

Glassboro, New Jersey

# Rowan University Strategic Parking Initiative Feasibility Study

March 31, 2015



**TimHaahs**

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March 31, 2015

Mr. Donald Moore  
Senior Vice President  
Facilities, Planning, and Operations  
Rowan University  
201 Mullica Hill Road  
Glassboro, NJ 08028

***RE: Rowan University Strategic Parking Initiative Feasibility Study – Final Report  
Glassboro, New Jersey***

Dear Mr. Moore:

Attached is the Final Report for the Rowan University Strategic Parking Initiative Feasibility Study. As you are aware, this analysis projects the future parking demand and adequacy for the Rowan campus through 2024. The study evaluates the current parking operation and provides recommendations to more effectively manage parking on-campus. The study also analyzes the parking user distribution scenario to satisfy Rowan's immediate parking demand and the feasibility of four potential sites for new parking facilities to address Rowan's future parking needs. Thank you for allowing us to work with you on this important project. We look forward to reviewing our findings with you. Please feel free to contact us with any questions.

Sincerely,



Chris Gray, PE  
Director of Operations



Bo Kyung Choi  
Planning Analyst

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## Executive Summary

Rowan University is planning a significant amount of development in the near future due to steady enrollment growth. This increased enrollment will result in more students and more vehicles from commuting students, resident students, employees and visitors. Currently, the parking system is capable of supporting the immediate campus needs; however, the parking facilities are operating at a high occupancy which does not afford much room for future growth.

There are management strategies that can be employed to ensure the University gets the most out of the parking that is currently available. Resources are available to monitor occupancy levels throughout campus parking facilities thereby reducing the time spent looking for parking and ensuring any unused parking spaces in each lot get utilized. The parking department does a good job enforcing parking policies throughout campus; to streamline their efforts with enforcement, we recommend the University employ License Plate Recognition (LPR) technology. By employing this strategy, the parking department can spend more time focusing on ensuring the parking system is optimized. Another strategy the University should consider is the implementation of proximity based pricing for under-utilized facilities such as the Townhouse Garage and the Rowan Boulevard Garage. Students are price sensitive consumers and will park further from their destination if the price differential is significant.

By employing the strategies noted above, and excluding current planned construction projects, there is a current parking surplus of 845 parking spaces. However, in the near future, Lots M-1, X and a portion of Lot A will be displaced, and with the new 634-space lots O and O-1, this will result in a net loss of approximately 599 parking spaces, resulting in an overall shortfall of approximately 382 parking spaces by the Fall 2015 semester.

By Fall 2015 semester, Rowan will experience a shortage of 382 parking spaces. To satisfy the immediate parking demand without any additional parking supply on the campus, TimHaahs recommends temporarily applying 98% effective supply factors, maximizing parking facility operation, and rearranging parking user distribution throughout the parking facilities.

However, Fall 2016 semester and after, Rowan will begin to have a shortfall of parking again. If the planned growth rate at Rowan University continues through Spring 2024, it is estimated that there will be an additional demand of approximately 2,450 parking spaces by that time. We understand there will be a new light rail stop to the University, which may further reduce the demand for parking, but details are not currently available and are therefore not considered in this report.

As per the discussion with Rowan representatives, TimHaahs has researched the pros and cons of various locations for surface parking lots, particularly along Ellis Street, and three potential locations for a new structured parking facility: Lot F, Lot B/B-1, and Lot P/R.

## Study Area

Rowan University (Rowan) has two campuses in the State of New Jersey: the main campus in the Township of Glassboro and a satellite campus in the City of Camden. This study focuses on the main campus in Glassboro. The study area is defined by Bowe Boulevard to the west, Whitney Avenue to the south, and Carpenter Street and Main Street to the east. A small surface parking lot (Lot N) on Girard Road and across Lot Y (see Figure 2), is also included in our study area. Figure 1 illustrates the aerial map of the study area while Figure 2 depicts the location of the various parking facilities.

Three (3) New Jersey Transit bus stops are located on campus: at Route 322 in front of Campbell Library, at Bowe Boulevard in front of Lot D, and at Main Street across from the Rowan Boulevard Apartments. In addition, Rowan provides a shuttle service throughout the campus from 7:00PM to 3:00AM for students and employees.

**Figure 1: Aerial Map of the Study Area**



Source: Google Map formatted by Timothy Haahs & Associates, Inc. 2015.

## Current Parking Conditions

Rowan serves multiple user groups: commuter students, resident students, apartment resident students, employees, visitors and others. Each user group is defined as follows:

- The commuter student user group includes full-time, part-time, undergraduate, professional and graduate students who do not live on-campus and therefore commute to the campus.
- The resident student user group includes full-time, part-time, undergraduate, professional and graduate students who live in on-campus housing including Triad, Edgewood, Laurel, Oak, Mimosa, Magnolia, Willow, Mullica, Evergreen and Chestnut Halls.
- The apartment resident student user group includes full-time, part-time, undergraduate, professional and graduate students who live in Townhouse, Rowan Boulevard and Whitney Apartments.

- The employee user group includes full-time and permanent part-time faculty, staff and adjuncts on the campus.
- The visitor group includes transients who visit the campus temporarily. Visitors receive a free parking permit at the Parking Office or other offices.
- The other user group includes recreation center members who are not affiliated with the University as well as the service employee and contractors; for example, Gourmet Dining employees and Emergency Medical Services (EMS) employees, etc.

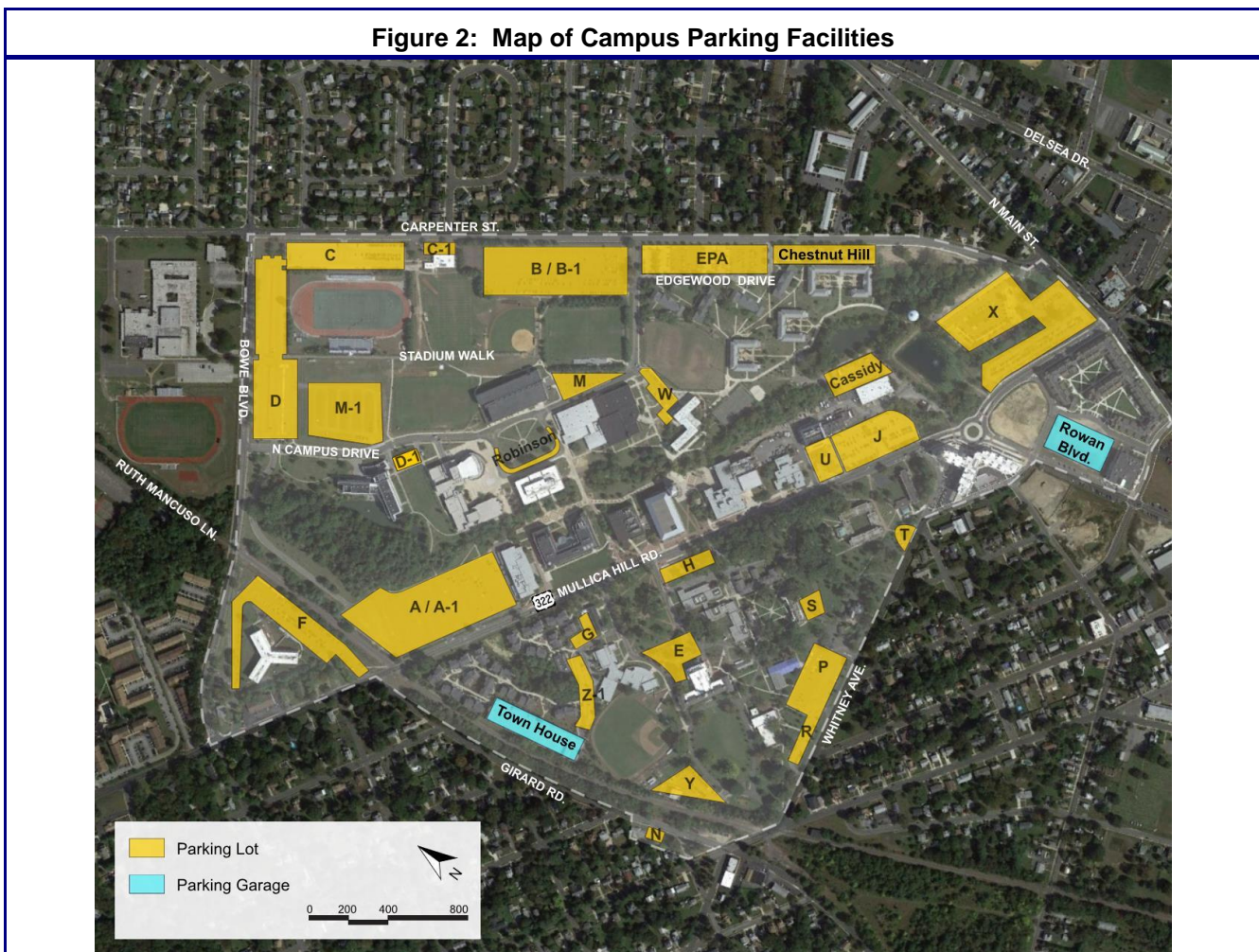
The University's current parking supply is located in off-street parking facilities. There are no on-street parking spaces within the campus boundary area.

The following sections outline the current parking supply and demand conditions at Rowan.

## Parking Supply

Rowan contains twenty-eight (28) surface parking lots and two (2) structured parking facilities totaling 5,787 spaces as of December 2014. There are 22 reserved parking spaces located within the Rowan campus for senior level managers titled Dean, Associate Vice President, Associate Provost, or above. However, the 22 reserved spaces have been removed from the parking supply in this report. Accordingly, the total parking supply is assumed as 5,765 spaces. Figure 2 illustrates the location of each parking facility on Rowan's campus.

Figure 2: Map of Campus Parking Facilities



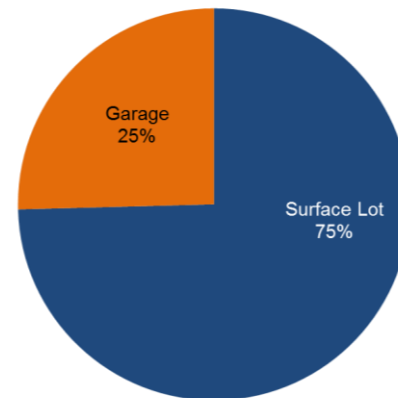
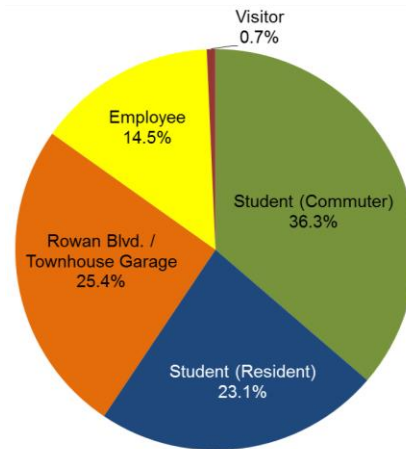
Source: Google Map formatted by Timothy Haahs & Associates, Inc. 2015.

Commuter Student permit holders are allowed to use 2,092 spaces located in Lots A, C, D, M-1, R, X and Y. Resident Student permit holders who live in on-campus housing can access 1,333 spaces in Lots B, F, J, EPA and Chestnut. Residents living in the Townhouse Apartments, Rowan Boulevard Apartments and Whitney Apartments with a parking permit must park at Townhouse and Rowan Boulevard parking garages adjacent to the resident halls. There are 1,465 spaces in those two parking garages. The Rowan Boulevard parking garage with 1,194 parking spaces is operated based on a shared parking model. Approximately 900 parking spaces are allocated to the resident students living at Rowan Boulevard and Whitney Apartments, and the remaining spaces are open to the general public in the form of monthly permit holders and transient customers.

Employee permit holders are allowed to access 835 spaces located in Lots A-1, B-1, D-1, E, G, H, M, N, P, S, T, U, W, Z-1, Robinson and Cassidy. Since the visitor group shares the parking spaces at Lot H with employees, we assume that 40 spaces can be occupied by visitors. Table 1 illustrates the existing parking supply and user group destination for each facility.

**Table 1: Parking Supply**

| • Parking Supply by Facility |                    |              | • Parking Supply by user group |              |             |
|------------------------------|--------------------|--------------|--------------------------------|--------------|-------------|
| Location                     | User Group*        | Supply       | User Group                     | Supply       | Percentage  |
| Surface Lot                  |                    |              | Student (Commuter)             | 2,092        | 36.3%       |
| A                            | Student (C)        | 579          | Student (Resident)             | 1,333        | 23.1%       |
| A-1                          | Employee           | 103          | Apartment Resident Student     | 1,465        | 25.4%       |
| B                            | Student (R), RC    | 469          | Employee                       | 835          | 14.5%       |
| B-1                          | Employee           | 100          | Visitor                        | 40           | 0.7%        |
| C                            | Student (C), RC    | 222          | <b>Total</b>                   | <b>5,765</b> | <b>100%</b> |
| D                            | Student (C)        | 449          |                                |              |             |
| D-1                          | Employee           | 4            |                                |              |             |
| E                            | Employee           | 85           |                                |              |             |
| F                            | Student (R)        | 326          |                                |              |             |
| G                            | Employee           | 29           |                                |              |             |
| H                            | Employee & Visitor | 83           |                                |              |             |
| J                            | Student (R)        | 176          |                                |              |             |
| M                            | Employee           | 60           |                                |              |             |
| M-1                          | Student (C)        | 242          |                                |              |             |
| N                            | Employee           | 8            |                                |              |             |
| P                            | Employee           | 167          |                                |              |             |
| R                            | Student (C)        | 50           |                                |              |             |
| S                            | Employee           | 20           |                                |              |             |
| T                            | Employee           | 12           |                                |              |             |
| U                            | Employee           | 34           |                                |              |             |
| W                            | Employee           | 39           |                                |              |             |
| X                            | Student (C)        | 500          |                                |              |             |
| Y                            | Student (C)        | 50           |                                |              |             |
| Z-1                          | Employee           | 58           |                                |              |             |
| Robinson                     | Employee           | 20           |                                |              |             |
| Cassidy                      | Employee           | 53           |                                |              |             |
| EPA                          | Student (R)        | 260          |                                |              |             |
| Chestnut                     | Student (R)        | 102          |                                |              |             |
| <b>Lot Total</b>             |                    | <b>4,300</b> |                                |              |             |
| Garage                       |                    |              |                                |              |             |
| Townhouse                    | Student (R)        | 565          |                                |              |             |
| Rowan Blvd.                  | Student (R)        | 900          |                                |              |             |
| <b>Garage Total</b>          |                    | <b>1,465</b> |                                |              |             |
| <b>Total</b>                 |                    | <b>5,765</b> |                                |              |             |



Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.



Approximately 85% of the campus parking supply is designated for student use. The remaining 15% is dedicated to employees and visitors. We assume that the other user groups including Recreation Center Members and service contractors do not generate a significant amount of parking demand. Therefore, we have not included any additional demand for those users in this analysis.

## Parking Demand and Occupancy

Parking Demand refers to the number of vehicles parked in a parking facility at a particular time of day. Generally, a parking demand is collected during a typical busy day in the Spring or Fall semester. For this study, parking demand data was collected by Rowan parking department representatives on Thursday, February 6<sup>th</sup> as well as Monday, February 10<sup>th</sup> through Wednesday, February 12<sup>th</sup>, 2014.

Parking occupancy is calculated by dividing the peak hour demand by the total number of parking spaces. The occupancy shows the level of spaces occupied at the peak demand hour. Table 2 shows the demand and occupancy by facility during the peak hour, Tuesday, February 11, 2014 at 11:30AM. Please see Table 14 and 15 in Appendix B for the entire parking demand and occupancy rate during the survey days.

**Table 2: Peak Parking Demand and Occupancy by Lot on Tuesday, February 11, 2014**

| Location            | Supply       | Peak Facility Demand<br>11:30AM | Occupancy  |
|---------------------|--------------|---------------------------------|------------|
| Surface Lot         |              |                                 |            |
| A                   | 579          | 579                             | 100%       |
| A-1                 | 103          | 103                             | 100%       |
| B                   | 469          | 382                             | 81%        |
| B-1                 | 100          | 87                              | 87%        |
| C                   | 222          | 180                             | 81%        |
| D                   | 449          | 429                             | 96%        |
| D-1                 | 4            | 4                               | 100%       |
| E                   | 85           | 85                              | 100%       |
| F                   | 326          | 270                             | 83%        |
| G                   | 29           | 29                              | 100%       |
| H                   | 83           | 83                              | 100%       |
| J                   | 176          | 176                             | 100%       |
| M                   | 60           | 60                              | 100%       |
| M-1                 | 242          | 242                             | 100%       |
| N                   | 8            | 8                               | 100%       |
| P                   | 167          | 167                             | 100%       |
| R                   | 50           | 50                              | 100%       |
| S                   | 20           | 20                              | 100%       |
| T                   | 12           | 12                              | 100%       |
| U                   | 34           | 34                              | 100%       |
| W                   | 39           | 39                              | 100%       |
| X                   | 500          | 23                              | 5%         |
| Y                   | 50           | 50                              | 100%       |
| Z-1                 | 58           | 58                              | 100%       |
| Robinson            | 20           | 20                              | 100%       |
| Cassidy             | 53           | 53                              | 100%       |
| EPA                 | 260          | 260                             | 100%       |
| Chestnut            | 102          | 102                             | 100%       |
| <b>Lot Total</b>    | <b>4,300</b> | <b>3,605</b>                    | <b>84%</b> |
| Garage              |              |                                 |            |
| Townhouse           | 565          | 321                             | 57%        |
| Rowan Blvd.         | 900          | 704                             | 78%        |
| <b>Garage Total</b> | <b>1,465</b> | <b>1,025</b>                    | <b>70%</b> |
| <b>Total</b>        | <b>5,765</b> | <b>4,630</b>                    | <b>80%</b> |

Source: Rowan University, 2015.

Table 2 shows that the campus peak hour demand is 4,630 vehicles at 11:30AM. This represents an overall occupancy of 80%. We noted that most lots are 81% to 100% occupied at the peak hour. On the other hand, Lot X with 500 spaces was only 5% occupied, significantly lower than the other lots and reducing the campus-wide overall occupancy. According to the data from Rowan, Lot X experienced similar low occupancy rates during the entire survey days and times. The Townhouse and Rowan Boulevard garages were 57% and 78% occupied during the peak hour, respectively.

In addition to the peak demand for each facility, it is also important to understand the demand and occupancy for each user group. The commuter students occupied 1,553 parking spaces, approximately 74% of the designated supply. Rowan Boulevard, Townhouse and Whitney Apartment residents occupied 70% of the parking spaces in the two parking garages. Furthermore, resident students and employees experienced 89% to 98% occupancy rates at the peak hour. We assumed that the visitor group experience 100% parking occupancy. Table 3 illustrates the peak hour demand for each user group.

|  | <b>User Group</b>          | <b>Supply</b> | <b>Peak Demand</b> | <b>Occupancy</b> |
|--|----------------------------|---------------|--------------------|------------------|
|  | Student (Commuter)         | 2,092         | 1,553              | 74%              |
|  | Student (Resident)         | 1,333         | 1,190              | 89%              |
|  | Apartment Resident Student | 1,465         | 1,025              | 70%              |
|  | Employee                   | 835           | 822                | 98%              |
|  | Visitor                    | 40            | 40                 | 100%             |
|  | <b>Total</b>               | <b>5,765</b>  | <b>4,630</b>       | <b>80%</b>       |

Source: Rowan University, 2015.

### **Effective Parking Supply**

Effective supply is a common term used in the parking industry. The effective supply is essentially a “cushion” applied to the actual supply to account for parking spaces lost due to improperly parked vehicles, snow removal, construction, and the natural flow of vehicles. Simply stated, it considers that a parking supply operates at peak efficiency when parking occupancy is no more than 85 to 95% of the supply. When occupancy exceeds this level, patrons may experience delays and frustration while searching for the last few remaining spaces. This creates a perception that the supply is inadequate and is at full occupancy even when there are some spaces still available.

Accordingly, we have adjusted Rowan’s parking inventory available for each user group by applying an effective supply factor. Since most students and employees are familiar with the campus and the parking supply, we have assigned a factor of 95% for these user groups. Likewise, since visitors are less familiar with the campus, we have assigned a factor of 90%. Table 4 summarizes the effective supply of each parking facility on Rowan’s campus.

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**Table 4: Effective Parking Supply**

| Effective Parking Supply by Facility |              |        |                  | Effective Parking Supply by User Group |              |        |                  |
|--------------------------------------|--------------|--------|------------------|--|--------------|--------|------------------|
| Location                             | Supply       | Factor | Effective Supply | User Group                             | Supply       | Factor | Effective Supply |
| Surface Lot                          |              |        |                  | Student (Commuter)                     | 2,092        | 95%    | 1,987            |
| A                                    | 579          | 95%    | 550              | Student (Resident)                     | 1,333        | 95%    | 1,266            |
| A-1                                  | 103          | 95%    | 98               | Apartment Resident Student             | 1,465        | 95%    | 1,392            |
| B                                    | 469          | 95%    | 446              | Employee                               | 835          | 95%    | 793              |
| B-1                                  | 100          | 95%    | 95               | Visitor                                | 40           | 90%    | 36               |
| C                                    | 222          | 95%    | 211              | <b>Total</b>                           | <b>5,765</b> |        | <b>5,475</b>     |
| D                                    | 449          | 95%    | 427              |  |              |        |                  |
| D-1                                  | 4            | 95%    | 4                |  |              |        |                  |
| E                                    | 85           | 95%    | 81               |  |              |        |                  |
| F                                    | 326          | 95%    | 310              |  |              |        |                  |
| G                                    | 29           | 95%    | 28               |  |              |        |                  |
| H                                    | 83           | 93%    | 77               |  |              |        |                  |
| J                                    | 176          | 95%    | 167              |  |              |        |                  |
| M                                    | 60           | 95%    | 57               |  |              |        |                  |
| M-1                                  | 242          | 95%    | 230              |  |              |        |                  |
| N                                    | 8            | 95%    | 8                |  |              |        |                  |
| P                                    | 167          | 95%    | 159              |  |              |        |                  |
| R                                    | 50           | 95%    | 48               |  |              |        |                  |
| S                                    | 20           | 95%    | 19               |  |              |        |                  |
| T                                    | 12           | 95%    | 11               |  |              |        |                  |
| U                                    | 34           | 95%    | 32               |  |              |        |                  |
| W                                    | 39           | 95%    | 37               |  |              |        |                  |
| X                                    | 500          | 95%    | 475              |  |              |        |                  |
| Y                                    | 50           | 95%    | 48               |  |              |        |                  |
| Z-1                                  | 58           | 95%    | 55               |  |              |        |                  |
| Robinson                             | 20           | 95%    | 19               |  |              |        |                  |
| Cassidy                              | 53           | 95%    | 50               |  |              |        |                  |
| EPA                                  | 260          | 95%    | 247              |  |              |        |                  |
| Chestnut                             | 102          | 95%    | 97               |  |              |        |                  |
| <b>Lot Total</b>                     | <b>4,300</b> |        | <b>4,083</b>     |  |              |        |                  |
| Garage                               |              |        |                  |  |              |        |                  |
| Townhouse                            | 565          | 95%    | 537              |  |              |        |                  |
| Rowan Blvd.                          | 900          | 95%    | 855              |  |              |        |                  |
| <b>Garage Total</b>                  | <b>1,465</b> |        | <b>1,392</b>     |  |              |        |                  |
| <b>Total</b>                         | <b>5,765</b> |        | <b>5,475</b>     |  |              |        |                  |

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

Based on the previous table, the effective parking supply is 5,475 spaces. This represents a 290-space cushion/reduction in the actual parking supply (5,765 actual parking spaces minus 5,475 effective parking spaces = 290-space cushion).

### Parking Adequacy

Parking Adequacy is calculated by subtracting the peak hour parking demand from the effective supply. A negative adequacy indicates a deficit or shortage, a positive result shows a surplus. **The current overall parking adequacy is an estimated surplus of 845 parking spaces.** The most significant parking deficiency is in Lot A with a shortage of 29 spaces. On the other hand, Lots B, B-1, C, F and X all contain a parking surplus. In addition, Lot X has an estimated surplus of 452 spaces. The Townhouse and Rowan Boulevard garages have a surplus of 367 spaces.

The following table illustrates the parking adequacy of each facility within the Rowan campus.

| <b>Table 5: Parking Adequacy by Facility on Tuesday, February 11, 2014</b> |                         |                    |                 |
|--|-------------------------|--------------------|-----------------|
| <b>Location</b>  | <b>Effective Supply</b> | <b>Peak Demand</b> | <b>Adequacy</b> |
| Surface Lot  |                         |                    |                 |
| A  | 550                     | 579                | (29)            |
| A-1  | 98                      | 103                | (5)             |
| B  | 446                     | 382                | 64              |
| B-1  | 95                      | 87                 | 8               |
| C  | 211                     | 180                | 31              |
| D  | 427                     | 429                | (2)             |
| D-1  | 4                       | 4                  | (0)             |
| E  | 81                      | 85                 | (4)             |
| F  | 310                     | 270                | 40              |
| G  | 28                      | 29                 | (1)             |
| H  | 77                      | 83                 | (6)             |
| J  | 167                     | 176                | (9)             |
| M  | 57                      | 60                 | (3)             |
| M-1  | 230                     | 242                | (12)            |
| N  | 8                       | 8                  | (0)             |
| P  | 159                     | 167                | (8)             |
| R  | 48                      | 50                 | (3)             |
| S  | 19                      | 20                 | (1)             |
| T  | 11                      | 12                 | (1)             |
| U  | 32                      | 34                 | (2)             |
| W  | 37                      | 39                 | (2)             |
| X  | 475                     | 23                 | 452             |
| Y  | 48                      | 50                 | (3)             |
| Z-1  | 55                      | 58                 | (3)             |
| Robinson   | 19                      | 20                 | (1)             |
| Cassidy  | 50                      | 53                 | (3)             |
| EPA  | 247                     | 260                | (13)            |
| Chestnut   | 97                      | 102                | (5)             |
| <b>Lot Total</b>   | <b>4,083</b>            | <b>3,605</b>       | <b>478</b>      |
| Garage   |                         |                    |                 |
| Townhouse  | 537                     | 321                | 216             |
| Rowan Blvd.  | 855                     | 704                | 151             |
| <b>Garage Total</b>  | <b>1,392</b>            | <b>1,025</b>       | <b>367</b>      |
| <b>Total</b>   | <b>5,475</b>            | <b>4,630</b>       | <b>845</b>      |

\*Note: This table does not account for current design plans and construction projects proposed in the immediate future.

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

### **Parking Permits Issued**

A parking permit is needed to park at the Rowan campus. Parking permits are sold on a semester, annual or two-year basis depending on permit type. Rowan provides each parking user group with different parking permit types including commuter student, resident student, employee, adjunct/graduate assistant/resident director, senior level manager, service contractor, recreation center member, and unlimited. Furthermore, the resident students who live in the Rowan Boulevard Apartments, Townhouse Apartments or Whitney Apartments are issued a special parking permit which allows access to the two garages adjacent to the apartment buildings. The permits are sold through an online system (Permit Store, <https://Rowan.ThePermitStore.com>) or at the Parking Office on campus.

Table 6 illustrates the number of permits issued in academic year 2013-2014 (July 2013 through June 2014) for each user group and the ratio of permits issued per headcount. To identify the number of permits sold for each user group, we made the following assumptions based on the information provided from Rowan:

- For commuter students, resident students, apartment resident students, the average number of permits sold from the Fall and Spring semesters is used for this analysis. It should be noted that the number of student parking permits sold in the Spring semester is higher than the Fall semester according to the data provided by Rowan. Students can purchase the parking permit annually or by each semester.
- The employee category includes the number of permits issued for adjuncts / graduate assistants / resident directors, employee 2012-2014 and unlimited 2012-2014. See Appendix A for a detailed breakdown of the information. The permit for adjuncts, graduate assistants and resident directors is provided annually while ‘employee’ and ‘unlimited’ permits are sold in 2-year basis.

Since a detailed breakdown of headcount data by each user group was not provided from Rowan, we also made the following assumptions pertaining to the headcount of each user group:

- The headcount of student groups including commuter students, resident students, and apartment resident students was calculated based on total enrollment provided by Rowan as well as students’ car ownership rate assumed by TimHaahs. See Appendix A for a list of parking study assumptions.
- We calculated the employee headcount based on the number of parking permits sold for the employee group as well as the U.S. Census data in terms of the commuting patterns of Gloucester County, NJ. See Appendix A for additional information. The headcount of senior level managers who were provided with designated parking spaces was not considered in this calculation.

Again, note that the parking supply and demand for senior level managers, service contractors, and recreation center members is not counted in this study. Also, the visitor group is not analyzed in this section since the group has only provided a daily parking permit from Rowan.

| User Group                 | Permits Issued | Headcount     | Ratio |
|----------------------------|----------------|---------------|-------|
| Student (Commuter)         | 3,686          | 9,509         | 0.39  |
| Student (Resident)         | 557            | 2,304         | 0.24  |
| Apartment Resident Student | 981            | 1,536         | 0.64  |
| Employee                   | 1,851          | 3,252         | 0.57  |
| <b>Total</b>               | <b>7,074</b>   | <b>16,601</b> |       |

Source: Rowan University and Timothy Haahs & Associates, Inc., 2015.

For every 100 commuter students, approximately 79 permits were issued and for every 100 resident students, approximately 10 permits were issued. For every 100 Rowan Boulevard, Townhouse, Whitney Apartment resident students (Townhouse and Rowan Boulevard Garages users), 29 permits were issued. In addition, for every 100 employees, approximately 57 permits were issued.

It is also helpful to understand how many users are accommodated by the Rowan parking system. To analyze this ratio, we compared the total number of permits issued against the total parking supply for each user group. Table 7 illustrates the ratio of parking permits issued per space in Academic Year 2013-2014. For instance, 1 parking space designated for a commuter student is utilized by just less than two commuter parkers, and 1 parking space designated for a resident student is utilized by less than one resident parker. The ratio for the employee group is high, more than 2 parkers per space, since the part-time faculty and staff are also provided the same type of employee parking permit.

**Table 7: Parking Permits Issued per Space (Academic Year 2013-2014)**

| User Group                 | Permits Issued | Parking Spaces | Ratio |
|----------------------------|----------------|----------------|-------|
| Student (Commuter)         | 3,686          | 2,092          | 1.76  |
| Student (Resident)         | 557            | 1,333          | 0.42  |
| Apartment Resident Student | 981            | 1,465          | 0.67  |
| Employee                   | 1,851          | 835            | 2.22  |
| <b>Total</b>               | <b>7,074</b>   | <b>5,725</b>   |       |

Source: Rowan University, 2015.

## Operation & Facility Management Recommendations

### Commuter Shared Parking Areas

Rowan commuter students currently have an option to park in Lots A, C, D, M-1, R, X and Y. These lots are shared among all commuter students on a first-come, first-serve basis. The issues that we observed include Lot A being filled to capacity due to it being the closest facility and Lot X will only have a few parkers due to being the furthest away. Another issue is that commuter students arriving after 9AM will drive around the “MOST” desirable parking lots and wait between 15-20 minutes to find an available space due to students leaving after their scheduled class. In order to better serve the students and get them to available parking spaces quicker we recommend that all the commuter parking lots install sensor technology, such as [Case Parking](#) ([www.caseparking.com](http://www.caseparking.com)), to monitor the lots occupancy levels. In-ground loops would be installed to count cars entering and exiting. The counts are then captured by field hardware sent to the network where parking management monitors their current occupancies. Once the counts are reported to the network they then can be sent to interactive maps or smartphone devices to advise where spaces are available. The main objective of this technology is to advise students of available parking alternatives and change their travel patterns. Another advantage of this technology is that the counts are stored for long-term trend analysis, and lot utilization which is typically performed manually.

In addition, it is recommended that the Townhouse Garage and the Rowan Boulevard Garage be analyzed using a shared model between resident and student commuter parking. This will help reduce the overall campus parking demand since residents and commuters are not parking in the same area at the same time. We estimate that Rowan will reduce the overall campus parking demand by 100 parking spaces by following this shared parking approach.

### Parking Equipment & Access Key Standardization

The parking gates that are currently utilized to secure parking areas are outdated and only provide entry / exit functionality. We recommend that Rowan upgrade all gates and standardize the access key card system. The selected access key system should support a parking platform that must include “anti-pass back” technology which will not allow access to more than one vehicle access key card. Currently the Rowan Boulevard Parking Garage operates the [3M Parking Revenue Control System](#) which was integrated with the Rowan University [Blackboard](#) ID system. The integration performs very well for entrance and exit functionality, but Blackboard is not equipped with “anti-pass back” features. University students are very intelligent and have realized that their Blackboard ID’s can let multiple vehicles into the parking facility. To prohibit abuse Nexus Parking Systems (Nexus) who operates the Rowan Boulevard Garage, has taken steps by asking Rowan to program the Blackboard system to not allow the next entry or exit within a five minute sequence. In the future, Nexus will ask Rowan to switch the access of the garage to standard [HID](#) cards which then can have “anti-pass back” measures included.

Another advantage of a system which incorporates a parking platform is that the live data can assist the parking department in optimizing the usage of the facilities. Again as explained in the section above, the data can be uploaded to the network and sent to interactive maps or smartphone devices to advise where parking is available.

## ***Update Enforcement Program Utilizing LPR***

In performing occupancy counts on the Rowan campus we have noticed many student vehicles that either do not have a parking permit, are outdated or are parking in the wrong location.

It has been our experience that in order to have a successful parking program there must be consistent and regular enforcement. Currently, the Public Safety department performs the parking enforcement on campus and does a great job. However, as Rowan grows this task will require more resources and enforcement officers. In order to be more efficient and reduce the time it takes to patrol, we recommend that Rowan to utilizes [License Plate Recognition](#), known as “LPR” technology, for their patrol vehicles. The basis of LPR is that cameras capture and validate license plate information as the patrol vehicle drives through each parking facility. If a vehicle does not have a permit for a parking area, the LPR system will notify the officers who can confirm the violation and issue a citation.

LPR technology will greatly reduce the time that it takes for patrol vehicles to monitor parking at Rowan as well as provide occupancy data to assist maximum utilization of Rowan’s available parking.

## ***Parking Rates***

There are several parking locations that have unused capacity such as the Townhouse Garage, Rowan Boulevard Garage and Lot X. In order to increase the occupancy of these locations, we recommend that Rowan revise the pricing structure or institute a standard single parking rate for all students. If there was a single parking rate for the students, Rowan could take a more active role in dictating where the students park. The dictating of locations would be catered to the resident student parking not commuters.

## **Future Parking Adequacy**

As part of this study, we have estimated the future parking conditions through Academic Year 2023-2024. To project future parking conditions, we used the following methodology.

1. We developed a customized parking demand ratio for Rowan user groups based on existing parking demand / supply data.
2. We applied the customized parking ratio to the projected increase or decrease in user group headcount (Commuter Student, Resident Student, Apartment Resident Student – Garage User, Employee and Visitor). A breakdown of student and employee headcounts was calculated based on our assumptions listed in Appendix A.
3. We identified any proposed increase or decrease to the Rowan future parking supply. Changes to parking supply typically occur through the development of existing facilities for other uses and the potential development of new parking facilities.
4. We compared the future parking demand to the future effective parking supply to identify the future parking adequacy.

Rowan plans to develop the West campus at the existing main campus. Note that any proposed parking supply at West campus is not included in this report. Due to the geographical distance between the main and West campus, we do not believe there is an impact on the parking demand of the main campus based on the West campus development at this time. To figure out the impact on the parking systems between these campuses, a separate parking study based on development programs and an additional shuttle service plan is recommended.

## Parking Demand Ratios

In order to project the future parking demand at Rowan, it is necessary to determine the parking demand ratios for each user group. To calculate the parking demand ratio, we compared current headcount against the peak hour parking demand for each user group. The following section outlines our methodology for calculating each demand ratio.

Student (Commuter) – Based on current parking occupancy data, 1,553 vehicles are identified as commuter student vehicles parked at designated spaces. Approximately 9,509 students were enrolled for the Academic Year 2013-2014. Accordingly, the parking demand ratio for commuter students is 0.16 spaces per student. (1,553 space demand ÷ 9,509 commuter students = 0.16) This means that for every 100 commuter students, approximately 16 spaces are needed during the peak hour.

Student (Resident) – Based on current parking demand, 1,190 vehicles were parked at designated spaces for resident students. Approximately 2,304 resident students were enrolled for the same academic year. Accordingly, the parking demand ratio for resident students is 0.52 spaces per student. (1,190 space demand ÷ 2,304 resident students = 0.52) This means that for every 100 resident students, approximately 52 spaces are needed at the peak hour.

Apartment Resident – Approximately 1,536 resident students were enrolled in the school as well as lived at the Townhouse, Rowan Boulevard and Whitney Apartments during the same academic year. Based on current parking demand, 1,025 vehicles were parked at designated garage spaces. Accordingly, the parking demand ratio for apartment resident students is 0.67 spaces per student. (1,025 space demand ÷ 1,536 apartment resident students = 0.67) This means that approximately 67 spaces are needed for every 100 apartment resident students at the peak hour.

Employee – We assumed that approximately 2,160 faculty and staff were employed at Rowan for the Academic Year 2013-2014. Based on the current parking demand, 822 vehicles were parked at designated spaces for employees. Accordingly, the employee parking demand ratio is 0.38 per employee. (822 space demand ÷ 2,160 employees = 0.38) This means that 38 spaces are needed for every 100 employees during the peak hour.

Visitor – Since a detail breakdown of visitors was not provided from Rowan, we assume that approximately 40 spaces are generally occupied by visitors' vehicles at Lot H. From the demand data, Lot H experienced 100% occupancy at the peak hour. Therefore, the visitor parking demand ratio is 1.00 spaces per visitor. (40 space demand ÷ 40 visitors = 1.00)

**Table 8: Parking Demand Ratios**

| User Group                 | Vehicles     | Users         | Ratio       |
|----------------------------|--------------|---------------|-------------|
| Student (Commuter)         | 1,553        | 9,509         | 0.16        |
| Student (Resident)         | 1,190        | 2,304         | 0.52        |
| Apartment Resident Student | 1,025        | 1,536         | 0.67        |
| Employee                   | 822          | 3,252         | 0.25        |
| Visitor                    | 40           | 40            | 1.00        |
| <b>Total</b>               | <b>4,630</b> | <b>16,641</b> | <b>0.28</b> |

Source: Rowan University and Timothy Haahs & Associates Inc. 2015.

The average demand ratio for Rowan school population including all student, employee and visitor groups, is at 0.30. (4,630 total demand ÷ 15,549 total headcount = 0.30) This ratio is commensurate with other academic institutions in suburban settings. According to the Institute of Transportation Engineers (ITE) Parking Generation Manual 4<sup>th</sup> Edition, the average peak parking demand on weekday for a suburban university/college is 0.33 vehicles per school population. (Peak Hour = 11:00AM – 12:00PM, R<sup>2</sup>=0.97)



## Future Parking Supply

Rowan adopted the Long Range Master Facilities Plan in accordance with the University's growth towards a public university with a national reputation for excellence and innovation. This report refers to the master plan package prepared by Sasaki Associates, Inc. in February 2013 as well as information provided from Rowan facilities representatives.

Rowan has indicated that Lot M-1 and a portion of Lot A, totaling 733 spaces, were removed as of March 2015 resulting in the construction of a new College of Engineering and College of Business buildings. Furthermore, Lot X with 500 spaces will be also eliminated in September 2015 for development of new student housing. On the other hand, new surface parking lots, O and O-1, with 634 additional spaces were opened in the Spring 2015 semester. Table 9 summarizes the future changes to the campus parking supply, based on information provided by Rowan. Parking facilities highlighted in red indicate facilities that will experience reduced parking supply, and facilities highlighted in yellow represent a gain in parking spaces.

**Table 9: Future Parking Total and Effective Supply Changes**

| Location            | Current Total Supply | Future Total Supply | Net Change Total Supply | Current Effective* Supply | Future Effective* Supply | Net Change Effective* Supply |
|---------------------|----------------------|---------------------|-------------------------|---------------------------|--------------------------|------------------------------|
| Surface Lot         |                      |                     |                         |                           |                          |                              |
| A*                  | 579                  | 88                  | (491)                   | 550                       | 84                       | (466)                        |
| A-1                 | 103                  | 104                 | 1                       | 98                        | 99                       | 1                            |
| B                   | 469                  | 469                 | 0                       | 446                       | 446                      | 0                            |
| B-1                 | 100                  | 100                 | 0                       | 95                        | 95                       | 0                            |
| C                   | 222                  | 222                 | 0                       | 211                       | 211                      | 0                            |
| D                   | 449                  | 449                 | 0                       | 427                       | 427                      | 0                            |
| D-1                 | 4                    | 4                   | 0                       | 4                         | 4                        | 0                            |
| E                   | 85                   | 85                  | 0                       | 81                        | 81                       | 0                            |
| F                   | 326                  | 326                 | 0                       | 310                       | 310                      | 0                            |
| G                   | 29                   | 29                  | 0                       | 28                        | 28                       | 0                            |
| H                   | 83                   | 83                  | 0                       | 79                        | 79                       | 0                            |
| J                   | 176                  | 176                 | 0                       | 167                       | 167                      | (0)                          |
| M                   | 60                   | 60                  | 0                       | 57                        | 57                       | 0                            |
| M-1*                | 242                  | 0                   | (242)                   | 230                       | 0                        | (230)                        |
| N                   | 8                    | 8                   | 0                       | 8                         | 8                        | 0                            |
| P                   | 167                  | 167                 | 0                       | 159                       | 159                      | 0                            |
| R                   | 50                   | 50                  | 0                       | 48                        | 48                       | 0                            |
| S                   | 20                   | 20                  | 0                       | 19                        | 19                       | 0                            |
| T                   | 12                   | 12                  | 0                       | 11                        | 11                       | (0)                          |
| U                   | 34                   | 34                  | 0                       | 32                        | 32                       | (0)                          |
| W                   | 39                   | 39                  | 0                       | 37                        | 37                       | (0)                          |
| X*                  | 500                  | 0                   | (500)                   | 475                       | 0                        | (475)                        |
| Y                   | 50                   | 50                  | 0                       | 48                        | 48                       | 0                            |
| Z-1                 | 58                   | 58                  | 0                       | 55                        | 55                       | (0)                          |
| Robinson            | 20                   | 20                  | 0                       | 19                        | 19                       | 0                            |
| Cassidy             | 53                   | 53                  | 0                       | 50                        | 50                       | (0)                          |
| EPA                 | 260                  | 260                 | 0                       | 247                       | 247                      | 0                            |
| Chestnut            | 102                  | 102                 | 0                       | 97                        | 97                       | 0                            |
| O / O-1             | 0                    | 634                 | 634                     | 0                         | 602                      | 602                          |
| <b>Lot Total</b>    | <b>4,300</b>         | <b>3,702</b>        | <b>(598)</b>            | <b>4,085</b>              | <b>3,515</b>             | <b>(570)</b>                 |
| Garage              |                      |                     |                         |                           |                          |                              |
| Townhouse           | 565                  | 565                 | 0                       | 537                       | 537                      | 0                            |
| Rowan Blvd.         | 900                  | 900                 | 0                       | 855                       | 855                      | 0                            |
| <b>Garage Total</b> | <b>1,465</b>         | <b>1,465</b>        | <b>0</b>                | <b>1,392</b>              | <b>1,392</b>             | <b>0</b>                     |
| <b>Total</b>        | <b>5,765</b>         | <b>5,167</b>        | <b>(598)</b>            | <b>5,477</b>              | <b>4,907</b>             | <b>(570)</b>                 |

\*95% effective supply factor was applied.

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

When applying all of the above changes to the current supply, there will be net loss of 598 actual spaces to Rowan’s future parking supply. In addition, with 95% effective supply factor, Rowan will have a net loss of 570 effective parking spaces. Figure 3 depicts the anticipated changes in Rowan’s future parking supply. Approximately 51% of the eliminated parking supply from Lots A, M-1, and X for commuter student will be replaced by a new surface lot with 634 spaces.

**Figure 3: Future Parking Supply Including New Surface Lot**



Source: Google Map formatted by Timothy Haahs & Associates, Inc. 2015.

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## Future Parking Demand

Rowan is currently undergoing its campus development plan and will continue to add additional academic facilities to enhance its campus and amenities. As a result, Rowan is projecting over 17,800 students and over 3,550 employees by Academic Year 2018-2019 (5-year projection). Furthermore, by Academic Year 2023-2024 (10-year projection), Rowan is projecting over 23,600 students as well as over 3,870 employees. We assume that the visitor population may change with the same growth rate as enrollment while the employee headcount will grow by 30% of student enrollment growth, since the detailed information was not provided by Rowan. Please see Appendix C for annual population growth by parking user group.

**Table 10: Future Headcount Projections (After 5-year and 10-year)**

| User Group                 | Academic Year 2013-2014 Headcount | Average Annual Growth Rate | Academic Year 2018-2019 Headcount | Academic Year 2023-2024 Headcount |
|----------------------------|-----------------------------------|----------------------------|-----------------------------------|-----------------------------------|
| Student (Commuter)         | 9,509                             | 6%                         | 13,047                            | 17,111                            |
| Student (Resident)         | 2,304                             | 6%                         | 2,864                             | 3,921                             |
| Apartment Resident Student | 1,536                             | 6%                         | 1,910                             | 2,614                             |
| Employee                   | 3,252                             | 2%                         | 3,554                             | 3,875                             |
| Visitor                    | 40                                | 6%                         | 53                                | 71                                |

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

With the projected growth of the student, employee and visitor headcount, parking demand will increase. In order to project the future parking demand, the current parking demand ratios are multiplied against the future headcount. For example, the future employee demand of 898 vehicles in Academic Year 2018-2019 is calculated by multiplying the future employee headcount of 3,554 by the employee demand ratio of 0.25. In the same way, the future commuter student demand of 2,131 vehicles in Academic Year 2023-2024 is calculated by multiplying the future commuter student headcount of 13,047 by the commuter student demand ratio of 0.16.

The 5-year and 10-year future parking demand projection of each user group is as follows:

**Table 11: Future Parking Demand Projection (5-year)**

| User Group                 | Academic Year 2018-2019 Headcount | Ratio | Academic Year 2018-2019 Demand |
|----------------------------|-----------------------------------|-------|--------------------------------|
| Student (Commuter)         | 13,047                            | 0.16  | 2,131                          |
| Student (Resident)         | 2,864                             | 0.52  | 1,479                          |
| Apartment Resident Student | 1,910                             | 0.67  | 1,274                          |
| Employee                   | 3,554                             | 0.25  | 898                            |
| Visitor                    | 53                                | 1.00  | 53                             |

| User Group                 | Academic Year 2013-2014 Demand | Academic Year 2018-2019 Demand | Net Change   |
|----------------------------|--------------------------------|--------------------------------|--------------|
| Student (Commuter)         | 1,553                          | 2,131                          | 578          |
| Student (Resident)         | 1,190                          | 1,479                          | 289          |
| Apartment Resident Student | 1,025                          | 1,274                          | 249          |
| Employee                   | 822                            | 898                            | 76           |
| Visitor                    | 40                             | 53                             | 13           |
| <b>Total</b>               | <b>4,630</b>                   | <b>5,836</b>                   | <b>1,206</b> |

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

**Table 12: Future Parking Demand Projection (10-year)**

| User Group                 | Academic Year<br>2023-2024<br>Headcount | Ratio | Academic Year<br>2023-2024<br>Demand |
|----------------------------|---|-------|--------------------------------------|
| Student (Commuter)         | 17,111                                  | 0.16  | 2,795                                |
| Student (Resident)         | 3,921                                   | 0.52  | 2,025                                |
| Apartment Resident Student | 2,614                                   | 0.67  | 1,745                                |
| Employee                   | 3,875                                   | 0.25  | 980                                  |
| Visitor                    | 71                                      | 1.00  | 71                                   |

| User Group                 | Academic Year<br>2013-2014<br>Demand | Academic Year<br>2023-2024<br>Demand | Net Change   |
|----------------------------|--------------------------------------|--------------------------------------|--------------|
| Student (Commuter)         | 1,553                                | 2,795                                | 1,242        |
| Student (Resident)         | 1,190                                | 2,025                                | 835          |
| Apartment Resident Student | 1,025                                | 1,745                                | 720          |
| Employee                   | 822                                  | 980                                  | 158          |
| Visitor                    | 40                                   | 71                                   | 31           |
| <b>Total</b>               | <b>4,630</b>                         | <b>7,615</b>                         | <b>2,985</b> |

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

Based on the above methodology, we anticipate a parking demand increase of 578 spaces for commuter students, 289 spaces for resident students, 249 spaces for garage users, 76 spaces for employees and 13 spaces for visitors, resulting in an overall need for 1,206 additional parking spaces by Academic Year 2018-2019. Furthermore, we estimate a parking demand increase of 1,242 spaces for commuter students, 835 spaces for resident students, 720 spaces for garage users, 158 spaces for employees and 31 spaces for visitors, resulting in an overall need for 2,985 additional parking spaces by Academic Year 2023-2024.

### **Future Parking Adequacy**

To determine the future parking for Rowan University, we compared the future parking demand against the future **effective parking supply**, the supply after a “cushion” has been applied to the actual supply. When we apply a 90% to 95% factor to the future supply, the future effective parking supply after Academic Year 2015 - 2016 is reduced from 5,167 spaces to 4,907 spaces (net reduction of 260 spaces).

Table 13 summarizes the future parking adequacy calculations by user group in 5 year and 10 year timeframe.

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**Table 13: Future Parking Adequacy**

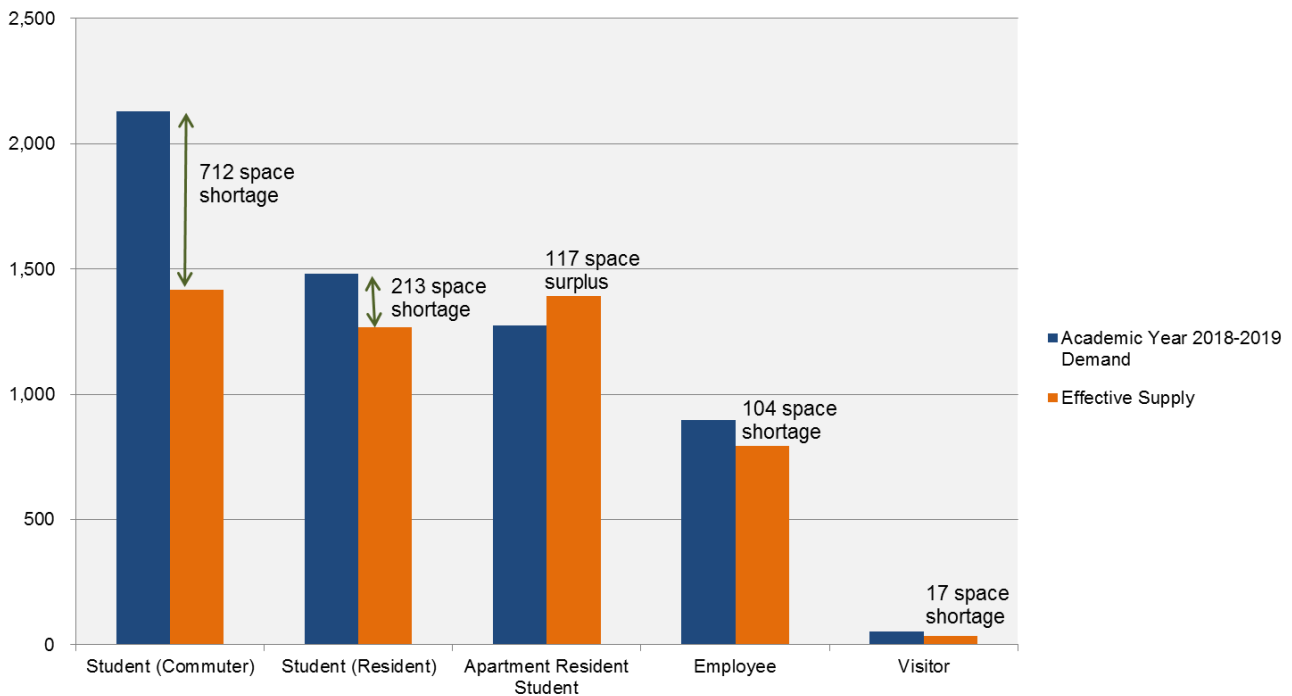
| User Group                 | Academic Year 2018-2019 Demand | Effective Supply | Adequacy     |
|----------------------------|--------------------------------|------------------|--------------|
| Student (Commuter)         | 2,131                          | 1,418            | (712)        |
| Student (Resident)         | 1,479                          | 1,266            | (213)        |
| Apartment Resident Student | 1,274                          | 1,392            | 117          |
| Employee                   | 898                            | 794              | (104)        |
| Visitor                    | 53                             | 36               | (17)         |
| <b>Total</b>               | <b>5,836</b>                   | <b>4,907</b>     | <b>(930)</b> |

| User Group                 | Academic Year 2023-2024 Demand | Effective Supply | Adequacy       |
|----------------------------|--------------------------------|------------------|----------------|
| Student (Commuter)         | 2,795                          | 1,418            | (1,376)        |
| Student (Resident)         | 2,025                          | 1,266            | (759)          |
| Apartment Resident Student | 1,745                          | 1,392            | (353)          |
| Employee                   | 980                            | 794              | (185)          |
| Visitor                    | 71                             | 36               | (35)           |
| <b>Total</b>               | <b>7,615</b>                   | <b>4,907</b>     | <b>(2,708)</b> |

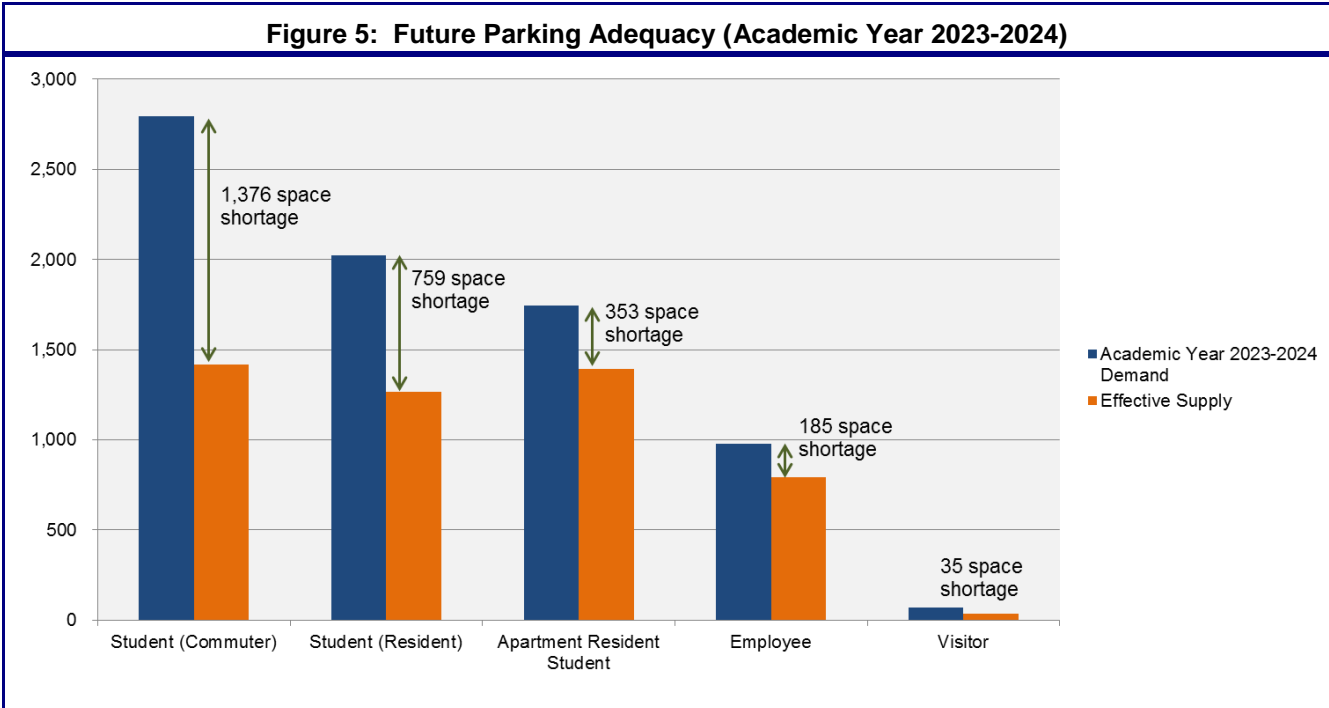
Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

The parking deficit is a result of demand growth of the student, employee and visitor headcounts as well as 598-space loss due to changes to the parking supply. Rowan’s campus may experience a shortage of 930 parking spaces in Academic Year 2018-2019 and the shortage of 2,708 spaces in Academic Year 2023-2024. Figure 4 and 5 depicts the parking demands and effective supply of each user group by Academic Year 2018-2019 as well as 2023-2024.

**Figure 4: Future Parking Adequacy (Academic Year 2018-2019)**



Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.



Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

According to the annual parking supply and demand projection, Rowan will experience a shortage of 255 parking spaces in Academic year 2015-2016 due to the removal of Lot M-1, X and a portion of Lot A as well as the population increase. Table 15 shows the estimated total demand, effective supply and adequacy of Rowan campus by academic year, and Figure 6 illustrates the timeframe when the campus experiences the parking shortage.

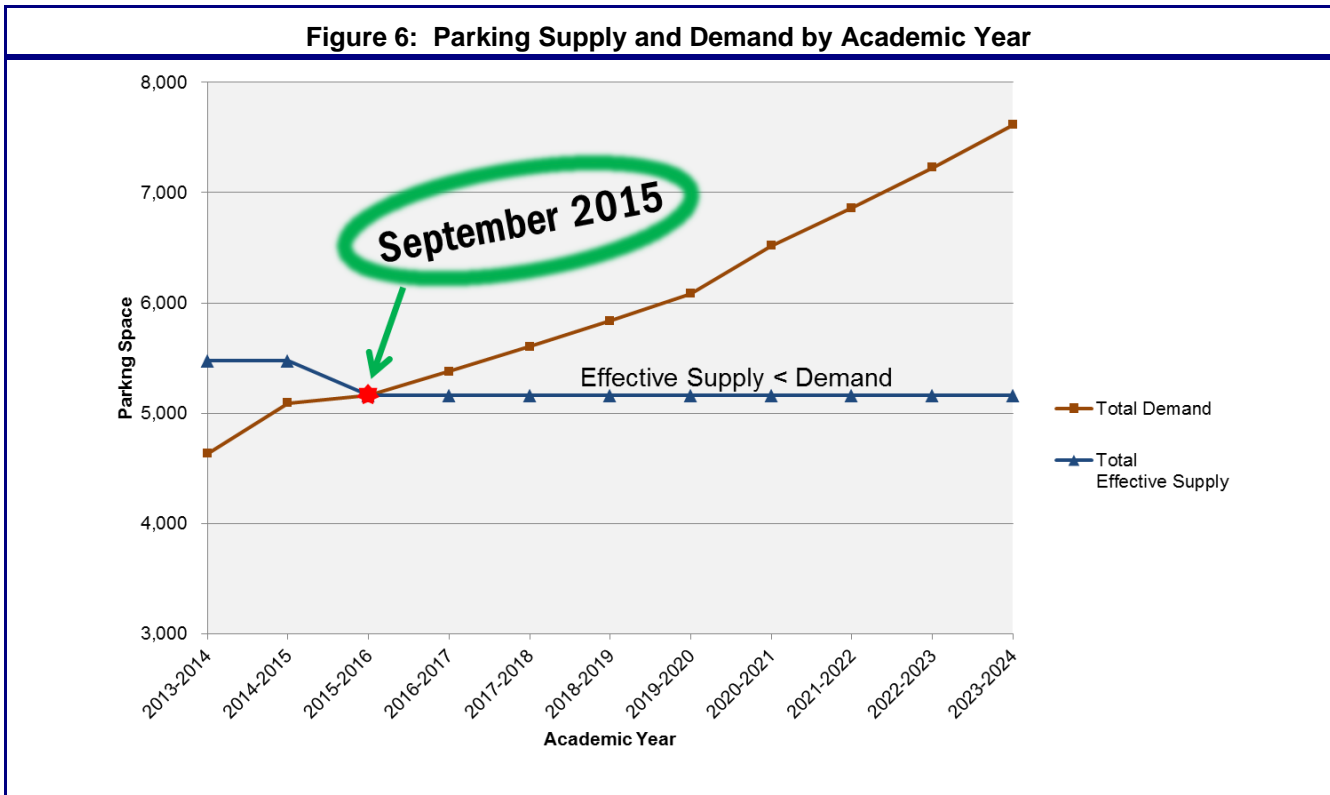
**Table 14: Estimated Future Parking Supply and Demand by Academic Year**

| Academic Year | Total Demand | Total Effective Supply | Adequacy* |
|---------------|--------------|------------------------|-----------|
| 2013-2014     | 4,630        | 5,477                  | 847       |
| 2014-2015     | 5,089        | 5,384                  | 294       |
| 2015-2016     | 5,162        | 4,907                  | (255)     |
| 2016-2017     | 5,377        | 4,907                  | (470)     |
| 2017-2018     | 5,601        | 4,907                  | (694)     |
| 2018-2019     | 5,836        | 4,907                  | (930)     |
| 2019-2020     | 6,082        | 4,907                  | (1,175)   |
| 2020-2021     | 6,516        | 4,907                  | (1,609)   |
| 2021-2022     | 6,862        | 4,907                  | (1,955)   |
| 2022-2023     | 7,228        | 4,907                  | (2,321)   |
| 2023-2024     | 7,615        | 4,907                  | (2,708)   |

\*95% effective supply factor was applied.

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

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Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

## Future Parking Recommendations

### Accommodate Immediate Parking Needs (September 2015)

In September 2015, Rowan will have 5,167 total parking spaces within the campus resulting from the displacement of Lots M-1, X and a portion of A, and including the recently added Lots O and O-1. On the other hand, Rowan will experience a projected parking demand of approximately 5,162 spaces. This allows only a 5 space buffer. TimHaahs generally recommends applying an effective supply factor of 95% to the total parking supply to ensure there is an adequate buffer of space for parking. However, it is important to note that in February 2014, Rowan was operating the majority of their parking lots at a 98% to 100% capacity. Understanding Rowan’s immediate parking needs and limited budget/time to build new parking in the upcoming Academic Year, we believe applying a 98% effective supply factor is appropriate for Rowan in the short term. Applying a 98% effective supply factor will result in a net shortage of 98 parking spaces which is summarized as follows:

- 5,064 Effective Total Parking Spaces (98% of 5,167 Total Parking Spaces)
- 5,162 Parking Demand
- **98 Space Shortage**

In order to meet the immediate parking needs in September 2015, the following changes to Rowan’s parking system are required:

- Rowan leases an additional 100 parking spaces from an adjacent property owner (such as from Rowan Blvd. Garage).
- Distribute parking user groups from existing lots to maximize parking facilities’ utilization up to 98% of total supply throughout all parking facilities. Appendix A shows the scenario of parking user group

relocation which is summarized as follows:

- o Previous Lot A users will be relocated to Lots F and O
- o Previous Lot F users will be relocated to Townhouse garage
- o Visitors will be relocated from Lot H to Lot O
- o Employee users exceeding effective supply of each employee lots will be relocated to Lots H, O-1, and R, as well as Townhouse and Rowan Blvd. Garage depending on the proximity from the parking facility to their destinations
- o Commuter student users exceeding effective supply of each commuter student lots will be relocated to Lot O, & Townhouse & Rowan Blvd. Garages
- o Lot F, R, O / O-1, & Townhouse & Rowan Blvd. Garages will open to multiple user groups
- o Once the parking demand of resident students decrease at Townhouse and Rowan Blvd. Garage, the commuter student and employee users from Lots A and O-1 may be relocated to the garages.

Table 15 describes an example of preliminary parking user distribution plan by facility for September 2015.

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**Table 15: Future Parking User Distribution by Facility (Example)**

| Future Parking Facility | Recommended Future User Group        | Total Supply | Projected Demand | Adequacy  | Occupancy    |
|-------------------------|--------------------------------------|--------------|------------------|-----------|--------------|
| <b>Surface Lot</b>      |                                      |              |                  |           |              |
| A                       | Student (C)                          | 88           | 86               | 2         | 98.0%        |
| A-1                     | Employee                             | 104          | 102              | 2         | 98.2%        |
| B                       | Student (R) & Student (C)            | 469          | 460              | 9         | 98.0%        |
| B-1                     | Employee                             | 100          | 98               | 2         | 97.5%        |
| C                       | Student (C)                          | 222          | 218              | 4         | 98.0%        |
| D                       | Student (C)                          | 449          | 440              | 0         | 98.0%        |
| D-1                     | Employee                             | 4            | 4                | 0         | 100.0%       |
| E                       | Employee                             | 85           | 83               | 0         | 98.2%        |
| F                       | Student (R) & Student (C)            | 326          | 319              | 7         | 97.8%        |
| G                       | Employee                             | 29           | 28               | 0         | 97.2%        |
| H                       | Employee                             | 83           | 81               | 2         | 97.5%        |
| J                       | Student (R) & Student (C)            | 176          | 172              | 0         | 98.0%        |
| M                       | Employee                             | 60           | 60               | 0         | 100.0%       |
| N                       | Employee                             | 8            | 8                | 0         | 100.0%       |
| P                       | Employee                             | 167          | 161              | 6         | 96.3%        |
| R                       | Employee & Student (C)               | 50           | 49               | 1         | 98.2%        |
| S                       | Employee                             | 20           | 20               | 0         | 99.0%        |
| T                       | Employee                             | 12           | 12               | 0         | 100.0%       |
| U                       | Employee                             | 34           | 34               | 0         | 100.0%       |
| W                       | Employee                             | 39           | 38               | 0         | 96.4%        |
| Y                       | Student (C)                          | 50           | 49               | 0         | 98.2%        |
| Z-1                     | Employee                             | 58           | 57               | 0         | 98.9%        |
| Robinson                | Employee                             | 20           | 20               | 0         | 99.0%        |
| Cassidy                 | Employee                             | 53           | 52               | 1         | 98.4%        |
| EPA                     | Student (R)                          | 260          | 255              | 0         | 98.0%        |
| Chestnut                | Student (R) & Visitor                | 102          | 100              | 0         | 98.5%        |
| O / O-1                 | Student (C)                          | 634          | 623              | 11        | 98.3%        |
| <b>Lot Total</b>        |                                      | <b>3,702</b> | <b>3,629</b>     | <b>48</b> |              |
| <b>Garage</b>           |                                      |              |                  |           |              |
| Townhouse               | Student (R) & Student (C)            | 565          | 554              | 11        | 98.1%        |
| Rowan Blvd.             | Student (R) & Student (C) & Employee | 1,000**      | 979              | 21        | 97.9%        |
| <b>Garage Total</b>     |                                      | <b>1,565</b> | <b>1,533</b>     | <b>32</b> |              |
| <b>Total</b>            |                                      | <b>5,267</b> | <b>5,162</b>     | <b>80</b> | <b>98.0%</b> |

\*98% effective supply factor was applied.

\*\*100 additional parking spaces noted as leased from Rowan Boulevard Garage.

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

## ***New Parking Development Options (September 2016 and Beyond)***

The recommendations noted previously will only support Rowan’s parking needs through the Spring 2016 semester. Beginning in September 2016, Rowan will begin to have a short fall of parking that cannot practically be solved on their commuter-based campus without some significant changes. Based on the projected growth of the University, there will be a short fall of parking that must be addressed. The following table summarizes the future parking adequacy by Academic Year:

| <b>Academic Year</b> | <b>Projected Future Parking Demand</b> | <b>Total Effective Supply</b> | <b>Future Parking Adequacy</b> |
|----------------------|--|-------------------------------|--------------------------------|
| 2015-2016            | 5,162                                  | 5,162                         | 0                              |
| 2016-2017            | 5,377                                  | 5,162                         | (215)                          |
| 2017-2018            | 5,601                                  | 5,162                         | (439)                          |
| 2018-2019            | 5,836                                  | 5,162                         | (674)                          |
| 2019-2020            | 6,082                                  | 5,162                         | (920)                          |
| 2020-2021            | 6,516                                  | 5,162                         | (1,354)                        |
| 2021-2022            | 6,862                                  | 5,162                         | (1,700)                        |
| 2022-2023            | 7,228                                  | 5,162                         | (2,066)                        |
| 2023-2024            | 7,615                                  | 5,162                         | (2,453)                        |

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

It is clear from Table 16 above that Rowan will consistently experience significant growth each Academic Year, on the order of 200–250 parking spaces per year for the next 5 years alone. There are two approaches to addressing the inadequacy of parking, which will begin in September 2016:

1. Reduce parking demand:
  - a. Limit / Restrict parking on campus for students/faculty
  - b. Implement Transit Demand Management (TDM) strategies:
    - i. Light rail station at campus
    - ii. Provide shuttle bus service
    - iii. Introduce bike & car share programs
2. Increase parking capacity:
  - a. Develop new surface parking lots
  - b. Develop new parking structure(s)
  - c. Lease parking from adjacent vacant lots/garages

For a commuter-based University, students and faculty must have a way to access the University. Limiting or restricting parking on campus may have an adverse effect on University growth and is not recommended. We understand a light rail station at campus has been previously discussed, but plans for this development will not be developed / constructed in time to satisfy Rowan’s parking needs within the next five years (or more).

Introduction of a shuttle bus service will help to reduce the parking demand on campus and is a viable solution to help reduce future parking demand as the University continues to grow in conjunction with bike and car share programs. However, introduction of a shuttle bus service and bike/car share programs will not reduce the parking demand enough to support the University’s planned growth.

Therefore, it will be necessary for the University to increase their parking capacity through the construction of new parking. Surface parking will provide a low cost and quick construction solution to immediate parking needs, however, there is limited space on-campus (within walking distance) for surface parking to be a viable solution on its own and would require use in conjunction with a shuttle bus service.

Alternatively, constructing a new parking structure(s) is achievable on existing parking lots within walking distance to campus and would therefore not require a shuttle bus service.

Leasing parking from nearby vacant sites may serve as a viable short-term solution, but is not recommended as a long-term parking solution due to the high expense.

In order to support Rowan’s future parking needs from September 2016 through September 2021, we have summarized the above assessment into three options for Rowan’s consideration, to be used in conjunction with bike and car share program, as follows:

**Option #1:** Build new 1000+/- space surface parking lot and introduce shuttle bus service.

- Pros:
  - Low initial cost as compared to Option #2
  - Short construction schedule (about 12 months procure/design/construct)
- Cons:
  - Higher long-term cost as compared to Option #2
  - Sprawl – lack of preservation of land for future development

**Option #2:** Build new 1500+/- space parking structure (net gain of about 1200 spaces).

- Pros:
  - Lower long-term cost as compared to Option #1
  - Preservation of land for future development
- Cons:
  - Higher initial cost as compared to Option #1
  - Longer construction schedule (about 18 months procure/design/construct)
  - Loss of parking during construction duration

**Option #3:** Hybrid Option – Build smaller surface lot (500-space) and plan for construction of new 1000+/- space parking structure (net gain of about 700 spaces).

- Pros:
  - Lowest cost of all options (initial & long-term)
- Cons:
  - Walkability to/from surface parking lot location to campus

Detailed recommendations in terms of parking facility development options are described in the following section.

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## New Parking Development Options

To mitigate the future parking deficit, Rowan may need additional parking facilities within or adjacent to the campus. Based on the discussion with Rowan representatives, two scenarios are considered as follows:

- Open a new surface parking lot on Ellis Street
- Open a new parking garage within the Glassboro campus

### **Scenario 1: New Ellis Street Lot**

The site is located on the south of the Rowan campus as illustrated in the Figure 7.

**Figure 7: Potential Site of Ellis Street Lot**



Source: Timothy Haahs & Associates, Inc. 2015.

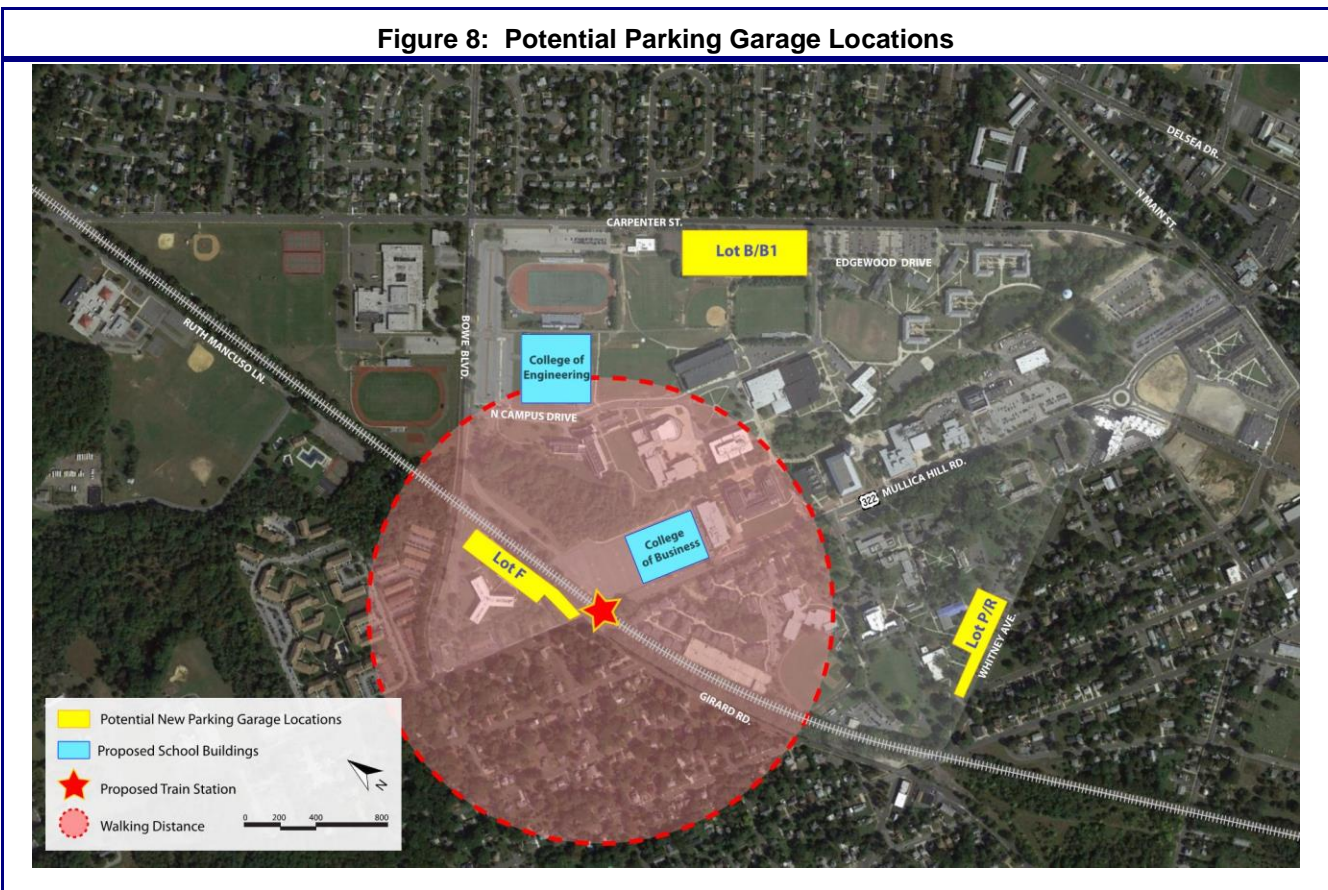
TimHaahs prepared a concept layout with approximately 950 to 1,000 parking spaces for the Ellis Street Lot site as the concept layout in Appendix D depicts. If this scenario applies, a portion of commuter student and resident student parkers may be relocated to the Ellis Street Lot. Furthermore, a shuttle service which connects from the lot to the major destinations on the campus will be required. Table 17 describes the pros and cons of a new Ellis Street surface parking lot. Please see Appendix D for more detailed information and potential plan form parking lot at this site.

| Table 17: New Ellis Street Lot - Pros and Cons   |  |
|--|--|
| Pros   | Cons   |
| <ul style="list-style-type: none"> <li>▪ Close proximity to the campus</li> <li>▪ No wet land approval</li> <li>▪ Phase I environmental completed (Rowan University to confirm)</li> </ul> | <ul style="list-style-type: none"> <li>▪ No existing permitted access to the site</li> <li>▪ No existing sidewalks or curbs</li> <li>▪ Improvement of access to the lot required</li> <li>▪ Utility relocation required</li> <li>▪ No existing stormwater management</li> <li>▪ Significant amount of tree relocation</li> </ul> |

Source: Timothy Haahs & Associates, Inc. 2015.

## Scenario 2: New Parking Garage

Based on the discussions with Rowan representatives, three locations, Lots F, B / B-1 and P / R were chosen for the new parking garage development. Figure 8 illustrates the locations of potential parking garage development.



Source: Timothy Haahs & Associates, Inc. 2015.

Based on the initial concept plans prepared by TimHaahs, Rowan may obtain approximately 1,250 parking spaces from the Option 1 for Lot F site, 1,200 spaces from the Option 2 for Lot F site, 1,280 spaces from Lot B / B-1 site, and 570 spaces from Lot P / R site. The concept layout drawings are attached in Appendix F. In addition, TimHaahs has reviewed the pros and cons of each location from geographical, traffic and architectural stand points as summarized on Table 18. Please see Appendix E more detailed information and potential parking garage plan for these sites. .

**Table 18: New Parking Garage Location - Pros and Cons**

| Location         | Pros  | Cons   |
|------------------|---|--|
| Lot F (Option 1) | <ul style="list-style-type: none"> <li>▪ Good Queuing of Vehicles</li> <li>▪ Potential revenue generation from future light rail users</li> <li>▪ Minor environmental investigation required</li> <li>▪ No additional stormwater management required</li> </ul>   | <ul style="list-style-type: none"> <li>▪ Flood issue</li> <li>▪ Major access permit will be required by NJDOT</li> <li>▪ Surface parking spaces to the south will be difficult to enforce</li> <li>▪ Conflicts with existing utilities including existing telecommunication line and stormwater sewer pipe</li> <li>▪ Limit to Firefighting Access</li> <li>▪ Approvals required by Borough, County and NJDCA</li> <li>▪ A geotechnical investigation required</li> <li>▪ PARCS required to provide efficient access to all user groups</li> </ul>           |
| Lot F (Option 2) | <ul style="list-style-type: none"> <li>▪ New Gateway provision</li> <li>▪ Less vehicular traffic through campus</li> <li>▪ Deferred maintenance cost due to Triad building demolition</li> <li>▪ No conflicts with existing utilities</li> <li>▪ Install user-friendly single helix structure</li> </ul>  | <ul style="list-style-type: none"> <li>▪ Adjacent properties should be purchased</li> <li>▪ Flood issue</li> <li>▪ Additional stormwater management required</li> <li>▪ Improvement to the existing access and intersections at Rt.322, Mullica Hill Road and Bowe Blvd.</li> <li>▪ Surface parking spaces will be difficult to enforce</li> <li>▪ Environmental investigation required</li> <li>▪ No designation for ADA path</li> <li>▪ Approvals required by Borough, County, NJDOT and NJDCA</li> <li>▪ A geotechnical investigation required</li> </ul> |
| Lot B / B-1      | <ul style="list-style-type: none"> <li>▪ Less vehicular traffic through campus</li> <li>▪ No traffic disturbance to local roadways</li> <li>▪ Proximity to the major destinations on campus</li> <li>▪ Install user-friendly single helix structure</li> <li>▪ Minor environmental investigations required</li> <li>▪ No additional stormwater management required</li> </ul>                     | <ul style="list-style-type: none"> <li>▪ Improvements to the existing access and intersections at North Campus Drive, Carpenter Street and Main Street</li> <li>▪ Impact to temporary parking</li> <li>▪ Adjacency to residential community</li> <li>▪ Conflicts with existing utilities including existing sewer line and stormwater pipe.</li> <li>▪ Approvals required by Borough, County and NJDCA</li> <li>▪ A geotechnical investigation required</li> <li>▪ PARCS required to provide efficient access to all user groups</li> </ul>                  |
| Lot P / R        | <ul style="list-style-type: none"> <li>▪ Less disruption to parking on campus during construction</li> <li>▪ Low impact to major roadways including Rt.322</li> <li>▪ Not along State or County highways</li> <li>▪ Proximity to campus</li> <li>▪ Cost effective parking option</li> <li>▪ Minor environmental investigations required</li> <li>▪ No additional stormwater management</li> </ul> | <ul style="list-style-type: none"> <li>▪ Improvement to the existing access and intersections at Whitney Avenue, Rt.322 and Girard Road</li> <li>▪ Surface parking spaces to the north will disrupt traffic flow</li> <li>▪ Low parking space count</li> <li>▪ Adjacency to residential community</li> <li>▪ Conflicts with existing utilities including water main and sanitary sewer pipes</li> <li>▪ A geotechnical investigation required</li> <li>▪ PARCS required to provide efficient access to all user groups</li> </ul>                            |

Source: Timothy Haahs & Associates, Inc. 2015.

## Conclusion and Recommendations

Based on the projected headcount growth, it is anticipated that Rowan will experience increased parking demand resulting in an estimated parking space deficit of over 2,700 spaces by year 2024. This projection assumes the loss of Lot A, M-1 and X, totaling 1,233 spaces and the addition of 634 spaces at the proposed new surface lot. To meet the future parking demand, Rowan should evaluate the following recommendations and strategies.

- Consider the parking user redistribution plan to maximize the existing parking facilities and satisfy immediate parking demand in Fall 2015 semester.
- Build one or more on-campus parking facilities for the increased demand in September 2016 and beyond. New surface parking lot and/or parking garages may meet the parking requirements resulting in the school population growth. One site along Ellis Street for a surface parking lot and three sites for a potential new parking facility, Lots F, B / B-1, and P / R, were evaluated for feasibility.
- Employ operational strategies to monitor occupancy levels throughout campus parking facilities to ensure better utilization of all parking facilities. License Plate Recognition technology will allow the parking department to spend more time focusing on ensuring utilization is optimized. And adjusting the parking rate structure for under-utilized facilities including the Townhouse Garage, and the Rowan Boulevard Garage will help distribute demand and increase the utilization of parking within those facilities.
- We also understand Rowan is in the early planning stage of a new commuter light rail system anticipated to be operational in the future which may reduce the overall campus parking demand. As the planning for the transit system moves forward, we recommend the findings in this report be re-evaluated.

## Appendix

### ***A. List of Parking Study Assumptions***

The following assumptions were made in the preparation of this report:

1. Total student and non-commuter student headcount (resident) was provided by Rowan. However, commuter student headcount was not provided. Thus, the total student headcount minus the non-commuter student headcount was assumed as the commuter student.
2. Apartment resident student is approximately 40% and non-apartment resident student is 60% of total resident student headcounts of Rowan Glassboro Campus.
3. The employee headcounts of Academic Year 2014-2015 is 3,356, according to Rowan's website (<http://www.rowan.edu/fastfacts/>). The headcount in the previous year (2013-2014) was presumed based on the 3% growth rate assumption.
4. Total population growth projection until 2019 was provided by Rowan. The growth projection after 2019 was assumed based on the average growth rate between 2013 and 2019, 6% annually.
5. Since the population growth rate of employee and visitor groups was not provided, 30% student population growth rate was applied to the employee headcount and a 100% student growth rate was applied to visitor headcount.



## B. Parking Demand and Occupancy Survey from Rowan University

**Table 19: Existing Parking Demand Counts**

| Location            | Supply       | Feb. 10, 2014 (Mon) |              |              |              |              | Feb. 11, 2014 (Tue) |              |              |              |              | Feb. 12, 2014 (Wed) |              |              |              |              | Feb. 6, 2014 (Thu) |              |              |              |              |              |              |              |              |            |     |
|---------------------|--------------|---------------------|--------------|--------------|--------------|--------------|---------------------|--------------|--------------|--------------|--------------|---------------------|--------------|--------------|--------------|--------------|--------------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|--------------|------------|-----|
|                     |              | 7:00AM              | 8:30AM       | 11:30AM      | 1:30PM       | 3:30PM       | 6:30PM              | 7:00AM       | 8:30AM       | 11:30AM      | 1:30PM       | 3:30PM              | 6:30PM       | 7:00AM       | 8:30AM       | 11:30AM      | 1:30PM             | 3:30PM       | 6:30PM       | 7:00AM       | 8:30AM       | 11:30AM      | 1:30PM       | 3:30PM       | 6:30PM       |            |     |
| Lot A               | 579          | 31                  | 529          | 559          | 576          | 529          | 502                 | 204          | 579          | 579          | 579          | 559                 | 507          | 579          | 579          | 579          | 576                | 579          | 579          | 579          | 496          | 88           | 546          | 579          | 579          | 556        | 485 |
| Lot A-1             | 103          | 21                  | 103          | 103          | 103          | 103          | 80                  | 15           | 103          | 103          | 103          | 103                 | 88           | 88           | 26           | 103          | 103                | 103          | 103          | 103          | 7            | 88           | 103          | 103          | 103          | 103        | 60  |
| Lot B               | 469          | 105                 | 359          | 320          | 345          | 324          | 321                 | 171          | 279          | 362          | 326          | 339                 | 345          | 345          | 140          | 306          | 321                | 370          | 288          | 322          | 200          | 228          | 345          | 345          | 258          | 289        |     |
| Lot B-1             | 100          | 84                  | 90           | 84           | 90           | 85           | 62                  | 88           | 87           | 87           | 88           | 100                 | 98           | 85           | 98           | 99           | 96                 | 97           | 93           | 93           | 34           | 80           | 91           | 88           | 84           | 71         |     |
| Lot C               | 222          | 38                  | 83           | 111          | 145          | 99           | 87                  | 32           | 63           | 180          | 148          | 83                  | 84           | 24           | 99           | 203          | 162                | 131          | 83           | 22           | 48           | 180          | 200          | 151          | 163          |            |     |
| Lot D               | 449          | 30                  | 120          | 310          | 345          | 302          | 324                 | 20           | 266          | 429          | 382          | 381                 | 304          | 29           | 286          | 441          | 431                | 309          | 201          | 62           | 114          | 420          | 438          | 358          | 200          |            |     |
| Lot D-1             | 4            | 3                   | 4            | 4            | 4            | 4            | 4                   | 4            | 4            | 4            | 4            | 4                   | 4            | 4            | 4            | 4            | 4                  | 4            | 4            | 4            | 4            | 4            | 4            | 4            | 4            |            |     |
| Lot E               | 85           | 85                  | 85           | 85           | 85           | 68           | (5)                 | 85           | 85           | 85           | 85           | 85                  | 70           | 85           | 85           | 85           | 85                 | 85           | 85           | 64           | 75           | 85           | 85           | 85           | 85           | 51         |     |
| Lot F               | 326          | 257                 | 259          | 264          | 249          | 236          | 231                 | 263          | 270          | 251          | 233          | 246                 | 261          | 256          | 253          | 241          | 246                | 234          | 272          | 276          | 264          | 264          | 264          | 264          | 223          | 205        |     |
| Lot G               | 29           | 8                   | 29           | 29           | 29           | 10           | 6                   | 29           | 29           | 29           | 29           | 29                  | 21           | 5            | 29           | 29           | 29                 | 29           | 15           | 10           | 29           | 29           | 29           | 29           | 29           | 11         |     |
| Lot H               | 83           | 20                  | 83           | 83           | 83           | 70           | 67                  | 83           | 83           | 83           | 83           | 83                  | 70           | 9            | 83           | 83           | 83                 | 83           | 27           | 67           | 83           | 83           | 83           | 83           | 58           | 63         |     |
| Lot I               | 176          | 176                 | 155          | 171          | 173          | 153          | 147                 | 105          | 145          | 176          | 176          | 146                 | 134          | 154          | 176          | 176          | 176                | 171          | 157          | 120          | 155          | 176          | 176          | 176          | 176          | 143        |     |
| Lot M               | 60           | 51                  | 60           | 60           | 60           | 46           | 60                  | 60           | 60           | 60           | 60           | 60                  | 46           | 60           | 60           | 60           | 60                 | 60           | 60           | 60           | 60           | 60           | 60           | 60           | 60           | 46         |     |
| Lot M-1             | 242          | 137                 | 242          | 242          | 242          | 233          | 227                 | 113          | 242          | 242          | 242          | 242                 | 242          | 85           | 242          | 242          | 242                | 193          | 192          | 61           | 209          | 242          | 242          | 242          | 242          | 130        |     |
| Lot N               | 8            | 8                   | 8            | 8            | 8            | 8            | 8                   | 8            | 8            | 8            | 8            | 8                   | 8            | 8            | 8            | 8            | 8                  | 8            | 8            | 8            | 8            | 8            | 8            | 8            | 8            | 8          |     |
| Lot P               | 167          | 46                  | 94           | 167          | 166          | 167          | 103                 | 3            | 156          | 167          | 167          | 167                 | 128          | 8            | 112          | 167          | 167                | 147          | 17           | 13           | 115          | 167          | 167          | 136          | 82           |            |     |
| Lot R               | 50           | 1                   | 40           | 50           | 50           | 50           | 50                  | 1            | 50           | 50           | 50           | 50                  | 33           | (47)         | 50           | 50           | 50                 | 50           | 38           | 50           | 50           | 50           | 50           | 50           | 50           | 47         |     |
| Lot S               | 20           | 16                  | 20           | 20           | 20           | 4            | 9                   | 20           | 20           | 20           | 20           | 20                  | 6            | -            | 20           | 20           | 20                 | 20           | 14           | 20           | 20           | 20           | 20           | 20           | 20           | 6          |     |
| Lot T               | 12           | 11                  | 12           | 12           | 12           | 12           | 12                  | 12           | 12           | 12           | 12           | 5                   | 12           | 12           | 12           | 12           | 12                 | 12           | 12           | 12           | 12           | 12           | 12           | 12           | 12           | 12         |     |
| Lot U               | 34           | 34                  | 34           | 34           | 34           | 27           | 32                  | 34           | 34           | 34           | 34           | 34                  | 34           | 34           | 34           | 34           | 34                 | 34           | 34           | 34           | 34           | 34           | 34           | 34           | 34           | 34         |     |
| Lot V               | 39           | 37                  | 39           | 39           | 39           | 39           | 32                  | 39           | 39           | 39           | 39           | 39                  | 39           | 39           | 39           | 39           | 39                 | 39           | 31           | 39           | 39           | 39           | 39           | 39           | 39           | 39         |     |
| Lot W               | 500          | 27                  | 21           | 25           | 23           | 17           | 10                  | 7            | 19           | 23           | 27           | 25                  | 20           | 11           | 13           | 21           | 24                 | 13           | 10           | 15           | 15           | 20           | 25           | 20           | 25           | 25         |     |
| Lot X               | 500          | 27                  | 21           | 25           | 23           | 17           | 10                  | 7            | 19           | 23           | 27           | 25                  | 20           | 11           | 13           | 21           | 24                 | 13           | 10           | 15           | 15           | 20           | 25           | 20           | 25           | 25         |     |
| Lot Y               | 50           | 1                   | 30           | 50           | 50           | 40           | 0                   | 50           | 50           | 50           | 50           | 50                  | 50           | 50           | 47           | 50           | 50                 | 50           | 50           | 13           | 50           | 50           | 50           | 50           | 50           | 47         |     |
| Lot Z-1             | 58           | 9                   | 58           | 58           | 58           | 24           | 3                   | 58           | 58           | 58           | 58           | 47                  | 31           | 1            | 33           | 58           | 58                 | 58           | 28           | 8            | 58           | 58           | 58           | 58           | 58           | 14         |     |
| Robinson            | 20           | 20                  | 20           | 20           | 20           | 20           | 20                  | 11           | 20           | 20           | 20           | 20                  | 18           | 6            | 20           | 20           | 20                 | 20           | 20           | 13           | 20           | 20           | 20           | 20           | 20           | 20         |     |
| Cassidy             | 53           | 53                  | 53           | 53           | 53           | 53           | 53                  | 53           | 53           | 53           | 53           | 53                  | 53           | 53           | 53           | 53           | 53                 | 53           | 53           | 53           | 53           | 53           | 53           | 53           | 53           | 53         |     |
| EPA                 | 260          | 240                 | 243          | 250          | 243          | 241          | 250                 | 241          | 250          | 247          | 260          | 249                 | 260          | 249          | 260          | 249          | 260                | 249          | 260          | 243          | 246          | 236          | 238          | 260          | 217          | 199        |     |
| Chesnut             | 102          | 91                  | 93           | 102          | 92           | 86           | 102                 | 102          | 102          | 102          | 102          | 102                 | 77           | 102          | 102          | 102          | 102                | 102          | 102          | 102          | 102          | 102          | 102          | 102          | 102          | 102        |     |
| <b>Lot Total</b>    | <b>4,300</b> | <b>1,495</b>        | <b>2,923</b> | <b>3,313</b> | <b>3,393</b> | <b>3,178</b> | <b>2,935</b>        | <b>1,642</b> | <b>3,150</b> | <b>3,605</b> | <b>3,458</b> | <b>3,297</b>        | <b>2,993</b> | <b>1,496</b> | <b>3,196</b> | <b>3,572</b> | <b>3,542</b>       | <b>3,244</b> | <b>2,754</b> | <b>1,581</b> | <b>2,786</b> | <b>3,535</b> | <b>3,588</b> | <b>3,208</b> | <b>2,609</b> |            |     |
| Garage              | 565          | 288                 | 272          | 280          | 300          | 248          | 278                 | 305          | 293          | 321          | 288          | 276                 | 266          | 266          | 302          | 296          | 288                | 278          | 272          | 330          | 332          | 298          | 298          | 298          | 259          | 254        |     |
| Townhouse           | 900          | 681                 | 689          | 689          | 703          | 662          | 635                 | 694          | 701          | 704          | 690          | 677                 | 663          | 677          | 677          | 667          | 659                | 640          | 642          | 639          | 673          | 673          | 659          | 659          | 658          | 646        |     |
| <b>Garage Total</b> | <b>1,465</b> | <b>969</b>          | <b>961</b>   | <b>969</b>   | <b>963</b>   | <b>910</b>   | <b>913</b>          | <b>999</b>   | <b>994</b>   | <b>1,025</b> | <b>978</b>   | <b>953</b>          | <b>929</b>   | <b>979</b>   | <b>979</b>   | <b>957</b>   | <b>954</b>         | <b>928</b>   | <b>920</b>   | <b>911</b>   | <b>1,003</b> | <b>1,005</b> | <b>957</b>   | <b>957</b>   | <b>917</b>   | <b>900</b> |     |
| <b>Total</b>        | <b>5,765</b> | <b>2,464</b>        | <b>3,884</b> | <b>4,282</b> | <b>4,356</b> | <b>4,088</b> | <b>3,948</b>        | <b>2,641</b> | <b>4,144</b> | <b>4,630</b> | <b>4,436</b> | <b>4,250</b>        | <b>3,922</b> | <b>2,475</b> | <b>4,153</b> | <b>4,526</b> | <b>4,470</b>       | <b>4,164</b> | <b>3,665</b> | <b>2,584</b> | <b>3,791</b> | <b>4,492</b> | <b>4,546</b> | <b>4,125</b> | <b>3,900</b> |            |     |

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

**Table 20: Existing Parking Occupancy**

| Location            | Supply       | Feb. 10, 2014 (Mon) |            |            |            |            | Feb. 11, 2014 (Tue) |            |            |            |            | Feb. 12, 2014 (Wed) |            |            |            |            | Feb. 6, 2014 (Thu) |            |            |            |            |            |
|---------------------|--------------|---------------------|------------|------------|------------|------------|---------------------|------------|------------|------------|------------|---------------------|------------|------------|------------|------------|--------------------|------------|------------|------------|------------|------------|
|                     |              | 7:00AM              | 8:30AM     | 11:30AM    | 3:30PM     | 6:30PM     | 7:00AM              | 8:30AM     | 11:30AM    | 3:30PM     | 6:30PM     | 7:00AM              | 8:30AM     | 11:30AM    | 3:30PM     | 6:30PM     | 7:00AM             | 8:30AM     | 11:30AM    | 3:30PM     | 6:30PM     |            |
| Lot A               | 579          | 5%                  | 91%        | 97%        | 99%        | 87%        | 35%                 | 100%       | 100%       | 100%       | 100%       | 88%                 | 25%        | 100%       | 100%       | 100%       | 82%                | 15%        | 94%        | 100%       | 100%       | 84%        |
| Lot A-1             | 103          | 20%                 | 100%       | 100%       | 100%       | 78%        | 15%                 | 100%       | 100%       | 100%       | 85%        | 25%                 | 100%       | 100%       | 100%       | 100%       | 86%                | 7%         | 86%        | 100%       | 100%       | 58%        |
| Lot B               | 469          | 22%                 | 77%        | 68%        | 74%        | 69%        | 36%                 | 59%        | 81%        | 70%        | 72%        | 74%                 | 30%        | 65%        | 68%        | 79%        | 61%                | 49%        | 43%        | 74%        | 74%        | 62%        |
| Lot B-1             | 100          | 84%                 | 90%        | 84%        | 90%        | 85%        | 62%                 | 88%        | 87%        | 88%        | 100%       | 98%                 | 85%        | 98%        | 99%        | 96%        | 93%                | 34%        | 80%        | 80%        | 88%        | 71%        |
| Lot C               | 222          | 17%                 | 37%        | 50%        | 65%        | 39%        | 14%                 | 28%        | 81%        | 37%        | 38%        | 38%                 | 11%        | 45%        | 91%        | 73%        | 59%                | 10%        | 22%        | 81%        | 90%        | 68%        |
| Lot D               | 449          | 7%                  | 27%        | 69%        | 77%        | 67%        | 4%                  | 59%        | 96%        | 85%        | 85%        | 68%                 | 6%         | 64%        | 96%        | 96%        | 69%                | 14%        | 25%        | 94%        | 96%        | 45%        |
| Lot D-1             | 4            | 75%                 | 100%       | 100%       | 100%       | 100%       | 100%                | 100%       | 100%       | 100%       | 100%       | 100%                | 50%        | 100%       | 100%       | 100%       | 100%               | 100%       | 0%         | 100%       | 100%       | 100%       |
| Lot E               | 85           | 9%                  | 100%       | 100%       | 100%       | 80%        | 4%                  | 100%       | 100%       | 100%       | 82%        | 0%                  | 0%         | 100%       | 100%       | 100%       | 75%                | 88%        | 100%       | 100%       | 100%       | 60%        |
| Lot F               | 326          | 79%                 | 79%        | 81%        | 76%        | 71%        | 81%                 | 79%        | 83%        | 77%        | 71%        | 75%                 | 80%        | 79%        | 78%        | 74%        | 75%                | 83%        | 85%        | 81%        | 81%        | 68%        |
| Lot G               | 29           | 28%                 | 100%       | 100%       | 100%       | 100%       | 21%                 | 100%       | 100%       | 100%       | 100%       | 72%                 | 17%        | 100%       | 100%       | 100%       | 52%                | 34%        | 100%       | 100%       | 100%       | 38%        |
| Lot H               | 83           | 24%                 | 100%       | 100%       | 100%       | 84%        | 81%                 | 100%       | 100%       | 100%       | 84%        | 11%                 | 100%       | 100%       | 100%       | 100%       | 33%                | 81%        | 100%       | 100%       | 100%       | 76%        |
| Lot I               | 176          | 61%                 | 88%        | 97%        | 98%        | 87%        | 60%                 | 82%        | 100%       | 100%       | 83%        | 88%                 | 8%         | 100%       | 100%       | 100%       | 89%                | 68%        | 88%        | 100%       | 100%       | 81%        |
| Lot M               | 60           | 85%                 | 100%       | 100%       | 100%       | 77%        | 100%                | 100%       | 100%       | 100%       | 100%       | 77%                 | 100%       | 100%       | 100%       | 100%       | 100%               | 62%        | 100%       | 100%       | 100%       | 100%       |
| Lot M-1             | 242          | 57%                 | 100%       | 100%       | 100%       | 94%        | 47%                 | 100%       | 100%       | 100%       | 100%       | 100%                | 35%        | 100%       | 100%       | 100%       | 80%                | 25%        | 86%        | 100%       | 100%       | 54%        |
| Lot N               | 8            | 100%                | 100%       | 100%       | 100%       | 100%       | 100%                | 100%       | 100%       | 100%       | 100%       | 100%                | 100%       | 100%       | 100%       | 100%       | 100%               | 100%       | 100%       | 100%       | 100%       | 100%       |
| Lot P               | 167          | 28%                 | 56%        | 100%       | 100%       | 62%        | 2%                  | 95%        | 100%       | 100%       | 100%       | 100%                | 5%         | 67%        | 100%       | 100%       | 88%                | 8%         | 69%        | 100%       | 100%       | 49%        |
| Lot R               | 50           | 2%                  | 80%        | 100%       | 100%       | 100%       | 2%                  | 100%       | 100%       | 100%       | 66%        | 94%                 | 100%       | 100%       | 100%       | 100%       | 94%                | 0%         | 76%        | 100%       | 100%       | 100%       |
| Lot S               | 20           | 80%                 | 100%       | 100%       | 100%       | 20%        | 45%                 | 100%       | 100%       | 100%       | 30%        | 0%                  | 100%       | 100%       | 100%       | 100%       | 50%                | 70%        | 100%       | 100%       | 100%       | 30%        |
| Lot T               | 12           | 92%                 | 100%       | 100%       | 100%       | 100%       | 100%                | 100%       | 100%       | 100%       | 42%        | 100%                | 100%       | 100%       | 100%       | 100%       | 100%               | 100%       | 100%       | 100%       | 100%       | 100%       |
| Lot U               | 34           | 100%                | 100%       | 100%       | 100%       | 79%        | 94%                 | 100%       | 100%       | 100%       | 100%       | 100%                | 100%       | 100%       | 100%       | 100%       | 100%               | 100%       | 100%       | 100%       | 100%       | 100%       |
| Lot W               | 39           | 95%                 | 100%       | 100%       | 100%       | 100%       | 82%                 | 100%       | 100%       | 100%       | 100%       | 100%                | 100%       | 100%       | 100%       | 100%       | 100%               | 79%        | 100%       | 100%       | 100%       | 100%       |
| Lot X               | 500          | 5%                  | 4%         | 5%         | 5%         | 2%         | 1%                  | 4%         | 5%         | 5%         | 4%         | 4%                  | 2%         | 3%         | 4%         | 5%         | 3%                 | 2%         | 3%         | 5%         | 4%         | 5%         |
| Lot Y               | 50           | 2%                  | 60%        | 100%       | 100%       | 80%        | 0%                  | 100%       | 100%       | 100%       | 100%       | 100%                | 2%         | 94%        | 100%       | 100%       | 100%               | 26%        | 100%       | 100%       | 100%       | 94%        |
| Lot Z-1             | 58           | 16%                 | 26%        | 100%       | 100%       | 41%        | 5%                  | 100%       | 100%       | 100%       | 81%        | 53%                 | 2%         | 57%        | 100%       | 97%        | 100%               | 48%        | 14%        | 100%       | 98%        | 24%        |
| Robinson            | 20           | 100%                | 100%       | 100%       | 100%       | 100%       | 5%                  | 100%       | 100%       | 100%       | 90%        | 30%                 | 100%       | 100%       | 100%       | 100%       | 65%                | 65%        | 100%       | 100%       | 100%       | 100%       |
| Cassidy             | 53           | 100%                | 100%       | 100%       | 100%       | 100%       | 100%                | 100%       | 100%       | 100%       | 100%       | 100%                | 100%       | 100%       | 100%       | 100%       | 100%               | 100%       | 100%       | 100%       | 100%       | 100%       |
| EPA                 | 260          | 92%                 | 93%        | 96%        | 93%        | 93%        | 96%                 | 94%        | 100%       | 100%       | 88%        | 87%                 | 96%        | 95%        | 100%       | 96%        | 93%                | 95%        | 91%        | 92%        | 100%       | 83%        |
| Chestnut            | 102          | 89%                 | 91%        | 100%       | 100%       | 100%       | 100%                | 100%       | 100%       | 100%       | 100%       | 75%                 | 100%       | 100%       | 100%       | 100%       | 100%               | 100%       | 100%       | 100%       | 100%       | 100%       |
| <b>Lot Total</b>    | <b>4,300</b> | <b>35%</b>          | <b>68%</b> | <b>77%</b> | <b>79%</b> | <b>68%</b> | <b>38%</b>          | <b>79%</b> | <b>84%</b> | <b>80%</b> | <b>77%</b> | <b>70%</b>          | <b>35%</b> | <b>74%</b> | <b>83%</b> | <b>82%</b> | <b>75%</b>         | <b>37%</b> | <b>65%</b> | <b>82%</b> | <b>89%</b> | <b>61%</b> |
| Garage              |              |                     |            |            |            |            |                     |            |            |            |            |                     |            |            |            |            |                    |            |            |            |            |            |
| Townhouse           | 565          | 51%                 | 48%        | 50%        | 46%        | 44%        | 54%                 | 52%        | 51%        | 52%        | 49%        | 47%                 | 53%        | 51%        | 52%        | 51%        | 49%                | 58%        | 59%        | 53%        | 53%        | 45%        |
| Rowan Blvd.         | 900          | 76%                 | 77%        | 77%        | 78%        | 71%        | 77%                 | 78%        | 78%        | 78%        | 75%        | 74%                 | 75%        | 74%        | 73%        | 71%        | 71%                | 75%        | 75%        | 73%        | 73%        | 72%        |
| <b>Garage Total</b> | <b>1,465</b> | <b>66%</b>          | <b>66%</b> | <b>66%</b> | <b>66%</b> | <b>62%</b> | <b>68%</b>          | <b>68%</b> | <b>70%</b> | <b>67%</b> | <b>65%</b> | <b>63%</b>          | <b>67%</b> | <b>65%</b> | <b>63%</b> | <b>62%</b> | <b>63%</b>         | <b>68%</b> | <b>69%</b> | <b>65%</b> | <b>65%</b> | <b>61%</b> |
| <b>Total</b>        | <b>5,765</b> | <b>43%</b>          | <b>67%</b> | <b>74%</b> | <b>76%</b> | <b>67%</b> | <b>46%</b>          | <b>72%</b> | <b>80%</b> | <b>77%</b> | <b>74%</b> | <b>68%</b>          | <b>43%</b> | <b>72%</b> | <b>79%</b> | <b>78%</b> | <b>72%</b>         | <b>48%</b> | <b>66%</b> | <b>78%</b> | <b>79%</b> | <b>61%</b> |

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

### C. Projected Headcount of Rowan University

**Table 21: Projected Headcount by Academic Year**

| Academic Year | Total Student Enrollment |     | Commuter Student | Resident Student | Apartment Resident Student | Employee |    | Visitor |     |
|---------------|--------------------------|-----|------------------|------------------|----------------------------|----------|----|---------|-----|
| 2013-2014     | 13,349                   |     | 9,509            | 2,304            | 1,536                      | 3,252    |    | 40      |     |
| 2014-2015     | 14,778                   | 11% | 10,466           | 2,587            | 1,725                      | 3,356    | 3% | 44      | 11% |
| 2015-2016     | 15,177                   | 3%  | 10,865           | 2,587            | 1,725                      | 3,384    | 1% | 45      | 3%  |
| 2016-2017     | 16,012                   | 6%  | 11,551           | 2,677            | 1,784                      | 3,439    | 2% | 48      | 6%  |
| 2017-2018     | 16,892                   | 5%  | 12,277           | 2,769            | 1,846                      | 3,496    | 2% | 51      | 5%  |
| 2018-2019     | 17,821                   | 5%  | 13,047           | 2,864            | 1,910                      | 3,554    | 2% | 53      | 5%  |
| 2019-2020     | 18,801                   | 5%  | 13,862           | 2,963            | 1,976                      | 3,612    | 2% | 56      | 5%  |
| 2020-2021     | 19,910                   | 6%  | 14,407           | 3,302            | 2,201                      | 3,676    | 2% | 60      | 6%  |
| 2021-2022     | 21,085                   | 6%  | 15,258           | 3,497            | 2,331                      | 3,742    | 2% | 63      | 6%  |
| 2022-2023     | 22,329                   | 6%  | 16,158           | 3,703            | 2,469                      | 3,808    | 2% | 67      | 6%  |
| 2023-2024     | 23,647                   | 6%  | 17,111           | 3,921            | 2,614                      | 3,875    | 2% | 71      | 6%  |

Source: Rowan University and Timothy Haahs & Associates, Inc. 2015.

### D. Ellis Street Lot Layout

Figure 9: Ellis Street Parking Lot Concept Layout

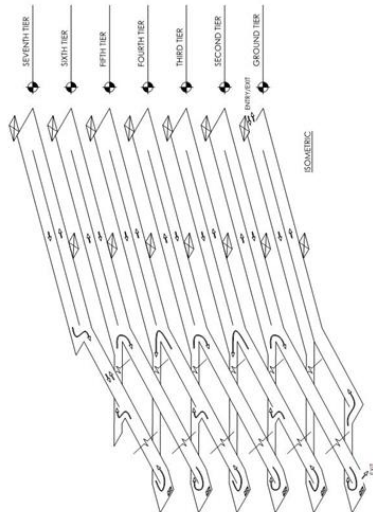
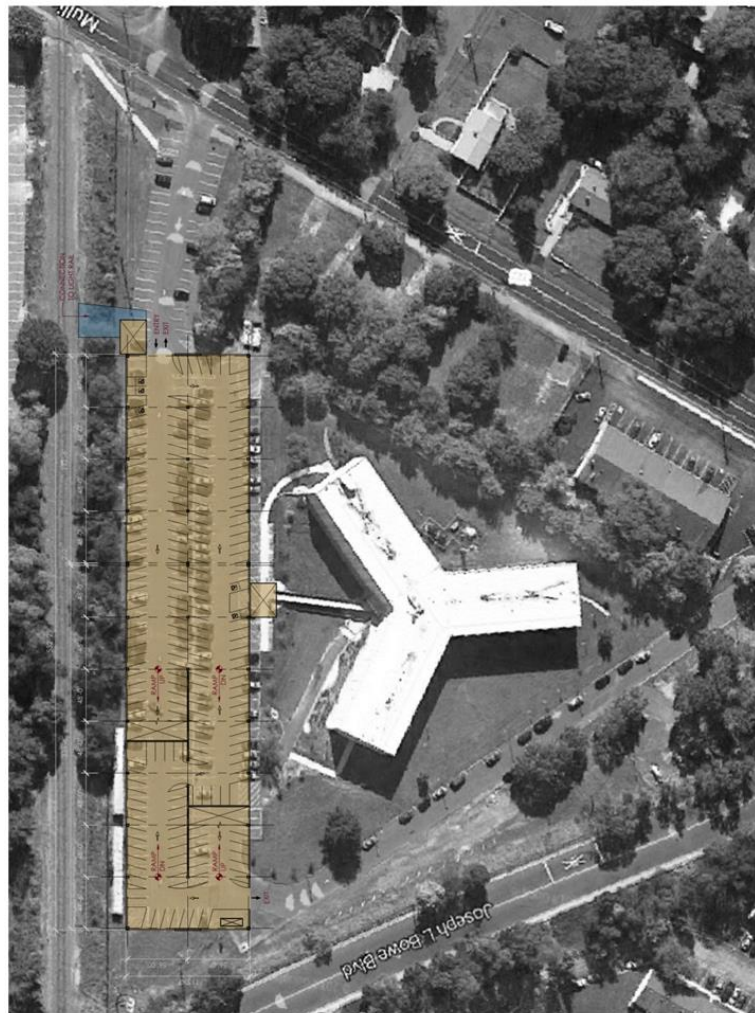


SURFACE LOT PLAN  
1"=70'-0"

Source: Timothy Haahs & Associates, Inc. 2015.

### E. Potential Parking Garage Layouts

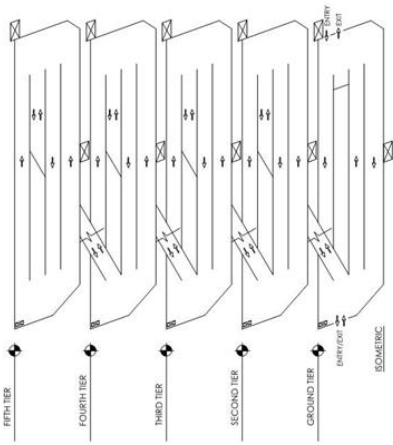
Figure 10: Lot F – Option 1



|   | CAR FABULATION |           |                | TOTAL       |
|---|----------------|-----------|----------------|-------------|
|   | TIER           | STANDARD  | VAN ACCESSIBLE |             |
| 7th   | 156            | 0         | 0              | 156         |
| 6th   | 217            | 4         | 0              | 221         |
| 5th   | 210            | 4         | 0              | 214         |
| 4th   | 217            | 4         | 0              | 221         |
| 3rd   | 210            | 4         | 0              | 214         |
| 2nd   | 217            | 4         | 0              | 221         |
| Ground  | 200            | 0         | 5              | 205         |
| <b>Total</b>  | <b>1427</b>    | <b>20</b> | <b>5</b>       | <b>1452</b> |
| <b>SURFACE AND SIGNAGE DEMOLISHED</b>                           |                |           |                | 204         |
| <b>NET GAIN</b>   |                |           |                | 1248        |
| TYPICAL STALL: 8'-6" X 18'-0" 75°                               |                |           |                |             |
| PARKING EFFICIENCY @ TYPICAL TIER = 277 SF/SPACE                |                |           |                |             |
| COST ESTIMATE: 1452 @ \$20K = \$29MM                            |                |           |                |             |
| SCHEDULE TO DESIGN/CONSTRUCT (EXCLUDING RESIDENTIAL): 20 MONTHS |                |           |                |             |

Source: Timothy Haahs & Associates, Inc. 2015.

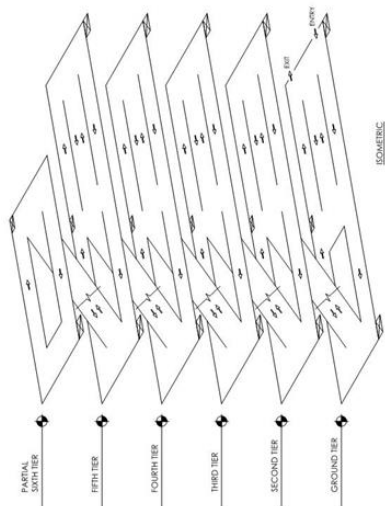
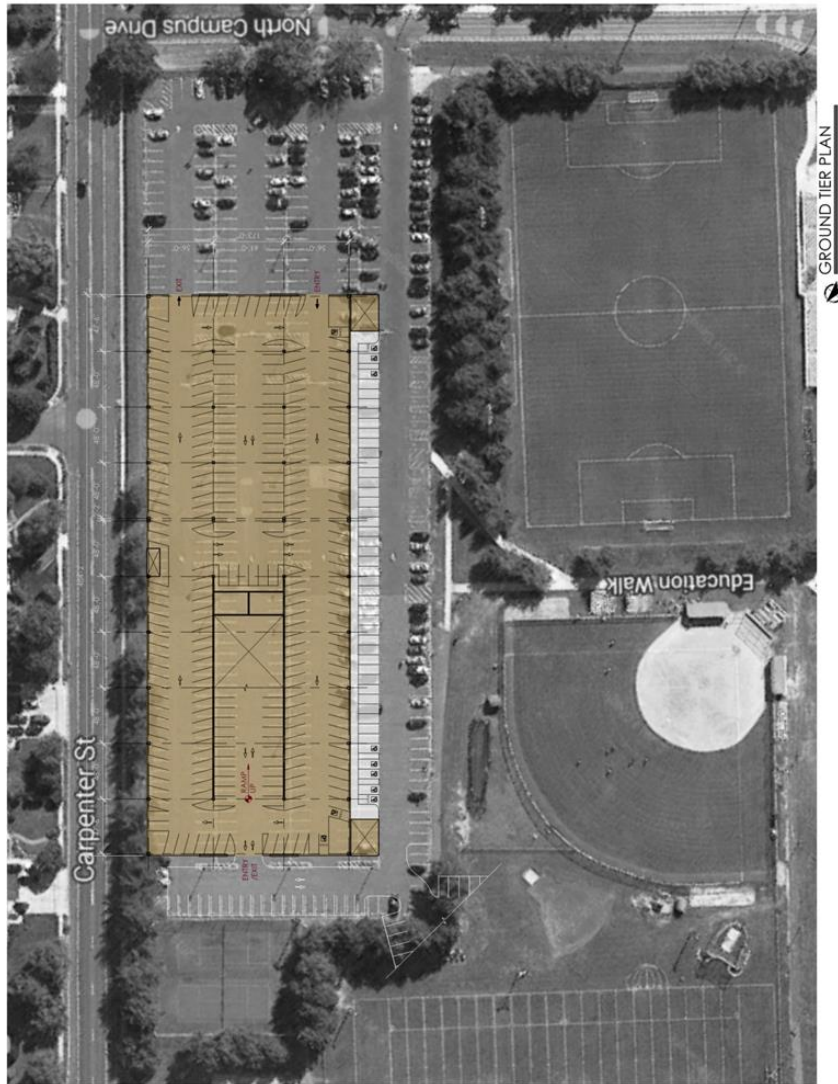
Figure 11: Lot F – Option 2



| CAR TABULATION  |          |            |                |       |
|---|----------|------------|----------------|-------|
| TIER  | STANDARD | ACCESSIBLE | VAN ACCESSIBLE | TOTAL |
| 5th   | 235      | 4          | 0              | 239   |
| 4th   | 259      | 4          | 0              | 263   |
| 3rd   | 259      | 4          | 0              | 263   |
| 2nd   | 259      | 4          | 0              | 263   |
| Ground  | 224      | 4          | 0              | 228   |
| Sub Total   | 1236     | 20         | 0              | 1256  |
| <b>SURFACE PARKING</b>  | 182      | 0          | 5              | 187   |
| <b>Total</b>  | 1418     | 20         | 5              | 1443  |
| <b>SURFACE PARKING DEMOLISHED</b>                               |          |            |                | 242   |
| <b>NET GAIN</b>   |          |            |                | 1201  |
| TYPICAL STALL: 8'-6" x 18'-0" @ CENTER BAY, 7'5" @ OUTER BAY    |          |            |                |       |
| PARKING EFFICIENCY @ TYPICAL TIER = 288 SF/SPACE                |          |            |                |       |
| COST ESTIMATE: 1256 @ \$20K PLUS 187 @ \$5K = \$26MM            |          |            |                |       |
| SCHEDULE TO DESIGN/CONSTRUCT (EXCLUDING RESIDENTIAL): 20 MONTHS |          |            |                |       |

Source: Timothy Haahs & Associates, Inc. 2015.

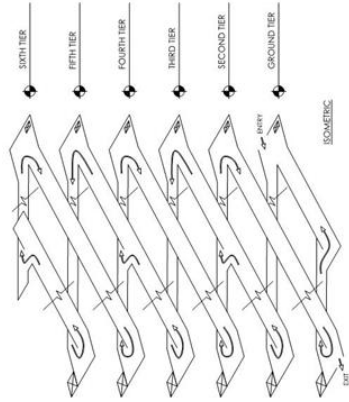
Figure 12: Lot B / B-1



| CAR TABULATION  |          |            |       |
|---|----------|------------|-------|
| TIER  | STANDARD | ACCESSIBLE | TOTAL |
| Partial 6th   | 151      | 0          | 151   |
| 5th   | 288      | 4          | 292   |
| 4th   | 288      | 4          | 292   |
| 3rd   | 288      | 4          | 292   |
| 2nd   | 288      | 4          | 292   |
| Ground  | 263      | 0          | 266   |
| Sub Total   | 1566     | 16         | 1585  |
| <b>SURFACE PARKING</b>  | 37       | 6          | 45    |
| <b>Total</b>  | 1603     | 22         | 1630  |
| <b>SURFACE PARKING DEMOLISHED</b>                             |          | 5          | 346   |
| <b>NET GAIN</b>   |          |            | 1284  |
| TYPICAL STALL: 8'-6" x 16'-0" @ CENTER BAY, 7'-5" @ OUTER BAY |          |            |       |
| PARKING EFFICIENCY @ TYPICAL TIER = 292 SF/SPACE              |          |            |       |
| COST ESTIMATE: 1.85 @ \$20K PLUS 45 @ \$5K = \$320MM          |          |            |       |
| SCHEDULE TO DESIGN/CONSTRUCT: 20 MONTHS                       |          |            |       |

Source: Timothy Haahs & Associates, Inc. 2015.

Figure 13: Lot P / R



| CAR TABULATION  |          |            |                |       |
|---|----------|------------|----------------|-------|
| TIER  | STANDARD | ACCESSIBLE | VAN ACCESSIBLE | TOTAL |
| Partial 7th   | 25       | 0          | 0              | 25    |
| 6th   | 113      | 2          | 0              | 115   |
| 5th   | 107      | 2          | 0              | 109   |
| 4th   | 113      | 2          | 0              | 115   |
| 3rd   | 107      | 2          | 0              | 109   |
| 2nd   | 113      | 2          | 0              | 115   |
| Ground  | 93       | 2          | 0              | 95    |
| Sub Total   | 671      | 12         | 0              | 683   |
| <b>SURFACE PARKING</b>                                | 116      | 2          | 3              | 121   |
| <b>SURFACE PARKING DEMOLISHED</b>                     | 787      | 14         | 3              | 804   |
| <b>NET GAIN</b>                                       |          |            |                | 218   |
| <b>NET GAIN</b>                                       |          |            |                | 586   |
| TYPICAL STALL: 8'-6" x 18'-07.75"                     |          |            |                |       |
| PARKING EFFICIENCY @ TYPICAL TIER = 290 SF/SPACE      |          |            |                |       |
| COST ESTIMATE: 683 @ \$20K PLUS 121 @ \$5K = \$14.3MM |          |            |                |       |
| SCHEDULE TO DESIGN/CONSTRUCT: 18 MONTHS               |          |            |                |       |

GROUND TIER PLAN  
 1/2" = 1'-0"

Source: Timothy Haahs & Associates, Inc. 2015.