Shockoe Bottom Preliminary Traffic and Parking Analysis

Richmond, Virginia

August 14, 2013

Prepared For
City of Richmond
Department of Public Works

Prepared By
EXECUTIVE SUMMARY

This report contains the findings of a preliminary traffic and parking analysis for the proposed Shockoe Bottom baseball stadium and supporting development. The stadium itself will consist of fixed-seating for approximately 6,500 spectators with additional lawn seating available to accommodate up to 8,000. In addition to the stadium, the proposed development includes three (3) buildings containing a total of 300 apartments; 150,000 square feet of general office space; a 55,000 square foot grocery store; 2,500 square feet of food & beverage retail space; and 7,500 square feet of non-food & beverage retail space. It is estimated that the aforementioned ancillary uses will generate an additional 7,500 daily/750 AM peak hour/850 PM peak hour vehicular trips.

Based on input from representatives of the City’s Department of Public Works, accommodating the daily peak hour impacts associated with the supporting development was determined to be integral to the success of the project. That being noted, the traffic analysis focuses primarily on weekday AM and PM peak hour operations at eight (8) key intersections adjacent to the proposed development that will be most impacted.

The analysis of these eight (8) intersections under anticipated total traffic conditions (existing + new site traffic) assuming existing lane geometries exhibited several operational deficiencies. Each of these locations was revisited and it was determined that through the implementation of conventional intersections upgrades and retrofits (such as re-striping, signals, roundabouts, and additional lanes), these intersections could effectively accommodate the projected traffic volumes. Nothing encountered in this analysis indicates that projected traffic volumes would prohibit the development of the Shockoe Bottom stadium site.

This work represents an executive-level overview of the area and outlines possible solutions to potential traffic congestion in Shockoe Bottom. Good site planning, including considerations for right of way dedication and building placement, will allow the City and developer to manage and/or mitigate the potential traffic concerns. As more project details are developed, a more formal analysis (including more sophisticated micro-simulation tools and VDOT Chapter 527 considerations) is recommended to provide definitive solutions at each key intersection.
INTRODUCTION

This report presents the findings of a preliminary traffic and parking analysis for the proposed Shockoe Bottom baseball stadium and supporting development. The stadium itself will consist of fixed-seating for approximately 6,500 spectators with additional lawn seating available to accommodate up to 8,000. In addition to the stadium, the proposed development includes three (3) buildings containing a total of 300 apartments; 150,000 square feet of general office space; a 55,000 square foot grocery store; 2,500 square feet of food & beverage retail space; and 7,500 square feet of non-food & beverage retail space.

The proposed stadium location is intended to take advantage of thousands of existing parking spaces located at multiple existing (and proposed) parking facilities located within a few blocks of the proposed ballfield. Because there is no single parking destination, it is impractical to estimate the specific traffic movements associated with visitors to the stadium. Based on input from representatives of the City’s Department of Public Works, accommodating the daily operational impacts associated with the supporting development was determined to be integral to the success of the project. That being noted, this analysis focuses primarily on weekday AM and PM peak hour operations at key intersections adjacent to the proposed development.

Because stadium visitors will routinely arrive and depart during off-peak hours, when background traffic volumes are significantly lower, it was generally agreed that the weekday AM and PM peak hours would sufficiently represent the anticipated traffic operations and identify any deficiencies in the adjacent transportation network.

STUDY AREA

The proposed development associated with the Shockoe Bottom stadium is located in the City of Richmond in the area roughly bounded by East Marshall Street to the north, North 18th Street to the east, East Franklin Street to the south, and Ambler Street to the west. Capacity analyses were performed for 2013 existing conditions as well as 2013 total volumes (existing + site trips) at the following eight (8) intersections (see Figure 1):

1. East Marshall Street at Oliver Hill Way;
2. East Marshall Street at North 18th Street;
3. East Broad Street at North 16th Street (egress from proposed parking deck);
4. East Broad Street at Oliver Hill Way;
5. East Broad Street at North 16th Street;
6. East Franklin Street at North 18th Street; and
7. East Main Street at North 18th Street.
8. East Franklin Street at North 15th Street/I-95 South Off Ramp;

Four (4) additional intersections outside of the immediate development area were reviewed qualitatively but not included in the capacity analyses:

9. East Broad Street at North 14th Street;
10. East Franklin Street at North 14th Street;
11. East Main Street at North 15th Street; and
12. East Main Street at South 17th Street.
2013 EXISTING CONDITIONS

The 2013 existing volumes were estimated using data from the following sources:

- The City’s SYNCHRO (traffic signal timing) models;
- Directional turning movement (DTM) counts conducted by Dominion Development Services for the 2008 traffic impact analysis for the Cold Storage Lofts development; and
- Supplemental DTM counts conducted by Timmons Group in May 2013.

The 2013 DTM counts collected by Timmons Group were comparable to the 2008 volumes in the City’s SYNCHRO models and the 2008 DTM counts contained in the Cold Storage Lofts study. Based on this information, it was not necessary to project (grow) the available 2008 count data. The traffic data was balanced between the intersections and used to estimate the volumes for unsignalized intersection of East Franklin Street and North 18th Street.

The 2013 existing volumes were adjusted to reflect the displacement of surface lots and on-street parking by the stadium development, rerouting the remaining trips on the anticipated roadway network. The following modifications to the network were assumed and discussed with City staff:

- Ambler Street will be converted to two-way operations;
- East Franklin Street between Ambler Street and North 19th Street will be converted to two-way operations;
- Crane Street between East Grace Street and East Broad Street will be eliminated;
- East Grace Street between Ambler Street and North 18th Street will be eliminated;
- North 17th Street between East Franklin Street and East Broad Street will be eliminated;
- The southbound approach of Oliver Hill Way at East Broad Street will be modified from a shared through-left lane, a through lane, and a right turn lane to dual left turn lanes and a right turn lane;
- North 18th Street between East Grace Street and East Broad Street will be converted to two-way operations – the northbound approach of North 18th Street at East Broad Street will be converted from a left turn lane, a through lane, and a shared through-right lane to a shared through-left lane and a shared through-right lane as well as a single southbound lane for accommodating southbound traffic (please note that this is a planned City project that is not dependent on the stadium development);
- Another planned City project includes a streetscaping plan for East Broad Street from 14th to 18th.
2013 EXISTING VOLUMES ANALYSIS

The level of service (LOS) for the 2013 existing traffic volumes is summarized in Table I. The overall LOS is provided for the three signalized intersections while the LOS of the worst movement is provided for the unsignalized intersections. Note: the intersection of East Broad Street at North 16th Street is not included in the existing conditions analysis since this is the proposed egress from a proposed parking deck and not currently part of the street network.

Table I
Level of Service and Delay Summary for 2013 Existing Volumes

<table>
<thead>
<tr>
<th>Intersection and Type of Control</th>
<th>Type of Control</th>
<th>Signal Overall/Unsignalized Worst Movement</th>
<th>AM PEAK HOUR</th>
<th>PM PEAK HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delay ¹ (sec/veh)</td>
<td>LOS ¹</td>
</tr>
<tr>
<td>1. Oliver Hill Way (N-S) at E. Marshall Street (E-W)</td>
<td>Two-Way Stop</td>
<td>WB Thru-Left</td>
<td>30.6</td>
<td>D</td>
</tr>
<tr>
<td>2. N. 18th Street (N-S) at E. Marshall Street (E-W)</td>
<td>Two-Way Stop</td>
<td>EB Thru-Left</td>
<td>17.1</td>
<td>C</td>
</tr>
<tr>
<td>3. E. Broad Street (E-W) at N. 16th Street (N-S)</td>
<td>N/A</td>
<td>N/A</td>
<td>--</td>
<td>--</td>
</tr>
<tr>
<td>4. E. Broad Street (E-W) at Oliver Hill Way (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>36.6</td>
<td>D</td>
</tr>
<tr>
<td>5. E. Broad Street (E-W) at N. 18th Street (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>22.8</td>
<td>C</td>
</tr>
<tr>
<td>6. N. 18th Street (N-S) at E. Franklin Street (E-W)</td>
<td>Two-Way Stop</td>
<td>EB Thru-Left</td>
<td>18.3</td>
<td>C</td>
</tr>
<tr>
<td>7. E. Main Street (E-W) at N. 18th Street (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>53.0</td>
<td>D</td>
</tr>
<tr>
<td>8. E. Franklin Street (E-W) at N. 15th Street (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>28.5</td>
<td>C</td>
</tr>
</tbody>
</table>

¹ Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

**Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO.**
PROPOSED DEVELOPMENT

In addition to the stadium, the proposed development consists of three buildings containing a total of 300 apartments, 150,000 square feet of general office space, a 55,000 square foot grocery store, 2,500 square feet of food & beverage retail space, and 7,500 square feet of non-food & beverage retail space. For consistency, these uses are the same that were analyzed in the Shockoe Bottom Baseball Analysis – Revised Revenue Estimates prepared by Davenport & Company and dated February 11, 2012.

The largest building (Building 1), located in the northwest quadrant of the East Broad Street and Oliver Hill Way intersection, is anticipated to include the office space, grocery store and 100 apartment units. It will also include a 1,200 space parking deck. Approximately 700 spaces will be provided for the daily office, retail and residential uses with the remaining 500 spaces being made available for public parking (replacing much of the surface parking displaced by the proposed stadium complex). Buildings 2 and 3 will be constructed adjacent to the stadium and consist of residential (100 apartments each) and the remaining retail uses. Each building will include parking decks to serve the residents.

Trip generation estimates were developed using the 9th edition (2012) of the ITE Trip Generation Manual. The retail uses (urban grocery store, food & beverage retail and non-food & beverage retail adjacent to the stadium) are not well-documented, and so the trip generation rates used (particularly supermarket and fast-food restaurant w/o drive-thru) are possibly over-stated. Therefore, and due to the urban infill nature of the development, a trip reduction factor was applied to the residential and retail uses to account for internal capture trips and trips made by alternate modes such as walking, biking or transit. After this reduction is applied, the development is anticipated to add approximately 750 to 850 peak hour trips to the surrounding roadway network (see Table II).

TRIP DISTRIBUTION

It is anticipated that ingress and egress to Building 1 will be provided via one right-in entrance and one right-in/right-out access from Oliver Hill Way, one full access from East Marshall Street, and one right-out access on East Broad Street via North 16th Street. Access to Building 2 will be provided via one full access from East Franklin Street opposite 17th Street and access to Building 3 will be provided via one full access from North 18th Street opposite East Grace Street. Each of these access points will serve the parking decks that will be provided for each building.

The new site trips were distributed onto the modified roadway network described previously. The distribution of site-generated traffic was based on the existing distribution from the traffic counts, the proposed land uses and their respective locations within the City, and the development’s location relative to the ramps serving I-95 and the Downtown Expressway.

The new site trips were added to the redistributed 2013 background volumes to generate the 2013 total AM and PM peak hour volumes used in the analyses (see Figure 1).
### Table II
Trip Generation Summary

<table>
<thead>
<tr>
<th>LAND USE</th>
<th>CODE</th>
<th>AMOUNT</th>
<th>UNITS</th>
<th>TYPE</th>
<th>%</th>
<th>AM PEAK HOUR</th>
<th>PM PEAK HOUR</th>
<th>TOTAL</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>East Broad Street at Oliver Hill Way (Building 1)</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>General Office</td>
<td>710</td>
<td>150,000 SF (GFA)</td>
<td>New</td>
<td>100%</td>
<td></td>
<td>1,787</td>
<td>324</td>
<td>90</td>
<td>80</td>
</tr>
<tr>
<td>Supermarket</td>
<td>550</td>
<td>55,000 SF (GFA)</td>
<td>New</td>
<td>50%</td>
<td>2,812</td>
<td>38</td>
<td>94</td>
<td>128</td>
<td>123</td>
</tr>
<tr>
<td>Walking/Transit/Internal Capture</td>
<td>365</td>
<td>5</td>
<td>21</td>
<td>26</td>
<td>24</td>
<td>13</td>
<td>36</td>
<td>13</td>
<td>36</td>
</tr>
<tr>
<td>Apartment (Multi-Family)</td>
<td>220</td>
<td>100 DU</td>
<td>New</td>
<td>50%</td>
<td>365</td>
<td>5</td>
<td>21</td>
<td>26</td>
<td>13</td>
</tr>
<tr>
<td>Walking/Transit/Internal Capture</td>
<td>365</td>
<td>5</td>
<td>21</td>
<td>26</td>
<td>24</td>
<td>13</td>
<td>36</td>
<td>13</td>
<td>36</td>
</tr>
<tr>
<td>Parking Deck&lt;sup&gt;1,2&lt;/sup&gt;</td>
<td>500</td>
<td>Spaces</td>
<td>New</td>
<td>100%</td>
<td>850</td>
<td>255</td>
<td>0</td>
<td>255</td>
<td>213</td>
</tr>
</tbody>
</table>

**SUBTOTAL FOR BUILDING 1:**

- New Trips: 5,813 5 88 640 193 552 745
- Walking/Transit/Internal Capture Trips: 850 255 0 255 213 213

| East Franklin Street at Ambler Street (Building 2) |      |          |       |      |   |               |               |       |       |
| Specialty Retail Center                   | 826  | 7,500 SF (GFA) | New | 50%  | 166 | 4  | 6            | 10            |
| Walking/Transit/Internal Capture<sup>1</sup> | 166  | -        | -    | -    | 4  | 6            | 10            |
| Apartment (Multi-Family)                 | 220  | 100 DU   | New | 50%  | 365 | 5  | 21           | 26            | 13    | 36    |
| Walking/Transit/Internal Capture<sup>1</sup> | 365  | 5       | 21    | 26   | 24  | 13            | 36            | 13    | 36    |

**SUBTOTAL FOR BUILDING 2:**

- New Trips: 531 5 21 26 28 18 46
- Walking/Transit/Internal Capture Trips: 531 5 21 26 28 18 46

| East Grace Street at North 18th Street (Building 3) |      |          |       |      |   |               |               |       |       |
| Fast-Food w/o Drive-Thru                 | 933  | 2,500 SF (GFA) | New | 50%  | 895 | 33 | 22           | 55            | 17    | 33    |
| Walking/Transit/Internal Capture<sup>1</sup> | 895  | 33       | 22    | 55   | 17  | 16           | 33            |
| Apartment (Multi-Family)                 | 220  | 100 DU   | New | 50%  | 365 | 5  | 21           | 26            | 13    | 36    |
| Walking/Transit/Internal Capture<sup>1</sup> | 365  | 5       | 21    | 26   | 24  | 13            | 36            | 13    | 36    |

**SUBTOTAL FOR BUILDING 3:**

- New Trips: 1,260 38 43 81 40 29 69
- Walking/Transit/Internal Capture Trips: 1,260 38 43 81 40 29 69

**TOTAL DEVELOPMENT WITHOUT STADIUM:**

- New Trips: 7,604 595 153 747 261 600 861
- Walking/Transit/Internal Capture Trips: 4,967 107 121 227 220 182 402

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**NOTE:** Land uses taken from Davenport & Company, LLC memorandum dated February 11, 2013; Revised Base Case assumptions were used.

**SOURCE:** Institute of Transportation Engineers’ Trip Generation Manual 9th Edition (2012)

1. 50% walking/transit/internal capture reduction for urban infill development; reduction percentage approved by City.
2. Parking garage has 1,200 total spaces; 700 spaces assumed to be reserved (375 for office, 125 for grocery, and 200 for residential); 500 spaces available for public parking.
3. ITE does not provide data for this land use. Weekday trips estimated using data previously provided by Tom Flynn. Assumed parking garage (500 spaces) is 85% occupied and 60% arrive during the AM peak hour and 50% exit during the PM peak hour.
2013 TOTAL VOLUMES ANALYSIS

The level of service (LOS) for the 2013 total traffic volumes is summarized in Table III. As with the existing volumes analysis, an overall LOS is provided for each signalized intersection while the LOS of the worst movement is provided for the unsignalized intersections.

Table III
Level of Service and Delay Summary for 2013 Total Volumes

<table>
<thead>
<tr>
<th>Intersection and Type of Control</th>
<th>Type of Control</th>
<th>Signal Overall/Unsignalized Worst Movement</th>
<th>AM PEAK HOUR</th>
<th>PM PEAK HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delay 1 (sec/veh)</td>
<td>LOS 1</td>
</tr>
<tr>
<td>1. Oliver Hill Way (N-S) at E. Marshall Street (E-W)</td>
<td>Two-Way Stop</td>
<td>WB Thru-Left</td>
<td>**</td>
<td>F</td>
</tr>
<tr>
<td>2. N. 18th Street (N-S) at E. Marshall Street (E-W)</td>
<td>Two-Way Stop</td>
<td>EB Thru-Left</td>
<td>706.9</td>
<td>F</td>
</tr>
<tr>
<td>3. E. Broad Street (E-W) at N. 16th Street (N-S)</td>
<td>One-Way Stop</td>
<td>SB Right</td>
<td>10.2</td>
<td>B</td>
</tr>
<tr>
<td>4. E. Broad Street (E-W) at Oliver Hill Way (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>43.6</td>
<td>D</td>
</tr>
<tr>
<td>5. E. Broad Street (E-W) at N. 18th Street (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>38.4</td>
<td>D</td>
</tr>
<tr>
<td>6. N. 18th Street (N-S) at E. Franklin Street (E-W)</td>
<td>Two-Way Stop</td>
<td>EB Left-Thru-Right</td>
<td>138.2</td>
<td>F</td>
</tr>
<tr>
<td>7. E. Main Street (E-W) at N. 18th Street (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>52.9</td>
<td>D</td>
</tr>
<tr>
<td>8. E. Franklin Street (E-W) at N. 15th Street (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>42.4</td>
<td>D</td>
</tr>
</tbody>
</table>

1 Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

† SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

**Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO.

The analysis demonstrates that without some additional improvements to the roadway network, congestion and extensive queuing could be experienced with the new development.
POTENTIAL NETWORK IMPROVEMENTS

Based on the results of the SYNCHRO analyses of the 2013 total volumes, the following potential improvements were evaluated:

- Oliver Hill Way at East Marshall Street – install a traffic signal and remove on-street parking on the westbound approach of East Marshall Street to provide a short (100 foot) left turn lane;
- North 18th Street at East Marshall Street – install a traffic signal;
- East Broad Street at Oliver Hill Way – modify the southbound lane assignments to provide a left turn lane, a shared left-right lane, and a right turn lane and prohibit right turns on red;
- East Broad Street at North 18th Street - remove on-street parking on the northbound approach of North 18th Street to provide a short (100 foot) right turn lane and modify the northbound lane assignments to provide a left turn lane, shared left-through lane, and shared through-right lane; and
- North 18th Street and East Franklin Street - install a traffic signal and remove on-street parking on the eastbound approach of East Franklin Street to provide a short (100 foot) left turn lane.

2013 TOTAL VOLUMES ANALYSIS WITH IMPROVEMENTS

The analysis of the 2013 total volumes with improvements assumes all of the modifications to the surrounding roadway network described above will be in place. The resulting LOS for the 2013 total traffic volumes with improvements is presented in Table IV.
Table IV
Level of Service and Delay Summary for 2013 Total Volumes with Improvements

<table>
<thead>
<tr>
<th>Intersection and Type of Control</th>
<th>Type of Control</th>
<th>Signal Overall/ Unsignalized Worst Movement</th>
<th>AM PEAK HOUR</th>
<th>PM PEAK HOUR</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Delay (^1) (sec/veh)</td>
<td>LOS (^1)</td>
</tr>
<tr>
<td>1. Oliver Hill Way (N-S) at E. Marshall Street (E-W)</td>
<td>Signal</td>
<td>Overall</td>
<td>14.3</td>
<td>B</td>
</tr>
<tr>
<td>2. N. 18th Street (N-S) at E. Marshall Street (E-W)</td>
<td>Signal</td>
<td>Overall</td>
<td>15.4</td>
<td>B</td>
</tr>
<tr>
<td>3. E. Broad Street (E-W) at N. 16th Street (N-S)</td>
<td>One-Way Stop</td>
<td>SB Right</td>
<td>10.3</td>
<td>B</td>
</tr>
<tr>
<td>4. E. Broad Street (E-W) at Oliver Hill Way (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>15.5</td>
<td>B</td>
</tr>
<tr>
<td>5. E. Broad Street (E-W) at N. 18th Street (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>26.0</td>
<td>C</td>
</tr>
<tr>
<td>6. N. 18th Street (N-S) at E. Franklin Street (E-W)</td>
<td>Signal</td>
<td>Overall</td>
<td>10.8</td>
<td>B</td>
</tr>
<tr>
<td>7. E. Main Street (E-W) at N. 18th Street (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>52.8</td>
<td>D</td>
</tr>
<tr>
<td>8. E. Franklin Street (E-W) at N. 15th Street (N-S)</td>
<td>Signal</td>
<td>Overall</td>
<td>42.4</td>
<td>D</td>
</tr>
</tbody>
</table>

\(^1\) Overall intersection LOS and delay reported for signalized intersections and roundabouts only.

\(^\dagger\) SYNCHRO does not provide level of service or delay for unsignalized movements with no conflicting volumes.

\(**\) Delay greater than 9999.99 seconds cannot be calculated by SYNCHRO.

The analysis shows that the increased traffic generated by development can be handled reasonably through the potential investment in some additional traffic signalization and minor changes in the street section (and/or on-street parking) to accommodate minor turn lane improvements.
OVERALL TRAFFIC ANALYSIS FINDINGS

The key findings at the analyzed study intersections are described below:

1. Oliver Hill Way at East Marshall Street:
   a. Oliver Hill Way and East Marshall Street will serve as a primary access routes to the parking deck for Building 1.
   b. With the addition of the site traffic, the stop controlled movements from East Marshall Street could experience long delays, particularly the westbound approach of East Marshall Street during the AM peak hour when the southbound volume on Oliver Hill Way is the highest.
   c. The installation of a traffic signal in conjunction with the removal of on-street parking on the westbound approach to provide a short (100 foot) left turn lane will provide acceptable levels of service on all approaches with minimal queues on southbound Oliver Hill Way (i.e. off-ramp from I-95 northbound will not be impacted by queues from the new signal).
   d. The signal should be installed when the need is independently demonstrated (warranted) and not necessarily in conjunction with the opening of the proposed development.

2. North 18th Street at East Marshall Street:
   a. North 18th Street to East Marshall Street serves a majority of the vehicles accessing the parking deck in Building 1 since Oliver Hill Way is one-way southbound.
   b. With the addition of the site traffic the eastbound approach of East Marshall Street could experience very long delays, particularly during the AM peak hour due to the high volume of northbound left turns from North 18th Street onto East Marshall Street.
   c. The installation of a traffic signal will provide acceptable levels of service on all approaches with minimal queues on northbound North 18th Street.
   d. The signal should be installed when the need is independently demonstrated (warranted) and not necessarily in conjunction with the opening of the proposed development.

3. East Broad Street at North 16th Street:
   a. North 16th Street will provide right-out only access from the parking deck in Building 1 onto East Broad Street.
   b. This access is key in reducing the amount of site traffic exiting onto Oliver Hill Way during the PM peak hour.

4. East Broad Street at Oliver Hill Way/North 17th Street:
   a. This intersection will serve a majority of the traffic exiting the parking deck in Building 1 (southbound left and right turns onto East Broad Street) in addition to the traffic coming from I-95 northbound.
   b. The elimination of the south leg of the intersection (North 17th Street) has negligible impacts on traffic signal operations since North 17th Street was one-way southbound.
   c. The additional site trips exiting Building 1 could increase the delay for the southbound right turn from Oliver Hill Way onto East Broad Street.
   d. Modifications to the lane assignments on the southbound approach will reduce that delay and the queue length for the southbound right turn volumes.
   e. The long-range VDOT plans for the I-95/I-64 corridor indicate a potential roundabout at this intersection; sufficient right of way should be preserved to ensure that this improvement could be accomplished in the future.
5. East Broad Street at North 18th Street:
   a. North 18th Street to East Marshall Street will provide the primary ingress path to parking deck for Building 1 (forms a one-way pair with Oliver Hill Way) and intersection is key for traffic leaving the Shockoe Bottom area (south of East Broad Street) and heading to I-95 northbound and southbound.
   b. The increased volume of eastbound left turns from East Broad Street onto North 18th Street, particularly during the PM peak hour, could result in long delays and queues that may impact the intersection of East Broad Street at Oliver Hill Way.
   c. The introduction of two-way operations on North 18th Street between East Grace Street and East Broad Street (a planned City project) results in the elimination of one of the northbound approach lanes at East Broad Street. This geometric change in conjunction with the additional site trips on North 18th Street produces increased delays and queues on the northbound approach.
   d. Modifications to the lane assignments on the northbound approach in conjunction with the removal of on-street parking to provide a short (100 foot) northbound right turn lane will provide acceptable levels of service on all approaches with minimal queues on northbound North 18th Street.
   e. Only 40’ curb-to-curb is currently available along 18th Street between Broad and Grace Street. To provide an adequate 4-lane section, this width will need to be increased to something between 45’ and 48’.
   f. The City has considered a potential roundabout at this intersection; sufficient right of way should be preserved to ensure that this improvement could be accomplished in the future.

6. North 18th Street and East Franklin Street
   a. The change in traffic operations around the stadium and conversion to two-way operations may increase the delay and queue lengths on the eastbound approach of Franklin Street.
   b. The addition of the site trips on North 18th Street also contributes to the increased delay and queue lengths on the eastbound approach of Franklin Street.
   c. The installation of a traffic signal in conjunction with the removal of on-street parking on the eastbound approach to provide a short (100 foot) left turn lane could provide acceptable levels of service on all approaches with minimal queues.
   d. It has been suggested that Franklin Street (west of 18th Street) may be converted to a pedestrian-only corridor. Therefore, a traffic signal might never be warranted.

7. North 18th Street at East Main Street
   a. North 18th Street will provide a more direct route to the stadium area than North 17th Street and the eastbound left turn movement from East Main Street is permissive only at North 17th Street but is protected-permissive at North 18th Street.
   b. The addition of the site trips has minimal impacts to the northbound approach of North 18th Street during the AM peak hour and to the southbound approach during the PM peak hour.

8. North 15th Street at East Franklin Street
   a. The southbound I-95 off-ramp will provide direct interstate access to both the proposed stadium and the supporting development for those coming from the north and east.
   b. Existing traffic queues on the ramp extend to mainline I-95 during the AM peak period; this queue will increase marginally with the addition of site-generated traffic.
c. A planned (funded) VDOT project that includes an additional lane on the southbound off-ramp will shorten the projected southbound traffic queues.

The other four intersections (outside of the development area) are not as likely to be impacted by the site-generated traffic given their location relative to the primary ingress/egress points to/from I-95 and the small (percentage-wise) traffic increases expected compared to the volumes that currently exist at each intersection.

Per conversations with City staff, these key intersections were identified as locations that will serve as gateways to the parking facilities that are anticipated to serve off-peak traffic volumes associated primarily with the proposed stadium.

Based on a comparison of the PM peak volumes against weekend/off peak volumes, it is anticipated that the traffic at the identified intersections (all west of I-95) will be approximately 45% less during anticipated events than what is typically occurs during the average weekday PM peak hour. This reduced overall background traffic condition will likely offset anticipated site-generated traffic associated with the proposed stadium, resulting in conditions similar to what is encountered on a daily basis during AM and PM peak hour conditions.

**PARKING AVAILABILITY**

Figure 2 illustrates a significant number of surface parking lots and parking decks in the area generally bounded by East Broad Street, 18th Street, East Cary Street and 14th Street. This exhibit highlights that with the construction of the proposed parking deck(s) associated with this development, there will be more than 4,000 parking spaces available within a 4-block radius of the proposed stadium. This does not include on-street parking, private parking, or parking reserved for Main Street Station and/or adjacent historical sites.