**C (22.8)**	**C (24.3)**	**C (26.0)**	**C (23.2)**	**C (24.4)**	**C (26.3)**
7th Street & Hamilton Street	EB L/T	C (33.8)	B (13.7)	B (12.8)	B (14.1)	B (14.0)	B (13.0)	B (14.4)
	SB L	B (17.2)	C (20.6)	C (23.7)	C (24.8)	C (21.0)	C (24.1)	C (24.1)
	SB T	B (15.3)	C (20.9)	C (22.8)	C (22.8)	C (21.3)	C (23.2)	C (23.5)
	ILOS	**C (22.3)**	**B (18.3)**	**B (19.4)**	**B (19.6)**	**B (18.6)**	**B (19.7)**	**B (19.6)**
6th Street & Hamilton Street	EB L/T	D (36.3)	B (11.9)	B (13.2)	B (13.7)	B (12.1)	B (13.3)	B (13.0)
	WB R	C (26.9)	A (6.6)	C (30.3)	C (33.6)	A (6.9)	C (30.5)	C (33.5)
	NB T/R	C (27.2)	A (9.2)	A (9.3)	B (11.8)	A (9.3)	A (9.2)	B (12.1)
	ILOS	**C (31.4)**	**B (10.2)**	**B (13.5)**	**B (15.3)**	**B (10.3)**	**B (13.5)**	**B (15.1)**
5th Street & Hamilton Street	EB T/R	D (42.7)	B (13.5)	B (13.9)	B (14.2)	B (13.7)	B (14.3)	B (14.6)
	WB L/T	C (24.7)	B (18.5)	B (18.8)	C (20.3)	B (18.7)	B (19.0)	C (20.5)
	SB L/T/R	B (15.5)	B (12.9)	B (13.0)	B (13.0)	B (13.0)	B (13.0)	B (13.0)
	ILOS	**C (32.5)**	**B (14.2)**	**B (14.6)**	**B (15.4)**	**B (14.4)**	**B (14.8)**	**B (15.6)**
4th Street & Hamilton Street	EB L/T	B (13.7)	C (20.0)	A (4.2)	A (4.2)	C (20.7)	A (4.3)	A (4.3)
	EB R	B (10.3)	B (16.5)	A (3.0)	A (3.0)	B (16.6)	A (3.0)	A (3.0)
	WB L/T/R	C (21.7)	B (13.5)	B (13.9)	B (15.8)	B (13.7)	B (14.1)	B (16.1)
	NB T	A (6.6)	B (12.4)	A (6.3)	A (6.3)	B (12.5)	A (6.4)	A (6.4)
	NB R	A (8.1)	B (15.6)	A (8.4)	A (8.4)	B (16.0)	A (9.3)	A (9.3)
	SB L	A (3.5)	B (16.8)	D (36.0)	D (35.8)	B (19.9)	D (41.2)	D (40.7)
	SB T/R	A (2.3)	A (6.6)	B (19.6)	B (19.6)	A (6.7)	B (19.8)	B (19.8)
	ILOS	**A (9.7)**	**B (15.3)**	**B (13.6)**	**B (14.0)**	**B (16.0)**	**B (14.6)**	**B (14.9)**
6th Street & Turner Street	EB L/T	C (22.2)	C (23.8)	C (22.5)	C (22.4)	C (24.2)	C (22.9)	C (22.8)
	NB T/R	B (13.3)	B (11.8)	B (15.4)	B (15.4)	B (12.1)	B (15.9)	B (15.9)
	ILOS	**B (16.5)**	**B (16.2)**	**B (18.0)**	**B (18.0)**	**B (16.5)**	**B (18.5)**	**B (18.4)**
6th Street & Walnut Street	EB L	B (15.2)	B (16.3)	B (17.5)	C (20.1)	B (16.5)	B (17.6)	C (20.2)
	EB T	B (15.4)	B (16.6)	B (17.2)	B (17.2)	B (16.7)	B (17.6)	B (17.6)
	NB T/R	B (18.2)	B (17.3)	B (16.7)	B (18.0)	B (17.6)	B (17.0)	B (18.4)
	ILOS	**B (16.5)**	**B (16.8)**	**B (17.0)**	**B (18.3)**	**B (17.0)**	**B (17.3)**	**B (18.6)**
7th Street & Turner Street	EB T/R	B (15.6)	C (23.1)	C (23.4)	C (23.3)	C (23.4)	C (23.7)	C (23.6)
	SB L/T	B (19.2)	B (10.4)	B (19.6)	C (25.8)	B (10.5)	B (19.7)	C (24.3)
	ILOS	**B (18.0)**	**B (14.6)**	**B (20.7)**	**C (25.3)**	**B (14.8)**	**C (20.9)**	**C (24.0)**
7th Street & Walnut Street	EB T/R	B (15.4)	B (18.3)	B (19.3)	C (20.1)	B (18.4)	B (19.7)	C (20.5)
	SB L/T	B (17.2)	B (14.8)	B (14.2)	B (14.2)	B (15.0)	B (14.4)	B (14.4)
	ILOS	**B (16.5)**	**B (16.2)**	**B (16.4)**	**B (17.1)**	**B (16.4)**	**B (16.7)**	**B (17.4)**

TABLE 18
LEVEL OF SERVICE/DELAY SUMMARY
SATURDAY MIDDAY PEAK HOUR

Intersection	Movement	Existing	2014			2019		
			Base	Projected (Non-Event)	Projected (Event)	Base	Projected (Non-Event)	Projected (Event)
9th Street & Linden Street	WB L/T	B (15.9)	A (8.9)	C (22.5)	C (22.8)	A (9.1)	C (23.1)	C (23.4)
	SB T/R	C (21.3)	B (19.7)	B (16.1)	B (18.8)	B (19.9)	B (16.2)	B (19.0)
	ILOS	**B (17.4)**	**B (11.9)**	**C (20.8)**	**C (21.2)**	**B (12.1)**	**C (21.2)**	**C (21.6)**
8th Street & Linden Street	WB T/R	B (12.7)	A (8.5)	B (13.0)	B (17.7)	A (8.7)	B (13.3)	B (18.4)
	NB L/T	C (23.9)	C (31.1)	C (29.6)	C (30.9)	C (32.2)	C (30.2)	C (31.4)
	ILOS	**B (17.9)**	**B (19.1)**	**B (19.7)**	**C (22.2)**	**B (19.7)**	**C (20.1)**	**C (22.9)**
7th Street & Linden Street	WB L/T	B (19.0)	C (23.8)	C (31.6)	D (38.3)	C (24.1)	C (32.6)	D (40.4)
	SB T/R	C (22.9)	B (18.3)	B (17.1)	F (90.2)	B (18.7)	B (17.2)	D (49.6)
	ILOS	**C (21.6)**	**C (20.1)**	**C (22.3)**	**E (74.8)**	**C (20.4)**	**C (22.8)**	**D (46.6)**
6th Street & Linden Street	WB T/R	B (19.0)	C (25.2)	C (26.1)	C (27.8)	C (25.5)	C (27.0)	C (33.9)
	NB L/T	C (21.8)	B (16.7)	B (19.5)	C (28.0)	B (17.0)	B (19.7)	C (27.2)
	ILOS	**C (20.7)**	**C (20.1)**	**C (22.2)**	**C (27.9)**	**C (20.4)**	**C (22.8)**	**C (29.9)**
5th Street & Linden Street	WB L/T	B (17.5)	B (16.8)	B (16.3)	B (17.2)	B (17.0)	B (16.7)	B (19.4)
	SB T/R	B (13.1)	B (13.6)	B (15.6)	B (15.6)	B (13.7)	B (15.6)	B (15.6)
	ILOS	**B (16.1)**	**B (15.8)**	**B (16.0)**	**B (16.7)**	**B (15.9)**	**B (16.4)**	**B (18.5)**
4th Street & Linden Street	WB L/T/R	B (17.8)	B (17.2)	B (18.0)	B (18.0)	B (17.4)	B (18.5)	C (20.4)
	NB L	C (21.3)	B (15.2)	C (22.1)	C (23.1)	B (15.4)	C (22.5)	C (23.4)
	NB T	B (18.0)	B (12.6)	B (18.1)	B (18.1)	B (12.6)	B (18.2)	B (18.2)
	SB T	B (12.2)	B (12.9)	B (12.4)	B (12.6)	B (13.0)	B (12.4)	B (12.7)
	SB R	B (11.1)	B (11.7)	B (11.4)	B (12.8)	B (11.7)	B (11.4)	B (12.4)
	ILOS	**B (16.6)**	**B (14.8)**	**B (16.7)**	**B (16.4)**	**B (14.9)**	**B (17.1)**	**B (18.0)**
9th Street & Hamilton Street	EB T/R	B (17.8)	B (17.8)	B (17.4)	C (21.0)	B (18.1)	B (17.6)	C (21.3)
	SB L/T	C (22.0)	B (16.7)	C (25.0)	C (27.4)	B (16.9)	C (25.3)	C (27.8)
	ILOS	**B (19.5)**	**B (17.4)**	**C (20.4)**	**C (23.3)**	**B (17.6)**	**C (20.7)**	**C (23.7)**
8th Street & Hamilton Street	EB L/T	B (17.6)	B (19.0)	B (19.7)	C (22.9)	B (19.3)	C (20.1)	C (23.3)
	NB T/R	B (17.4)	C (23.3)	C (23.8)	C (24.6)	C (23.7)	C (24.0)	C (24.7)
	ILOS	**B (17.5)**	**C (21.1)**	**C (21.7)**	**C (23.6)**	**C (21.5)**	**C (21.9)**	**C (23.9)**
7th Street & Hamilton Street	EB L/T	B (12.8)	B (11.9)	B (12.3)	B (13.6)	B (12.0)	B (12.5)	B (13.8)
	SB L	A (10.0)	C (20.4)	C (21.7)	C (22.5)	C (20.6)	C (21.8)	C (21.8)
	SB T	B (10.1)	C (21.3)	C (21.5)	C (21.5)	C (21.6)	C (21.8)	C (21.8)
	ILOS	**B (11.1)**	**B (17.6)**	**B (18.0)**	**B (18.1)**	**B (17.8)**	**B (18.2)**	**B (18.1)**
6th Street & Hamilton Street	EB L/T	D (37.2)	A (8.9)	B (12.4)	B (12.0)	A (8.9)	B (12.4)	B (10.9)
	WB R	B (17.8)	A (7.8)	C (30.7)	C (33.7)	A (7.9)	C (30.9)	C (33.8)
	NB T/R	C (29.7)	A (8.8)	A (8.0)	A (9.9)	A (9.0)	A (7.9)	A (9.9)
	ILOS	**C (32.2)**	**A (8.7)**	**B (13.2)**	**B (14.0)**	**A (8.8)**	**B (13.2)**	**B (13.6)**
5th Street & Hamilton Street	EB T/R	D (41.7)	B (12.5)	B (12.7)	B (12.9)	B (12.6)	B (12.8)	B (13.1)
	WB L/T	C (23.2)	B (11.7)	B (18.2)	B (19.6)	B (11.8)	B (18.4)	B (19.7)
	SB L/T/R	B (13.3)	B (12.3)	B (12.3)	B (12.3)	B (12.4)	B (12.4)	B (12.4)
	ILOS	**C (32.1)**	**B (12.3)**	**B (13.8)**	**B (14.7)**	**B (12.4)**	**B (13.9)**	**B (14.8)**
4th Street & Hamilton Street	EB L/T	B (13.7)	B (13.0)	A (3.7)	A (3.7)	B (13.1)	A (3.8)	A (3.8)
	EB R	B (11.1)	B (11.2)	A (2.9)	A (2.9)	B (11.2)	A (2.9)	A (2.9)
	WB L/T/R	C (20.8)	B (12.9)	B (12.9)	B (14.4)	B (13.0)	B (13.0)	B (14.6)
	NB T	A (5.9)	B (13.1)	B (11.8)	B (11.8)	B (12.8)	B (11.8)	B (11.8)
	NB R	A (6.2)	B (13.4)	B (12.4)	B (12.4)	B (13.5)	B (12.7)	B (12.7)
	SB L	A (7.1)	B (15.5)	B (14.5)	B (14.5)	B (15.8)	B (15.0)	B (15.0)
	SB T/R	A (5.7)	B (12.3)	B (11.4)	B (11.4)	B (12.3)	B (11.4)	B (11.4)
	ILOS	**B (11.5)**	**B (13.2)**	**A (9.4)**	**B (10.2)**	**B (13.4)**	**A (9.6)**	**B (10.4)**
6th Street & Turner Street	EB L/T	C (20.7)	B (19.5)	C (20.8)	C (20.8)	B (19.7)	C (21.0)	C (21.0)
	NB T/R	B (11.3)	B (12.7)	B (12.1)	B (12.1)	B (12.9)	B (2.3)	B (12.3)
	ILOS	**B (15.1)**	**B (15.5)**	**B (16.0)**	**B (16.0)**	**B (15.6)**	**B (16.1)**	**B (16.1)**
6th Street & Walnut Street	EB L	B (17.1)	B (16.0)	B (15.9)	B (18.1)	B (16.0)	B (16.0)	B (18.2)
	EB T	B (17.1)	B (15.9)	B (15.6)	B (15.4)	B (16.0)	B (15.6)	B (15.6)
	NB T/R	B (12.5)	B (14.5)	B (15.5)	B (16.5)	B (14.6)	B (15.7)	B (16.6)
	ILOS	**B (14.7)**	**B (15.2)**	**B (15.6)**	**B (16.7)**	**B (15.3)**	**B (15.7)**	**B (16.8)**
7th Street & Turner Street	EB T/R	C (21.6)	C (22.3)	C (22.4)	C (22.5)	C (22.5)	C (22.6)	C (22.6)
	SB L/T	B (10.5)	B (10.5)	C (20.0)	B (17.8)	B (10.7)	C (20.0)	C (24.8)
	ILOS	**B (13.6)**	**B (13.8)**	**C (20.6)**	**B (18.5)**	**B (14.0)**	**C (20.7)**	**C (24.4)**
7th Street & Walnut Street	EB T/R	B (15.1)	B (17.3)	B (18.2)	B (18.9)	B (17.4)	B (18.4)	B (19.1)
	SB L/T	B (15.8)	B (14.3)	B (13.6)	B (13.6)	B (14.5)	B (13.8)	B (13.8)
	ILOS	**B (15.6)**	**B (15.3)**	**B (15.3)**	**B (15.9)**	**B (15.4)**	**B (15.5)**	**B (16.1)**

Under the 2014 and 2019 Projected Conditions (Non-Event Days), all intersections will operate at the same overall intersection level of service (ILOS) under Base Conditions and Projected Conditions, or fall within PennDOT's allowable 10-second variance between no-build and build condition scenarios.

Under the 2014 and 2019 Projected Conditions (Event Days), all intersections will operate at the same overall intersection level of service (ILOS) under Base Conditions and Projected Conditions, or fall within PennDOT's allowable 10-second variance between no-build and build condition scenarios except for the intersection of Linden Street & 6th Street and the intersection of Linden Street & 7th Street. Following the completion of the American Parkway Bridge, all intersections will operate with an overall intersection level of service (ILOS) E or better.

As previously noted, the analysis for the PM Peak Hour on event days represents a highly conservative approach. This scenario assumes that the peak hour of street traffic and traffic associated with the office uses will coincide with the peak hour of event traffic associated with the arena. In reality, these peak periods will not overlap with the peak event traffic occurring from 6:00-7:00 PM. By assuming that the peak hour of traffic for a large arena event will occur simultaneously with the peak hour of exiting office traffic, the resulting levels of service represent an unlikely, worst-case scenario.

Supplemental Analysis

TPD performed a supplemental analysis to examine a more realistic portrayal of traffic patterns associated with a sold-out hockey game. This analysis was focused on the intersection of Linden Street & 7th Street, which was identified as a critical intersection. Because the peak hour of event traffic is 6:00-7:00 PM, TPD conducted a supplemental traffic count for the intersection during this time period. The traffic conditions from 6:00-7:00 PM differ significantly from the peak hour traffic volumes from 4:00-5:00 PM. The following is a summary of key differences:

- Existing traffic volumes are 43 percent lower than the PM peak hour.
- Events of the maximum attendance (10,500 attendees) will occur very infrequently (approximately ten events per year). This supplemental analysis is based upon a more typical event; a sold-out hockey game with 8,500 attendees.
- The Lehigh Valley Health Network office will share parking with the arena. By contract, they must vacate the parking garage prior to arena events. Therefore, there will be no traffic associated with this land use from 6:00-7:00 PM.
- It is anticipated that the majority of traffic associated with the proposed office uses will depart between 4:00-6:00 PM. For this supplemental analysis, TPD assumed that the office traffic from 6:00-7:00 PM will be 25 percent of the peak hour traffic.
- To be conservative, TPD assumed that the trip generation for all other land uses will be equal to the PM peak hour trip generation.

The results of this analysis are summarized in **Table 19**.

TABLE 19
LEVEL OF SERVICE/DELAY SUMMARY
PEAK HOUR OF EVENT TRAFFIC

Intersection	Movement	2019	
		Base	Projected (Event)
7th Street & Linden Street	WB L/T	C (27.9)	C (27.9)
	SB T/R	B (18.3)	C (28.9)
	ILOS	**C (22.3)**	**C (28.5)**

As shown in **Table 19**, the more realistic analysis of peak event traffic results in an overall Level of Service C or better at the critical intersection of 7th Street & Linden Street. Therefore, it is our opinion that the conservative primary analysis overstates the potential for traffic congestion during peak periods of event traffic.

Post-Development Monitoring

The City and arena management should monitor post-development traffic conditions along Linden Street. If congestion or delays are experienced along the corridor, the City may wish to pursue alternatives to reduce traffic pressure on Linden Street. TPD has identified potential alternatives to address this issue. These alternatives are summarized in **Appendix H**.

95TH PERCENTILE QUEUE ANALYSIS

Queue analyses were conducted at the study area intersections using Synchro 8 software. For this analysis, the 95th percentile queue is defined as the queue length that is exceeded in 5% of the signal cycles. As an example, for a signal with a 90-second cycle, this means that the 95th percentile queue length will be exceeded during 2 of the 40 signal cycles that occur during the peak hour. The queue analysis results are summarized in **Table 20** for the analyzed peak hours.

TABLE 20
95TH PERCENTILE QUEUE SUMMARY
2019 BASE AND PROJECTED CONDITIONS

Intersection	Movement	Available Storage	Weekday AM		Weekday PM			Saturday Midday		
			Base	Projected	Base	Projected (Non-Event)	Projected (Event)	Base	Projected (Non-Event)	Projected (Event)
9th Street & Linden Street	WB L/T	550	278	315	355	505	503	198	345	353
	SB T/R	525	140	163	125	130	490	110	110	225
8th Street & Linden Street	WB T/R	550	248	308	228	463	728	188	313	228
	NB L/T	550	225	248	343	395	423	288	310	325
7th Street & Linden Street	WB L/T	550	248	335	293	495	868	218	300	385
	SB T/R	550	323	505	240	465	1678	258	275	1410
6th Street & Linden Street	WB T/R	550	235	313	278	373	548	183	243	363
	NB L/T	550	213	305	310	385	583	230	290	478
5th Street & Linden Street	WB L/T	725	223	265	245	298	403	160	200	305
	SB T/R	525	90	170	83	108	108	55	80	80
4th Street & Linden Street	WB L/T/R	1,100	258	280	165	198	275	118	150	230
	NB L	550	60	75	53	170	175	53	78	78
	NB T	550	108	108	35	178	178	78	108	108
	SB T	550	153	160	165	160	170	100	103	115
	SB R	550	40	78	28	38	80	25	28	78
9th Street & Hamilton St.	EB T/R	725	203	243	200	223	350	220	243	368
	SB L/T	550	128	153	173	210	270	135	195	258
8th Street & Hamilton St.	EB L/T	550	200	240	230	255	343	210	235	325
	NB T/R	550	208	233	295	318	343	215	225	248
7th Street & Hamilton St.	EB L/T	550	125	163	173	193	250	140	165	230
	SB L	525	138	213	233	288	288	185	225	225
	SB T	525	263	268	258	278	278	228	233	233
6th Street & Hamilton St.	EB L/T	550	82	92	92	151	176	78	94	92
	WB R	550	25	92	42	141	194	41	131	183
	NB T/R	550	41	57	77	84	136	42	58	106
5th Street & Hamilton St.	EB T/R	550	130	148	180	203	215	120	135	148
	WB L/T	725	65	110	143	158	220	80	130	195
	SB L/T/R	550	65	68	80	83	83	40	43	43
4th Street & Hamilton St.	EB L/T	725	128	115	210	60	60	123	43	43
	EB R	130	25	25	25	25	25	25	25	25
	WB L/T/R	1,000	135	158	155	178	263	115	128	215
	NB T	750	170	170	110	60	60	75	70	70
	NB R	750	120	123	235	185	185	98	103	103
	SB L	550	65	73	250	308	305	88	90	90
	SB T/R	550	50	50	73	188	188	38	35	35
6th Street & Turner Street	EB L/T	550	208	268	208	228	228	148	180	180
	NB T/R	550	125	135	233	298	298	158	160	160
6th Street & Walnut Street	EB L	550	90	123	163	193	293	83	108	218
	EB T	550	150	150	185	198	198	83	88	88
	NB T/R	550	138	155	173	185	230	110	123	170
7th Street & Turner Street	EB T/R	550	218	250	190	198	198	155	160	160
	SB L/T	550	320	563	180	283	433	195	300	395
7th Street & Walnut Street	EB T/R	550	175	490	148	500	215	95	115	158
	SB L/T	500	165	385	190	368	195	168	168	168

As shown in **Table 20**, all 95th percentile queues can be accommodated within the available storage for all non-event time periods. Queue analysis worksheets are included with the capacity analysis worksheets provided in **Appendix G**.

RECOMMENDATIONS

Based upon the results of this analysis, Traffic Planning and Design Inc. (TPD) offers the following recommendations:

- Optimize traffic signal timing along the following key corridors based upon the projected traffic volumes: Hamilton Street, Linden Street, 6th Street, 7th Street and 8th Street. The new timing plans should utilize the existing signal equipment and time-based coordination.
- Provide wayfinding signage on all major approach routes. Within the immediate vicinity of the arena, signage should direct motorists directly to the appropriate parking facilities.
- Arena management should work with the City, the Allentown Parking Authority and a traffic engineer to create an event management plan. All attendees driving to the event should be guided efficiently to the various available parking opportunities. A variety of tools may be utilized, including flaggers, traffic cones and variable message signs. The event management plan should include strategies to reduce traffic volumes on 7th Street and Linden Street during the weekday P.M. peak hour by encouraging some event attendees to utilize one of the many alternate routes available.
- The project team should coordinate with the Allentown Parking Authority to examine the existing methods of payment and determine if any improvements can be made to allow for maximum traffic flow into and out of parking facilities. An alternative payment system may allow for improved ingress and egress from the garage before and after events.

CONCLUSIONS

Based on the results of the Traffic Analysis, TPD offers the following conclusions:

1. This traffic analysis includes the following proposed developments:
   a. At the intersection of 7th Street & Hamilton Street, a new mixed-use complex on the northwest corner will include the following land uses:
      - Multi-use arena;
      - 164,657 s.f. general office space;
      - 65,863 s.f. health/fitness club;
      - 180-room hotel;
      - 8,820 s.f. restaurant;
      - 13,060 s.f. restaurant;
      - Two parking decks with a total of 867 parking spaces.

   b. At the intersection of 7th Street & Hamilton Street, a new office building ("Two City Center") on the northeast corner will include the following land uses:
      - 272,000 s.f. general office space;
      - 8,000 s.f. sit-down restaurant;
      - 20,000 s.f. retail space;

- 56 below grade parking spaces.

c. At the intersection of Hamilton Street and Law Street, a new office building ("Three City Center") on the northeast corner will include the following land uses:

- 175,000 s.f. office space;
- 106 below grade spaces.

d. At the intersection of 7th Street & Linden Street, a new mixed-use complex ("Four City Center") on the southeast corner will include the following land uses:

- 168 apartments;
- 37,500 s.f. complementary first floor retail space;
- 96 below grade parking spaces.

2. It is anticipated that all development outlined above will be completed in 2014. TPD analyzed traffic conditions for the opening year (2014) and design year (2019) of the proposed development.

3. The proposed arena will accommodate minor league hockey games, concerts and other events. The arena capacity for a hockey game will be 8,500 attendees and the capacity for concerts and other events will be 10,500 attendees.

4. In association with the proposed development, the Allentown Parking Authority's Linden Deck will be expanded to include an additional 225 parking spaces. The deck is located at the intersection of Linden Street & Church Street on the southeast corner.

5. The trip generation rates for the proposed development are based upon data published by the Institute of Transportation Engineers (ITE) and the Urban Land Institute (ULI). The total trip generation for each milestone is outlined below:

a. The Arena Complex (including the attached hotel and office building) is expected to generate **485** new vehicle-trips in the weekday AM peak hour. During the weekday PM peak hour, the Arena Complex is expected to generate **744** new vehicle-trips on non-event days and **2,753** new vehicle-trips on event days. During the Saturday midday peak hour, the Arena Complex is expected to generate **542** new vehicle-trips on non-event days and **2,630** new vehicle-trips on event days.

b. Two City Center is expected to generate **401** new vehicle-trips in the weekday AM peak hour, **422** new vehicle-trips in the weekday PM peak hour and **221** new vehicle-trips in the Saturday midday peak hour.

c. Three City Center is expected to generate **269** new vehicle-trips in the weekday AM peak hour, **247** new vehicle-trips in the weekday PM peak hour and **67** new vehicle-trips in the Saturday midday peak hour.

d. Four City Center is expected to generate **103** new vehicle-trips in the weekday AM peak hour, **182** new vehicle-trips in the weekday PM peak hour and **200** new vehicle-trips in the Saturday midday peak hour.

6. The following study area intersections are included in this Traffic Analysis:

   - 7th Street (S.R. 0145) & Turner Street;
   - 6th Street & Turner Street;
   - 9th Street & Linden Street ;
   - 8th Street & Linden Street;
   - 7th Street (S.R. 0145) & Linden Street;
   - 6th Street & Linden Street;
   - 5th Street & Linden Street;
   - 4th Street & Linden Street;
   - 9th Street & Hamilton Street;
   - 8th Street & Hamilton Street;
   - 7th Street (S.R. 0145) & Hamilton Street;
   - 6th Street & Hamilton Street;
   - 5th Street & Hamilton Street;
   - 4th Street & Hamilton Street;
   - 7th Street (S.R. 0145) & Walnut Street;
   - 6th Street & Walnut Street.

7. Under the 2014 and 2019 Projected Conditions, all intersections will operate at the same overall intersection level of service (ILOS) under Base Conditions and Projected Conditions on a typical weekday (non-event day), or fall within PennDOT's allowable 10-second variance between no-build and build condition scenarios.

8. The PM peak hour analysis for event days represents a highly conservative approach. Therefore, TPD also performed a supplemental analysis to examine a more realistic portrayal of traffic patterns associated with a sold-out hockey game. This analysis was focused on the intersection of Linden Street & 7th Street, which was identified as a critical intersection. Because the peak hour of event traffic is 6:00-7:00 PM, TPD conducted a supplemental traffic count for the intersection during this time period. This analysis resulted in an overall level of service C at the intersection of 7th Street & Linden Street. Therefore, it is our opinion that the conservative primary analysis overstates the potential for traffic congestion during peak periods of event traffic.

9. Based upon this Traffic Analysis, it is TPD's opinion that with the implementation of the recommended improvements and the development of an event management plan the existing street network can accommodate the new traffic generated by the proposed development.

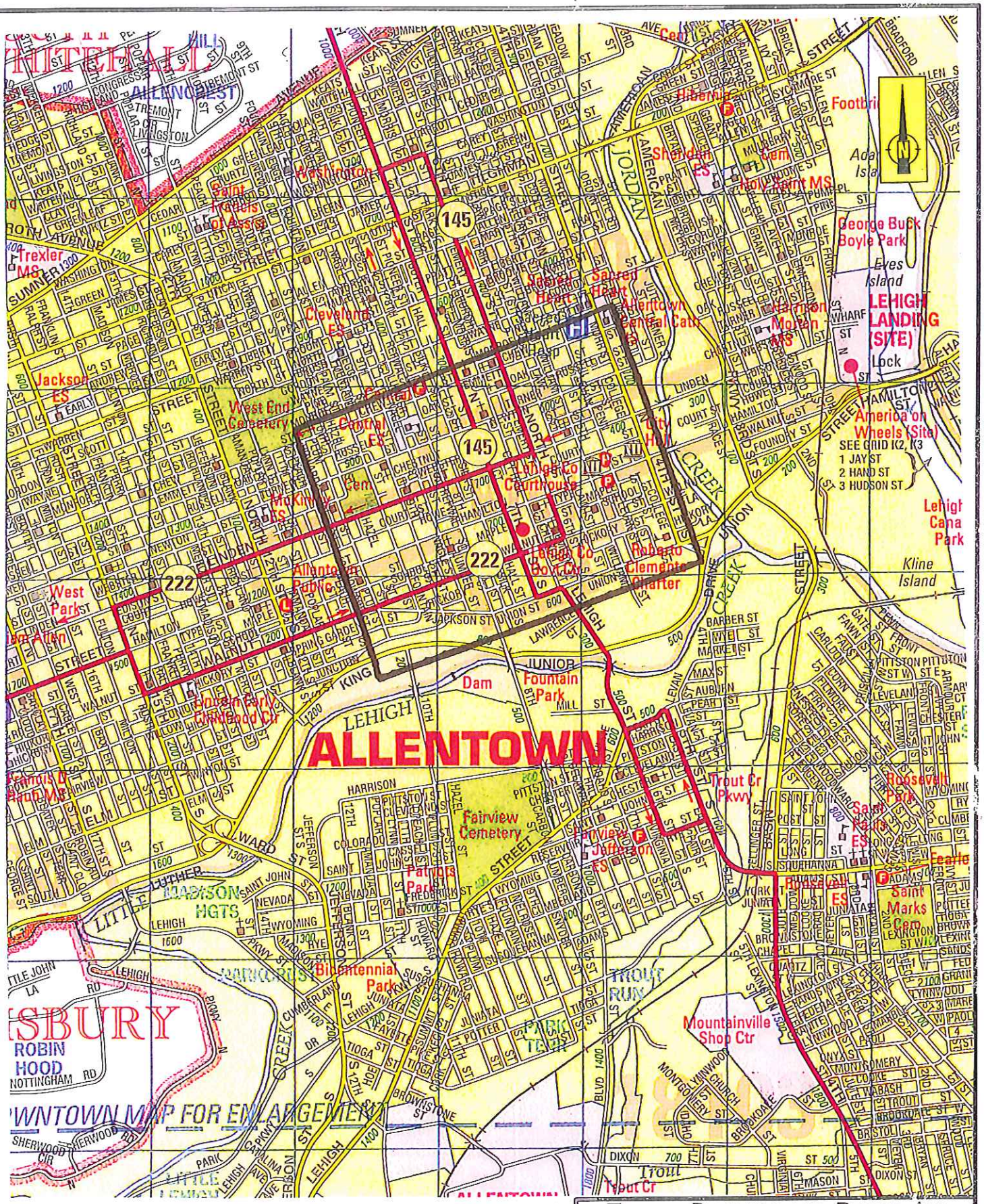

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FIGURE 1

STUDY AREA

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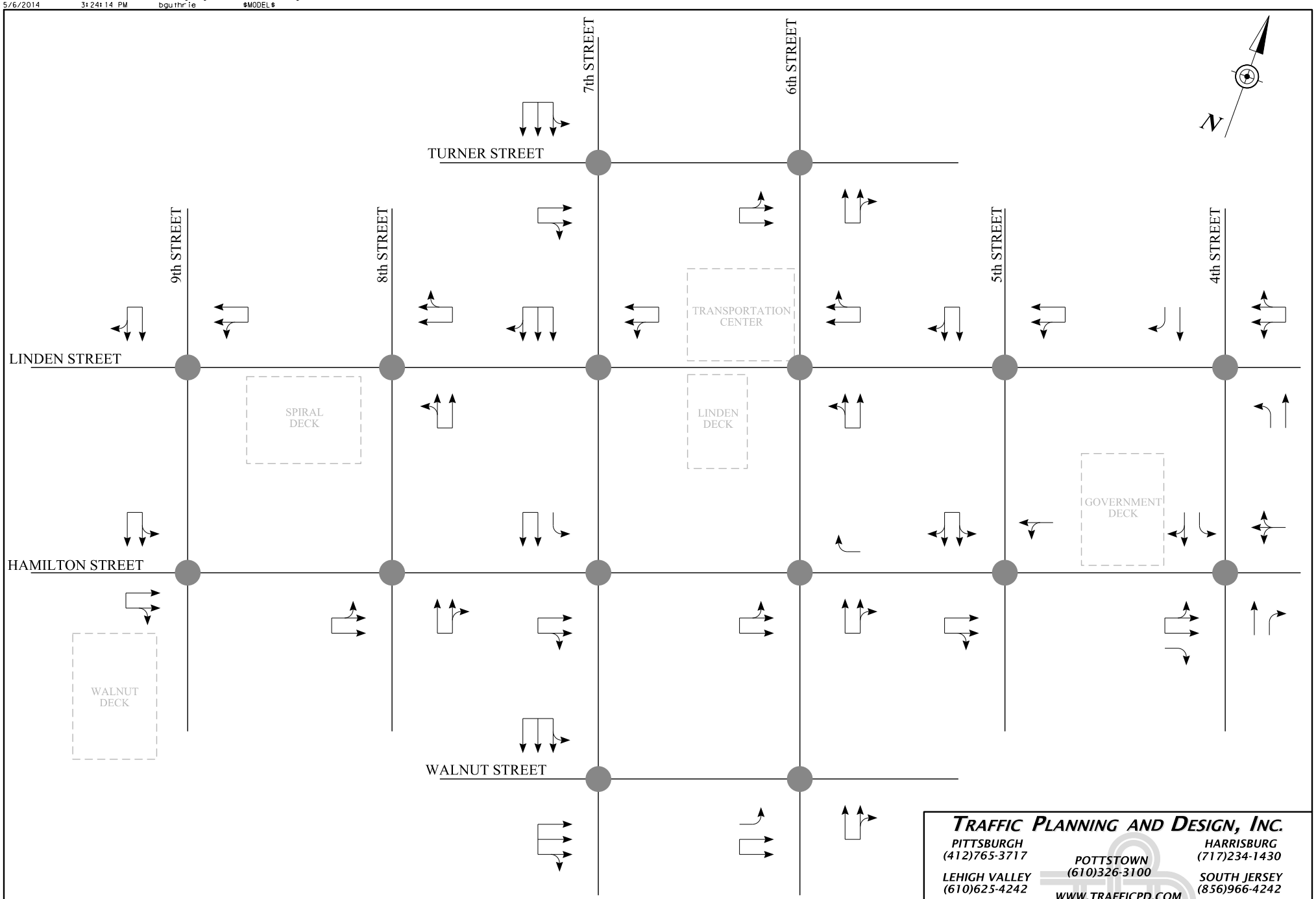

KEY:

● **SIGNALIZED INTERSECTION**

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FIGURE 2

LANE CONFIGURATION AND INTERSECTION CONTROL

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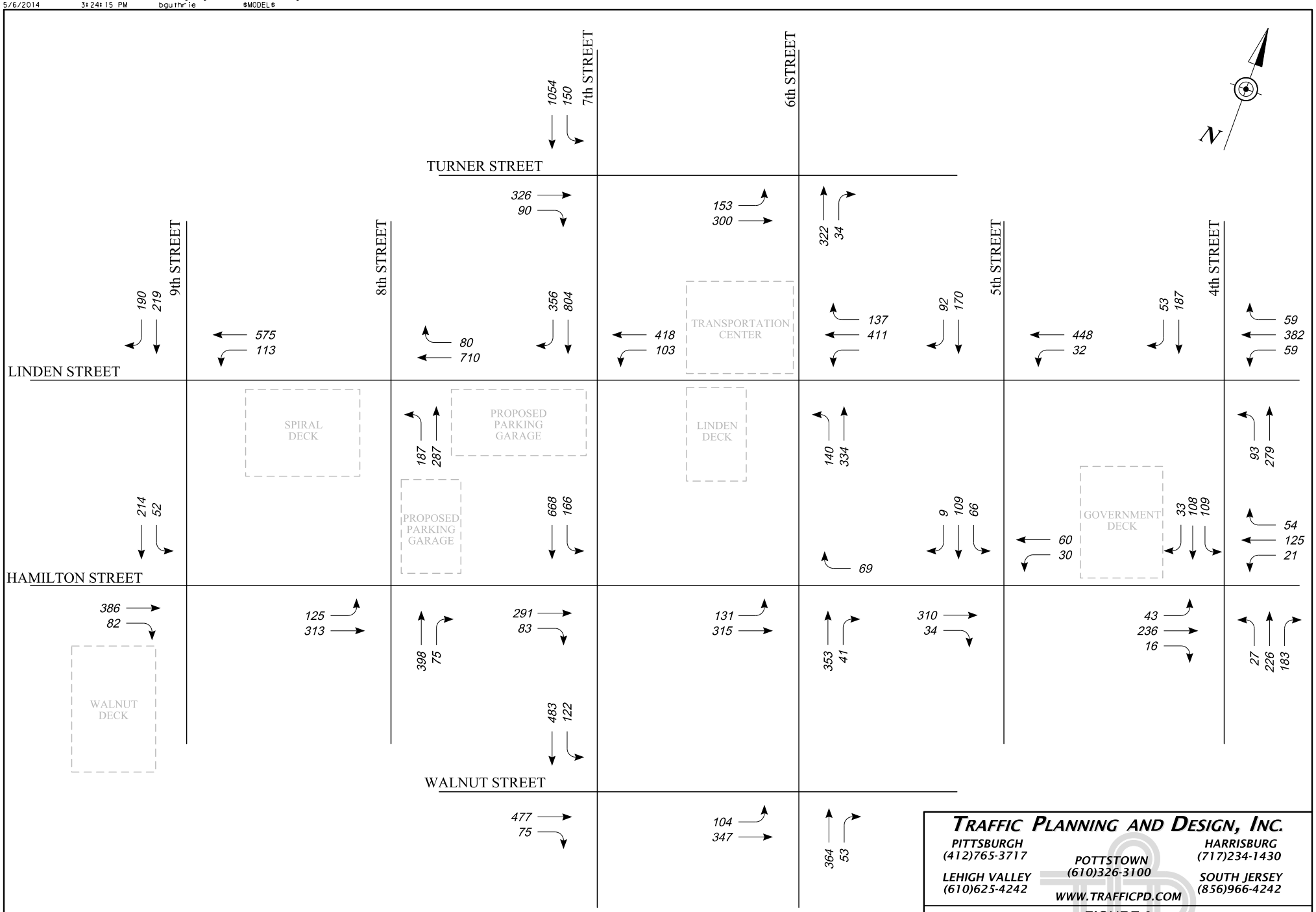

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FIGURE 3

EXISTING CONDITIONS
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:16 PM bguthrie $MODEL$

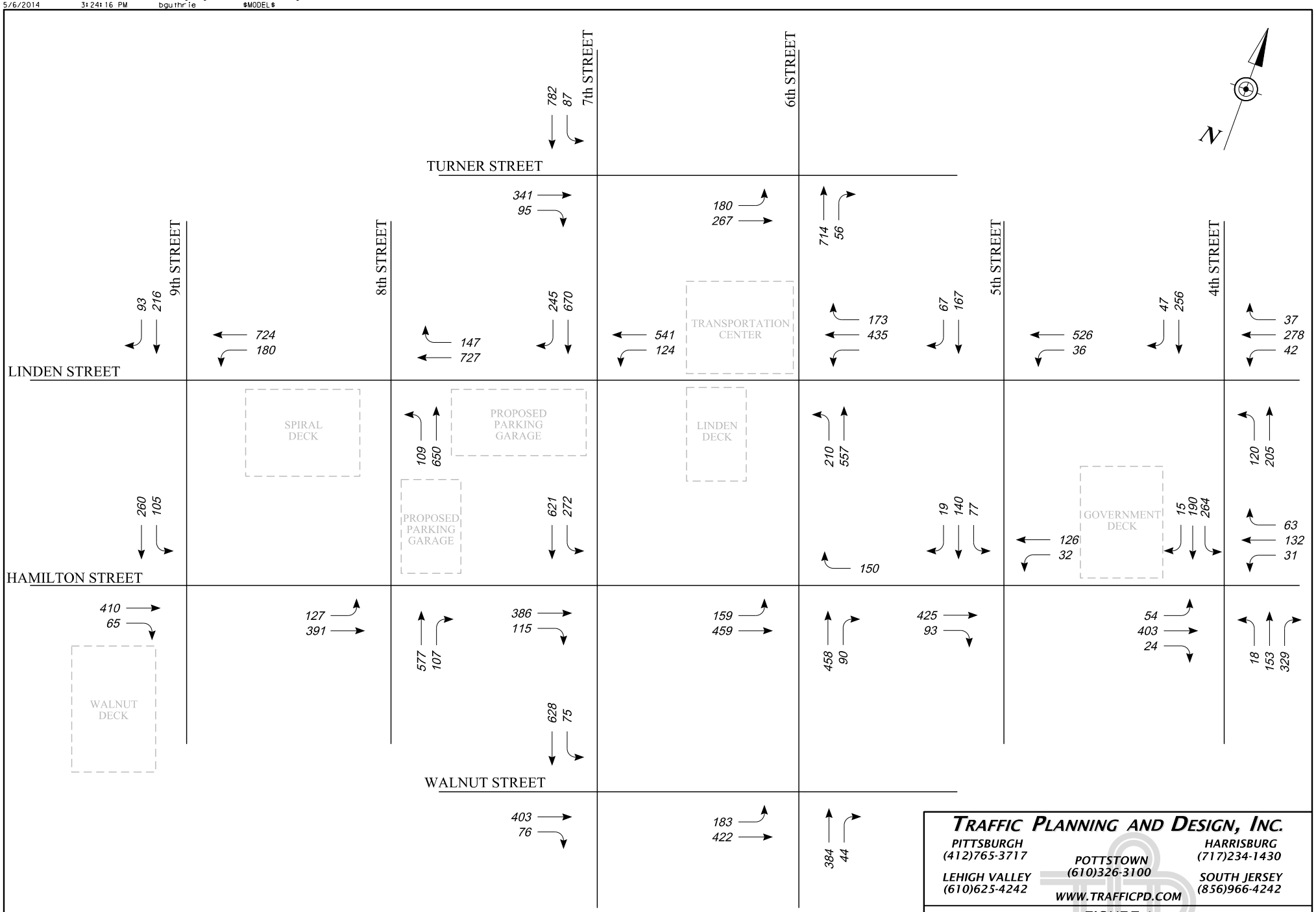

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FIGURE 4

EXISTING CONDITIONS
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
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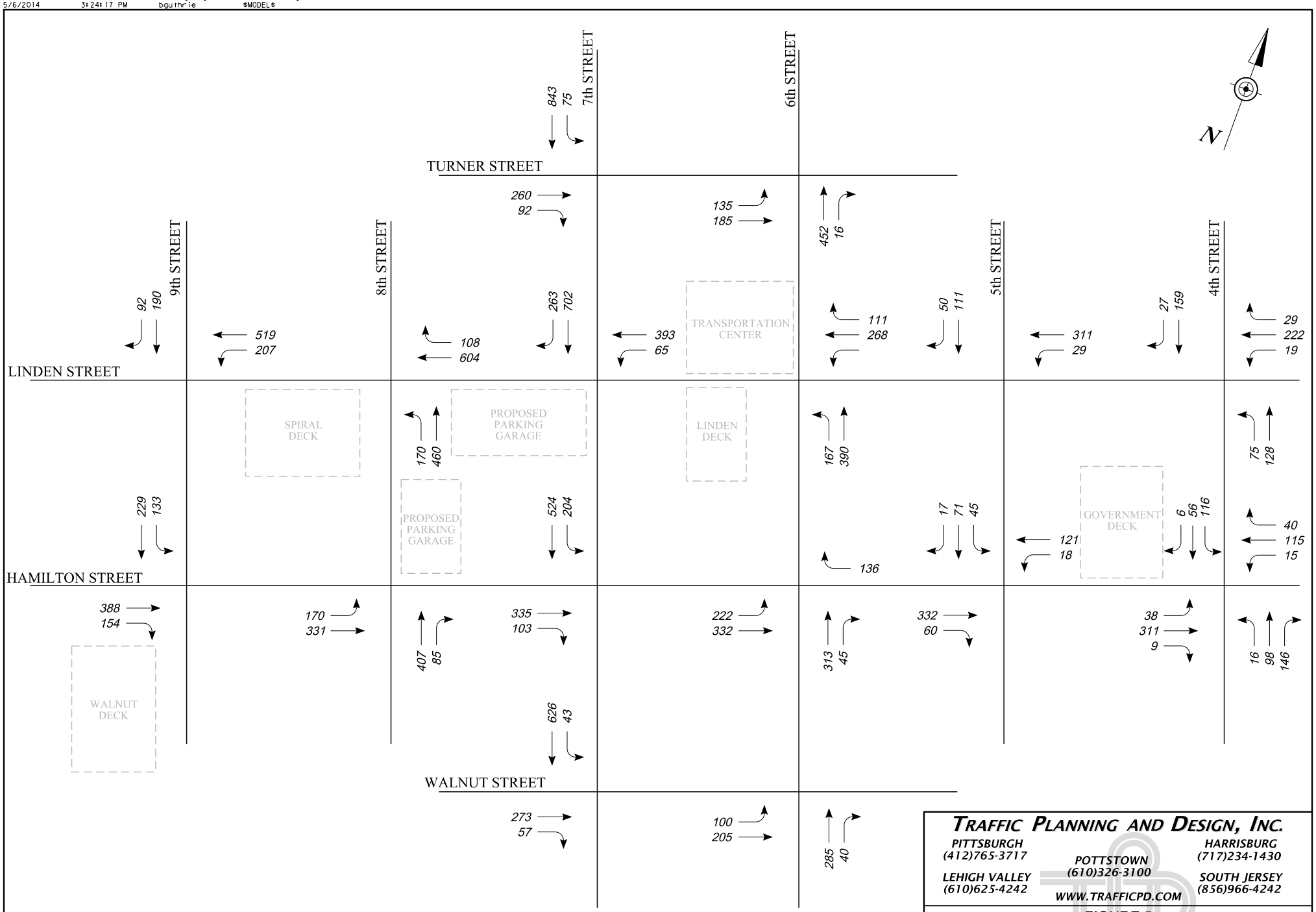

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FIGURE 5

EXISTING CONDITIONS
SATURDAY MIDDAY PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:19 PM bguthrie $MODEL$

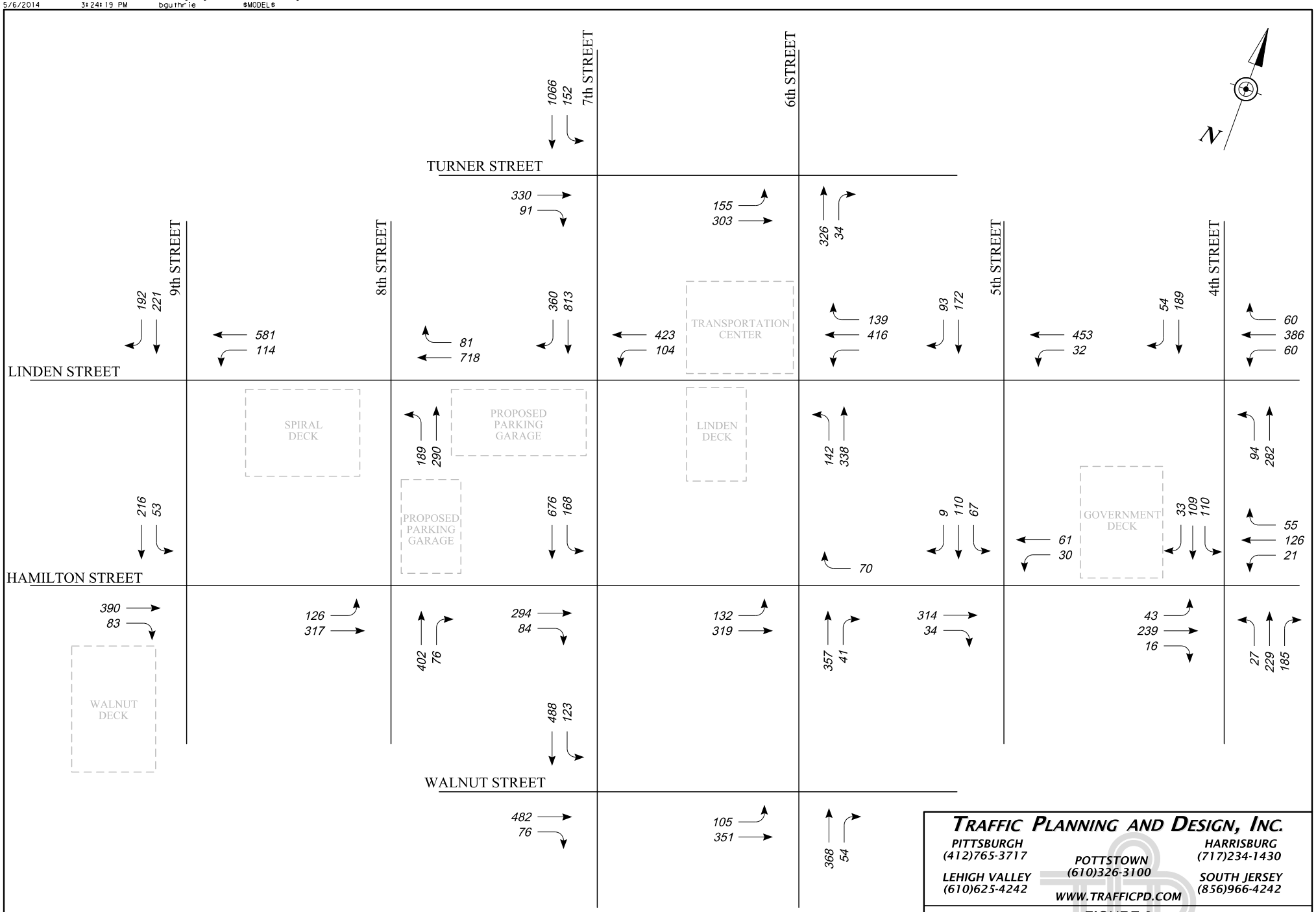

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FIGURE 6

2014 BASE CONDITIONS
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:20 PM bguthrie $MODEL$

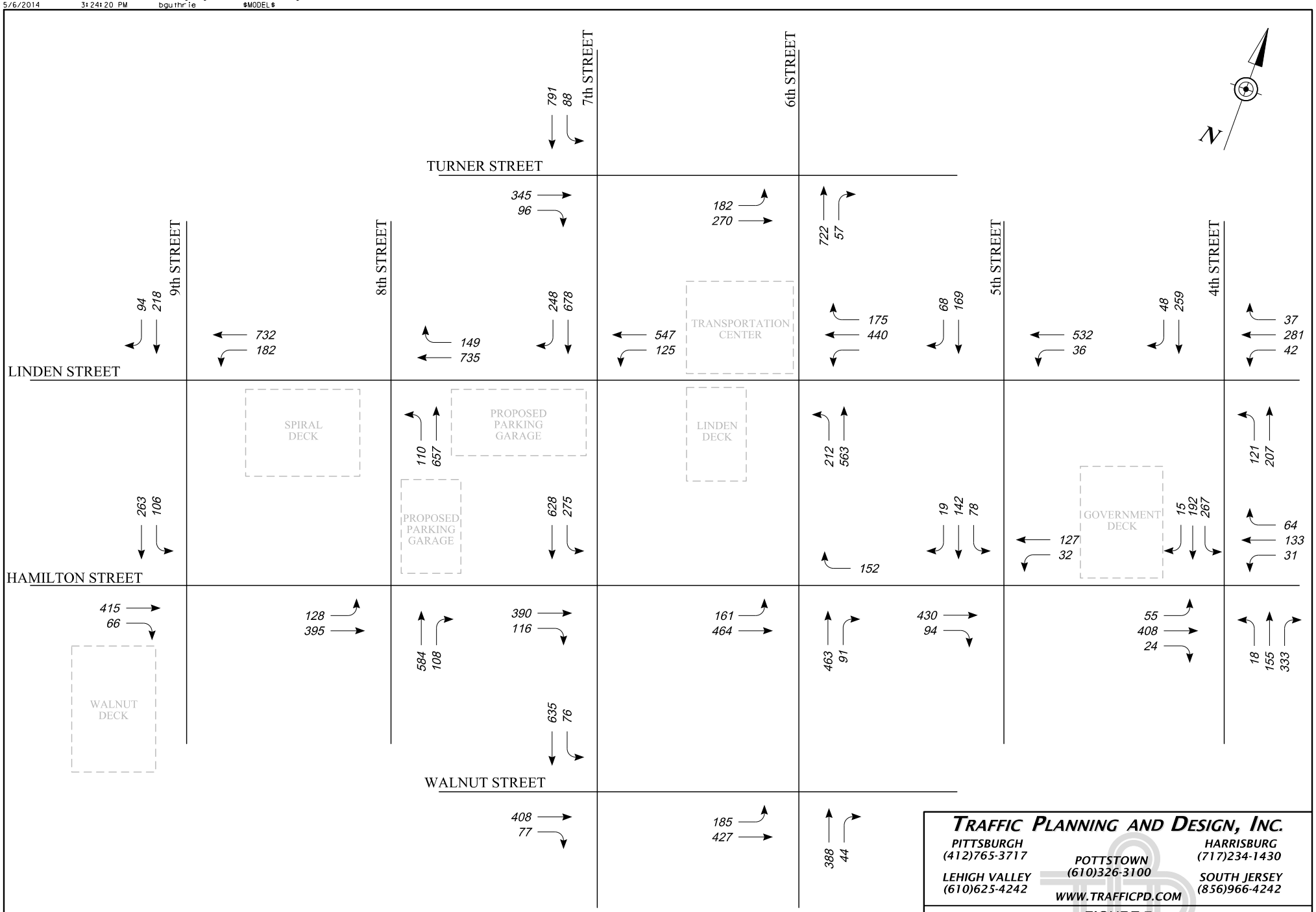

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FIGURE 7

2014 BASE CONDITIONS
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:21 PM bguthrie $MODEL$

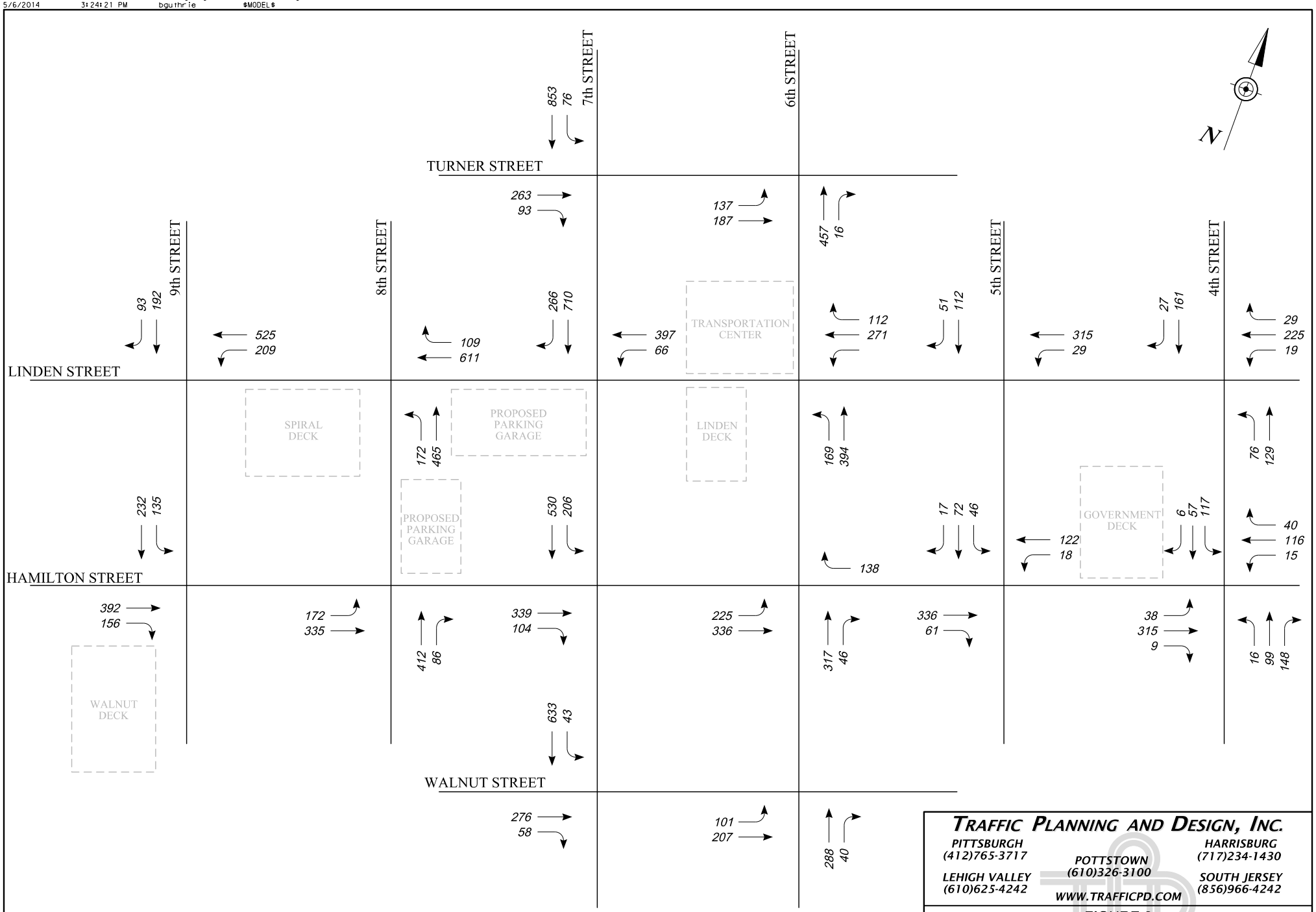

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FIGURE 8

2014 BASE CONDITIONS
SATURDAY MIDDAY PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:22 PM bguthrie $MODEL$

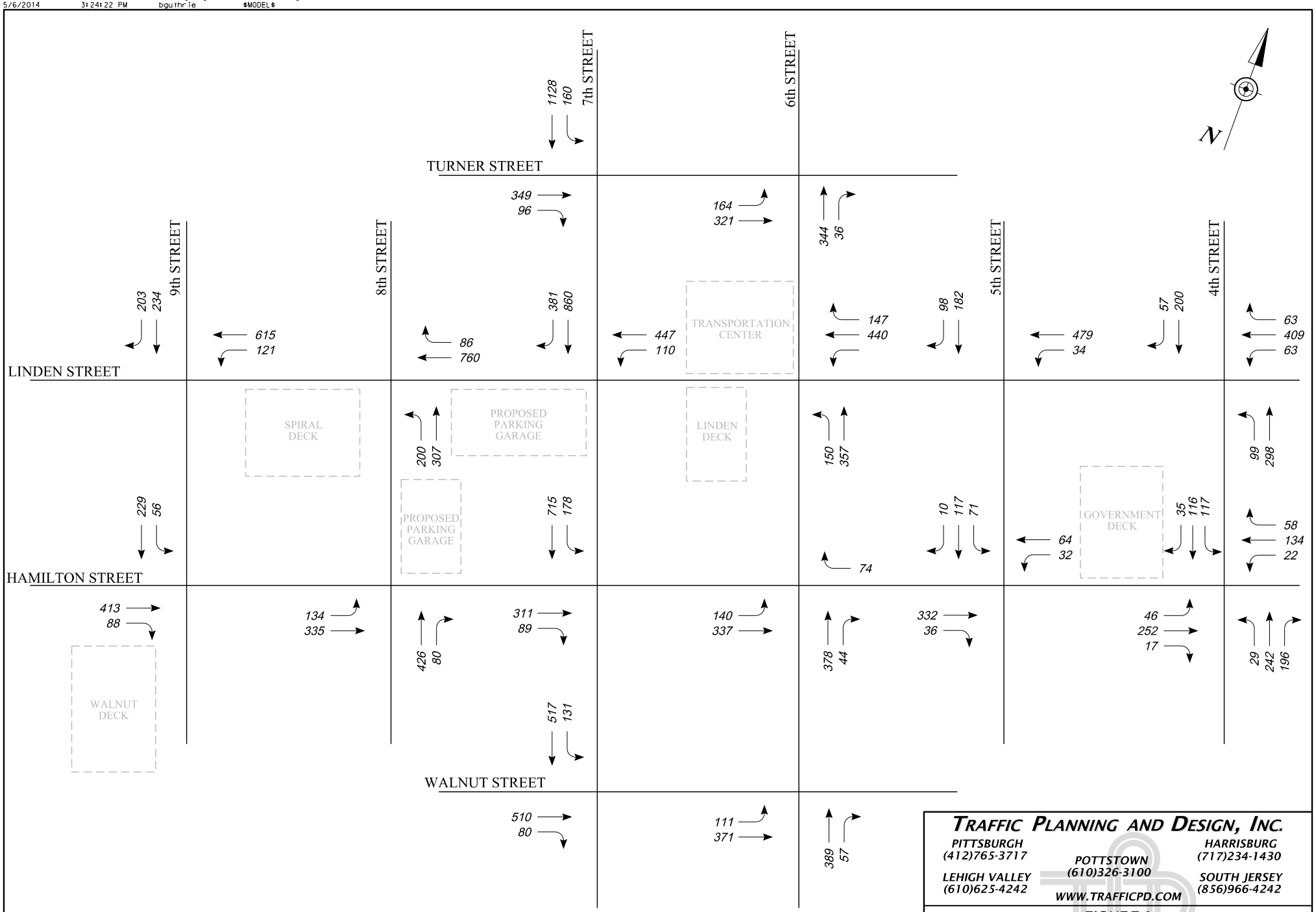

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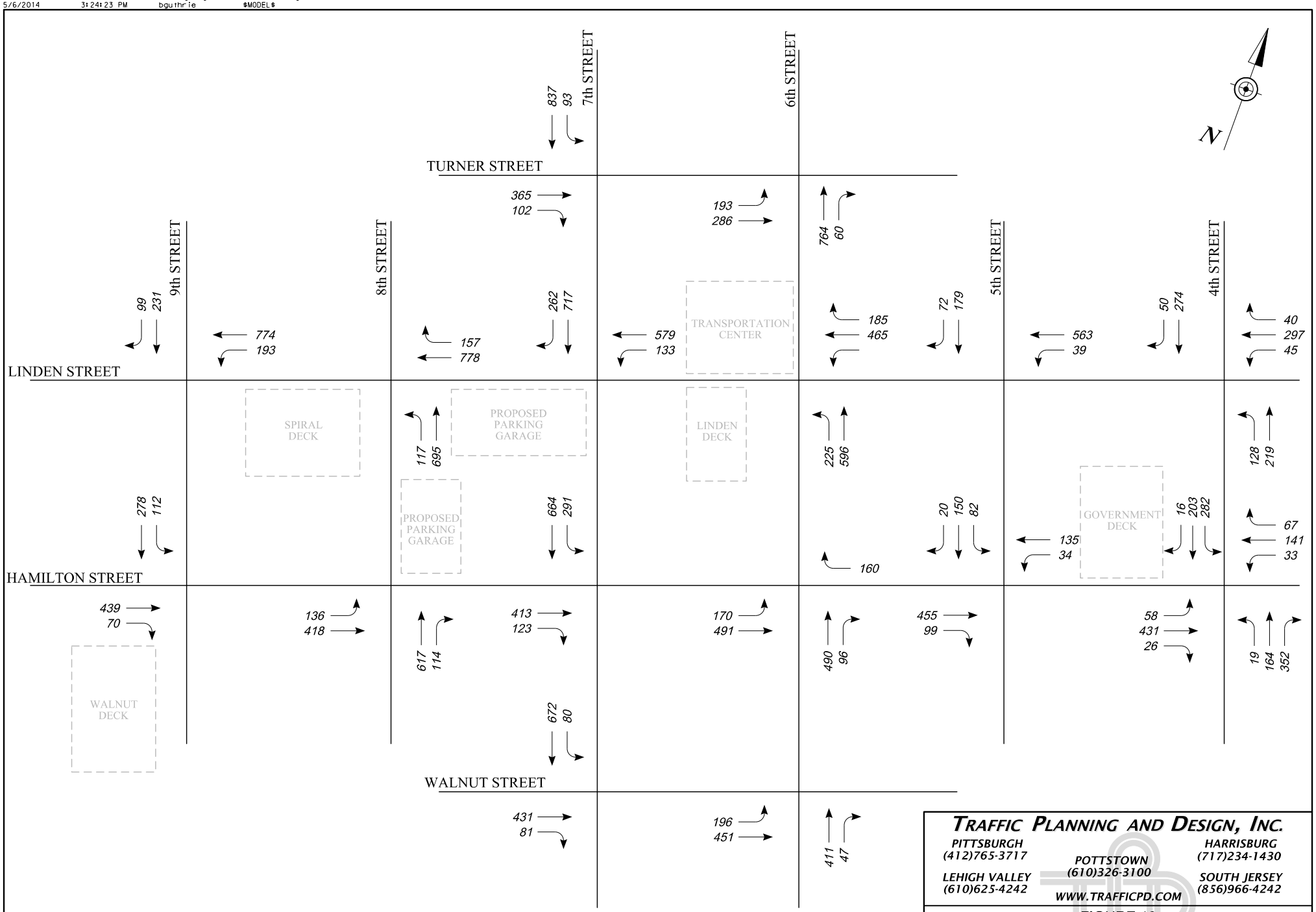
FIGURE 9

2019 BASE CONDITIONS
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:23 PM bguthrie $MODEL$



KEY:
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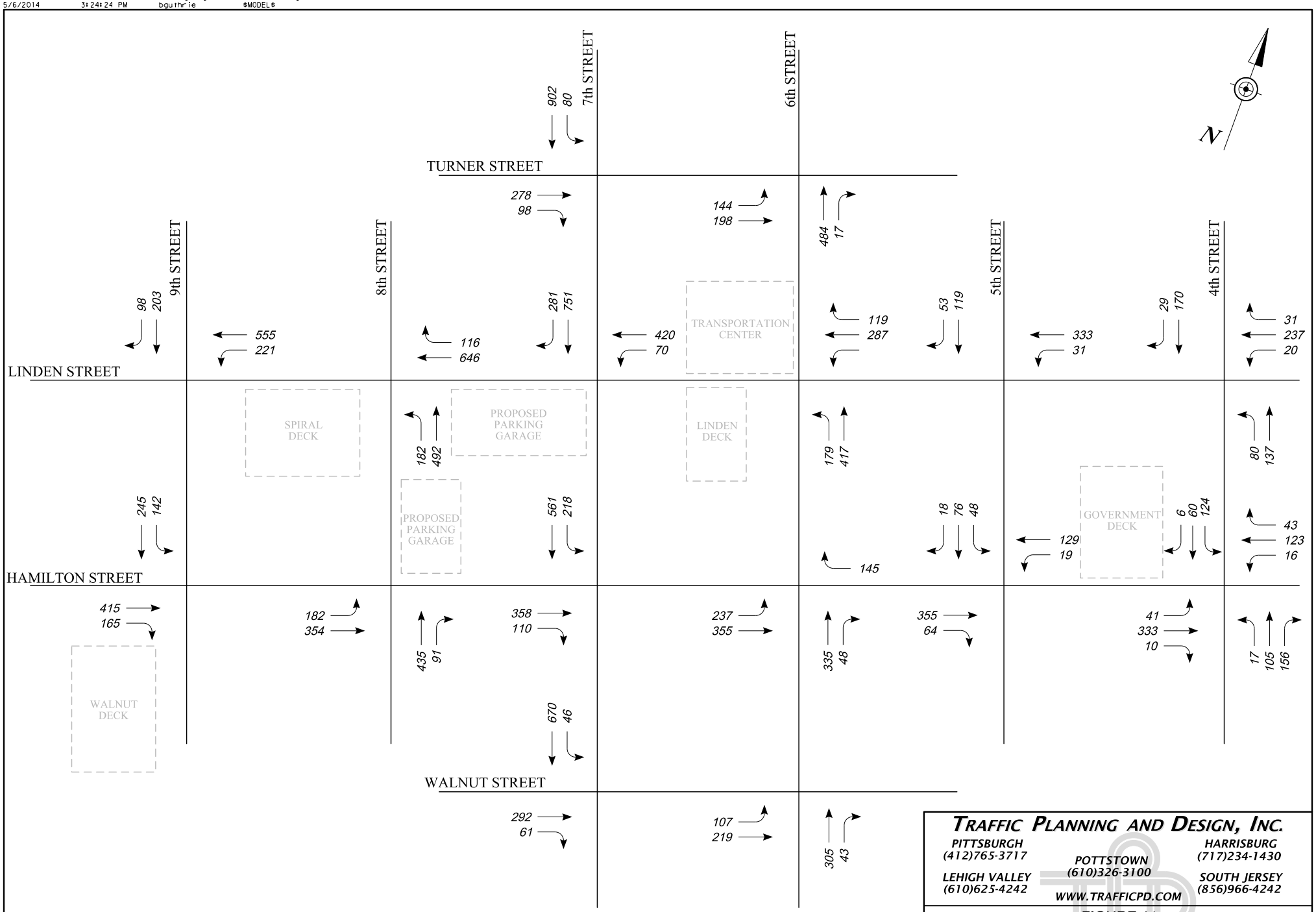
FIGURE 10

2019 BASE CONDITIONS
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:24 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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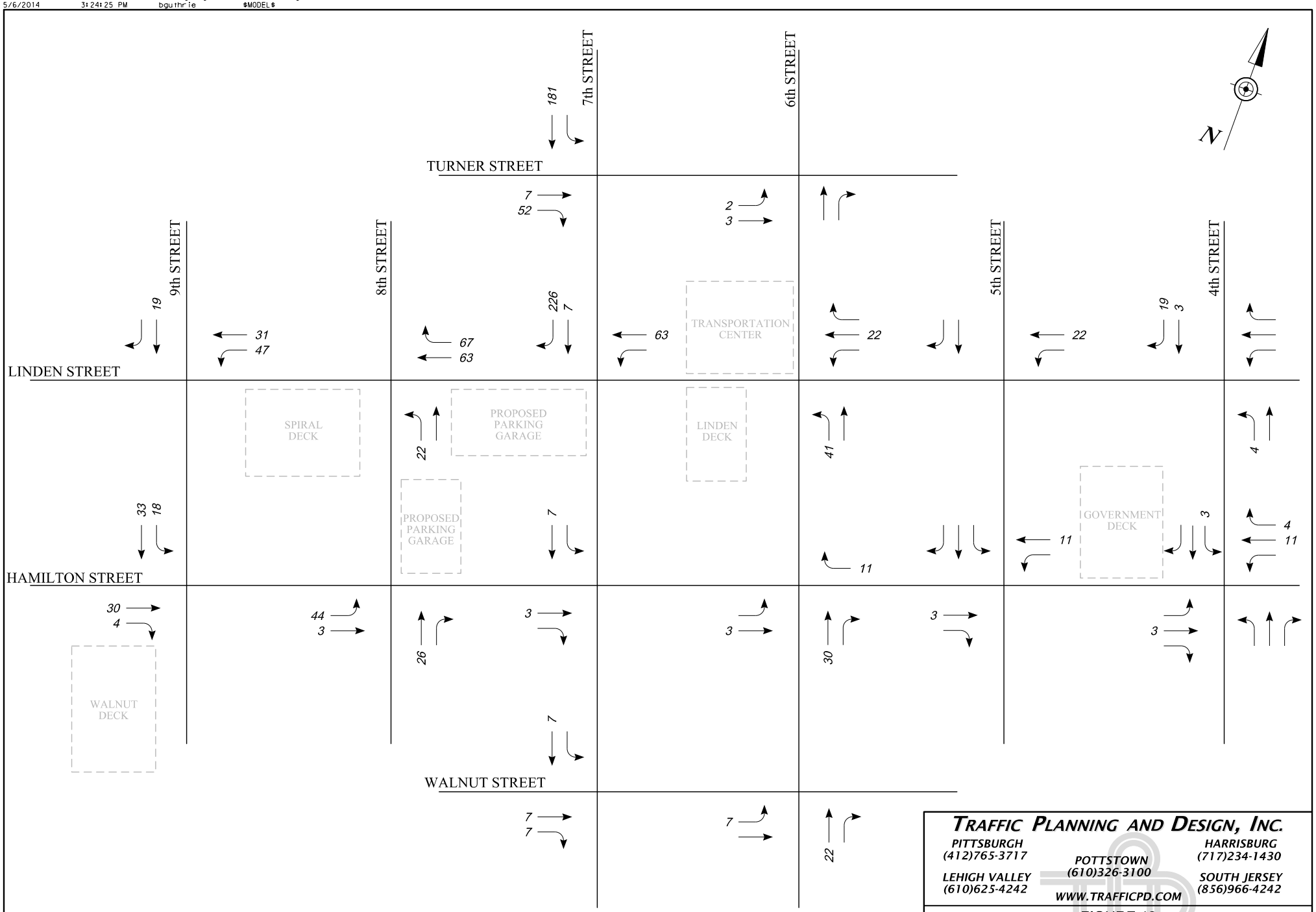
FIGURE 11

2019 BASE CONDITIONS
SATURDAY MIDDAY PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:25 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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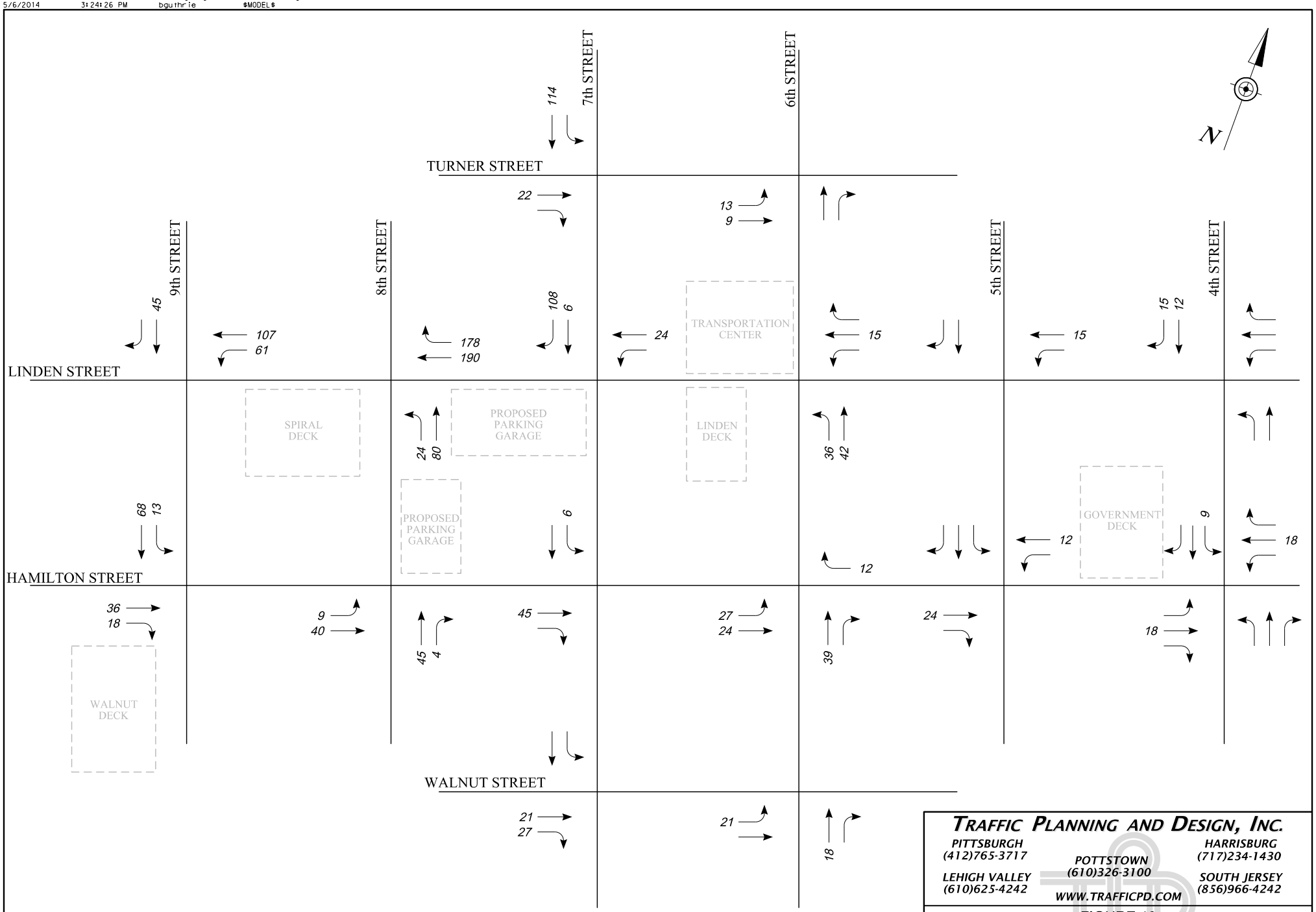
FIGURE 12

ARENA COMPLEX TRIP DISTRIBUTION
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:26 PM bguthrie $MODEL$



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SCHEMATIC DRAWING:NOT TO SCALE

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FIGURE 13

ARENA COMPLEX TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR (NON-EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
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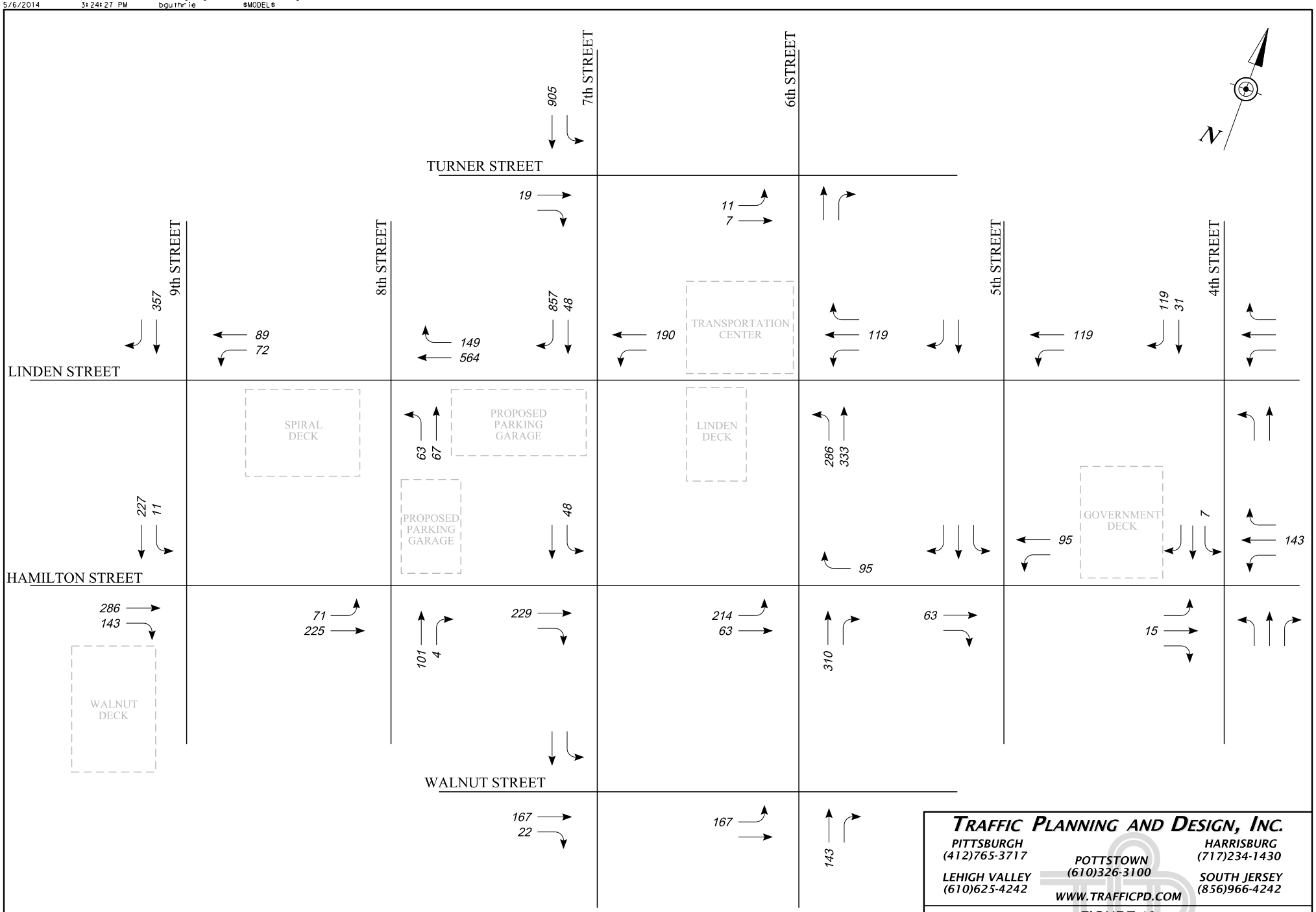

KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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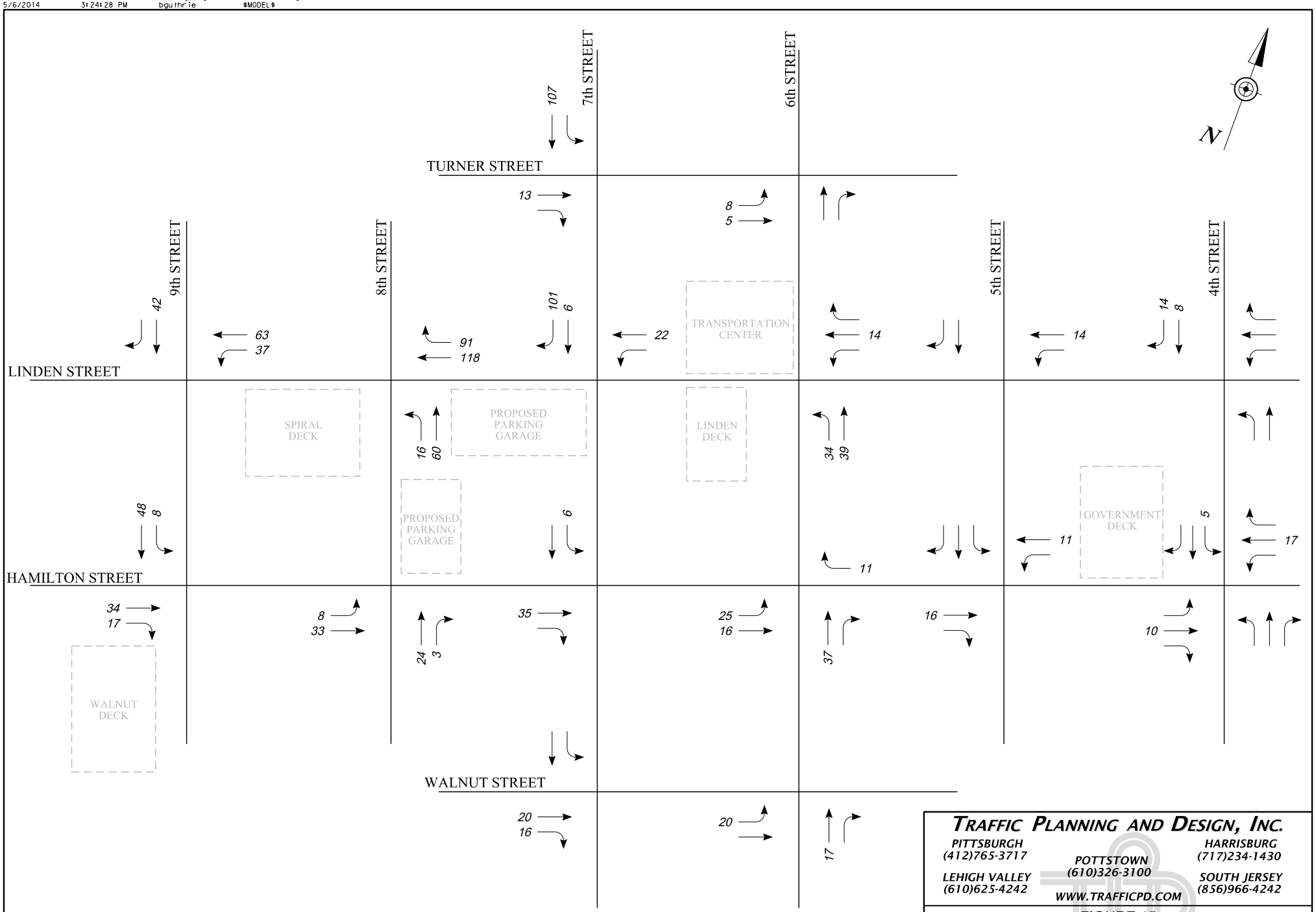
FIGURE 13

ARENA COMPLEX TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR (EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:28 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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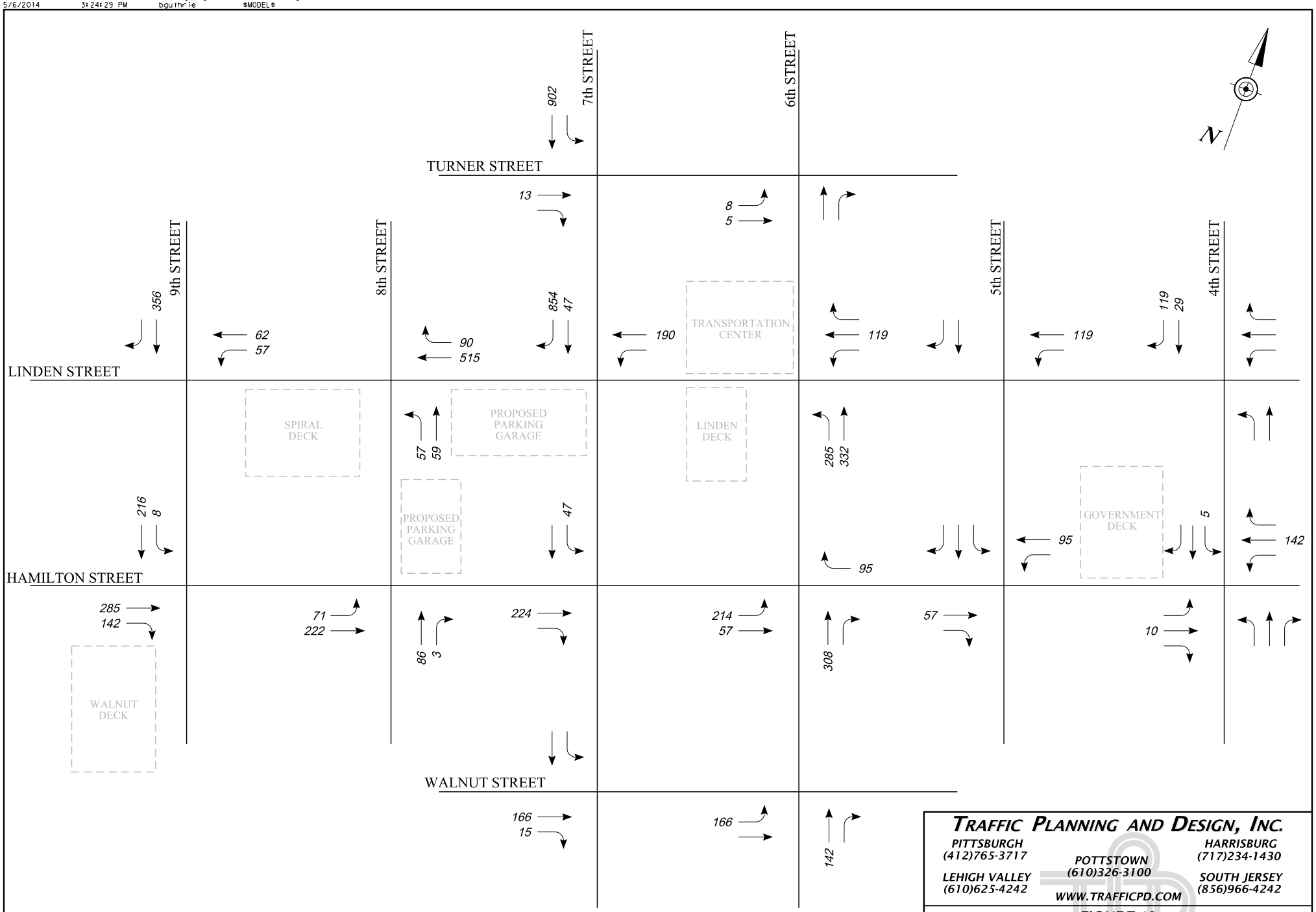
FIGURE 15

ARENA COMPLEX TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR (NON-EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:29 PM bguthrie $MODEL$



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SCHEMATIC DRAWING:NOT TO SCALE

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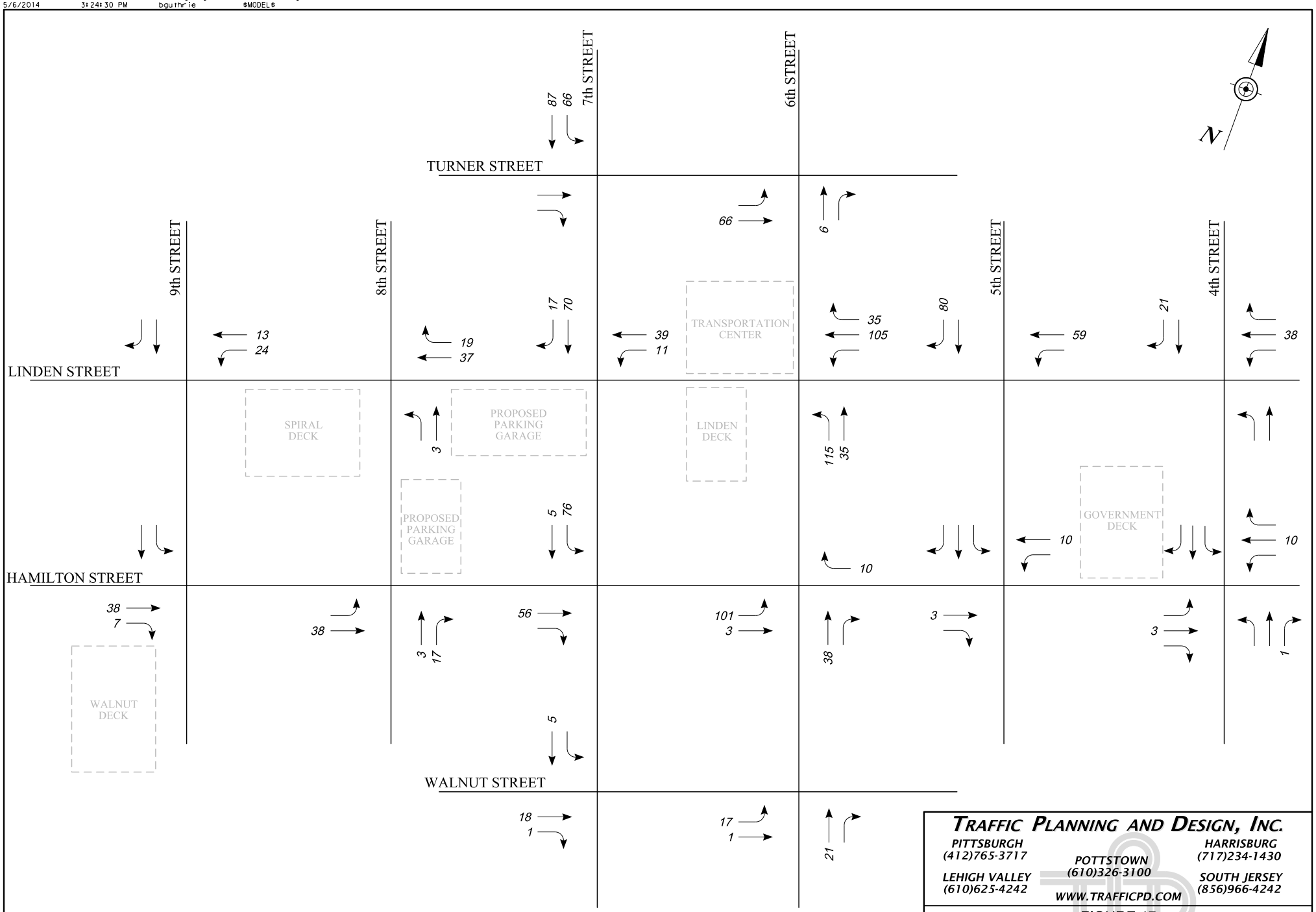
FIGURE 16

ARENA COMPLEX TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR (EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:30 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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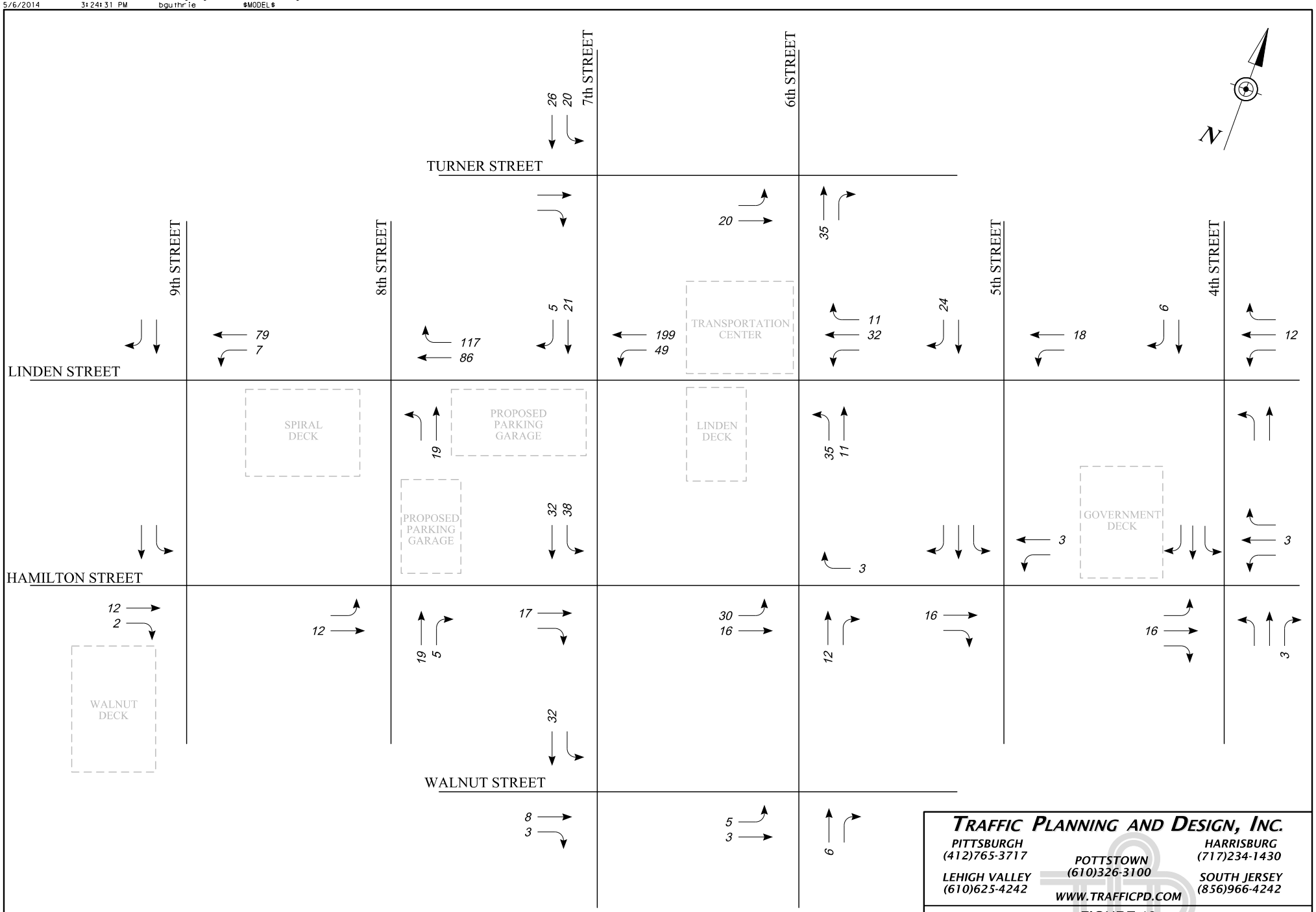
FIGURE 17

TWO CITY CENTER TRIP DISTRIBUTION
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:31 PM bguthrie $MODEL$



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SCHEMATIC DRAWING:NOT TO SCALE

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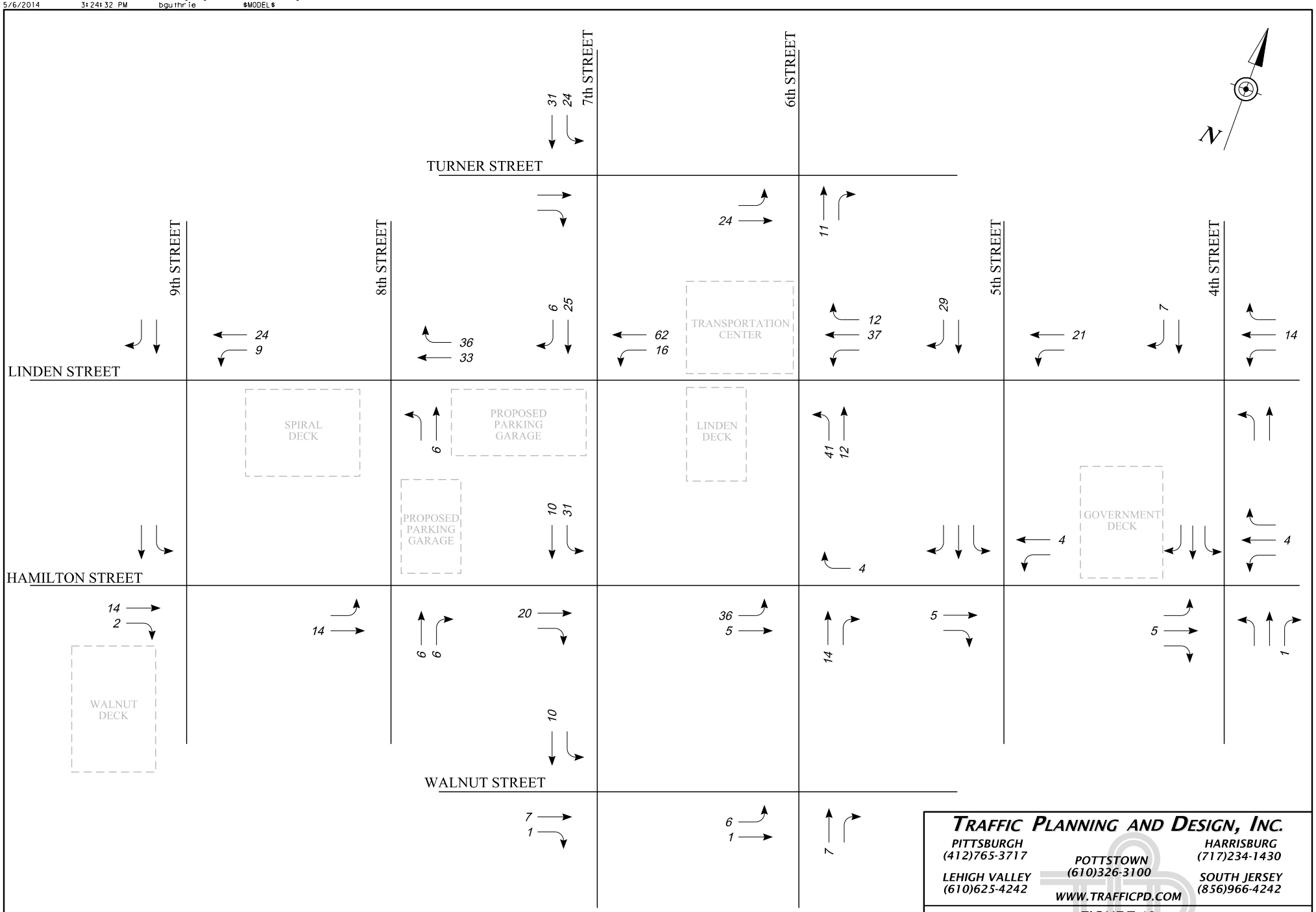
FIGURE 18

TWO CITY CENTER TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:32 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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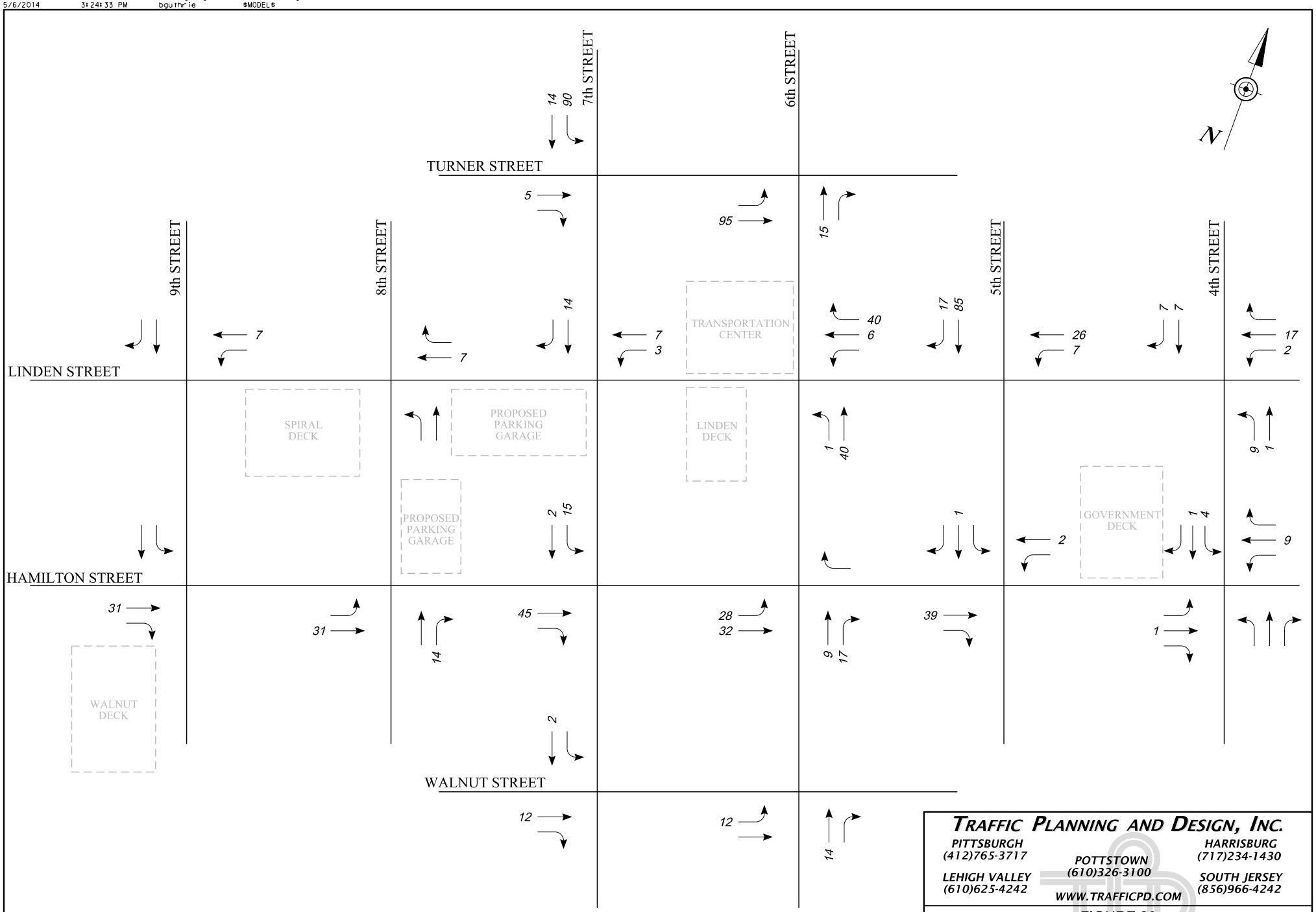
FIGURE 19

TWO CITY CENTER TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:33 PM bguthrie $MODEL$



KEY:
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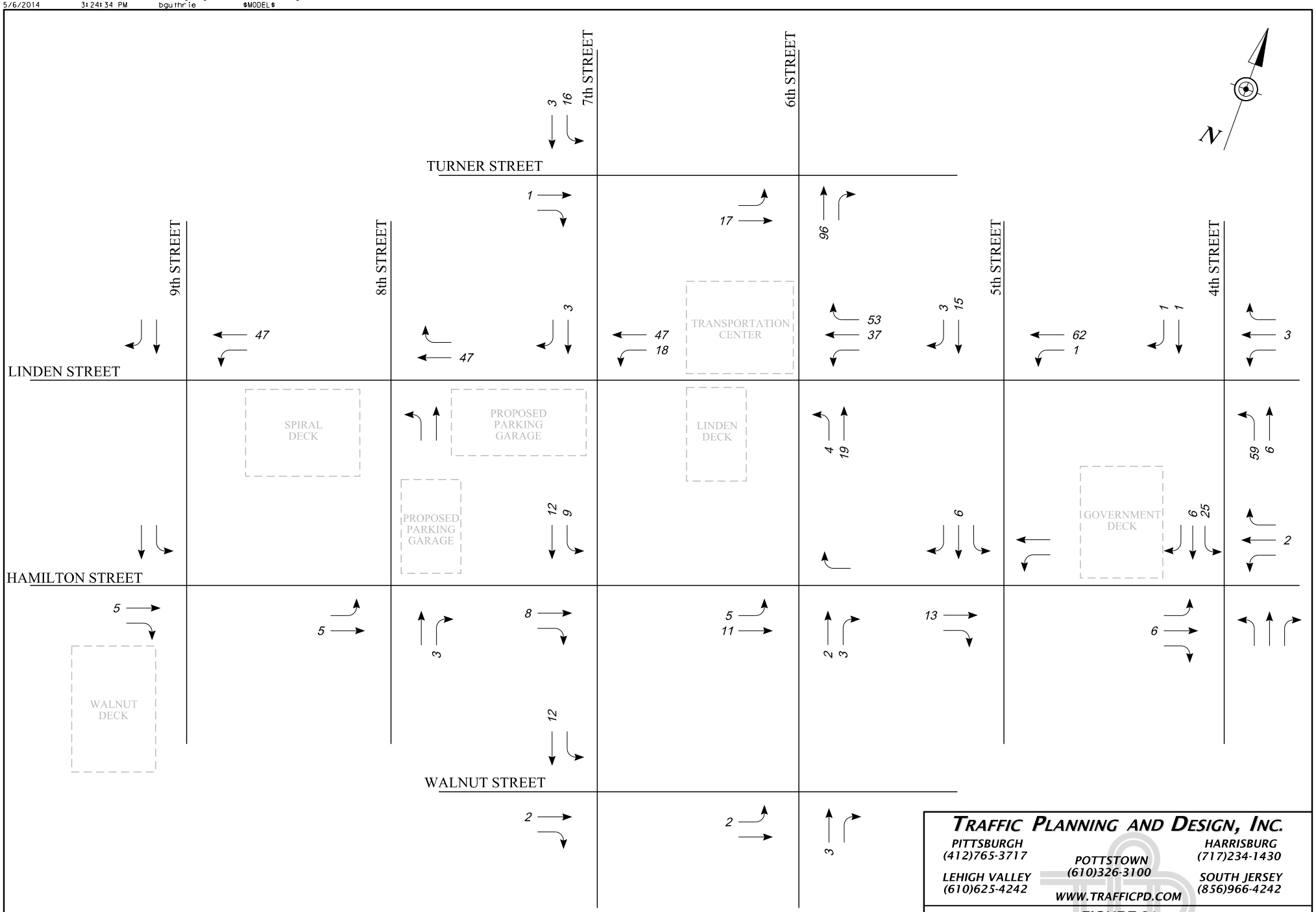
FIGURE 20

THREE CITY CENTER TRIP DISTRIBUTION
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:34 PM bguthrie $MODEL$



KEY:
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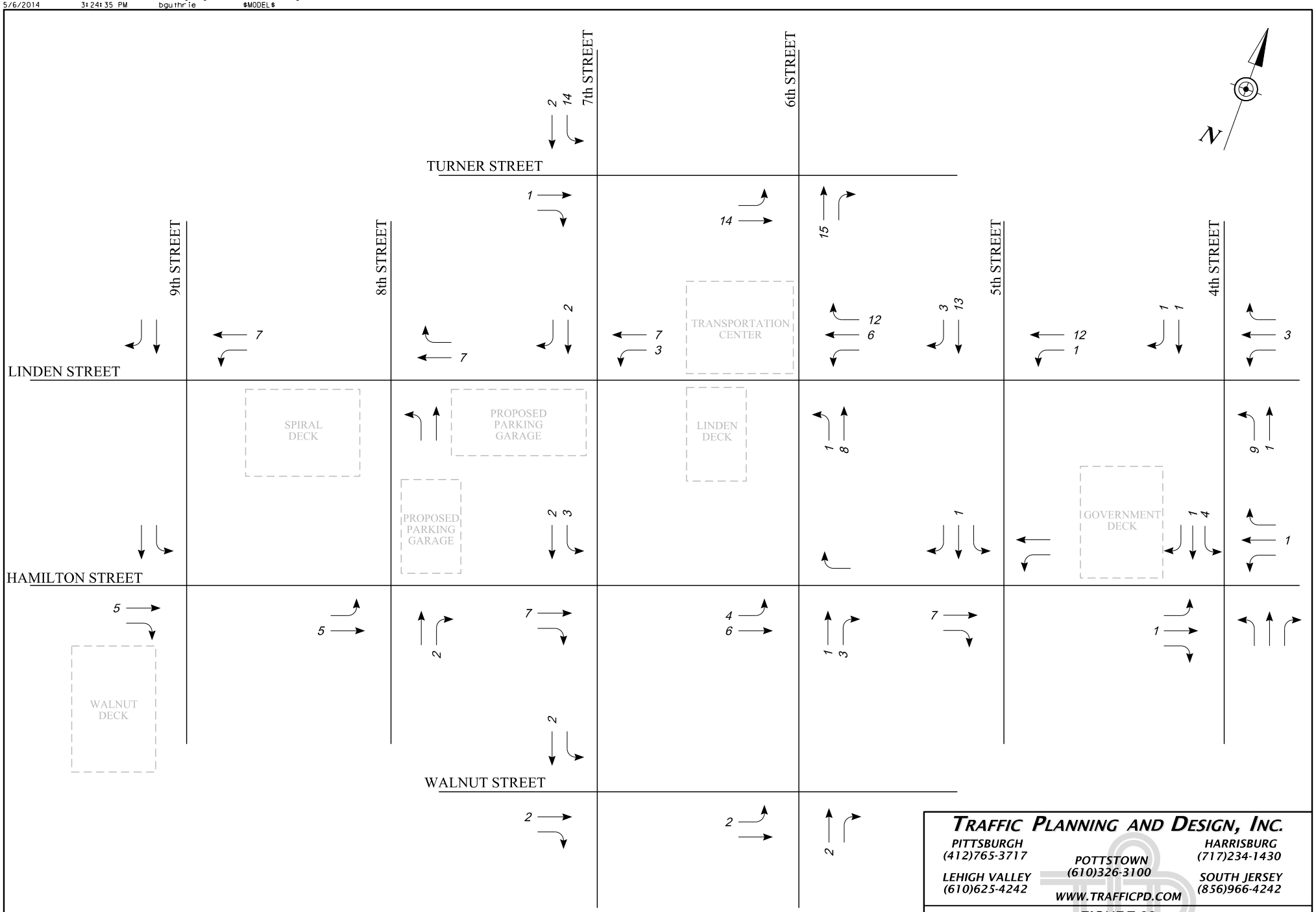
FIGURE 21

THREE CITY CENTER TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:35 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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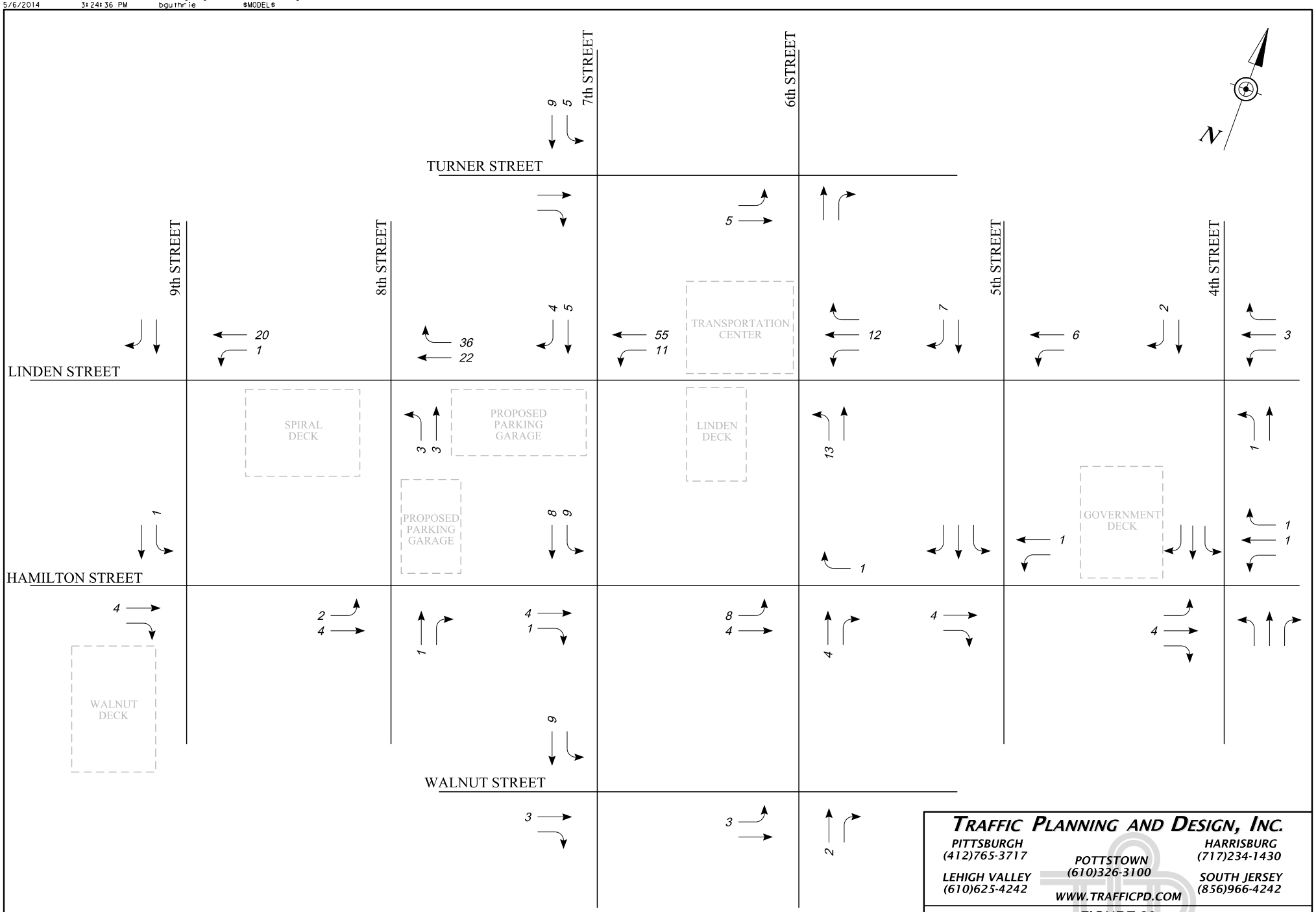
FIGURE 22

THREE CITY CENTER TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:36 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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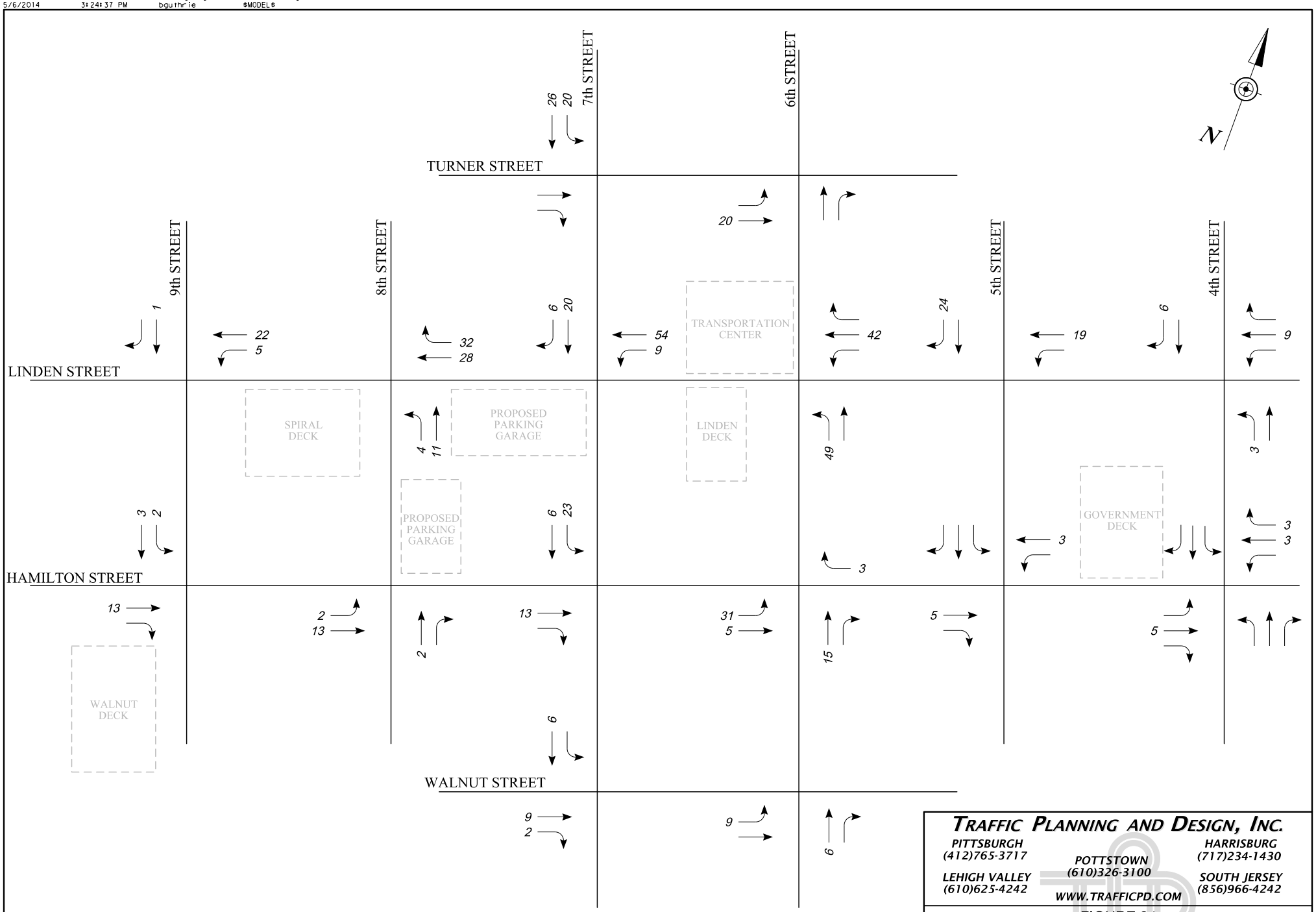
FIGURE 23

FOUR CITY CENTER TRIP DISTRIBUTION
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:37 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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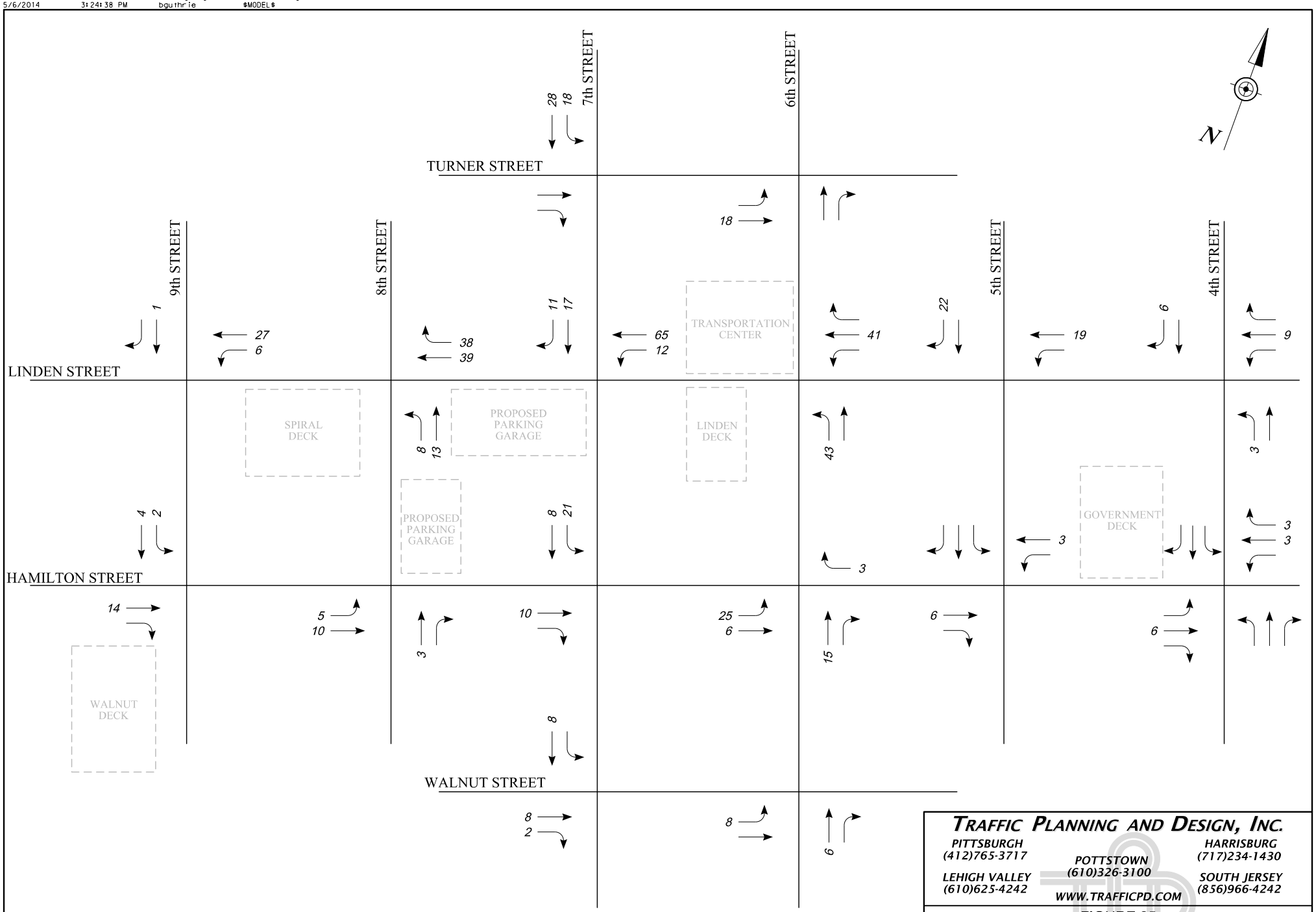
FIGURE 24

FOUR CITY CENTER TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:38 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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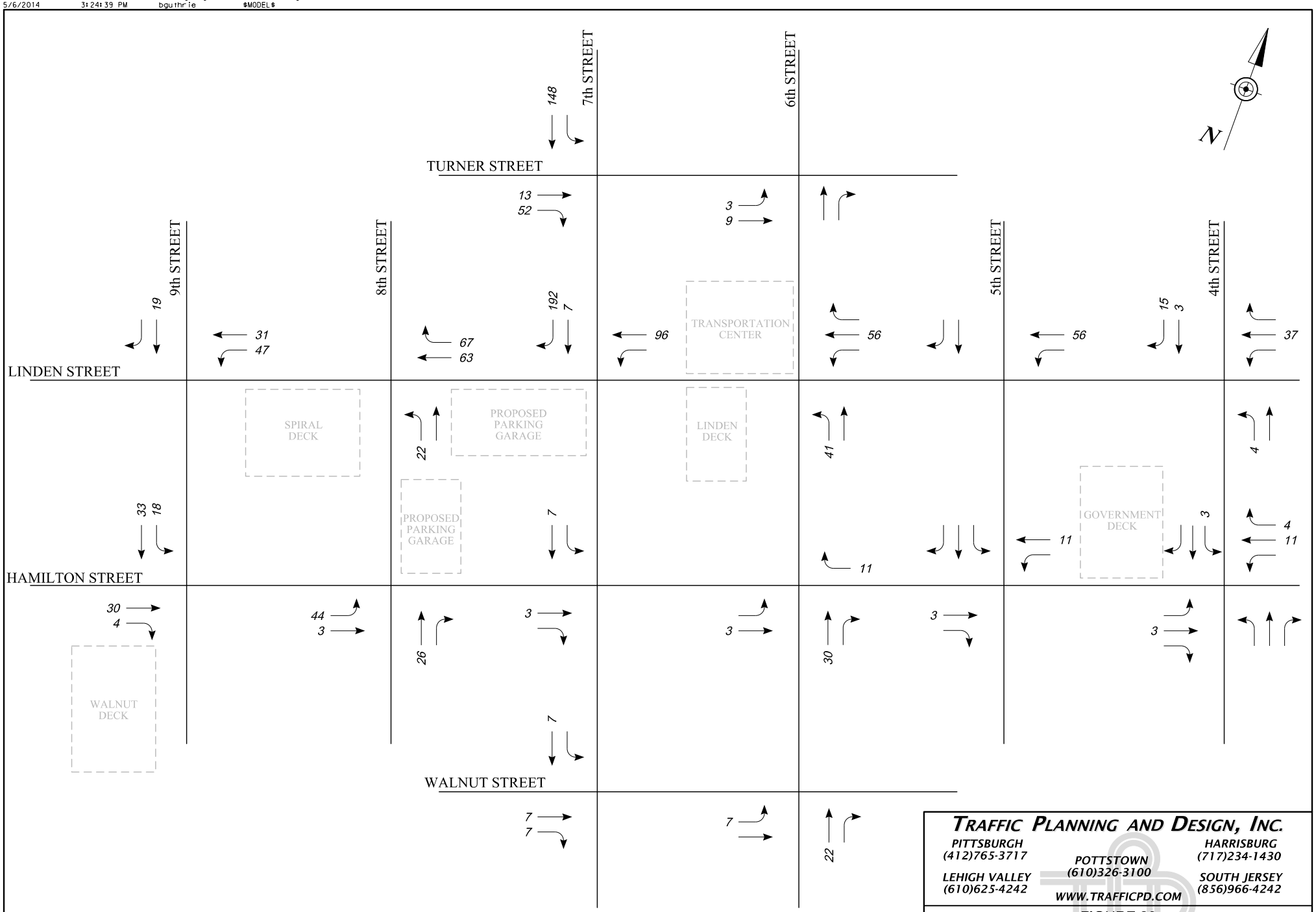
FIGURE 25

FOUR CITY CENTER TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:39 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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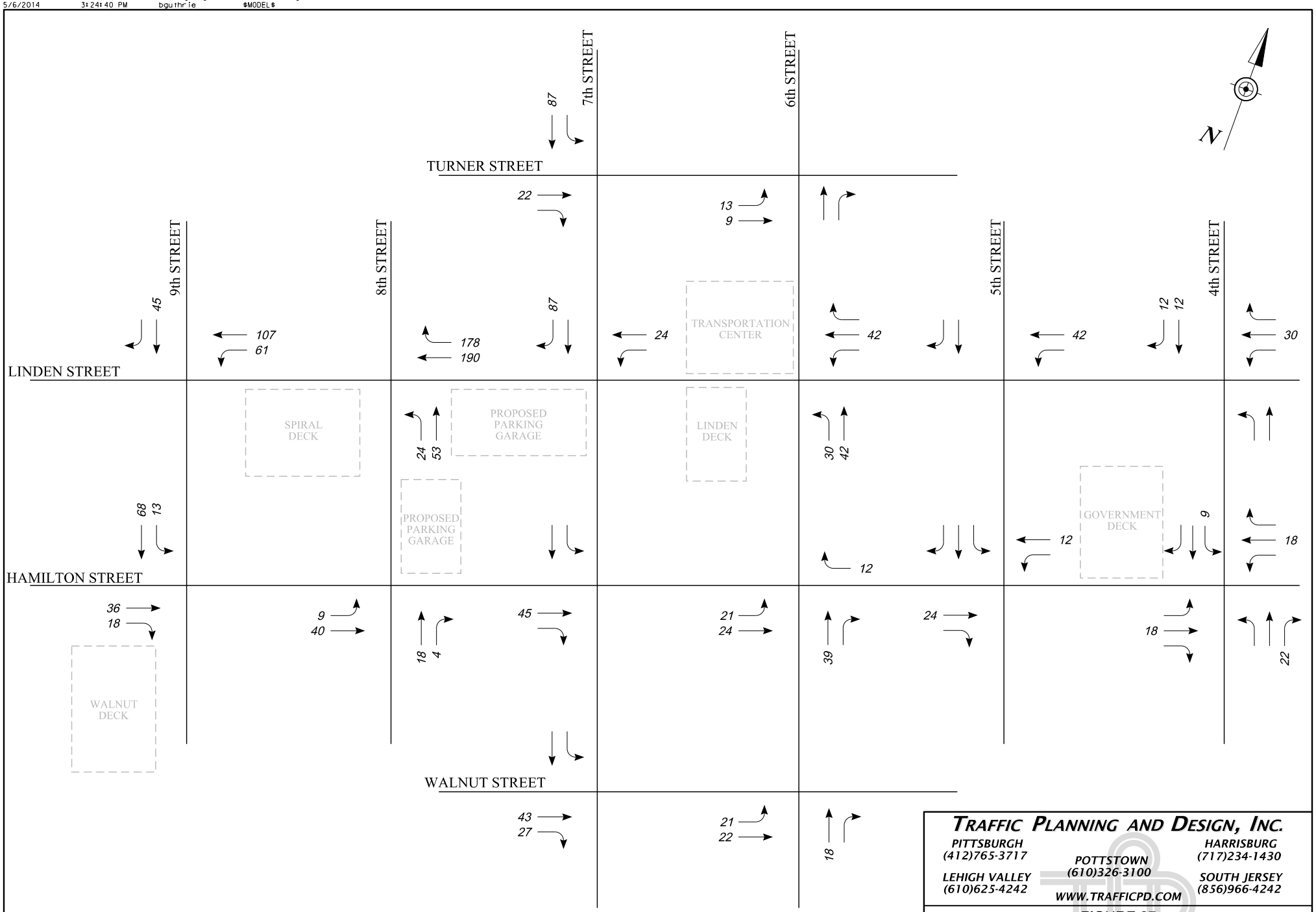
FIGURE 26

ARENA COMPLEX TRIP DISTRIBUTION
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:40 PM bguthrie $MODEL$



KEY:
SCHEMATIC DRAWING:NOT TO SCALE

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FIGURE 27

ARENA COMPLEX TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR (NON-EVENT DAY)
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:41 PM bguthrie $MODEL$

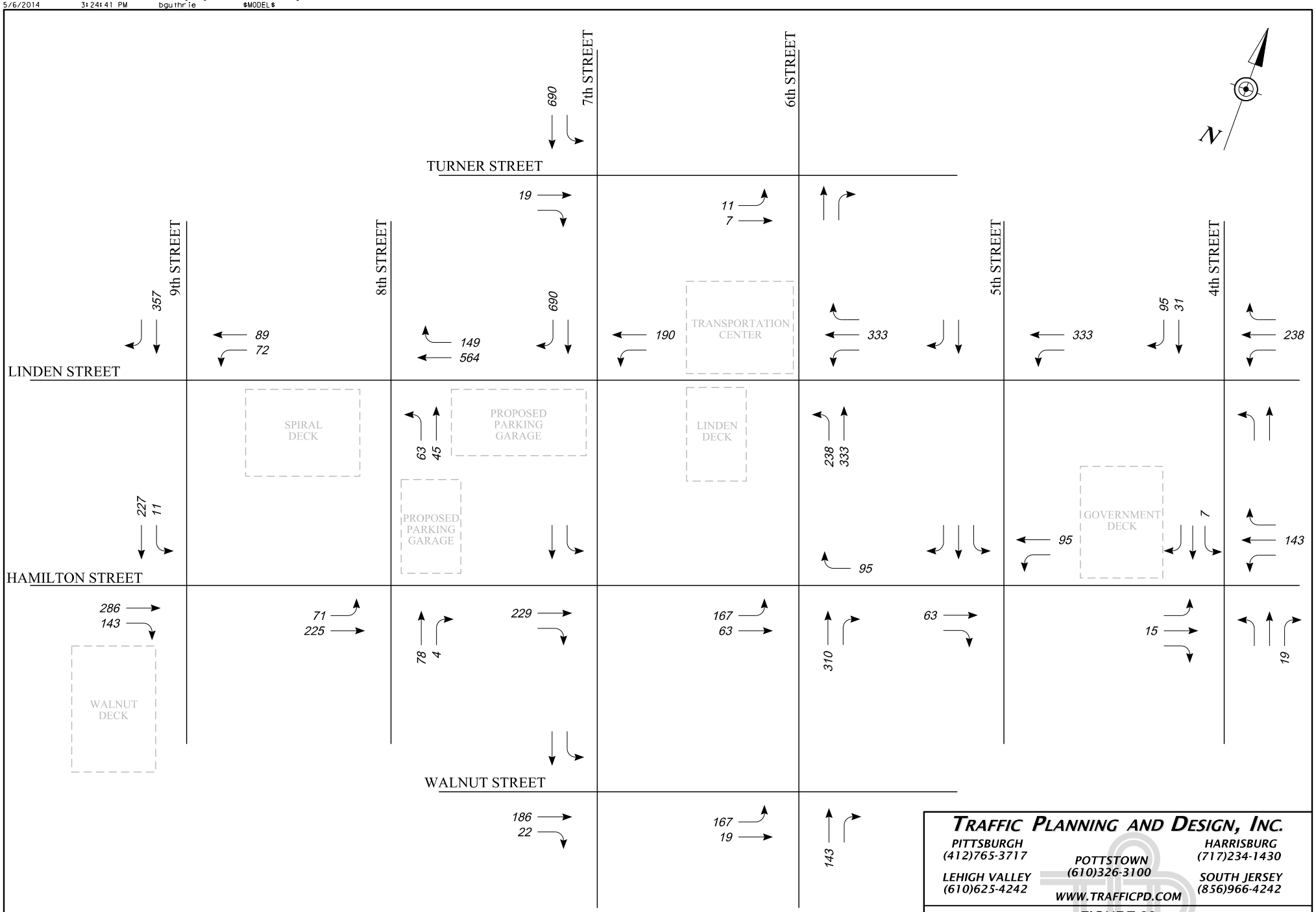

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FIGURE 28

ARENA COMPLEX TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR (EVENT DAY)
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
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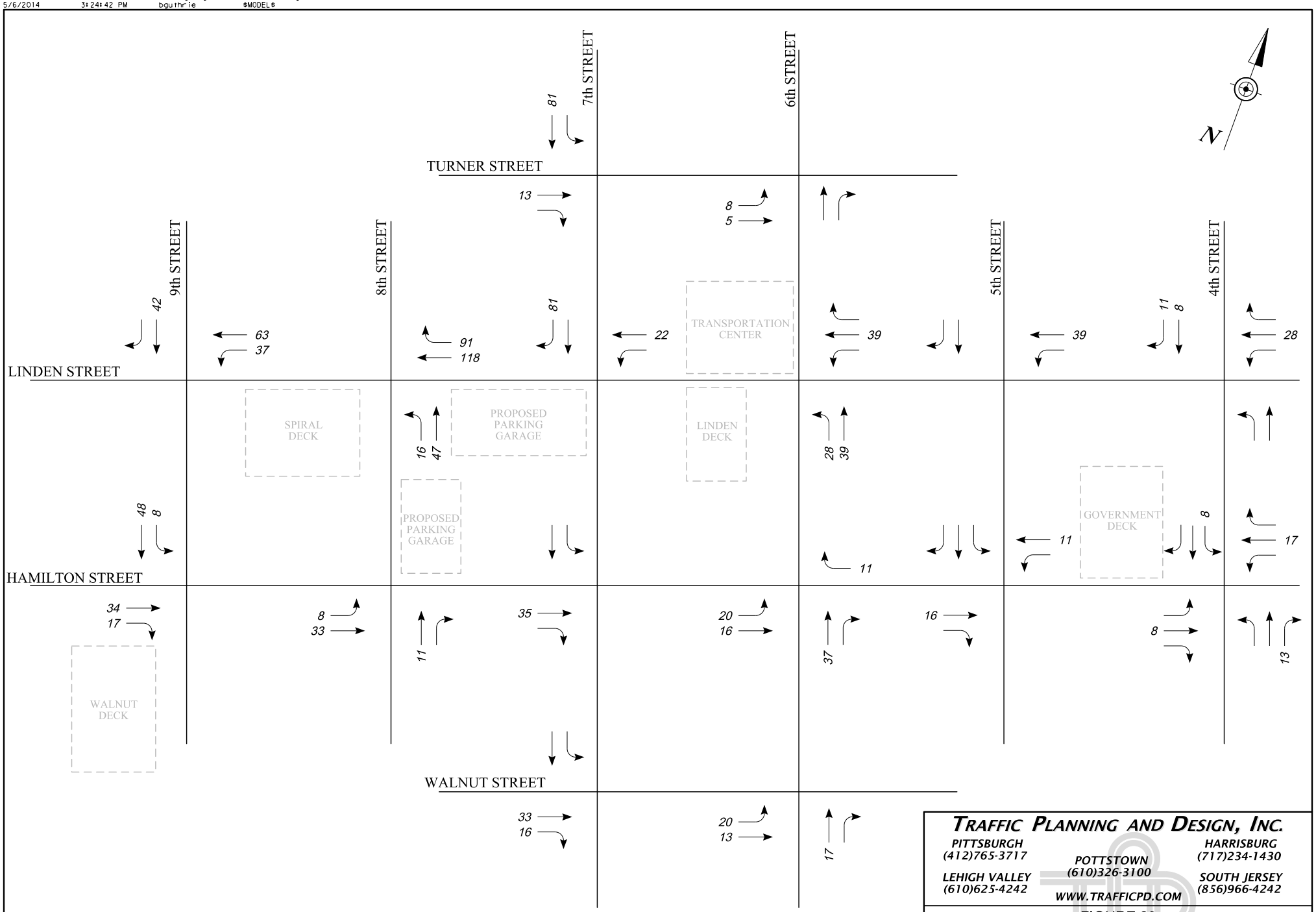

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FIGURE 29

ARENA COMPLEX TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR (NON-EVENT DAY)
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:43 PM bguthrie $MODEL$

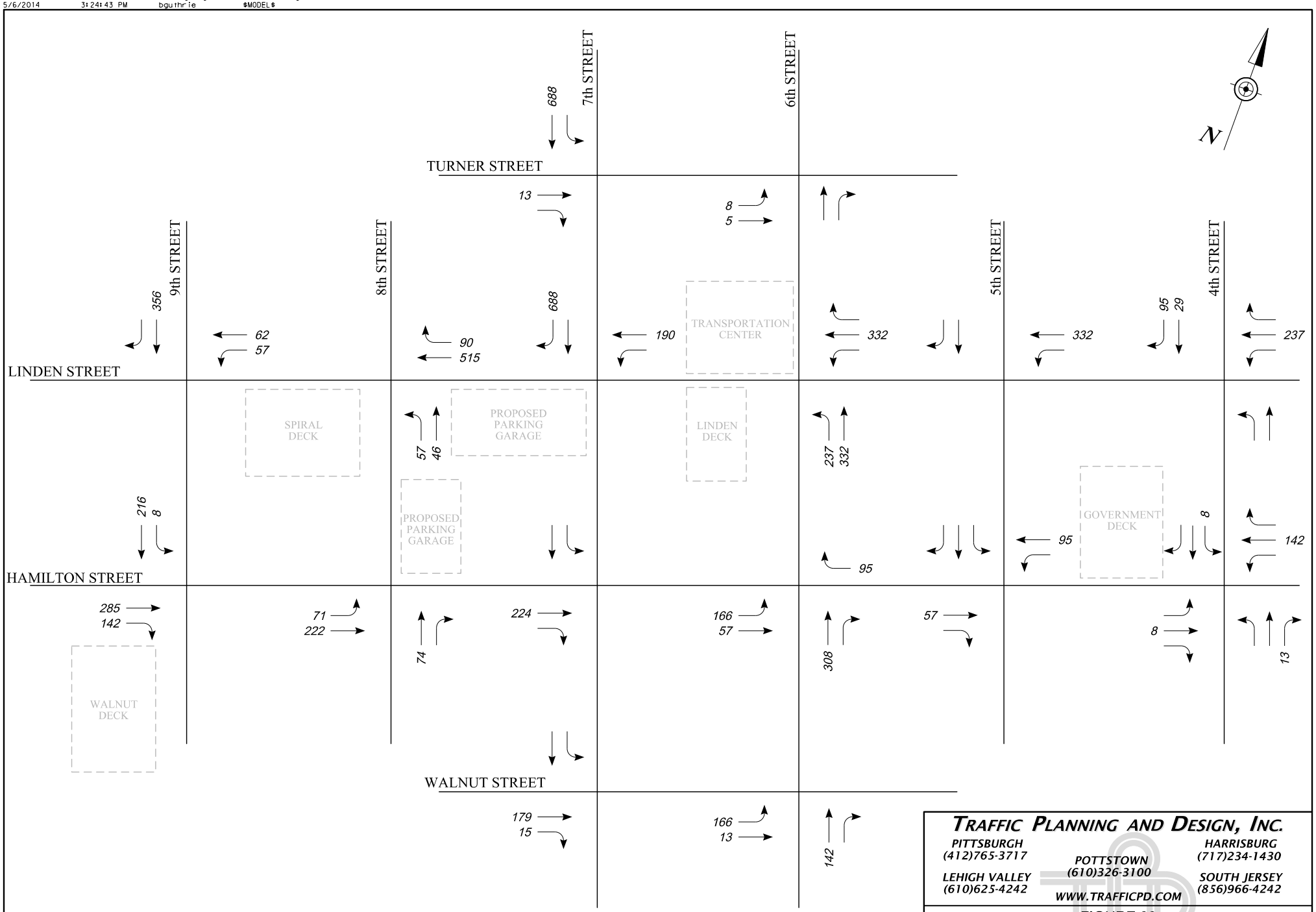

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FIGURE 30

ARENA COMPLEX TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR (EVENT DAY)
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:45 PM bguthrie $MODEL$

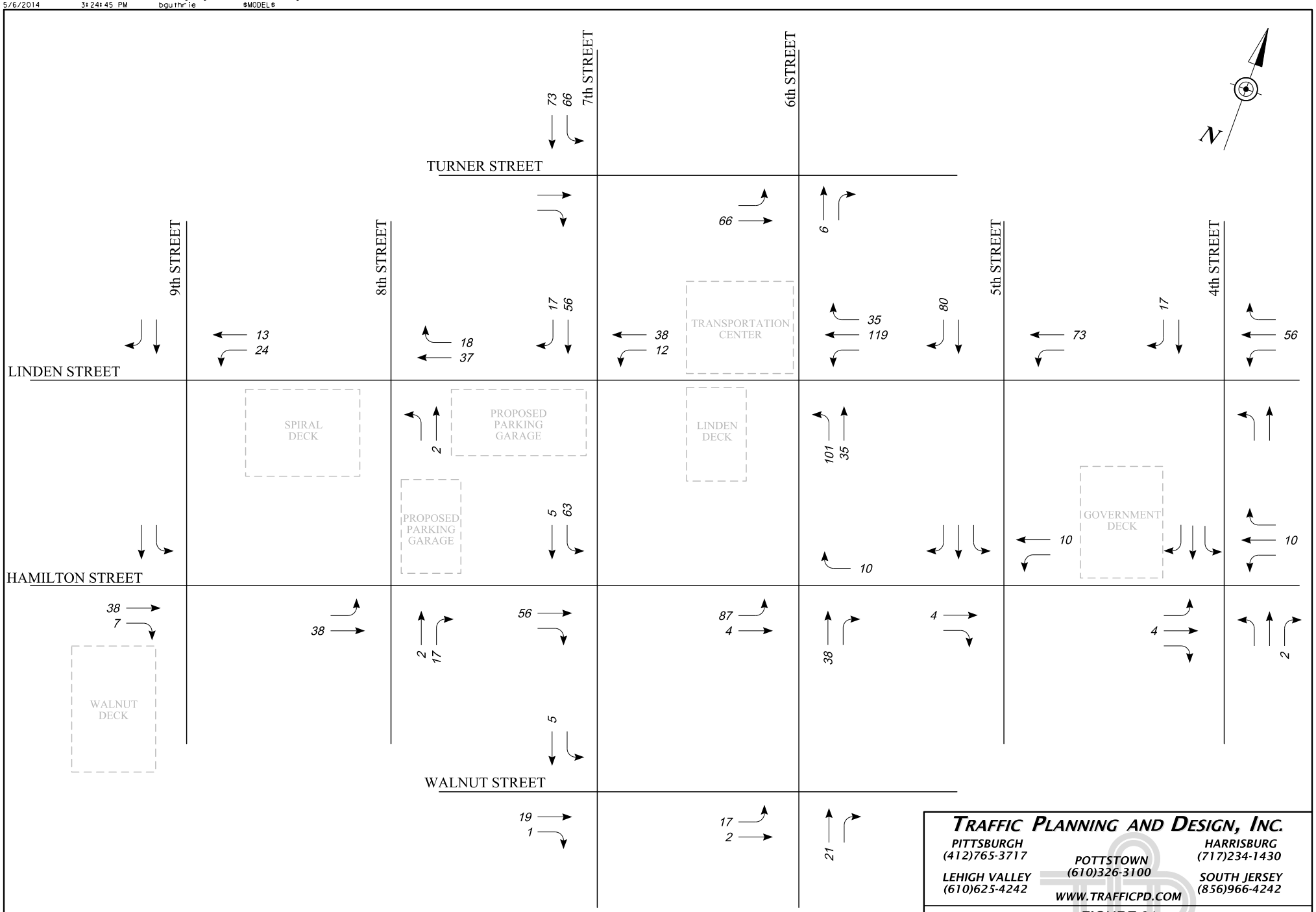

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FIGURE 31

TWO CITY CENTER TRIP DISTRIBUTION
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
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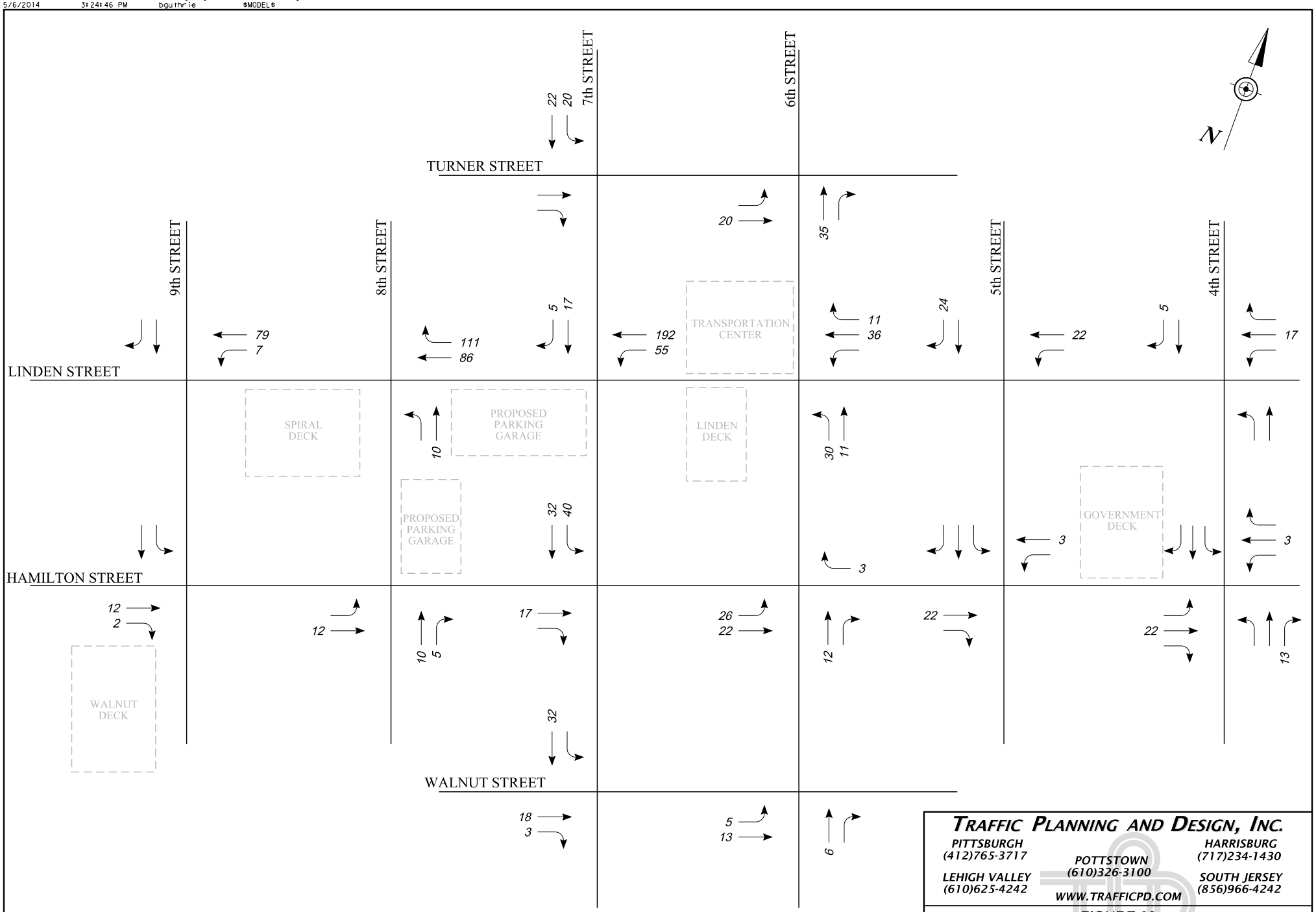

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FIGURE 32

TWO CITY CENTER TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:47 PM bguthrie $MODEL$

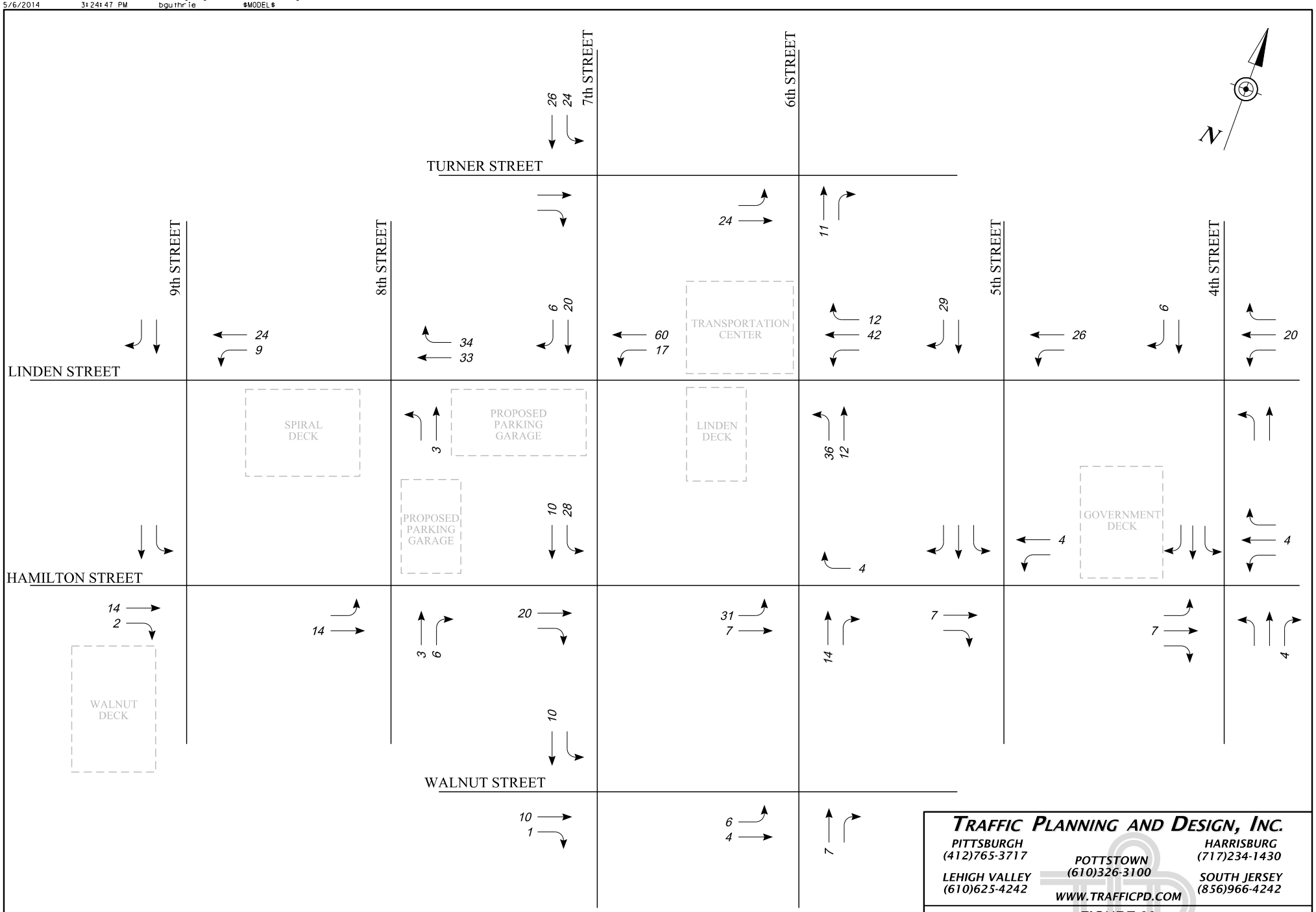

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FIGURE 33

TWO CITY CENTER TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:48 PM bguthrie $MODEL$

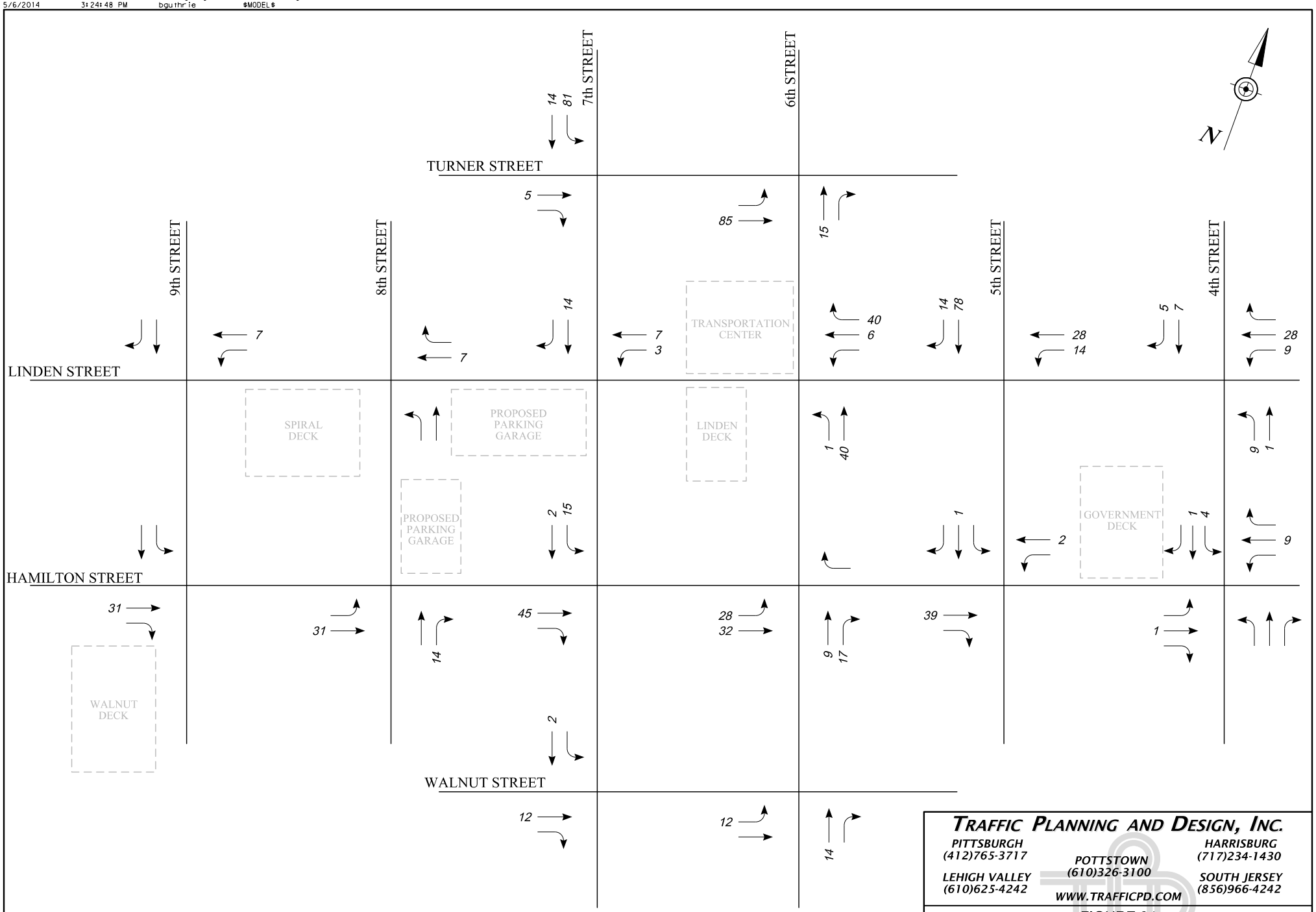

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FIGURE 34

THREE CITY CENTER TRIP DISTRIBUTION
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:49 PM bguthrie $MODEL$

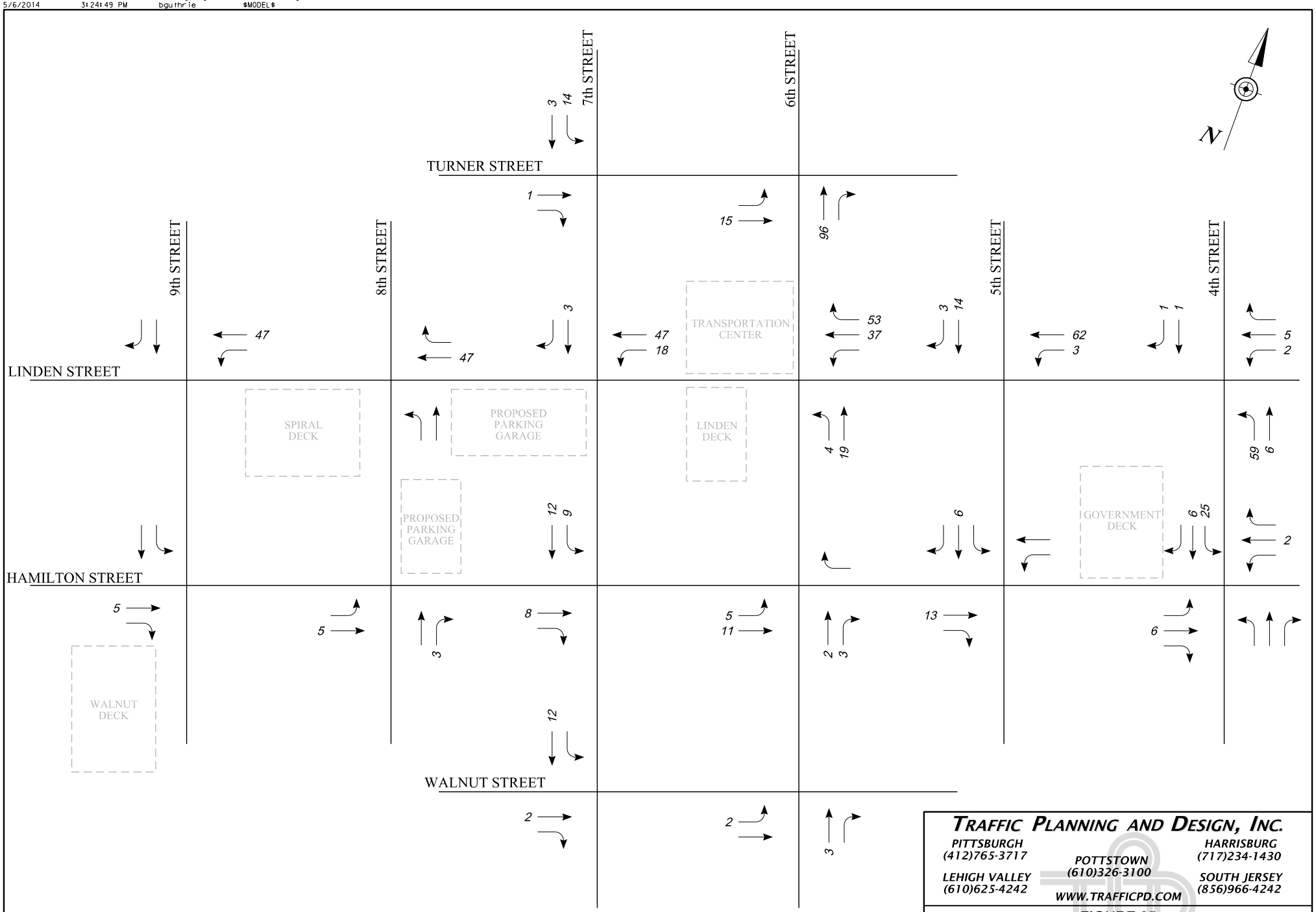

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FIGURE 35

THREE CITY CENTER TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
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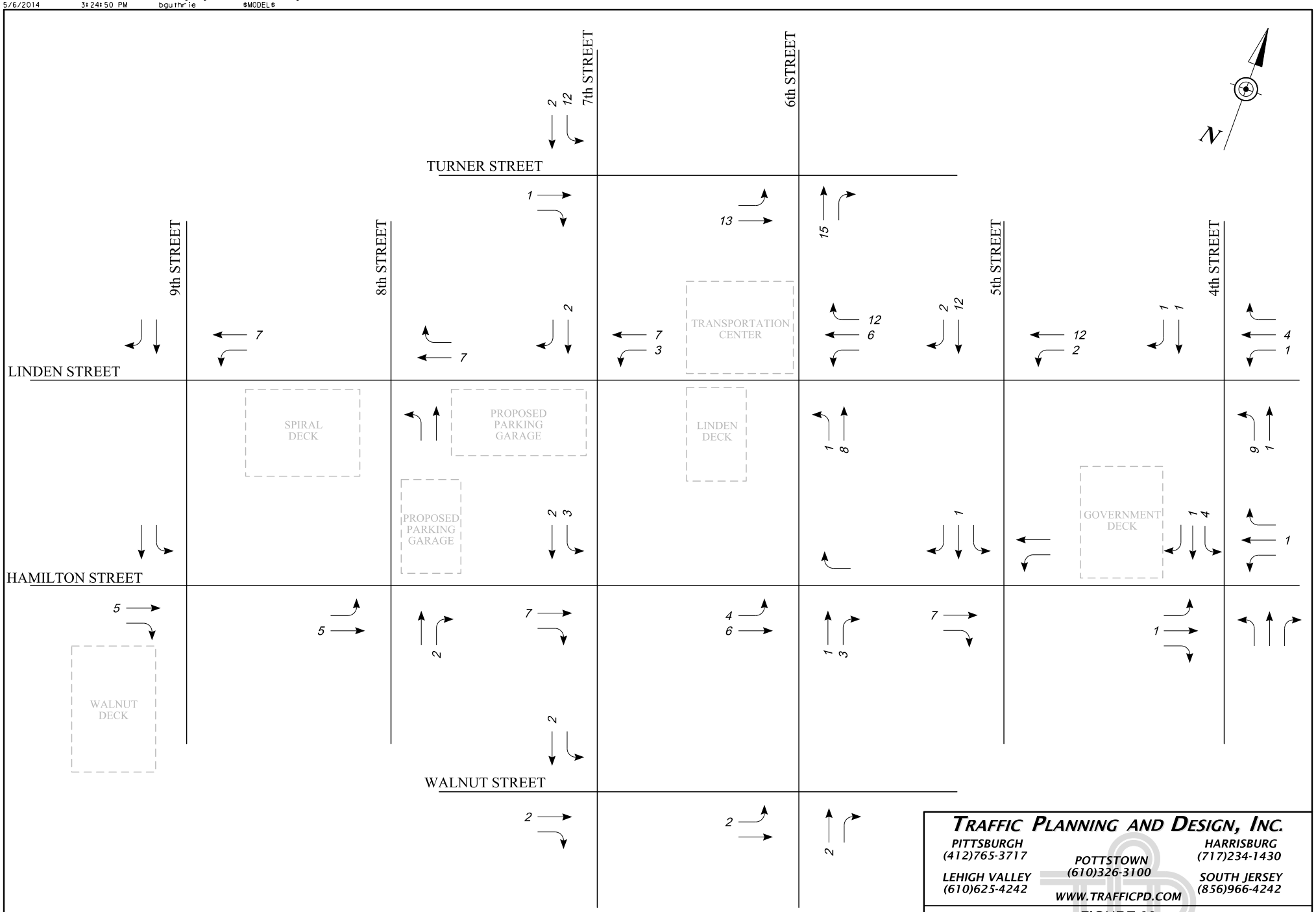

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FIGURE 36

THREE CITY CENTER TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:52 PM bguthrie $MODEL$

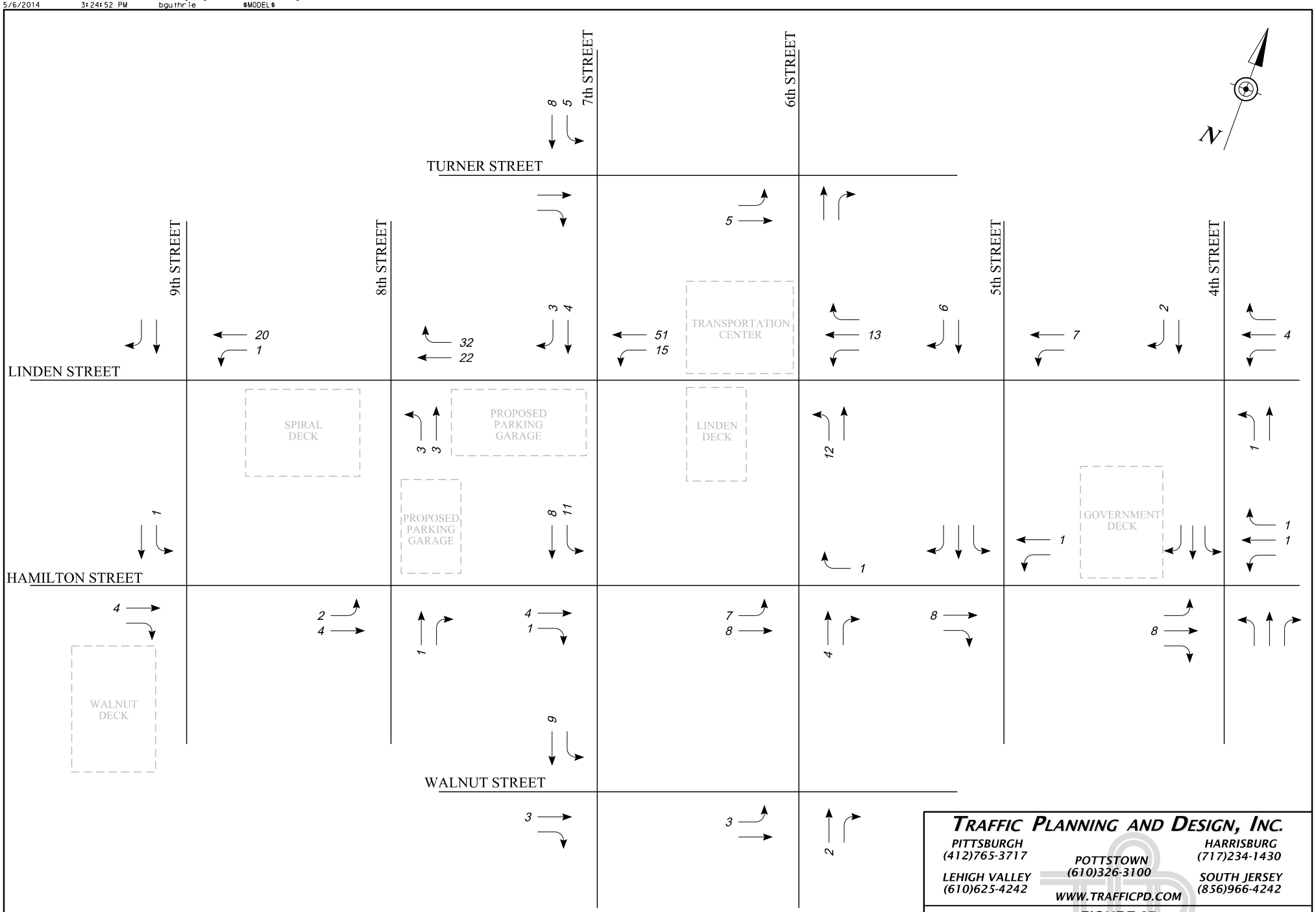

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FIGURE 37

FOUR CITY CENTER TRIP DISTRIBUTION
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:53 PM bguthrie $MODEL$

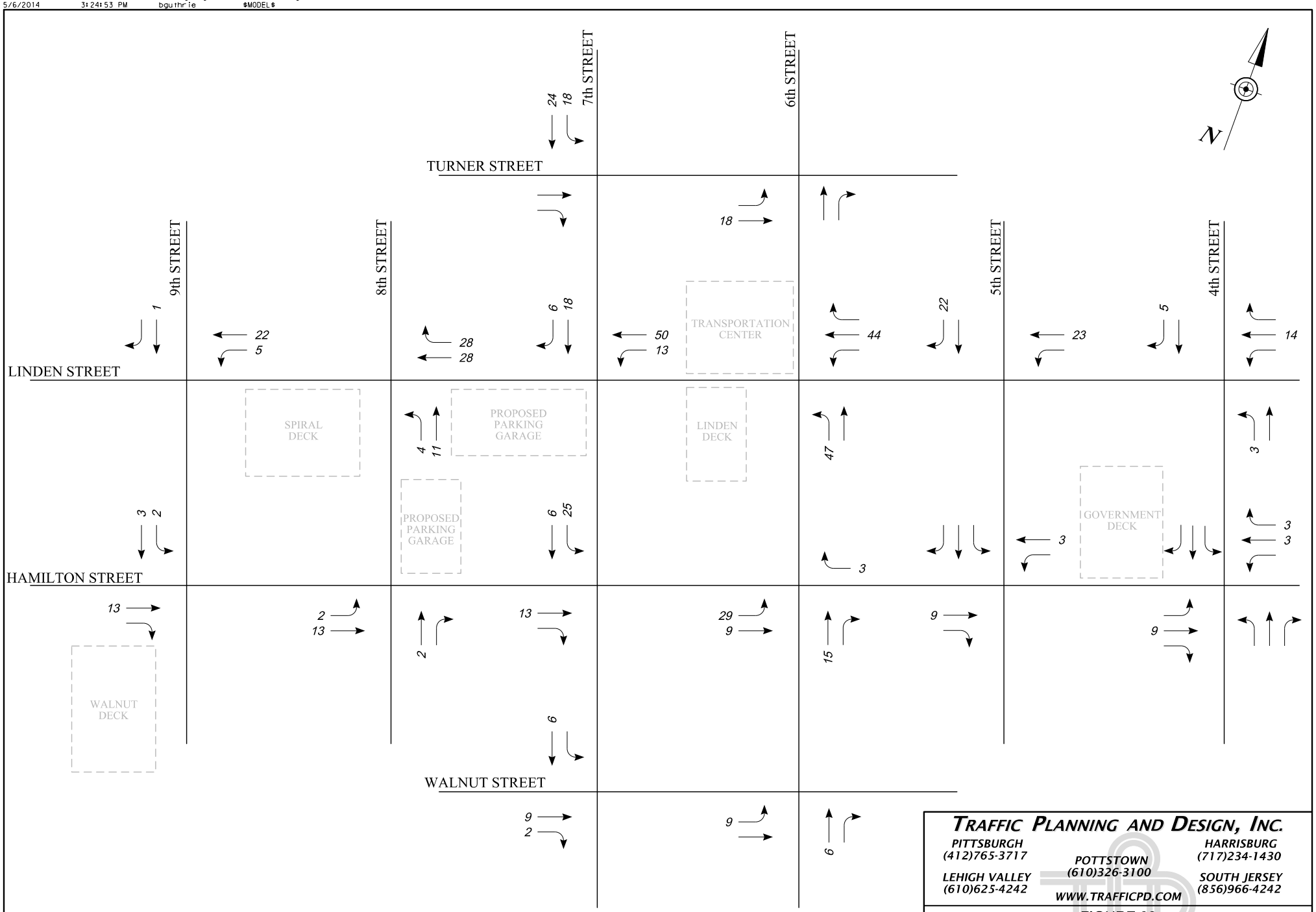

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FIGURE 38

FOUR CITY CENTER TRIP DISTRIBUTION
WEEKDAY PM PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:55 PM bguthrie $MODEL$

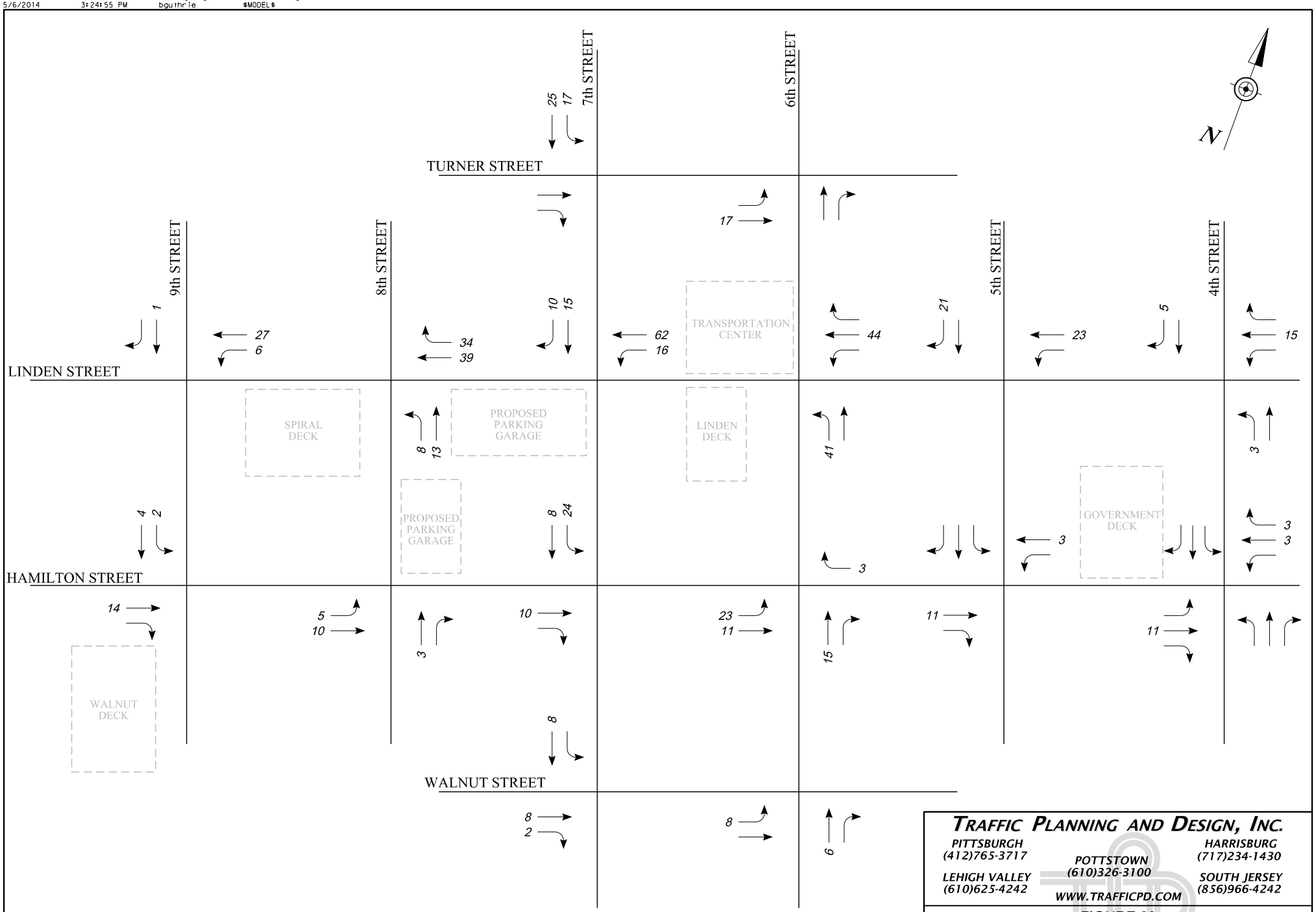

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FIGURE 39

FOUR CITY CENTER TRIP DISTRIBUTION
SATURDAY MIDDAY PEAK HOUR
TRAFFIC VOLUMES
WITH AMERICAN PARKWAY BRIDGE

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:56 PM bguthrie $MODEL$

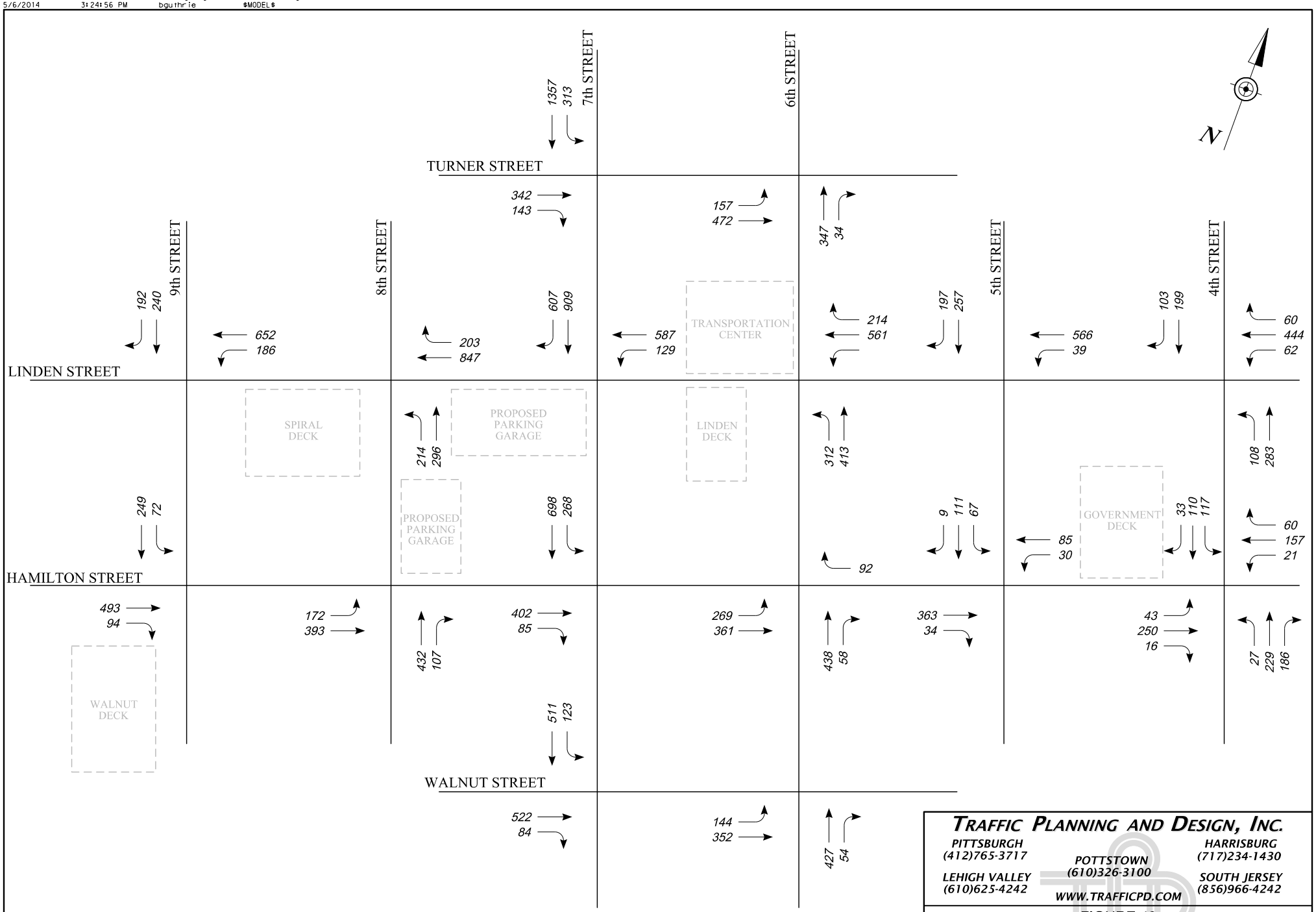

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FIGURE 40

2014 PROJECTED CONDITIONS
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:57 PM bguthrie $MODEL$

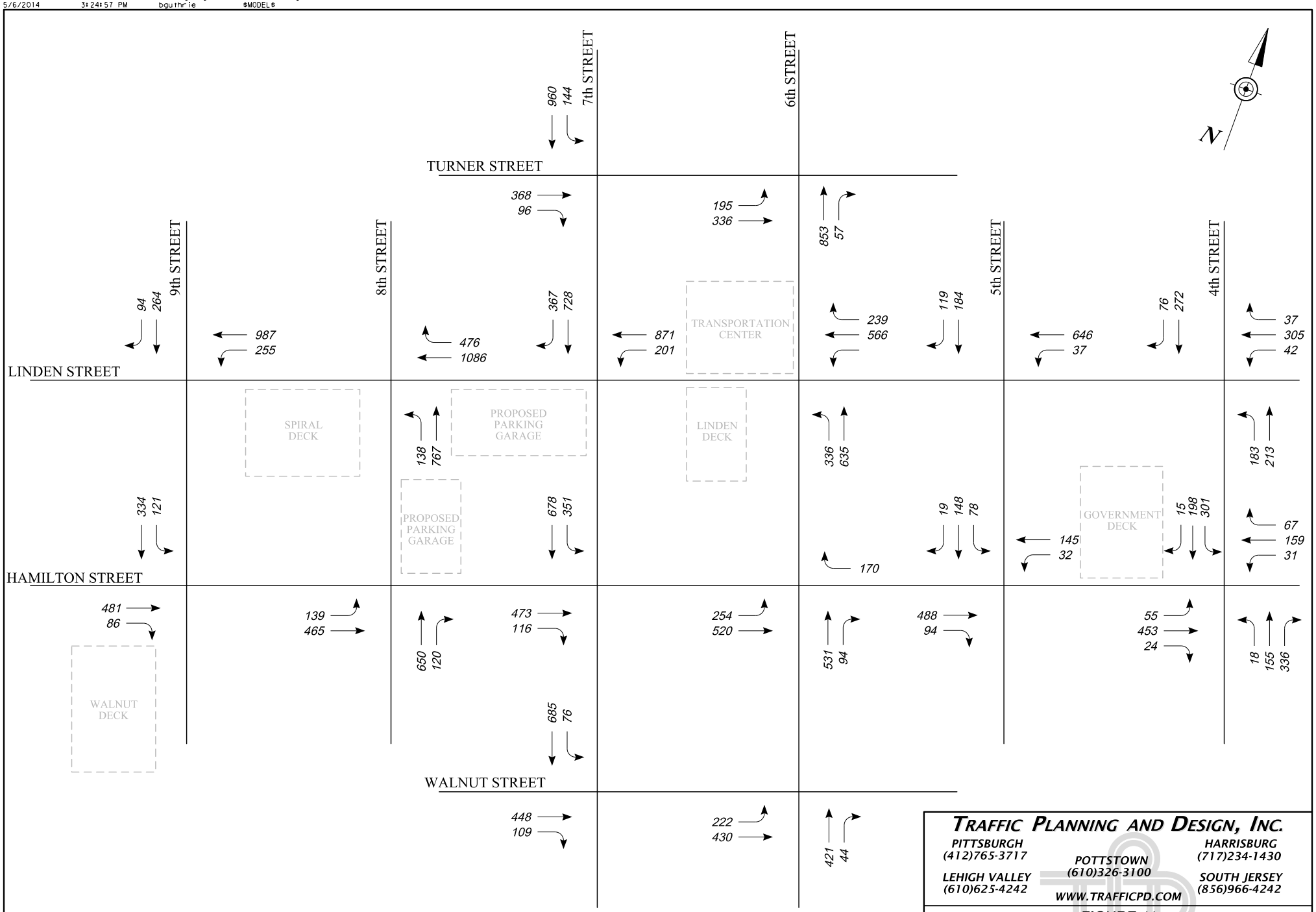

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FIGURE 41

2014 PROJECTED CONDITIONS
WEEKDAY PM PEAK HOUR (NON-EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:58 PM bguthrie $MODEL$

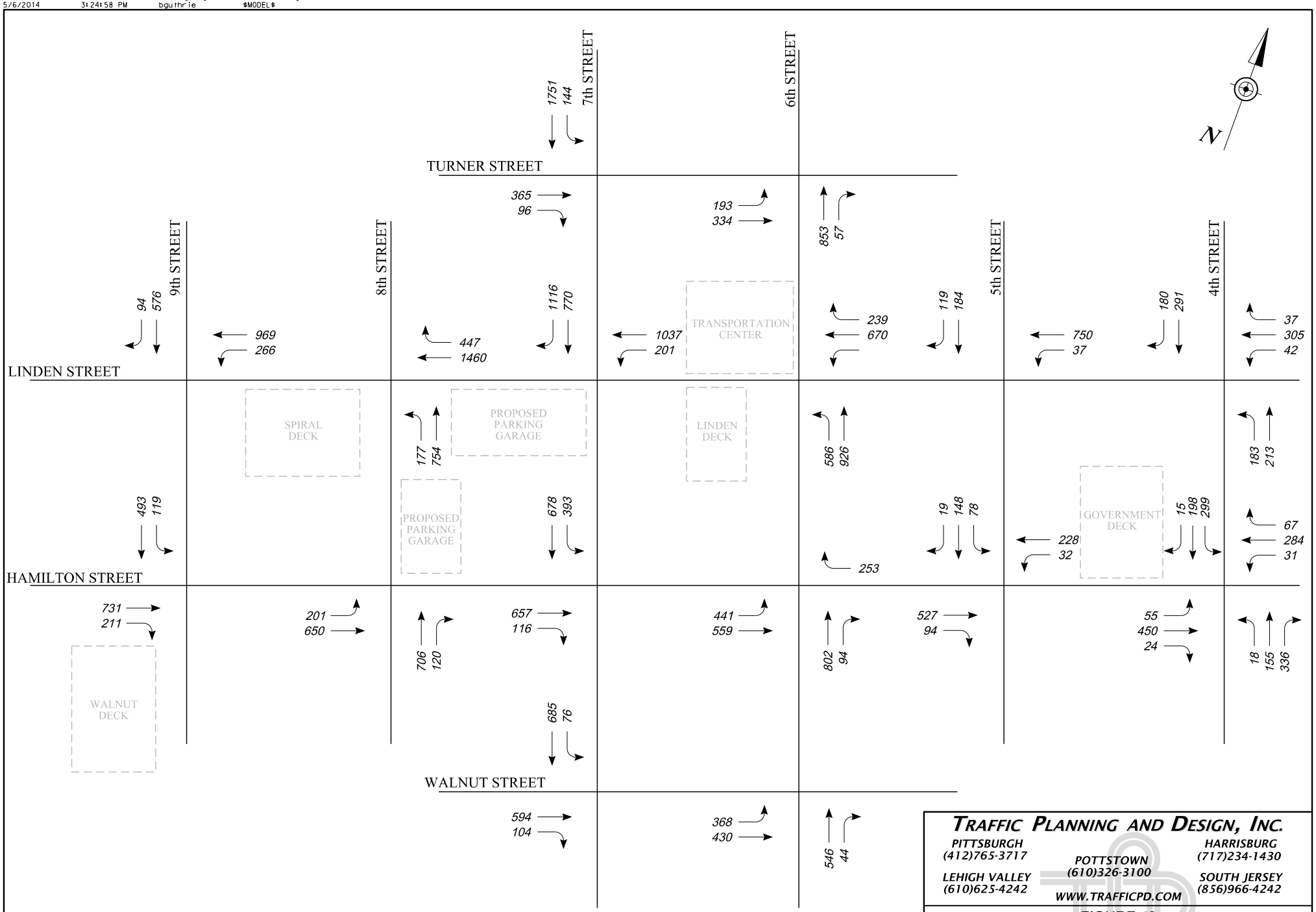

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FIGURE 42

2014 PROJECTED CONDITIONS
WEEKDAY PM PEAK HOUR (EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:24:59 PM bguthrie $MODEL$

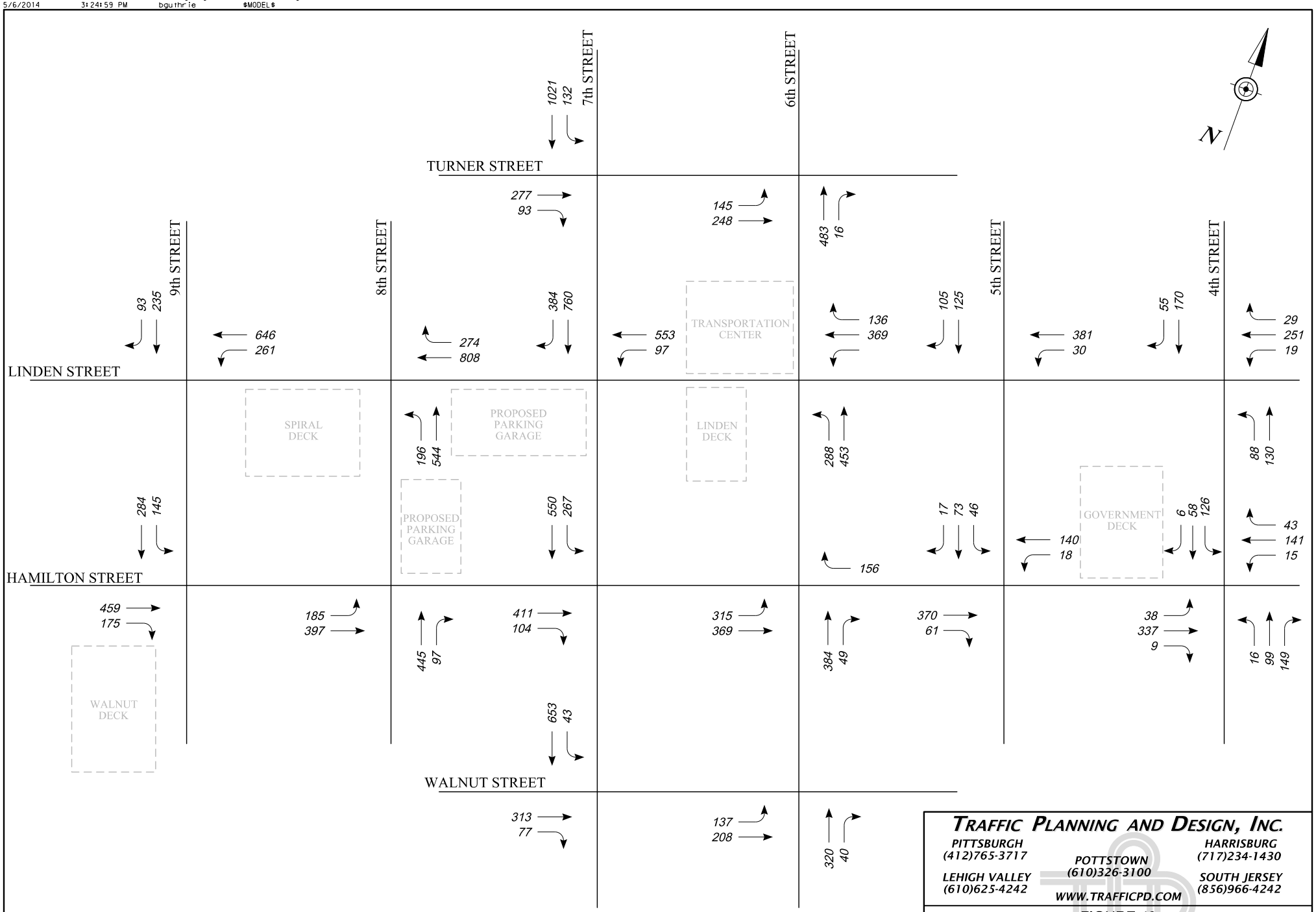

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FIGURE 43

2014 PROJECTED CONDITIONS
SATURDAY MIDDAY PEAK HOUR (NON-EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:25:00 PM bguthrie $MODEL$

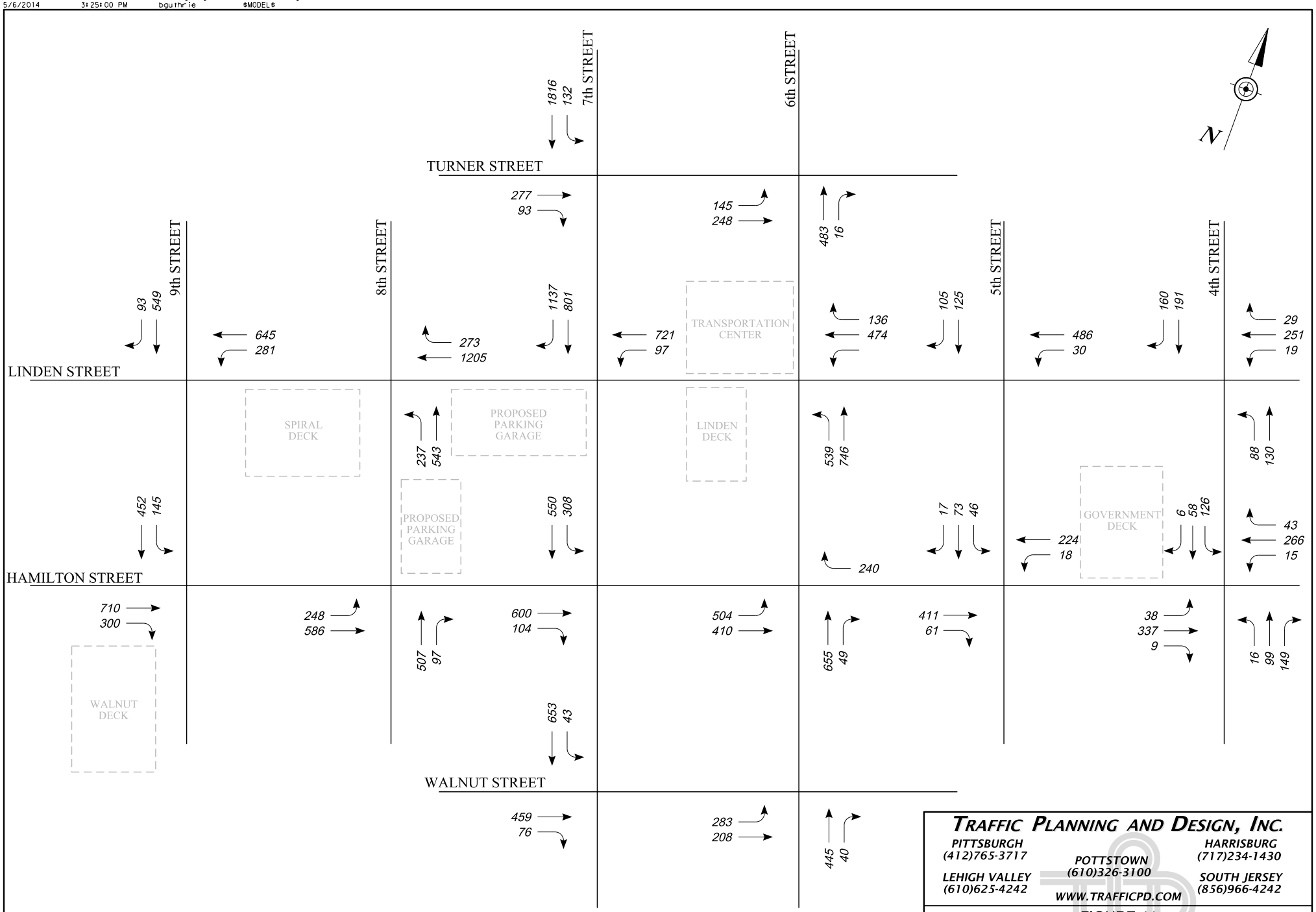

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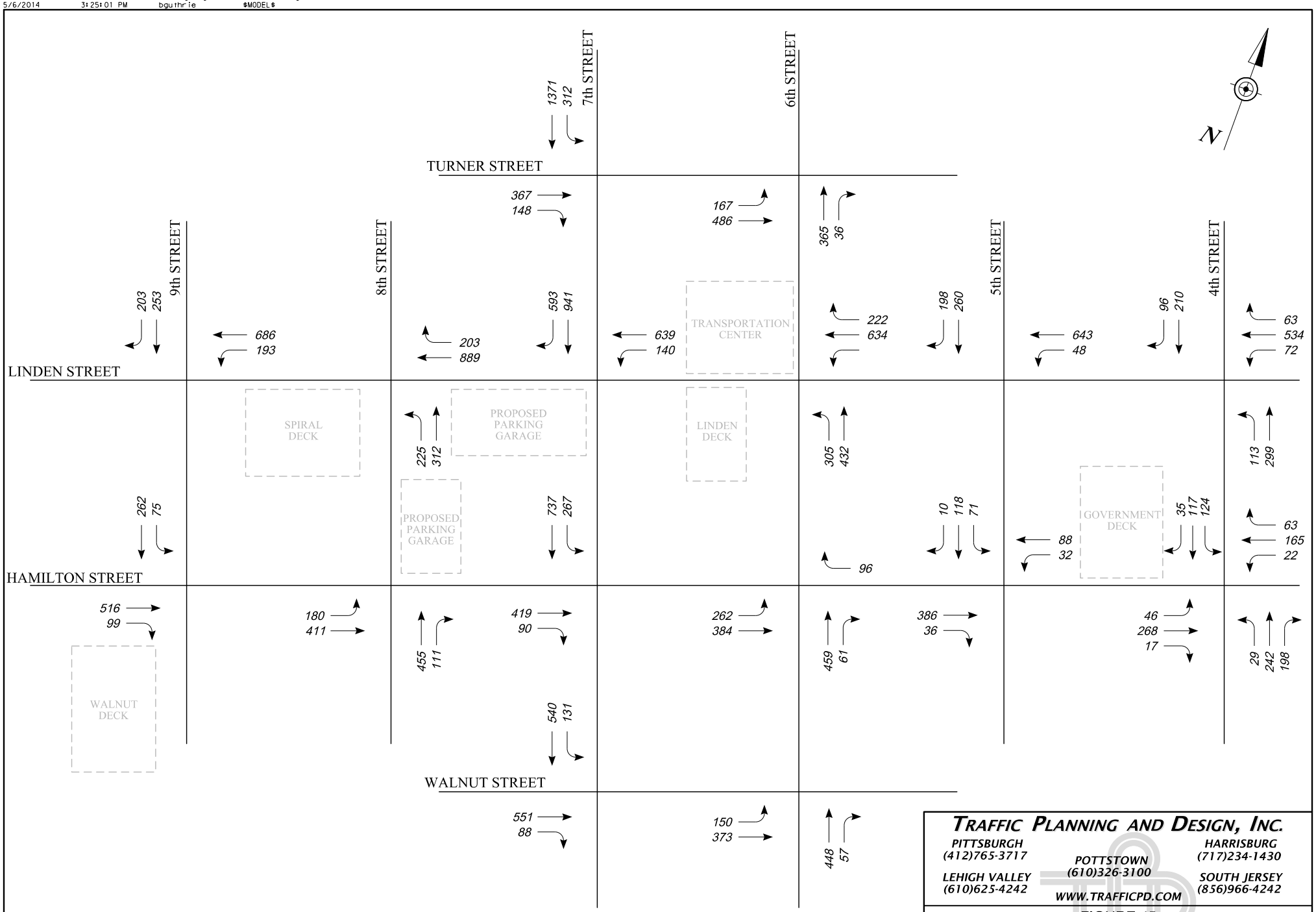
FIGURE 44

2014 PROJECTED CONDITIONS
SATURDAY MIDDAY PEAK HOUR (EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:25:01 PM bguthrie $MODEL$



KEY:
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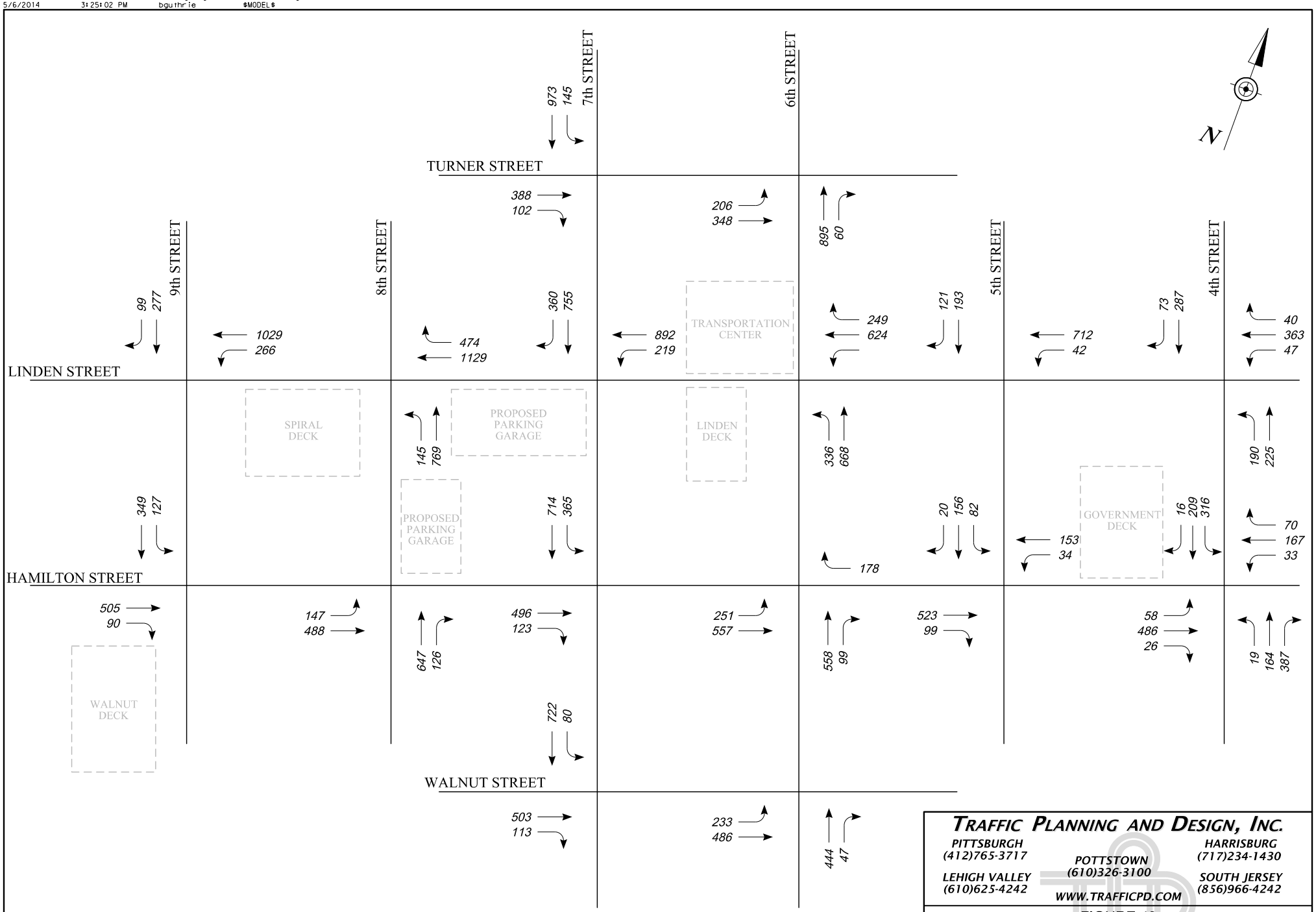
FIGURE 45

2019 PROJECTED CONDITIONS
WEEKDAY AM PEAK HOUR
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:25:02 PM bguthrie $MODEL$



KEY:
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FIGURE 46

2019 PROJECTED CONDITIONS
WEEKDAY PM PEAK HOUR (NON-EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:25:03 PM bguthrie $MODEL$

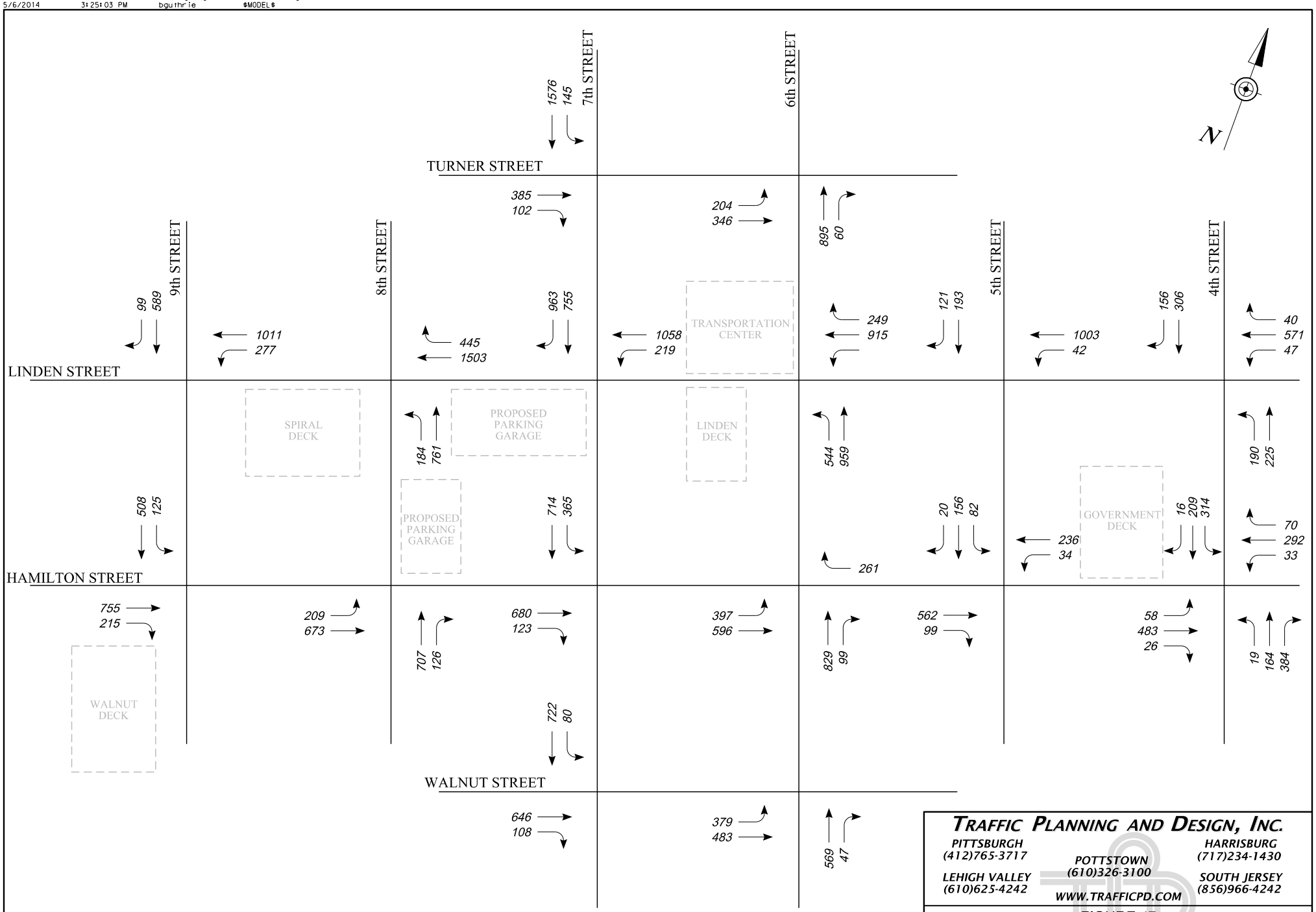

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FIGURE 47

2019 PROJECTED CONDITIONS
WEEKDAY PM PEAK HOUR (EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:25:04 PM bguthrie $MODEL$

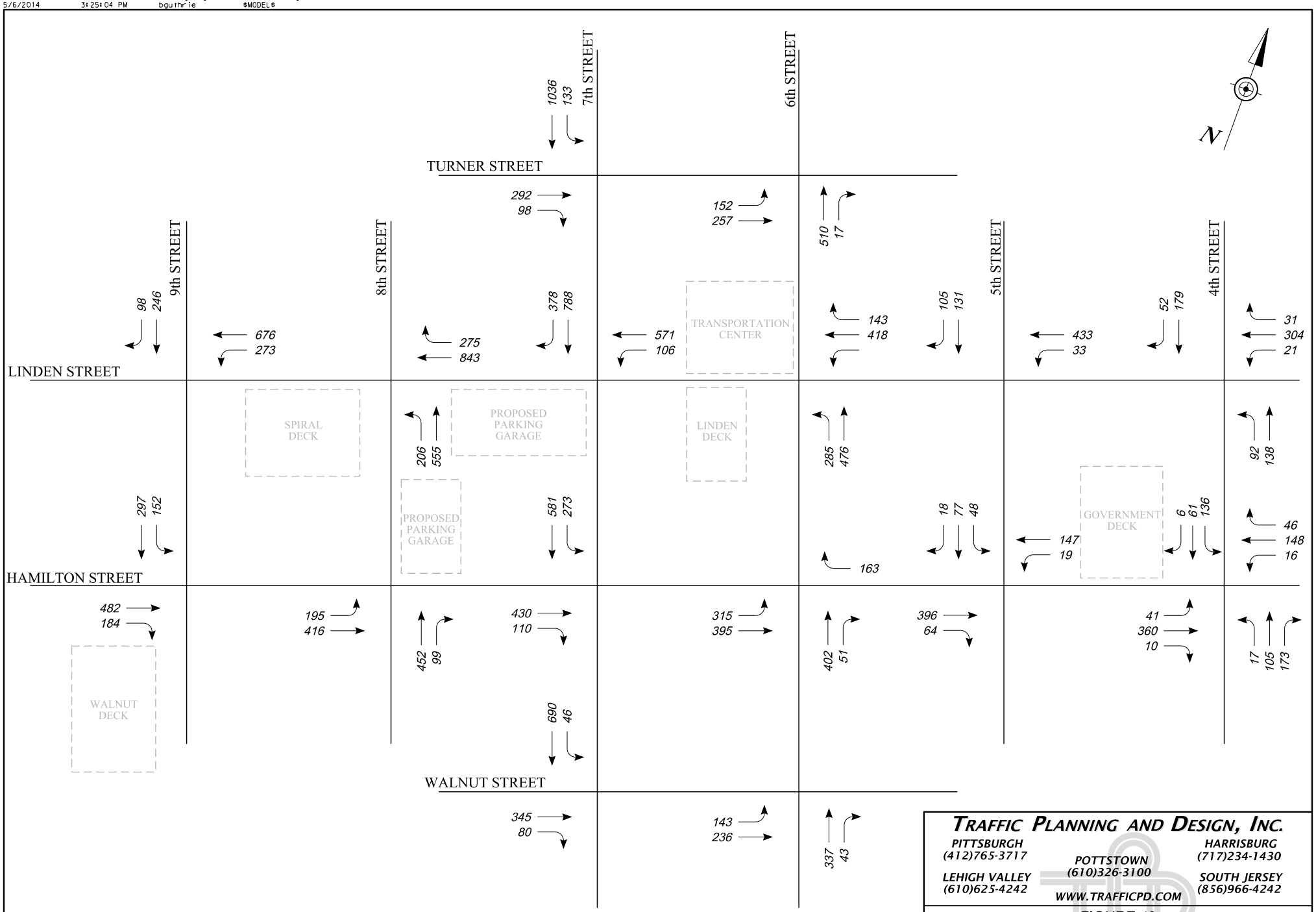

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FIGURE 48

2019 PROJECTED CONDITIONS
SATURDAY MIDDAY PEAK HOUR (NON-EVENT DAY)
TRAFFIC VOLUMES

J:\HCSD\00001 (Allentown Arena)\Planning\Figs\HCSD.A.00001 R8.dgn
5/6/2014 3:25:05 PM bguthrie $MODEL$

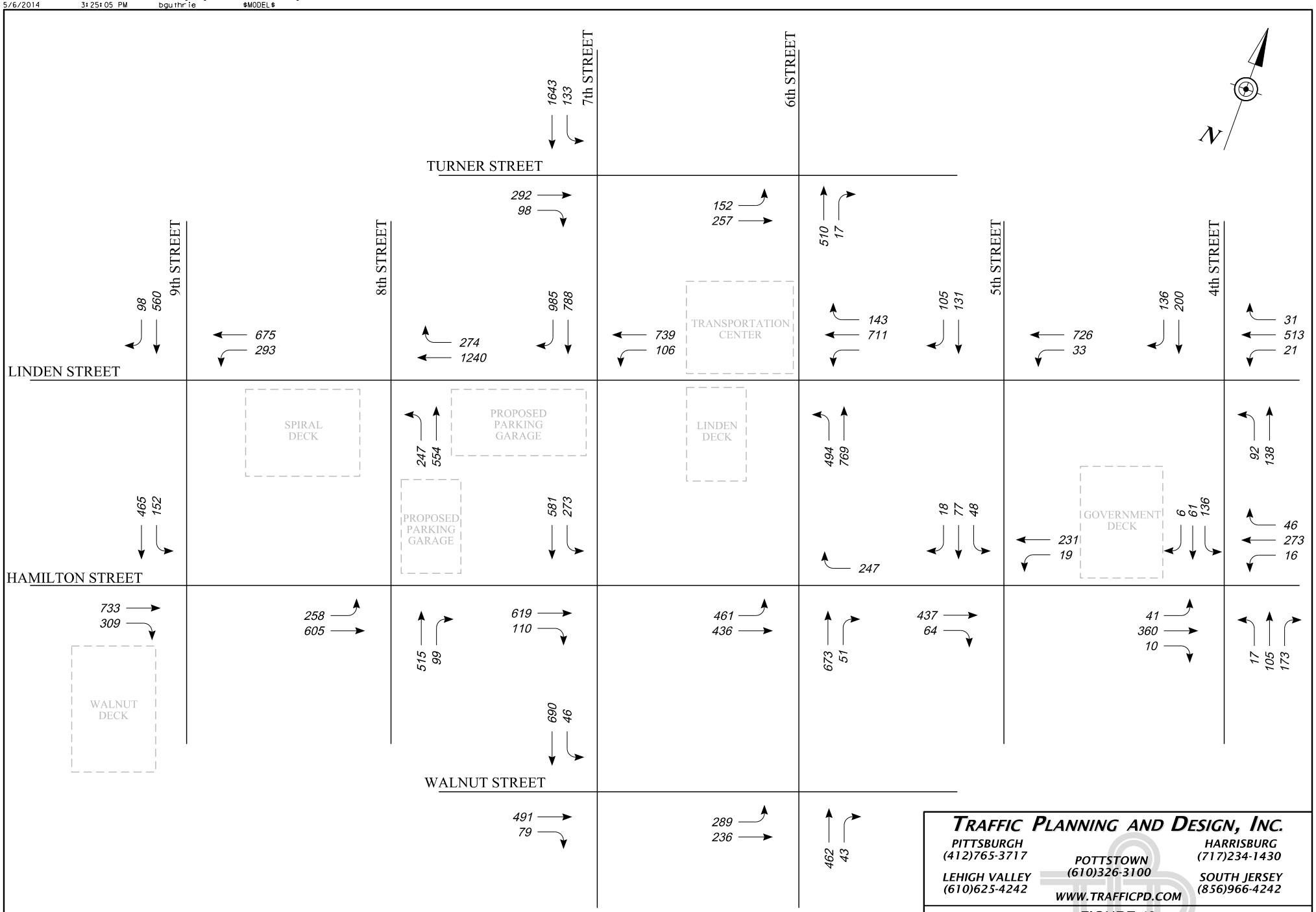

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FIGURE 49

2019 PROJECTED CONDITIONS
SATURDAY MIDDAY PEAK HOUR (EVENT DAY)
TRAFFIC VOLUMES