

UPMC SHADYSIDE 2011 MASTER PLAN  
TRAFFIC, PARKING, AND PEDESTRIAN STUDY



Transportation Solutions for Today and Tomorrow

Prepared for:  
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November 15, 2011

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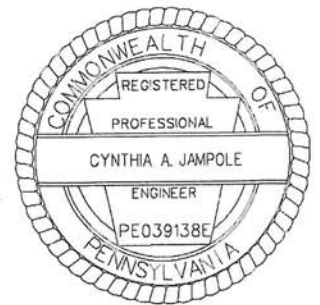


UPMC SHADYSIDE HOSPITAL  
2011 MASTER PLAN

Prepared for:  
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November 15, 2011

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**1.0 INTRODUCTION AND SUMMARY**

## **1.1 Purpose of Report and Study Objectives**

This report provides the results of the analysis of the ten (10) year traffic and parking analysis for the proposed University of Pittsburgh Medical Center (UPMC) Shadyside campus Master Plan, the composition and location of which are detailed below. The study, as documented in this report, was performed in order to meet the study requirements established by the City of Pittsburgh Department of City Planning (DCP), and to provide appropriate traffic and parking mitigation measures.

The considerations studied in detail include the traffic and parking aspects of the proposed master plan projects.

The study objectives were to identify impacts upon the considerations listed above, and to develop appropriate mitigation strategies as necessary. These objectives were accomplished through performance of the following tasks relative to the 10 year master plan:

- Performance of existing (year 2011) traffic and pedestrian counts, and analysis of existing traffic conditions to identify existing problems;
- Determination of existing (year 2011) parking supply to establish existing parking supply and demand;
- Projection of future (year 2021) traffic volumes by projecting area-wide traffic growth;
- Assessment of traffic operations under 2021 base conditions (without development);
- Projection of future 2021 combined (with development) traffic volumes including all of the proposed Master Plan development projects;
- Assessment of traffic operations under 2021 conditions (with development) and determination of mitigating actions required to address the impacts of the proposed Master Plan development projects;
- Assessment of parking supply and demand conditions and parking allocation under 2021 future conditions with all of the proposed Master Plan development projects in place;
- Development of a future (year 2021) parking allocation and management plan for the UPMC Shadyside campus; and
- Assessment of existing Port Authority of Allegheny County bus routes and stops.

## **1.2 Executive Summary**

An overview of the project description, principal findings resulting from the analysis, and recommended mitigation strategies is presented in this summary.

### **1.2.1 Site Location and Study Area**

The proposed Master Plan projects are to be located within the vicinity of the existing UPMC Shadyside campus in the Bloomfield and Shadyside neighborhoods of the City of Pittsburgh. Further details of the proposed new project developments are summarized in section 1.2.2 of this report.

The current UPMC Shadyside campus is bounded by Baum Boulevard to the north, the Martin Luther King Junior East Busway to the south and to the west, and South Aiken Avenue to the east. The campus provides three (3) on-site parking garages, the Medical Center garage (mixed-use), the Visitor/Patient garage (mixed-use), and the Employee garage (employees only).

There are various other existing parking garages and surface parking lots utilized by UPMC Shadyside staff/employees. These include Shadyside Place parking garage and lot, Hillman Cancer Center parking garage, Family Health Center parking lot, and Urgent Care parking lot. In addition, the Penn Circle lot, Towerview Garage, and the School of Nursing lot (Motor Square Garden) are located off-campus in the surrounding neighborhoods and UPMC shuttle service is provided.

The site location of the existing UPMC Shadyside campus is shown in **Figure S-1**.

Based upon discussions with the City of Pittsburgh Department of Public Works and Department of Planning, the following intersections were selected for study:

- Baum Boulevard (S.R. 0400) and South Millvale Avenue;
- Baum Boulevard (S.R. 0400) and Morewood Avenue;
- Baum Boulevard (S.R. 0400) and Cypress Street;
- Baum Boulevard (S.R. 0400) and Liberty Avenue;
- Baum Boulevard (S.R. 0400) and South Aiken Avenue;
- Centre Avenue and Morewood Avenue;
- Centre Avenue and Cypress Street/UPMC Shadyside Driveway;

- Centre Avenue and South Aiken Avenue/Liberty Avenue;
- Liberty Avenue and South Millvale Avenue;
- South Millvale Avenue and Morewood Avenue;
- South Millvale Avenue and Cypress Street;
- Cypress Street and Gross Street;
- South Aiken Avenue and Ellsworth Avenue;
- South Aiken Avenue and Claybourne Street/Patient and Visitor Driveway/Aiken Building Governor's Driveway;
- South Aiken Avenue and Emergency Department Driveway/Employee Garage Driveway; and
- South Aiken Avenue and Employee Garage Secondary Exit Only Driveway.

The study area and study intersections are presented in Figure S-1.

### **1.2.2 Development Description**

The UPMC Shadyside 10 year master plan projects consist of the following:

1. Construction of a new outpatient building which will contain outpatient services, the urgent care center, and first floor retail (Boston Market) with an internal 440 space parking garage. The new outpatient care building will be located on the northeast corner of Centre Avenue and Cypress Street across the street from the Hillman Cancer Center. This building will be connected to both the Hillman Cancer Center and the new UPMC Shadyside inpatient expansion with over the road (enclosed) pedestrian walkways. Bicycle parking will be provided in the new outpatient center garage as required by the City of Pittsburgh Zoning Code. For this facility, at least 14 bicycle parking spaces will be provided.
2. Construction of a new inpatient expansion to better accommodate patients by providing private patient rooms instead of the current semi-private patient rooms.
3. Construction of the Center for Innovative Science (CIS), a new research building which will replace the former Ford Motor Site Building which is located on the northeast corner of the intersection of Centre Avenue and Morewood Avenue. The research building will have an internal 306 space parking garage which will be used exclusively by the CIS employees. Access to the garage will be provided via a full-access unsignalized driveway Morewood Avenue between Baum Boulevard and Centre Avenue. Bicycle

parking will be provided in the new CIS garage as required by the City of Pittsburgh Zoning Code. For this facility, at least 35 bicycle parking spaces will be provided.

4. Construction of a new 1,000 space parking garage on the Luna Site which is bounded by Gross Street to the north, Baum Boulevard to the south, Cypress Street to the east, and the Martin Luther King Jr. Busway to the west. Access to the parking garage will be provided via a full-access signalized driveway on Baum Boulevard and a full-access unsignalized driveway (stop control on driveway approach) on Gross Street. This garage will be used for hospital employees and at times Herberman Conference Center visitor parking (as necessary). As such, this lot will mainly be active during the day, with little to no activity in the evenings, nights, and weekends. During these times, hospital employees will park in the existing on-campus parking facilities which have available parking during non-peak patient periods. Bicycle parking will be provided in the new garage as required by the City of Pittsburgh Zoning Code. For this facility, at least 100 bicycle parking spaces will be provided.
5. Construction of an expansion to the existing hospital power house which will help to mitigate noise pollution to the surrounding neighborhoods.

The location of each of the Master Plan development components are presented in **Figure S-2**.

### **1.2.3 Land Development Control Status**

The UPMC Shadyside campus currently comprises multiple zoning designations including EMI (Educational/Medical Institution) and UNC (Urban Neighborhood Commercial). The Hillman Cancer Center and hospital buildings south of Centre Avenue are currently zoned EMI. The Family Health Center parking lot, Urgent Care parking lot, Penn Circle North parking lot, and the School of Nursing parking lot are currently zoned UNC. The Shadyside Place parking garage/lot are currently zoned R2-M (Two Unit Residential Moderate Density).

In the future, the UPMC Shadyside campus is planned to be rezoned as EMI in its entirety.

The existing zoning map for the study area is presented in **Figure S-3**. The future zoning map is presented in **Figure S-4**.

### **1.2.4 Principal Findings**

#### Parking Analysis

Parking conditions have been evaluated under existing 2011 conditions and projected 2021 conditions with the campus 10 year master plan components in place. The parking



supply/demand comparison performed for the future 2021 conditions with the master plan components indicates that at the peak period of the peak day, parking provided on the campus will be adequate to serve the needs of the campus. All off-site parking will be eliminated with development of the 10 year master plan components.

Future parking spaces assignments were made based on a priority of accommodating patient and visitor parking needs. This is accomplished through the construction of a new Outpatient Center, which will provide 385 patient/visitor parking spaces. The patients/visitors will also benefit from a reallocation of parking space assignments, which will more easily allow patients/visitor to park closer to their intended hospital destination.

With the 10 year master plan components in place, hospital employees will also benefit from improved parking conditions. Use of the Towerview Garage, Penn Circle Lot, and the Ford Motor Site Lots will be eliminated. With the addition of the Luna Parking Garage, the UPMC Shadyside campus employee parking will be consolidated entirely onto the campus, which will eliminate employee shuttle parking and greatly reduce the overall numbers of shuttles used by UPMC Shadyside. The hospital will still provide shuttle service for employees that travel between UPMC campuses.

The existing UPMC Shadyside campus parking locations and inventories are presented in **Figure S-5**. The proposed UPMC Shadyside campus parking locations (with 10 year master plan components) and parking space assignments are presented in **Figure S-6**. Further details of the parking demand analysis are presented in Section 3.4 of this report.

### Queuing Analysis

For dense urban conditions, queuing analyses provide a far greater representation of traffic flow than level of service designations. The 95<sup>th</sup> percentile queue lengths for the study intersections under 2011 Existing, 2021 Base (without master plan components), and 2021 combined (with master plan components) conditions were evaluated. Analyses were performed using methodologies published in the *Highway Capacity Manual 2000*, by the Transportation Research Board using Synchro, Version 7 traffic analysis and simulation software.

The critical analysis time period for the study area is the PM peak hour. Under 2021 Base conditions (without master plan projects), PM peak hour 95<sup>th</sup> percentile queue lengths were calculated to extend back through the upstream intersections at two (2) locations as shown in **Figure S-7**. Under 2021 combined conditions (with master plan projects), PM peak hour 95<sup>th</sup> percentile queue lengths were calculated to extend back through the upstream intersections at four (4) locations as shown in **Figure S-8**. Under 2021 combined mitigated conditions (with

master plan projects and UPMC recommended improvements in place), PM peak hour 95<sup>th</sup> percentile queue lengths were calculated to extend back through the upstream intersections at one (1) location as shown in **Figure S-9**.

Based on the results of the analysis, with the recommended mitigation measures in place, the study intersections are projected to have 95<sup>th</sup> percentile queue lengths that are similar to or better than the projected 2021 base conditions. Therefore, Trans Associates believes that with the development of the UPMC Shadyside 10 year master plan components and implementation of the recommended mitigation measures, there will be no significant degradation of traffic flow throughout the study area roadway network.

### Travel Time

In addition to the queuing improvements, the recommended mitigation measures have improved the travel time along Centre Avenue. During the PM peak hour, the eastbound travel time on Centre Avenue has been reduced by over four (4) minutes or 52% and the westbound travel time has been reduced by over one (1) minute or 33%.

### **1.2.5 Recommendations**

Under the 2021 combined conditions, the following mitigation measures are required in order to minimize impacts on intersection levels of service:

#### Baum Boulevard and Morewood Avenue

- Restripe northbound Morewood Avenue approach to provide a 120 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space will be removed from the east side of Morewood Avenue between Baum Boulevard and Centre Avenue.

#### Baum Boulevard and Proposed Luna Garage Driveway

- Construct full-access signalized site driveway.
- Install audible, push-button, pedestrian countdown crossing equipment.
- Construct westbound Centre Avenue right turn lane into Luna Garage Driveway, which extends back to Woodworth Street.

#### Centre Avenue (between Morewood Avenue and South Graham Street)

- Prohibit on-street parking to allow for two travel lanes in each direction.
- Remove a total of 92 on-street metered parking spaces along Centre Avenue.

#### Centre Avenue and Morewood Avenue

- Restripe southbound Morewood Avenue approach to provide a 100 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space would need to be removed from the eastern side of Morewood Avenue, between Baum Boulevard and Centre Avenue.
- Stripe westbound Centre Avenue outside lane as an exclusive right turn lane which drops onto Morewood Avenue.

#### Centre Avenue and Cypress Street

- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Centre Avenue and South Aiken Avenue/Liberty Avenue

- Update traffic signal equipment to provide protected/permitted northbound/southbound left turn phases.
- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Morewood Avenue and Proposed Research Building Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.

#### Gross Street and Proposed Luna Garage Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.
- Perform street repairs on Gross Street to accommodate site traffic including repaving and curb/shoulder repair.

#### All Intersections

- Optimize intersection timings and offsets.

### Baum Boulevard and Centre Avenue Corridor

- Provide pedestrian crossing upgrades including:
  - repainting of crosswalks.
  - installation of new audible, push-button, pedestrian countdown crossing equipment.

### Bicycle Racks

- Provide, at a minimum, new bicycle racks in the new Luna Parking Garage (at least 100 bicycle parking spaces), new Research Building Garage (at least 35 bicycle parking spaces), and new Outpatient Center Garage (at least 14 bicycle parking spaces).

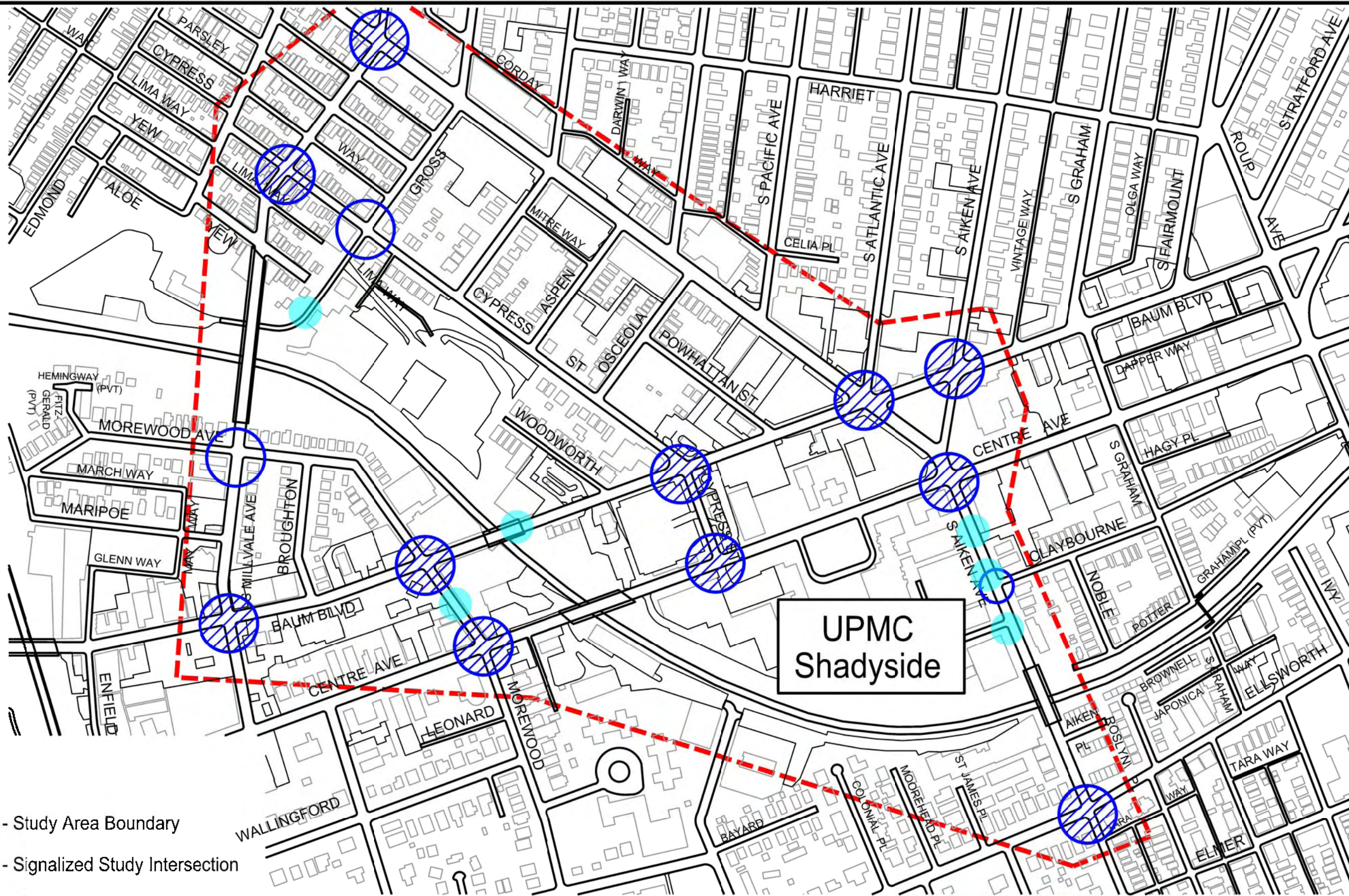
A summary of the recommended improvements is presented in **Figure S-10**.

This study has been performed to determine the traffic, parking, and pedestrian impacts of the proposed UPMC Shadyside 10 Year Master Plan based upon the City of Pittsburgh's traffic impact study methodologies and to develop a program of recommended improvements.

Provided these recommendations are implemented, the traffic, parking, and pedestrian impacts of the proposed UPMC Shadyside 10 Year Master Plan will be appropriately mitigated.





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Legend

- Study Area Boundary
- Signalized Study Intersection
- Unsignalized Study Intersection
- Study Driveway

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# 10 YEAR P




Luna Parking Garage (10

Hillman Cancer Center  
4 stories

Center for Innovative  
Science & Parking  
(306 spaces)



Inpatient Expansion

### Legend

-  UPMC Facilities Exp
-  UPMC Buildings
-  Non-UPMC Building

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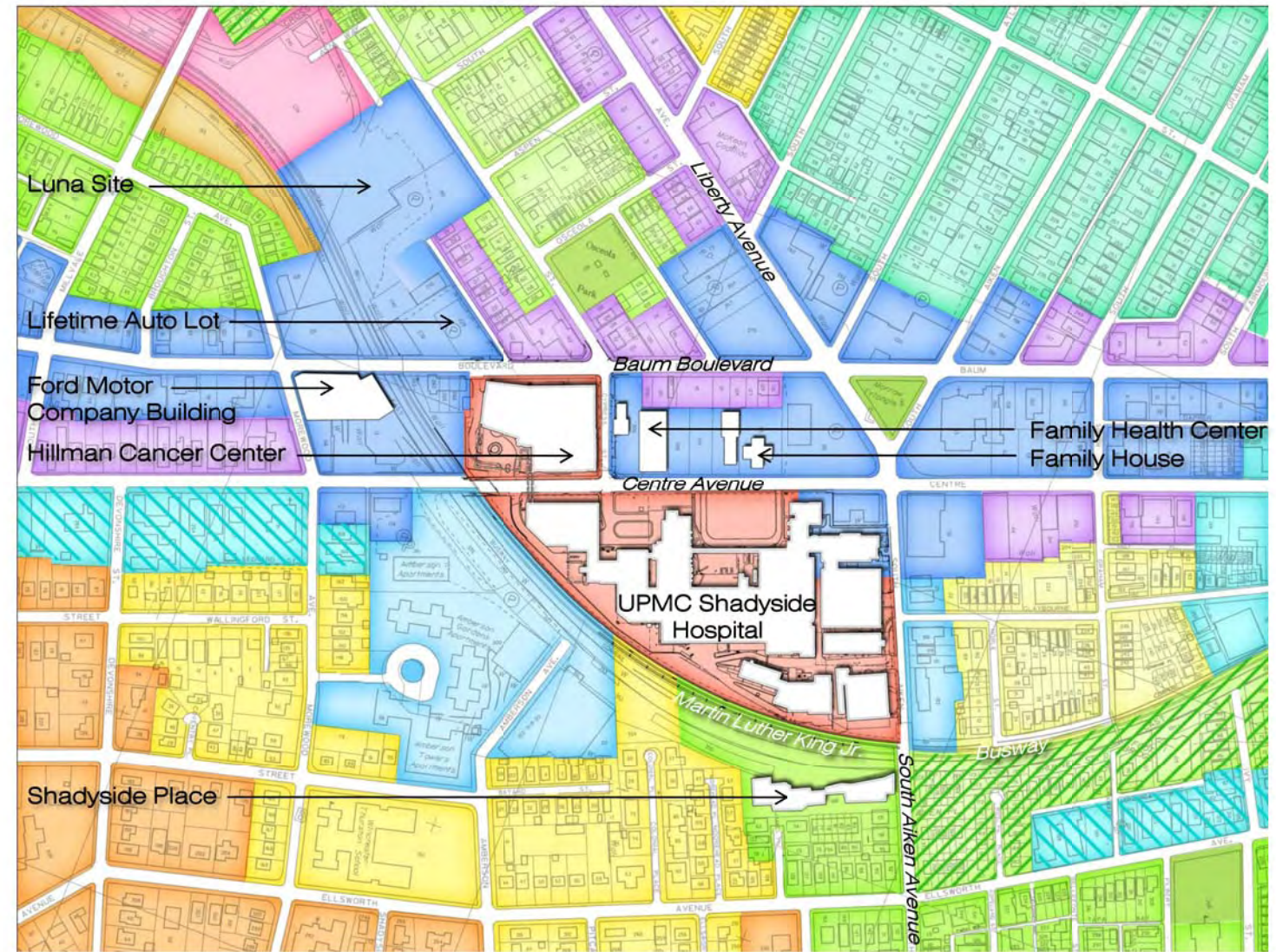
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# EXISTING ZONING MAP

## LEGEND

-  AP Residential/Commercial Planned Unit Development
-  EMI Educational/Medical Institution
-  H Hillside
-  LNC Local Neighborhood Commercial
-  P Parks & open Space
-  R1A -H Single Unit Attached Residential High Density
-  R1A -VH Single Unit Attached Residential Very High Density
-  R1D -VL Single Unit Detached Residential Very Low Density
-  R1D -L Single Unit Detached Residential Low Density
-  R2-M Two Unit Residential Moderate Density
-  R2-H Two Unit Residential High Density
-  R3-M Three Unit Residential Moderate Density
-  RM-M Multi Unit Residential Moderate Density
-  RM-H Multi Unit Residential High Density
-  UI Urban Industrial
-  UNC Urban Neighborhood Commercial



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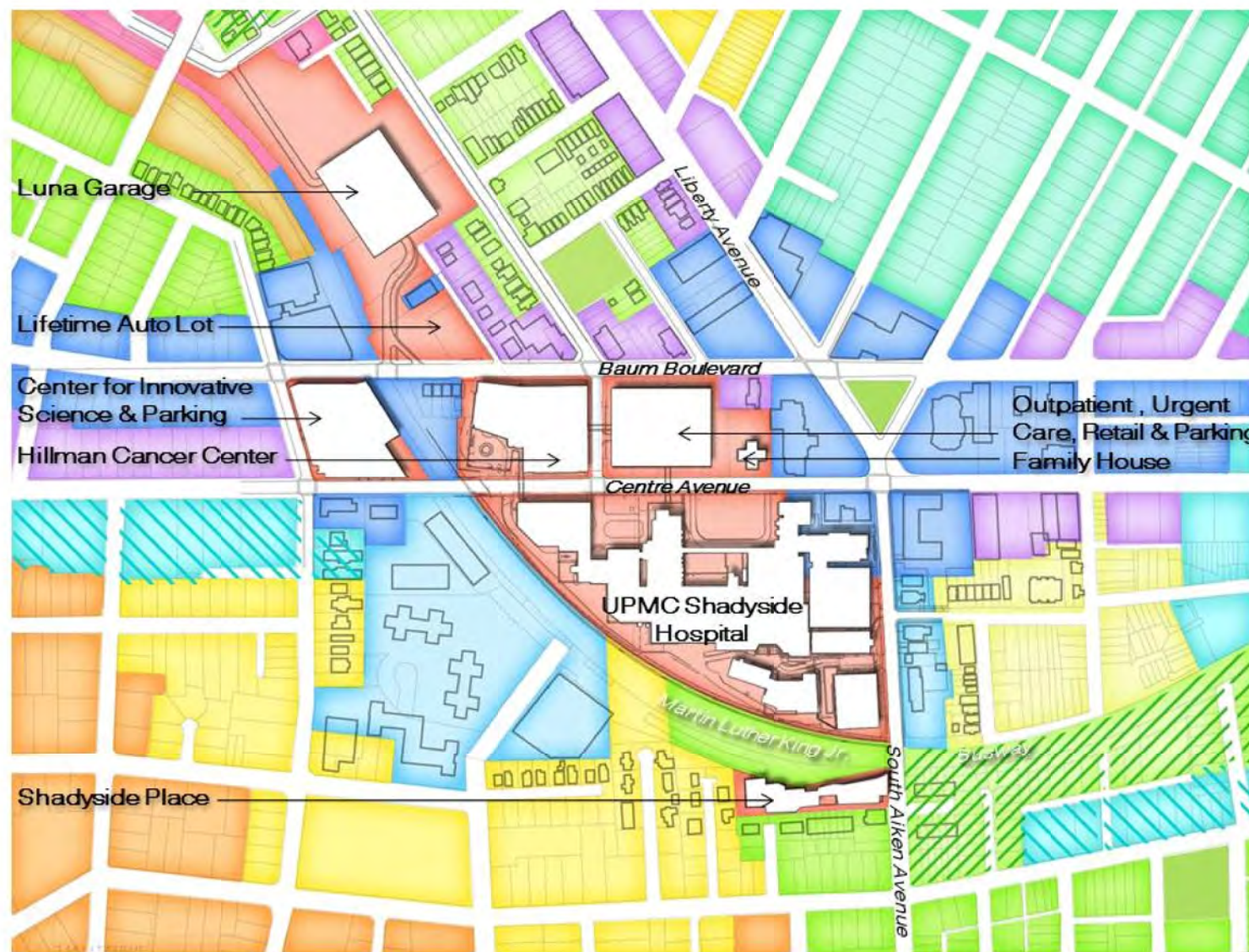
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# TEN YEAR PROPOSED ZONING MAP

## Legend

- AP Residential/Commercial Planned Unit Development
- EMI Educational/Medical Institution
- H Hillside
- LNC Local Neighborhood Commercial
- P Parks & open Space
- R1A -H Single Unit Attached Residential High Density
- R1A -VH Single Unit Attached Residential Very High Density
- R1D -VL Single Unit Detached Residential Very Low Density
- R1D -L Single Unit Detached Residential Low Density
- R2-M Two Unit Residential Moderate Density
- R2-H Two Unit Residential High Density
- R3-M Three Unit Residential Moderate Density
- RM-M Multi Unit Residential Moderate Density
- RM-H Multi Unit Residential High Density
- UI Urban Industrial
- UNC Urban Neighborhood Commercial



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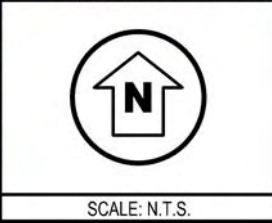
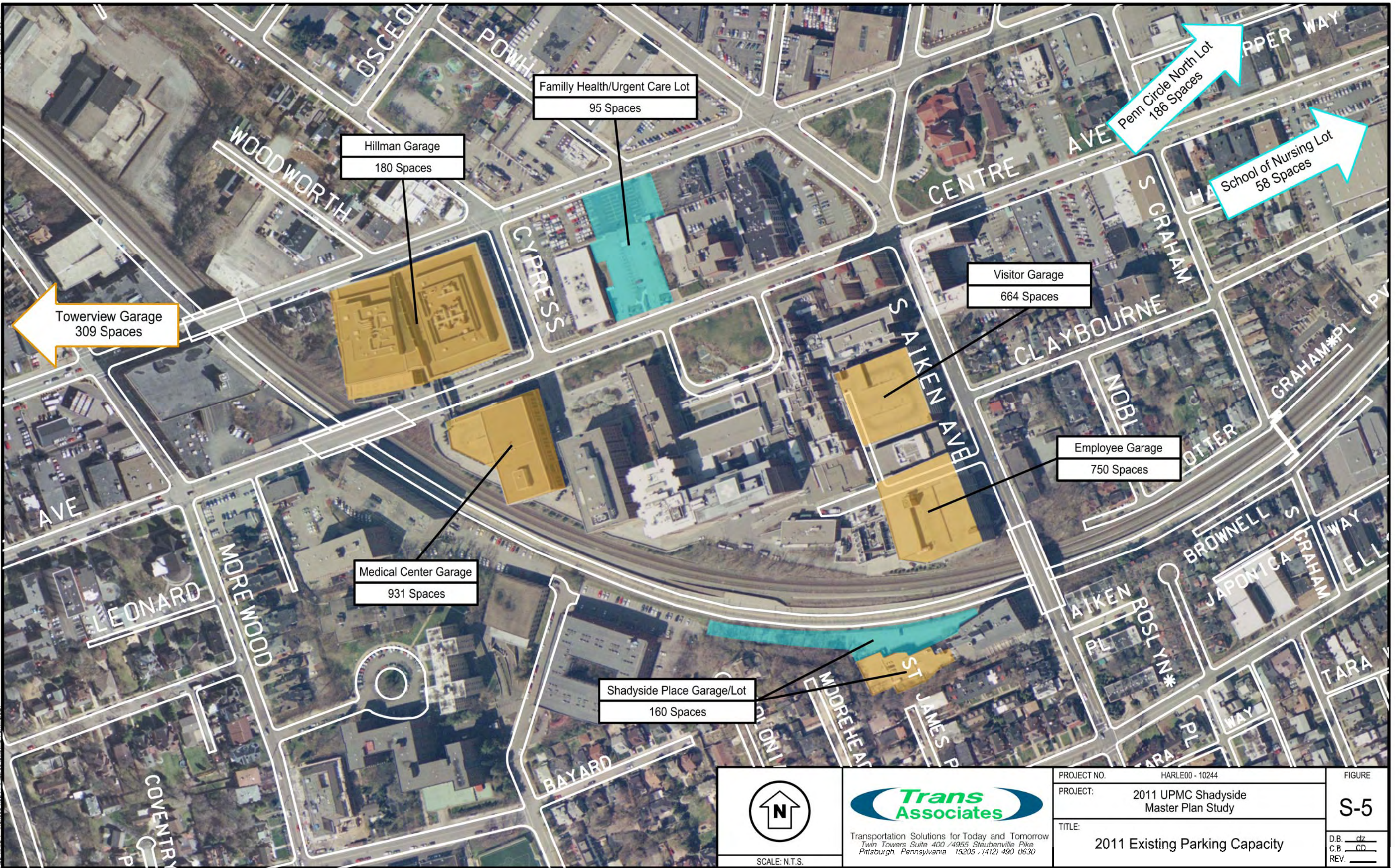
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 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE <b>S-4</b>
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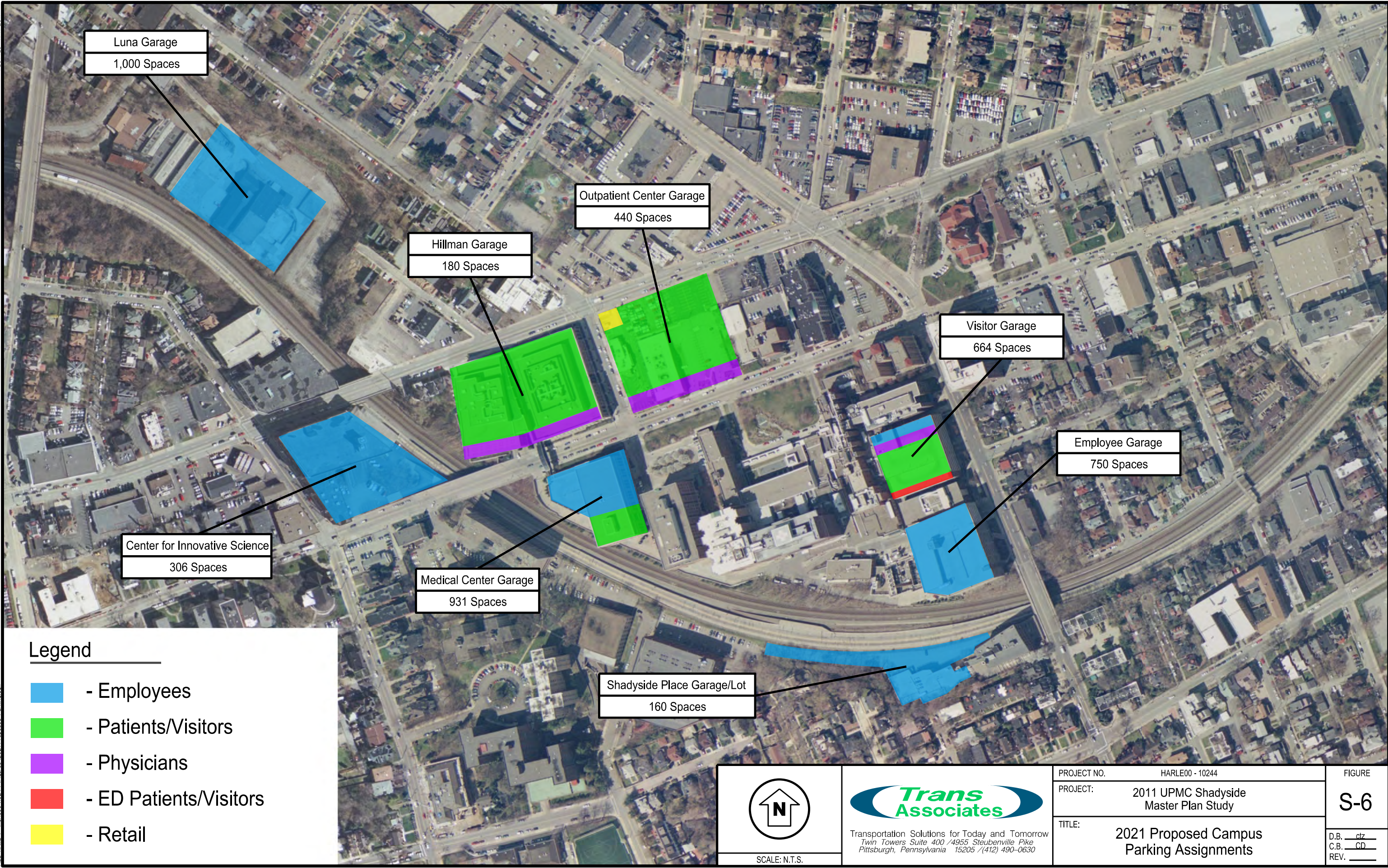
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Luna Garage  
1,000 Spaces

Outpatient Center Garage  
440 Spaces

Hillman Garage  
180 Spaces

Visitor Garage  
664 Spaces

Employee Garage  
750 Spaces



Center for Innovative Science  
306 Spaces

Medical Center Garage  
931 Spaces

Shadyside Place Garage/Lot  
160 Spaces

**Legend**



- - Employees
- - Patients/Visitors
- - Physicians
- - ED Patients/Visitors
- - Retail


 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00 - 10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	<b>S-6</b>
		TITLE: 2021 Proposed Campus Parking Assignments	D.B. <u>   </u> C.B. <u>   </u> REV. <u>   </u>





**Legend:**

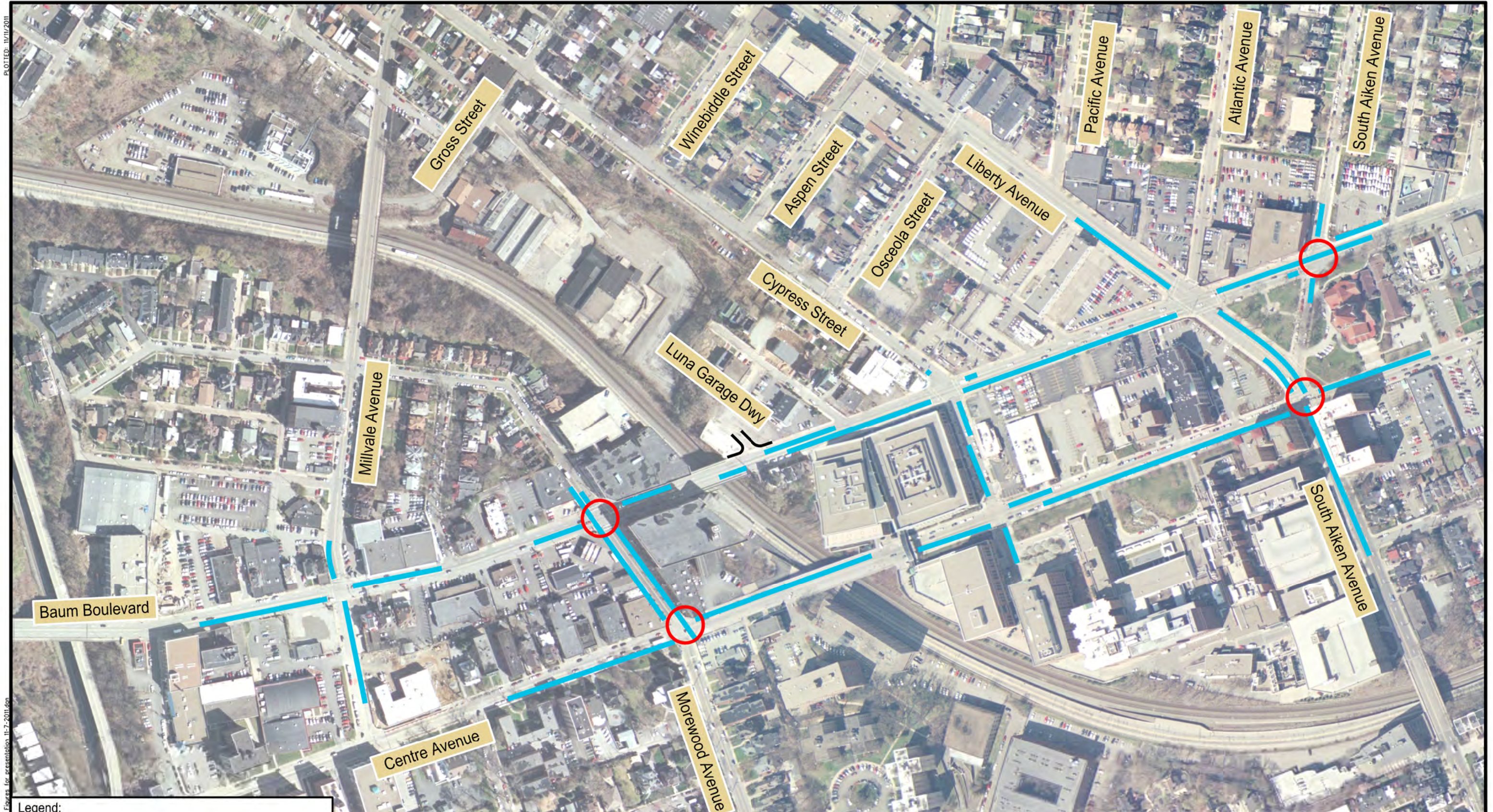
-  - 2011 Base (No Master Plan Projects) 95th Percentile Queue Length (feet) (Optimized Signals)
-  - 95th Percentile Queue Extends Through intersection

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00-10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	S-7
		TITLE: 2011 Base PM Peak Hour 95th Percentile Queue Lengths	D.B. cad C.B. raj REV. _____







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**Legend:**



-  - 2021 Combined (with Master Plan projects) 95th Percentile Queue Length (feet) (Optimized Signals)
-  - 95th Percentile Queue Extends Through intersection



 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00-10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	S-8
		TITLE: 2021 Combined PM Peak Hour 95th Percentile Queue Lengths	D.B. cad C.B. raj REV. _____





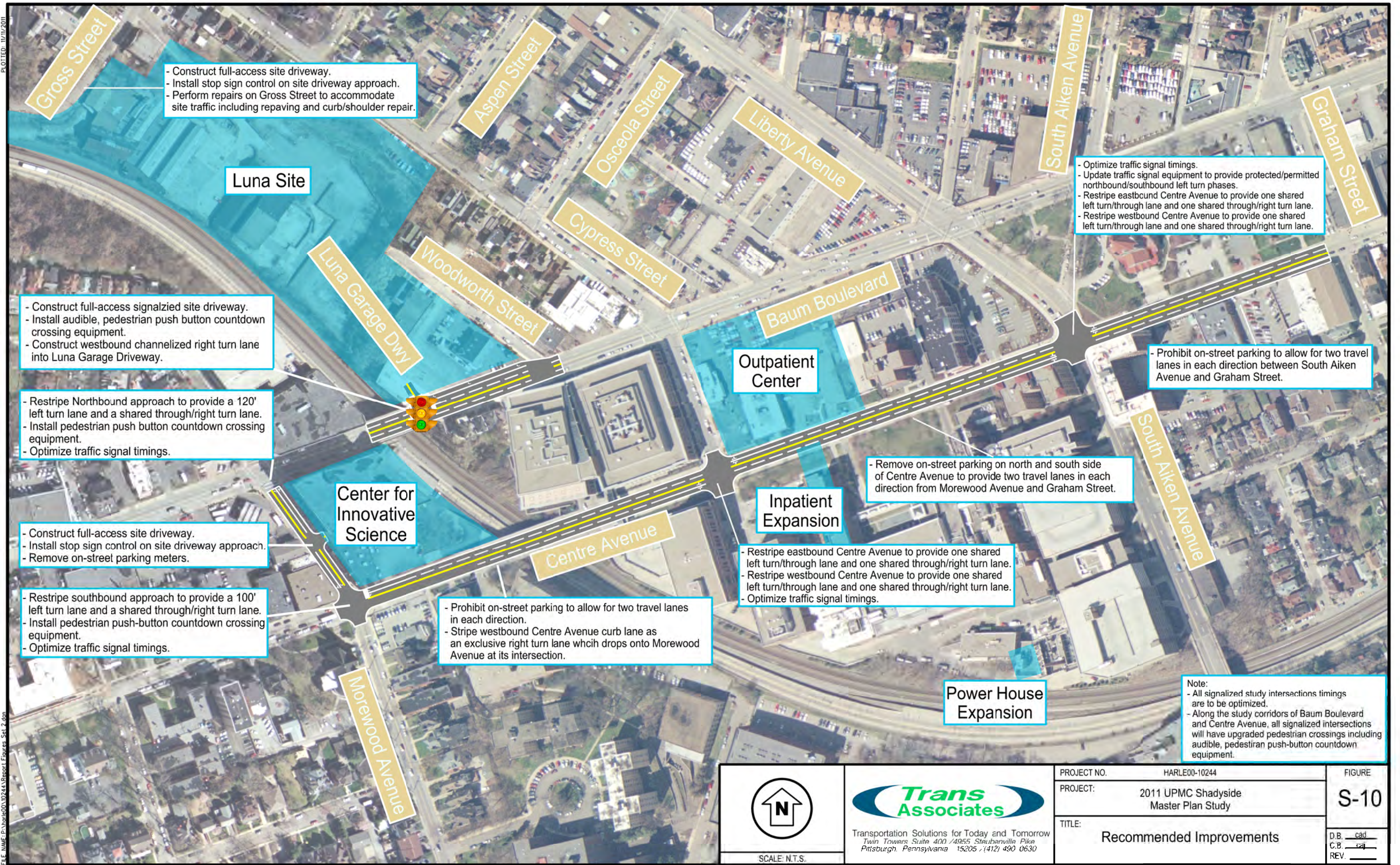
**Legend:**

-  - 2021 Combined Mitigated (with Master Plan projects and UPMC recommended improvements in place) 95th Percentile Queue Length (feet) (Optimized Signals)
-  - 95th Percentile Queue Extends Through intersection

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	S-9
TITLE: 2021 Combined Mitigated PM Peak Hour 95th Percentile Queue Lengths		D.B. cad	C.B. caj
		REV. _____	



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- Construct full-access site driveway.  
 - Install stop sign control on site driveway approach.  
 - Perform repairs on Gross Street to accommodate site traffic including repaving and curb/shoulder repair.

- Construct full-access signalized site driveway.  
 - Install audible, pedestrian push button countdown crossing equipment.  
 - Construct westbound channelized right turn lane into Luna Garage Driveway.

- Restripe Northbound approach to provide a 120' left turn lane and a shared through/right turn lane.  
 - Install pedestrian push button countdown crossing equipment.  
 - Optimize traffic signal timings.

- Construct full-access site driveway.  
 - Install stop sign control on site driveway approach.  
 - Remove on-street parking meters.

- Restripe southbound approach to provide a 100' left turn lane and a shared through/right turn lane.  
 - Install pedestrian push-button countdown crossing equipment.  
 - Optimize traffic signal timings.

- Prohibit on-street parking to allow for two travel lanes in each direction.  
 - Stripe westbound Centre Avenue curb lane as an exclusive right turn lane which drops onto Morewood Avenue at its intersection.

- Restripe eastbound Centre Avenue to provide one shared left turn/through lane and one shared through/right turn lane.  
 - Restripe westbound Centre Avenue to provide one shared left turn/through lane and one shared through/right turn lane.  
 - Optimize traffic signal timings.

- Remove on-street parking on north and south side of Centre Avenue to provide two travel lanes in each direction from Morewood Avenue and Graham Street.

- Optimize traffic signal timings.  
 - Update traffic signal equipment to provide protected/permitted northbound/southbound left turn phases.  
 - Restripe eastbound Centre Avenue to provide one shared left turn/through lane and one shared through/right turn lane.  
 - Restripe westbound Centre Avenue to provide one shared left turn/through lane and one shared through/right turn lane.

- Prohibit on-street parking to allow for two travel lanes in each direction between South Aiken Avenue and Graham Street.

Note:  
 - All signalized study intersections timings are to be optimized.  
 - Along the study corridors of Baum Boulevard and Centre Avenue, all signalized intersections will have upgraded pedestrian crossings including audible, pedestrian push-button countdown equipment.

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00-10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	S-10
		TITLE: Recommended Improvements	D.B. cad C.B. raj REV. _____



## 2.0 PROPOSED DEVELOPMENT

## **2.1 Summary of Development**

A description of the proposed UPMC Shadyside 2011 Master Plan is presented in this section.

### **2.1.1 Location**

The proposed Maser Plan projects are to be located within the vicinity of the existing UPMC Shadyside campus in the Bloomfield and Shadyside neighborhoods of the City of Pittsburgh. Further details of the proposed new project developments are summarized in section 2.1.2 of this report.

The UPMC Shadyside campus is bounded by Baum Boulevard to the north, the Martin Luther King Junior East Busway to the south and to the west, and South Aiken Avenue to the east. The campus provides three (3) on-site parking garages, the Medical Center garage, the Visitor/Patient garage, and the Employee garage.

There are various other existing parking garages and surface parking lots utilized by UPMC Shadyside staff/employees. These include Shadyside Place parking garage and lot, Hillman Cancer Center parking garage, Family Health Center parking lot, and Urgent Care parking lot. In addition, the Penn Circle lot, Towerview Garage, and the School of Nursing lot (Motor Square Garden) are located off-campus in the surrounding neighborhoods and UPMC shuttle service is provided.

The site location of the existing UPMC Shadyside campus is shown in **Figure 1**.

### **2.1.2 Development Plan**

The UPMC Shadyside 10 year master plan projects consist of the following:

1. Construction of a new outpatient building which will contain outpatient services, the urgent care center, and first floor retail (Boston Market) with an internal 440 space parking garage. The new outpatient care building will be located on the northeast corner of Centre Avenue and Cypress Street across the street from the Hillman Cancer Center. This building will be connected to both the Hillman Cancer Center and the new UPMC Shadyside inpatient expansion with over the road (enclosed) pedestrian walkways. Bicycle parking will be provided in the new outpatient center garage as required by the City of Pittsburgh Zoning Code. For this facility, at least 14 bicycle parking spaces will be provided.



2. Construction of a new inpatient expansion to better accommodate patients by providing private patient rooms instead of the current semi-private patient rooms.
3. Construction of the Center for Innovative Science (CIS), a new research building which will replace the former Ford Motor Site Building which is located on the northeast corner of the intersection of Centre Avenue and Morewood Avenue. The research building will have an internal 306 space parking garage which will be used exclusively by the CIS employees. Access to the garage will be provided via a full-access unsignalized driveway Morewood Avenue between Baum Boulevard and Centre Avenue. Bicycle parking will be provided in the new CIS garage as required by the City of Pittsburgh Zoning Code. For this facility, at least 35 bicycle parking spaces will be provided.
4. Construction of a new 1,000 space parking garage on the Luna Site which is bounded by Gross Street to the north, Baum Boulevard to the south, Cypress Street to the east, and the Martin Luther King Jr. Busway to the west. Access to the parking garage will be provided via a full-access signalized driveway on Baum Boulevard and a full-access unsignalized driveway (stop control on driveway approach) on Gross Street. This garage will be used for hospital employees and at times Herberman Conference Center visitor parking (as necessary). As such, this lot will mainly be active during the day, with little to no activity in the evenings, nights, and weekends. During these times, hospital employees will park in the existing on-campus parking facilities which have available parking during non-peak patient periods. Bicycle parking will be provided in the new garage as required by the City of Pittsburgh Zoning Code. For this facility, at least 100 bicycle parking spaces will be provided.
5. Construction of an expansion to the existing hospital power house which will help to mitigate noise pollution to the surrounding neighborhoods.

The location of each of the Master Plan development components are presented in **Figure 2**.

## **2.2 Land Development Control Status**

### **2.2.1 Existing and Proposed Zoning**

The UPMC Shadyside campus is currently zoned EMI (Educational/Medical Institution) and UNC (Urban Neighborhood Commercial). The Hillman Cancer Center is currently zoned EMI. The Family Health Center parking lot, Urgent Care parking lot, Penn Circle North parking lot, and the School of Nursing (Motor Square Garden) parking lot are currently zoned UNC. The Shadyside Place parking garage/lot are currently zoned R2-M (Two Unit Residential Moderate Density).

In the future, the UPMC Shadyside campus is planned to be rezoned as EMI in its entirety. The existing zoning map for the study area is presented in **Figure 3**. The future zoning map is presented in **Figure 4**.

**3.0 AREA CONDITIONS**



### **3.1 Study Area**

The study area for the site has been determined based upon the area of influence and the area of significant traffic impact. The study area and study intersections have been approved by the City of Pittsburgh Department of City Planning (DCP). The approved Form B from the DCP is included in the Appendix A to this report.

#### **3.1.1 Area of Influence**

The area of influence for the UPMC Shadyside campus is shown in Figure 1.

#### **3.1.2 Area of Significant Traffic Impact**

The area of significant traffic impact will be on the streets immediately surrounding the development. Based upon discussions with the City of Pittsburgh Department of Public Works and Department of Planning, the following intersections were selected for study:

- Baum Boulevard (S.R. 0400) and South Millvale Avenue;
- Baum Boulevard (S.R. 0400) and Morewood Avenue;
- Baum Boulevard (S.R. 0400) and Cypress Street;
- Baum Boulevard (S.R. 0400) and Liberty Avenue;
- Baum Boulevard (S.R. 0400) and South Aiken Avenue;
- Centre Avenue and Morewood Avenue;
- Centre Avenue and Cypress Street/UPMC Shadyside Driveway;
- Centre Avenue and South Aiken Avenue/Liberty Avenue;
- Liberty Avenue and South Millvale Avenue;
- South Millvale Avenue and Morewood Avenue;
- South Millvale Avenue and Cypress Street;
- Cypress Street and Gross Street;
- South Aiken Avenue and Ellsworth Avenue;
- South Aiken Avenue and Claybourne Street/Patient and Visitor Driveway/Aiken Building Governor's Driveway;
- South Aiken Avenue and Emergency Department Driveway/Employee Garage Driveway;  
and

- South Aiken Avenue and Employee Garage Secondary Exit Only Driveway.

The study intersections are presented in Figure 1.

### **3.2 Study Area Land Use**

#### **3.2.1 Existing Land Use**

The existing land uses on the site include UPMC Shadyside, Hillman Cancer Center, Family Health Center, Family House Shadyside Place and other business/residential land uses.

#### **3.2.2 Anticipated Future Development**

The proposed development is described in Section 2.1.2 of this report.

#### **3.2.3 Existing Zoning and Anticipated Changes**

The existing zoning of the site is as described in Section 2.2.1.

#### **3.2.4 Existing Travel Mode Splits**

The hospital campus is located within a dense urban setting which provides numerous opportunities for a variety of transportation modes. This includes an extensive roadway network well suited for both vehicular and bicycle travel, an abundant public transit service provided by the Port Authority of Allegheny County, and an extensive network of sidewalks for pedestrian travel. Currently, the UPMC Shadyside campus also provides shuttle service for employees to the off-site parking lots as well as for travel between UPMC campuses. The UPMC Shadyside campus also provides six (6) bicycle racks on campus.

Within the study area, bicycle lane markings are painted along Liberty Avenue in both directions including painted lane separation lanes and bicycle symbols.

#### **3.2.5 Public Transit**

The public transit service provided by the Port Authority of Allegheny County provides service to the study area. These routes and bus stop locations are presented graphically in **Figure 5**. The Port Authority routes within the study area include the following:

- 54
- 64
- 71A
- 71C
- 75
- 77
- 82
- 86

In addition, the UPMC Shadyside campus provides shuttle service for employees to the off-site parking lots as well as for travel between UPMC campuses.

### **3.3 Site Accessibility**

#### **3.3.1 Public and Private Roadway Systems**

Site accessibility is greatly influenced by the roadway system adjacent to the site and within the study area. The existing roadway system, including traffic control devices, is documented in this section.

##### **3.3.1.1 Existing Area Roadway Systems**

The existing area roadway system is presented in Figure 1. The study area includes Baum Boulevard (S.R. 0400) and Centre Avenue, which are classified as urban principal arterial roadways; Liberty Avenue and South Aiken Avenue, which are classified as urban minor arterial roadways; and South Millvale Avenue, Morewood Avenue, and South Atlantic Avenue, which are classified as urban collector roadways. The remaining roadways are classified as local streets.

The following study intersections are signalized:

- Baum Boulevard (S.R. 0400) and South Millvale Avenue;
- Baum Boulevard (S.R. 0400) and Morewood Avenue;
- Baum Boulevard (S.R. 0400) and Cypress Street;
- Baum Boulevard (S.R. 0400) and Liberty Avenue;
- Baum Boulevard (S.R. 0400) and South Aiken Avenue;
- Centre Avenue and Morewood Avenue;
- Centre Avenue and Cypress Street/UPMC Shadyside Driveway;
- Centre Avenue and South Aiken Avenue;
- Liberty Avenue and South Millvale Avenue;
- Cypress Street and South Millvale Avenue; and
- South Aiken Avenue and Ellsworth Street.

The following provides a brief description of the study intersections.

### **Baum Boulevard (S.R. 0400) and South Millvale Avenue**

The intersection of Baum Boulevard (S.R. 0400) and South Millvale Avenue is controlled by a pretimed traffic signal. All approaches currently have curb in addition to sidewalks on both sides of each approach. Meter parking is provided on the north side of the westbound Baum Boulevard (S.R. 0400) approach during non-peak hours. One hour Parking is currently permitted on both sides of the eastbound Baum Boulevard approach during non-peak hours. Meter parking is also provided on the eastern side of the northbound South Millvale Avenue approach. The eastbound and westbound Baum Boulevard (S.R. 0400) approaches each consist of one shared left turn/through lane and one shared through/right turn lane. The northbound South Millvale Avenue approach consists of a shared left turn/through/right turn lane. The southbound approach of South Millvale Avenue consists of an exclusive left turn lane and an exclusive through lane.

### **Baum Boulevard (S.R. 0400) and Morewood Avenue**

The intersection of Baum Boulevard (S.R. 0400) and Morewood Avenue is controlled by a pretimed traffic signal. All approaches currently have curb in addition to sidewalks on both sides of each approach. Meter parking is provided on both sides of the westbound Baum Boulevard (S.R. 0400) approach during non-peak hours. Parking is also permitted on both sides of the southbound Morewood Avenue approach, with no restrictions. Meter parking is also provided from 8:00 AM to 6:00 PM on the eastern side of the northbound Morewood Avenue approach. The eastbound and westbound Baum Boulevard (S.R. 0400) approaches each consist of one shared left turn/through lane and one shared through/right turn lane. The northbound and southbound Morewood Avenue approaches each consist of one shared left turn/through/right turn lane.

### **Baum Boulevard (S.R. 0400) and Cypress Street**

The intersection of Baum Boulevard (S.R. 0400) and Cypress Street is controlled by a pretimed traffic signal. All approaches currently have curb in addition to sidewalks on both sides of each approach. Within the vicinity of the intersection, 2-hour parking is currently permitted on the north side of the eastbound Baum Boulevard approach during non-peak hours. Meter parking is provided on the south side of the eastbound Baum Boulevard approach during non-peak hours. The northbound Cypress Street approach provides 4-hour metered parking on the eastern side from 8:00 AM to 6:00 PM. The southbound Cypress Street approach provides residential permit parking H 1 hour parking. The eastbound and westbound Baum Boulevard approaches each consist of one shared left turn/through lane and one shared through/right turn lane. The northbound and southbound Cypress Street approaches each consist of one shared left turn/through/right turn lane.

### **Baum Boulevard (S.R. 0400) and Liberty Avenue**

The intersection of Baum Boulevard (S.R. 0400) and Liberty Avenue is controlled by a pretimed traffic signal. All approaches have curb and provide sidewalks on both sides of the street. Within the vicinity of the intersection, 1-hour metered parking is provided on Baum Boulevard during non-peak hours. The southbound Liberty Avenue approach provides 2-hour metered parking from 8:00 AM to 6:00 PM. Parking is permitted on both sides of the South Atlantic Avenue approach with no restrictions. The eastbound and westbound Baum Boulevard approaches each consist of one shared left turn/through lane and one shared through/right turn lane. The northbound Liberty Avenue approach consists of an exclusive left turn lane and a shared through/right turn lane. The southbound Liberty Avenue approach consists of one shared left turn/through lane and one shared through/right turn lane. Finally, South Atlantic Avenue, the fifth leg of the intersection, carries traffic flow one-way via a single lane northeast bound away from the intersection. Within the study area, bicycle lanes are currently painted along Liberty Avenue in both directions.

### **Baum Boulevard (S.R. 0400) and South Aiken Avenue**

The intersection of Baum Boulevard (S.R. 0400) and South Aiken Avenue is controlled by a pretimed traffic signal. All approaches have curb and provide sidewalks on both sides of the street. Parking is not permitted on either side of the westbound Baum Boulevard (S.R. 0400) approach. One hour metered parking is provided on the eastbound Baum Boulevard (S.R. 0400) approach during non-peak hours. Metered parking is permitted on both sides of the northbound South Aiken Avenue approach. Parking is permitted on the southbound South Aiken Avenue approach, with no restrictions. The eastbound Baum Boulevard (S.R. 0400) approach consists of one shared left turn/through lane and one exclusive through lane. The westbound Baum Boulevard (S.R. 0400) approach consists of one exclusive through lane and one shared through/right turn lane. The northbound South Aiken Avenue approach is a one-way approach which consists of one shared left turn/through/right turn lane. The southbound South Aiken Avenue approach is two-way and consists of one shared left turn/right turn lane.

### **Centre Avenue and Morewood Avenue**

The intersection of Centre Avenue and Morewood Avenue is controlled by a pretimed traffic signal. All approaches have curb and provide sidewalks on both sides of the street. Within the vicinity of the intersection, 2-hour meter parking is permitted on the northern side of the eastbound Centre Avenue approach from 8:00 AM to 6:00 PM and residential parking is permitted on the south side of this approach. Four-hour meter parking is permitted on the northern side of the westbound Centre Avenue approach, from 8:00 AM to 6:00 PM. Meter parking is permitted on the eastern side of the southbound Morewood Avenue approach from 8:00 AM to 6:00 PM. Residential permit parking J 1-hour parking is provided on the east side of the northbound Morewood Avenue approach. The eastbound and westbound Centre Avenue



approaches consist of a shared left turn/through/right turn lane. The northbound/southbound Morewood Avenue approaches consist of a shared left turn/through/right turn lane.

### **Centre Avenue and Cypress Street/UPMC Shadyside – POB 2 Driveway**

The intersection of Centre Avenue and Cypress Street/UPMC Shadyside driveway is controlled by a pretimed traffic signal. All approaches have curb and provide sidewalks on both sides of the street. Within the vicinity of the intersection, 2-hour metered parking is provided along the eastbound Centre Avenue approach from 8:00 AM to 6:00 PM. The westbound Centre Avenue approach provides 4-hour metered parking from 8:00 AM to 6:00 PM. The southbound Cypress Street approach provides 4-hour metered parking along the east side from 8:00 AM to 6:00 PM. The eastbound and westbound Centre Avenue approaches each consist of one shared left turn/through/right turn lane. The northbound hospital driveway approach consists of a shared left turn/through lane and an exclusive right turn lane. The southbound Cypress Street approach consists of one shared left turn/through/right turn lane.

### **Centre Avenue and South Aiken Avenue**

The intersection of Centre Avenue and South Aiken Avenue is controlled by a pretimed traffic signal. All approaches have curb and provide sidewalks on both sides of the street. Within the vicinity of the intersection, 4-hour metered parking is provided along Centre Avenue from 8:00 AM to 6:00 PM. The eastbound and westbound Centre Avenue approaches each consist of one shared left turn/through/right turn lane. The northbound South Aiken Avenue two-lane approach consists of one exclusive left turn lane and one shared through/right turn lane. The southbound South Aiken Avenue two-lane approach consists of an exclusive left turn lane and a shared through/right turn lane.

### **Liberty Avenue and South Millvale Avenue**

The intersection of Liberty Avenue and South Millvale Avenue is controlled by a pretimed traffic signal. All approaches have curb and provide sidewalks on both sides of the street. Within the vicinity of the intersection, 1-hour parking is provided along the north side of the westbound Liberty Avenue approach from 8:00 AM to 6:00 PM. 2-hour parking is provided along the northern side of eastbound Liberty Avenue from 8:00 AM to 6:00 PM. One-hour parking is provided on the western side of northbound South Millvale Avenue approach from 7:00 AM to 7:00 PM. The eastbound and westbound Liberty Avenue approaches each consist of one shared left turn/through/right turn lane. The northbound and southbound South Millvale Avenue approaches consist of one exclusive left turn lane and one shared through/right turn lane. Within the study area, bicycle lane markings are currently painted along Liberty Avenue in both directions.

### **Cypress Street and South Millvale Avenue**

The intersection of Cypress Street and South Millvale Avenue is controlled by a pretimed traffic signal. All approaches have curb and provide sidewalks on both sides of the street. Within the vicinity of the intersection, 1-hour parking is provided along the west side of the South Millvale Avenue approach from 7:00 AM to 7:00 PM. One-hour parking is provided along both sides of Cypress Street. Each approach consists of one shared left turn/through/right turn lane.

### **Cypress Street and Gross Street**

The unsignalized intersection of Cypress Street and Gross Street is stop controlled on all approaches. All approaches have curb in addition to sidewalks on both sides of each approach. Within the vicinity of the intersection, Cypress Street and Gross Street provide residential permit H 1-hour parking. The eastbound Cypress Street approach consists of a shared through/right turn lane. The westbound Cypress Street approach consists of a shared left turn/through lane. The northbound Gross Street approach consists of a shared left turn/right turn lane. The one-way southbound Gross Street approach consists of one shared left turn/through/right turn lane.

### **South Millvale Avenue and Morewood Avenue**

The unsignalized intersection of South Millvale Avenue and Morewood Avenue is a two-way stop controlled intersections with stop signs on the eastbound and westbound Morewood Avenue approaches. All approaches have curb in addition to sidewalks on both sides of each approach. Within the vicinity of the intersection, South Millvale Avenue and Morewood Avenue provide unrestricted on-street parking. The eastbound Morewood Avenue approach consists of a shared left turn/right turn lane. The westbound Morewood Avenue approach consists of a shared left turn/through/right turn lane. The northbound South Millvale Avenue consists of a shared left turn/through lane. The southbound Millvale Avenue approach consists of a shared through/right turn lane.

### **South Aiken Avenue and Ellsworth Avenue**

The intersection of South Aiken Avenue and Ellsworth Avenue is controlled by a pretimed traffic signal. All approaches have curb and provide sidewalks on both sides of the street. Within the vicinity of the intersection, residential permit parking U 2-hour parking is provided along both sides of the eastbound Ellsworth Avenue approach and on the southern side of the westbound Ellsworth Avenue approach. Along the northbound Aiken Avenue approach, residential permit parking U 2-hour parking is provided on the east side of the approach. The eastbound and westbound Ellsworth Avenue approaches consist of a shared left turn/through/right turn lane. The northbound and southbound South Aiken Avenue approaches consist of an exclusive left turn lane and a shared through/right turn lane.

### **South Aiken Avenue and Claybourne Street/Patient and Visitor Garage Driveway**

The unsignalized intersection of South Aiken Avenue and Claybourne Street/Patient Visitors Garage Driveway is a two-way stop controlled intersections with stop signs on the eastbound Visitors Garage Driveway and westbound Claybourne Street approaches. Claybourne Street is designated as one-way westbound. All approaches have curb in addition to sidewalks on both sides of each approach. Within the vicinity of the intersection, residential permit parking Y 1-hour parking is provided on the north side of the Claybourne Street approach. During the AM peak hour the garage driveway has two ingress and one egress lane. During the PM peak hour the driveway has one ingress and two egress lanes. The westbound Claybourne Street approach consists of a shared left turn/right turn lane. The northbound South Aiken Avenue approach consists of a shared left turn/through lane and an exclusive through lane. The southbound South Aiken Avenue approach consists of a shared through/right turn lane.

### **South Aiken Avenue and Emergency Department Driveway/Employee Garage Driveway**

The unsignalized intersection of South Aiken Avenue and the Emergency Department/Employee Garage Driveway is a two-way stop controlled intersections with stop control on the eastbound ED/Employee Garage Driveway. All approaches have curb in addition to sidewalks on both sides of each approach. The eastbound ED/Employee Garage Driveway approach consists of one exclusive left turn lane and one exclusive right turn lane. The northbound South Aiken Avenue approach consists of a shared left turn/through lane and an exclusive through lane. The southbound South Aiken Avenue approach consists of a shared through/right turn lane.

#### **3.3.1.2 Future Area Roadway Systems**

No major changes in the study area corridors are currently approved. However, with the UPMC Shadyside 10 year master plan improvements, the following roadway mitigations are recommended under 2021 combined conditions:

##### Baum Boulevard and Morewood Avenue

- Restripe northbound Morewood Avenue approach to provide a 120 foot left turn lane and a shared through/right turn lane.

##### Baum Boulevard and Proposed Luna Garage Driveway

- Construct westbound Centre Avenue right turn lane into Luna Garage Driveway, which extends back to Woodworth Street.

##### Centre Avenue (between Morewood Avenue and South Graham Street)

- Prohibit on-street parking to allow for two travel lanes in each direction.

#### Centre Avenue and Morewood Avenue

- Restripe southbound Morewood Avenue approach to provide a 100 foot left turn lane and a shared through/right turn lane.
- Stripe westbound Centre Avenue outside lane as an exclusive right turn lane which drops onto Morewood Avenue.

#### Centre Avenue and Cypress Street

- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Centre Avenue and South Aiken Avenue/Liberty Avenue

- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

### **3.3.2 Traffic Volumes and Conditions**

Documentation of existing traffic volumes and conditions in the study area includes descriptions of the data collection effort and documentation of existing pedestrian and vehicular traffic patterns.

#### **3.3.2.1 Data Collection**

A data collection effort was previously organized and conducted by Trans Associates (TA) during April 2008 and September 2008. However, at the Form B scoping meeting, additional study intersections were requested by DCP; therefore, additional data collection was completed during April 2011.

The data collection included the following items:

- Field reconnaissance of the study area, including roadway geometry, crosswalk locations, and existing traffic control;
- Acquisition of intersection as-built drawings, signal permit drawings and signal phasing and timing information from the City of Pittsburgh Department of Public Works;
- Performance of vehicle turning movement counts for the study intersections during the following peak periods:
  - Weekday AM peak period – 7:00 AM to 9:00 AM

- Weekday PM peak period – 2:00 PM to 6:00 PM
- Performance of pedestrian counts at all study intersections;
- Identification of Port Authority bus routes and other shuttle bus routes adjacent to the site;
- Collection of existing available data on UPMC Shadyside physicians, staff, patients, students and visitors.
- Completion of an inventory of the existing UPMC Shadyside campus off-street parking facilities. Results of the existing parking inventory is summarized in **Figure 6**;
- Review of a detailed development components of the proposed master plan (Figure 2) including the projected future UPMC Shadyside campus parking supply as detailed in **Figure 7**; and
- Review of existing City of Pittsburgh residential permit parking areas as presented in **Figure 8**.

### **3.3.2.2 Automatic Traffic Recorder Counts**

Not applicable.

### **3.3.2.3 Peak Periods**

The traffic peak periods were determined to be as listed above in Section 3.3.2.1. Traffic volumes for all study intersections were compared to determine the study area peak hours within the peak periods.

### **3.3.2.4 Peak Hour Traffic Volumes**

Manual turning movement counts were performed by TA from 7:00 AM to 9:00 AM and from 2:00 PM to 6:00 PM during a typical weekday (Tuesday through Thursday) in April 2008, September 2008, and March 2011. Summaries of the data collected during the manual turning movement counts at each of the study intersections has been included in Appendix B to this report.

The overall peak hours determined from these counts are as follows:

- \* AM Peak Hour – 7:30 AM to 8:30 AM
- \* PM Peak Hour – 4:45 PM to 5:45 PM

Traffic volume data collected in year 2008 were projected to year 2011 utilizing a background growth rate of 0.62% per year linear, obtained from the Southwestern Pennsylvania Commission (SPC), and including background developments which have been approved and/or constructed since 2008. Background development details are provided in section 3.3.5.1.

The 2011 existing peak hour traffic volumes are presented in **Figure 9**.

In addition, pedestrian volumes were obtained during the data collection. Pedestrian count summaries are included in the Appendix B to this report.

### **3.3.2.5 2011 Existing Conditions – Intersection Levels of Service**

Capacity calculations were performed for each of the existing study intersections using existing 2011 traffic volumes and conditions at the study intersections during the AM and PM peak hours using the methodologies published in the *Highway Capacity Manual 2000*, by the Transportation Research Board, 2000. This methodology determines how well an intersection, approach to an intersection, or movement at an intersection operates, and assigns to it a Level of Service (LOS) A through F, with LOS A representing the best operating conditions and LOS F, the worst. Detailed definitions of LOS have been included in Appendix C to this report.

Existing signal timings and operations were obtained from the City of Pittsburgh Department of Public Works (DPW) and were utilized in the 2011 existing conditions capacity analysis. The results of the capacity calculations performed using existing 2011 traffic volumes and existing timings are presented in **Figure 10** for the AM and PM peak hours. Both LOS and delay for each approach are summarized in **Table 1**.

Results of the 2011 existing conditions capacity analyses indicate that all overall intersections currently operate with levels of service of D or better with the following exceptions (detailed approach and movement levels of services are summarized in Table 1):

- Baum Boulevard and South Millvale Avenue
  - The overall intersection currently operates at LOS E during the AM peak hour.
- Baum Boulevard and Liberty Avenue
  - The overall intersection currently operates at LOS F during the AM peak hour and at LOS E during the PM peak hour.

Detailed capacity and levels of service printouts are provided in Appendix D to this report.

### **3.3.3 Transit Routes and Service**

See Section 3.2.5.

### **3.3.4 Existing Relevant Transportation Systems Management (TSM) Programs**

The UPMC Shadyside campus currently provides shuttle service for employees to the off-site parking lots as well as for travel between UPMC campuses.

### **3.3.5 Other Considerations**

#### **3.3.5.1 Background Data**

Developments that have been approved but not yet constructed at the time traffic volumes were collected have been identified to include the following:

- Fidelity Bank development (located at the corner of Centre Avenue and Morewood Avenue – traffic impact study not performed);
- Falk School expansion (Parking and Access Evaluation prepared by Trans Associates, dated October 12, 2007);
- VA Medical Center Oakland expansion (Traffic and Parking Impact Study prepared by Trans Associates, dated November 13, 2006);
- Craig Academy development (Traffic and Parking Study prepared by Trans Associates, dated December 7, 2006);
- The Chelsea Development (Traffic, Parking, Loading, and Pedestrian Impact Study prepared by Trans Associates, dated June 19, 2008); and
- Shadyside GetGo reconstruction (Traffic Impact Study prepared by Trans Associates, dated June 20, 2008).

In addition, there are several planned, but not yet approved developments within the study area. In order to provide a conservative analysis, site generated for these trips were included in the study as well. These developments include the following:

- Homewood Suites by Hilton Hotel (Traffic and Parking Study currently being prepared by Trans Associates);
- LA Fitness (Site generated traffic volumes were obtained from the traffic study prepared by L.R. Kimball); and
- Aldi's Grocery Store (plus specialty retail and office space) (Traffic and Impact Study prepared by Trans Associates, dated November 5, 2010).

The locations of the background and planned developments are presented in **Figure 11**. The total site generated traffic volumes for the background developments are presented in **Figure 12**. The total site generated traffic volumes for the planned background developments are presented in **Figure 13**.



### **3.3.5.2 Accident Data**

Not applicable.

## **3.4 Parking Analysis**

Parking analysis was conducted for existing 2011 conditions and future 2021 conditions with all the proposed Master Plan developments in place.

### **3.4.1 2011 Existing Parking Inventory**

TA has previously completed the 2010 UPMC Shadyside Campus Wide Parking Study, dated June 9, 2010. The purpose of the study was to provide a current parking supply/demand analysis and evaluation of the parking activity/performance for the UPMC Shadyside campus.

Existing on-campus parking supply has not changed since completion of the 2010 study. However, since the 2010 parking study was performed, UPMC Shadyside has eliminated use of the Baum Lot. For analysis purposes, the parking accumulation in this lot is still included in the campus parking demand. Therefore, for existing conditions, the parking demand calculations reference the Baum Lot. The existing parking supply for the UPMC Shadyside campus is presented on **Table 2** and the locations of the parking facilities are presented graphically in Figure 6. The UPMC Shadyside campus currently provides a total of 3,139 parking spaces.

#### **3.4.1.1 2011 Existing Parking Demand**

Based on the aforementioned 2010 parking study, accumulation counts were conducted at all on-campus and off-campus parking facilities on Thursday, March 25, 2010. As determined by the parking accumulation counts, a maximum parking accumulation of 2,838 vehicles occurred at 11:00 AM; resulting in a parking surplus of 301 spaces (3,139 – 2,838). This demand was adjusted to account for maximum patient loads and unused medical office space.

##### Maximum Patient Load Adjustment

The parking demand was then adjusted to account for maximum simultaneous inpatient, outpatient, emergency department, same day surgery, and Hillman Cancer Center patient loads. The maximum number of patients for each patient category was determined from historical data provided by UPMC Shadyside. These values were then compared to the number of patients present on March 25, 2010 to produce the potential maximum number of additional patients the hospital could have during peak patient activity. Based on the peak patient activity



parking demand calculations, a peak period parking demand of 165 parking spaces is created; therefore resulting in a peak parking demand of 3,003 parking spaces (2,838 + 165).

#### Unused Medical Office Adjustment

The parking demand was then further adjusted to account for the unused medical office suites. Based in the aforementioned study, a total of 9,716 square feet of unused medical office space exists on the UPMC Shadyside campus. Based on ITE parking demand rates, this unused space has a potential peak period parking demand of 35 spaces; therefore resulting in a peak parking demand of 3,038 parking spaces (3,003 + 35).

The existing parking demand is presented on **Table 3**.

#### **3.4.1.2 Existing Herberman Conference Center Events**

Information regarding the Herberman Conference Center (April, 2010 – March, 2011) event utilization was provided by UPMC. All events analyzed were held Monday - Friday from 8:00 AM to 5:00 PM. As shown in **Table 4**, during this time frame a total of 562 events were held. Of these 562 events, 380 (67.62 %) had attendances of 1-50 people, 88 (15.66 %) had attendances of 51 - 100 people, 74 (13.17 %) had attendances of 101-200 people, and 20 (3.56 %) had attendances of 201-400 people.

According to information provided for the UPMC Shadyside 2004 Parking Update, UPMC staff estimates that, for events which attract off-site attendees, approximately 20 percent of these attendees would already be on the UPMC Shadyside/Hillman Cancer Center campus. Therefore, at most 80 percent of the attendees arrived from off-site locations.

As shown in **Table 5**, during the day of the parking counts (March 25, 2010), there were a total of six (6) events with a maximum individual event attendance of 100 people and a maximum total attendance with overlapping events considered of 170 people. During the 11:00 AM peak hour on the campus, 110 attendees were present. TA estimates that approximately 88 (110 x 80%) parking spaces were used by attendees of the events held at the Herberman Conference Center at this time. This indicates that during a peak day without events at the Herberman Conference Center, at least 189 (3,139 – 2,950) parking spaces are available all day.

The 380 events with maximum attendance of 50 people make up approximately 67.62% of the events held during the study period (Monday - Friday from 8:00 AM - 5:00 PM). Conservatively assuming all of these events drew the maximum attendance of 50 people, a parking demand of 40 (50 x 80 percent) parking spaces would be generated for each event. The estimated 189 parking space surplus (not including the 88 space parking demand generated on the day of the

counts) during a peak day should be sufficient to accommodate the numbers of spaces needed to handle events of this size.

The 88 events with a maximum attendance of 100 people make up approximately 15.66% of the events held during the study period (Monday - Friday from 8:00 AM - 5:00 PM). Conservatively assuming all of these events drew the maximum attendance of 100 people, a parking demand of 80 (100 x 0.8) parking spaces would be generated for each event. With 189 spaces available, demand for these events could easily be accommodated on the campus.

The 74 events with a maximum attendance of 200 people make up approximately 13.17% of the events held during the study period (Monday - Friday from 8:00 AM - 5:00 PM). Conservatively assuming all of these events drew the maximum attendance of 200 people, a parking demand of up to 160 (200 x 0.8) parking spaces would be generated for each event. With 189 spaces available, demand for these events could be accommodated on the campus.

Of the total 562 events held during the study period (Monday – Friday 8:00 AM to 5:00 PM), 20 events involved attendances of 201-400 people. This makes up approximately 3.56% of the events during this time frame. Events of this size create a parking demand of up to 320 (400 x 0.8) parking spaces. Of these large events, some occur at off-peak times so no special parking arrangements are needed for the events. Of those few large events per year that occur during peak times, the additional parking demand is handled by scheduling the events well in advance and making appropriate parking arrangements for the attendees.

During peak days, the parking demand created by larger events can be accommodated on-campus during non-peak hours of the day. The largest events of up to 400 attendees can also be accommodated on-campus without special arrangements throughout the entire day with the exception of the 11:00 AM peak hour. Based on the calculated parking surplus of 189 spaces, the Herberman Conference Center could accommodate events of up to 236 attendees (189 spaces / 80%) without special arrangements during the peak hour of activity on a peak day.

### **3.4.1.3 2011 Existing Numbers of Patients/Visitors**

The existing numbers of UPMC Shadyside inpatients, outpatients, same day surgery patients, Hillman Cancer Center patients, Emergency Department patients, and Urgent Care patients have been supplied by UPMC and are included in the *UPMC Shadyside Campus Wide Parking Study – 2010*, prepared by Trans Associates and dated June 9, 2010. These numbers of patients are summarized in **Table 6**.

#### **3.4.1.4 2011 Existing Patient/Visitor Parking Demand**

Based on the March 25, 2010 parking accumulation counts detailed in Table 3 and the provided numbers of lease parkers, patient parking turnover rates were estimated and presented in Table 6. Utilizing these calculated turnover rates, the existing daytime peak period parking demand for patients/visitors was determined. As presented in Table 6, the existing UPMC Shadyside campus has a daytime peak patient/visitor parking demand of 1,057 spaces.

The existing UPMC Shadyside campus parking demand has been further refined to reflect the existing conditions daytime peak parking demand for all employee and patient/visitor parking categories. As shown in **Table 7**, the existing campus is projected to have a daytime peak parking demand of 3,355 spaces.

This existing parking demand reflects a parking space demand increase of 40 spaces for the School of Nursing, which has experienced growth since the March 2010 parking accumulation counts. This demand also accounts for the potential occurrence of a large event in the Herberman Conference Center with attendees of up to 200 persons, which would include approximately 96% of the total events that occurred during the study year. Finally, this existing parking demand also accounts for employees currently using the off-campus Towerview Parking Garage, and the potential parking demand generated by employee orientation in the Ford Motor Site Parking Lot.

#### **3.4.2 2021 Projected Parking Demand**

The projected increase in UPMC Shadyside patients and visitors for the projected 2021 conditions with the 10 year master plan components in place has been supplied by UPMC. According to UPMC's projections, a 22% growth in the numbers of patients/visitors is expected for all patient categories with the exception of inpatients, which are projected to have 0% growth.

Utilizing the previously calculated patient/visitor turnover rates, the UPMC Shadyside campus is projected to have a daytime peak period parking demand of 1,241 spaces. This is an increase of 184 patients/visitors over existing conditions. Detailed parking calculations are presented in Table 6.

In addition, UPMC projects that the number of hospital employees will increase by 5% for the projected 2021 conditions with the 10 year master plan components in place. Therefore, the projected employee parking demand is expected to increase by 94 spaces. With the

construction of the new Research Building, UPMC projects a parking demand of 560 spaces for this facility.

The total 2021 projected UPMC Shadyside campus parking demand with the proposed 10 year master plan projects in place is 4,193 spaces. This reflects a parking demand increase of 838 spaces over existing conditions.

Detailed parking demand calculations are presented in Table 7.

#### **3.4.2.1 2021 Projected Parking Inventory**

The UPMC Shadyside campus 10 year master plan is planned to provide a total of 3,476 parking spaces, which is an increase of 1,337 spaces over the existing conditions (4,476 – 3,139).

The projected increase in parking supply is achieved through the following means:

- Construction of a new Outpatient Center, which will provide 440 parking spaces.
- Construction of a new parking garage (Luna Parking Garage), which will provide 1,000 parking spaces.
- UPMC Shadyside will consolidate parking onto the campus by eliminating off-campus shuttle lots including the Towerview Garage, Penn Circle Lot, and the Ford Motor Site Lot.

The 2021 projected UPMC Shadyside campus (with the 10 year master plan components in place) parking inventory is summarized in **Table 8**.

#### **3.4.2.2 2021 Projected Parking Space Allocation**

Future parking spaces assignments were made based on a priority of accommodating patient and visitor parking needs. This is accomplished through the construction of a new Outpatient Center, which will provide 385 patient/visitor parking spaces. The patients/visitors will also benefit from a reallocation of parking space assignments, which will more easily allow patients/visitor to park closer to their intended hospital destination.

With the 10 year master plan components in place, hospital employees will also benefit from improved parking conditions. The Towerview Garage, Penn Circle Lot, and the Ford Motor Site Lots will be eliminated. With the addition of the Luna Parking Garage, the UPMC Shadyside campus employee parking will be consolidated entirely onto the campus, which will eliminate employee shuttle parking and greatly reduce the overall numbers of shuttles used by UPMC

Shadyside. However, there will still be shuttle service provided for employees that travel between UPMC campuses.

Detailed future parking space inventories and space allocations are presented in Figure 7 and **Table 10**.

### **3.4.3 Parking Summary**

Parking conditions have been evaluated under existing and projected 2021 conditions with the master plan components in place. The parking demand analysis and space allocations performed for projected conditions indicates that at the peak period of the peak day, parking provided on the campus will be adequate to serve the needs of patients/visitors, physicians, and employees on the UPMC Shadyside campus.

#### 4.0 PROJECTED TRAFFIC VOLUMES AND INTERSECTION CAPACITY ANALYSIS

## **4.1 Background Traffic (Base Traffic)**

### **4.1.1 Background Traffic Growth**

In order to project year 2021 traffic volumes, an annual traffic growth factor was determined and applied to the existing traffic volume data. According to The Southwestern Pennsylvania Commission (SPC), traffic in the study area has a linear growth rate of 0.62% annually. The resultant 2021 background conditions traffic volumes for the AM and PM peak hour were determined by applying the growth rate to the 2011 existing traffic volumes (Figure 9). The 2021 background conditions traffic volumes are presented in **Figure 14**.

### **4.1.2 Background Traffic Growth**

As detailed in Section 3.3.5.1, a number of developments have been approved but not yet constructed at the time traffic volumes were collected. These developments include the following:

- Fidelity Bank development;
- Falk School expansion;
- VA Medical Center Oakland expansion;
- Craig Academy development;
- The Chelsea Development; and
- Shadyside GetGo reconstruction.

In addition, there are several planned, but not yet approved developments within the study area. In order to provide a conservative analysis, site generated for these trips were included in the study as well. These developments include the following:

- Homewood Suites by Hilton Hotel;
- LA Fitness; and
- Aldi's Grocery Store (plus specialty retail and office space).

The locations of the background and planned developments are presented in Figure 11. The total site generated traffic volumes for the background developments are presented in Figure 12. The total site generated traffic volumes for the planned background developments are presented in Figure 13.

## **4.2 Year 2021 Base Conditions Traffic Volumes**

In order to project year 2021 base traffic volumes, the 2021 background conditions traffic volumes (Figure 14) were combined with the background developments site generated trips (Figure 12) and the planned background developments site generated trips (Figure 13). The resultant 2021 base traffic volumes are presented in **Figure 15**.

### **4.2.1 Design Year 2021 Base Conditions - Intersections Levels of Service**

Using the analysis methodologies described in Section 3.3.2.5, intersection levels of service were determined at all of the study intersections under 2021 base conditions. It should be noted that the 2021 base conditions utilized optimized signal timings and existing roadway conditions for this analysis. The results of the 2021 base conditions analysis are presented in Table 1 and graphically in **Figure 16**.

Results of the 2021 base (without master plan components) conditions capacity analyses indicate that all overall intersections are projected to operate with levels of service of D or better with the following exceptions (detailed approach and movement levels of services are summarized in Table 1):

- Baum Boulevard and South Millvale Avenue
  - The overall intersection is projected to operate at LOS E during the AM peak hour.
- Baum Boulevard and Liberty Avenue
  - The overall intersection is projected to operate at LOS E during the AM peak hour and at LOS F during the PM peak hour.
- Centre Avenue and South Aiken Avenue/Liberty Avenue
  - The overall intersection is projected to operate at LOS E during the PM peak hour.

Detailed capacity and levels of service printouts are provided in Appendix E to this report.

## **4.3 Site-Generated Traffic**

### **4.3.1 Trip Generation**

Trip generation rates for the UPMC Shadyside employees have been calculated based on the numbers of assigned parking spaces and the existing AM and PM peak hour employee trip distributions at the Employee Garage. Detailed employee trip generation calculations are



presented in Table A1 in the Appendix F to this report. As detailed in Table A1, the following employee trip generation rates have been calculated:

- AM Peak Hour
  - 0.155 entering trips per person
  - 0.043 exiting trips per person
- PM Peak Hour
  - 0.036 entering trips per person
  - 0.151 exiting trips per person

Trip generation rates for the UPMC Shadyside patients/visitors have been estimated based on the calculated parking space demand/space allocation and with experience with similar facilities. The AM peak hour patient/visitor trip generation is estimated to be 25% of the total parking demand/space allocation for entering trips and 10% of the total patient/visitor parking demand/space allocation for exiting trips. PM peak hour trip generation rates have been estimated to be 10% of the total parking demand/space allocation for entering trips and 25% of the total patient/visitor parking demand/space allocation for exiting trips.

To determine the number of site generated trips that would enter and exit the proposed Research Building, it was conservatively assumed that 80 % of the required number of parking spaces would enter and 10 % of the required number of parking spaces would exit during the AM peak hour. Likewise, it was assumed that 10 % of the required number of parking spaces would enter and 70 % of the required number of parking spaces would exit during the PM peak hour.

Detailed trip generation calculations for each parker category and its corresponding parking facility are presented in **Table 10**. As shown in the table, the 2021 UPMC Shadyside campus (with 10 year master plan components) is projected to generate 1,501 AM peak hour trips (1,200 entering and 301 exiting) and 1,414 PM peak hour trips (284 entering and 1,130 exiting).

#### **4.3.2 Trip Arrival and Departure Distribution**

With the proposed 10 year UPMC Shadyside master plan components, there will be a number of parking reallocations. In order to assign the projected site generated arrival and departure trips for the projected 2021 conditions, trips needed to first be removed from the Medical Center and Visitors Parking Garages so that they could be reassigned accordingly. The resultant parking garage removals are presented graphically in **Figure 17**.

Vehicular arrival/departure distributions were developed for the projected new trips for the proposed Master Plan development. The distribution was based on existing traffic patterns on the surrounding roadway network within the study area. The resultant arrival/departure distribution for the Master Plan development study area is presented in **Figure 18**.

#### **4.3.3 Trip Assignment – Determination of Site-Generated Traffic**

The projected new trips presented in Table 10 were then applied to the corresponding arrival/departure distributions to produce a roadway network assignment of the site-generated trips for the development.

New site generated trips for the 10 year master plan are graphically presented in **Figure 19**.

#### **4.4 Combined Traffic Volumes (With 10 Year Master Plan Components)**

##### **4.4.1 Year 2021 Combined Conditions Traffic Volumes (Build)**

The 2021 combined conditions traffic volumes were determined by combining the projected new site generated trips (Figure 19) with the 2021 base traffic volumes (Figure 15) and with the rerouted Medical Center and Visitors Parking Garage trips (Figure 17). The resultant 2021 combined conditions traffic volumes are presented in **Figure 20**.

##### **4.4.2 2021 Combined Traffic Volumes - Intersections Levels of Service**

Using the methodologies described in Section 3.3.2.5, intersection levels of service were determined at all of the study intersections under 2011 combined conditions. It should be noted that optimized signal timings and existing roadway conditions were used for analysis purposes. The results of the 2021 combined conditions analysis are presented in Table 1 and graphically in **Figure 21**.

Results of the future 2021 combined (with master plan components) conditions capacity analyses (with optimized intersection signal timings) indicate that all overall intersections are projected to operate with levels of service of D or better with the following exceptions (detailed approach and movement levels of services are summarized in Table 1):

- Baum Boulevard and South Millvale Avenue
  - The overall intersection is projected to operate at LOS F during the AM peak hour and at LOS F during the PM peak hour.

- Baum Boulevard and Morewood Avenue
  - The overall intersection is projected to operate at LOS E during the AM peak hour and at LOS F during the PM peak hour.
- Baum Boulevard and Liberty Avenue
  - The overall intersection is projected to operate at LOS F during the AM peak hour and at LOS F during the PM peak hour.
- Centre Avenue and Morewood Avenue
  - The overall intersection is projected to operate at LOS F during the AM peak hour and at LOS F during the PM peak hour.
- Centre Avenue and South Aiken Avenue/Liberty Avenue
  - The overall intersection is projected to operate at LOS F during the AM peak hour and at LOS F during the PM peak hour.

Detailed capacity and levels of service printouts are provided in the Technical Appendix G to this report.

#### **4.4.3 2021 Mitigated Combined Traffic Volumes - Intersections Levels of Service**

Under the 2021 combined conditions, the following mitigation measures are required in order to minimize impacts on intersection levels of service:

##### Baum Boulevard and Morewood Avenue

- Restripe northbound Morewood Avenue approach to provide a 120 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space will be removed from the east side of Morewood Avenue between Baum Boulevard and Centre Avenue.

##### Baum Boulevard and Proposed Luna Garage Driveway

- Construct full-access signalized site driveway.
- Install audible, push-button, pedestrian countdown crossing equipment.
- Construct westbound Centre Avenue right turn lane into Luna Garage Driveway, which extends back to Woodworth Street.

##### Centre Avenue (between Morewood Avenue and South Graham Street)

- Prohibit on-street parking to allow for two travel lanes in each direction.
- Remove a total of 92 on-street metered parking spaces along Centre Avenue.

#### Centre Avenue and Morewood Avenue

- Restripe southbound Morewood Avenue approach to provide a 100 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space would need to be removed from the eastern side of Morewood Avenue, between Baum Boulevard and Centre Avenue.
- Stripe westbound Centre Avenue outside lane as an exclusive right turn lane which drops onto Morewood Avenue.

#### Centre Avenue and Cypress Street

- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Centre Avenue and South Aiken Avenue/Liberty Avenue

- Update traffic signal equipment to provide protected/permitted northbound/southbound left turn phases.
- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Morewood Avenue and Proposed Research Building Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.

#### Gross Street and Proposed Luna Garage Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.
- Perform street repairs on Gross Street to accommodate site traffic including repaving and curb/shoulder repair.

#### All Intersections

- Optimize intersection timings and offsets.

### Baum Boulevard and Centre Avenue Corridor

- Provide pedestrian crossing upgrades including:
  - repainting of crosswalks.
  - installation of new audible, push-button, pedestrian countdown crossing equipment.

### Bicycle Racks

- Provide, at a minimum new bicycle racks in the new Luna Parking Garage (at least 100 bicycle parking spaces), new CIS Garage (at least 35 bicycle parking spaces), and new Outpatient Center Garage (at least 14 bicycle parking spaces).

Results of the future Mitigated 2021 combined (with master plan components) conditions capacity analyses (with signal timing optimization and mitigation measures) indicate that all overall intersections are projected to operate with levels of service of D or better with the following exceptions (detailed approach and movement levels of services are summarized in Table 1):

- Baum Boulevard and South Millvale Avenue
  - The overall intersection is projected to operate at LOS F during the AM peak hour and at LOS F during the PM peak hour.
- Baum Boulevard and Liberty Avenue
  - The overall intersection is projected to operate at LOS F during the AM peak hour and at LOS F during the PM peak hour.
- Centre Avenue and South Aiken Avenue/Liberty Avenue
  - The overall intersection is projected to operate at LOS F during the PM peak hour.

The results of the mitigated 2021 combined conditions analysis are presented in Table 1 and graphically in **Figure 22**. The calculated 95<sup>th</sup> percentile queue lengths for the AM and PM peak hours are presented in **Table 11** and graphically in **Figures 23 and 24**.

A summary of the recommended improvements is presented in **Figure 25**.

Detailed capacity and levels of service printouts are provided in Appendix H to this report.

## 5.0 SUPPLEMENTARY TRAFFIC ANALYSIS

## 5.1 Site Access

Under the 2021 combined conditions, the following site access changes have been made to accommodate the 10 year master plan components:

### Baum Boulevard and Morewood Avenue

- Restripe northbound Morewood Avenue approach to provide a 120 foot left turn lane and a shared through/right turn lane.

### Baum Boulevard and Proposed Luna Garage Driveway

- Construct full-access signalized site driveway.
- Construct westbound Centre Avenue right turn lane into Luna Garage Driveway, which extends back to Woodworth Street.

### Centre Avenue (between Morewood Avenue and South Graham Street)

- Prohibit on-street parking to allow for two travel lanes in each direction.

### Centre Avenue and Morewood Avenue

- Restripe southbound Morewood Avenue approach to provide a 100 foot left turn lane and a shared through/right turn lane.
- Stripe westbound Centre Avenue outside lane as an exclusive right turn lane which drops onto Morewood Avenue.

### Centre Avenue and Cypress Street

- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

### Centre Avenue and South Aiken Avenue/Liberty Avenue

- Update traffic signal equipment to provide protected/permitted northbound/southbound left turn phases.
- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Morewood Avenue and Proposed Research Building Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.

#### Gross Street and Proposed Luna Garage Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.
- Perform street repairs on Gross Street to accommodate site traffic including repaving and curb/shoulder repair.

### **5.2 Traffic Safety**

Traffic safety conditions within the study area will be maintained through additional traffic controls, as necessary. Stop signs should be placed on the exiting approach of the site driveways for the new Luna Garage and Research Building Garages.

The proposed new parking access driveways will be designed in such a manner as to meet the sight distance requirements of PennDOT/City of Pittsburgh. Landscape and streetscape elements will not interfere with required sight distances. In addition, pedestrian push button countdown crossing equipment will be provided at this new intersection. Pedestrian amenities will also be constructed along the new Luna Garage Driveway including sidewalks and lighting.

Existing pedestrian crossings along the study area Baum Boulevard and Centre Avenue corridors will also be improved with updated audible, push button, pedestrian countdown crossing equipment and repainting of crosswalk markings.

The new Outpatient Center building will be located on the northeast corner of Centre Avenue and Cypress Street across the street from the Hillman Cancer Center. This building will be connected to both the Hillman Cancer Center and the new UPMC Shadyside inpatient expansion via over the road (enclosed) pedestrian walkways.

In order to accommodate the new traffic along Gross Street, street repairs including repaving and curb/shoulder will be made.

### **5.3 Traffic Signals**

The traffic signals have been previously described in Section 3.3.1.1.



Traffic signal warrant criteria were evaluated at all unsignalized study intersections for all conditions in accordance with criteria outlined in PENNDOT Publication 212 and the MUTCD:

Based upon the signal warrant analyses, Warrant 3 (Peak Hour Volume) was met for only the new intersection of Baum Boulevard and the proposed Luna Garage Driveway. Signal warrant calculation sheets are included in Appendix I of this report.

#### **5.4 Site Circulation and Parking**

##### **5.4.1 Automobiles**

See Section 5.1 of this report and Figure 2 for details.

##### **5.4.2 Loading Vehicles**

Not applicable.

##### **5.4.3 Emergency Vehicles**

Emergency (fire, paramedics, etc.) vehicles will have multiple access points to the site via the surrounding roadways.

#### **5.5 Sight Distance Evaluation**

Not applicable.

#### **5.6 Queuing Analysis**

For dense urban conditions, queuing analyses provide a far greater representation of traffic flow than level of service designations. The 95<sup>th</sup> percentile queue lengths for the study intersections under 2011 Existing, 2021 Base (without master plan components), and 2021 combined (with master plan components) conditions were evaluated. Analyses were performed using methodologies published in the Highway Capacity Manual 2000, by the Transportation Research Board using Synchro, Version 7 traffic analysis and simulation software.

Under 2021 Base conditions (without master plan projects), PM peak hour 95<sup>th</sup> percentile queue lengths were calculated to extend back through the upstream intersections at two (2) locations as shown in Figure S-7. Under 2021 combined conditions (with master plan projects), PM peak hour 95<sup>th</sup> percentile queue lengths were calculated to extend back through the upstream intersections at four (4) locations as shown in Figure S-8. Under 2021 combined mitigated conditions (with master plan projects and UPMC recommended improvements in place), PM

peak hour 95<sup>th</sup> percentile queue lengths were calculated to extend back through the upstream intersections at one (1) location as shown in Figure S-9.

Based on the results of the analysis, with the recommended mitigation measures in place, the study intersections are projected to have 95<sup>th</sup> percentile queue lengths that are similar to or better than the projected 2021 base conditions. Therefore, Trans Associates believes that with the development of the UPMC Shadyside 10 year master plan components and implementation of the recommended mitigation measures, there will be no significant degradation of traffic flow throughout the study area roadway network.

The calculated 95<sup>th</sup> percentile queue lengths are presented in **Table 11**. In addition the 95<sup>th</sup> percentile queue lengths are graphically presented in **Figure 23** for the AM peak hour and **Figure 24** for the PM peak hour. Detailed Synchro queuing calculations are presented in Appendix J to this report.

### **5.7 Travel Time Analysis**

In addition to the queuing improvements, the recommended mitigation measures have improved the travel time along Centre Avenue. During the PM peak hour, the eastbound travel time on Centre Avenue has been reduced by over four (4) minutes or 52% and the westbound travel time has been reduced by over one (1) minute or 33%. Detailed Synchro travel time calculations are presented in Appendix K to this report.

## 6.0 IMPROVEMENT ANALYSIS

## **6.1 Improvements to Accommodate Base Traffic and Site Traffic**

The recommended improvements are as follows:

### Baum Boulevard and Morewood Avenue

- Restripe northbound Morewood Avenue approach to provide a 120 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space will be removed from the east side of Morewood Avenue between Baum Boulevard and Centre Avenue.

### Baum Boulevard and Proposed Luna Garage Driveway

- Construct full-access signalized site driveway.
- Install audible, push-button, pedestrian countdown crossing equipment.
- Construct westbound Centre Avenue right turn lane into Luna Garage Driveway, which extends back to Woodworth Street.

### Centre Avenue (between Morewood Avenue and South Graham Street)

- Prohibit on-street parking to allow for two travel lanes in each direction.
- Remove a total of 92 on-street metered parking spaces along Centre Avenue.

### Centre Avenue and Morewood Avenue

- Restripe southbound Morewood Avenue approach to provide a 100 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space would need to be removed from the eastern side of Morewood Avenue, between Baum Boulevard and Centre Avenue.
- Stripe westbound Centre Avenue outside lane as an exclusive right turn lane which drops onto Morewood Avenue.

### Centre Avenue and Cypress Street

- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Centre Avenue and South Aiken Avenue/Liberty Avenue

- Update traffic signal equipment to provide protected/permitted northbound/southbound left turn phases.
- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Morewood Avenue and Proposed Research Building Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.

#### Gross Street and Proposed Luna Garage Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.
- Perform street repairs on Gross Street to accommodate site traffic including repaving and curb/shoulder repair.

#### All Intersections

- Optimize intersection timings and offsets.

#### Baum Boulevard and Centre Avenue Corridor

- Provide pedestrian crossing upgrades including:
  - repainting of crosswalks.
  - installation of new audible, push-button, pedestrian countdown crossing equipment.

#### Bicycle Racks

- Provide, at a minimum, new bicycle racks in the new Luna Parking Garage (at least 100 bicycle parking spaces), new Research Building Garage (at least 35 bicycle parking spaces), and new Outpatient Center Garage (at least 14 bicycle parking spaces).

A summary of the recommended improvements is presented in Figure 25. The locations of the proposed on-street metered parking space removals are presented in Appendix L of this report.

## 7.0 FINDINGS

### **7.1 Site Accessibility**

See Section 5.1.

### **7.2 Traffic Impacts**

See Section 4.2, 4.3 and 5.2.

### **7.3 Need for Improvements**

The recommended improvements are as follows:

#### Baum Boulevard and Morewood Avenue

- Restripe northbound Morewood Avenue approach to provide a 120 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space will be removed from the east side of Morewood Avenue between Baum Boulevard and Centre Avenue.

#### Baum Boulevard and Proposed Luna Garage Driveway

- Construct full-access signalized site driveway.
- Install audible, push-button, pedestrian countdown crossing equipment.
- Construct westbound Centre Avenue right turn lane into Luna Garage Driveway, which extends back to Woodworth Street.

#### Centre Avenue (between Morewood Avenue and South Graham Street)

- Prohibit on-street parking to allow for two travel lanes in each direction.
- Remove a total of 92 on-street metered parking spaces along Centre Avenue.

#### Centre Avenue and Morewood Avenue

- Restripe southbound Morewood Avenue approach to provide a 100 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space would need to be removed from the eastern side of Morewood Avenue, between Baum Boulevard and Centre Avenue.
- Stripe westbound Centre Avenue outside lane as an exclusive right turn lane which drops onto Morewood Avenue.

#### Centre Avenue and Cypress Street

- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Centre Avenue and South Aiken Avenue/Liberty Avenue

- Update traffic signal equipment to provide protected/permitted northbound/southbound left turn phases.
- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Morewood Avenue and Proposed Research Building Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.

#### Gross Street and Proposed Luna Garage Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.
- Perform street repairs on Gross Street to accommodate site traffic including repaving and curb/shoulder repair.

#### All Intersections

- Optimize intersection timings and offsets.

#### Baum Boulevard and Centre Avenue Corridor

- Provide pedestrian crossing upgrades including:
  - repainting of crosswalks.
  - installation of new audible, push-button, pedestrian countdown crossing equipment.

#### Bicycle Racks

- Provide, at a minimum, new bicycle racks in the new Luna Parking Garage (at least 100 bicycle parking spaces), new Research Building Garage (at least 35 bicycle parking spaces), and new Outpatient Center Garage (at least 14 bicycle parking spaces).

A summary of the recommended improvements is presented in Figure 25.



**8.0 RECOMMENDATIONS**

## **8.1 Site Access/Circulation Plan**

See Section 5.4.

## **8.2 Roadway Improvements**

The recommended improvements are as follows:

### Baum Boulevard and Morewood Avenue

- Restripe northbound Morewood Avenue approach to provide a 120 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space will be removed from the east side of Morewood Avenue between Baum Boulevard and Centre Avenue.

### Baum Boulevard and Proposed Luna Garage Driveway

- Construct full-access signalized site driveway.
- Install audible, push-button, pedestrian countdown crossing equipment.
- Construct westbound Centre Avenue right turn lane into Luna Garage Driveway, which extends back to Woodworth Street.

### Centre Avenue (between Morewood Avenue and South Graham Street)

- Prohibit on-street parking to allow for two travel lanes in each direction.
- Remove a total of 92 on-street metered parking spaces along Centre Avenue.

### Centre Avenue and Morewood Avenue

- Restripe southbound Morewood Avenue approach to provide a 100 foot left turn lane and a shared through/right turn lane. In order to accommodate the reconfiguration of Morewood Avenue, five (5) existing metered parking spaces and one (1) 30-minute loading space would need to be removed from the eastern side of Morewood Avenue, between Baum Boulevard and Centre Avenue.
- Stripe westbound Centre Avenue outside lane as an exclusive right turn lane which drops onto Morewood Avenue.

### Centre Avenue and Cypress Street

- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Centre Avenue and South Aiken Avenue/Liberty Avenue

- Update traffic signal equipment to provide protected/permitted northbound/southbound left turn phases.
- Restripe eastbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.
- Restripe westbound Centre Avenue approach to provide one shared left turn/through lane and one shared through/right turn lane.

#### Morewood Avenue and Proposed Research Building Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.

#### Gross Street and Proposed Luna Garage Driveway

- Construct full-access site driveway.
- Install stop sign control on site driveway approach.
- Perform street repairs on Gross Street to accommodate site traffic including repaving and curb/shoulder repair.

#### All Intersections

- Optimize intersection timings and offsets.

#### Baum Boulevard and Centre Avenue Corridor

- Provide pedestrian crossing upgrades including:
  - repainting of crosswalks.
  - installation of new audible, push-button, pedestrian countdown crossing equipment.

#### Bicycle Racks

- Provide, at a minimum, new bicycle racks in the new Luna Parking Garage (at least 100 bicycle parking spaces), new Research Building Garage (at least 35 bicycle parking spaces), and new Outpatient Center Garage (at least 14 bicycle parking spaces).

A summary of the recommended improvements is presented in Figure 25.

### **8.3    *Transportation Systems Management (TSM) Actions***

Not applicable.

### **8.4    *Traffic Operations Plan***

Not applicable.

### **8.5    *Truck Loading Management Plan***

Not required.

### **8.6    *Construction Management Plan***

Not required.

### **8.7    *Parking Management Plan***

Parking assignments should be made as detailed in Section 3.4.2.3 and in Figure 7.

## 9.0 CONCLUSIONS

This study has been performed to determine the traffic, parking, pedestrian, and loading impacts of the proposed UPMC Shadyside 10 Year Master Plan based upon the City of Pittsburgh's traffic impact study methodologies and to develop a program of recommended improvements.

A summary of the recommended improvements is presented in Figure 25.

Provided these recommendations are implemented, the traffic, parking, loading, and pedestrian impacts of the proposed UPMC Shadyside 10 Year Master Plan will be appropriately mitigated.

**TABLE 1**  
**CAPACITY ANALYSIS SUMMARY**  
**2011 UPMC Shadyside Hospital Master Plan**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

Approach	Movement	Level of Service/Delay <sup>(1)</sup>							
		A.M. Peak Hour				P.M. Peak Hour			
		2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>Baum Boulevard (S.R. 0400) &amp; South Millvale Avenue</b>									
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	B / 11.0	A / 9.0	B / 19.6	C / 20.2	B / 14.7	B / 20.0	C / 32.9	C / 27.4
	Approach	B / 11.0	A / 9.0	B / 19.6	C / 20.2	B / 14.7	B / 20.0	C / 32.9	C / 27.4
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	F / 97.6	F / 106.0	F / 159.7	F / 148.2	C / 31.3	C / 33.8	F / 143.0	F / 124.9
	Approach	F / 97.6	F / 106.0	F / 159.7	F / 148.2	C / 31.3	C / 33.8	F / 143.0	F / 124.9
<b>Northbound</b> <i>South Millvale Ave</i>	Left Turn/Through/Right Turn	D / 37.8	F / 204.2	F / 201.9	F / 201.9	E / 66.7	F / 98.2	F / 127.8	F / 176.5
	Approach	D / 37.8	F / 204.2	F / 201.9	F / 201.9	E / 66.7	F / 98.2	F / 127.8	F / 176.5
<b>Southbound</b> <i>South Millvale Ave</i>	Left Turn	C / 30.4	C / 23.8	C / 30.4	C / 32.5	C / 34.0	C / 34.8	C / 34.8	D / 39.1
	Through/Right Turn	D / 37.0	C / 34.4	C / 32.5	C / 34.6	C / 30.9	C / 29.9	C / 31.0	C / 32.8
	Approach	D / 35.8	C / 32.6	C / 32.0	C / 34.1	C / 31.6	C / 31.0	C / 31.8	C / 34.0
<b>Overall Intersection</b>		<b>E / 55.7</b>	<b>E / 70.9</b>	<b>F / 95.4</b>	<b>F / 90.9</b>	<b>C / 28.6</b>	<b>D / 35.6</b>	<b>F / 83.3</b>	<b>F / 80.4</b>
<b>Baum Boulevard (S.R. 0400) &amp; Morewood Avenue</b>									
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	B / 17.6	A / 9.2	B / 11.9	B / 14.3	B / 14.9	B / 16.8	B / 16.9	B / 12.3
	Approach	B / 17.6	A / 9.2	B / 11.9	B / 14.3	B / 14.9	B / 16.8	B / 16.9	B / 12.3
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	D / 42.6	C / 21.8	F / 96.1	D / 43.7	B / 11.8	C / 22.4	D / 45.6	D / 37.1
	Approach	D / 42.6	C / 21.8	F / 96.1	D / 43.7	B / 11.8	C / 22.4	D / 45.6	D / 37.1
<b>Northbound</b> <i>Morewood Ave</i>	Left Turn/Through/Right Turn	B / 19.8	E / 72.2	F / 177.5	-- -- --	D / 50.8	E / 55.0	F / 306.6	-- -- --
	Left Turn	-- -- --	-- -- --	-- -- --	F / 90.2	-- -- --	-- -- --	-- -- --	F / 82.4
	Through/Right Turn	-- -- --	-- -- --	-- -- --	B / 19.4	-- -- --	-- -- --	-- -- --	C / 21.8
<b>Southbound</b> <i>Morewood Ave</i>	Left Turn/Through/Right Turn	B / 19.8	C / 25.2	C / 25.2	C / 26.8	C / 23.9	C / 24.2	C / 24.0	C / 28.8
	Approach	B / 19.8	C / 25.2	C / 25.2	C / 26.8	C / 23.9	C / 24.2	C / 24.0	C / 28.8
<b>Overall Intersection</b>		<b>C / 31.0</b>	<b>C / 24.5</b>	<b>E / 77.9</b>	<b>D / 35.5</b>	<b>C / 20.3</b>	<b>C / 25.2</b>	<b>F / 89.0</b>	<b>C / 29.4</b>
<b>Baum Boulevard (S.R. 0400) &amp; Cypress Street</b>									
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	A / 4.5	A / 6.7	A / 5.8	A / 7.2	A / 5.1	B / 10.2	B / 19.8	A / 5.1
	Approach	A / 4.5	A / 6.7	A / 5.8	A / 7.2	A / 5.1	B / 10.2	B / 19.8	A / 5.1
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	B / 16.0	A / 3.6	A / 6.0	A / 3.1	A / 1.5	A / 3.6	A / 3.9	A / 6.8
	Approach	B / 16.0	A / 3.6	A / 6.0	A / 3.1	A / 1.5	A / 3.6	A / 3.9	A / 6.8
<b>Northbound</b> <i>Cypress St</i>	Left Turn/Through/Right Turn	C / 34.6	D / 35.5	E / 67.4	D / 50.3	E / 63.5	C / 29.8	C / 31.4	C / 31.2
	Approach	C / 34.6	D / 35.5	E / 67.4	D / 50.3	E / 63.5	C / 29.8	C / 31.4	C / 31.2
<b>Southbound</b> <i>Cypress St</i>	Left Turn/Through/Right Turn	C / 27.2	D / 40.1	D / 37.1	D / 35.1	D / 41.8	C / 26.2	C / 24.3	C / 26.3
	Approach	C / 27.2	D / 40.1	D / 37.1	D / 35.1	D / 41.8	C / 26.2	C / 24.3	C / 26.3
<b>Overall Intersection</b>		<b>B / 13.4</b>	<b>A / 7.4</b>	<b>B / 10.8</b>	<b>A / 8.3</b>	<b>B / 12.0</b>	<b>B / 10.7</b>	<b>B / 15.7</b>	<b>A / 8.8</b>
<b>Baum Boulevard (S.R. 0400) &amp; Liberty Avenue</b>									
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	C / 24.0	A / 9.8	B / 17.1	B / 15.8	E / 58.6	F / 175.2	F / 279.6	F / 296.9
	Approach	C / 24.0	A / 9.8	B / 17.1	B / 15.8	E / 58.6	F / 175.2	F / 279.6	F / 296.9
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	F / 231.6	E / 64.7	F / 275.7	F / 183.4	E / 75.6	F / 126.4	F / 259.2	F / 125.5
	Approach	F / 231.6	E / 64.7	F / 275.7	F / 183.4	E / 75.6	F / 126.4	F / 259.2	F / 125.5
<b>Northbound</b> <i>Liberty Ave</i>	Left Turn	D / 35.0	F / 97.7	F / 385.6	F / 386.1	C / 31.2	F / 91.2	F / 156.2	F / 148.1
	Through/Right Turn	C / 32.3	C / 31.4	F / 134.6	D / 35.4	D / 38.9	F / 210.4	F / 232.2	F / 225.5
	Approach	C / 33.1	D / 48.3	F / 209.9	F / 140.6	D / 37.4	F / 191.5	F / 218.8	F / 211.8

**TABLE 1  
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		A.M. Peak Hour				P.M. Peak Hour			
		2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>Southbound</b> <i>Liberty Ave</i>	Left Turn/Through/Right Turn	C / 20.1	F / 99.1	F / 90.5	F / 157.3	D / 39.9	E / 67.6	E / 77.5	E / 77.9
	Approach	C / 20.1	F / 99.1	F / 90.5	F / 157.3	D / 39.9	E / 67.6	E / 77.5	E / 77.9
<b>Overall Intersection</b>		<b>F / 119.2</b>	<b>E / 56.5</b>	<b>F / 177.1</b>	<b>F / 136.8</b>	<b>E / 56.0</b>	<b>F / 142.3</b>	<b>F / 223.9</b>	<b>F / 194.1</b>
<b>Baum Boulevard (S.R. 0400) &amp; South Aiken Avenue</b>									
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	A / 5.3	A / 6.2	A / 6.4	A / 2.4	B / 11.8	A / 3.1	A / 3.0	A / 3.0
	Approach	A / 5.3	A / 6.2	A / 6.4	A / 2.4	B / 11.8	A / 3.1	A / 3.0	A / 3.0
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	A / 8.1	A / 9.8	B / 11.5	A / 9.6	A / 5.7	A / 8.7	A / 8.9	A / 8.9
	Approach	A / 8.1	A / 9.8	B / 11.5	A / 9.6	A / 5.7	A / 8.7	A / 8.9	A / 8.9
<b>Northbound</b> <i>S Aiken Ave</i>	Left Turn/Through/Right Turn	B / 16.3	C / 29.5	C / 29.9	D / 43.2	D / 44.8	C / 32.4	C / 31.4	C / 20.9
	Approach	B / 16.3	C / 29.5	C / 29.9	D / 43.2	D / 44.8	C / 32.4	C / 31.4	C / 20.9
<b>Southbound</b> <i>South Aiken Ave</i>	Left Turn/Through/Right Turn	C / 28.8	D / 35.8	D / 42.0	D / 46.0	C / 30.6	C / 29.0	C / 31.4	C / 31.4
	Approach	C / 28.8	D / 35.8	D / 42.0	D / 46.0	C / 30.6	C / 29.0	C / 31.4	C / 31.4
<b>Overall Intersection</b>		<b>A / 8.5</b>	<b>B / 11.4</b>	<b>B / 13.3</b>	<b>B / 12.0</b>	<b>B / 13.2</b>	<b>A / 9.3</b>	<b>A / 9.8</b>	<b>A / 8.8</b>
<b>Centre Avenue &amp; Morewood Avenue</b>									
<b>Eastbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	B / 15.9	B / 17.6	C / 22.6	D / 50.0	C / 25.2	C / 27.3	C / 34.1	E / 68.5
	Approach	B / 15.9	B / 17.6	C / 22.6	D / 50.0	C / 25.2	C / 27.3	C / 34.1	E / 68.5
<b>Westbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	B / 15.4	C / 20.2	C / 32.9	-- -- --	C / 25.8	C / 23.4	E / 79.4	-- -- --
	Left Turn/Through	-- -- --	-- -- --	-- -- --	C / 24.5	-- -- --	-- -- --	-- -- --	C / 28.6
	Right Turn	-- -- --	-- -- --	-- -- --	A / 8.2	-- -- --	-- -- --	-- -- --	A / 5.8
<b>Northbound</b> <i>Morewood Ave</i>	Approach	B / 15.4	C / 20.2	C / 32.9	C / 21.6	C / 25.8	C / 23.4	E / 79.4	C / 24.0
	Left Turn/Through/Right Turn	D / 36.2	D / 40.8	E / 66.1	D / 50.9	C / 28.6	D / 36.2	D / 41.7	F / 90.2
<b>Southbound</b> <i>Morewood Ave</i>	Approach	D / 36.2	D / 40.8	E / 66.1	D / 50.9	C / 28.6	D / 36.2	D / 41.7	F / 90.2
	Left Turn/Through/Right Turn	C / 28.0	C / 20.6	F / 254.6	-- -- --	B / 17.0	C / 31.1	F / 339.0	-- -- --
<b>Southbound</b> <i>Morewood Ave</i>	Left Turn	-- -- --	-- -- --	-- -- --	B / 15.9	-- -- --	-- -- --	-- -- --	F 81.9
	Through/Right Turn	-- -- --	-- -- --	-- -- --	B / 12.4	-- -- --	-- -- --	-- -- --	C 28.9
	Approach	C / 28.0	C / 20.6	F / 254.6	B / 13.2	B / 17.0	C / 31.1	F / 339.0	D / 43.2
<b>Overall Intersection</b>		<b>C / 22.6</b>	<b>C / 24.0</b>	<b>F / 85.2</b>	<b>C / 33.8</b>	<b>C / 24.6</b>	<b>C / 28.8</b>	<b>F / 118.5</b>	<b>D / 54.3</b>
<b>Centre Avenue &amp; Cypress Street/UPMC Shadyside Hospital Driveway</b>									
<b>Eastbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	B / 15.8	A / 8.7	A / 8.4	A / 6.9	A / 7.0	A / 8.9	B / 10.4	B / 17.5
	Approach	B / 15.8	A / 8.7	A / 8.4	A / 6.9	A / 7.0	A / 8.9	B / 10.4	B / 17.5
<b>Westbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	B / 10.2	B / 10.2	A / 9.6	A / 8.5	A / 7.6	A / 7.2	A / 7.7	B / 13.8
	Approach	B / 10.2	B / 10.2	A / 9.6	A / 8.5	A / 7.6	A / 7.2	A / 7.7	B / 13.8
<b>Northbound</b> <i>Hospital Dwy</i>	Left Turn/Through	C / 29.0	C / 29.9	C / 32.0	C / 28.6	D / 38.7	D / 40.7	D / 35.2	C / 20.8
	Right Turn	C / 26.0	C / 26.4	C / 28.1	C / 25.9	C / 31.0	C / 31.8	C / 30.7	B / 19.3
	Approach	C / 28.0	C / 28.8	C / 30.4	C / 27.5	D / 35.8	D / 37.4	C / 33.3	C / 20.2
<b>Southbound</b> <i>Cypress St</i>	Left Turn/Through/Right Turn	D / 46.5	D / 42.3	E / 60.0	D / 43.2	D / 39.6	D / 37.1	E / 78.2	C / 25.3
	Approach	D / 46.5	D / 42.3	E / 60.0	D / 43.2	D / 39.6	D / 37.1	E / 78.2	C / 25.3
<b>Overall Intersection</b>		<b>B / 18.5</b>	<b>B / 15.3</b>	<b>B / 17.9</b>	<b>B / 14.4</b>	<b>B / 15.1</b>	<b>B / 15.4</b>	<b>B / 19.6</b>	<b>B / 17.4</b>



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Approach	Movement	Level of Service/Delay <sup>(1)</sup>							
		A.M. Peak Hour				P.M. Peak Hour			
		2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>Centre Avenue &amp; South Aiken Avenue/Liberty Avenue</b>									
<b>Eastbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	C / 31.8	C / 23.4	E / 59.0	D / 36.2	F / 96.5	F / 133.7	F / 335.1	C / 27.5
	Approach	C / 31.8	C / 23.4	E / 59.0	D / 36.2	F / 96.5	F / 133.7	F / 335.1	C / 27.5
<b>Westbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	E / 70.7	D / 48.9	E / 56.8	D / 37.1	C / 27.8	C / 32.4	D / 44.3	C / 20.3
	Approach	E / 70.7	D / 48.9	E / 56.8	D / 37.1	C / 27.8	C / 32.4	D / 44.3	C / 20.3
<b>Northbound</b> <i>South Aiken Ave</i>	Left Turn	C / 24.2	F / 85.5	F / 641.2	D / 39.9	D / 37.7	F / 222.6	F / 516.7	F / 80.5
	Through/Right Turn	C / 22.4	D / 35.7	D / 42.4	E / 64.2	C / 26.9	D / 40.6	E / 56.6	F / 184.1
	Approach	C / 22.8	D / 46.3	F / 204.6	E / 57.6	C / 28.5	E / 67.3	F / 146.3	F / 163.9
<b>Southbound</b> <i>Liberty Ave</i>	Left Turn	B / 18.8	C / 31.1	D / 49.7	B / 18.1	D / 33.2	F / 221.9	F / 298.3	C / 27.3
	Through/Right Turn	C / 20.8	C / 21.9	C / 22.5	D / 35.2	C / 28.4	B / 14.3	C / 26.6	F / 182.8
	Approach	C / 20.5	C / 23.4	C / 26.3	C / 32.8	C / 29.1	D / 48.4	E / 72.1	F / 156.7
<b>Overall Intersection</b>		<b>D / 37.2</b>	<b>D / 36.8</b>	<b>F / 92.9</b>	<b>D / 41.9</b>	<b>D / 47.4</b>	<b>E / 73.6</b>	<b>F / 163.7</b>	<b>F / 98.6</b>
<b>Liberty Avenue &amp; Millvale Avenue</b>									
<b>Eastbound</b> <i>Liberty Ave</i>	Left Turn/Through/Right Turn	B / 11.1	B / 11.8	B / 13.3	B / 13.3	B / 15.9	B / 16.8	B / 17.2	B / 17.2
	Approach	B / 11.1	B / 11.8	B / 13.3	B / 13.3	B / 15.9	B / 16.8	B / 17.2	B / 17.2
<b>Westbound</b> <i>Liberty Ave</i>	Left Turn/Through/Right Turn	A / 5.8	B / 15.5	B / 12.1	A / 8.2	A / 8.9	B / 11.9	B / 12.0	B / 11.1
	Approach	A / 5.8	B / 15.5	B / 12.1	A / 8.2	A / 8.9	B / 11.9	B / 12.0	B / 11.1
<b>Northbound</b> <i>Millvale Ave</i>	Left Turn	C / 20.9	C / 22.7	C / 25.6	C / 24.2	C / 24.5	B / 18.6	C / 26.2	C / 26.0
	Through/Right Turn	B / 16.1	B / 17.8	B / 19.3	B / 17.4	C / 26.5	C / 20.4	C / 25.5	C / 25.0
	Approach	B / 17.8	B / 19.6	C / 21.7	B / 20.0	C / 25.9	B / 19.9	C / 25.5	C / 25.3
<b>Southbound</b> <i>Millvale Ave</i>	Left Turn	C / 27.7	C / 28.5	C / 31.7	C / 31.7	C / 21.0	C / 22.5	C / 24.6	C / 24.6
	Through/Right Turn	C / 27.5	C / 28.4	C / 29.2	C / 29.2	B / 19.9	C / 20.7	C / 20.8	C / 20.8
	Approach	C / 27.6	C / 28.4	C / 30.2	C / 30.2	C / 20.1	C / 21.2	C / 21.9	C / 21.9
<b>Overall Intersection</b>		<b>B / 14.1</b>	<b>B / 17.9</b>	<b>B / 17.9</b>	<b>B / 16.5</b>	<b>B / 16.9</b>	<b>B / 16.6</b>	<b>B / 18.4</b>	<b>B / 18.1</b>
<b>South Aiken Avenue &amp; Ellsworth Avenue</b>									
<b>Eastbound</b> <i>Ellsworth Ave</i>	Left Turn/Through/Right Turn	B / 18.5	B / 15.1	B / 13.8	B / 15.1	E / 60.8	E / 55.8	E / 55.4	E / 55.4
	Approach	B / 18.5	B / 15.1	B / 13.8	B / 15.1	E / 60.8	E / 55.8	E / 55.4	E / 55.4
<b>Westbound</b> <i>Ellsworth Ave</i>	Left Turn/Through/Right Turn	C / 30.5	C / 23.9	C / 21.9	C / 24.5	B / 14.8	B / 13.4	B / 13.3	B / 13.3
	Approach	C / 30.5	C / 23.9	C / 21.9	C / 24.5	B / 14.8	B / 13.4	B / 13.3	B / 13.3
<b>Northbound</b> <i>South Aiken Ave</i>	Left Turn	B / 12.6	B / 16.5	B / 16.7	B / 15.4	B / 15.8	C / 24.3	C / 24.3	C / 24.3
	Through/Right Turn	B / 18.3	C / 27.6	C / 34.5	C / 29.4	B / 15.4	B / 19.6	C / 20.5	C / 20.5
	Approach	B / 17.5	C / 26.2	C / 32.3	C / 27.7	B / 15.4	C / 20.1	C / 20.9	C / 20.9
<b>Southbound</b> <i>South Aiken Ave</i>	Left Turn	B / 15.6	C / 34.4	D / 36.8	D / 35.7	B / 18.8	D / 35.7	C / 34.8	C / 34.8
	Through/Right Turn	B / 14.4	B / 18.7	B / 18.9	B / 17.7	C / 24.1	D / 43.7	E / 70.3	E / 70.3
	Approach	B / 14.7	C / 21.6	C / 21.9	C / 20.6	C / 23.0	D / 42.1	E / 64.1	E / 64.1
<b>Overall Intersection</b>		<b>C / 21.5</b>	<b>C / 22.9</b>	<b>C / 24.3</b>	<b>C / 23.5</b>	<b>C / 31.0</b>	<b>D / 36.7</b>	<b>D / 44.8</b>	<b>D / 44.8</b>
<b>Millvale Avenue &amp; Cypress Street</b>									
<b>Eastbound</b> <i>Cypress Ave</i>	Left Turn/Through/Right Turn	C / 31.4	C / 20.2	C / 20.2	C / 21.7	C / 32.2	C / 22.0	C / 21.9	C / 21.9
	Approach	C / 31.4	C / 20.2	C / 20.2	C / 21.7	C / 32.2	C / 22.0	C / 21.9	C / 21.9
<b>Westbound</b> <i>Cypress Ave</i>	Left Turn/Through/Right Turn	D / 38.2	C / 22.0	C / 22.5	C / 24.3	D / 44.9	C / 25.0	C / 31.0	C / 31.0
	Approach	D / 38.2	C / 22.0	C / 22.5	C / 24.3	D / 44.9	C / 25.0	C / 31.0	C / 31.0

**TABLE 1  
CAPACITY ANALYSIS SUMMARY  
2011 UPMC Shadyside Hospital Master Plan  
City of Pittsburgh, Allegheny County, Pennsylvania**

Approach	Movement	Level of Service/Delay <sup>(1)</sup>							
		A.M. Peak Hour				P.M. Peak Hour			
		2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>Northbound</b> <i>Millvale Ave</i>	Left Turn/Through/Right Turn	A / 4.4	A / 9.7	A / 9.9	A / 9.5	A / 5.3	B / 13.0	B / 12.4	B / 12.2
	Approach	A / 4.4	A / 9.7	A / 9.9	A / 9.5	A / 5.3	B / 13.0	B / 12.4	B / 12.2
<b>Southbound</b> <i>Millvale Ave</i>	Left Turn/Through/Right Turn	A / 3.5	A / 8.6	B / 10.5	A / 8.3	A / 4.7	A / 7.2	A / 7.1	A / 7.4
	Approach	A / 3.5	A / 8.6	B / 10.5	A / 8.3	A / 4.7	A / 7.2	A / 7.1	A / 7.4
<b>Overall Intersection</b>		<b>B / 11.0</b>	<b>B / 11.8</b>	<b>B / 12.7</b>	<b>B / 11.9</b>	<b>B / 14.0</b>	<b>B / 14.7</b>	<b>B / 17.2</b>	<b>B / 17.1</b>
<b>South Millvale Avenue &amp; Morewood Avenue</b>									
<b>Eastbound</b> <i>Morewood Ave</i>	Left Turn/Right Turn	B / 10.8	B / 11.0	B / 11.1	B / 11.1	B / 14.4	C / 24.0	D / 26.3	D / 26.3
	Approach	B / 10.8	B / 11.0	B / 11.1	B / 11.1	B / 14.4	C / 24.0	D / 26.3	D / 26.3
<b>Westbound</b> <i>Morewood Ave</i>	Left Turn/Through/Right Turn	B / 11.1	B / 11.3	B / 11.7	B / 11.7	B / 11.3	C / 17.5	C / 18.5	C / 18.5
	Approach	B / 11.1	B / 11.3	B / 11.7	B / 11.7	B / 11.3	C / 17.5	C / 18.5	C / 18.5
<b>Northbound</b> <i>South Millvale Ave</i>	Left Turn/Through	A / 1.3	A / 1.2	A / 1.0	A / 1.0	A / 1.0	A / 0.7	A / 0.7	A / 0.7
	Approach	A / 1.3	A / 1.2	A / 1.0	A / 1.0	A / 1.0	A / 0.7	A / 0.7	A / 0.7
<b>Southbound</b> <i>South Millvale Ave</i>	Through/Right Turn	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0
	Approach	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0
<b>Cypress Street &amp; Gross Street</b>									
<b>Eastbound</b> <i>Morewood Ave</i>	Left Turn/Right Turn	A / 7.3	A / 7.3	A / 7.8	A / 7.8	A / 7.3	A / 7.3	A / 7.5	A / 7.5
	Approach	A / 7.3	A / 7.3	A / 7.8	A / 7.8	A / 7.3	A / 7.3	A / 7.5	A / 7.5
<b>Westbound</b> <i>Morewood Ave</i>	Left Turn/Through/Right Turn	A / 7.4	A / 7.4	A / 7.7	A / 7.7	A / 7.4	A / 7.5	A / 7.8	A / 7.8
	Approach	A / 7.4	A / 7.4	A / 7.7	A / 7.7	A / 7.4	A / 7.5	A / 7.8	A / 7.8
<b>Northbound</b> <i>S Millvale Ave</i>	Left Turn/Through	A / 7.3	A / 7.3	A / 7.9	A / 7.9	A / 7.3	A / 7.3	A / 8.3	A / 8.3
	Approach	A / 7.3	A / 7.3	A / 7.9	A / 7.9	A / 7.3	A / 7.3	A / 8.3	A / 8.3
<b>Southbound</b> <i>S Millvale Ave</i>	Through/Right Turn	A / 7.4	A / 7.4	A / 8.0	A / 8.0	A / 7.4	A / 7.4	A / 7.6	A / 7.6
	Approach	A / 7.4	A / 7.4	A / 8.0	A / 8.0	A / 7.4	A / 7.4	A / 7.6	A / 7.6
<b>Overall Intersection</b>		<b>A / 7.3</b>	<b>A / 7.4</b>	<b>A / 7.9</b>	<b>A / 7.9</b>	<b>A / 7.4</b>	<b>A / 7.4</b>	<b>A / 7.9</b>	<b>A / 7.9</b>
<b>South Aiken Avenue &amp; Claybourne Street &amp; Patient/Visitor Driveway</b>									
<b>Eastbound</b> <i>Patient/Visitor Dwy</i>	Left Turn/Right Turn	C / 24.9	D / 28.7	E / 37.6	E / 37.5	-- -- --	-- -- --	-- -- --	-- -- --
	Left Turn	-- -- --	-- -- --	-- -- --	-- -- --	E / 48.0	F / 74.3	F / 506.8	F / 518.0
	Right Turn	-- -- --	-- -- --	-- -- --	-- -- --	B / 14.2	B / 15.0	C / 15.9	C / 16.3
	Approach	C / 24.9	D / 28.7	E / 37.6	E / 37.5	D / 31.5	E / 45.4	F / 446.6	F / 456.5
<b>Westbound</b> <i>Claybourne St</i>	Left Turn/Through/Right Turn	D / 29.4	E / 39.1	E / 35.1	E / 35.5	F / 72.1	F / 161.8	F / 200.4	F / 194.1
	Approach	D / 29.4	E / 39.1	E / 35.1	E / 35.5	F / 72.1	F / 161.8	F / 200.4	F / 194.1
<b>Northbound</b> <i>South Aiken Ave</i>	Left Turn/Through	A / 3.7	A / 3.7	A / 1.0	A / 1.0	A / 1.4	A / 1.4	A / 1.5	A / 1.5
	Approach	A / 1.6	A / 1.6	A / 0.4	A / 1.0	A / 0.5	A / 0.5	A / 0.5	A / 0.5
<b>Southbound</b> <i>South Aiken Ave</i>	Through/Right Turn	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0
	Approach	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0	A / 0.0
<b>South Aiken Avenue &amp; ED Driveway/Employee Garage Driveway</b>									
<b>Eastbound</b> <i>Employee Garage Dwy</i>	Left Turn	C / 21.2	C / 23.3	C / 24.6	C / 24.6	D / 34.6	E / 49.5	F / 68.3	F / 66.6
	Right Turn	B / 11.3	B / 11.7	B / 12.0	B / 12.0	C / 15.3	C / 16.4	C / 17.9	C / 18.1
	Approach	C / 16.6	C / 17.9	C / 18.7	C / 18.7	D / 28.0	E / 38.2	F / 51.1	F / 50.1
<b>Northbound</b> <i>South Aiken Ave</i>	Left Turn/Through	A / 3.1	A / 3.0	A / 3.0	A / 3.0	A / 1.0	A / 1.0	A / 1.0	A / 1.0
	Approach	A / 1.3	A / 1.3	A / 1.2	A / 1.2	A / 0.3	A / 0.3	A / 0.4	A / 0.3

**TABLE 1**  
**CAPACITY ANALYSIS SUMMARY**  
**2011 UPMC Shadyside Hospital Master Plan**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

Approach	Movement	Level of Service/Delay <sup>(1)</sup>							
		A.M. Peak Hour				P.M. Peak Hour			
		2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>South Aiken Avenue &amp; Employee Garage Secondary Exit Only Driveway</b>									
<b>Eastbound</b> <i>Garage Dwy</i>	Right Turn	B / 10.9	B / 11.2	B / 11.5	B / 11.5	C / 15.3	C / 16.4	C / 16.4	C / 16.4
	Approach	B / 10.9	B / 11.2	B / 11.5	B / 11.5	C / 15.3	C / 16.4	C / 16.4	C / 16.4
<b>Baum Boulevard &amp; Luna Garage Driveway</b>									
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through	-- -- --	-- -- --	A / 5.5	B / 10.1	-- -- --	-- -- --	A / 4.5	A / 4.5
	Approach	-- -- --	-- -- --	A / 5.5	B / 10.1	-- -- --	-- -- --	A / 4.5	A / 4.5
<b>Westbound</b> <i>Baum Blvd</i>	Through/Right Turn	-- -- --	-- -- --	A / 3.4	-- -- --	-- -- --	-- -- --	A / 9.1	-- -- --
	Through	-- -- --	-- -- --	-- -- --	A / 5.8	-- -- --	-- -- --	-- -- --	A / 7.5
	Right Turn	-- -- --	-- -- --	-- -- --	A / 3.5	-- -- --	-- -- --	-- -- --	A / 6.3
	Approach	-- -- --	-- -- --	A / 3.4	A / 5.6	-- -- --	-- -- --	A / 9.1	A / 7.5
<b>Southbound</b> <i>Luna Garage Dwy</i>	Left Turn/Right Turn	-- -- --	-- -- --	C / 26.3	C / 26.7	-- -- --	-- -- --	C / 33.5	C / 33.5
	Approach	-- -- --	-- -- --	C / 26.3	C / 26.7	-- -- --	-- -- --	C / 33.5	C / 33.5
<b>Overall Intersection</b>		-- -- --	-- -- --	<b>A / 4.5</b>	<b>A / 7.5</b>	-- -- --	-- -- --	<b>A / 8.8</b>	<b>A / 8.2</b>
<b>Morewood Avenue &amp; Research Building Garage Driveway</b>									
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Right Turn	-- -- --	-- -- --	C / 21.9	C / 21.9	-- -- --	-- -- --	D / 31.8	D / 31.8
	Approach	-- -- --	-- -- --	C / 21.9	C / 21.9	-- -- --	-- -- --	D / 31.8	D / 31.8
<b>Southbound</b> <i>Luna Garage Dwy</i>	Left Turn/Through	-- -- --	-- -- --	A / 4.1	A / 4.1	-- -- --	-- -- --	A / 0.6	A / 0.6
	Approach	-- -- --	-- -- --	A / 4.1	A / 4.1	-- -- --	-- -- --	A / 0.6	A / 0.6
<b>Gross Street &amp; Luna Garage Driveway</b>									
<b>Westbound</b> <i>Luna Garage Dwy</i>	Left Turn/Right Turn	-- -- --	-- -- --	A / 8.6	A / 8.6	-- -- --	-- -- --	A / 8.8	A / 8.8
	Approach	-- -- --	-- -- --	A / 8.6	A / 8.6	-- -- --	-- -- --	A / 8.8	A / 8.8
<b>Southbound</b> <i>Gross St</i>	Left Turn/Through	-- -- --	-- -- --	A / 6.0	A / 6.0	-- -- --	-- -- --	A / 4.5	A / 4.5
	Approach	-- -- --	-- -- --	A / 6.0	A / 6.0	-- -- --	-- -- --	A / 4.5	A / 4.5

(1) Levels of service and vehicular delay calculated using methodologies published in *Highway Capacity Manual*, published by the Transportation Research Board, 2000. Synchro Traffic Simulation Software HCM Methodology Reports were utilized to determine the level of service and delay.

Source: Analysis by Trans Associates.

**TABLE 2**  
**2010 EXISTING PARKING INVENTORY**  
**2011 UPMC Shadyside Hospital Master Plan Study**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

PARKING FACILITY	TYPE OF PARKING	CAPACITY <sup>(1)</sup>
Medical Center Garage	Lined	823
	Valet	108
Visitor Garage	Lined	664
Employee Garage	Lined	750
Shadyside Place Garage	Lined	160
Shadyside Place Lot	Lined	
Hillman Garage	Lined	180
	Valet	
Family Health Lot	Lined	108
Urgent Care Lot	Lined	12
Baum Lot	Lined	90
Penn Circle North Lot	Lined	186
School of Nursing	Lined	58
<b>TOTAL SPACES</b>		<b>3,139</b>

(1) Data obtained from the UPMC Shadyside Campus Wide Parking Study - 2010, prepared by Trans Associates and dated June 9, 2010.

Source: Trans Associates.

**TABLE 3**  
**PARKING ACCUMULATION COUNT SUMMARY**  
**March 25, 2010**  
**2011 UPMC Shadyside Hospital Master Plan Study**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

PARKING FACILITY	CAPACITY	TIME/ACCUMULATION (VEHICLES PARKED) <sup>(2)</sup>									
	(SPACES) <sup>(1)</sup>	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM	2:00 PM	3:00 PM	4:00 PM	
Medical Center Garage (including valet spaces)	931	568	759	851	<b>886</b>	855	839	817	731	593	
Visitor Garage	664	380	395	524	<b>580</b>	571	570	545	511	423	
Employee Garage	750	611	608	714	<b>725</b>	711	705	682	607	504	
Shadyside Place Garage	160	73	85	83	<b>92</b>	83	88	78	73	50	
Shadyside Place Lot		40	59	90	<b>77</b>	57	61	56	51	50	
Hillman Garage	180	56	127	184	<b>186</b>	197	202	176	125	66	
Family Health Lot (24 + 84 spaces)	108	31	72	86	<b>93</b>	84	86	89	85	81	
Urgent Care Lot	12	0	0	0	<b>0</b>	0	2	1	2	2	
Baum Lot	90	59	71	79	<b>81</b>	84	80	80	66	38	
Penn Circle Lots	186	67	87	96	<b>100</b>	97	95	97	83	66	
School of Nursing	58	8	15	18	<b>18</b>	19	20	19	11	8	
<b>TOTALS</b>	<b>3,139</b>	<b>1,893</b>	<b>2,278</b>	<b>2,725</b>	<b>2,838</b>	<b>2,758</b>	<b>2,748</b>	<b>2,640</b>	<b>2,345</b>	<b>1,881</b>	
Number of Spaces Available	--	1,246	861	414	<b>301</b>	381	391	499	794	1,258	
Additional Parking Demand to Account for Peak Day Activity <sup>(3)</sup>	--	165	165	165	<b>165</b>	165	165	165	165	165	
Additional Parking Demand to Account for Unused Space <sup>(4)</sup>		35	35	35	<b>35</b>	35	35	35	35	35	
Peak Activity Parking Demand with Unused Space Occupied <sup>(5)</sup>		<b>2,093</b>	<b>2,478</b>	<b>2,925</b>	<b>3,038</b>	<b>2,958</b>	<b>2,948</b>	<b>2,840</b>	<b>2,545</b>	<b>2,081</b>	

Note: Data obtained from the UPMC Shadyside Campus Wide Parking Study - 2010, prepared by Trans Associates and dated June 9, 2010.

- (1) From Table 2.
- (2) Parking accumulation counts were performed by Trans Associates on Thursday, March 25, 2010.
- (3) Parking demand to account for peak day peak patient loads was calculated based on historical patient data from September 9, 2009 through November 9, 2009. Detailed calculations are provided in the UPMC Shadyside Campus Wide Parking Study - 2010, prepared by Trans Associates and dated June 9, 2010. Based on the calculations, an additional 165 parkers were assumed for each study hour to be conservative.
- (4) Parking demand to account for unused medical office space was calculated based on data provided by UPMC and parking demand rates contained in the *ITE Parking Generation Manual, 3rd Edition*. Detailed calculations are provided in the UPMC Shadyside Campus Wide Parking Study - 2010, prepared by Trans Associates and dated June 9, 2010. The peak parking demand rate was assumed for all hours to be conservative.
- (5) Peak parking demand includes Herberman Conference Center event parking demand. As presented in Table 4, 80% of event attendees during each hour originate from off-site as estimated by UPMC (UPMC Shadyside 2004 Parking Update). The number of attendees for each event on March 25, 2010 is presented in Table 4. During the peak hour there were approximately 88 parkers for the conference center.

Source: Analysis by Trans Associates

**TABLE 4**  
**HERBERMAN CONFERENCE CENTER EVENT SUMMARY**  
**MONDAY THROUGH SATURDAY, 8:00 A.M. TO 5:00 P.M.**  
**2011 UPMC Shadyside Hospital Master Plan Study**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

MONTH	NUMBERS OF EVENTS <sup>(1)</sup>					TOTAL EVENTS
	1-50 Attendees	51-100 Attendees	101-200 attendees	201-400 attendees	401-600 attendees	
April, 2010	31	6	9	0	0	46
May, 2010	30	7	7	1	0	45
June, 2010	49	14	8	1	0	72
July, 2010	21	4	7	2	0	34
August, 2010	28	2	6	1	0	37
September, 2010	24	5	5	1	0	35
October, 2010	10	7	7	6	0	30
November, 2010	26	6	7	2	0	41
December, 2010	30	4	3	1	0	38
January, 2011	33	11	4	1	0	49
February, 2011	50	9	4	2	0	65
March, 2011	48	13	7	2	0	70
<b>TOTAL, Number of Events</b>	<b>380</b>	<b>88</b>	<b>74</b>	<b>20</b>	<b>0</b>	<b>562</b>
<b>Percent of All Events</b>	<b>67.62%</b>	<b>15.66%</b>	<b>13.17%</b>	<b>3.56%</b>	<b>0.00%</b>	<b>--</b>
DAY OF PARKING COUNTS	NUMBERS OF EVENTS <sup>(1)</sup>					TOTAL EVENTS
	1-50 Attendees	51-100 Attendees	101-200 attendees	201-400 attendees	400-600 attendees	
March 25, 2010	5	1	0	0	0	6
<b>Max Number of Attendees Present During Daytime (8:00 AM – 5:00 PM)</b>				<b>170</b>		
<b>Numbers of Attendees Present During Peak Hour (11:00 A.M.)<sup>(2)</sup>:</b>				<b>110</b>		
<b>Numbers of Parkers Associated with Events<sup>(2)(3)</sup>:</b>				<b>88</b>		

(1) Numbers of events held at the Herberman Conference Center were provided by UPMC for April, 2010 through March, 2011. All events listed were held Monday through Friday from 8:00 A.M. to 5:00 P.M.

(2) Numbers of attendees present during peak hour were obtained from data provided by UPMC for March 25, 2010.

(3) Numbers of parkers associated with events was calculated based on an 80% off-site origination rate as estimated by UPMC in the UPMC Shadyside 2004 Parking Update.

Source: Summary by Trans Associates.



**TABLE 5**  
**HERBERMAN CONFERENCE CENTER EVENTS**  
**March 25, 2010**  
**2011 UPMC Shadyside Hospital Master Plan Study**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

EVENT	LOCATION	START TIME	END TIME	NUMBER OF PERSONS ATTENDING
Eng & Maint Dept / Inservice	Cooper Classroom AB	7:00 AM	8:30 AM	45
Course/Scientific Management	202 Herberman Auditorium & 201AB Herberman Conference Center	8:30 AM	6:30 PM	100
HR / Generational Difference	Cooper Classroom C	9:00 AM	10:00 AM	20
		&	&	
		2:00 PM	3:00 PM	
Surgical Oncology / Lab	Cooper Classroom B	9:30 AM	11:30 AM	10
Prof. Edu / Lunch & Learn	Cooper Classroom BC	12:00 PM	1:00 PM	45
HR / HR-Worksite Weight Manage	Cooper Classroom AB	12:00 PM	1:00 PM	25
<b>TOTAL NUMBER OF PERSONS ATTENDING EVENTS</b>				<b>245</b>
<b>NUMBER OF PERSONS PRESENT DURING 11:00 AM PEAK HOUR</b>				<b>110</b>

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Note: Data provided by UPMC Shadyside

Summary by: Trans Associates

**TABLE 6**  
**EXISTING 2010 AND PROJECTED 2021 PATIENT/VISITOR PARKING DEMAND**  
**2011 UPMC Shadyside Hospital Master Plan Study**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

Patient / Visitor Classification	2010 Peak Numbers of Persons <sup>(1)</sup>	Parking Turnover Rate (vehicles/space) <sup>(2)</sup>	2010 Parking Demand During Daytime Peak Period	2021 Projected Patient/Visitor Growth	2021 Projected Parking Demand During Daytime Peak Period	Projected Increase in Parking Demand
Inpatient Visitors <sup>(3)</sup>	451	2.00	226	0%	226	0
Outpatients	1,026	2.22	462	22%	564	102
Same Day Surgery Patients	130	1.00	130	22%	159	29
Hillman Cancer Center Patients	495	2.83	175	22%	214	39
Emergency Department Patients <sup>(4)</sup>	--	--	45	22%	55	10
Urgent Care Patients <sup>(5)</sup>	--	--	19	22%	23	4
<b>Total</b>	<b>2,102</b>	<b>--</b>	<b>1,057</b>	<b>--</b>	<b>1,241</b>	<b>184</b>

(1) Data supplied by UPMC and detailed in the UPMC Shadyside Campus Wide Parking Study - 2010, prepared by Trans Associates and dated June 9, 2010.

(2) Calculated based on the March 25, 2010 parking counts detailed in Table 3. Patient parking was estimated based on the observed parking accumulation minus the numbers of leased parkers as provided by UPMC.

(3) Numbers of Inpatient visitors reflects the number of persons present during daytime peak period.

(4) The existing emergency department peak patient parking demand was based on existing data and projections provided by UPMC detailed in the UPMC Shadyside Emergency Department Expansion study prepared by Trans Associates.

(5) Urgent Care peak period patient parking demand was calculated based on the available patient parking spaces in the Family Health/Urgent Care Lots (19 patient spaces). For analysis purposes, all patient spaces were assumed to be utilized.

Source: Analysis by Trans Associates.

**TABLE 7**  
**EXISTING AND PROJECTED 2021 PARKING DEMAND**  
**2011 UPMC Shadyside Hospital Master Plan Study**  
**City of Pittsburgh, Pennsylvania**

Parker Category	Number of Spaces Needed		
	Existing Peak Conditions <sup>(1)(2)</sup>	2021 Projected Conditions <sup>(1)</sup>	Increase in Parking Demand 2021 - 2010
Employees <sup>(3)</sup>	1,875	1,969	94
Inpatient Visitors	226	226	0
Outpatients <sup>(4)</sup>	427	524	97
Same Day Surgery Patients	130	159	29
Hillman Cancer Center Patients	175	214	39
Emergency Department Patients	45	55	10
Urgent Care Patients	19	23	4
Herberman Conference Center <sup>(5)</sup>	88	88	0
Herberman Conference Center <sup>(6)</sup>	72	72	0
School of Nursing <sup>(7)</sup>	58	58	0
Family Health <sup>(4)</sup>	35	40	5
Ford Motor Site Lot Demand <sup>(8)</sup>	40	40	0
Towerview Employees Demand <sup>(9)</sup>	150	150	0
New CIS Building	0	560	560
Boston Market	15	15	0
<b>Total</b>	<b>3,355</b>	<b>4,193</b>	<b>838</b>

(1) From Table 6.

(2) From Tables 3 and 6.

(3) Employee parking demand was derived by subtracting the calculated patient/visitor parking demand from the total campus parking demand. The existing 2010 parking demand for the School of Nursing has also been moved from the total employee parking demand to its own line item. For projected 2021 condition, the employee parking demand is assumed to increase by 5% based on data supplied by UPMC.

(4) Family Health patient parking demand has been separated from the outpatient total and tabulated as a separate line item. According to UPMC, the peak parking demand for this use is currently 35 spaces and is projected to be approximately 40 spaces for future conditions.

(5) Parking demand reflects the peak hour conference center parking demand on the day of the parking counts, March 25, 2010 as shown in Table 3.

(6) As shown in Table 4, approximately 96% of the yearly events at the conference center have up to 200 attendees. 80% of event attendees originate from off-site. Therefore, events of up to 200 attendees would generate a parking demand of 160 vehicles. The 2010 counts already accounted for an event with 110 attendees which generated a parking demand for 88 spaces. Therefore, the potential difference in parking demand is 72 additional spaces (160 - 88).

(7) Since completion of the UPMC Shadyside Campus Wide Parking Study - 2010, the School of Nursing has experienced growth which now completely utilizes the 58 space parking lot for this facility. The 2010 parking counts showed a total of 18 parkers in this lot during the peak hour. In 2011, the number of parkers during the peak hour is 58. Therefore, the 2010 parking demand of 18 spaces has been added to the additional parking demand of 40 spaces to account for the growth.

(8) Parking demand reflects the 2011 usage of this site for employee orientation parking.

(9) Employee parking demand in the Towerview Garage has been provided by UPMC.

Source: Analysis by Trans Associates.

**TABLE 8**  
**2021 PROJECTED PARKING INVENTORY**  
**WITH LUNA GARAGE**  
**2011 UPMC Shadyside Hospital Master Plan Study**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

PARKING FACILITY	TYPE OF PARKING	PROJECTED CAPACITY (number of spaces) <sup>(1)</sup>
Medical Center Garage	Lined	823
	Valet	108
Visitor Garage <sup>(2)</sup>	Lined	651
Employee Garage	Lined	750
Shadyside Place Garage	Lined	160
Shadyside Place Lot	Lined	
Hillman Garage	Lined	180
	Valet	
School of Nursing	Lined	58
New CIS Garage	Lined	306
New Outpatient Center Garage	Lined	440
New Luna Garage	Lined	1,000
<b>TOTAL SPACES</b>		<b>4,476</b>

(1) From Table 2 and data supplied by UPMC.

(2) Projected visitor garage capacity includes the removal of 13 spaces to accommodate the ED improvement projects.

Source: Trans Associates.

**TABLE 9**  
**2021 PROPOSED PARKING SPACE ALLOCATION**  
**2011 UPMC Shadyside Hospital Master Plan Study**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

PARKING FACILITY	PROJECTED CAPACITY (number of spaces) <sup>(1)</sup>	Parker Category	Number of Spaces Allocated (95% Efficiency) <sup>(2)</sup>
<b>Medical Center Garage</b>	931	Inpatient Visitors	160
		Outpatients	78
		Hillman Patients/Visitors	56
		Employees	637
		<i>Subtotal</i>	<b>931</b>
<b>Visitor Garage<sup>(2)</sup></b>	651	Same Day Surgery Patients	167
		Outpatients	155
		Inpatient Visitors	78
		Emergency Department Patients	58
		Physicians	95
		Employees	98
		<i>Subtotal</i>	<b>651</b>
<b>Employee Garage</b>	750	Employees	<b>750</b>
<b>Shadyside Place Garage and Lot</b>	160	Employees	<b>160</b>
<b>Hillman Garage</b>	180	Patients/Visitors	169
		Physicians	11
		<i>Subtotal</i>	<b>180</b>
<b>School of Nursing</b>	58	Employees	<b>58</b>
<b>New CIS Garage</b>	306	CIS Employees	<b>306</b>
<b>New Outpatient Center Garage</b>	440	Outpatients	319
		Urgent Care Patients/Visitors	24
		Family Health Patients/Visitors	42
		Physicians	40
		Boston Market	15
		<i>Subtotal</i>	<b>440</b>
<b>New Luna Garage<sup>(3)</sup></b>	1,000	CIS Employees	283
		Ford Motor Stie Lot Demand (Employees)	42
		Employees	506
		Herberman Conference Center Visitors	169
		<i>Subtotal</i>	<b>1,000</b>
<b>TOTAL SPACES</b>	<b>4,476</b>	--	<b>4,476</b>

(1) From Table 8.

(2) Parking Demand was obtained from Table 7. Parking spaces were assigned based on a 95% efficiency rate, with the exception of the Boston Market and School of Nursing which are established.

Source: Analysis by Trans Associates.

**TABLE 10**  
**2021 PROJECTED TRIP GENERATION**  
**2011 UPMC Shadyside Hospital Master Plan Study**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

PARKING FACILITY	Parker Category	Number of Spaces Allocated (95% Efficiency) <sup>(1)</sup>	Trip Generation <sup>(2)</sup>					
			AM Peak			PM Peak		
			Enter	Exit	Total	Enter	Exit	Total
<b>Medical Center Garage</b>	Inpatient Visitors	160	40	16	56	16	40	56
	Outpatients	78	20	8	28	8	20	28
	Hillman Patients/Visitors	56	14	6	20	6	14	20
	Employees	637	99	27	126	23	96	119
	<i>Subtotal</i>	<b>931</b>	173	57	230	53	170	223
<b>Visitor Garage<sup>(2)</sup></b>	Same Day Surgery Patients	167	42	17	59	17	42	59
	Outpatients	155	39	16	55	16	39	55
	Inpatient Visitors	78	20	8	28	8	20	28
	Emergency Department Patients	58	15	6	21	6	15	21
	Physicians	95	15	4	19	3	14	17
	Employees	98	15	4	19	4	15	19
	<i>Subtotal</i>	<b>651</b>	146	55	201	54	145	199
<b>Employee Garage</b>	Employees	<b>750</b>	116	32	148	27	113	140
<b>Shadyside Place Garage and Lot</b>	Employees	<b>160</b>	25	7	32	6	24	30
<b>Hillman Garage</b>	Patients/Visitors	169	42	17	59	17	42	59
	Physicians	11	2	0	2	0	2	2
	<i>Subtotal</i>	<b>180</b>	44	17	61	17	44	61
<b>School of Nursing</b>	Employees	<b>58</b>	9	2	11	2	9	11
<b>New CIS Garage</b>	CIS Employees <sup>(3)</sup>	<b>306</b>	245	31	276	31	214	245
<b>New Outpatient Center Garage</b>	Outpatients	319	80	32	112	32	80	112
	Urgent Care Patients/Visitors	24	6	2	8	2	6	8
	Family Health Patients/Visitors	42	11	4	15	4	11	15
	Physicians	40	6	2	8	1	6	7
	Boston Market	15	2	1	3	1	2	3
	<i>Subtotal</i>	<b>440</b>	105	41	146	40	105	145
<b>New Luna Garage<sup>(3)</sup></b>	CIS Employees <sup>(3)</sup>	283	226	28	254	28	198	226
	Ford Motor Site Lot Demand (Employees)	42	7	2	9	2	6	8
	Employees	506	78	22	100	18	76	94
	Herberman Conference Center Visitors	169	26	7	33	6	26	32
	<i>Subtotal</i>	<b>1,000</b>	337	59	396	54	306	360
<b>TOTAL SPACES</b>	--	<b>4,476</b>	<b>1,200</b>	<b>301</b>	<b>1,501</b>	<b>284</b>	<b>1,130</b>	<b>1,414</b>

(1) From Table 9.

(2) Trip generation rates for the UPMC Shadyside Employees have been based on the numbers of assigned parking spaces and the existing AM and PM peak hour employee trip distributions at the Employee Garage. Detailed calculations are included in Table A1 of the Appendix to this report. Patient peak hour trip distributions have been estimated based on the calculated assigned parking spaces and with experience with similar facilities. The AM peak hour patient entering trip generation is estimated to be 25% of the total assigned parking spaces. The AM peak hour patient exiting trip generation is estimated to be 10% of the total assigned patient parking spaces. For example, Medical Center inpatient visitors (AM entering trips = 25% \* 160 = 40). PM peak hour patient trips have been estimated to be the reverse of the AM trip generation rates (10% entering and 25% exiting).

(3) Trip generation for the CIS building assumed 80% of the assigned number of parking spaces entered and 10% of the required number of parking spaces exited during the AM peak hour. During the PM peak hour, 10% of the required number of parking spaces entered and 70% of the required number of parking spaces exited.

Source: Analysis by Trans Associates.



**TABLE 11**  
**QUEUE ANALYSIS SUMMARY**  
**2011 UPMC Shadyside Hospital Master Plan**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

Approach	Movement	Queue Length (Feet) <sup>(1)</sup>								
		Existing Queue Capacity <sup>(2)</sup>	A.M. Peak Hour				P.M. Peak Hour			
			2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>Baum Boulevard (S.R. 0400) &amp; South Millvale Avenue</b>										
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	127	123	211	215	191	256	342	313
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	327	340	265	335	236	245	239	288
<b>Northbound</b> <i>South Millvale Ave</i>	Left Turn/Through/Right Turn	--	85	139	144	144	241	269	274	287
<b>Southbound</b> <i>South Millvale Ave</i>	Left Turn	50	38	30	44	44	37	40	40	43
	Through/Right Turn	--	126	120	118	118	86	92	102	103
<b>Baum Boulevard (S.R. 0400) &amp; Morewood Avenue</b>										
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	120	78	104	156	225	171	141	174
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	393	175	495	153	66	179	135	153
<b>Northbound</b> <i>Morewood Ave</i>	Left Turn/Through/Right Turn	--	78	216	184	--	197	139	364	--
	Left Turn	120	--	--	--	148	--	--	--	155
	Through/Right Turn	--	--	--	--	24	--	--	--	22
<b>Southbound</b> <i>Morewood Ave</i>	Left Turn/Through/Right Turn	--	7	8	8	9	38	41	41	44
<b>Baum Boulevard (S.R. 0400) &amp; Cypress Street</b>										
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	83	109	100	71	124	303	401	48
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	203	30	36	36	14	36	33	54
<b>Northbound</b> <i>Cypress St</i>	Left Turn/Through/Right Turn	--	33	29	73	70	181	102	96	73
<b>Southbound</b> <i>Cypress St</i>	Left Turn/Through/Right Turn	--	41	51	36	36	29	26	13	14
<b>Baum Boulevard (S.R. 0400) &amp; Liberty Avenue</b>										
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	156	91	95	176	346	493	597	597
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	531	493	664	626	297	376	433	391
<b>Northbound</b> <i>Liberty Ave</i>	Left Turn	330	78	84	122	118	53	60	66	69
	Through/Right Turn	--	184	144	233	139	233	357	317	303

**TABLE 11**  
**QUEUE ANALYSIS SUMMARY**  
**2011 UPMC Shadyside Hospital Master Plan**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

Approach	Movement	Queue Length (Feet) <sup>(1)</sup>								
		Existing Queue Capacity <sup>(2)</sup>	A.M. Peak Hour				P.M. Peak Hour			
			2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>Southbound</b> <i>Liberty Ave</i>	Left Turn/Through/Right Turn	--	112	245	185	280	219	298	306	311
<b>Baum Boulevard (S.R. 0400) &amp; South Aiken Avenue</b>										
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	67	71	77	28	166	33	29	30
<b>Westbound</b> <i>Baum Blvd</i>	Left Turn/Through/Right Turn	--	176	224	281	244	80	123	131	131
<b>Northbound</b> <i>South Aiken Ave</i>	Left Turn/Through/Right Turn	--	8	23	24	18	41	41	65	69
<b>Southbound</b> <i>South Aiken Ave</i>	Left Turn/Through/Right Turn	--	37	95	132	134	48	82	87	87
<b>Centre Avenue &amp; Morewood Avenue</b>										
<b>Eastbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	--	195	229	273	375	389	437	464	508
<b>Westbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	--	197	231	402	--	327	374	493	--
	Left Turn/Through	--	--	--	--	299	--	--	--	386
	Right Turn	--	--	--	--	38	--	--	--	23
<b>Northbound</b> <i>Morewood Ave</i>	Left Turn/Through/Right Turn	--	280	304	374	359	220	256	292	338
<b>Southbound</b> <i>Morewood Ave</i>	Left Turn/Through/Right Turn	--	193	156	320	--	153	201	429	--
	Left Turn	100	--	--	--	22	--	--	--	86
	Through/Right Turn	--	--	--	--	76	--	--	--	208
<b>Centre Avenue &amp; Cypress Street/UPMC Shadyside Hospital Driveway</b>										
<b>Eastbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	--	210	140	125	62	125	173	202	132
<b>Westbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	--	138	163	179	111	131	104	121	97
<b>Northbound</b> <i>Hospital Dwy</i>	Left Turn/Through	--	38	38	50	48	139	144	99	79
	Right Turn	--	15	16	27	26	67	68	61	49
<b>Southbound</b> <i>Cypress St</i>	Left Turn/Through/Right Turn	--	144	157	171	147	75	71	145	92

**TABLE 11  
 QUEUE ANALYSIS SUMMARY  
 2011 UPMC Shadyside Hospital Master Plan  
 City of Pittsburgh, Allegheny County, Pennsylvania**

Approach	Movement	Queue Length (Feet) <sup>(1)</sup>								
		Existing Queue Capacity <sup>(2)</sup>	A.M. Peak Hour				P.M. Peak Hour			
			2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>Centre Avenue &amp; South Aiken Avenue/Liberty Avenue</b>										
<b>Eastbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	--	206	127	345	60	499	561	691	270
<b>Westbound</b> <i>Centre Ave</i>	Left Turn/Through/Right Turn	--	432	442	445	205	203	275	312	101
<b>Northbound</b> <i>South Aiken Ave</i>	Left Turn	--	90	152	222	139	101	140	180	126
	Through/Right Turn	--	231	334	373	401	270	373	428	506
<b>Southbound</b> <i>Liberty Ave</i>	Left Turn	330	35	27	26	15	46	66	72	41
	Through/Right Turn	--	187	135	148	148	233	102	115	294
<b>Liberty Avenue &amp; Millvale Avenue</b>										
<b>Eastbound</b> <i>Liberty Ave</i>	Left Turn/Through/Right Turn	--	163	187	233	233	266	303	313	313
<b>Westbound</b> <i>Liberty Ave</i>	Left Turn/Through/Right Turn	--	103	202	131	78	77	123	112	122
<b>Northbound</b> <i>Millvale Ave</i>	Left Turn	50	35	37	46	39	90	42	118	112
	Through/Right Turn	--	26	28	36	31	152	67	124	117
<b>Southbound</b> <i>Millvale Ave</i>	Left Turn	200	64	67	80	80	31	33	39	39
	Through/Right Turn	--	104	111	119	119	43	45	47	47
<b>South Aiken Avenue &amp; Ellsworth Avenue</b>										
<b>Eastbound</b> <i>Ellsworth Ave</i>	Left Turn/Through/Right Turn	--	109	104	95	100	341	355	354	354
<b>Westbound</b> <i>Ellsworth Ave</i>	Left Turn/Through/Right Turn	--	286	286	242	277	111	110	109	109
<b>Northbound</b> <i>South Aiken Ave</i>	Left Turn	55	32	39	39	38	30	44	43	43
	Through/Right Turn	--	187	272	311	300	113	143	153	153
<b>Southbound</b> <i>South Aiken Ave</i>	Left Turn	100	17	22	21	21	76	117	108	108
	Through/Right Turn	--	91	115	118	115	275	338	391	391
<b>Millvale Avenue &amp; Cypress Street</b>										
<b>Eastbound</b> <i>Cypress Ave</i>	Left Turn/Through/Right Turn	--	21	17	16	17	19	16	15	15
<b>Westbound</b> <i>Cypress Ave</i>	Left Turn/Through/Right Turn	--	28	22	24	25	40	33	51	51
<b>Northbound</b> <i>Millvale Ave</i>	Left Turn/Through/Right Turn	--	22	38	40	39	81	141	127	127
<b>Southbound</b> <i>Millvale Ave</i>	Left Turn/Through/Right Turn	--	30	49	72	66	28	34	35	36

**TABLE 11**  
**QUEUE ANALYSIS SUMMARY**  
**2011 UPMC Shadyside Hospital Master Plan**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

Approach	Movement	Queue Length (Feet) <sup>(1)</sup>								
		Existing Queue Capacity <sup>(2)</sup>	A.M. Peak Hour				P.M. Peak Hour			
			2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>South Millvale Avenue &amp; Morewood Avenue</b>										
<b>Eastbound</b> <i>Morewood Ave</i>	Left Turn/Right Turn	--	4	4	4	4	8	17	19	19
<b>Westbound</b> <i>Morewood Ave</i>	Left Turn/Through/Right Turn	--	7	7	8	8	16	32	35	35
<b>Northbound</b> <i>South Millvale Ave</i>	Left Turn/Through	--	1	1	1	1	1	1	2	2
<b>Southbound</b> <i>South Millvale Ave</i>	Through/Right Turn	--	0	0	0	0	0	0	0	0
<b>South Aiken Avenue &amp; Claybourne Street &amp; Patient/Visitor Driveway &amp; Aiken Building Governor's Driveway</b>										
<b>Eastbound</b> <i>Patient/Visitor Dwy</i>	Left Turn/Right Turn	--	28	32	43	43	--	--	--	--
	Left Turn	--	--	--	--	--	48	66	292	294
	Right Turn	--	--	--	--	--	11	12	4	5
<b>Westbound</b> <i>Claybourne St</i>	Left Turn/Through/Right Turn	--	19	26	23	23	45	76	84	83
<b>Northbound</b> <i>South Aiken Ave</i>	Left Turn/Through	--	6	7	2	2	2	2	2	2
<b>Southbound</b> <i>South Aiken Ave</i>	Through/Right Turn	--	0	0	0	0	0	0	0	0
<b>South Aiken Avenue &amp; ED Driveway/Employee Garage Driveway</b>										
<b>Eastbound</b> <i>ED/Garage Dwy</i>	Left Turn	--	9	10	10	10	47	64	81	80
	Right Turn	--	3	3	3	3	10	11	12	12
<b>Northbound</b> <i>South Aiken Ave</i>	Left Turn/Through	--	5	5	5	5	1	1	1	1
<b>Southbound</b> <i>South Aiken Ave</i>	Through/Right Turn	--	0	0	0	0	0	0	0	0
<b>South Aiken Avenue &amp; Employee Garage Secondary Exit Only Driveway</b>										
<b>Eastbound</b> <i>Garage Dwy</i>	Right Turn	--	0	0	0	0	6	0	0	0

**TABLE 11**  
**QUEUE ANALYSIS SUMMARY**  
**2011 UPMC Shadyside Hospital Master Plan**  
**City of Pittsburgh, Allegheny County, Pennsylvania**

Approach	Movement	Queue Length (Feet) <sup>(1)</sup>								
		Existing Queue Capacity <sup>(2)</sup>	A.M. Peak Hour				P.M. Peak Hour			
			2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated	2011 Existing	2021 Base	2021 Combined	2021 Combined Mitigated
<b>Baum Boulevard &amp; Luna Garage Driveway</b>										
<b>Eastbound</b> <i>Baum Blvd</i>	Left Turn/Through	--	--	--	65	123	--	--	76	68
<b>Westbound</b> <i>Baum Blvd</i>	Through/Right Turn	--	--	--	67	--	--	--	197	--
	Through	--	--	--	--	93	--	--	--	94
	Right Turn	200	--	--	--	2	--	--	--	2
<b>Southbound</b> <i>Luna Garage Dwy</i>	Left Turn/Right Turn	--	--	--	32	32	--	--	130	130
<b>Morewood Avenue &amp; CIS Garage Driveway</b>										
<b>Westbound</b> <i>CIS Garage Dwy</i>	Left Turn/Right Turn	--	--	--	10	10	--	--	89	89
<b>Southbound</b> <i>Morewood Ave</i>	Left Turn/Through	--	--	--	12	12	--	--	1	1
<b>Gross Street &amp; Luna Garage Driveway</b>										
<b>Westbound</b> <i>Luna Garage Dwy</i>	Left Turn/Right Turn	--	--	--	1	1	--	--	6	6
<b>Southbound</b> <i>Gross St</i>	Left Turn/Through	--	--	--	4	4	--	--	1	1

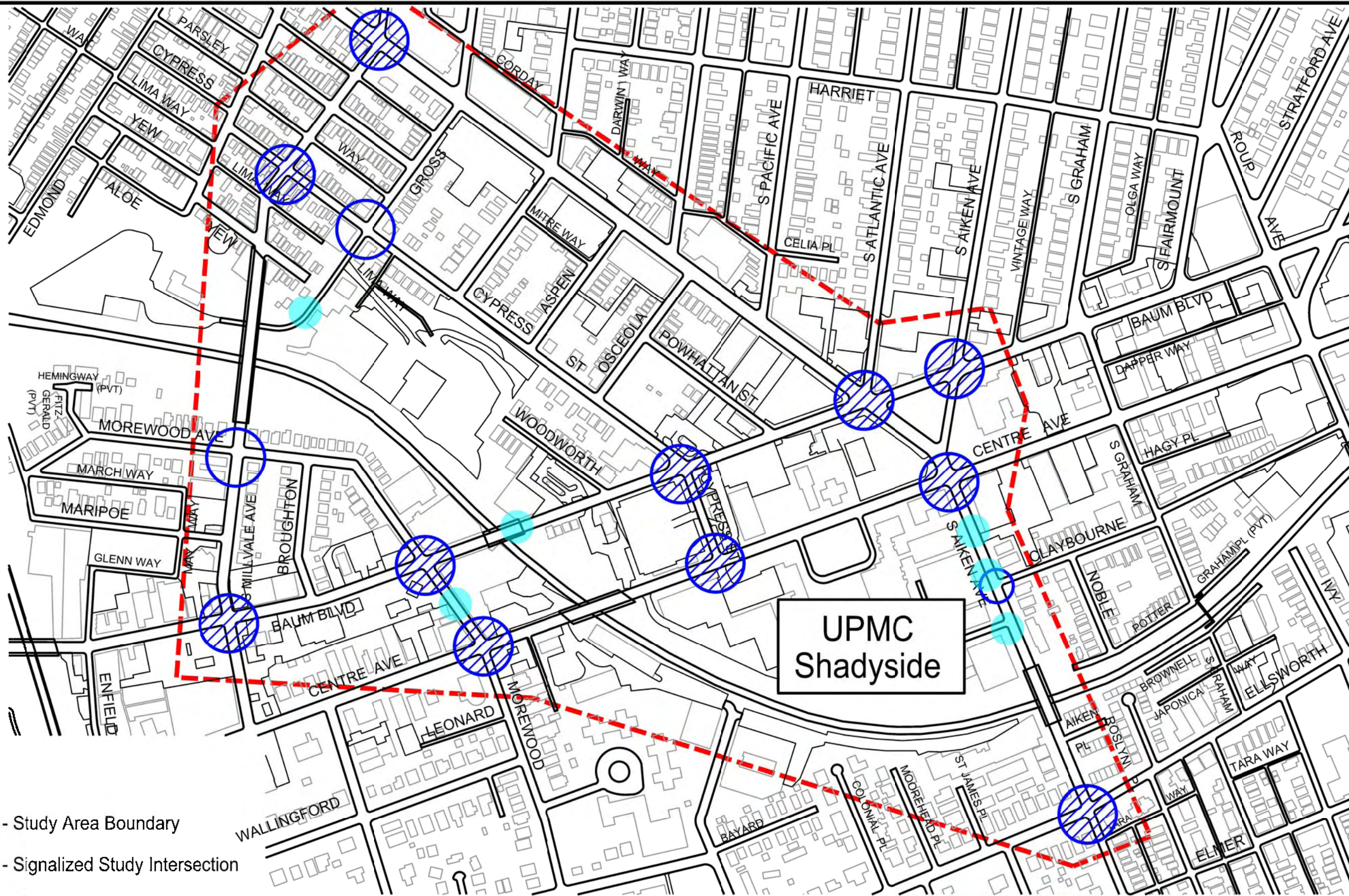
(1) Queue length analysis utilized Synchro, Version 7. The 95th percentile queue length is reported.

(2) The existing queue capacity for study intersections was obtained from Google Earth, Build 5, rounded to the nearest 5 feet.

Source: Analysis by Trans Associates.





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Legend

- Study Area Boundary
- Signalized Study Intersection
- Unsignalized Study Intersection
- Study Driveway

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00-10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	1
		TITLE: Study Intersections	D.B. <u>   </u> C.B. <u>   </u> REV. <u>   </u>



# 10 YEAR P




Luna Parking Garage (10

Hillman Cancer Center  
4 stories

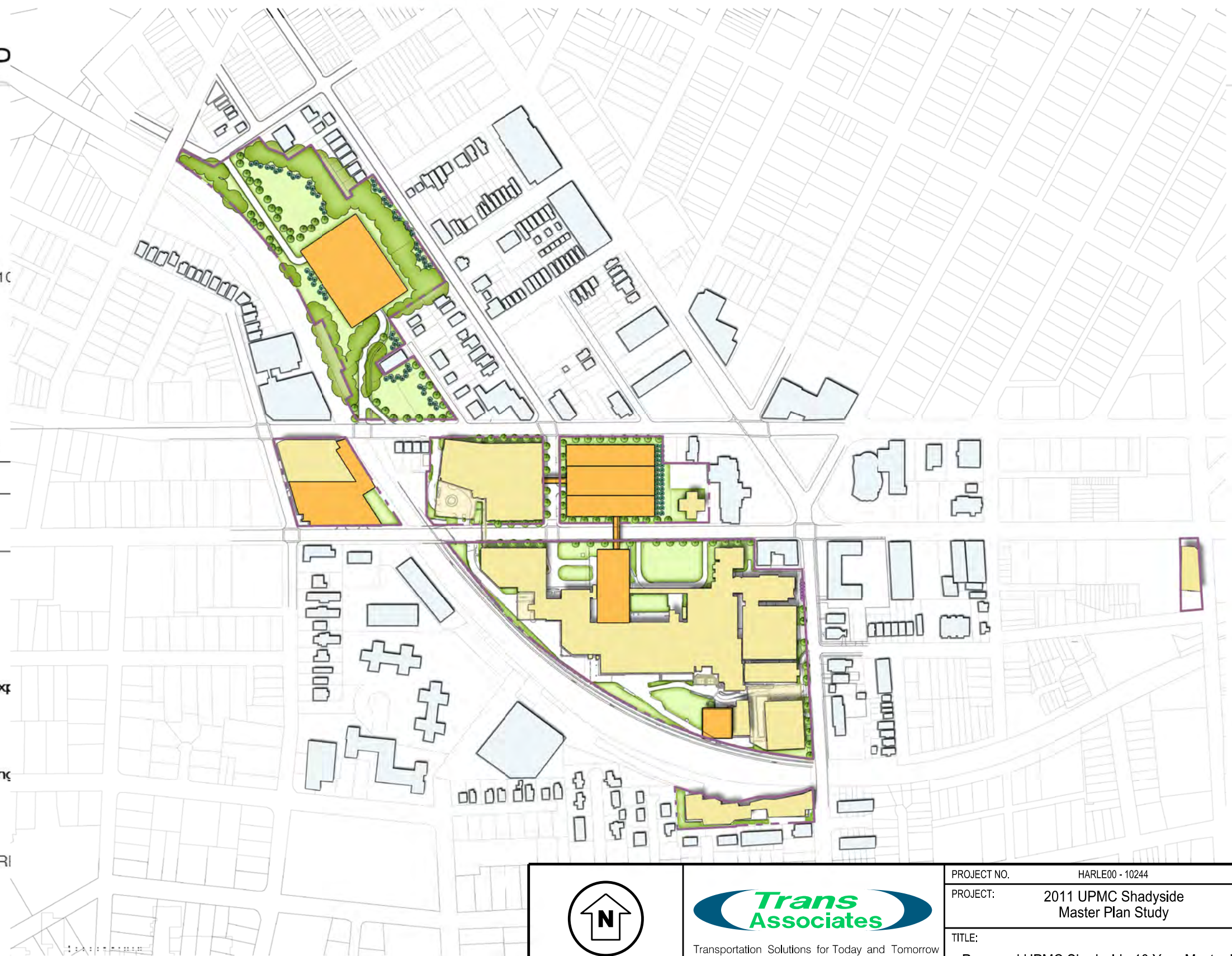
Center for Innovative  
Science & Parking  
(306 spaces)

Inpatient Expansion

### Legend

-  UPMC Facilities Exp
-  UPMC Buildings
-  Non-UPMC Building

HARLEY ELLIS DEVERI



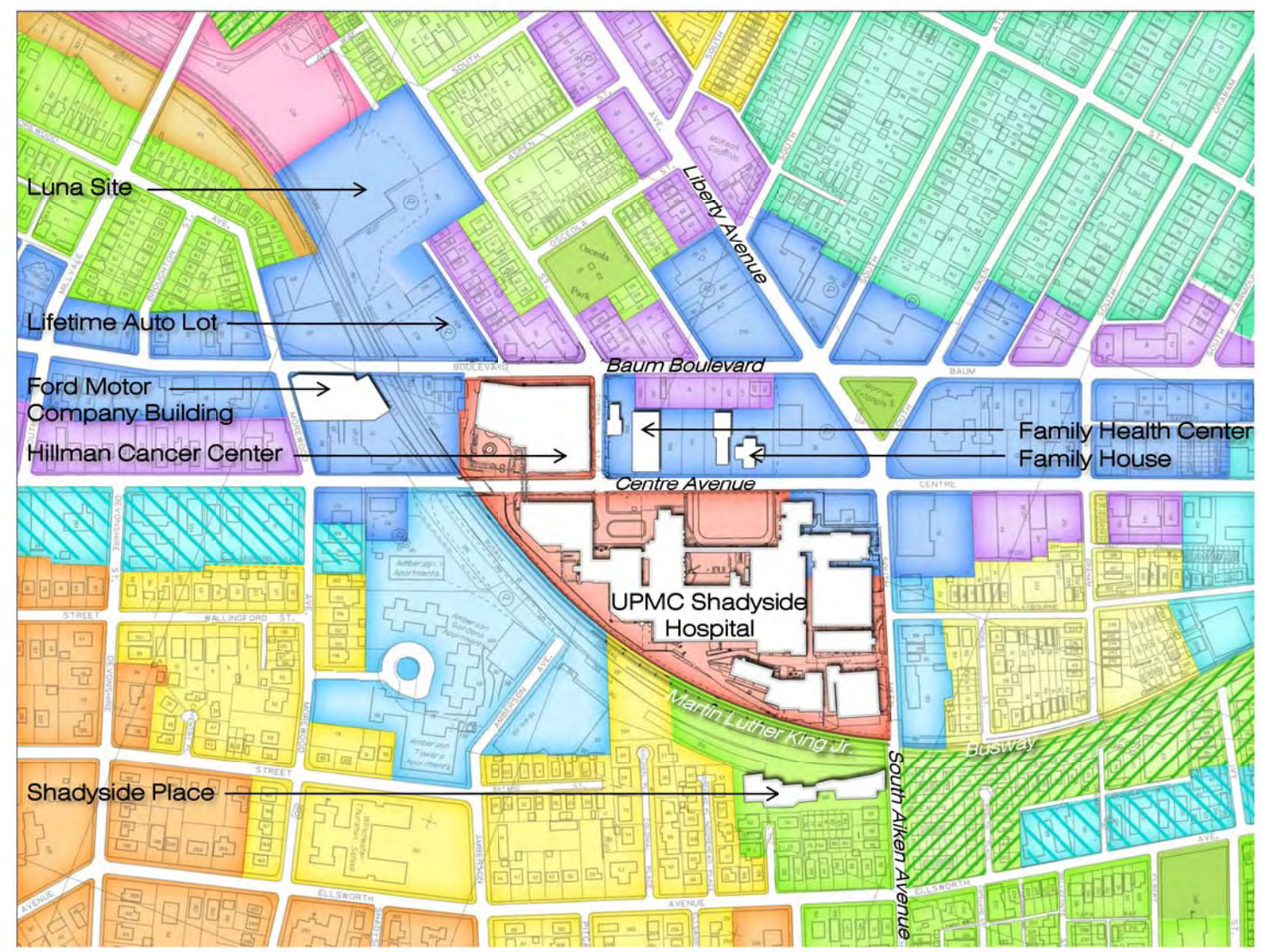
 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00 - 10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	2
		TITLE: Proposed UPMC Shadyside 10 Year Master Plan	D.B. <u>sme</u> C.B. <u>cad</u> REV. <u>cad</u>



# EXISTING ZONING MAP

## LEGEND

-  AP Residential/Commercial Planned Unit Development
-  EMI Educational/Medical Institution
-  H Hillside
-  LNC Local Neighborhood Commercial
-  P Parks & open Space
-  R1A -H Single Unit Attached Residential High Density
-  R1A -VH Single Unit Attached Residential Very High Density
-  R1D -VL Single Unit Detached Residential Very Low Density
-  R1D -L Single Unit Detached Residential Low Density
-  R2-M Two Unit Residential Moderate Density
-  R2-H Two Unit Residential High Density
-  R3-M Three Unit Residential Moderate Density
-  RM-M Multi Unit Residential Moderate Density
-  RM-H Multi Unit Residential High Density
-  UI Urban Industrial
-  UNC Urban Neighborhood Commercial



HARLEY ELLIS DEVEREAUX/Trans Associates

4

Prepared by Harley Ellis Deveraux

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00-10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	3
TITLE: Existing City of Pittsburgh Zoning Map		D.B. cad	C.B. raj
		REV. _____	

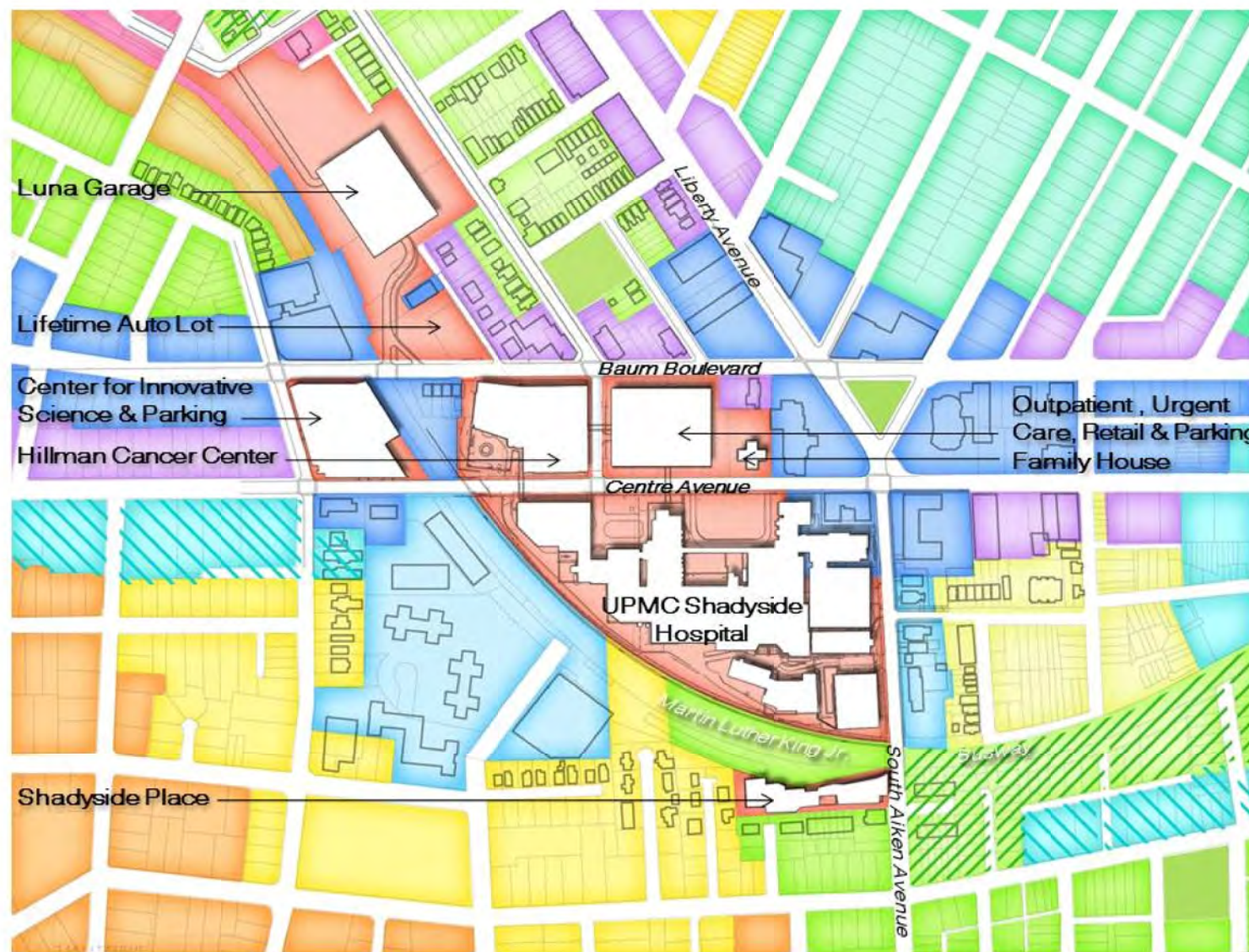
P:\011100 - 11/3/2011  
 P:\011100 - 11/3/2011  
 P:\011100 - 11/3/2011



# TEN YEAR PROPOSED ZONING MAP

## Legend



-  AP Residential/Commercial Planned Unit Development
-  EMI Educational/Medical Institution
-  H Hillside
-  LNC Local Neighborhood Commercial
-  P Parks & open Space
-  R1A-H Single Unit Attached Residential High Density
-  R1A-VH Single Unit Attached Residential Very High Density
-  R1D-VL Single Unit Detached Residential Very Low Density
-  R1D-L Single Unit Detached Residential Low Density
-  R2-M Two Unit Residential Moderate Density
-  R2-H Two Unit Residential High Density
-  R3-M Three Unit Residential Moderate Density
-  RM-M Multi Unit Residential Moderate Density
-  RM-H Multi Unit Residential High Density
-  UI Urban Industrial
-  UNC Urban Neighborhood Commercial



HARLEY ELLIS DEVEREAUX/Trans Associates

30

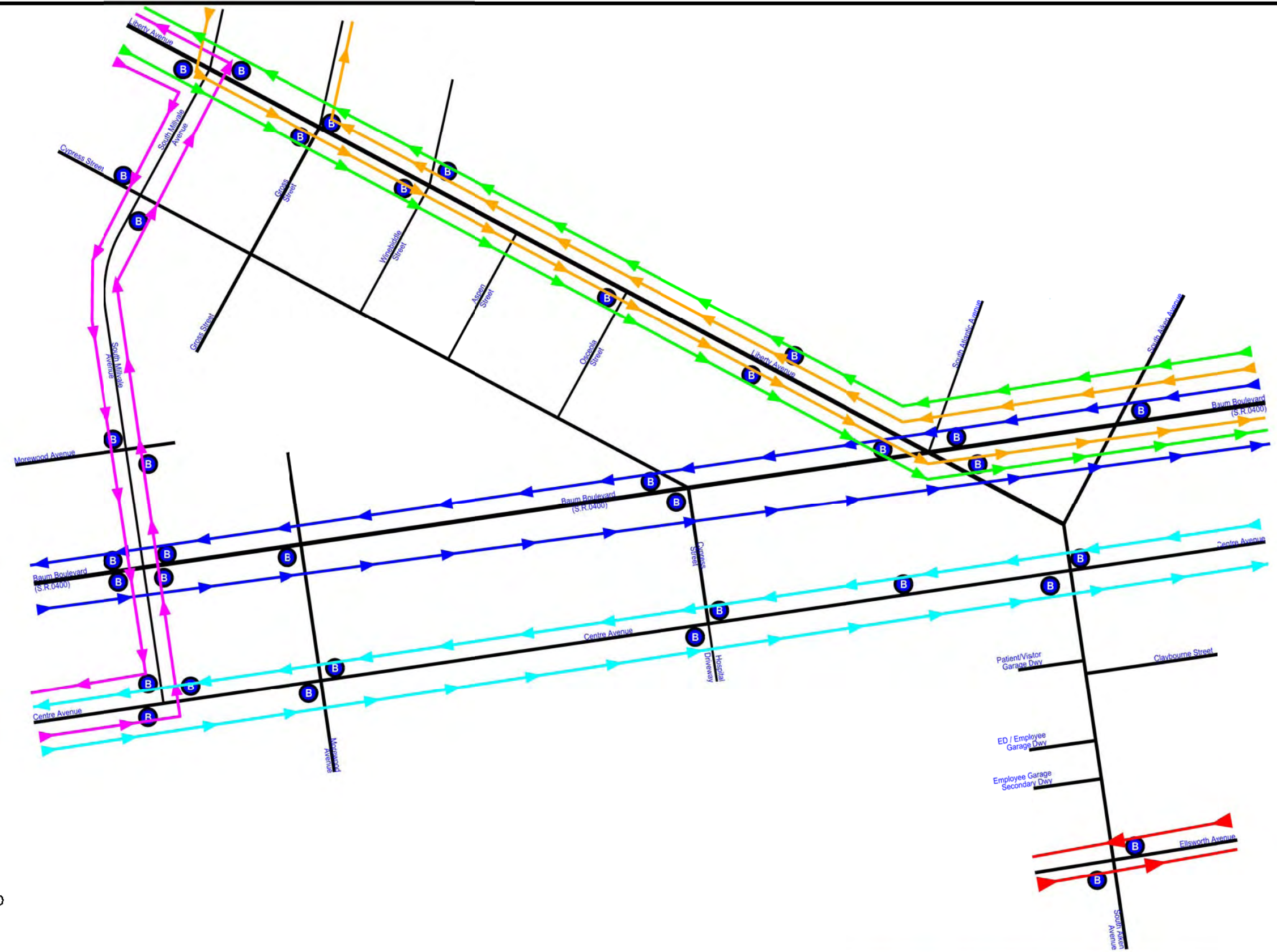
Prepared by Harley Ellis Deveraux

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE <b>4</b>
		PROJECT: 2011 UPMC Shadyside Master Plan Study	
		TITLE: Proposed City of Pittsburgh Zoning Map	D.B. <u>cad</u> C.B. <u>caj</u> REV. _____

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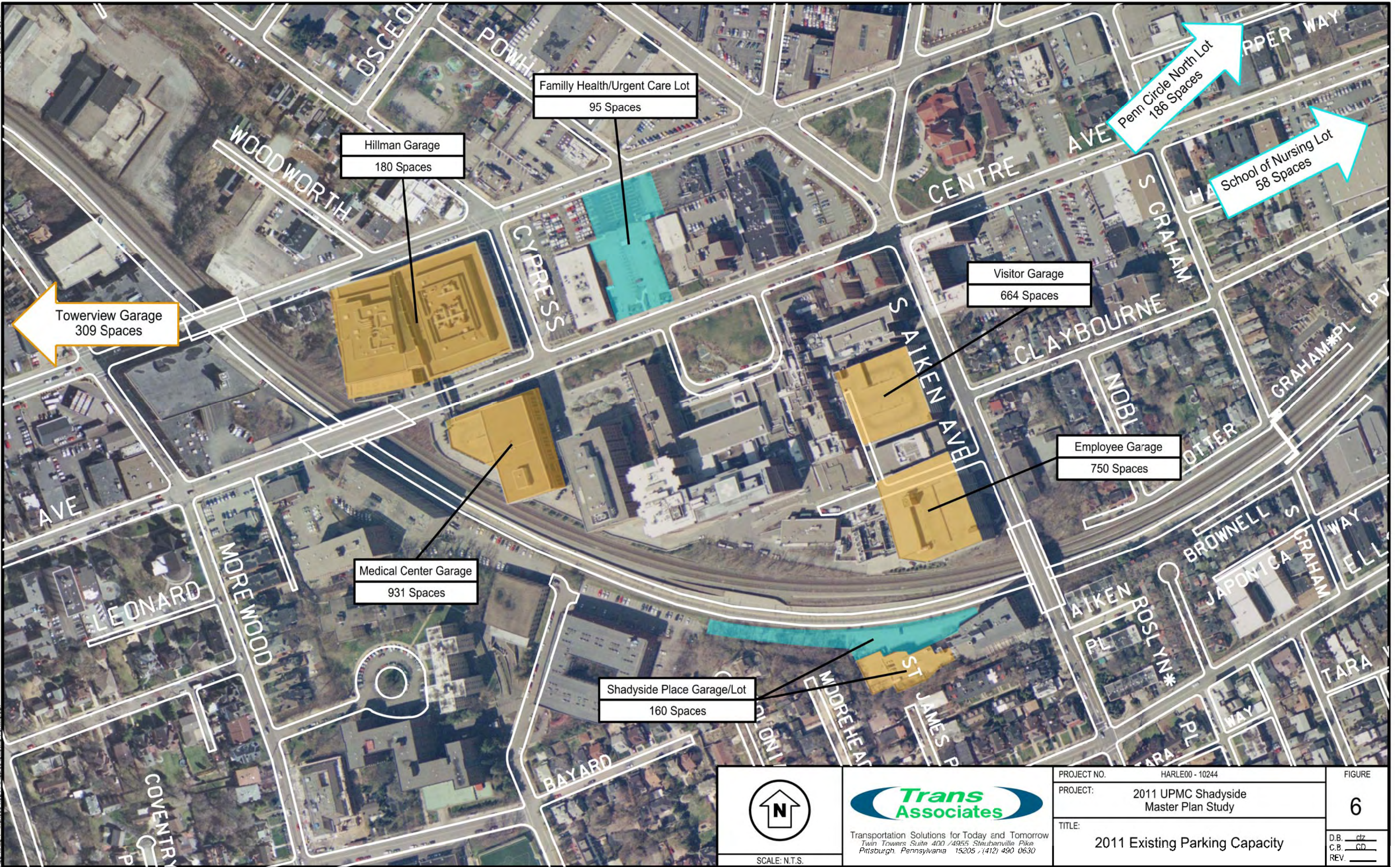


- Legend**
- B - Bus Stop
  - 54
  - 64
  - 71A, 71C, 82
  - 75
  - 77
  - 86

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00-10244	FIGURE <span style="font-size: 24px; font-weight: bold;">5</span>
		PROJECT: 2011 UPMC Shadyside Master Plan Study	
TITLE: Port Authority of Allegheny County Bus Routes and Stops		D.B. cad	C.B. caj
		REV. _____	



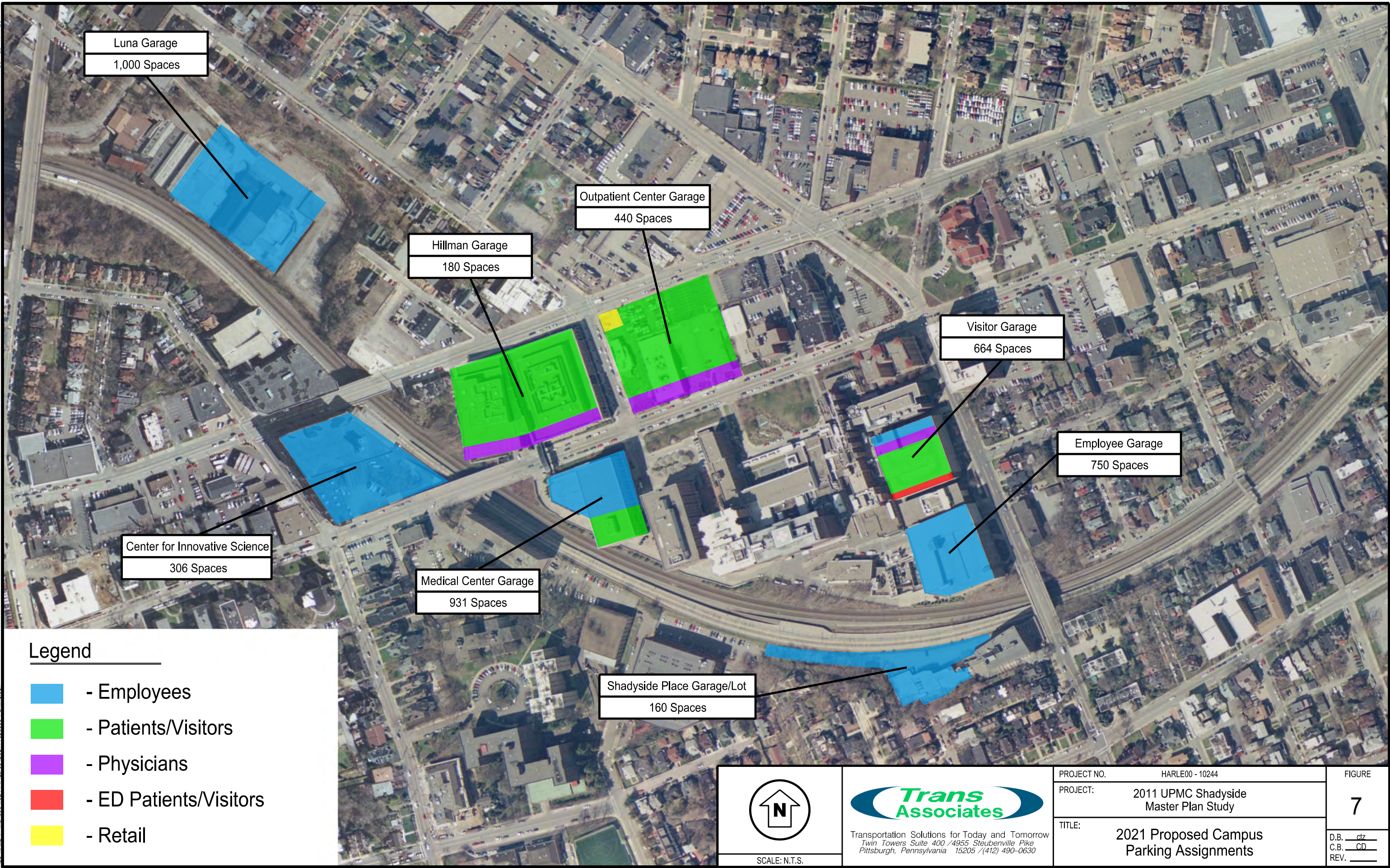
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 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00 - 10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	6
		TITLE: 2011 Existing Parking Capacity	D.B. <u>clz</u> C.B. <u>gd</u> REV. <u>    </u>



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### Legend

- - Employees
- - Patients/Visitors
- - Physicians
- - ED Patients/Visitors
- - Retail



SCALE: N.T.S.

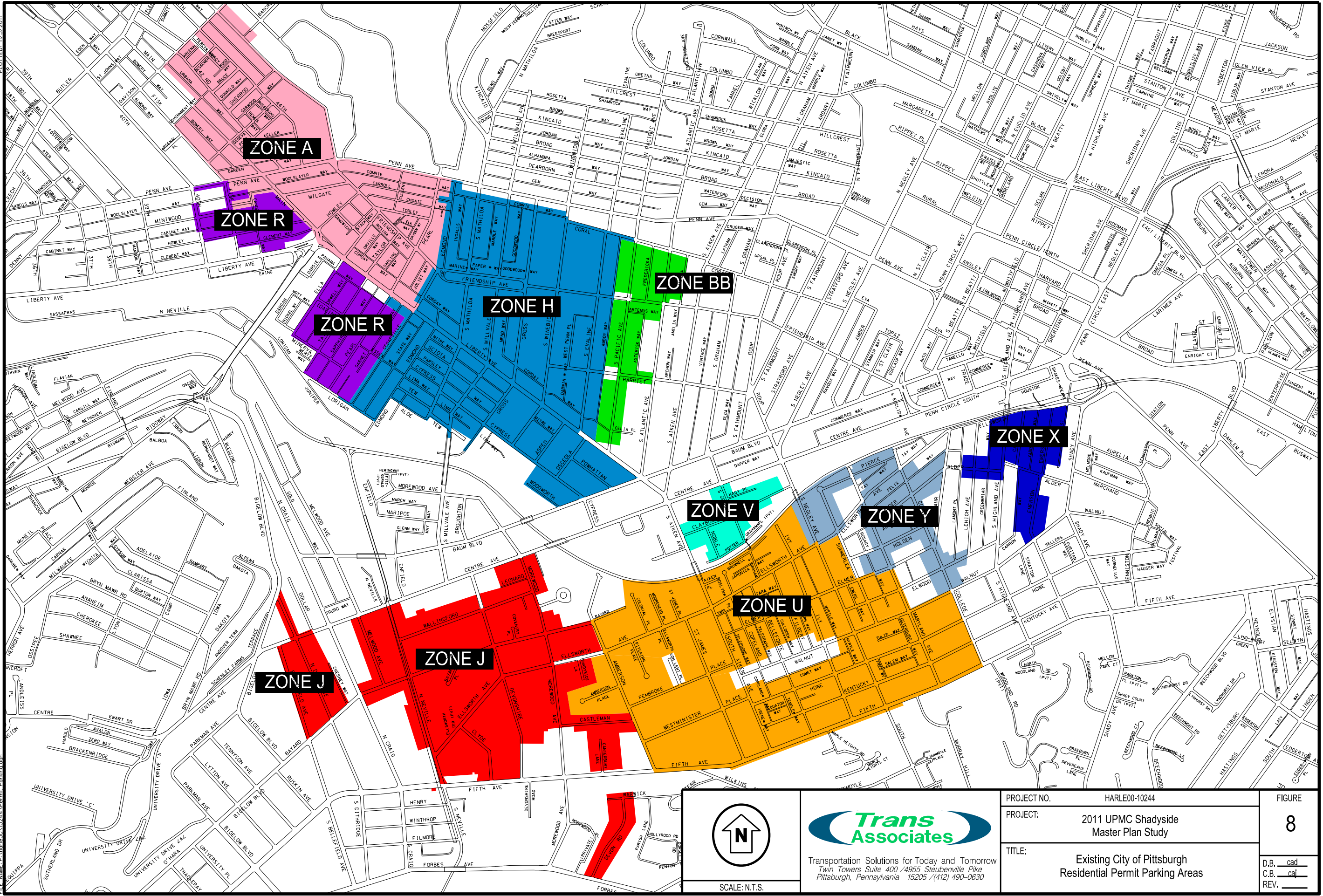




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Pittsburgh, Pennsylvania 15205 / (412) 490-0630

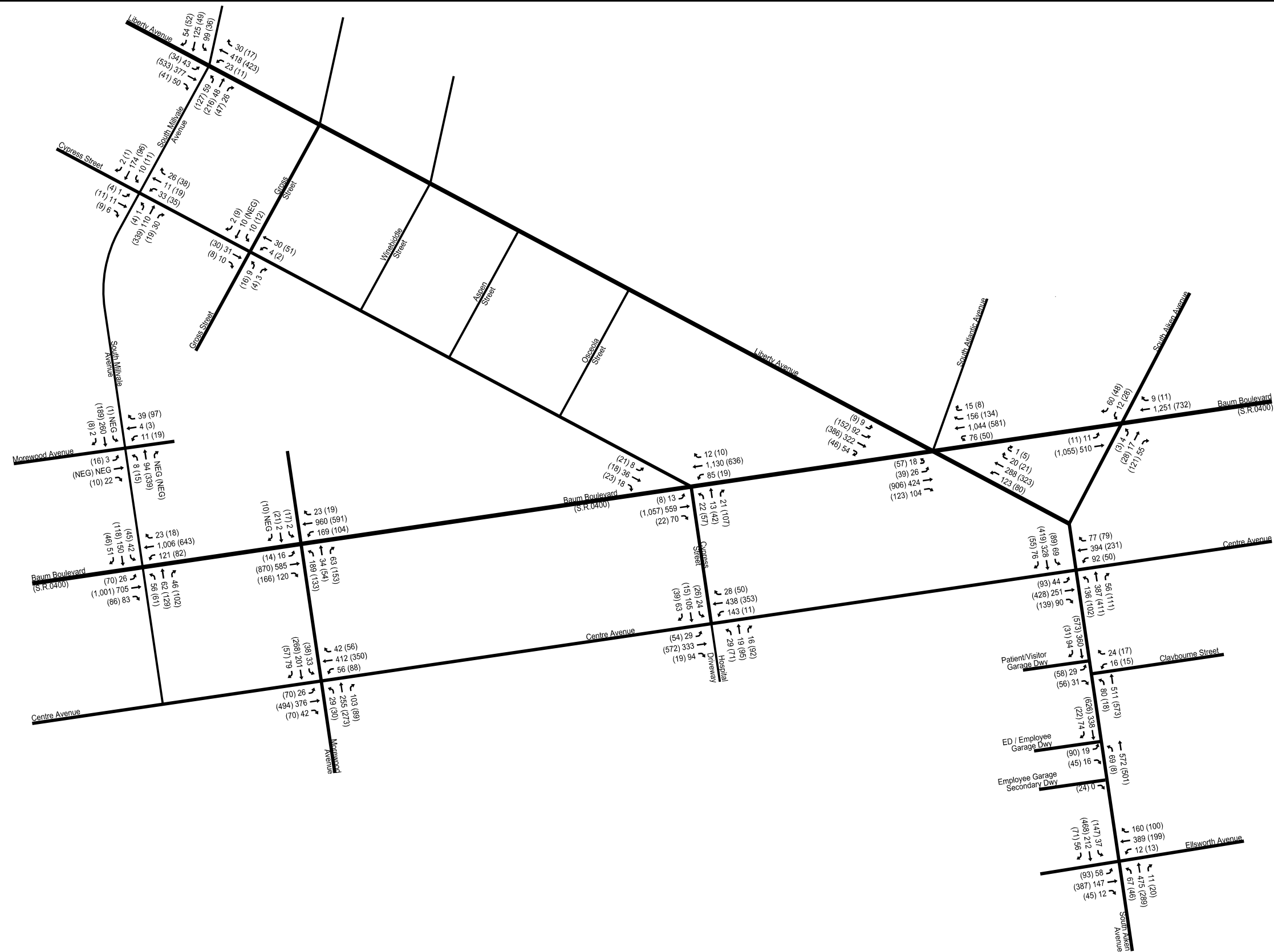
PROJECT NO.	HARLE00 - 10244	FIGURE	7
PROJECT:	2011 UPMC Shadyside Master Plan Study	D.B.	ctz
TITLE:	2021 Proposed Campus Parking Assignments	C.B.	CD
		REV.	





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PLOT DATE: 11/23/2011

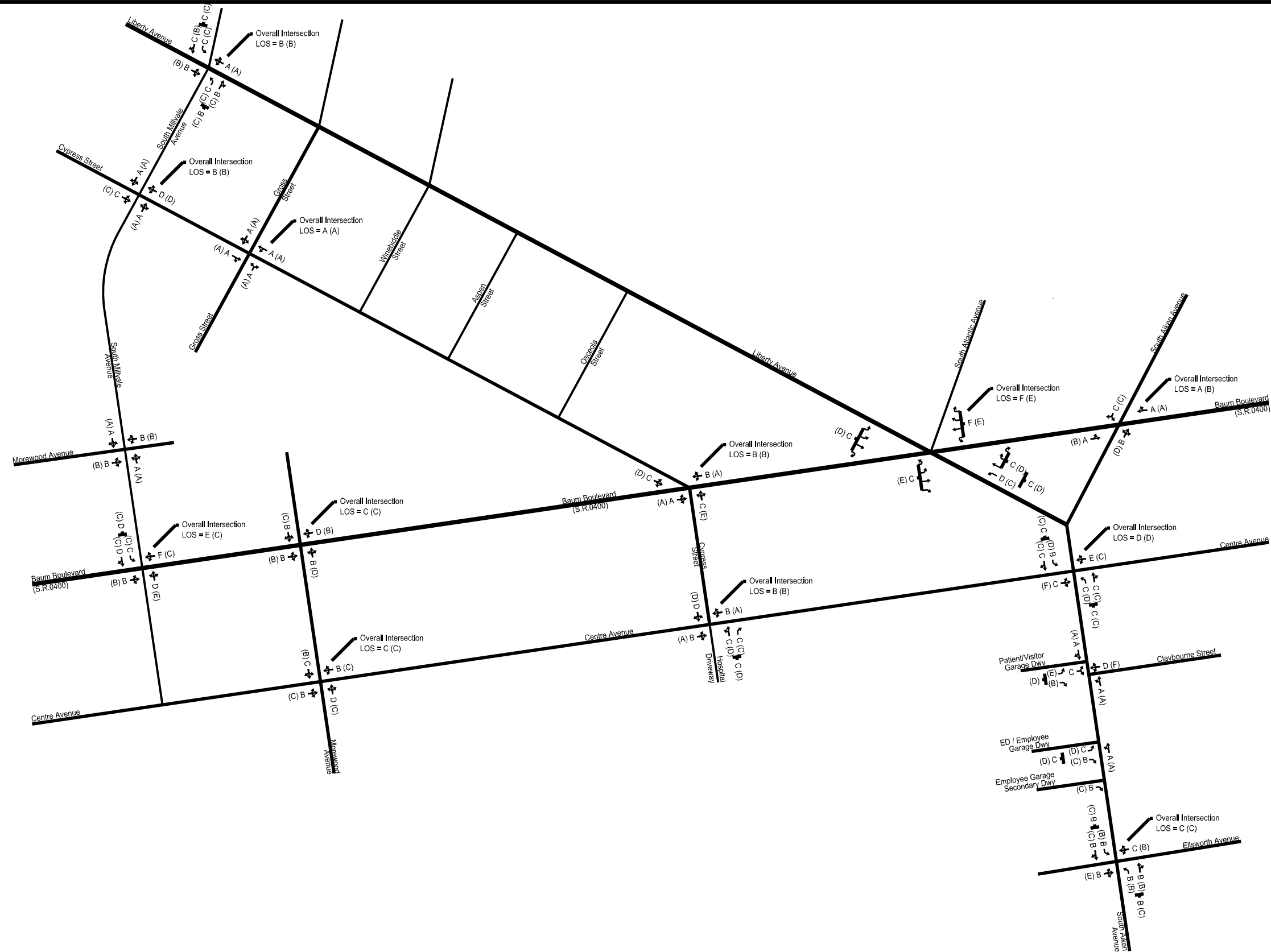


 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	<b>8</b>
		TITLE: Existing City of Pittsburgh Residential Permit Parking Areas	D.B. cad C.B. cal REV. _____



**Legend**  
 123 - A.M. Peak Hour Traffic Volumes  
 (123) - P.M. Peak Hour Traffic Volumes

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE <b>9</b>
		PROJECT: 2011 UPMC Shadyside Master Plan Study	
		TITLE: 2011 Existing Conditions Peak Hour Traffic Volumes	D.B. <u>cad</u> C.B. <u>caj</u> REV. _____



**Legend**

- A - A.M. Peak Hour Levels of Service
- (A) - P.M. Peak Hour Levels of Service



SCALE: N.T.S.



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PROJECT NO.	HARLE00-10244	FIGURE	10
PROJECT:	2011 UPMC Shadyside Master Plan Study		
TITLE:	2011 Existing Conditions Peak Hour Levels of Service	D.B. cad	C.B. caj
		REV.	





Legend:

- Developments constructed since turning movement counts were performed
- UPMC planned developments
- Anticipated future developments



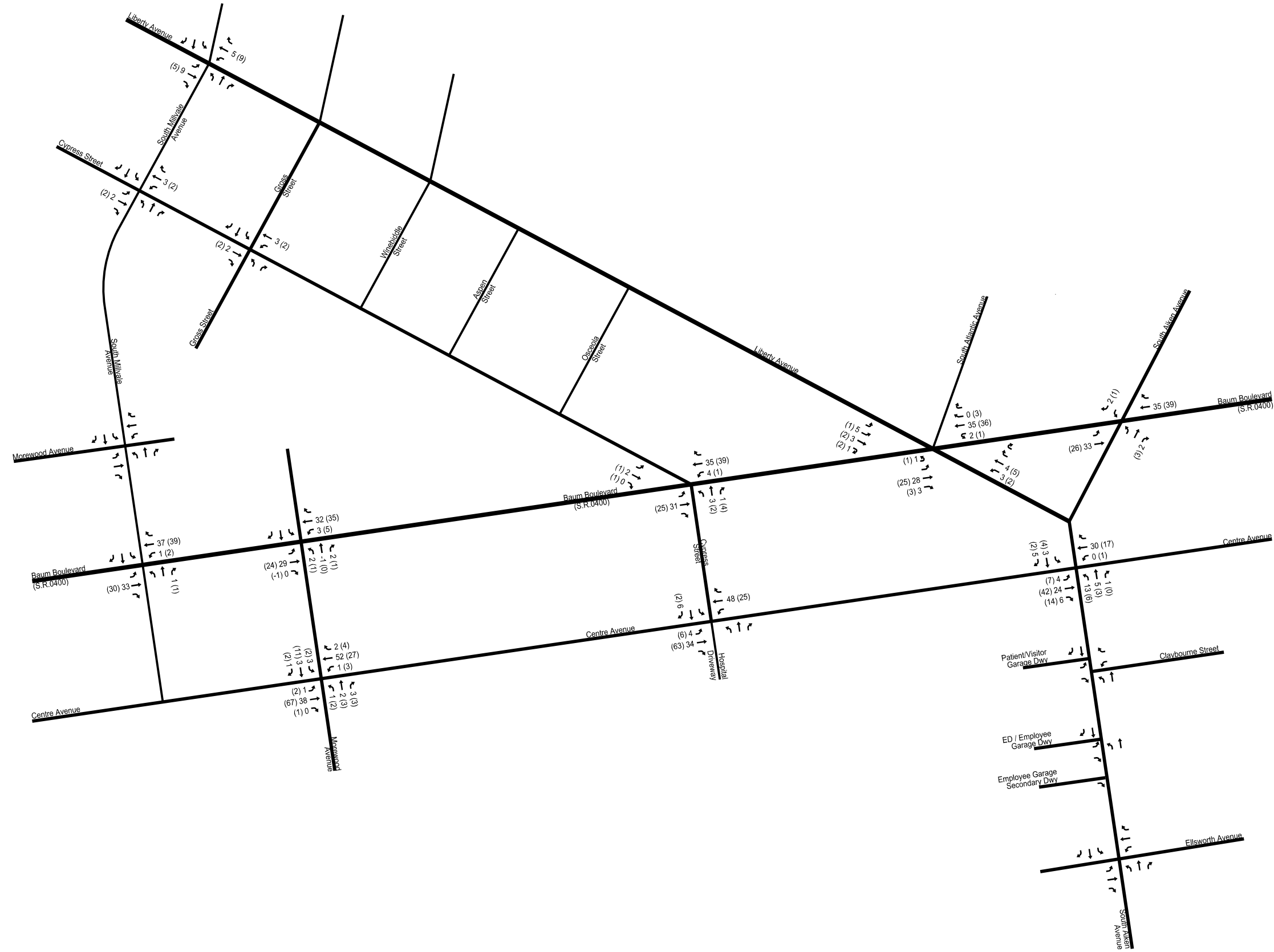
SCALE: N.T.S.



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PROJECT NO.	HARLE00-10244	FIGURE
PROJECT:	2011 UPMC Shadyside Master Plan Study	11
TITLE:	Background and Future Developments	
	D.B. <u>cad</u>	
	C.B. <u>caj</u>	
	REV. _____	

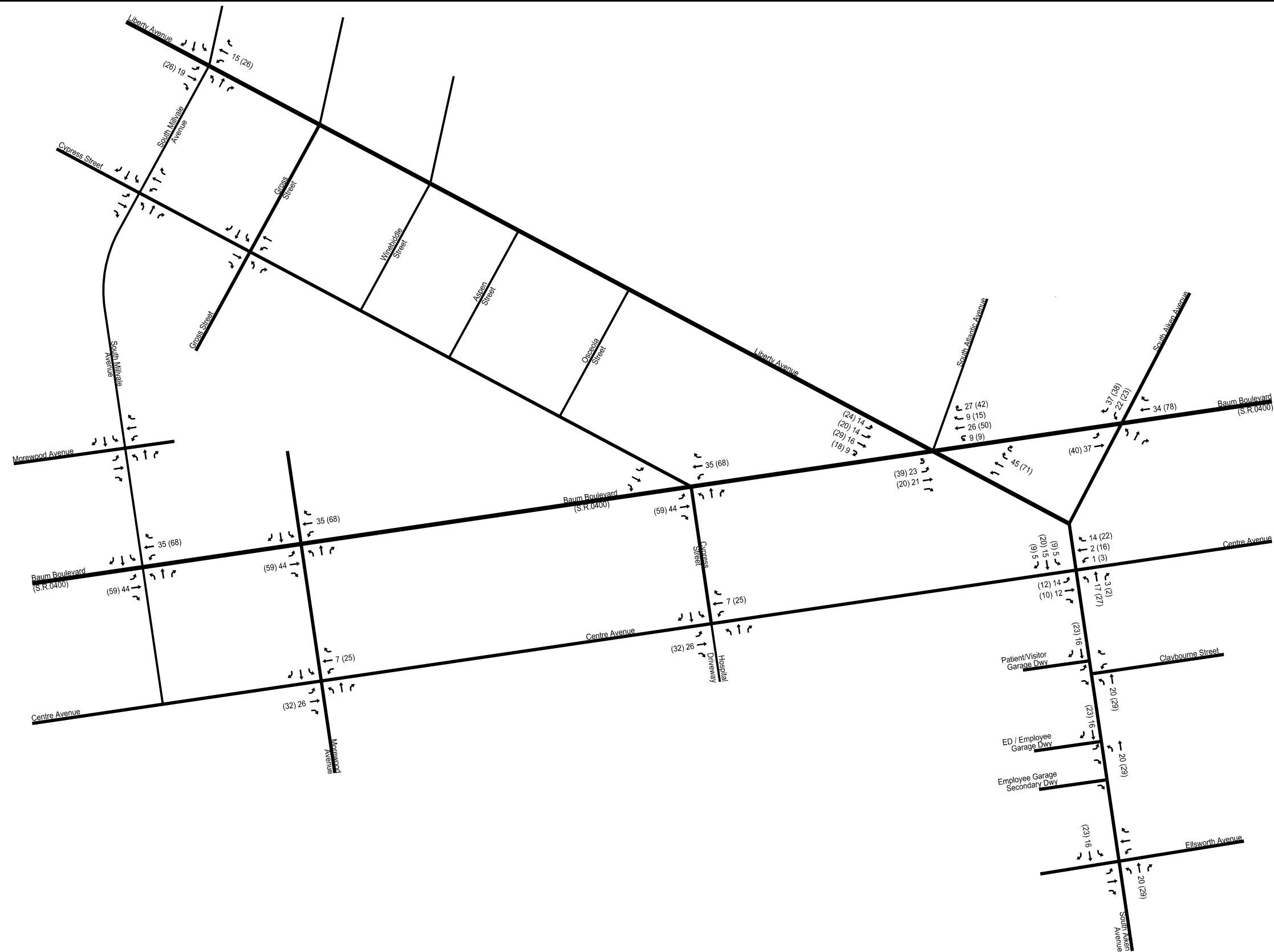




**Legend**



- 123 - A.M. Peak Hour Traffic Volumes
- (123) - P.M. Peak Hour Traffic Volumes

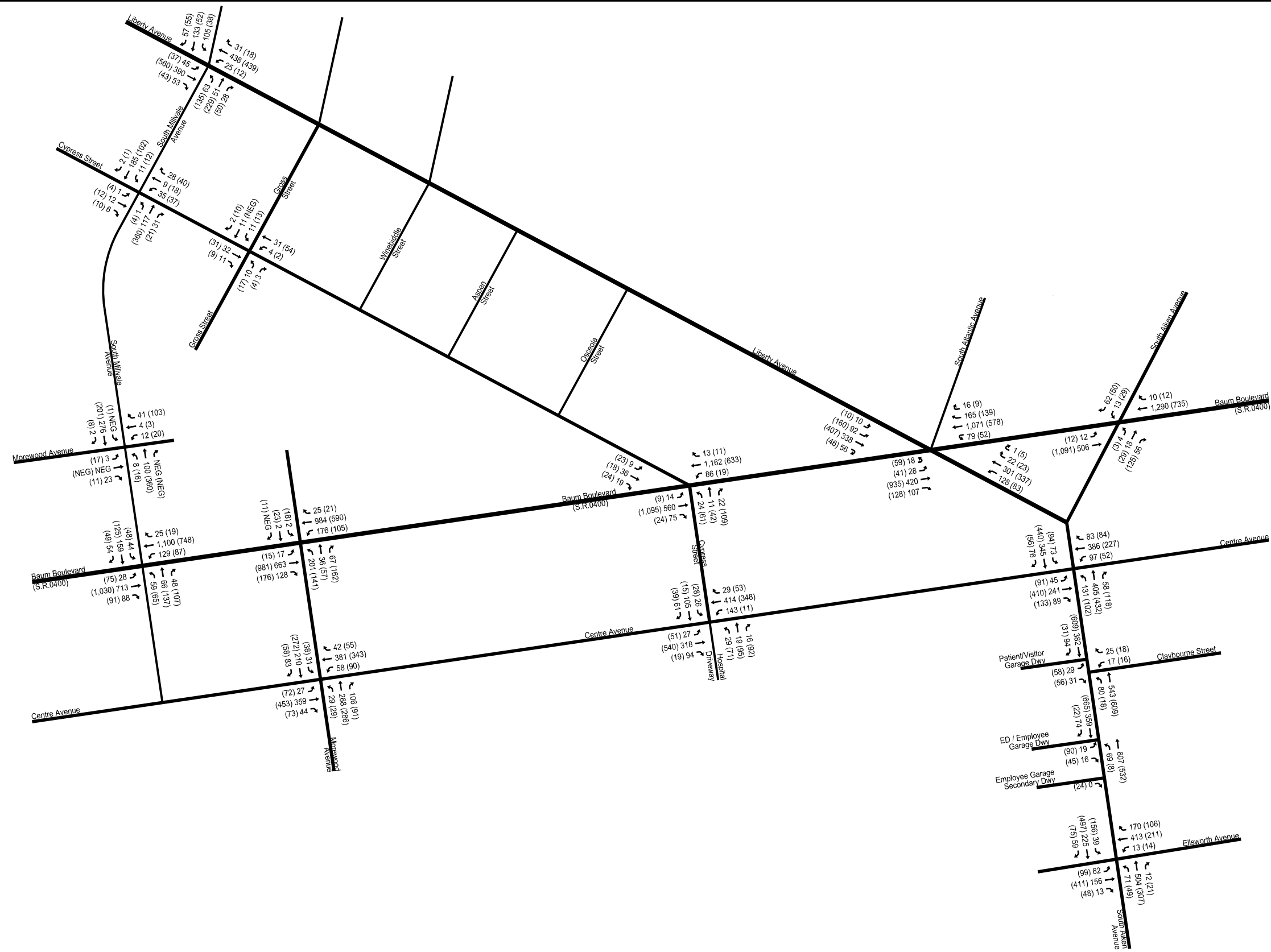
 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE <b>12</b>
		PROJECT: 2011 UPMC Shadyside Master Plan Study	
		TITLE: Background Developments Peak Hour Traffic Volumes	D.B. <u>cad</u> C.B. <u>caj</u> REV. _____





**Legend**

- 123 - A.M. Peak Hour Traffic Volumes
- (123) - P.M. Peak Hour Traffic Volumes

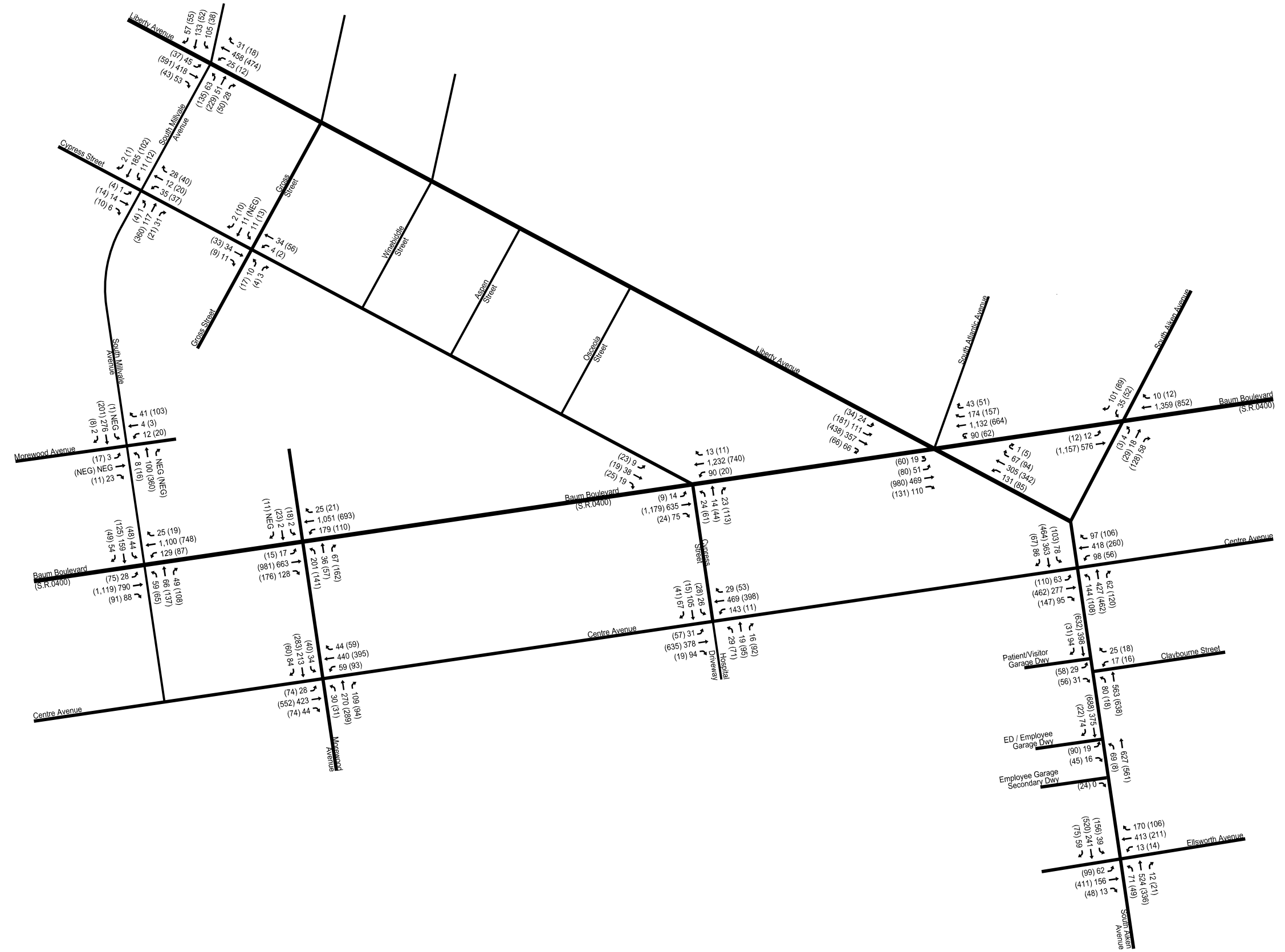
 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244 PROJECT: 2011 UPMC Shadyside Master Plan Study TITLE: New Proposed/Approved Developments Peak Hour Traffic Volumes	FIGURE <b>13</b> D.B. <u>cad</u> C.B. <u>caj</u> REV. _____
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**Legend**  
 123 - A.M. Peak Hour Traffic Volumes  
 (123) - P.M. Peak Hour Traffic Volumes

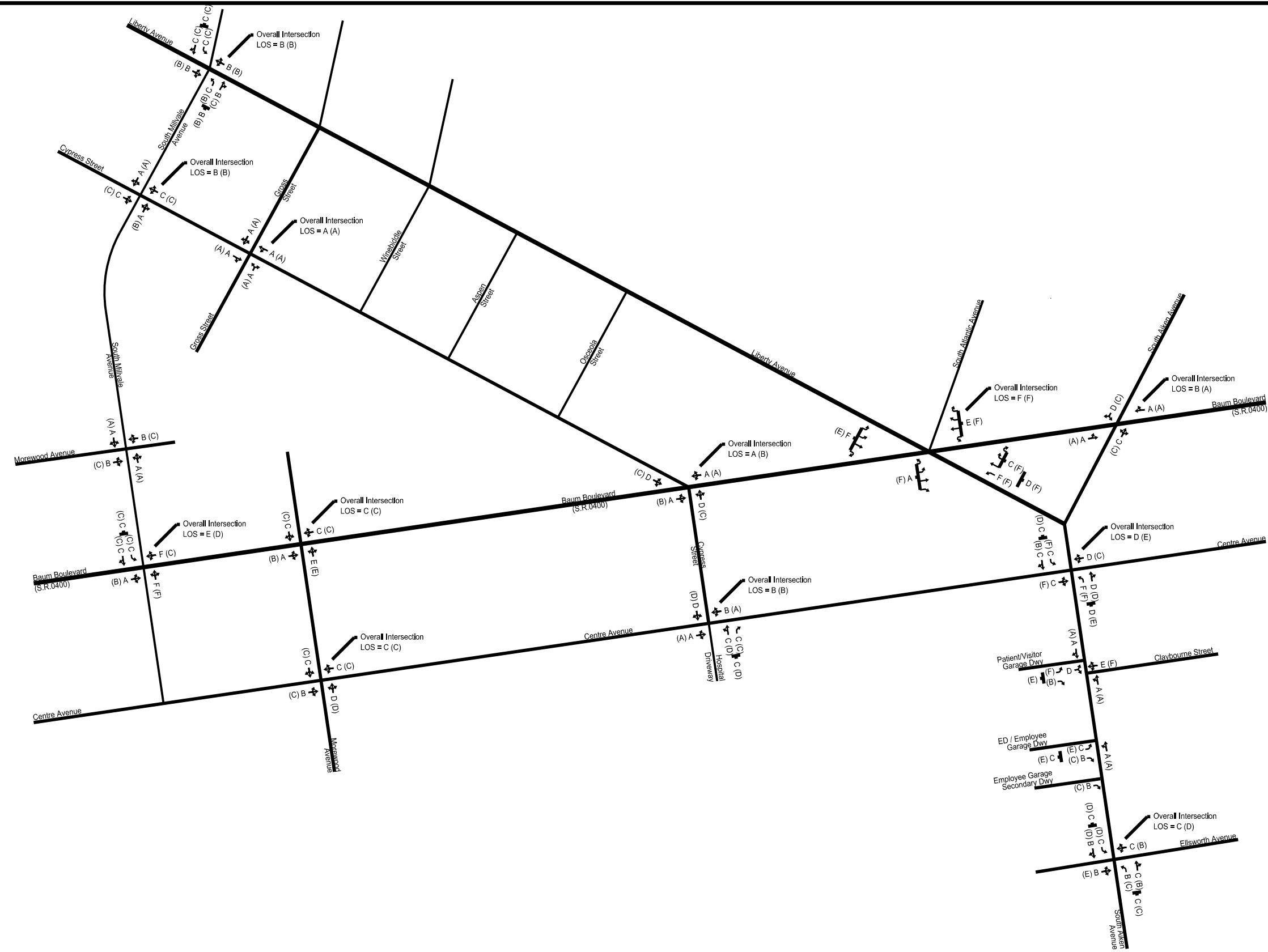
 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE <b>14</b>
		PROJECT: 2011 UPMC Shadyside Master Plan Study	
		TITLE: 2021 Background Conditions Peak Hour Traffic Volumes	D.B. cad C.B. caj REV. _____







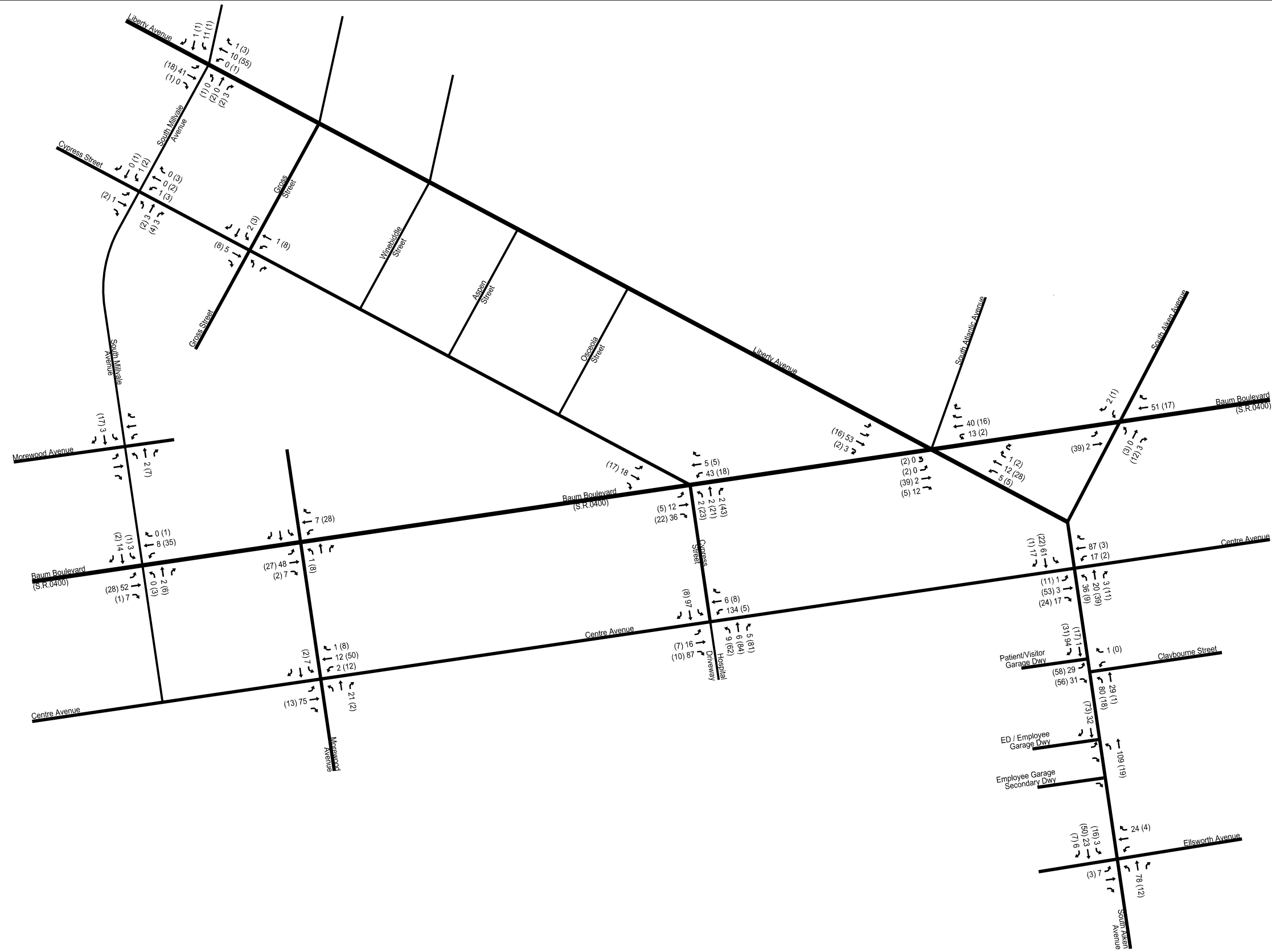
**Legend**  
 123 - A.M. Peak Hour Traffic Volumes  
 (123) - P.M. Peak Hour Traffic Volumes

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE <b>15</b>
		PROJECT: 2011 UPMC Shadyside Master Plan Study	
		TITLE: 2021 Base Conditions Peak Hour Traffic Volumes	D.B. <u>cad</u> C.B. <u>caj</u> REV. _____



- Legend**
- A - A.M. Peak Hour Levels of Service
  - (A) - P.M. Peak Hour Levels of Service

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%;">PROJECT NO.</td> <td>HARLE00-10244</td> </tr> <tr> <td>PROJECT:</td> <td>2011 UPMC Shadyside Master Plan Study</td> </tr> <tr> <td>TITLE:</td> <td>2021 Base Conditions Peak Hour Levels of Service</td> </tr> </table>	PROJECT NO.	HARLE00-10244	PROJECT:	2011 UPMC Shadyside Master Plan Study	TITLE:	2021 Base Conditions Peak Hour Levels of Service	FIGURE <b>16</b>  D.B. cad C.B. caj REV.
PROJECT NO.	HARLE00-10244								
PROJECT:	2011 UPMC Shadyside Master Plan Study								
TITLE:	2021 Base Conditions Peak Hour Levels of Service								



**Legend**

- 123 - A.M. Peak Hour Traffic Volumes
- (123) - P.M. Peak Hour Traffic Volumes



SCALE: N.T.S.



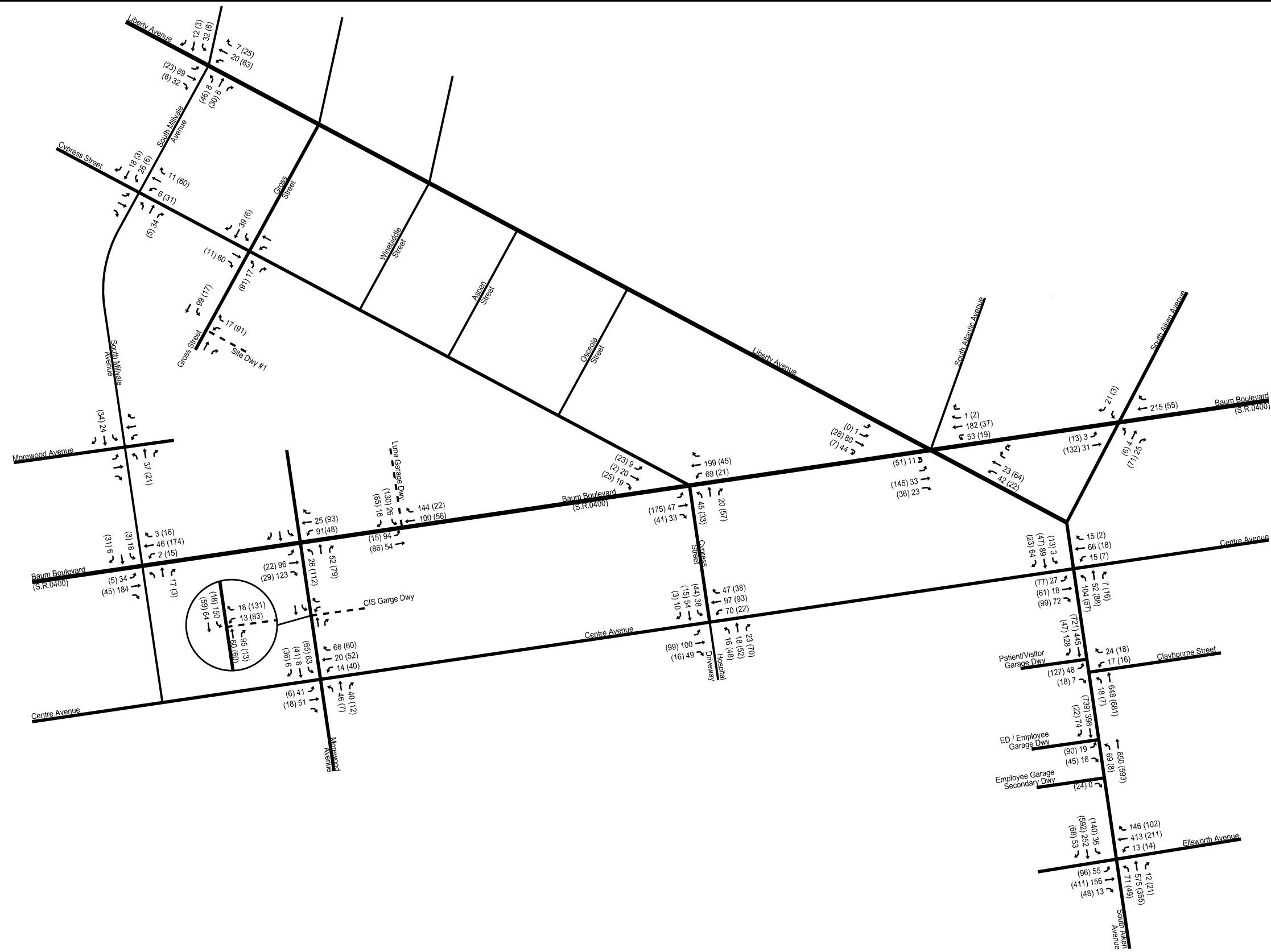
Transportation Solutions for Today and Tomorrow  
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 Pittsburgh, Pennsylvania 15205 / (412) 490-0630

PROJECT NO.	HARLE00-10244	FIGURE <b>17</b>
PROJECT:	2011 UPMC Shadyside Master Plan Study	
TITLE:	Existing UPMC Shadyside Medical Center Garage & Visitors Garage Peak Hour Trips Removed for Parking Reassignments	D.B. <u>cad</u> C.B. <u>caj</u> REV. _____





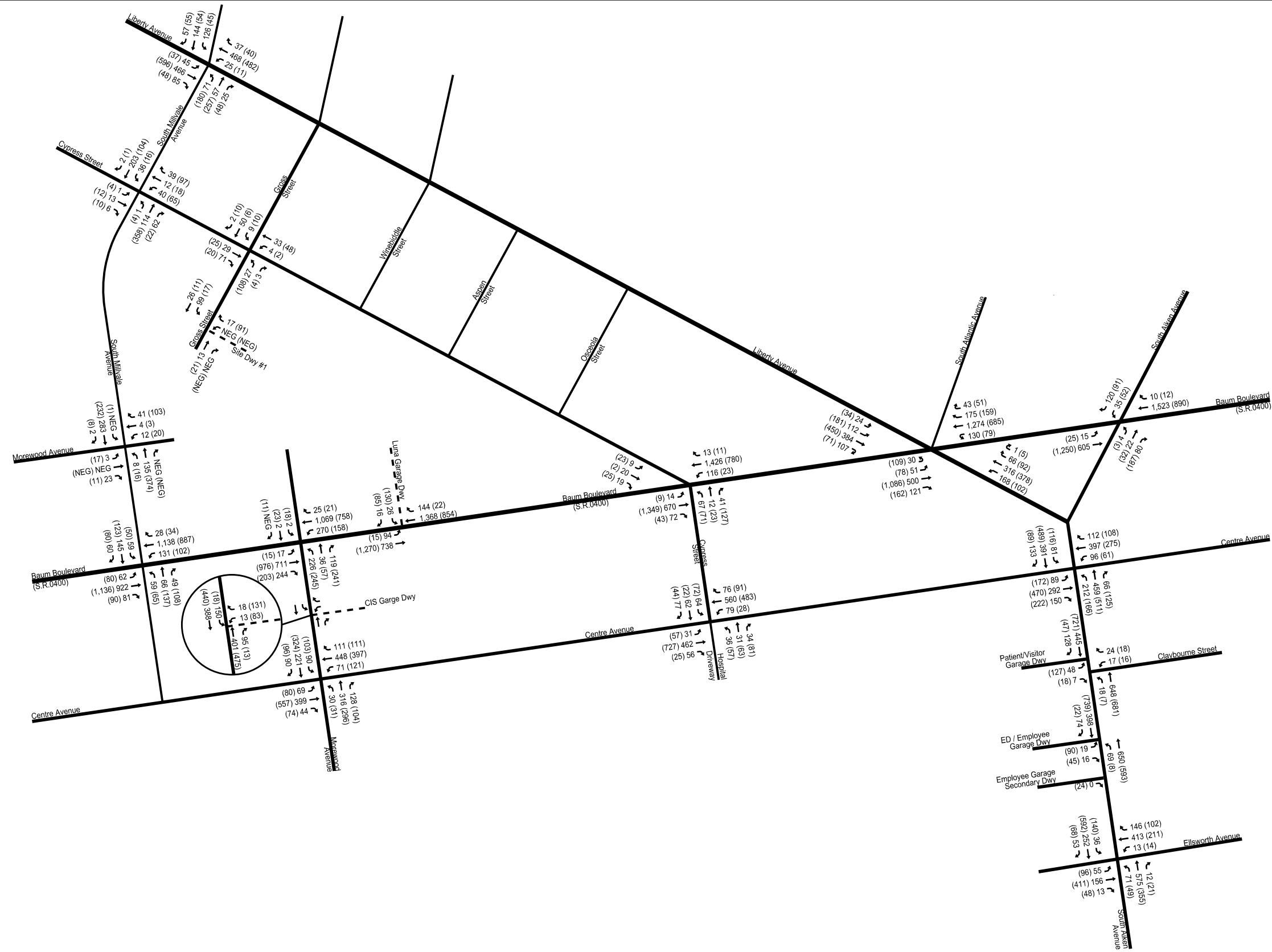
 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00 - 10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	18
		TITLE: Arrival & Departure Trip Distribution	D.B. <u>sme</u> C.B. <u>caj</u> REV. <u>cad</u>





**Legend**  
 123 - A.M. Peak Hour Traffic Volumes  
 (123) - P.M. Peak Hour Traffic Volumes

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE <b>19</b>
		PROJECT: 2011 UPMC Shadyside Master Plan Study	
		TITLE: Rerouted and New UPMC Shadyside Peak Hour Site Generated Trips	D.B. <u>cad</u> C.B. <u>caj</u> REV. _____



**Legend**

- 123 - A.M. Peak Hour Traffic Volumes
- (123) - P.M. Peak Hour Traffic Volumes



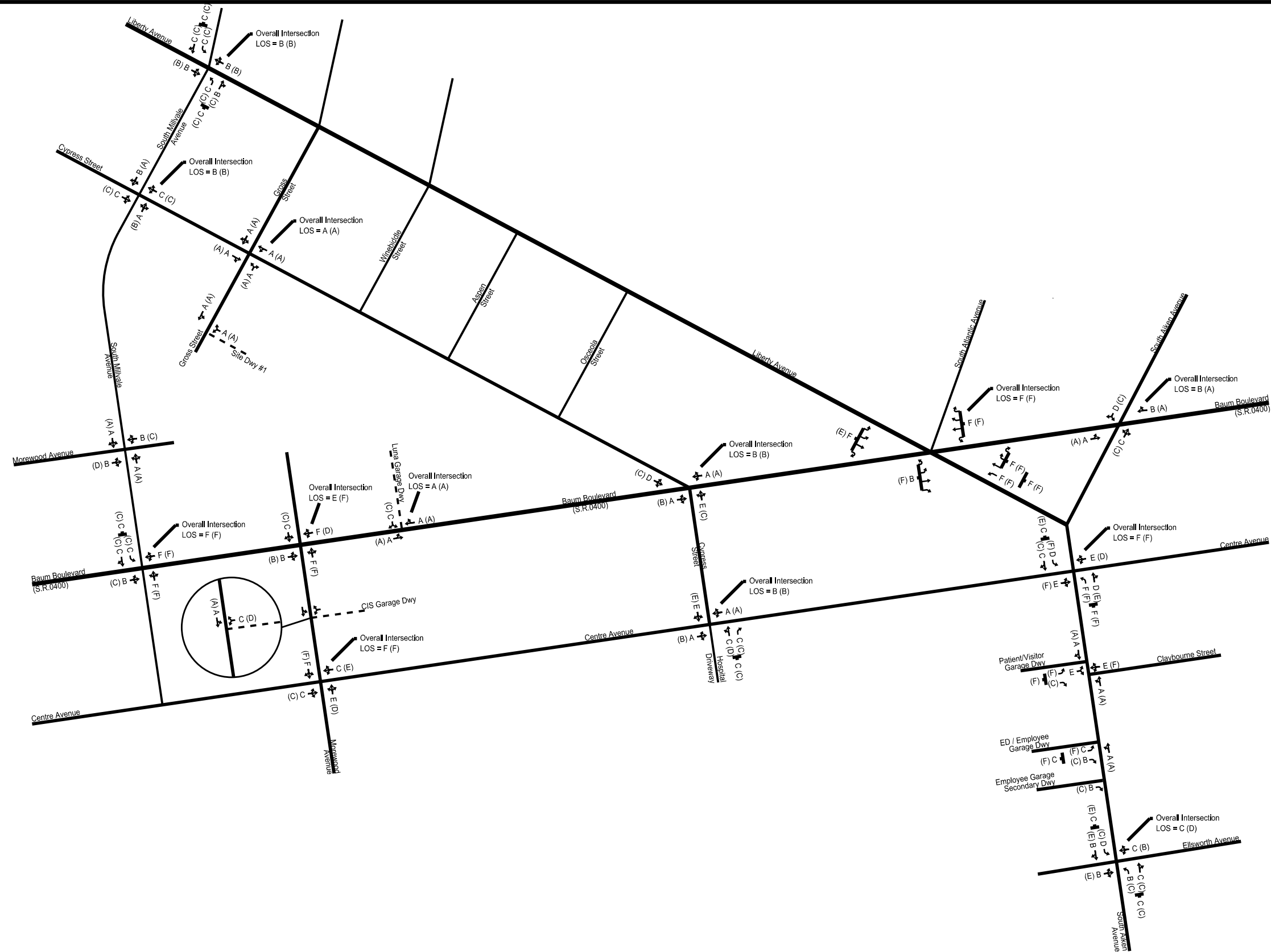
SCALE: N.T.S.





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 Pittsburgh, Pennsylvania 15205 / (412) 490-0630

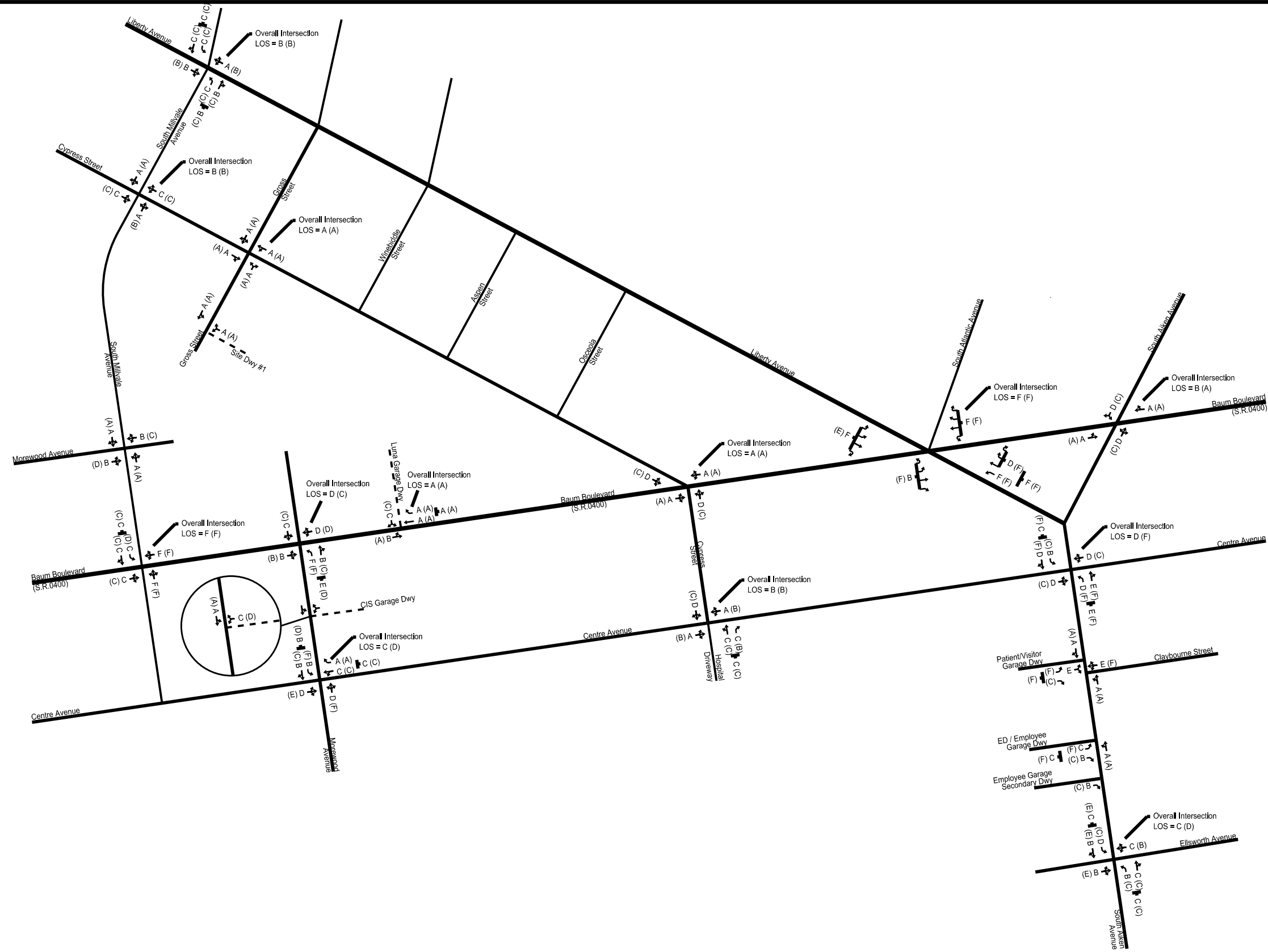
PROJECT NO.	HARLE00-10244	FIGURE	20
PROJECT:	2011 UPMC Shadyside Master Plan Study		
TITLE:	2021 Combined Conditions Peak Hour Traffic Volumes	D.B. cad	C.B. caj
		REV.	







- Legend**
- A - A.M. Peak Hour Levels of Service
  - (A) - P.M. Peak Hour Levels of Service

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244 PROJECT: 2011 UPMC Shadyside Master Plan Study TITLE: 2021 Combined Conditions Peak Hour Levels of Service	FIGURE <b>21</b> D.B. cad C.B. caj REV.
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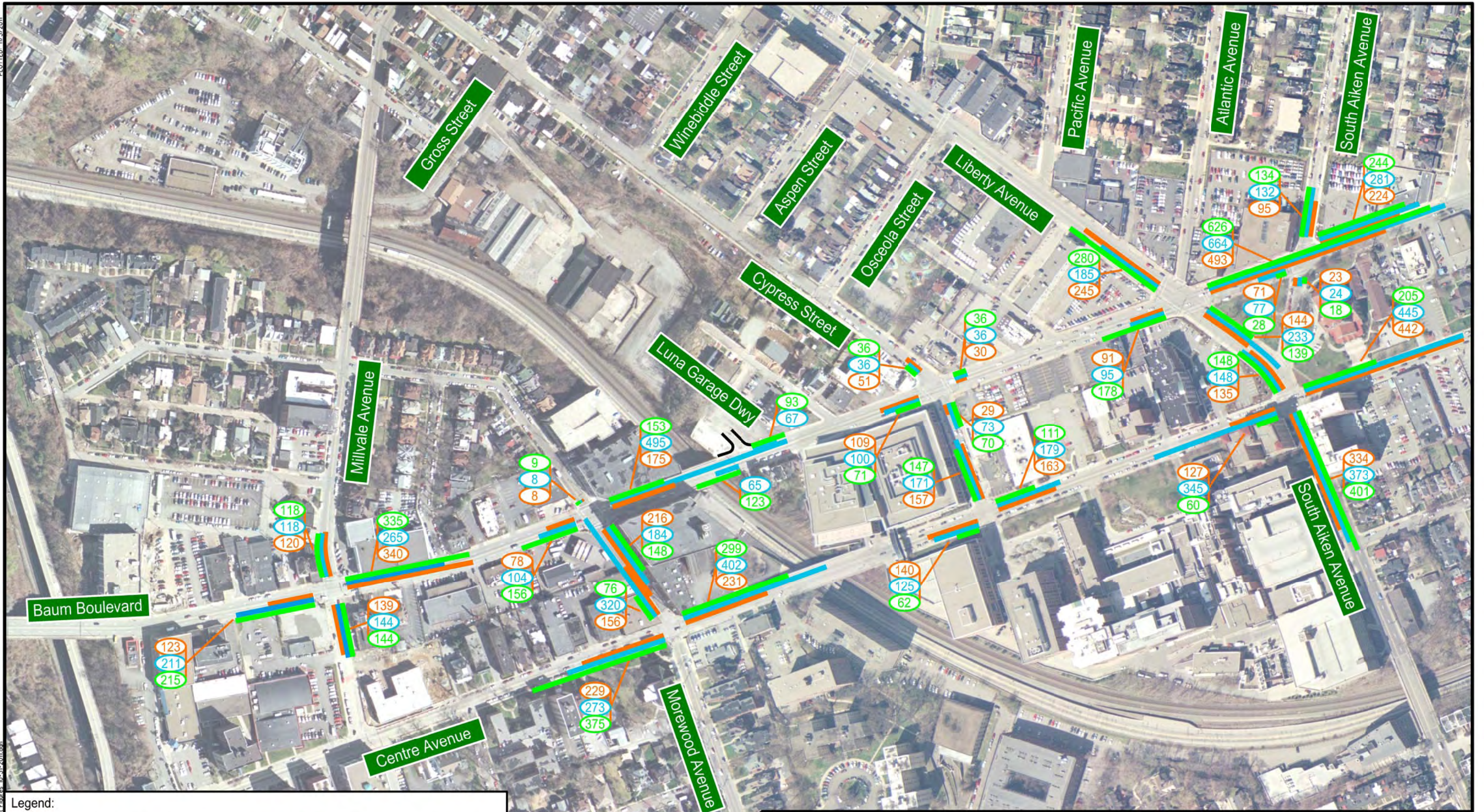


- Legend**
- A - A.M. Peak Hour Levels of Service
  - (A) - P.M. Peak Hour Levels of Service

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490-0630	PROJECT NO. HARLE00-10244	FIGURE <b>22</b>
		PROJECT: 2011 UPMC Shadyside Master Plan Study	
		TITLE: 2021 Combined Conditions Mitigated Peak Hour Levels of Service	D.B. cad C.B. caj REV. _____




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**Legend:**

<span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">123</span> - 2021 Base 95th Percentile Queue Length (feet) (Optimized Signals)	<span style="border: 1px solid green; border-radius: 50%; padding: 2px;">123</span> - 2021 Combined Mitigated 95th Percentile Queue Length (feet)
<span style="border: 1px solid blue; border-radius: 50%; padding: 2px;">123</span> - 2021 Combined 95th Percentile Queue Length (feet) (Optimized Signals)	

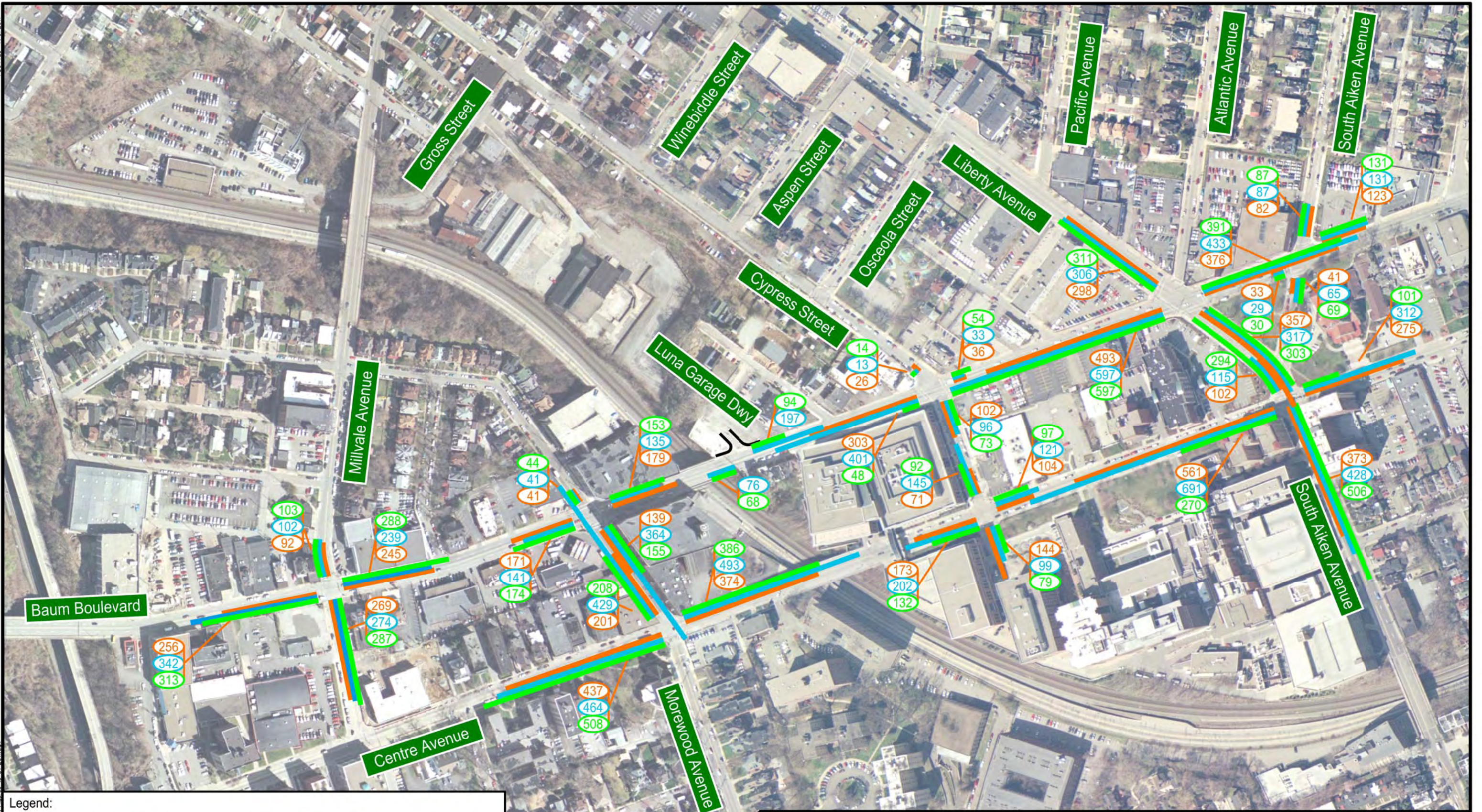
  
 SCALE: N.T.S.

  
 Transportation Solutions for Today and Tomorrow  
 Twin Towers Suite 400 / 4955 Steubenville Pike  
 Pittsburgh, Pennsylvania 15205 / (412) 490 0630

PROJECT NO.	HARLE00-10244	FIGURE
PROJECT:	2011 UPMC Shadyside Master Plan Study	<b>23</b>
TITLE:	AM Peak Hour 95th Percentile Queue Lengths	
	D.B. cad	
	C.B. raj	
	REV.	



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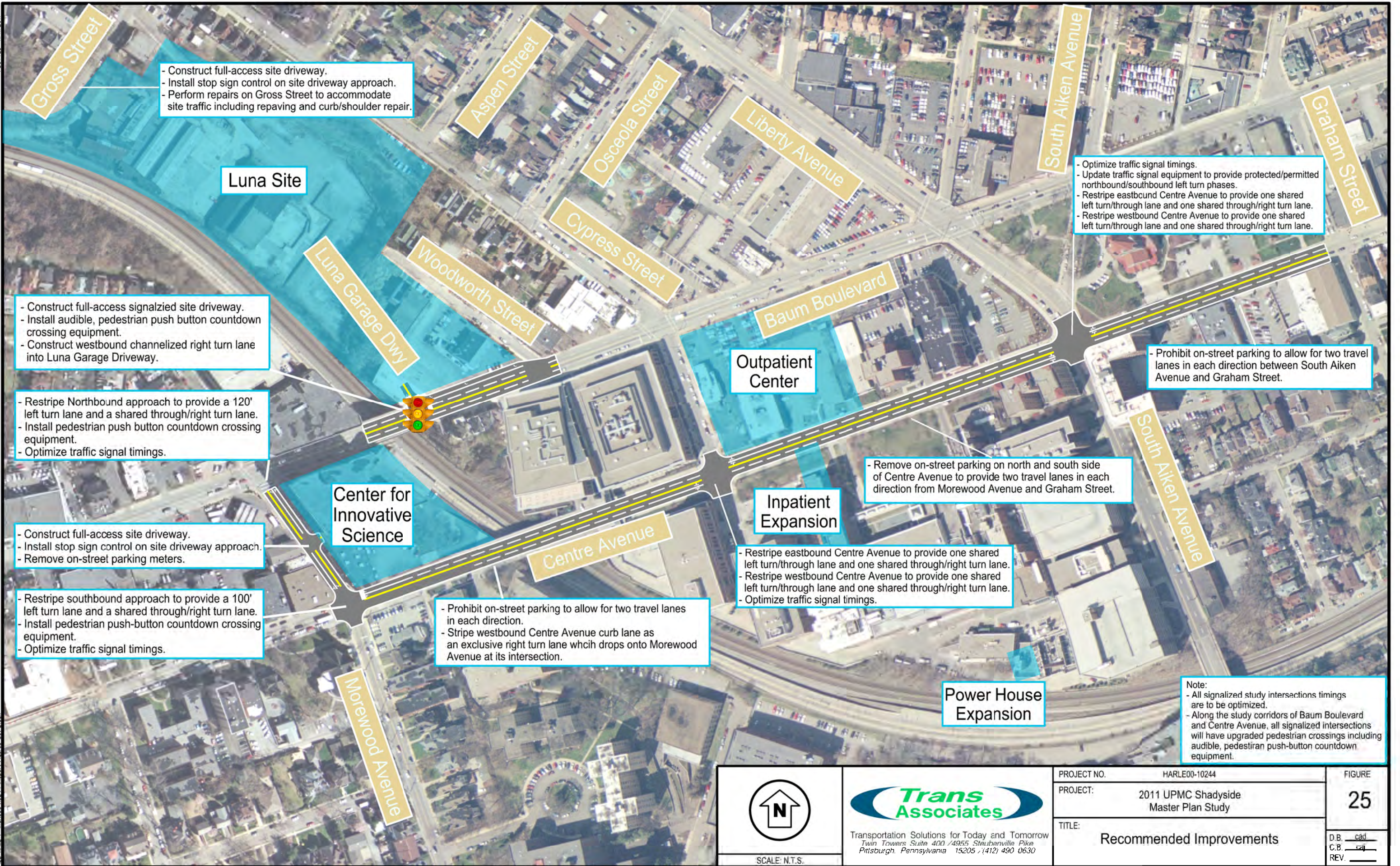
**Legend:**

<p><span style="border: 1px solid orange; border-radius: 50%; padding: 2px;">123</span> - 2021 Base 95th Percentile Queue Length (feet) (Optimized Signals)</p> <p><span style="border: 1px solid blue; border-radius: 50%; padding: 2px;">123</span> - 2021 Combined 95th Percentile Queue Length (feet) (Optimized Signals)</p>	<p><span style="border: 1px solid green; border-radius: 50%; padding: 2px;">123</span> - 2021 Combined Mitigated 95th Percentile Queue Length (feet)</p>
---	--

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00-10244 PROJECT: 2011 UPMC Shadyside Master Plan Study TITLE: PM Peak Hour 95th Percentile Queue Lengths	FIGURE <span style="font-size: 24px; font-weight: bold;">24</span> D.B. cad C.B. raj REV.
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- Construct full-access site driveway.  
 - Install stop sign control on site driveway approach.  
 - Perform repairs on Gross Street to accommodate site traffic including repaving and curb/shoulder repair.

- Construct full-access signalized site driveway.  
 - Install audible, pedestrian push button countdown crossing equipment.  
 - Construct westbound channelized right turn lane into Luna Garage Driveway.

- Restripe Northbound approach to provide a 120' left turn lane and a shared through/right turn lane.  
 - Install pedestrian push button countdown crossing equipment.  
 - Optimize traffic signal timings.

- Construct full-access site driveway.  
 - Install stop sign control on site driveway approach.  
 - Remove on-street parking meters.

- Restripe southbound approach to provide a 100' left turn lane and a shared through/right turn lane.  
 - Install pedestrian push-button countdown crossing equipment.  
 - Optimize traffic signal timings.

- Prohibit on-street parking to allow for two travel lanes in each direction.  
 - Stripe westbound Centre Avenue curb lane as an exclusive right turn lane which drops onto Morewood Avenue at its intersection.

- Restripe eastbound Centre Avenue to provide one shared left turn/through lane and one shared through/right turn lane.  
 - Restripe westbound Centre Avenue to provide one shared left turn/through lane and one shared through/right turn lane.  
 - Optimize traffic signal timings.

- Remove on-street parking on north and south side of Centre Avenue to provide two travel lanes in each direction from Morewood Avenue and Graham Street.

- Optimize traffic signal timings.  
 - Update traffic signal equipment to provide protected/permitted northbound/southbound left turn phases.  
 - Restripe eastbound Centre Avenue to provide one shared left turn/through lane and one shared through/right turn lane.  
 - Restripe westbound Centre Avenue to provide one shared left turn/through lane and one shared through/right turn lane.

- Prohibit on-street parking to allow for two travel lanes in each direction between South Aiken Avenue and Graham Street.

Note:  
 - All signalized study intersections timings are to be optimized.  
 - Along the study corridors of Baum Boulevard and Centre Avenue, all signalized intersections will have upgraded pedestrian crossings including audible, pedestrian push-button countdown equipment.

 SCALE: N.T.S.	 Transportation Solutions for Today and Tomorrow Twin Towers Suite 400 / 4955 Steubenville Pike Pittsburgh, Pennsylvania 15205 / (412) 490 0630	PROJECT NO. HARLE00-10244	FIGURE
		PROJECT: 2011 UPMC Shadyside Master Plan Study	25
		TITLE: Recommended Improvements	D.B. cad C.B. raj REV. _____