APPENDIX C: TRANSPORTATION STUDY

National Naval Medical Center

Transportation Study in Support of Environmental Impact Statement

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EXECUTIVE SUMMARY

This transportation study was prepared by Gorove/Slade Associates, Inc. in support of the Environmental Impact Statement (EIS) which examines the environmental impacts caused by the BRAC-mandated relocation of certain medical functions from the Walter Reed Army Medical Center (WRAMC) in Washington, DC to the National Naval Medical Center (NNMC) in Bethesda, Maryland. This BRAC Action would result in the integration of the two institutions to establish the Walter Reed National Military Medical Center (WRNMMC) at Bethesda.

The primary purpose of this report is to evaluate the existing transportation system serving the NNMC campus. The study also evaluates the potential impacts of the proposed BRAC Action and identifies potential improvements that would be required to mitigate any identified adverse impacts. This study also lists a number of improvements that should be considered by the State Highway Administration (SHA) and the County to address regional traffic issues. The BRAC Action consists of two alternatives which differ primarily with respect to the location of proposed land uses and parking supply. The BRAC Action alternatives currently call for approximately 2,200 employees to be accommodated at the NNMC campus by 2011. However, the EIS assumes approximately 2,500 additional employees as a conservative estimate to insure any additional staff determined necessary have been evaluated in the EIS, as well as to account for possible increases in staff at NNMC under other ongoing or future projects on Base being addressed under cumulative impacts. Based on these considerations, and taking a conservative approach, which allows for flexibility in the Navy employee programming, this study analyzes the potential transportation impacts of accommodating 2,500 new employees at the NNMC campus.

The transportation study was undertaken in consultation with appropriate State and County transportation review agencies, and involved review of relevant planning documents, and extensive data collection with respect to the study area roadways and other adjacent transportation facilities and services. Figure ES-1 shows the location of the NNMC and the study area roadway network. The key findings of the study are presented below.

Existing Conditions

The NNMC site is favorably located in proximity to regional freeway and arterial facilities. These include Rockville Pike (MD 355), Connecticut Avenue (MD 185), Old Georgetown Road (MD 187) which interchange with the Capital Beltway (I-495). The Capital Beltway runs partially along the northern perimeter of the site.

The local study area roadway network consists of twenty-seven (27) intersections located primarily along three major arterials (Rockville Pike, Old Georgetown Road and Connecticut Avenue). Field observations and capacity analyses indicate that there is excessive congestion along these arterials. This occurs particularly during the peak directional traffic flows, i.e., southbound during the AM peak period and northbound during the PM peak period.

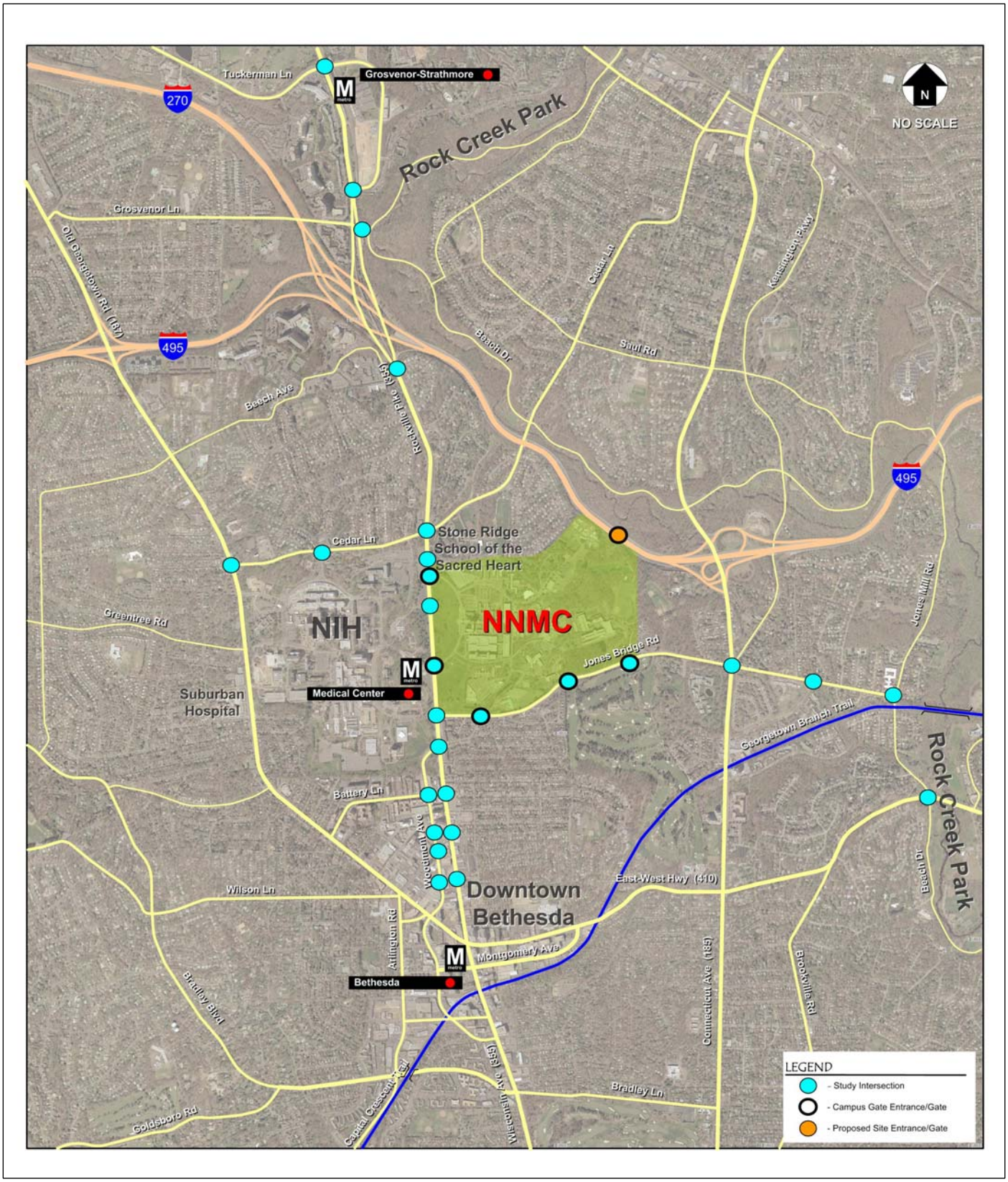

Figure ES-1 – Study Area Roadway Network

Capacity constraints, as determined with reference to established County standards, occur at two major intersections. These are *Rockville Pike at Cedar Lane and Connecticut Avenue at Jones Bridge Road.*

The condition of sidewalks, crosswalks and related signage along the study area roadways were also noted. Notable deficiencies along MD 355 and Jones Bridge Road, in the vicinity of NNMC, are narrow sidewalks without adequate buffer separation from adjacent traffic, utility poles obstructing pedestrian right-of-way, lack of "zebra" striping at some major intersection crosswalks, poorly marked crosswalks and lack of crosswalks at side streets and NNMC entrances. The pedestrian related signage is in good condition and well placed along all these routes.

Accident data records were obtained from the State for the study intersections, with respect to the last four (4) years for which such data was available. The data does not indicate any significant safety deficiencies, nor does the data for any location, satisfy the State criteria for designation as a Candidate Safety Improvement Location (CSIL). Further analysis of the accident data, in conjunction with observed pedestrian volumes, indicates that four study area intersections should be considered for safety improvements. These are *Rockville Pike at Cheltenham Drive, Rockville Pike at Cordell Avenue, Rockville Pike at Jones Bridge Road and Rockville Pike at South Drive.*

The NNMC site has easy access to mass transportation facilities. The Medical Center metrorail station is situated directly across from the South Wood Road entrance along Rockville Pike. Several Metro and County bus routes, that travel in all directions locally as well as regionally, serve this station. Heavy rail commuter service is available via the Maryland Rail Commuter (MARC) "Brunswick" line. These trains originate from Martinsburg in West Virginia, or Brunswick and Frederick in Maryland, and travel to Union Station in Washington, D.C. All trains stop in Rockville about six miles to the north of the NNMC Bethesda campus, where a connection can be made to the Metro Red Line.

NNMC operates two shuttle bus lines, i.e., the Blue Line and the Gold Line. These run between the metro station and the NNMC campus during the morning and evening peak hours.

Future Background Traffic Conditions

These traffic conditions would occur in year 2011 without the BRAC Action. The capacity analysis results for this situation show that four intersections would operate above the established Critical Lane Volume (CLV) standards. These are *Rockville Pike at Cedar Lane, Connecticut Avenue at Jones Bridge Road, Rockville Pike at Jones Bridge Road and Old Georgetown Road at Cedar Lane.*

Future BRAC Traffic Conditions

Trip Generation

In keeping with the requirements of Montgomery County, two methodologies were considered for estimating the peak hour trip generation of proposed development alternatives. The first methodology

extrapolated the future vehicular trip generation using employee-trip ratios derived from summing the existing NNMC peak hour inbound and outbound vehicle trips, and dividing those totals by the site's employee population (8,000). The existing trips were obtained from the turning movement counts conducted at the center's five access points as part of this study.

The second methodology involved the use of trip rates and equations published by the Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 7th Edition (2003). The land use types in which new staff were divided are "Hospital" (defined as any institution where medical or surgical care and overnight accommodations are provided to non-ambulatory and ambulatory patients), "Military Base" (defined as a complex that serves one division of the armed forces of the United States. It typically contains offices, training, housing, dining and recreational facilities) and "Research and Development" (facilities devoted exclusively to research and development activities. These may contain offices and light fabrication areas).

The ITE Trip Generation Manual not only provides the average percent of employees that arrive or depart during the peak hour, it also includes the number of additional trips per employee that the land use generates. This EIS must evaluate traffic associated with an estimated 484,000 annual patients and visitors as well as employees, which is an average of 1,862 daily if one conservatively assumes all occur on weekdays. The ITE Manual includes the additional trips in the projected peak hour traffic. Specifically, the combination of land use categories discussed in the preceding paragraph generates 1,880 additional trips in and a like number out each day in addition to the trips of the 2,500 employees.

Using the ITE trip rates, the projected trip estimates for both alternatives would be approximately 42.5% and 91% greater for the morning and afternoon peak hours, compared with using the locally derived rates. *Based on this consideration and directives provided by Maryland-National Capital Park and Planning Commission (M-NCPPC) staff, this study considered the ITE trip methodology in evaluating the potential traffic impacts of the two alternative development programs. It is noted that the use of the ITE trip methodology represents a conservative approach which adequately provides a factor of safety regarding the potential trips that would be generated by the additional patients and visitors.*

Total Future Traffic Analyses

The capacity analysis results for total future conditions show that, five intersections would operate above the established CLV standards. These are *Rockville Pike at Cedar Lane, Connecticut Avenue at Jones Bridge Road, Rockville Pike at Jones Bridge Road, Old Georgetown Road at Cedar Lane and Rockville Pike at North Drive.*

Analysis of the traffic impacts on the campus indicate that the existing roadway network would continue to operate efficiently except for the *Robert Brown Road at North Palmer Road* intersection. This intersection would experience significant vehicular delay due to geometric constraints, during the afternoon peak period.

Transportation Improvement Considerations

The foregoing data, analysis and discussion have identified several existing and future transportation constraints and deficiencies. It was also noted that the BRAC Action and other campus development would have adverse traffic impacts on the existing study area roadway network. Further analyses, and extensive discussions with State and County transportation staff, have identified a list of potential improvements including the provision of slip ramp access off the Capital Beltway.

The potential improvements are presented below under the headings "Potential Mitigation Measures" and "Potential Long Term Improvements". "Potential Mitigation Measures" are short term (0 - 5 years) or intermediate term (5 – 10 years) improvements required to mitigate the impacts of trips generated by proposed action. The Navy will support the implementation of these measures together with other involved public agencies. However, the Navy is allowed to use its DoD funds to support any such improvements only within military land. "Potential Long Term Improvements" are intermediate term (5 – 10 years) or long term (more than 10 years) measures that need to be further studied and implemented by the public agencies in order to improve the overall congestion level of the study area intersections. These are not aimed at mitigating the impacts of BRAC Action, but for improving the already congested transportation system to operate at better levels of service. Hence, the Navy is not responsible for further analysis of these recommendations. The improvements are as follows:

Potential Mitigation Measures (to Address Impacts from BRAC Actions)

External Mitigation Measures

These would "mitigate" the traffic impacts on the external study area intersections by the trips generated by the BRAC Action Alternatives. This mitigation improves future traffic conditions to and beyond the "Background" capacity/congestion levels that would occur without the development alternatives. However, the improvements may not fully eliminate projected capacity deficiencies to achieve conditions that satisfy established congestion/capacity thresholds.

- Rockville Pike (MD 355) at Cedar Lane
    - Provide an additional left-turn lane along the eastbound and westbound approaches of Cedar Lane (Short Term).
- Old Georgetown Road (MD 187) at Cedar Lane
    - Provide an additional left-turn lane along the southbound approach of Old Georgetown Road and eliminate parking along Cedar Lane eastbound to provide an additional receiving lane (Short Term)
    -

- Rockville Pike (MD 355) at North Wood Road

    - Conduct a full intersection study, including a traffic signal warrant analysis for this location, and implement identified geometric and/or signalization improvements. (Short Term)

- Rockville Pike (MD 355) at Jones Bridge Road Intersection

    - Provide pavement marking improvements along the eastbound approach to designate the inner lane for exclusive left-turn movements and the outer lane for shared through/ right-turn movements. (Short Term)

- Connecticut Avenue (MD 185) at Jones Bridge Road Intersection

    - Provide additional left-turn lane along the eastbound approach of Jones Bridge Road (Short Term)
    - Provide a separate right-turn lane along the southbound approach of Connecticut Avenue. (Short Term)

Internal Mitigation Measures

For all gates, a safety and security analysis is being conducted by DOD to improve security, safety, improve queuing on-site and reduce queuing off-site, and reduce damage to gates and guard houses. These following additional measures would mitigate the roadway operational constraints that would occur within the NNMC campus.

- Robert Brown Road at North Palmer Road

    - Widen the northbound approach of the intersection and provide a separate left-turn lane and a shared through/right turn lane. (Short Term)

    - Widen the eastbound approach of the intersection and provide a separate right-turn lane and a shared through/left turn lane. (Short Term)

- North Wood Road Gate

    - Conduct a full intersection study including a signal warrant analysis for this location, and implement identified geometric and/or signalization improvements. (Short Term)

    - Expand the number of lanes from two lanes to three lanes. These would operate as two inbound and one outbound in the morning peak hour, and two outbound and one inbound in the evening peak hour. (Short Term)

- Grier Road Gate (Navy Lodge Gate)

  - Widen Grier Road and provide pavement markings to delineate a separate right-turn lane and a left-turn lane for outbound traffic movements, and a single lane for inbound movements. (Short Term)

- Perimeter Road

  - Widen and improve within NNMC to improve internal circulation. (Short Term)

- NIH Commercial Vehicle Inspection Station

  - Conduct a study at the NIH Commercial Vehicle Inspection Station on Rockville Pike to determine if a traffic signal is warranted and suitable for submission of a request to state and local transportation authorities for funding and implementation. (Short Term)

Potential Long Term Improvements

These are potential measures for addressing existing and future regional transportation issues and should be studied and implemented by the appropriate public agencies if found warranted.

- Potential I-495 Slip Ramp Access

  Analyses undertaken as part of this study show that the provision of this access would not significantly improve traffic congestion levels along the study area roadways, but may have site trip-mitigation benefits, with respect to existing and future NNMC trips. However, the operation of this access may affect traffic conditions along I-495 and the adjacent interchanges, and may also not satisfy the FHWA Interstate Access Point Approval (IAPA) requirements including a minimum one-mile separation from an adjacent interchange.

- Fringe Parking

  M-NCPPC transportation staff has identified two parcels of land owned by the State which could be improved as fringe parking lots for use by area commuters. These parcels are located within the northeast quadrant of the I-495 at Connecticut Avenue Interchange. A preliminary study conducted by M-NCPPC staff indicates that the total capacity of the lots could be approximately 250 spaces. The fringe parking could reduce NNMC employee trips and related local area congestion impacts. It is noted that this potential fringe parking improvement was recommended by the Bethesda Chevy Chase Master Plan (see page 39 of this report).

- Pedestrian Improvements

  - Provide sidewalks with five-feet minimum of pedestrian clear space along with a four-feet minimum curbside buffer along both sides of all study area arterials (particularly along the east side of MD 355 adjacent to NNMC, Old Georgetown Road adjacent to NIH, and both sides Jones Bridge Road between Connecticut Avenue and Rockville Pike).
  - Provide ADA-compliant curb-ramps at all pedestrian crossings.
  - Provide high-visibility white in-lay tape "ladder" or "zebra" pattern crosswalks at all controlled and uncontrolled pedestrian crossings, (particularly along Rockville Pike and Old Georgetown Road in the vicinity of NIH and NNMC).
  - Provide pedestrian count-down signals at all controlled pedestrian crossings (particularly along Rockville Pike and Old Georgetown Road adjacent to NIH and NNMC).

- Bicyclist Improvements

  - Eliminate gaps in the study area bicycle network, particularly along Old Georgetown Road adjacent to NIH as well as between the Georgetown Branch Trail and East-West Highway along Pearl Street.
  - Implement maintenance and geometric improvements to Rock Creek Park Trail north of East-West Highway.
  - Provide better lighting along many study area trails, particularly along Rock Creek and Georgetown Branch Trails.
  - Provide a comprehensive system of bicycle wayfinding signage and maps throughout the study area, particularly along Woodmont Avenue in Downtown Bethesda.

- Transit Improvements

  - Provide a pedestrian connection (in the form of a bridge or tunnel) between the Metro station and NNMC. This would significantly eliminate pedestrian exposure to unsafe crossing conditions along Rockville Pike in the vicinity of the NNMC South Gate/Metro station Area. This will create safe access to metro-rail and bus users of NNMC without having to cross the wide section of Rockville Pike.
  - Improve bus stop waiting experience with shelters and seating throughout the study area.
  - Provide more extensive bus route information, including route schedules, maps and real-time next bus information at all bus stops.

- Potential Bethesda Chevy-Chase and Bethesda Downtown Master Plan Improvements

  - Provide an additional lane in each direction along Rockville Pike between Jones Bridge Road and Cedar Lane, in keeping with the Bethesda Chevy Chase Master Plan (see page 39 of this report) (Long Term)

- Provide an additional through lane in each direction along the Old Georgetown Road approaches to Cedar Lane, in keeping with the Bethesda Chevy Chase Master Plan (see page 39 of this report) (Long Term)

Transportation Management Plan

The National Capital Planning Commission (NCPC) established the requirement that federal agencies with master plan implementation projects resulting in over 500 employees prepare and implement an effective Transportation Management Plan (TMP). The primary purpose of a TMP is to reduce traffic congestion and related pollution problems by influencing commuting choices and patterns towards the use of travel modes other than single-occupant motor vehicles. The NNMC TMP will be developed as part of the ongoing Master Plan Update.

1.0 INTRODUCTION

The Defense Base Closure and Realignment Act of 1990 (BRAC Law) as amended in 2005 recommends the following: *"Realign Walter Reed Army Medical Center (WRAMC), Washington DC, as follows: relocate all tertiary (sub-specialty and complex care) medical services to National Naval Medical Center, Bethesda, MD, establishing it as the Walter Reed National Military Medical Center Bethesda, MD; relocate Legal Medicine to the new Walter Reed National Military Medical Center Bethesda, MD; relocate sufficient personnel to the new Walter Reed National Military Center Bethesda MD, to establish a Program Management Office that will coordinate pathology results, contract administration and quality assurance and control of Department of Defense (DoD) second opinion consults worldwide; relocate all non-tertiary (primary and specialty) patient care functions to a new community hospital at Fort Belvoir, VA."* In addition, the NNMC Master Plan is currently being revised to reflect the new mission of WRNMMC.

The NNMC is the flagship of all medical centers operated by the Navy. The center has been in existence since 1940. It includes a major hospital facility and ancillary support services including a university, navy exchange store, lodges and residential uses. The center currently accommodates approximately 8,000 employees and receives approximately 435,000 visitors annually. There are currently 6,123 parking spaces in structured and surface facilities.

The center is surrounded by the National Institute of Health (NIH) main campus to the west; Stone Ridge School of the Sacred Heart (Pre-K to 12 girls school) and residential housing to the north; North Chevy Chase Recreation Center, residential housing and Rock Creek Park to the east; and Columbia Country Club, residential housing, parks and a golf course to the south. Interstate 495 (I-495) is adjacent to the northeastern corner. Jones Bridge Road is the southern boundary and Rockville Pike forms the western boundary. The Medical Center Metrorail Station is situated to the west directly across Rockville Pike from the South Wood Road Entrance to the NNMC campus. Figure 1 shows the location of the NNMC complex.

1.1 Project Purpose and Scope

In keeping with National Environmental Protection Agency (NEPA) requirements, the Navy has commissioned the preparation of an Environmental Impact Statement (EIS) to evaluate the potential environmental impacts of the BRAC Action and future growth at NNMC Bethesda. This transportation study was prepared in support of the NNMC EIS and NNMC Master Plan Update.

The BRAC Action consists of two alternatives which differ primarily with respect to the location of proposed land uses and parking supply. The BRAC Action alternatives currently call for approximately 2,200 employees to be accommodated at the NNMC campus by 2011. The EIS assumes approximately 2,500 additional employees as a conservative estimate to insure any additional staff determined necessary have been evaluated in the EIS, as well as to account for possible increases in staff under other ongoing and future projects not associated with BRAC being addressed under cumulative impacts. Based on these considerations, and taking a conservative approach, which allows for flexibility in the

Navy employee programming, this study analyzes the potential transportation impacts of accommodating 2,500 new employees at the NNMC campus.

The following key tasks were undertaken to facilitate the preparation of this study:

- *Field Reconnaissance*: Observed existing roadway and intersection geometrics, traffic controls, speed limits and operations.
- *Scoping Discussions:*
  - Held discussions and corresponded with Maryland-National Capital Park and Planning Commission (M-NCPPC) transportation planning staff regarding the study scope and methodology (see resulting M-NCPPC scoping letter included as Appendix A).
  - Participated in several scoping/guidance meetings with a Technical Advisory Group (TAC) which was formed primarily by representatives from relevant State and County agencies to guide the transportation study process.
- *Document* Review: Reviewed several planning documents including the following -
  - Local Area Transportation Review Guidelines, M-NCPPC (Montgomery County), July, 2004.
  - National Institutes of Health Draft EIS and Master Plan Documents, September 2004.
  - Comprehensive Plan for the National Capital – Transportation Element, 2004.
  - Bethesda CBD Transportation Plan, July 1994.
  - Bethesda Chevy Chase Transportation Plan, April 1990.
- *Data Collection:* Performed the following -
  - Peak period vehicular and pedestrian turning movement counts at twenty-seven intersections.
  - Travel time and delay surveys along the Capital Beltway, Rockville Pike, Connecticut Avenue and Old Georgetown Road-Cedar Road in the vicinity of the NNMC.
  - Inventory of pedestrian, bicyclist and transit facilities within the roadway network defined by the 27 study intersections.

Figure 1 – NNMC Site Location Map

- *Analyses*: Conducted analyses for the following –
  - Existing transportation conditions.
  - Future (2011) background traffic conditions without the BRAC Action (based on ambient traffic growth due to other planned land use developments).
  - Future (2011) traffic conditions with the BRAC Action and other potential campus development (which would result in approximately 2,500 employees).
  - Future (2011) traffic conditions with potential mitigation measures.

1.2 Report Organization

This report is organized into four main sections. Section 1 presents the Introduction and Background. Section 2 presents an assessment of the existing transportation conditions. Section 3 discusses potential future transportation conditions and impacts, without and with the planned NNMC changes. Section 4 presents the transportation improvements required to address the identified potential impacts of the planned changes, as well as address existing and projected regional transportation issues.

2.0 EXISTING CONDITIONS

2.1 Roadway Accessibility

The NNMC is situated just south of the Capital Beltway (I-495), in Bethesda, Montgomery County, Maryland. The western and southern boundaries of the center are formed by Rockville Pike (MD 355) and Jones Bridge Road, respectively.

The roadway network providing immediate regional and local access to the campus is illustrated in Figure 2. The principal roadways involved include the following:

- *Rockville Pike (MD 355)*

  This six-lane divided roadway is classified as a Major Highway by the County. It runs north-south along the western edge of the campus, connecting the site with Washington, DC to the south and the City of Frederick, Maryland to the north. This roadway also provides connections to other regional areas via an interchange with the I-270/I-495 Freeway System situated just to the north, and intersections with major east-west arterials along other segments to the north and south of the campus. MD 355 is therefore a major regional and commuter route. It is also a main artery for several bus routes operated by the Washington Metropolitan Area Transit Authority (WMATA) and the Montgomery County Ride-On transit systems.

  MD 355 provides direct access to the campus via two intersections/access points. The northern entrance (North Wood Road) is unsignalized. The southern entrance (South Wood Drive) is the eastern leg of the signalized MD 355/South Drive intersection. South Drive provides access to the National Institutes of Health complex and Washington Metropolitan Area Transit Authority's (WMATA's) Medical Center Rail Station. The current MSHA Traffic Trends Document (2005) indicates that MD 355 serves an average annual weekday traffic (AAWT) volume of 52,075 vehicle trips in the vicinity of the NNMC campus. The posted speed limit on Rockville Pike is 35 mph.

  Rockville Pike is heavily traveled in the vicinity of the NNMC. Significant traffic congestion and delay occurs in the southbound direction during the morning peak period, with similar conditions occurring in the northbound during the afternoon peak period. This congestion is primarily due to through/commuter traffic associated with employment areas south of the campus, including Washington, DC and Bethesda-Chevy Chase.

- *Jones Bridge Road*

  This four-lane divided roadway is classified as an Arterial Road between Rockville Pike and Jones Mill Road by the County. It runs east-west along the southern edge of the NNMC Campus, and intersects with Connecticut Avenue (MD 185) to the east. Jones Bridge Road provides directs access to NNMC via three entrances/intersections, i.e., at Gunnell Road,

Grier Road and University Road. The roadway serves an AAWT volume of 20,860 vehicles along the campus. The posted speed limit is 40 mph.

- *Cedar Lane*

  This is a four-lane undivided roadway that is classified as an Arterial Road by the County. It runs east-west just north of the NNMC campus. There is no direct entrance to the NNMC campus off Cedar Lane. Cedar Lane serves an AAWT volume of 16,520 vehicle trips just east of its intersection with Rockville Pike. The posted speed limit is 30 mph.

- *Connecticut Avenue (MD 185)*

  This six-lane divided roadway is classified as a Major Highway by the County. It runs north-south just to the east of the NNMC, and extends from Washington DC to Aspen Hill, east of the Rockville area in Montgomery County. MD 185 interchanges with I-495 to the northeast of the site. This roadway serves regional/commuter traffic and is traversed by several WMATA and County bus routes. It serves an AAWT of 73,150 vehicle trips just south of its interchange with I- 495. The posted speed is 35 mph.

- *East-West Highway (MD 410)*

  This is a four-lane roadway with two lanes in each direction. It is classified as a Major Highway by the County. It runs east-west inside the Beltway between Landover to the east and Rockville Pike to the west. This is the next major east-west roadway after I-495. This roadway serves regional/commuter traffic and is traversed by several WMATA and County bus routes. It serves an AAWT of 17,000 vehicle trips just east of Rockville Pike (MD 355). The posted speed is 35 mph.

- *Old Georgetown Road (MD 187)*

  This six-lane divided roadway is classified as a Major Highway by the County. It runs north-south just to the west of Rockville Pike. It begins at Rockville Pike just south of Montrose Road towards the north and ends at the intersection of Rockville Pike and East-West Highway towards south. In between it interchanges with I-270 and I-495. This roadway serves the Beltway traffic from Virginia and I-270 corridor traffic from the north coming towards NNMC site; and is traversed by several WMATA and County bus routes. It serves an AAWT of 42,100 vehicle trips just south of its interchange with I- 495. The posted speed is 40 mph.

- *Jones Mill Road*

  This is a four-lane roadway with two lanes in each direction. It is classified as a Primary Residential Street by the County and runs primarily in the north-south direction between I-495 and East-West Highway. This roadway serves traffic coming from east towards the NNMC site. The posted speed is 25 mph.

- *Woodmont Avenue*

  This is primarily a four-lane roadway with two lanes in each direction. It runs parallel to MD 355 on its western side. It is classified as a Arterial Street and runs from south of Jones Bridge Road to Leland Street just north of Bradley Boulevard. This roadway segment passes through the Bethesda Central Business District (CBD), and circulates traffic in and out of the area. The posted speed is 25 mph.

2.2 Study Area Intersections

The key intersections providing immediate access to the NNMC campus are shown in Figure 2. Five of those intersections include entrances to the campus. Field observations, data collection and analyses were undertaken for these intersections listed below.

1) Rockville Pike (MD 355) and Tuckerman North
2) Rockville Pike (MD 355) and Tuckerman South
3) Rockville Pike (MD 355) and Grosvenor Lane
4) Rockville Pike (MD 355) and Pooks Hill Road
5) Rockville Pike (MD 355) and Cedar Lane
6) Old Georgetown Road and West Cedar Lane
7) West Cedar Lane and West Drive
8) Rockville Pike (MD 355) and North Drive
9) Rockville Pike (MD 355) and North Wood Road
10) Rockville Pike (MD 355) and Wilson Drive
11) Rockville Pike (MD 355) and South Drive
12) Rockville Pike (MD 355) and Jones Bridge Road
13) Jones Bridge Road and Gunnell Road
14) Jones Bridge Road and Grier Road
15) Jones Bridge Road and University Road
16) Connecticut Avenue/ Kensington Pkwy and Jones Bridge Road
17) Jones Bridge Road and Manor Road
18) Jones Mill Road and Jones Bridge Road
19) East - West Highway and Jones Mill Road
20) Rockville Pike and Woodmont Avenue
21) Wisconsin Avenue (MD 355) and Battery Lane
22) Wisconsin Avenue (MD 355) and Cordell Avenue
23) Wisconsin Avenue (MD 355) and Cheltenham Drive
24) Woodmont Avenue and Battery Lane
25) Woodmont Avenue and Cordell Avenue
26) Woodmont Avenue and St. Elmo Avenue
27) Woodmont Avenue and Cheltenham Drive

Figures 3a & 3b show the traffic control devices and lane use configurations provided at

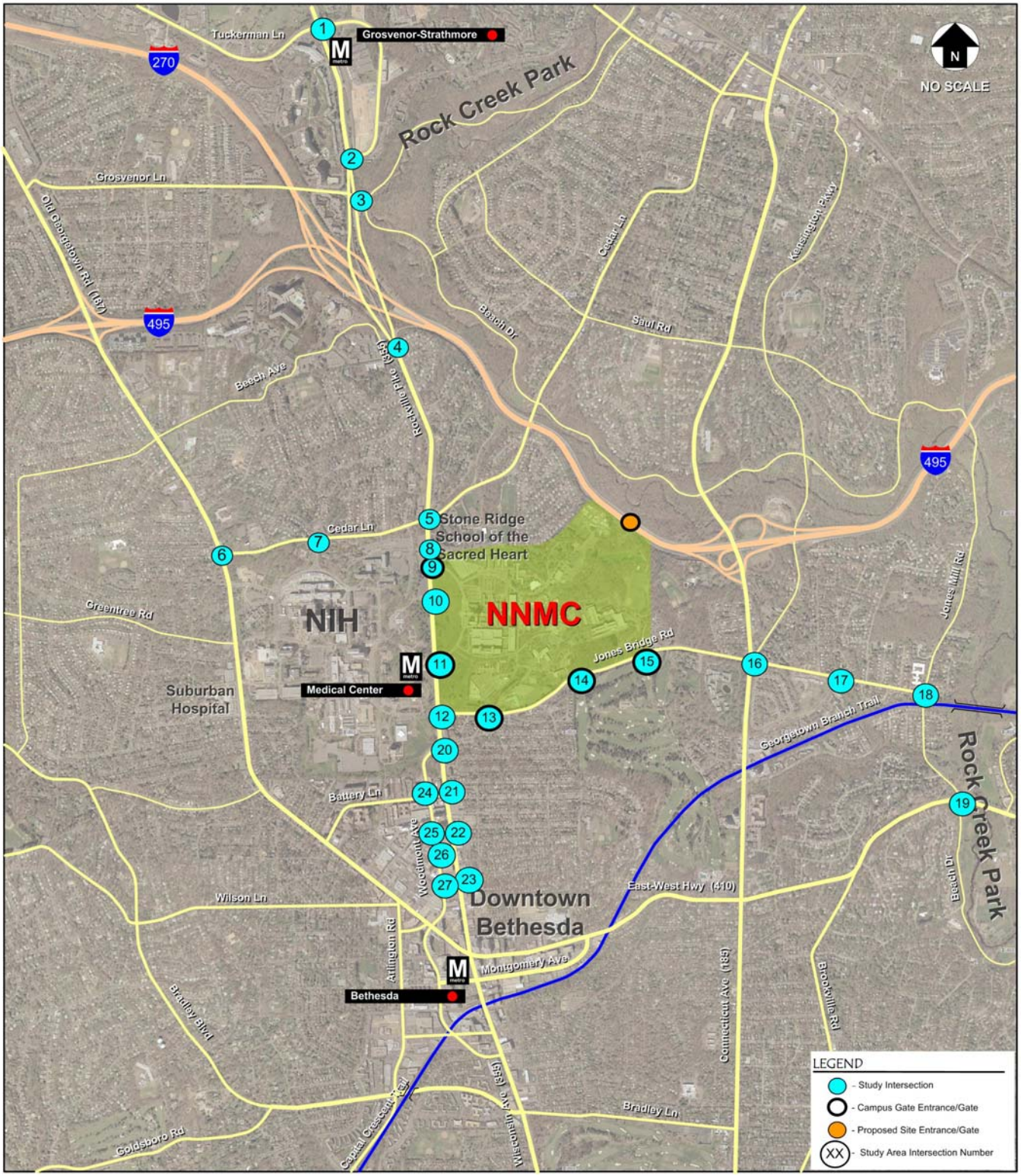

Figure 2 – Study Area Roadway Network

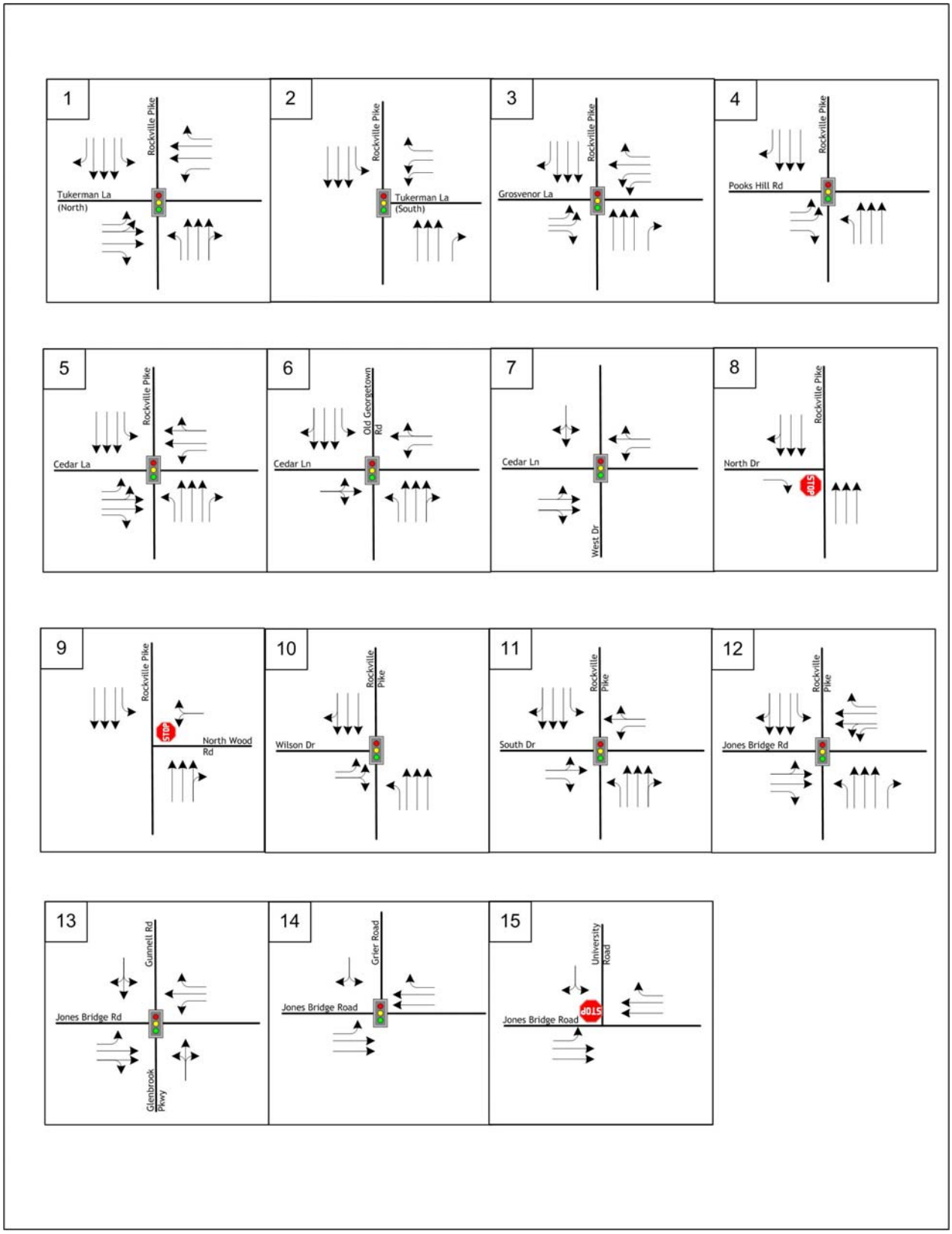

Figure 3a – Existing Lane Configurations and Traffic Control Devices

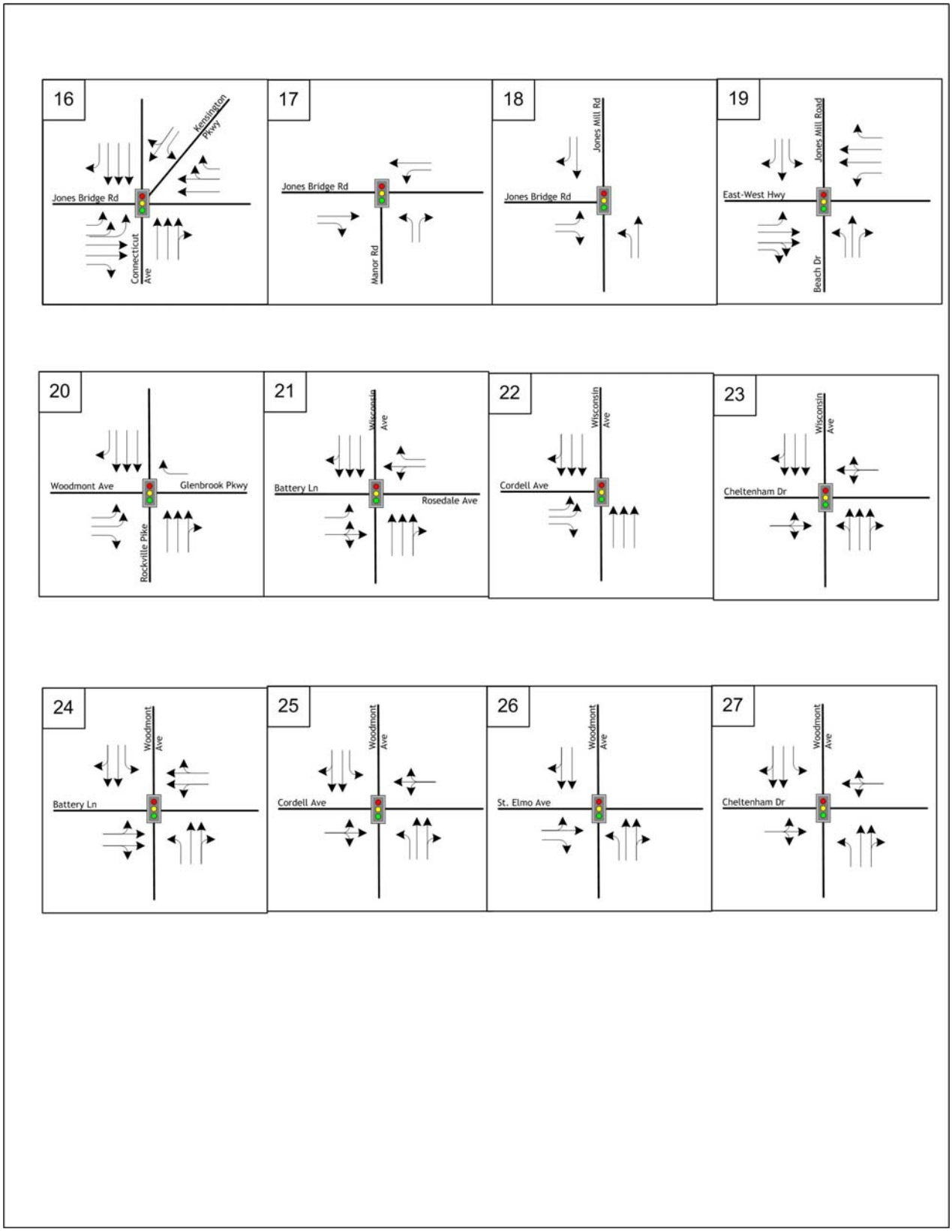

Figure 3b – Existing Lane Configurations and Traffic Control Devices

the study area intersections.

2.3 NNMC Access Situation

The NNMC complex has five entrances/gates. Two entrances are located along Rockville Pike and the others are located along Jones Bridge Road. The locations of these entrances were shown in Figure 2.

The two entrances off Rockville Pike are connected by an internal loop road (Wood Road). The northern entrance (North Gate) is located just south of Cedar Lane, and is aligned with the future entrance to the NIH truck inspection facility. The North Gate is configured with two lanes which serve inbound employee traffic during the morning peak period (5:00 - 8:00 am). Two-way traffic movements are provided between 8:00 am and 7:00 pm, via a single lane in each direction. The entrance is closed from 7:00 pm to 5:00 am from Monday to Friday, and on weekends and holidays.

The southern entrance (South Gate) is the main entrance to the campus, and is located across Rockville Pike from the NIH South Drive entrance and the WMATA Medical Center Metro Station. This gate is open all the time, except when there is activity related to the use of the adjacent heliport facility. The entrance serves inbound and outbound vehicular movements by employees, all visitors and all commercial delivery vehicles (including large trucks). The South Gate is also the main access point for pedestrian traffic, most of which is generated by the adjacent WMATA metro station.

The three entrances off Jones Bridge Road are Gunnell Road (Navy Exchange/NEX Gate), Grier Road (Navy Lodge Gate) and University Road (USUHS Gate). The Navy Exchange Gate is open to two-way traffic from 5:00 am to 7:00 pm from Monday to Friday, and is closed at all other times including weekends and holidays. Commercial traffic is allowed at this gate when the South Gate is closed. The Navy Lodge Gate is open to traffic in the outbound direction between 2:00 pm to 6:00 pm from Monday to Friday and closed at all other times. The USUHS Gate is open to inbound traffic between 5:00 am to 8:30 pm from Monday to Friday, and is closed during other times.

Vehicular turning movement counts, counted at the gates as part of this study, were used to determine the trip generation characteristics of the center. Figure 4 shows the trip generation profile of NNMC traffic for a typical weekday, relative to the NIH traffic and the ambient traffic along Rockville Pike section providing direct access to the NNMC. The AM and PM peak hours of NNMC vehicular traffic were determined to be 6:30 - 7:30 am and 4:00 - 5:00 pm, respectively. The general AM and PM peak hours of the adjacent ambient traffic were determined to be between 7:45 - 8:45 am and 4:30 - 5:30 pm, respectively. The morning and afternoon peak hours for the NIH Bethesda campus, which is located across Rockville Pike from the NNMC campus, are 8:00 - 9:00 am and 5:00 - 6:00 pm, respectively. This shows that the peak hours of NNMC and ambient traffic do not coincide with each other in the morning and coincide partially in the evening.

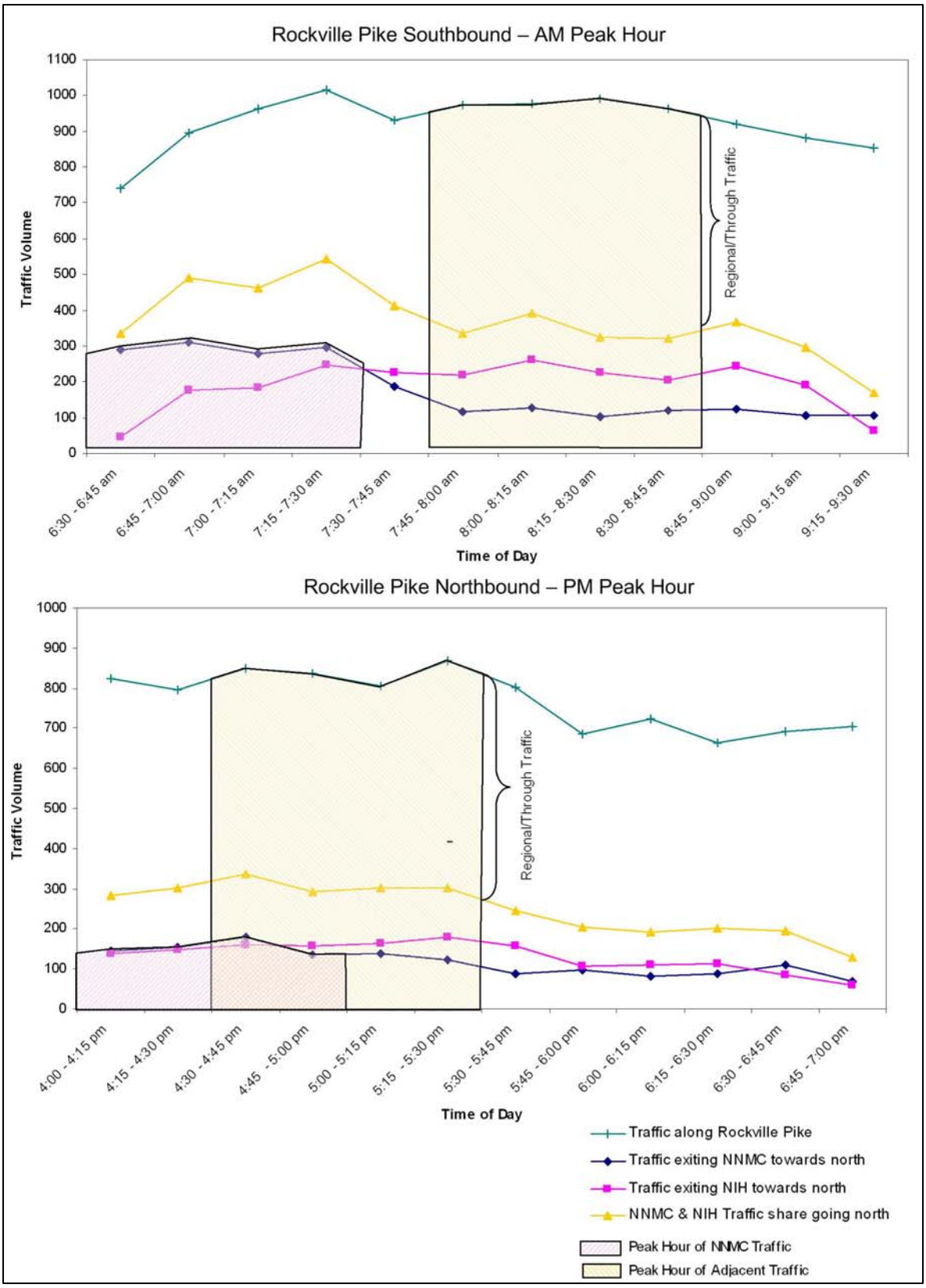

Figure 4 – Peak Hour Traffic Trends

2.4 Existing Capacity Analysis

Field observations were undertaken to enable an assessment of the existing traffic conditions along the roadways providing immediate access to the campus. In addition, peak period turning movement traffic counts were conducted from 6:30 - 9:30 AM and 4:00 - 7:00 PM at twenty seven (27) intersections. Other data collected at these intersections included traffic control devices, signal timings/phasing and lane configurations. A set of field activities was conducted over a three-week period during the months of September and October, 2006. This was followed by another set in March and April, 2007. The count sheets are included in the Appendix B.

Due to the extended study area, the peak hours of intersections within the study area varied widely as shown in Table 1. Hence individual intersection peak hour volumes were considered for analysis purposes. It should be noted that the volumes were not balanced between adjacent intersections to compensate for constrained throughput due to congestion, in keeping with the M-NCPPC requirements. The existing morning and evening peak hour volumes at the twenty seven (27) study intersections are shown in Figures 5a & 5b on pages 15 and 16, respectively. Based on these volumes and other collected information as noted above, the capacity of the intersections was evaluated for both the AM and PM peak hours, using the Critical Lane Analysis Technique, as stipulated by the Montgomery County Local Area Transportation Review (LATR) Guidelines (M-NCPPC, 2004). The Critical Lane Analysis outputs an intersection Critical Lane Volume (CLV) which is then compared against the CLV standard[1] for that jurisdiction. The capacity analysis results are summarized in Table 2 on pages 17 and 18, respectively. This table also provides corresponding Level of Service (LOS) results. The capacity analysis worksheets and LOS figures are included in the Appendix C.

The capacity analysis results show that all study area intersections and campus access points operate within the applicable CLV standards except:

- Rockville Pike and Cedar Lane (CLV:2011) during AM peak
- Rockville Pike and Cedar Lane (CLV:1702) during PM peak
- Jones Bridge Road and Connecticut Avenue (CLV:1927) during PM peak

[1] CLV Standard – refers to the maximum acceptable critical lane volume threshold for a given intersection established by M-NCPPC TPD staff.

Table 1 – Intersection Peak Hours of Traffic

Study Intersection	AM Peak	PM Peak
Rockville Pike and Tuckerman North	7:45 - 8:45	5:30 - 6:30
Rockville Pike and Tuckerman South	7:30 - 8:30	5:15 - 6:15
Rockville Pike and Grosvenor Lane	7:30 - 8:30	5:00 - 6:00
Rockville Pike and Pooks Hill Road	7:45 - 8:45	5:30 - 6:30
Rockville Pike and Cedar Lane	7:30 - 8:30	4:30 - 5:30
Old Georgetown Road and West Cedar Lane	8:00 - 9:00	5:30 - 6:30
West Cedar Lane and West Drive	7:45 - 8:45	4:45 - 5:45
Rockville Pike and North Drive	8:00 - 9:00	4:15 - 5:15
Rockville Pike and North Wood Road	7:15 - 8:15	5:15 - 6:15
Rockville Pike and Wilson Drive	7:30 - 8:30	5:15 - 6:15
Rockville Pike and South Drive	7:30 - 8:30	5:15 - 6:15
Rockville Pike and Jones Bridge Road	8:00 - 9:00	5:15 - 6:15
Jones Bridge Road and Gunnell Road	8:15 - 9:15	4:30 - 5:30
Jones Bridge Road and Grier Road	8:15 - 9:15	5:00 - 6:00
Jones Bridge Road and University Road	8:15 - 9:15	4:45 - 5:45
Connecticut Avenue and Jones Bridge Road	8:00 - 9:00	4:15 - 5:15
Jones Bridge Road and Kensington Parkway	7:45 - 8:45	5:30 - 6:30
Jones Bridge Road and Manor Road	8:15 - 9:15	4:45 - 5:45
Jones Mill Road and Jones Bridge Road	8:00 - 9:00	4:45 - 5:45
East - West Highway and Jones Mill Road	7:45 - 8:45	5:45 - 6:45
Rockville Pike and Woodmont Avenue	8:00 - 9:00	4:45 - 5:45
Wisconsin Avenue and Battery Lane	8:00 - 9:00	5:00 - 6:00
Wisconsin Avenue and Cordell Avenue	8:00 - 9:00	5:45 - 6:45
Wisconsin Avenue and Cheltenham Drive	8:15 - 9:15	5:00 - 6:00
Woodmont Avenue and Battery Lane	8:30 - 9:30	5:15 - 6:15
Woodmont Avenue and Cordell Avenue	8:30 - 9:30	5:30 - 6:30
Woodmont Avenue and St. Elmo Avenue	8:15 - 9:15	5:15 - 6:15

Source: G/SA traffic counts

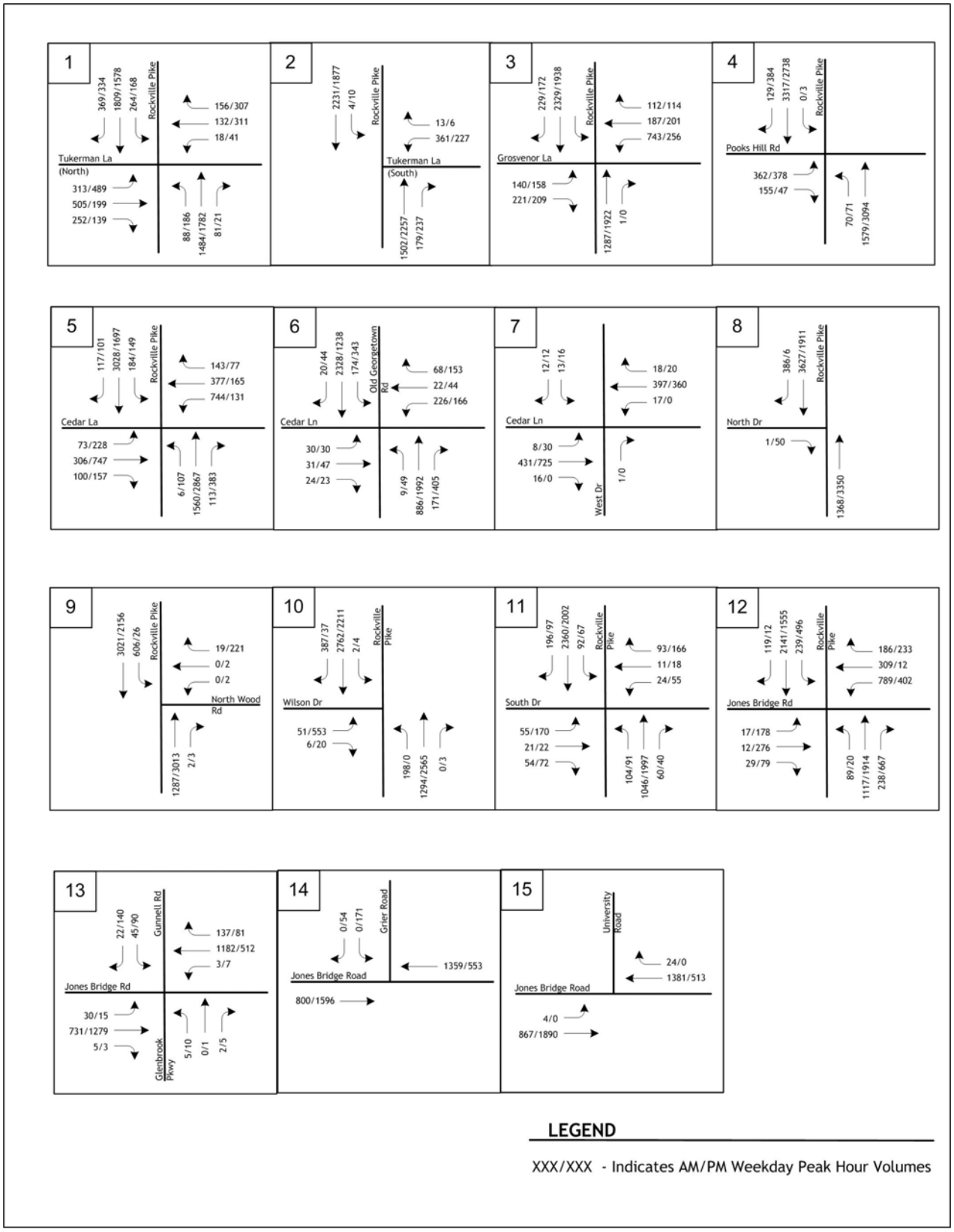

Figure 5a – Existing Peak Hour Volumes

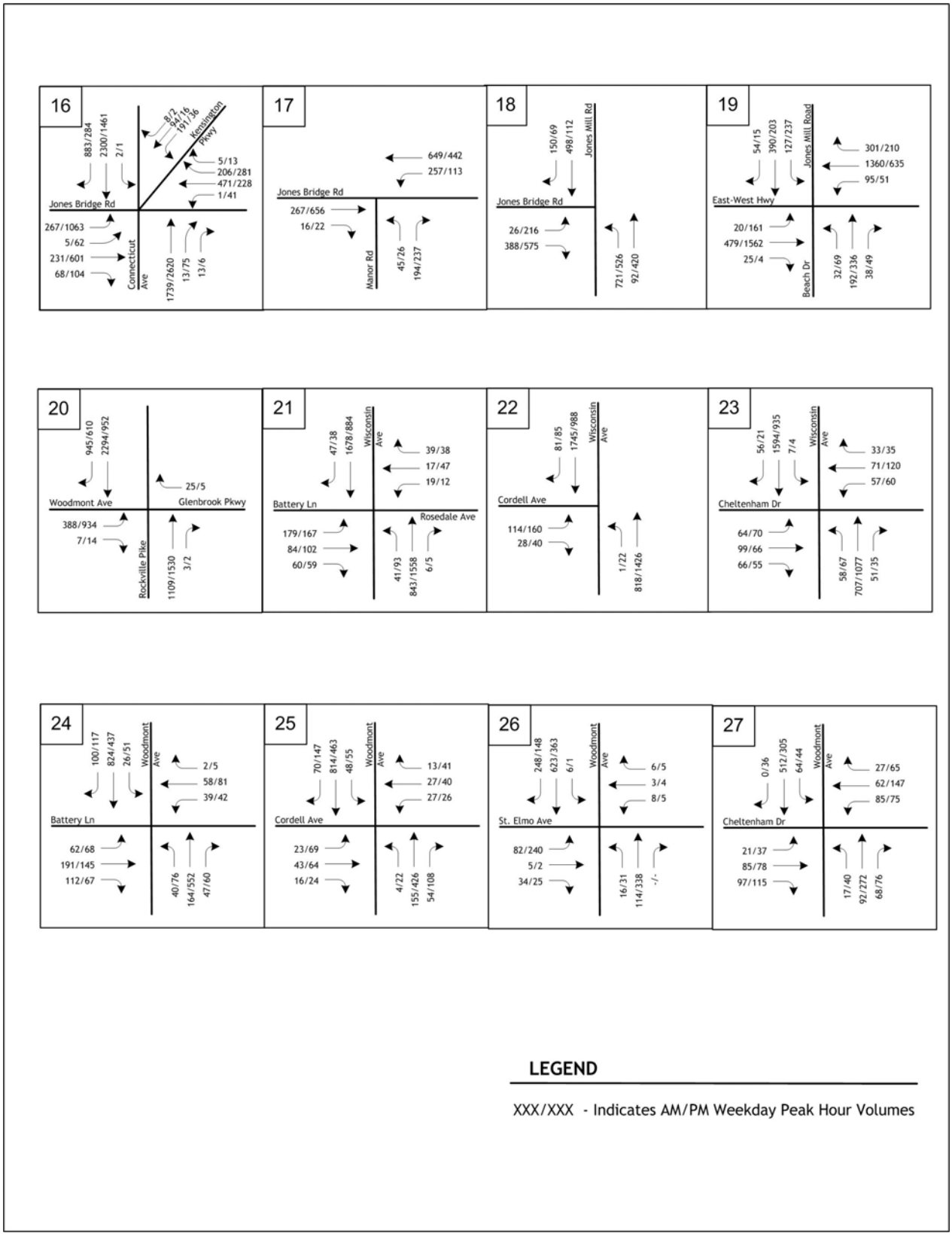

Figure 5b – Existing Peak Hour Volumes

Table 2 – Existing Capacity Analysis Results

Ref. #	Intersection	AM Peak		PM Peak		CLV STD.	Policy Area
		CLV	LOS	CLV	LOS		
1	Rockville Pike &Tuckerman north	1216	C	1255	C	1550	North Bethesda
2	Rockville Pike &Tuckerman south	1017	A/B	965	A	1550	North Bethesda
3	Rockville Pike & Grosvenor Lane	1256	C	1002	A/B	1550	North Bethesda
4	Rockville Pike & Pooks Hill Road	1489	E	1348	D	1600	Bethesda/Chevy Chase
5	Rockville Pike & West Cedar Lane	2011	F	1702	F	1600	Bethesda/Chevy Chase
6	Old Georgetown Road &West Cedar Lane	1189	C	1496	E	1600	Bethesda/Chevy Chase
7	West Cedar Lane & West Drive	448	A	438	A	1600	Bethesda/Chevy Chase
8	Rockville Pike & North Drive	1486	E	1240	C	1600	Bethesda/Chevy Chase
9	Rockville Pike & North Wood Road	1137	B/C	1337	D	1600	Bethesda/Chevy Chase
10	Rockville Pike & Wilson Drive	1415	D	1502	E	1600	Bethesda/Chevy Chase
11	Rockville Pike & South Wood Road	1150	B/C	1135	B/C	1600	Bethesda/Chevy Chase
12	Rockville Pike & Jones Bridge Road	1347	D	1598	E/F	1600	Bethesda/Chevy Chase
13	Jones Bridge Road & Gunnell Road	801	A	926	A	1600	Bethesda/Chevy Chase
14	Jones Bridge Road & Grier Road	721	A	1071	B	1600	Bethesda/Chevy Chase
15	Jones Bridge Road & University Road	736	A	1002	A/B	1600	Bethesda/Chevy Chase
16	Connecticut Avenue & Jones Bridge Road	1437	D/E	1927	F	1600	Bethesda/Chevy Chase
17	Jones Bridge Road & Manor Road	694	A	795	A	1600	Bethesda/Chevy Chase
Ref. #	Intersection	AM Peak		PM Peak		CLV STD.	Policy Area
		CLV	LOS	CLV	LOS		
18	Jones Bridge Road & Jones Mill Road	1245	C	854	A	1600	Bethesda/Chevy Chase
19	East - West Highway & Jones Mill Road	1163	B/C	1452	D/E	1600	Bethesda/Chevy Chase
20	Rockville Pike & Woodmont Avenue	1054	B	1067	B	1600	Bethesda/Chevy Chase

21	Rockville Pike & Battery Lane	886	A	846	A	1800	Bethesda CBD
22	Rockville Pike & Cordell Avenue	737	A	621	A	1800	Bethesda CBD
23	Rockville Pike & Cheltenham Drive	957	A	725	A	1800	Bethesda CBD
24	Woodmont Avenue & Battery Lane	762	A	592	A	1800	Bethesda CBD
25	Woodmont Avenue & Cordell Ave	582	A	528	A	1800	Bethesda CBD
26	Woodmont Avenue & St. Elmo Drive	568	A	544	A	1800	Bethesda CBD
27	Woodmont Avenue & Cheltenham Drive	576	A	552	A	1800	Bethesda CBD

Source: G/SA capacity Analysis
Ref. # = Reference Number (See Figures 5a and 5b)
CLV = Critical Lane Volume
LOS = Level of Service
CLV STD. = Critical Lane Volume Standard

2.5 Travel Time and Delay Survey

Travel time runs were conducted in May, 2007 for the morning and evening peak periods along various corridor sections of the study area. A map showing the travel time run locations is attached in Appendix D.

Figure 6 shows the actual travel times versus ideal travel times (with free flow speed) along the Rockville Pike corridor between Tuckerman Lane (North) and East-West Highway. These times relate to travel time runs done in the southbound direction during the morning peak hour and in the northbound direction during the evening peak hour. Table 3 summarizes the travel time survey results. It can be interpreted from the results that the northbound MD 355 is more congested in the evening peak hour than the southbound MD 355 in the morning peak hour. Jones Bridge Road westbound is more congested in the morning than in the evening. Similarly, the Connecticut Avenue southbound is more congested southbound during the morning peak compared to northbound during the evening peak hour. I - 495 eastbound is extremely congested in the evening peak period. The detailed survey tables and graphs for all the locations listed below are also included in Appendix D.

Table 3 – Travel Time Survey Results

Corridor (Peak Period)	Corridor Length (miles)	Average Travel Time (mins)	Average Delay (mins)	Design Speed (mph)	Average Speed (mph)
MD 355 Southbound (AM)	3.26	13.4	8.2	35	14.59
MD 355 Northbound (PM)	3.1	21.15	16.2	35	8.8
Jones Bridge Road Westbound (AM)	1.71	10.25	7.32	35	10
Jones Bridge Road Eastbound (PM)	1.73	7.73	4.76	35	13.44
Old Georgetown Rd. to Cedar Lane to MD 355 (AM)	1.56	5.65	2.94	35	16.58
MD 355 to Cedar Lane to Old Georgetown Rd. (PM)	1.56	5.17	2.46	35	18.13
Connecticut Avenue Southbound (AM)	1.39	5.47	3.08	35	15.26
Connecticut Avenue Northbound (PM)	1.38	5.13	2.76	35	16.19
I- 495 Eastbound (AM)	8.06	10.35	1.55	55	46.72
I- 495 Westbound (AM)	8.09	9.57	0.73	55	50.74
I- 495 Eastbound (PM)	8.06	43.12	34.31	55	11.22
I- 495 Westbound (PM)	8.09	9.88	1.05	55	49.11

Source: G/S A Travel Time Survey

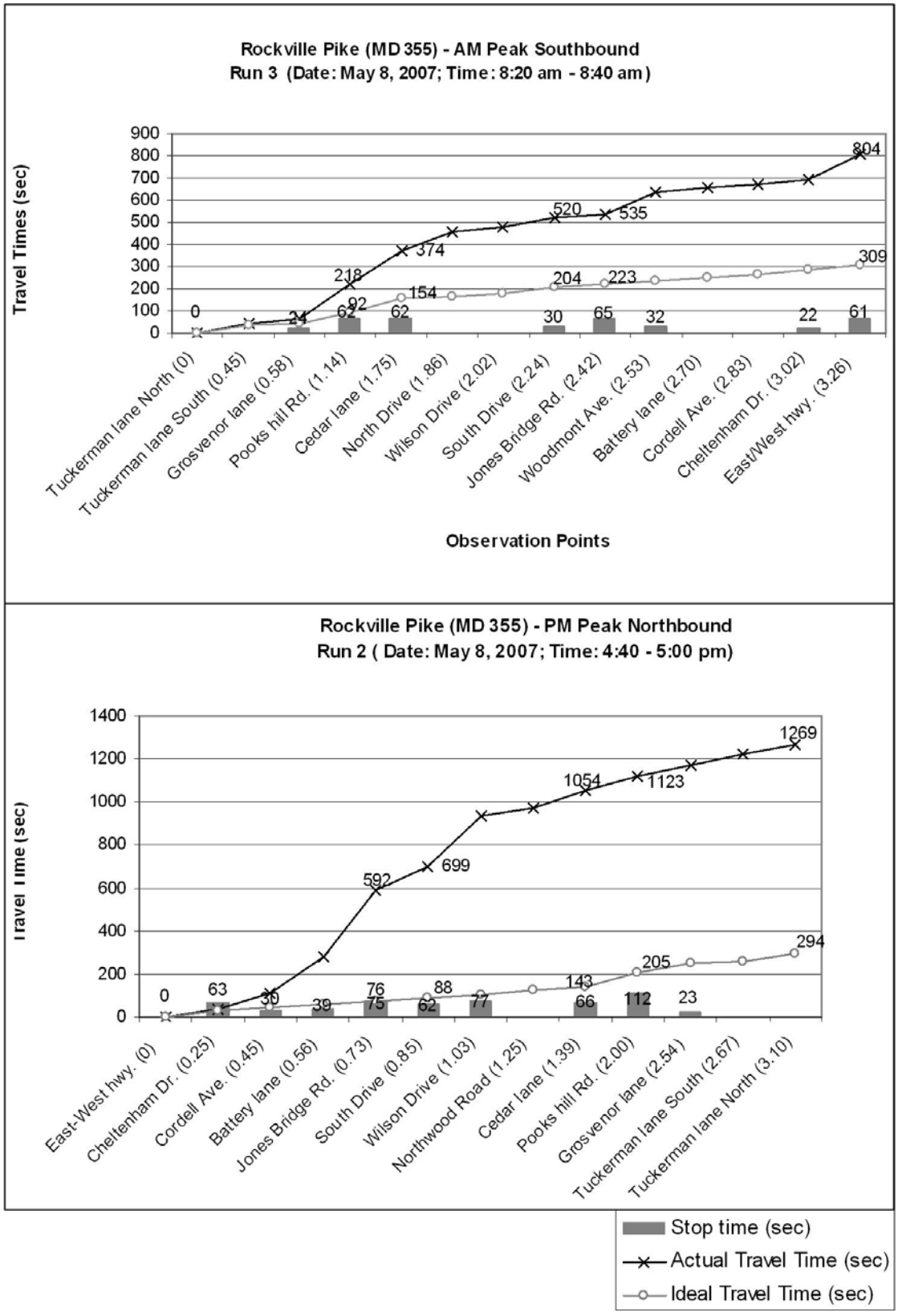

Figure 6 – Travel Time Graphs – Rockville Pike

2.6 Truck Access and Circulation Patterns

Truck deliveries to NNMC involve primarily mail trucks (UPS, US Postal Service), 18 wheeler trucks (Beverages, Supplies), box trucks (Bread, Medical Supplies), fuel trucks (Gasoline, Kerosene) and construction vehicles (dump trucks). NNMC receives an average of 84 commercial vehicles per day and 44% of these vehicles arrive between 10:00 am to 2:00 pm. Figure 7 graphically illustrates the average daily truck deliveries.

Typically trucks access NNMC campus via its South Gate. In cases of emergency, truck access is provided at the Navy Exchange Gate. However during 2007 NNMC has used both University Road Gate and Grier Road Gate for Truck Traffic. This is to evaluate the impact on safety and the possibility of creating a new security truck inspection station at other locations or using the truck inspection station at NIH. The main loading dock destinations within the campus are located at Buildings 54/55. Figure 8 shows the loading dock locations and the associated truck routes.

The roadways surrounding NNMC campus are also major truck routes. G/SA collected volume classification counts from State Highway Administration (SHA) traffic count library and conducted its own automatic traffic recorder counts in June of 2007. The truck percentages on the roadways surrounding NNMC campus are shown in Table 4. The data shows that trucks constitute a significant proportion of the peak hour traffic on the adjacent roadways.

Table 4 – Truck Traffic Percentage – Adjacent Roadways

Location	AM Peak Hour	PM Peak Hour
Rockville Pike NB (0.1 miles north of Jones Bridge Road)*	18.80%	11.60%
Rockville Pike SB (0.1 miles north of Jones Bridge Road)*	15.30%	12.80%
Rockville Pike NB (0.1 miles north of I – 495)*	12.50%	9.50%
Rockville Pike SB (0.1 miles north of I – 495)*	11.80%	8.70%
Jones Bridge Road EB (bet. Gunnell and Grier Road)**	24.40%	24.40%
Jones Bridge Road WB (bet. Gunnell and Grier Road)**	20.90%	18.40%
I – 495 EB (0.2 miles east of MD 355)*	20.50%	16.70%
I – 495 EB (0.2 miles east of MD 355)*	20.70%	22.80%

Source:
* State Highway Administration (SHA) Traffic Count Data, Year 2006
** G/SA ATR Data, June, 2007.

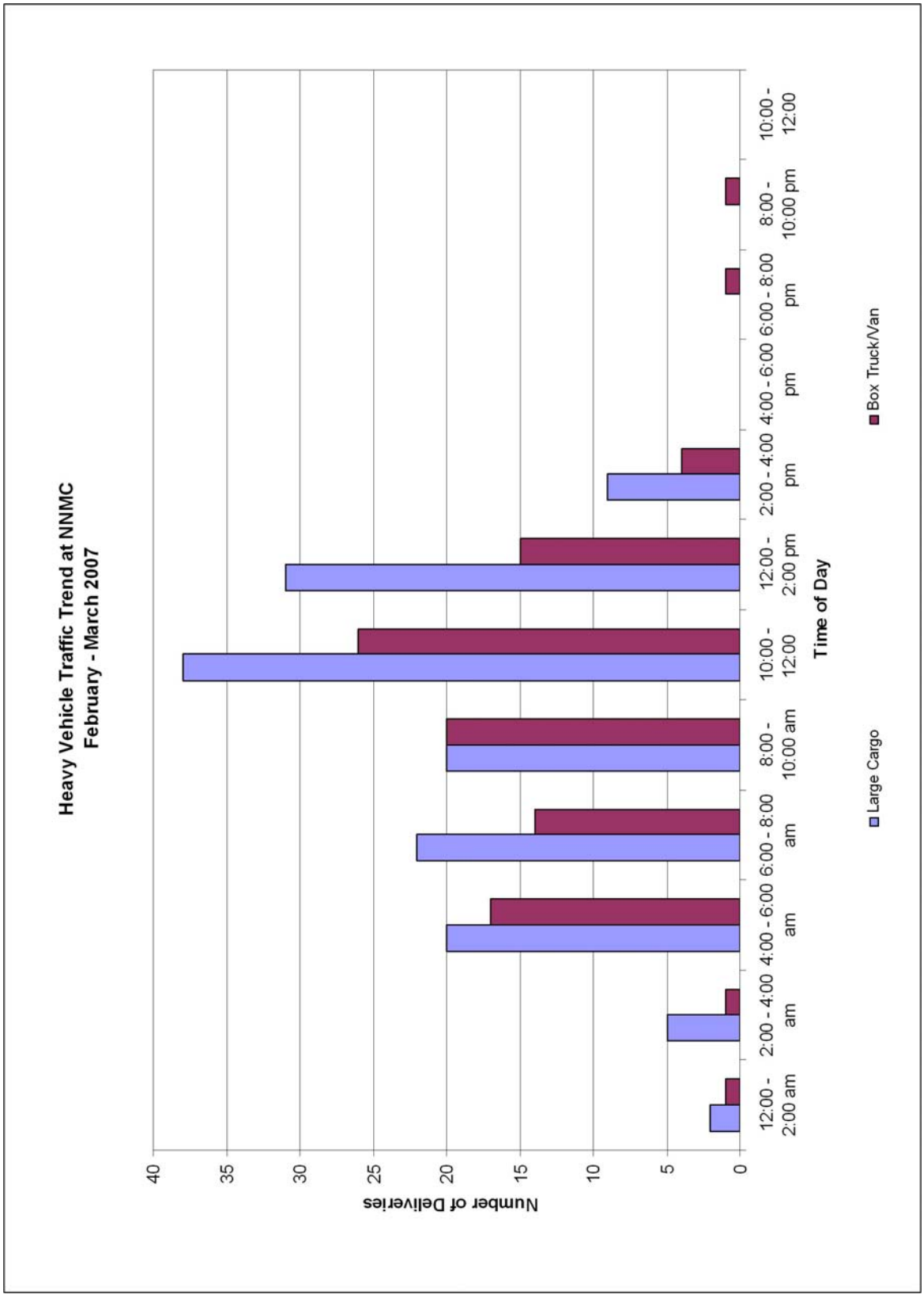

Figure 7 – Average Daily Truck Deliveries

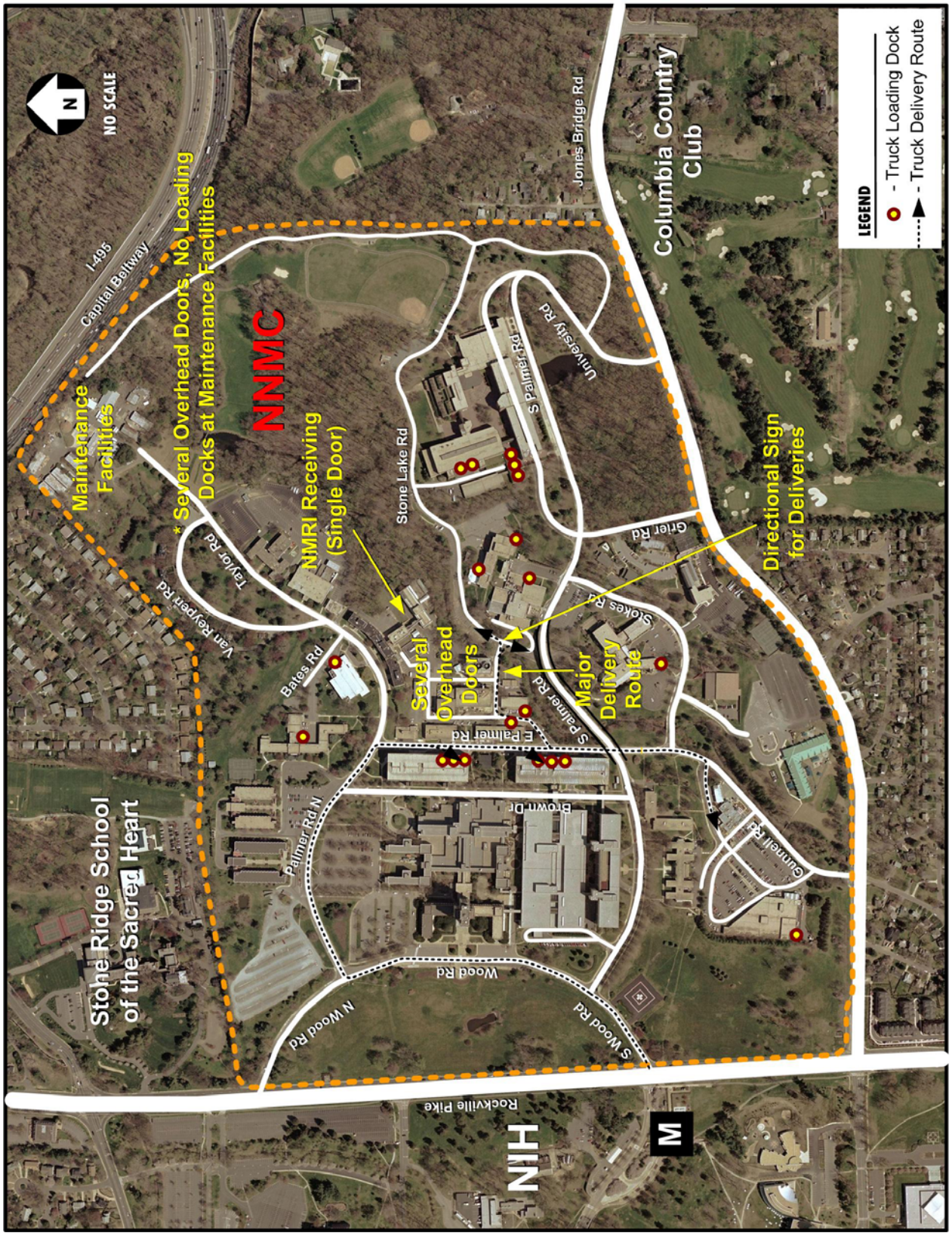

Figure 8 – Existing Loading Docks and Delivery Route

2.7 Traffic Safety

An assessment of the existing traffic safety situation within the study area was undertaken based on the following:

a) An inventory and evaluation of the pedestrian, bicyclist and transit facilities and services provided along the study area roadways, and

b) An analysis of the State accident data records for the study area intersections, considering the last four (4) years for which such data is available.

Item (a) was also necessary to provide a "Pedestrian Statement" in keeping with the requirements of the M-NCPPC Transportation Planning Division (see M-NCPPC scoping letter included as Appendix A). The inventory and evaluation found most of the facilities to be in good condition, function efficiently, provide for a high level of user safety and to be in compliance with the standards of the County and the American Association of State Highway and Transportation Officials (AASHTO). A detailed inventory and assessment document is provided as Appendix E of this report.

The main NNMC pedestrian/bicyclist access and circulation occurs along Rockville Pike between Cedar Lane and Jones Bridge Road, Jones Bridge Road between Rockville Pike and Connecticut Avenue and Cedar Lane between Rockville Pike and I-495. The highest pedestrian and bicyclist activities occur at the Medical Center metro station. Table 5 below presents a detailed inventory of existing sidewalk, crosswalk and pedestrian related signage conditions along these sections. Notable deficiencies along MD 355 and Jones Bridge Road, in the vicinity of NNMC, are narrow sidewalks without adequate buffer separation from adjacent traffic, utility poles obstructing pedestrian movements, lack of "zebra" striping at some major intersections, poorly marked crosswalks and lack of crosswalks at side streets and NNMC entrances. The pedestrian related signage is in good condition and well placed along all these routes.

Pedestrian volumes were collected concurrently with the vehicular turning movement counts conducted for the study area intersections. Figures 9 and 10 show the AM and PM peak hour pedestrian volumes, respectively. In the context of pedestrian safety, accident data was obtained for the study intersections, with respect to the last four years for which such data is available (2003 to 2006). This data is summarized in Table 6.

None of the intersections satisfy the following State criteria for classification as a Candidate Safety Improvement Location (CSIL):

1. Accident Frequency of 12 Accidents/year

2. Accident Rate of 1 accident per million entering vehicle (MEV) per year

Table 5 – Inventory of Existing Pedestrian Facilities

Roadway Segment	Sidewalk					Crosswalk Markings	Pedestrian-Related Signage Condition
	Width	General Condition	Buffer	ADA Compliant	ADA Compliant Intersection Curb Ramps		
Rockville Pike (between Jones Bridge Road and Cedar Lane)	Fair (8' west side; 3' – 5' east side)	Fair (good west side; poor east side)	Good west side; poor east side	Fair (effective sidewalk width mostly under 5' with utility poles obstructing pedestrian ROW on east side; grade issues on west side)	Fair (curb-ramps face crossings on west side; ramps on east side face center and are poorly maintained)	Fair (mostly "zebra" striped along west side; poorly marked crosswalk on east side of Jones Bridge at Wisconsin Ave; lack of "zebra" striping on Cedar Lane at Rockville Pike; NNMC entrances lack crosswalk striping)	Good
Jones Bridge Road (between Connecticut Avenue and Wisconsin Avenue)	Fair (4' – 6')	Good	Fair (no buffer between Connecticut Ave and Montrose Drwy)	Fair	Good	Fair (crosswalks at Connecticut Ave and Jones Bridge Road lack "zebra striping; side streets lack marked crosswalks)	Good
Cedar Lane (between I-495 and Rockville Pike)	Fair (5' – 6')	Fair (some sidewalk segments are uneven)	Poor**	Poor (grade issues, some rough pavement; utility poles blocking pedestrian ROW)	Poor	Fair (some side streets lack crosswalk markings, some crosswalks faded)	Good

Source: G/SA Field Survey

* Both FHWA and the Institute of Transportation Engineers (ITE) recommend a minimum width of 5 feet for a sidewalk or walkway, which allows two people to pass comfortably or to walk side by side.

** According to FHWA, a buffer zone of 4 to 6 feet is desirable and should be provided to separate pedestrians from street.

However four (4) intersections merit further consideration for remedial safety measures. These intersections and their safety characteristics are presented below:

1. Cheltenham Drive @ Rockville Pike (MD 355)

- The site reconnaissance shows poorly marked east and west crosswalks.

- Pedestrian volumes are high in both AM and PM peaks.

- Accident history shows an accident rate of 0.54 per million entering vehicles, with three (3) pedestrian accidents (2 in 2003 and 1 in 2006).

2. South Drive @ Rockville Pike (MD 355)

- Site reconnaissance shows poor/inadequate sidewalk conditions on the east side of Rockville Pike.

- Pedestrian volume data shows high volumes of pedestrians in both AM and PM peaks.

- Accident history shows an accident rate of 0.44 per million entering vehicles, with six (6) pedestrian related accidents (1 each in 2003, 2004 and 2 each in 2005, 2006).

3. Center Drive (Jones Bridge Road) @ Rockville Pike (MD 355)

- Site reconnaissance shows poorly marked east crosswalk and poor/inadequate sidewalk conditions on the northeast corner of the intersection.

- Pedestrian volume data shows moderate volumes of pedestrians in both AM and PM peaks.

- Accident history shows an accident rate of 0.36 per million entering vehicles with two (2) pedestrian related accidents (1 in 2003 and 1 in 2006).

4. Cordell Avenue @ Rockville Pike (MD 355)

- Site reconnaissance shows poorly marked west crosswalk.

- Pedestrian volume data shows moderate volumes of pedestrians in both AM and PM peaks.

- Accident history shows an accident rate of 0.28 per million entering vehicles with two (2) pedestrian related accidents (1 in 2005 and 1 in 2006).

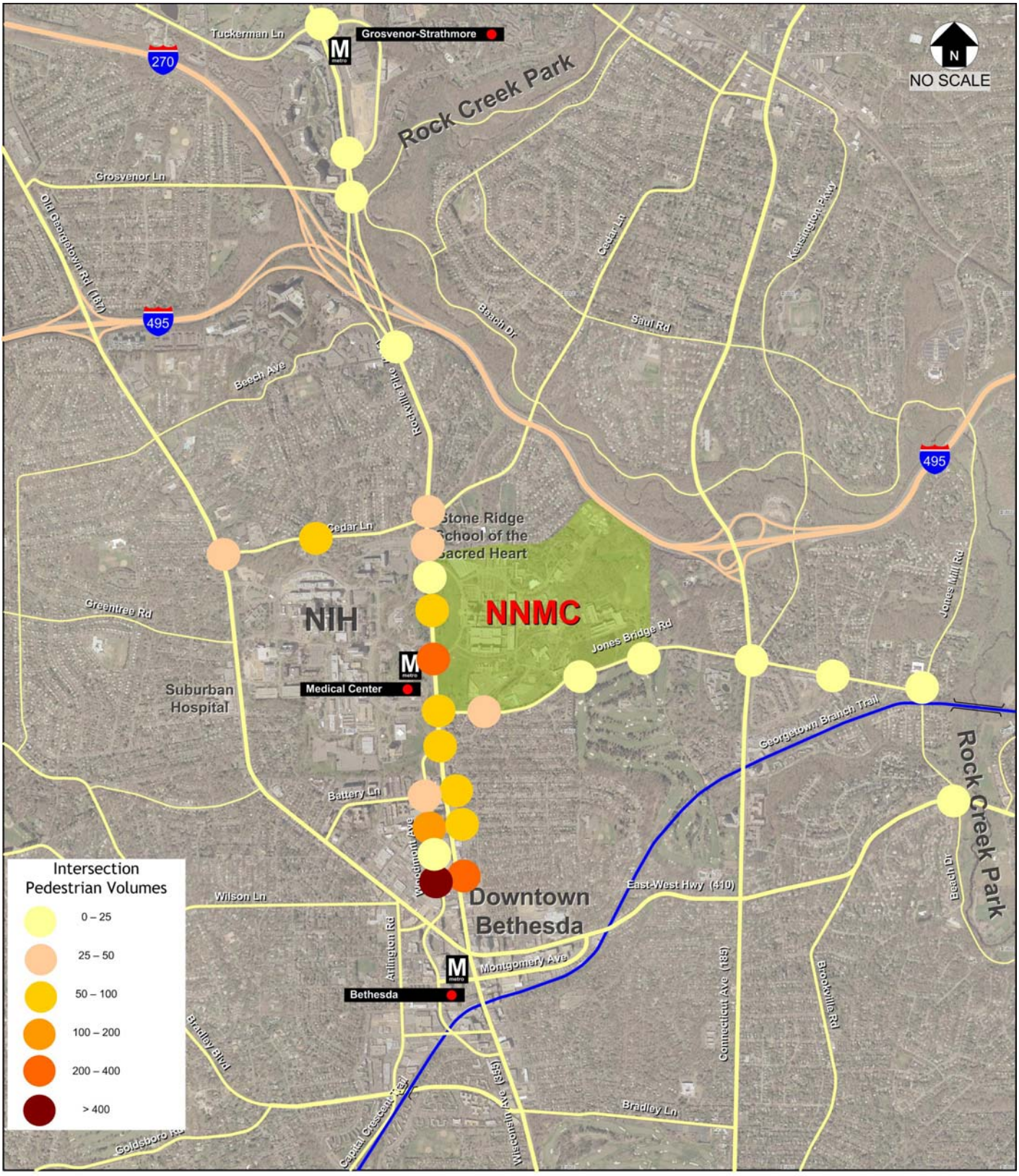

Figure 9 – Pedestrian Volumes – AM Peak Hour

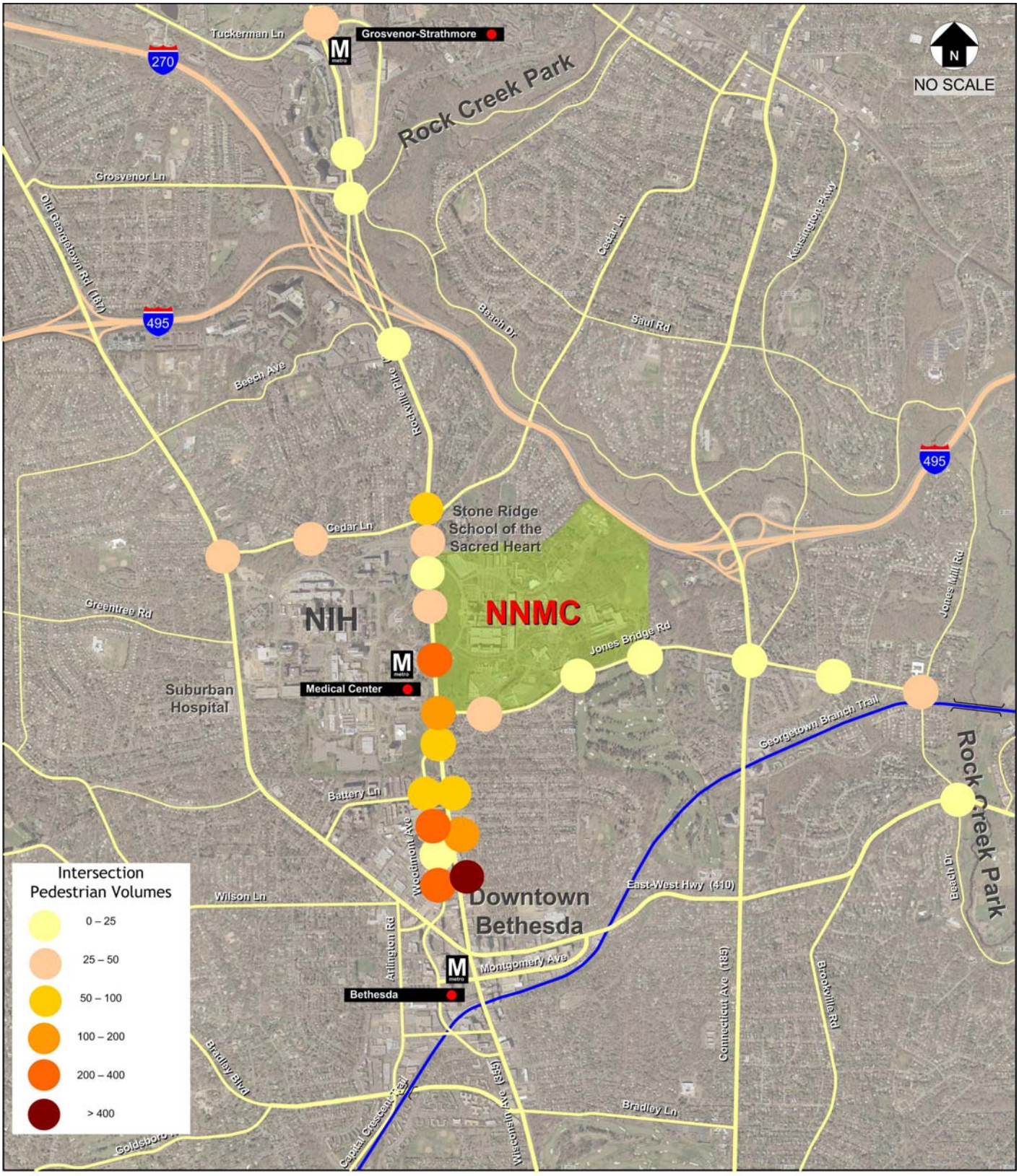

Figure 10 – Pedestrian Volumes – PM Peak Hour

Table 6 – Accident Data Summary

Intersection	Year				Total	Avg./ Year	Accident Rate	Dominant Type	Pedestrian Related
	2003	2004	2005	2006					
Rockville Pike (MD 355) @									
Cheltenham	9	5	3	3	20	5	0.54	Left Turn (8)	3 (2 in 2003 and 1 in 2006)
Cordell	2	2	6	1	11	2.75	0.28	Rear End (3) Angle (3)	2 (1 in 2005 and 1 in 2006)
Battery Lane	5	2	1	2	10	2.5	0.23	Rear End (4)	---
Woodmont Avenue	10	13	7	7	37	9.25	0.63	Rear End (29)	1 (in 2006)
Jones Bridge Road	10	9	8	4	31	7.75	0.36	Rear End(14)	2 (1 in 2003 and 1 in 2006)
South Drive	11	6	9	5	31	7.75	0.44	Left Turn (11)	6 (1 each in 2003 & 2004, 2 each in 2005 & 2006)
Wilson Drive	4	2	8	0	14	3.5	0.20	Rear End (10)	---
North Drive	1	1	0	1	3	0.75	0.04	none	1 (in 2004)
Cedar Lane	9	9	13	3	34	8.5	0.34	Rear End (18)	---
Pooks Hill Road	10	4	2	5	21	5.25	0.21	Rear End (12)	---
Grosvenor Lane	10	16	18	7	51	12.75	0.70	Angle (26)	1 (in 2003)
Tuckerman Lane (south)	13	7	7	4	31	7.75	0.46	Rear End (14)	---
Tuckerman Lane (north)	7	9	8	2	26	6.5	0.32	Rear End (12)	---
from Woodmont Avenue to Cedar Lane	64	58	63	28	213	53.25	---	Rear End (119)	11 (3 in 2003, 2 in 2004,2 in 2005, 4 in 2006)
from Cedar Lane to I-495	43	36	46	20	145	36.25	---	Rear End (76)	---
from Woodmont Avenue to Tukerman Lane (north)	149	132	145	67	493	123.25	---	Rear End (248)	16 (5 in 2003, 3 in 2004, 3 in 2005, 5 in 2006)
Jones Bridge Road @ Connecticut Avenue	5	14	7	5	31	7.75	0.30	Rear End (18)	---
Old Georgetown Road @ Cedar Lane	8	3	1	3	15	3.75	0.23	Rear End (9)	2 (in 2003)
East-West Hwy. @ Jones Mill Road/ Beach Drive.	5	6	3	3	17	4.25	0.33	Left Turn (7)	1 (in 2006)

Source: State Highway Administration, Accident Data

2.8 Public Transportation

The NNMC is well served by public transportation facilities as shown in Figure 11. The campus is located at the Medical Center Metrorail Station on the Red Line of the Washington Metropolitan Area Transit Authority (WMATA). The station is also a major stop/transfer point for several WMATA and Montgomery Ride-On bus routes. This station opens at 5:00 am on weekdays and at 7:00 am on weekends; and closes at 12:30 am from Sunday through Thursday, and at 3:30 am on Friday and Saturday. The trains operate with headways of 3 to 6 minutes during the peak weekday morning and afternoon periods, and with headways of 6 to 15 minutes during the weekday off-peak periods. The current number of weekday boardings/alightings at this station is 5,100, representing an 88% increase since the opening of the station in 1985. During the weekday morning peak period (5:30 – 9:30 a.m.), approximately 2,845 riders use this station. A significant amount (1,780 or 63%) of those riders arrives at this station as their destination to work.

The Metrobus routes serving the campus are as follows:

- Route J1 route provides rush hour only service between the Silver Spring and NIH Medical Center Metro stations via Jones Bridge Road with 30 minute headways.

- Routes J2 and J3 routes offer through service between the Silver Spring Metrorail Station and Montgomery Mall with intermediate stops in the Bethesda CBD and at the NIH Medical Center Metro Station. These routes operate with 7-minute headways during peak hours, and 20-minute headways during off-peak hours.

- Routes J7 and J9 are the two new lines that comprise the "I-270 Express". They run between the Lake Forest Transit Center Station and the Bethesda Metro Station.

There are six (6) Ride-On Routes serving the Medical Center Metro Station. These are as follows:

- Route 30 is a local collector route that circles through the neighborhoods before terminating at the Bethesda Metro Station.

- Route 33 and 34 provide rush hour only service to Wheaton Plaza from several areas.

- Route 42 provides service to Friendship Heights via Woodmont and Wisconsin Avenues.

- Route 46 connects NNMC with Rockville via Rockville Pike, with 20-minute headways and primarily serves as a feeder to the Metrorail Stations along this route.

- Route 70 is an express service running between the Germantown Milestone park-and-ride lot and Bethesda.

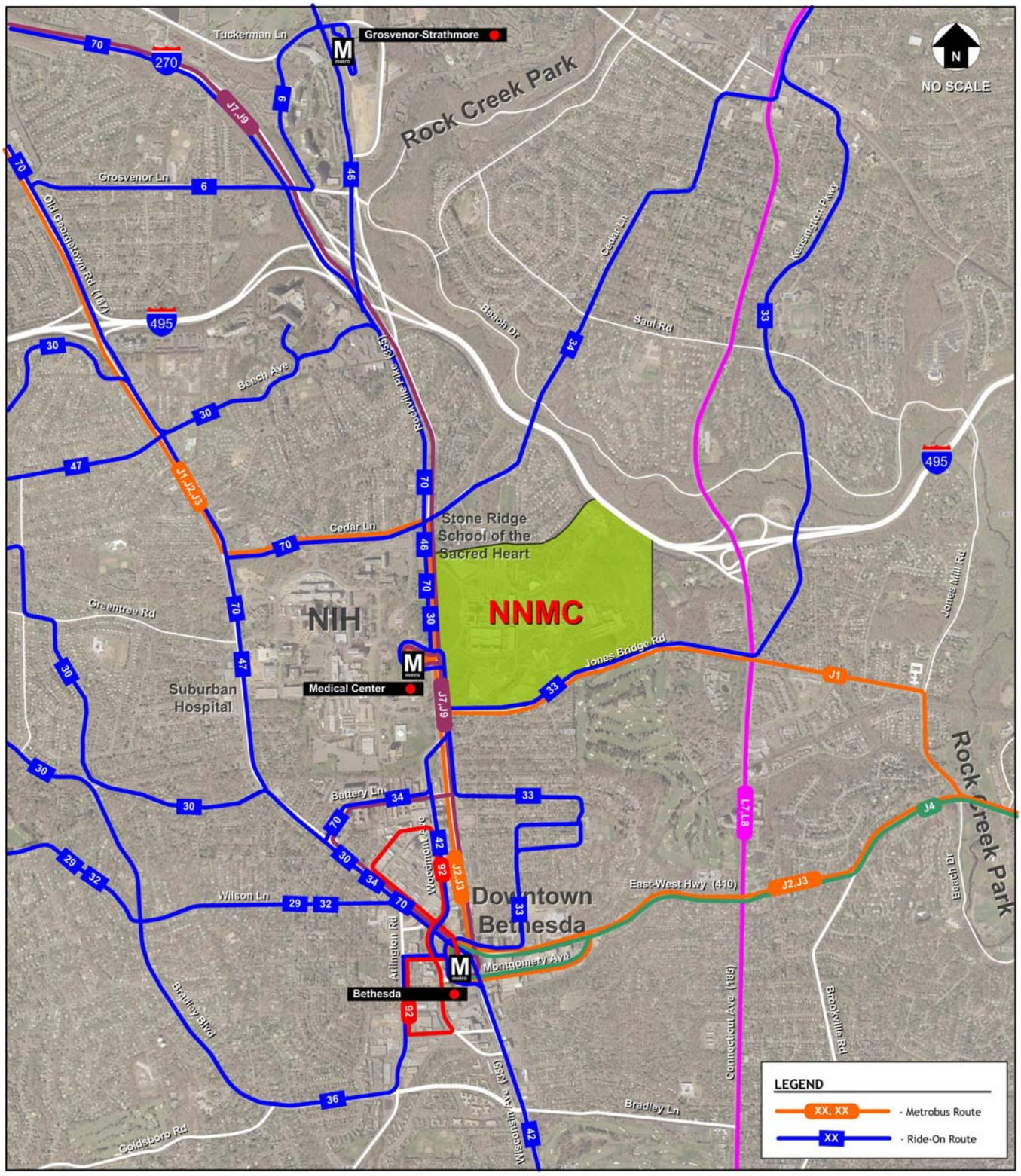

Figure 11 – Existing Transit Facilities Serving the NNMC Campus

Heavy rail commuter service is available via the Maryland Rail Commuter (MARC) "Brunswick" line. Trains originate from Martinsburg in West Virginia, or Brunswick and Frederick in Maryland, and travel to Union Station in Washington, D.C. in the AM hours with reverse movements occurring in the evening. MARC currently operates nine (9) trains inbound to Washington in the morning and ten (10) trains outbound in the evening. All trains stop in Rockville about six miles to the north of the NNMC Bethesda campus, where a connection can be made to the Metro Red Line.

The NNMC provides Metrochecks to its military and civilian employees under The USDOT Mass Transportation Fringe Benefit (MTFB) Program. Metrochecks with a maximum value of $100 per month are provided to each employee registered for the program. As of November 1, 2006, at least 1,923 NNMC employees and 1,410 Walter Reed employees were registered in this program. The Metrochecks can be used towards expenses incurred in any mass transit to and from work such as the Metrorail, Metrobus, MARC Train and registered van pools. However, an MTFB program member is not permitted to park any car in the NNMC campus and is instructed to remove any previously held parking sticker from the vehicle.

NNMC Shuttle Services

NNMC operates two shuttle bus lines. The shuttle base service was started because more than half the base is beyond the 2,000 feet walking distance from current Metrorail Station entrance/exit which is National Capital Planning Commission (NCPC) criteria for acceptable walking distance.

The Blue Line shuttle begins at the Metro Station and runs primarily along South Palmer Drive, branches out on Stokes Road, loops around the Child Development Center (Day Care) and returns back to South Palmer Drive and continues down to loop around the USUHS underground garage. The ridership data for this line was obtained from NNMC authorities. The average monthly and daily ridership, during a seven-month period in 2004, were 2,360 and 136, respectively.

The Gold Line shuttle also begins at the Metro Station and runs along South Palmer Drive, branches out at Brown Drive, joins onto Taylor Road, continues towards the Research Institute to loop around the Navy Call Center and Health Services Building, before retracing its path back to South Palmer Drive, from where it branches out to Stokes Road and loops around the Child Development Center before returning back to the starting point. The average monthly and daily ridership, during a seven-month period in 2004, were 3,000 and 143, respectively. The NNMC Shuttle bus routes are shown in Figure 12.

The NNMC is also accessed by shuttle bus services operated by other Department of Defense (DOD) agencies. These include the Walter Reed Army Medical Center, Annapolis Naval Station, Patuxent River and Naval Air Station and Quantico Marine Corps Base.

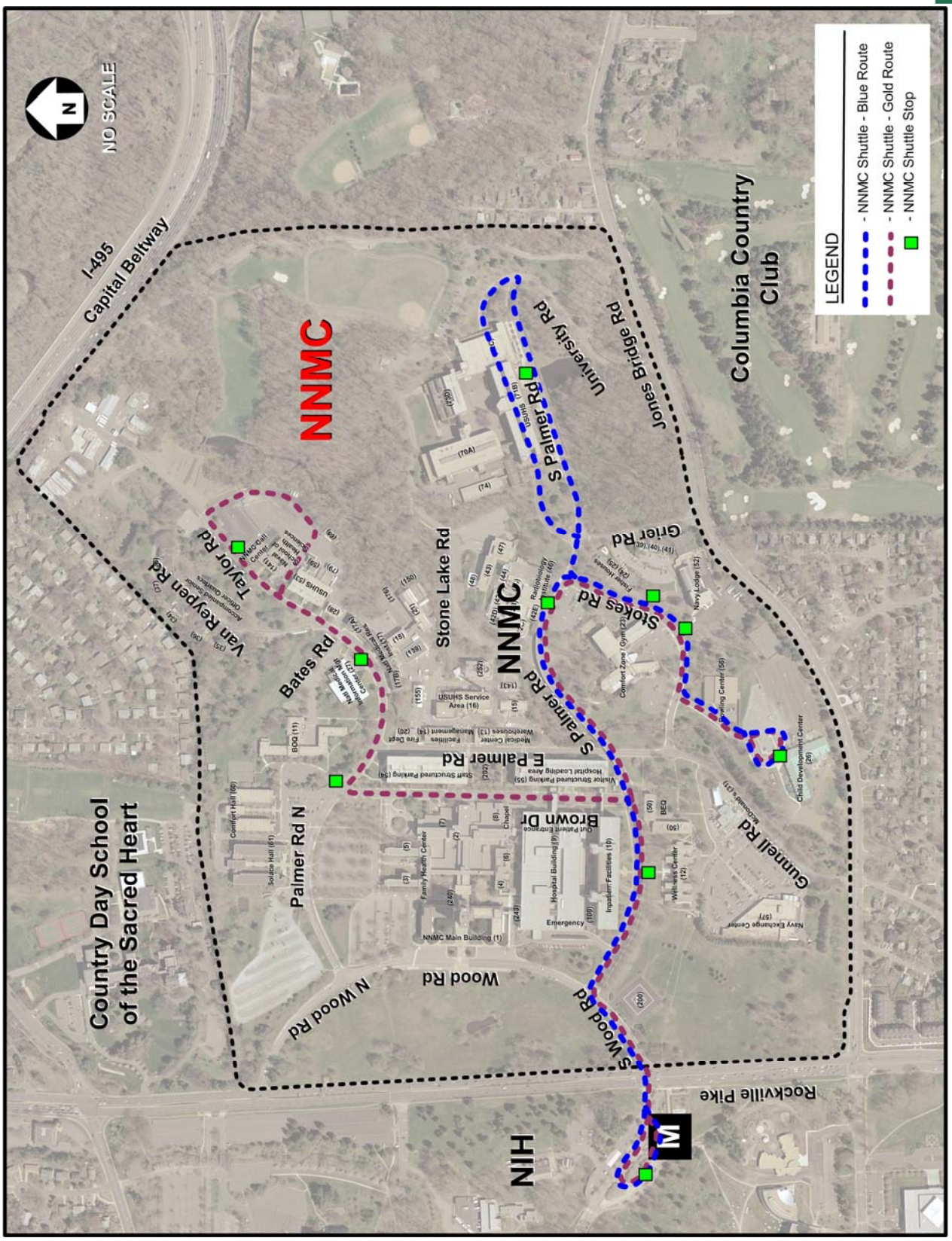

Figure 12 – Existing Shuttle Bus Services within NNMC Campus

2.9 Existing Parking on Campus

Inventories and occupancy surveys were conducted during the late September-October period to assess the existing campus parking situation. The campus has a total of 6,123 parking spaces, which are distributed among several surface lots, garages and on-street areas. The locations of the campus parking facilities are illustrated in Figure 13. The numerical breakdown of the total supply by facility type is presented in Table 7.

Table 7 – Parking Space Distribution by Facility Type

Structured Parking	3,074	(50%)
Surface Parking Lot	2,915	(48%)
On-Street Parking	134	(2%)
TOTAL	6,123	(100%)

A breakdown of the parking spaces by user category is presented in Table 8 following.

Table 8 – Parking Space Distribution by Designation

	Structured Parking				Surface Parking				On-Street				
User Category	**Reg.**	**Res.**	**Hdicp.**	**Tot.**	**Reg.**	**Res.**	**Hdicp**	**Tot.**	**Reg**	**Res**	**Hdicp**	**Tot**	**Total**
Employee/Patient	1176	195	66	1,437	1,682	40	41	1,763	123	0	4	127	**3,327**
Visitor	407	33	26	466	685	30	11	726	0	0	0	0	**1,192**
Resident	N/A	N/A	N/A	0	N/A	N/A	N/A	0	N/A	N/A	N/A	0	**0**
USUHS	974	62	32	1,068	32	0	1	33	0	0	0	0	**1,101**
Contractor	96	0	0	96	340	26	14	380	3	0	0	3	**479**
Others (Fire Dept., Police, Govt. Vehicles)	0	7	0	7	0	13	0	13	0	4	0	4	**24**
Total	2,653	297	124	3,074	2,739	109	67	2,915	126	4	4	134	**6,123**

N/A - Not Available; Reg. - Regular; Res. - Reserved; Hdicp. - Handicap; Tot. - Total

(Source: G/S A Field Survey)

The results, of the occupancy survey undertaken, indicate that 4,685 spaces were occupied during the morning peak period. This is equivalent to a peak occupancy rate of seventy-seven percent (77%).

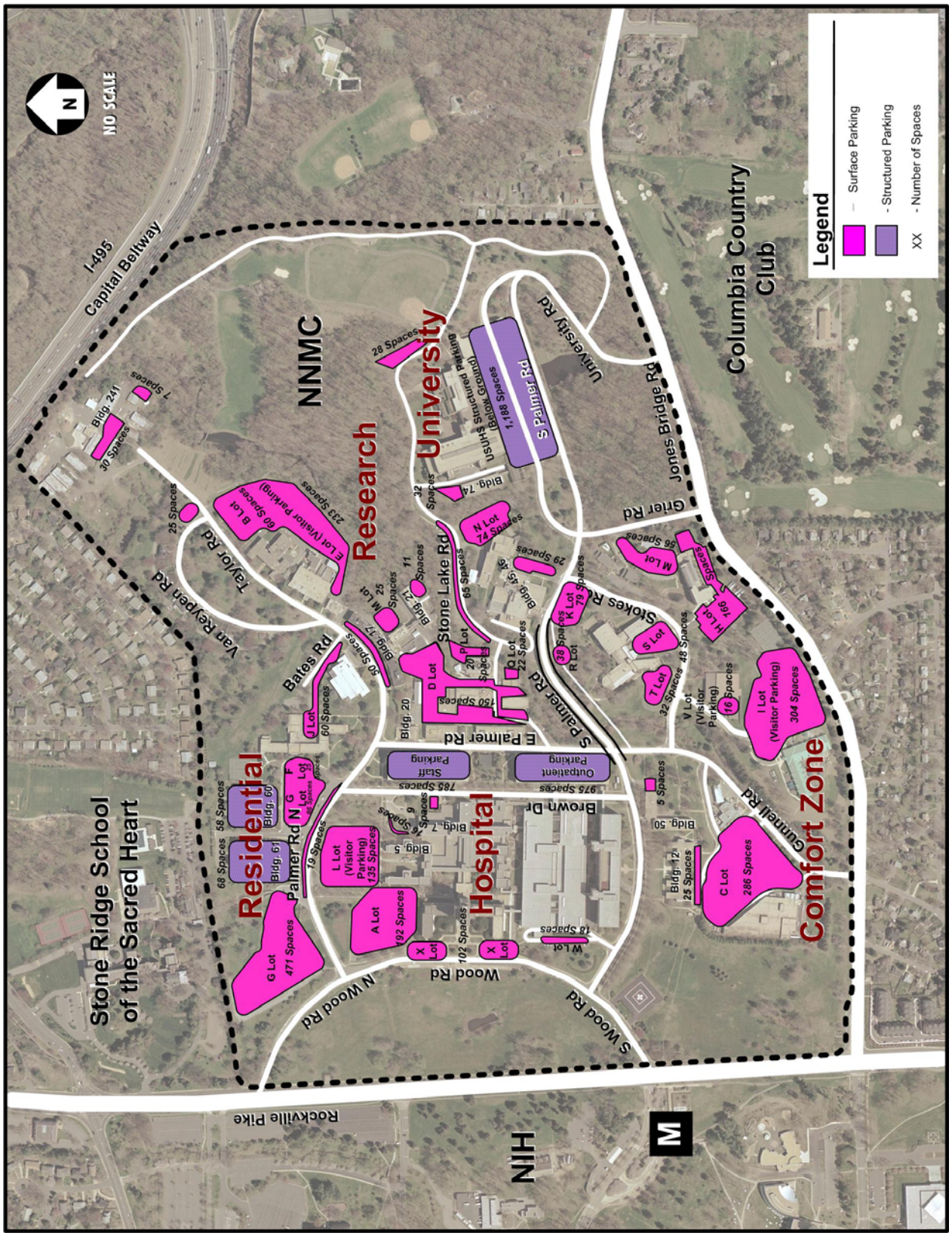

Figure 13 – Existing Distribution of Parking within Campus

3.0 FUTURE BACKGROUND CONDITIONS (YEAR 2011)

The Future Background situation represents future traffic levels in 2011 without the proposed BRAC Action. In order to develop the background traffic forecasts, the existing traffic and traffic generated by planned area developments (anticipated to be built by year 2011) were combined. The background traffic situation also includes planned and programmed roadway improvements that can influence the capacity of study area intersections and/or influence travel patterns.

3.1 Background Developments

The planned developments considered in the traffic forecasts were identified by the M-NCPPC Transportation Planning Division as a part of the study scoping process (See Appendix A). Figure 14 shows the locations of these developments. The projected peak hour trip generation for these developments was calculated based on the M-NCPPC Local Area Transportation Review (LATR) guidelines, July 2004. Table 9 shows the projected trip generation.

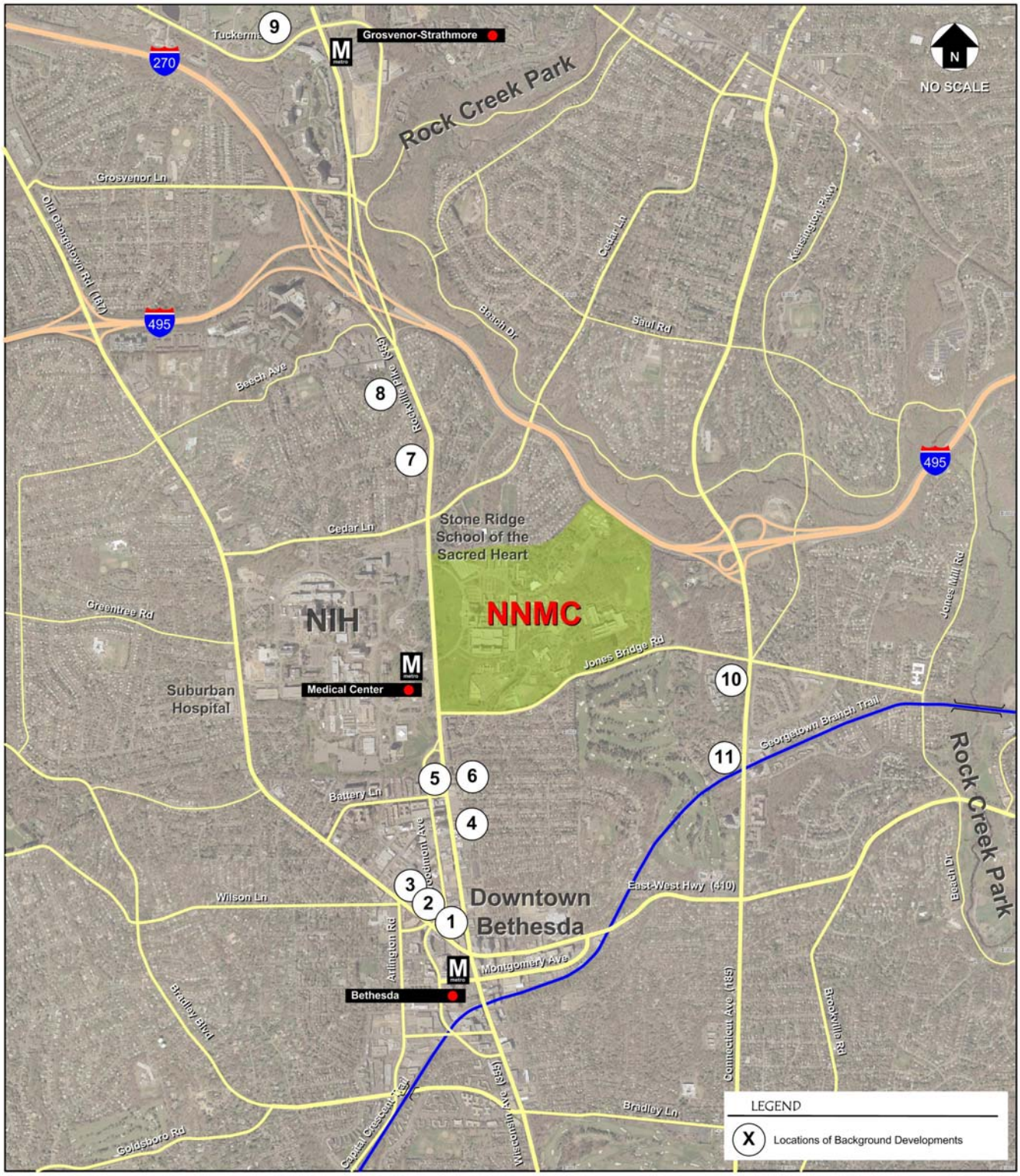

Figure 14 – Locations of Approved Background Developments

Table 9 – Approved Background Developments

Ref. #	Background Developments	Land Use	Size (Sq.Ft.)	Units	AM Peak Hour			PM Peak Hour		
					In	Out	Total	In	Out	Total
1	Woodmont Corner	Multi-Family Residential	---	253	23	91	114	76	38	114
2	Duball Woodmont LLC	Retail	16,595	---	6	5	11	22	21	43
2	Duball Woodmont LLC	Multi-Family Residential	---	158	14	57	71	48	23	71
3	4933 Fairmont Avenue	Office	1,489	---	2	-	2	1	2	3
3	4933 Fairmont Avenue	Retail	1,090	---	-	1	1	2	1	3
3	4933 Fairmont Avenue	Multi-Family Residential	---	2	-	1	1	1	-	1
4	West Virginia Avenue	Single Family Detached	---	4	1	2	3	2	1	3
5	8400 Wisconsin Avenue	Multi-Family Residential	---	198	18	71	89	60	29	89
6	Town at Rosedale Park	Townhouse	---	6	1	2	3	2	1	3
7	Goodwill Property	Townhouse	---	28	3	10	13	15	8	23
8	FASEB	Office	40,000	---	51	9	60	20	58	78
9	Georgetown Prep School/Inigos Crossing	Multi-Family Residential	---	473	38	154	192	149	74	223
10	Howard Hughes Medical Center	Office	75,000	---	102	18	120	32	96	128
11	Chevy Chase Lake East	Office	100,000	---	138	24	162	41	123	164
11	Chevy Chase Lake East	Retail	74,016	---	70	69	139	278	278	556
				TOTAL	**467**	**514**	**981**	**749**	**753**	**1,502**

Source: Appendix B Table B - 1, 2, 3, LATR Guidelines, July 1, 2004.
Appendix C Table C - 1, LATR Guidelines, July 1, 2004.

3.2 Planned and Programmed Improvements

The Background traffic conditions also include consideration of planned and programmed improvements which would influence traffic conditions if or when implemented.

3.2.1 Planned Improvements

The following roadway improvements are recommended by Bethesda Chevy Chase (BCC) Master Plan (April 1990):

1. Cedar Lane at Rockville Pike:
    - Add a right turn lane to eastbound Cedar Lane
    - Add a through lane to westbound Cedar Lane
    - Add a right turn lane to northbound Rockville Pike
    - Add north-south through lanes on Rockville Pike

2. Jones Bridge Road at Wisconsin Avenue:
    - Add a left turn lane to westbound Jones Bridge Road and to southbound Rockville Pike.

3. Rockville Pike would be widened to eight lanes between Cedar Lane and Jones Bridge Road after 2010.

4. An interchange at Rockville Pike and Cedar Lane would be retained as a possible project after year 2010.

5. The Bethesda CBD Master Plan (July 1994) recommends implementing a peak period reversible lane on Old Georgetown Road from Woodmont Avenue northward to Huntington Parkway, and subsequently extend it from Huntington Parkway to north of West Cedar Lane when future traffic conditions warrant this improvement.

6. The Bethesda CBD Master Plan also recommends converting Wisconsin (northbound) and Woodmont (southbound) Avenues into a one way pair through the CBD, if warranted by future traffic conditions.

7. Increase the level of feeder bus services, particularly in the eastern half of planning area.

8. Provide park and ride lots for 750 vehicles at locations that would intercept vehicles destined to employment centers such as Bethesda CBD, NIH and the National Naval Medical Center. Recommended potential locations include I-495 at Kensington Parkway (250 spaces), and River Road, from west of the Cabin John Fire Station No.10 to the west of Seven Locks Road (500 spaces).

3.2.2 Programmed Improvements

Following is a list of funded projects in planning/engineering or construction phases from the Maryland Consolidated Transportation Program (2007- 2012) that could influence NNMC transportation conditions in the long term (See CTP extracts attached in Appendix F):

- Intersection Capacity Improvement and Roadway Rehabilitation:

    1. Rockville Pike at Jones Bridge Road: widening to extend right turn lanes (Funded for preliminary engineering only).

    2. Rockville Pike: northbound Bridge 15119 over I 495 outer loop - bridge deck replacement. (Funded for Construction)

    3. Capital Beltway at MD 355; geometric improvements. (Funded for Construction)

- Corridor and Transit-way Projects:
    4. The Capital Beltway Study is in its planning phase and to date has determined the need to widen this facility to 10 lanes through Montgomery and Prince George's Counties, with two lanes devoted to HOV and express bus service.

    5. The InterCounty Connector is a new East-West multi-modal highway in Montgomery and Prince George's counties between I-270 and I-95/ US 1. This is a BRAC related project which will be under construction during this fiscal year 2007. This project is needed to improve access between economic growth centers and to advance homeland security measures.

    6. The Bi-County Transitway Study is evaluating the feasibility of constructing a 14-mile transitway that would connect Silver Spring and Bethesda with a light rail line following an abandoned railroad right of way for most of its length. The constrained Long Range Plan calls for its implementation by 2012.

    7. The I-270 Corridor Cities Transitway (CCT) Study has been funded for planning and engineering with respect to widening of US 15 to six lanes and I-270 (to progressively match the existing 12-lane I-270 at Shady Grove Road) between MD Route 26 in Frederick and Shady Grove Road near Gaithersburg. The CCT would be either a light rail transit (LRT) or bus rapid transit (BRT) line. HOV and Transportation Demand Management measures such as park and ride lots and bus transit will be included throughout.

- Pedestrian and Bicycle Facilities:
    8. Rock Creek Hiker-Biker Trail Bridge: construction of a 1,060 linear feet long by 8 feet wide trail with 610 feet long by 12 feet wide pedestrian bridge over Veirs Mill Road.

Figure 15 shows the programmed improvements within the vicinity of the NNMC campus.

3.3 Future Background Traffic Forecast

Future Background traffic forecasts were developed based on a composite of existing traffic counts and impacts from other future non-BRAC area developments. Since none of the approved and funded roadway improvements would directly influence the capacity of intersections in our study area, the background traffic forecasts did not include any of the planned roadway improvements. Figures 16a & 16b show the Future Background traffic volumes for the study area intersections. The projected peak hour trip generation for the background developments is shown in Appendix G.

3.4 Future Background Capacity Analysis

Based on the future background volumes and other field observations collected above, the capacity of the intersections was evaluated for both the AM and PM peak hours, using the Critical Lane Analysis Technique, as was done for the existing traffic conditions. The capacity analysis results are summarized in Table 10. The capacity analysis worksheets and LOS figures are included in the Appendix H.

The capacity analysis results for background conditions show that all the study area intersections and campus access points would operate within the CLV standards, except:

- Rockville Pike and Cedar Lane (CLV:2048) in AM Peak Hour;
- Rockville Pike and Cedar Lane (CLV:1784) in the PM Peak Hour;
- Jones Bridge Road and Connecticut Avenue (CLV:1994) in the PM Peak Hour;
- Rockville Pike (MD 355) and Jones Bridge Road (CLV:1680) in the PM peak hour
- and Cedar Lane and Old Georgetown Road (CLV:1660) in the PM peak hour

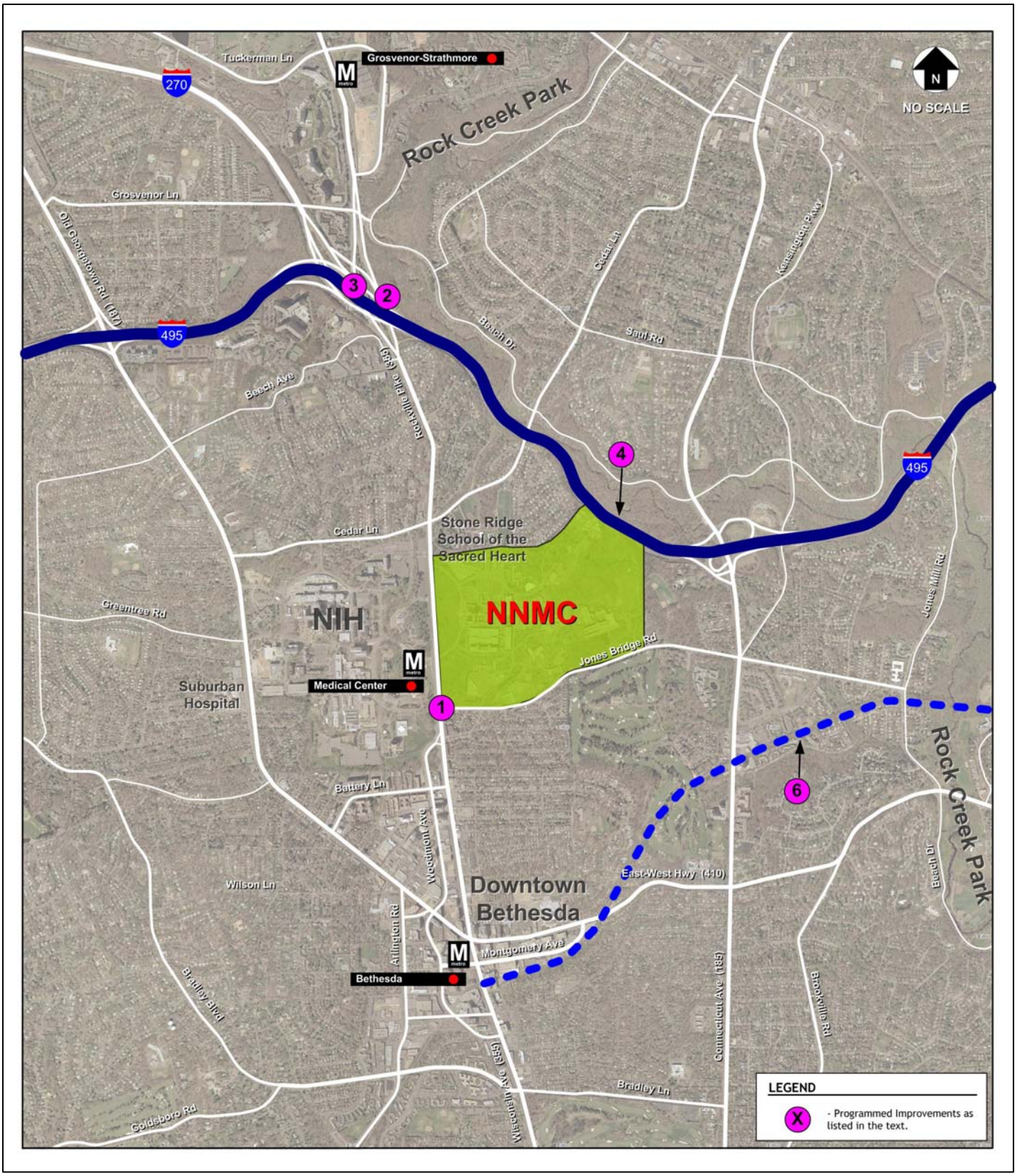

Figure 15 – Programmed Transportation Improvements

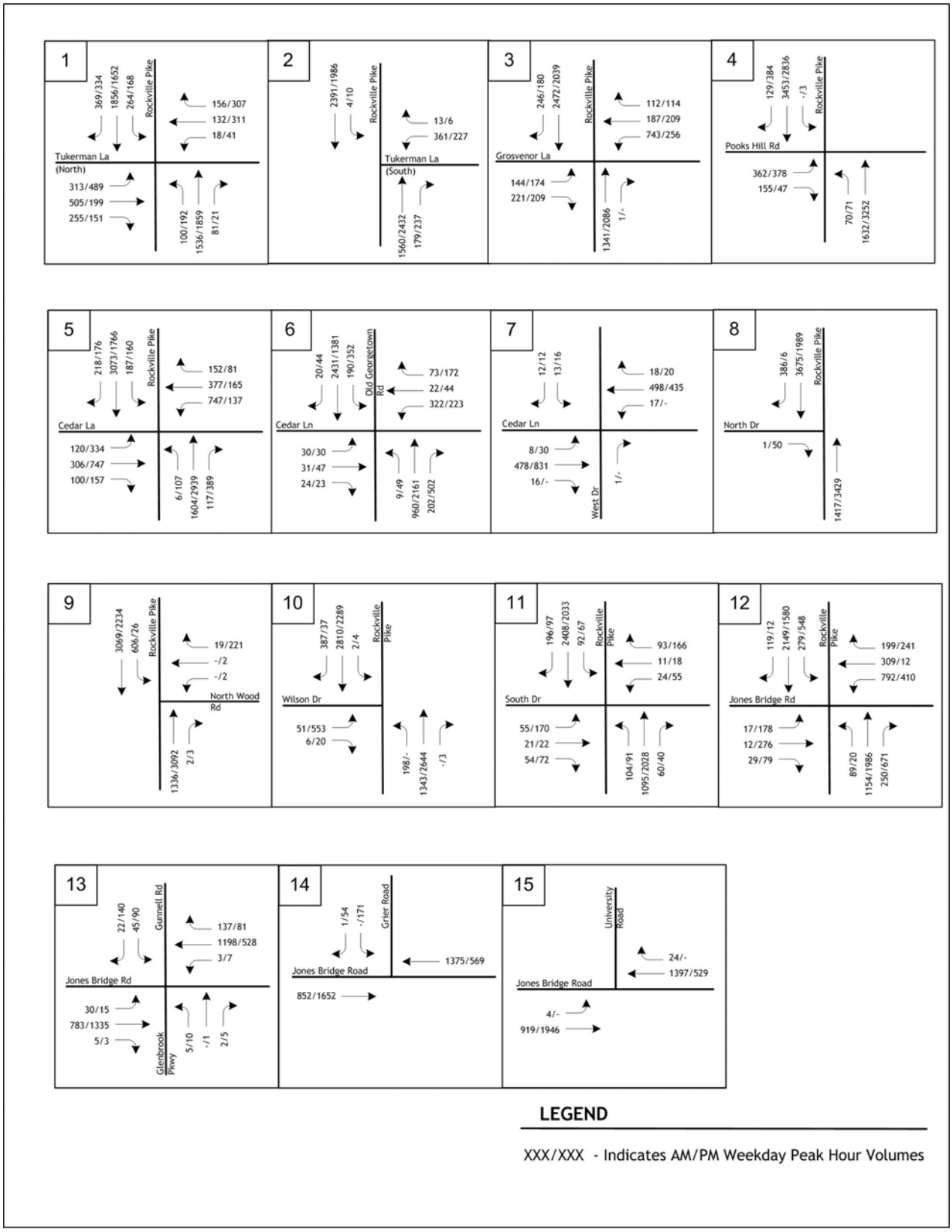

Figure 16a – Future Background Peak Hour Volumes

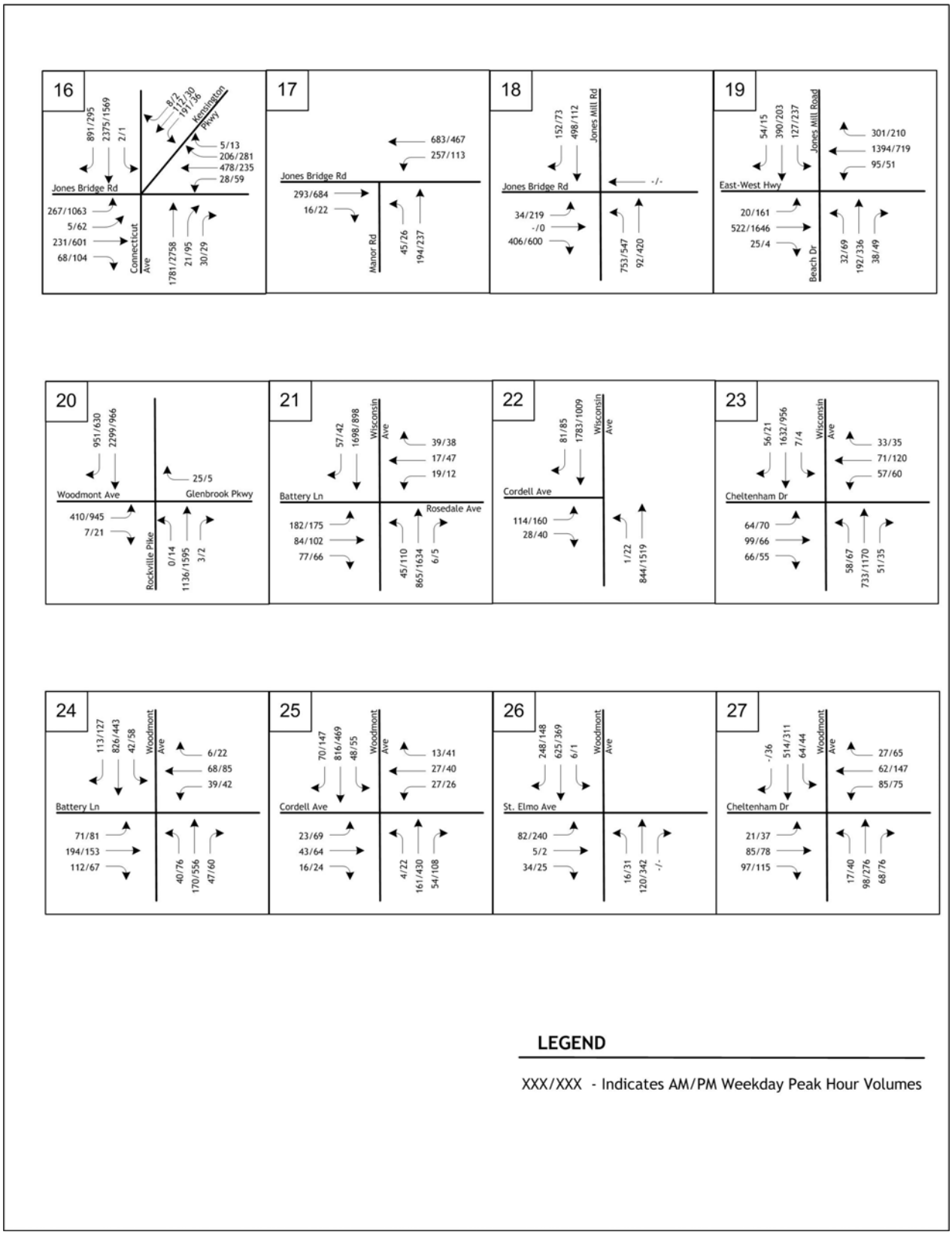

Figure 16b – Future Background Peak Hour Volumes

Table 10 – Future Background Level of Service Conditions

Ref. #	Intersection	AM Peak		PM Peak		CLV STD.	Policy Area
		CLV	LOS	CLV	LOS		
1	Rockville Pike & Tuckerman north	1235	C	1283	C/D	1550	North Bethesda
2	Rockville Pike & Tuckerman south	1076	B	1030	B	1550	North Bethesda
3	Rockville Pike & Grosvenor Lane	1308	C/D	1073	B	1550	North Bethesda
4	Rockville Pike & Pooks Hill Road	1539	E	1407	D	1600	Bethesda/Chevy Chase
5	Rockville Pike & West Cedar Lane	2048	F	1784	F	1600	Bethesda/Chevy Chase
6	Old Georgetown Road & West Cedar Lane	1324	D	1660	F	1600	Bethesda/Chevy Chase
7	West Cedar Lane & West Drive	549	A	513	A	1600	Bethesda/Chevy Chase
8	Rockville Pike & North Drive	1503	E	1269	C	1600	Bethesda/Chevy Chase
9	Rockville Pike & North Wood Road	1154	B/C	1366	D	1600	Bethesda/Chevy Chase
10	Rockville Pike & Wilson Drive	1432	D/E	1536	E	1600	Bethesda/Chevy Chase
11	Rockville Pike & South Wood Road	1167	B/C	1146	B/C	1600	Bethesda/Chevy Chase
12	Rockville Pike & Jones Bridge Road	1351	D	1680	F	1600	Bethesda/Chevy Chase
13	Jones Bridge Road & Gunnell Road	808	A	956	A	1600	Bethesda/Chevy Chase
14	Jones Bridge Road & Grier Road	728	A	1101	B	1600	Bethesda/Chevy Chase
15	Jones Bridge Road & University Road	743	A	1031	B	1600	Bethesda/Chevy Chase
16	Connecticut Avenue & Jones Bridge Road	1476	E	1994	F	1600	Bethesda/Chevy Chase
17	Jones Bridge Road & Manor Road	713	A	823	A	1600	Bethesda/Chevy Chase
Ref. #	Intersection	AM Peak		PM Peak		CLV STD.	Policy Area
		CLV	LOS	CLV	LOS		
18	Jones Bridge Road & Jones Mill Road	1268	C	878	A	1600	Bethesda/Chevy Chase

19	East - West Highway & Jones Mill Road	1190	C	1496	E	1600	Bethesda/Chevy Chase
20	Rockville Pike & Woodmont Avenue	1071	B	1097	B	1600	Bethesda/Chevy Chase
21	Rockville Pike & Battery Lane	915	A	888	A	1800	Bethesda CBD
22	Rockville Pike & Cordell Avenue	752	A	655	A	1800	Bethesda CBD
23	Rockville Pike & Cheltenham Drive	972	A	760	A	1800	Bethesda CBD
24	Woodmont Avenue & Battery Lane	776	A	623	A	1800	Bethesda CBD
25	Woodmont Avenue & Cordell Avenue	583	A	531	A	1800	Bethesda CBD
26	Woodmont Avenue & St. Elmo Drive	569	A	548	A	1800	Bethesda CBD
27	Woodmont Avenue & Cheltenham Drive	577	A	555	A	1800	Bethesda CBD

Source: G/SA capacity Analysis
Ref. # = Reference Number (See Figures 16a and 16b)
CLV = Critical Lane Volume
LOS = Level of Service
CLV STD. = Critical Lane Volume Standard

4.0 TOTAL FUTURE CONDITIONS

The projected total future (2011) traffic conditions would result from the combination of the background traffic situation (discussed in previous section) and the additional trips generated by the BRAC/EIS Alternatives and other campus development resulting in approximately 2,500 additional employees. As noted earlier, the BRAC Action consists of two alternatives which differ primarily with respect to the location of proposed land uses and parking supply. The BRAC Action alternatives currently call for approximately 2,200 employees to be accommodated at the NNMC campus by 2011. The EIS assumes approximately 2,500 additional employees as a conservative estimate to insure any additional staff determined necessary have been evaluated in the EIS, as well as to account for possible increases in staff under other ongoing and future projects not associated with BRAC being addressed under cumulative impacts. Based on these considerations, and taking a conservative approach, which allows for flexibility in the Navy employee programming, this study analyzes the potential transportation impacts of accommodating 2,500 new employees at the NNMC campus.

Additional programming information related to the two BRAC alternatives in presented in Table 11.

Table 11 – Proposed Programming Elements

Element	Density
	EIS Alternative One and Two (2011)
New Staff	**2,200 Persons ***
Visitors & Patients	484,000 Persons Annually
Residential New and Renovated Space	384,000 SF (342 Units)
BRAC Medical New Space	638,000 SF
BRAC Medical Renovated Space	317,000 SF
Non-BRAC Medical/Admin. Space	114,000 SF
Non-BRAC Medical/Admin. Renovated	85,000 SF
TBI/PTSD COE	50,000 SF
Fitness Center	64,000 SF
Total Space (SF)	**1,652,000 SF**
Parking	2,500 Spaces

Source: The Louis Berger Group, Inc.

* Approximately 2,500 additional employees is assumed as a conservative estimate to insure any additional staff determined necessary have been evaluated, as well as to account for possible increases in staff under other ongoing and future projects not associated with BRAC being addressed under cumulative impacts.

Based on information provided by NNMC staff, brief descriptions of the operational characteristics of the programming elements noted in Table 11, particularly as they pertain to external trip-making, are provided below to facilitate the trip generation analysis and discussion which follows later in this report.

- **Medical Staff.** This would comprise additional new and relocated doctors, nurses and other medical personnel from the Army and Air Force who would join the NNMC staff to support the BRAC-mandated changes. This staff would be a primary generator of additional vehicular trips accessing the NNMC.
- **Non-Medical Staff.** This would comprise additional administrative support staff whose contribution to additional traffic generated by the NNMC would be the same as the medical staff.

Patients and Visitors. NNMC is expected to receive approximately 484,000 patients and visitors annually due to the BRAC Actions. These would consist of the following:

- patients visiting the hospital facilities to receive medical care;
- family members and friends accompanying patients on their trips for medical appointments, as well as those coming individually to visit patients; and
- Some smaller number of visitors conducting business with the medical care and administrative organizations supporting the BRAC realignment..

Trips by patients and associated visitors are likely to have vehicular occupancies greater than one, involving families and other groups of people. Trips by all visitors are also spread across all hours (NNMC hospital appointments and care are scheduled 24 hours per day, predominantly on weekdays but including weekends). The impact from patients and visitors is discussed in the next section.

4.1 Trip Generation

The M-NCPPC Local Area Transportation Review (LATR) Guidelines stipulate that the analysis of the potential traffic impacts of planned land uses should be based on the highest one-hour (or peak hour) of the adjacent streets which occurs within the 6:30 - 9:30 AM and 4:00 - 7:00 PM periods of a typical weekday. The LATR also notes that peak hour trip estimates for planned land uses should be based on trip rates and formulas provide in Appendix A of the LATR document, if applicable. Trip rates for other land uses not included in the LATR Guidelines can be obtained from the latest edition of the Trip Generation Manual published by the Institute of Transportation Engineers (ITE).[2] The latest edition of the ITE Manual is the 7th (2003). The User's Guide of this Manual states that the trip rates provided were derived from surveys undertaken at "suburban locations having little or no transit service, nearby pedestrian amenities or travel demand management (TDM) programs". The Guide also advises that the trip rates should be supplemented with locally derived data, when practical.

[2] "Local Area Transportation Review Guidelines", M-NCPPC, July 2004, Pages 28 & 29.

Based on the above considerations, and as advised by M-NCPPC transportation planning staff, two methodologies were considered for estimating the peak hour trip generation of the BRAC/EIS Alternatives and other development (represented by 2,500 employees for the trip projection purposes). The first methodology extrapolated the future vehicular trip generation using employee-trip ratios derived from summing the existing NNMC peak hour inbound and outbound vehicle trips, and dividing those totals by the site's employee population (8,000). The existing trips were obtained from the turning movement counts conducted at the center's five access points as part of this study.

The second methodology involved the use of trip rates and equations published by the Institute of Transportation Engineers (ITE), *Trip Generation Manual*, 7th Edition (2003). The land use types in which new staff were divided are "Hospital" (defined as any institution where medical or surgical care and overnight accommodations are provided to non-ambulatory and ambulatory patients), "Military Base" (defined as a complex that serves one division of the armed forces of the United States. It typically contains offices and training, housing, dining and recreational facilities) and "Research and Development" (facilities devoted exclusively to research and development activities. These may contain offices and light fabrication areas). Please see Appendix I for excerpts from ITE Manual with land use descriptions mentioned above**.**

It may be noted that even though the trip rates used in the trip generation table for each of the above land-uses are based on the number of employees, the rates also include the trips made by patients, visitors and other users.

A 15% reduction in trips using modes other than auto was applied to the basic trip rates, considering the following:

- The existing Transit Check Program at NNMC campus has 1,923 enrollments which constitute 24% of the total NNMC population (8000).

- According to the WMATA 2005 Development Related Ridership Survey Report, an office site located inside the Beltway would likely have a metro rail mode share of 21% and metro bus and other transit mode share of 9%. Also an office site located within ¼ mile of metro station would likely have a transit mode share of 30%. Excerpts of the survey report can be found in Appendix I.

- The Transportation Management Plan (TMP) would be implemented effectively to increase the alternative mode percentage in the NNMC traffic above the existing scenario.

- Based on discussions with M-NCPPC TPD staff a conservative rate of 15% was considered reasonable for the purposes of this study.

The locally derived and ITE rates are presented in Table 12. Table 13a compares the projected trip

estimates based on the locally derived and ITE trip rates. The data shows that, using the ITE trip rates, the projected trip estimates would be approximately 42.5% and 91% greater for the morning and afternoon peak hours, compared with using the locally derived rates.

Based on the above and directives provided by M-NCCPC staff, this study used the ITE trip methodology in evaluating the potential traffic impacts of the two BRAC/EIS Alternatives and other developments (which would result in 2,500 additional employees). It is noted that the use of the ITE trip methodology represents a conservative approach which adequately provides a factor of safety regarding the potential trips that would be generated by the additional patients and visitors.

Table 12 – Trip Generation Rates from Existing Patterns and ITE Manual

Rates (per employee)	AM Peak Hour			PM Peak Hour		
	IN	OUT	TOTAL	IN	OUT	TOTAL
Locally Derived Rates [1]	0.22	0.02	0.24	0.03	0.16	0.19
Hospital (ITE Land Use Code 610) [2]	0.25	0.10	0.35	0.11	0.25	0.36
Military Base (ITE Land Use Code 501) [2]	0.25	0.25	0.50	0.295	0.295	0.59
Research & Development (ITE Land Use Code 760) [2]	0.35	0.06	0.41	0.04	0.37	0.41

Source:

1. G/SA Traffic Counts conducted at all NNMC Gates in October, 2006.

2. ***Trip Generation Manual, 7th Edition***. Institute of Transportation Engineers. 2003. Note: AM Peak Hour and PM Peak Hour refer to peak hour of adjacent street traffic between, 7 - 9 am and 4 - 6 pm, respectively.

Table 13a – Peak Hour Trip Generation Based on Existing Patterns and ITE Manual

Land Use	Size		AM Peak Hour			PM Peak Hour		
			In	Out	Total	In	Out	Total
Locally Derived Rates	*2,500*	*Employees*	**558**	**42**	**600**	**81**	**394**	**475**
ITE Derived Rates								
Hospital	*1,000*	*Employees*	250	100	350	110	250	360
Military Base	*600*	*Employees*	150	150	300	177	177	354
Research and Development	*900*	*Employees*	315	54	369	36	333	369
Alternative Mode Reduction	*15%*		(107)	(46)	(153)	(48)	(114)	(162)
		Total	**608**	**258**	**866**	**275**	**646**	**921**

Source: Same as Table 12

Note: The research and development category, which involves technical administration and operations, was originally selected when that was included in the alternatives. When NNMC functions being evaluated by the EIS eliminated research and development and added other functions related to medical care, including more administration, the potential substitute land uses were evaluated and found to provide equivalent or less severe traffic estimates. In addition, the administration in Research

and Development is not dissimilar from the supporting administrative functions for the BRAC realignment. This study therefore evaluates the total site trips as shown, retaining the research and development category.

NNMC estimates that the annual visitors and patients will be 484,000. The 484,000 annual patients and visitors, if assumed to come for medical care on the 260 weekdays in each year, equates to 484,000/260 or 1,862 additional patients/visitors daily on weekdays. Because some appointments and medical care occur on Saturday, an estimate that an additional half day each week should be considered yields a daily average of 484,000/286 or 1,692. So the 484,000 patients and visitors annually is 1,692 – 1,862 daily depending upon the assumption used.

The combination of land use categories in Table 13a using the ITE Trip Generation rates generates 1,880 additional trips in and a like number out each day in addition to the trips of the 2,500 employees. (see Table 13b). Using the ITE-generated trips to cover the additional patients and visitors is also very conservative however, because a large percentage of these trips are patients with accompanying family members or friends. So the 1,692-1,862 patients and visitors estimated daily for the EIS, most of which involve medical care, actually would come in significantly fewer vehicles – perhaps half the number being estimated. In addition, the visitors actually would come throughout the weekend for visits as well, although in much smaller numbers, which would further reduce the allocation to peak weekday hours.

Table 13b – Daily Trip Generation Based on Existing Patterns and ITE Manual

Land Use	Employees	Daily Trip Rate	Daily Trips		
			In	Out	Total
ITE PROCEDURE					
Hospital	*1,000*	5.20	2600	2600	5200
Military Base	*600*	1.78	534	534	1068
Research and Development	*900*	2.77	1247	1247	2494
		Total	**4381**	**4381**	**8761**
		Trips by Employees	2500	2500	5000
		Trips by Visitors and Patients	**1881**	**1881**	**3761**
NNMC ESTIMATE					
		Visitors and Patients per Year	484000		
		Weekdays per year	260		
		Average Visitors and Patients per weekday	1862		
Difference ITE vs. NNMC Estimate			**19**		

4.2 Trip Distribution

The assumed distribution for the new trips generated by additional 2,500 employees was derived from the LATR Guidelines Appendix E, Table E -1, (July 2004). However the distribution of trips at the five NNMC gates was based on existing vehicular access patterns. Figure 17 shows the percentage of inbound and outbound site trips that would utilize each of the study area intersections. Figures 19a and 19b show the projected traffic assignments.

The potential for providing access off the Capital Beltway (I-495) to the NNMC campus, via slip ramps in the eastern direction, was also analyzed with respect to the total future conditions. This potential access point would result in some redistribution of the existing and future site trips. The anticipated trip distribution pattern is illustrated in Figure 18. The resulting traffic assignment with the I-495 slip ramp access is shown in Figures 20a and 20b.

4.3 Total Future Traffic Forecasts

In order to calculate the total future volumes, for the access situation without the direct connection to I-495, the future background traffic volumes (Figures 16a and 16b) were combined with the assigned site trips (Figures 19a and 19b). The results are presented in Figures 21a and 21b. The total future volumes for the situation reflecting the new ramp access off I-495 were similarly derived, and the results are shown in Figure 22a and 22b.

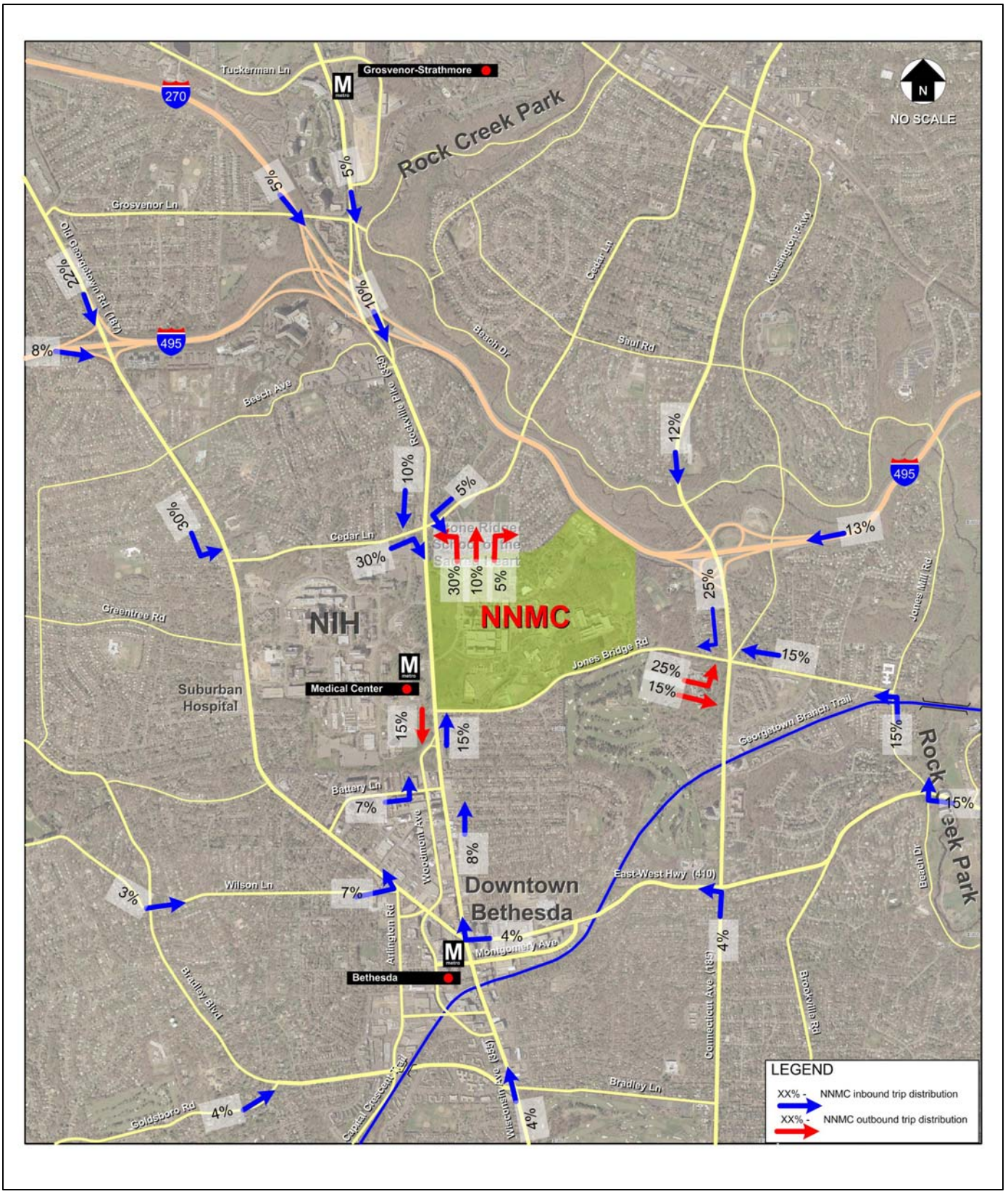

Figure 17 – Projected Site Trip Distribution Pattern

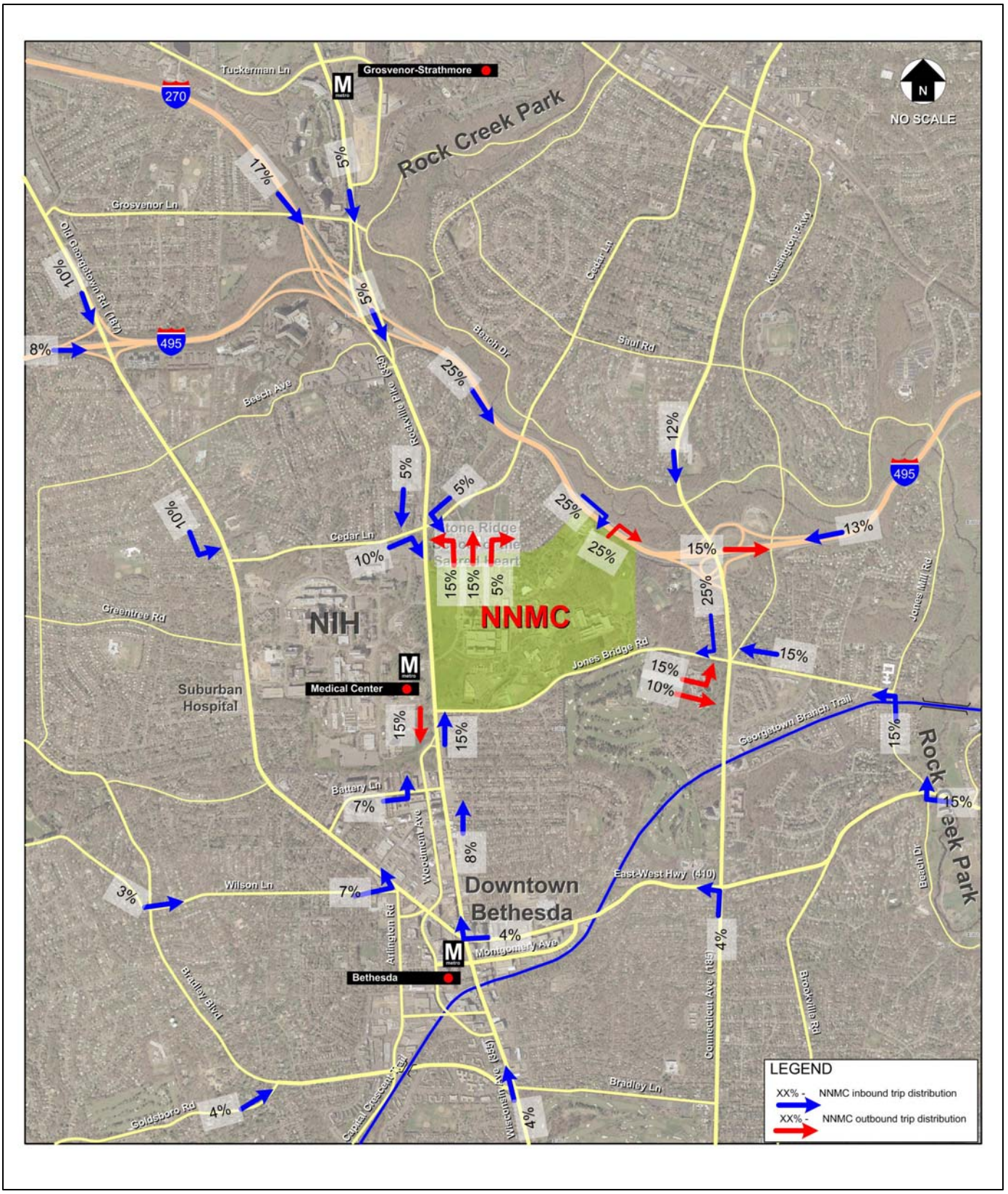

Figure 18 – Projected Site Trip Distribution Pattern (with Slip Ramps)

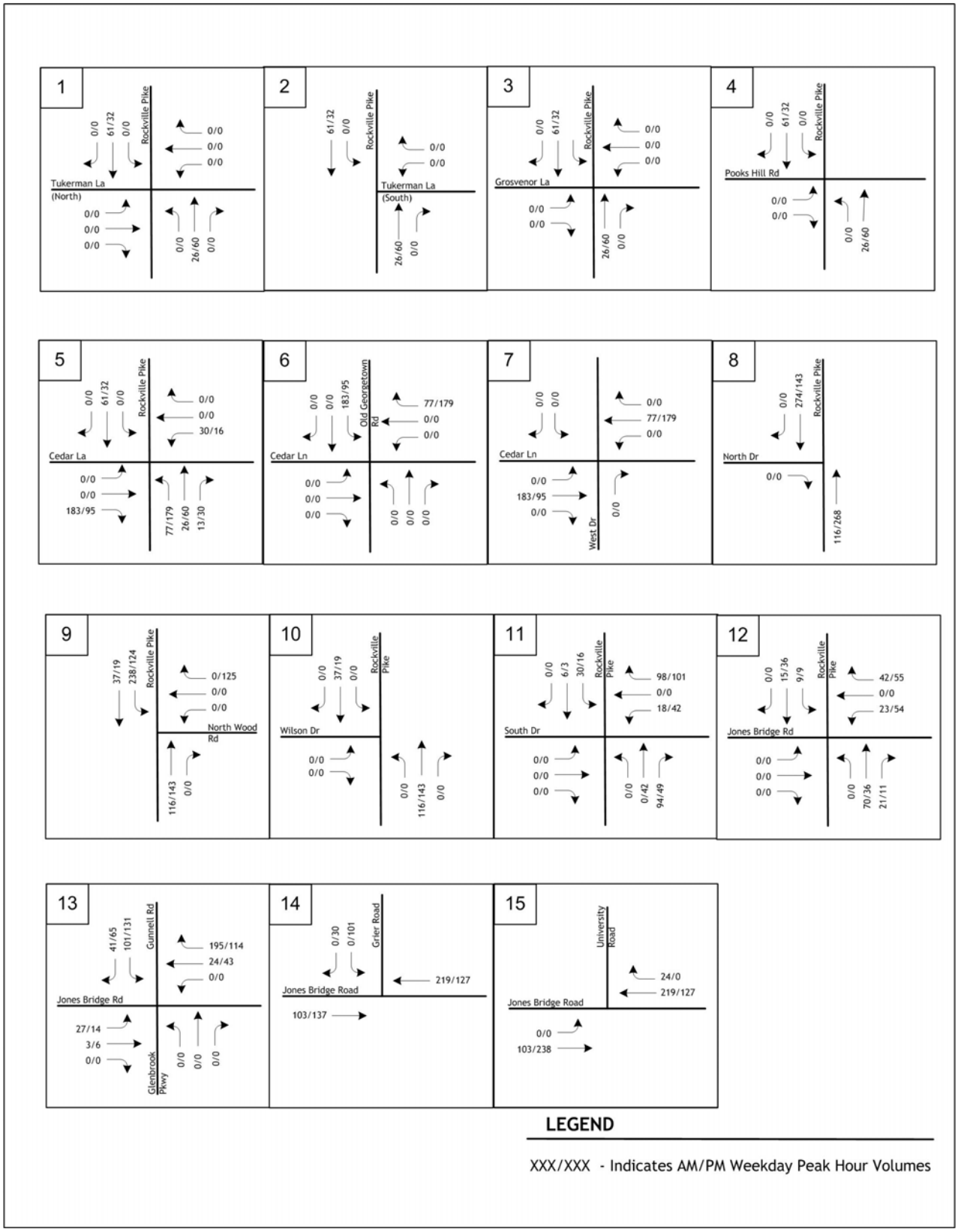

Figure 19a – Site Traffic Assignment

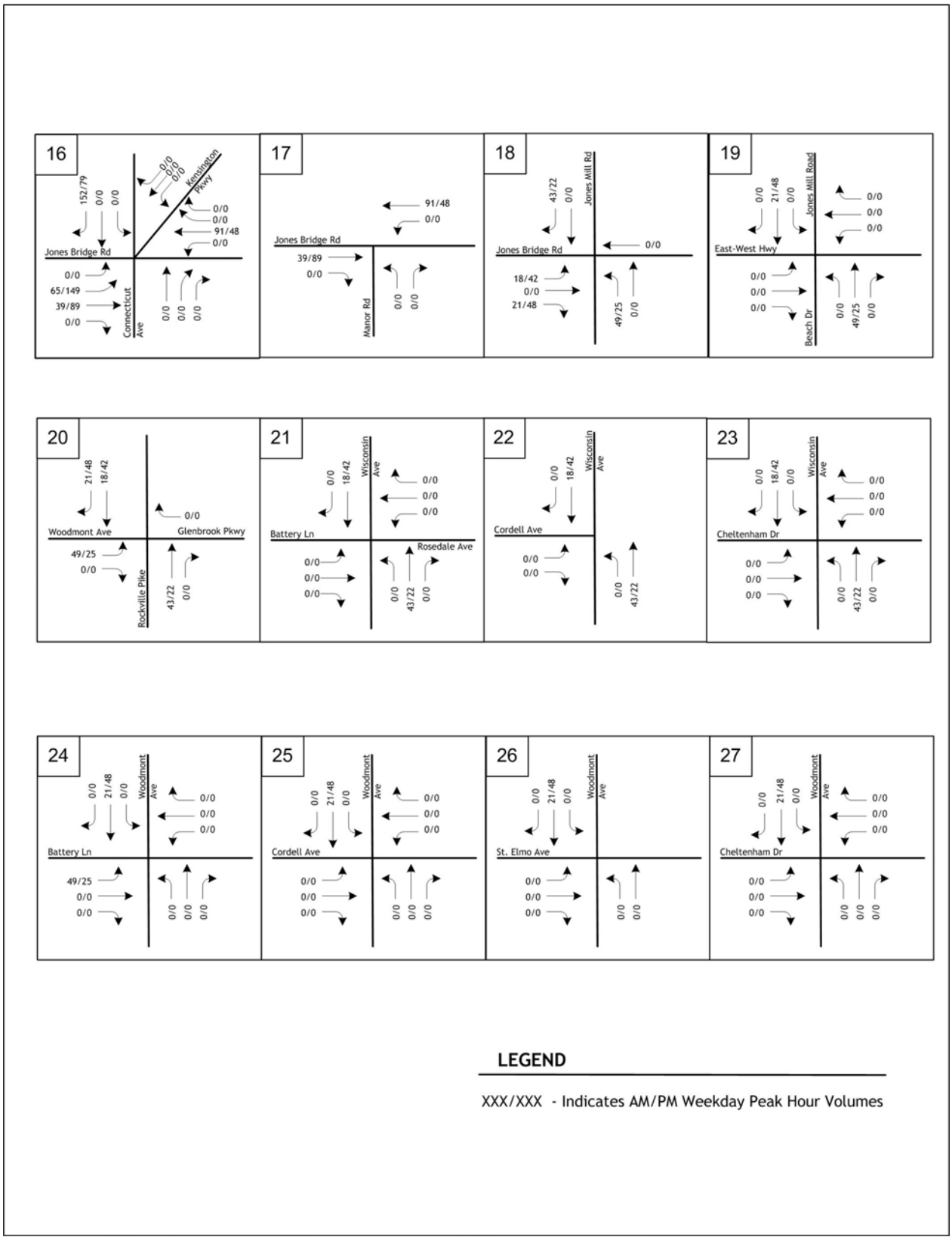

Figure 19b – Site Traffic Assignment

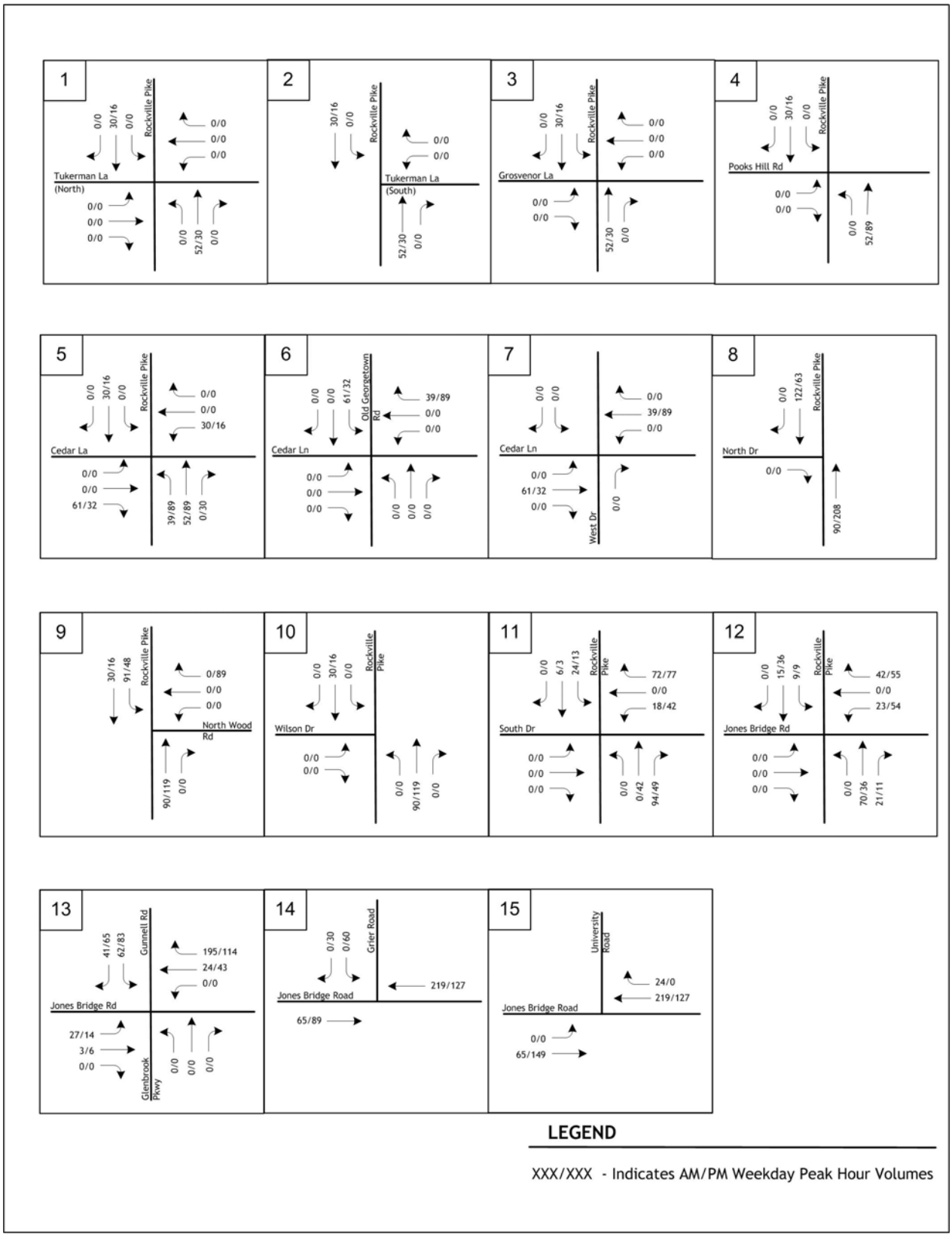

Figure 20a – Site Traffic Assignment Reflecting I-495 Access

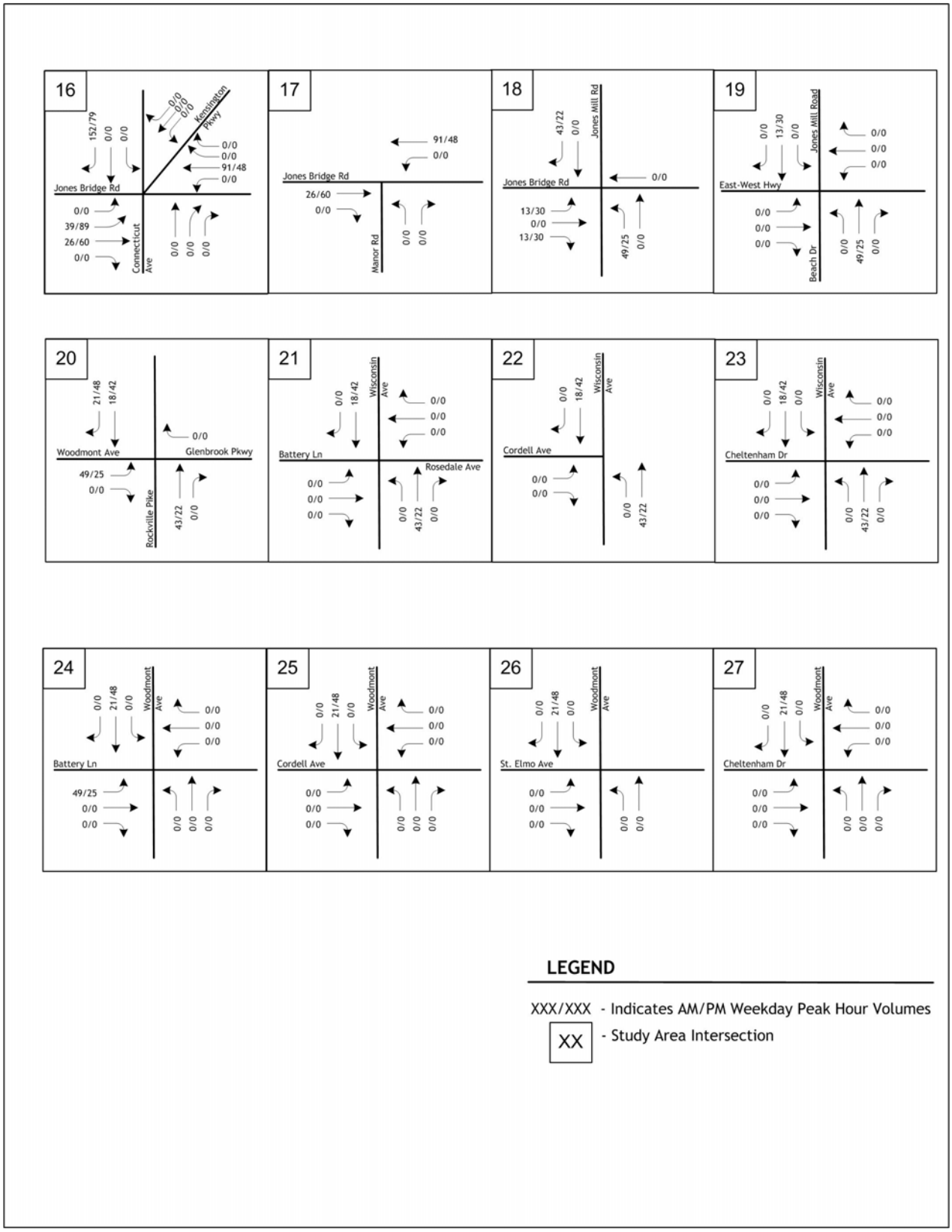

Figure 20b – Site Traffic Assignment Reflecting I-495 Access

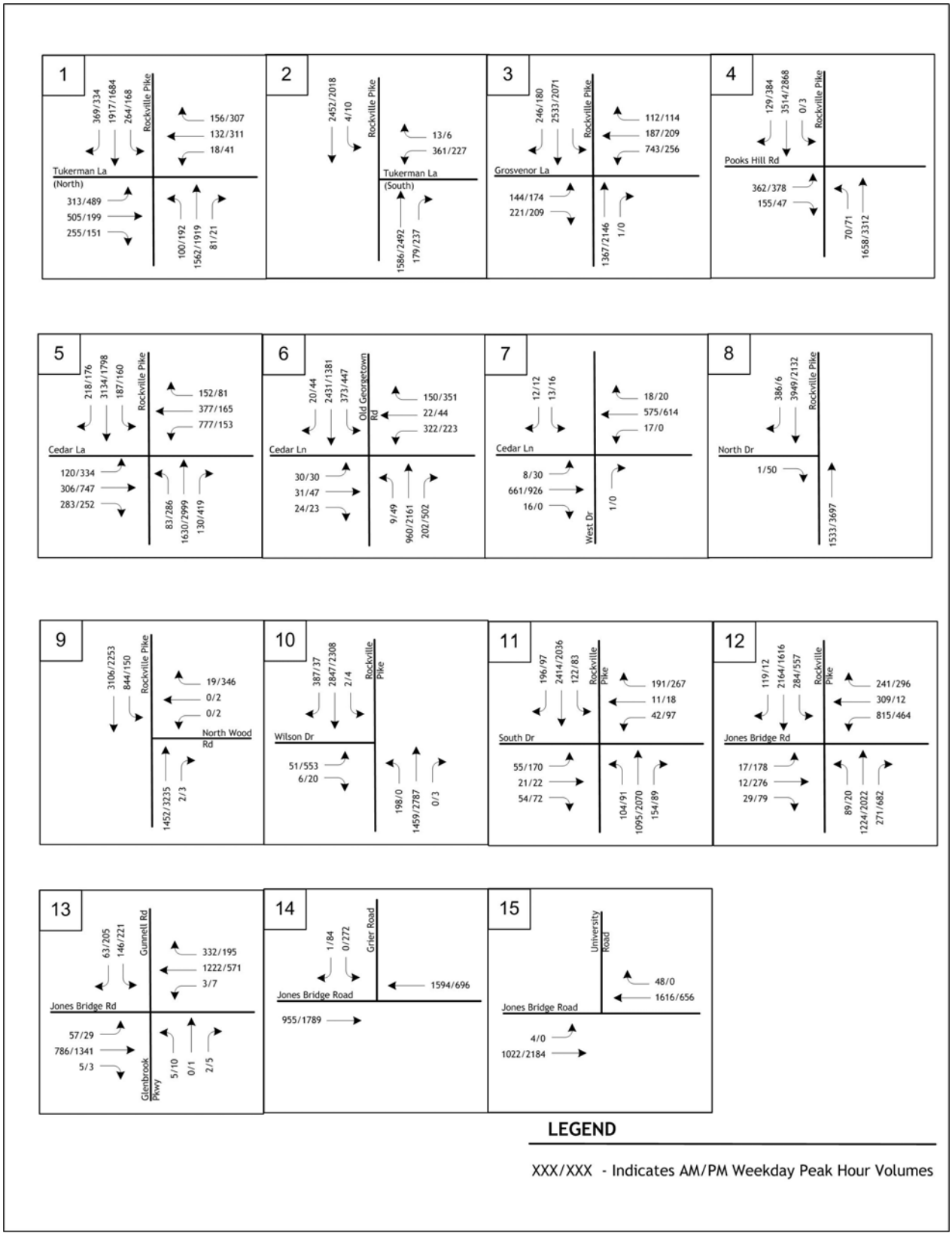

Figure 21a – Projected Total (2011) Traffic Situation

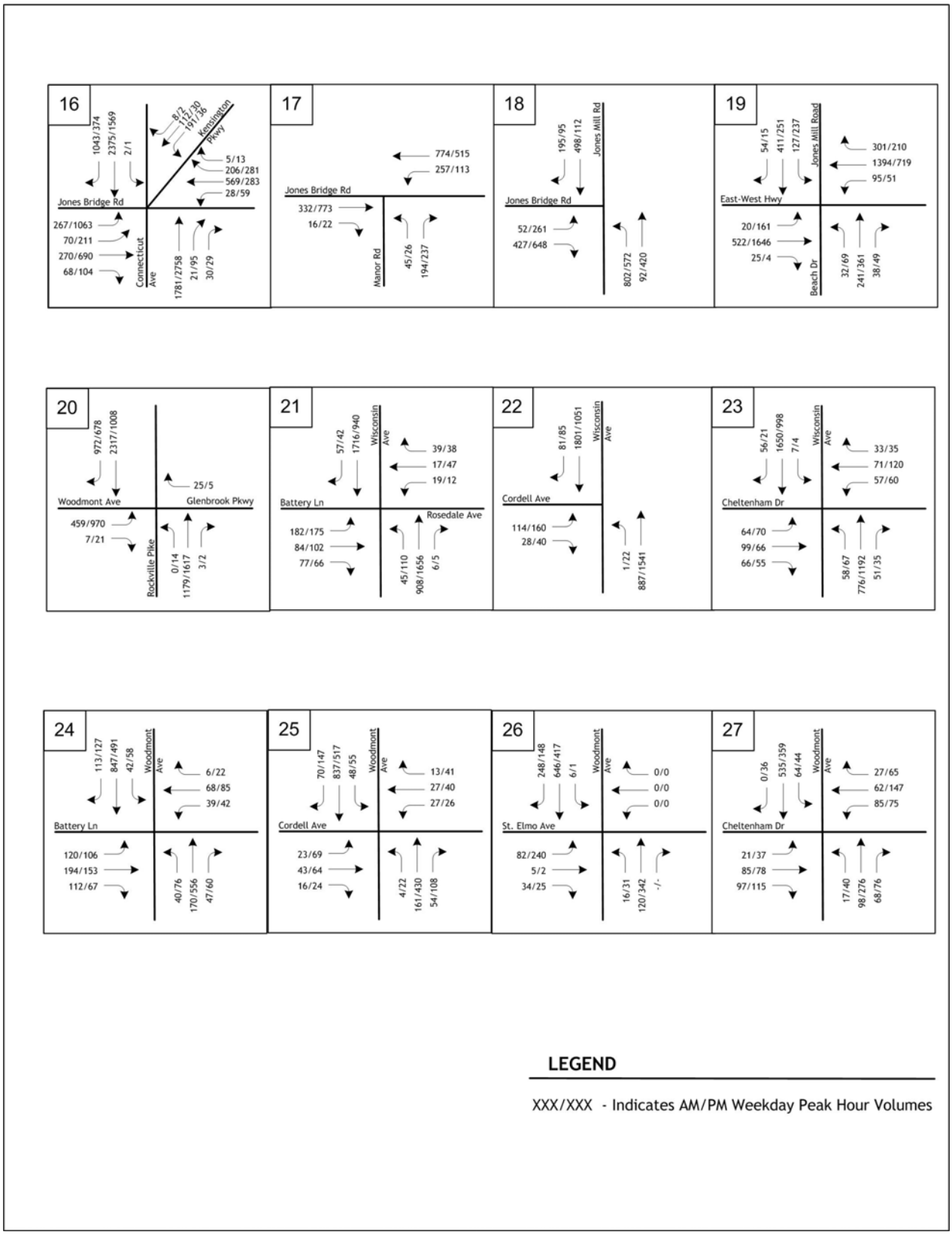

Figure 21b – Projected Total (2011) Traffic Situation

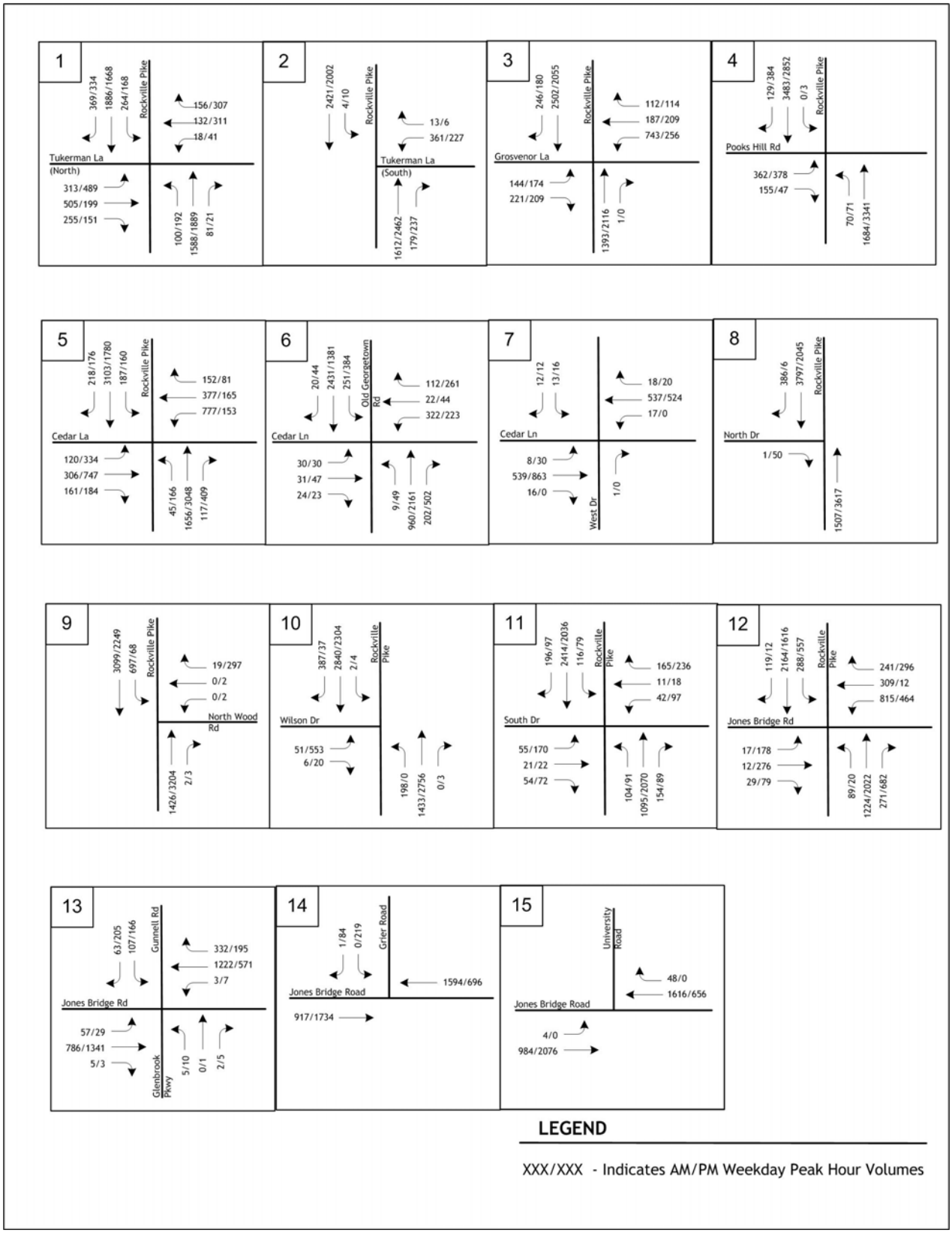

Figure 22a – Projected Total (2011) Traffic Situation Including I-495 Access

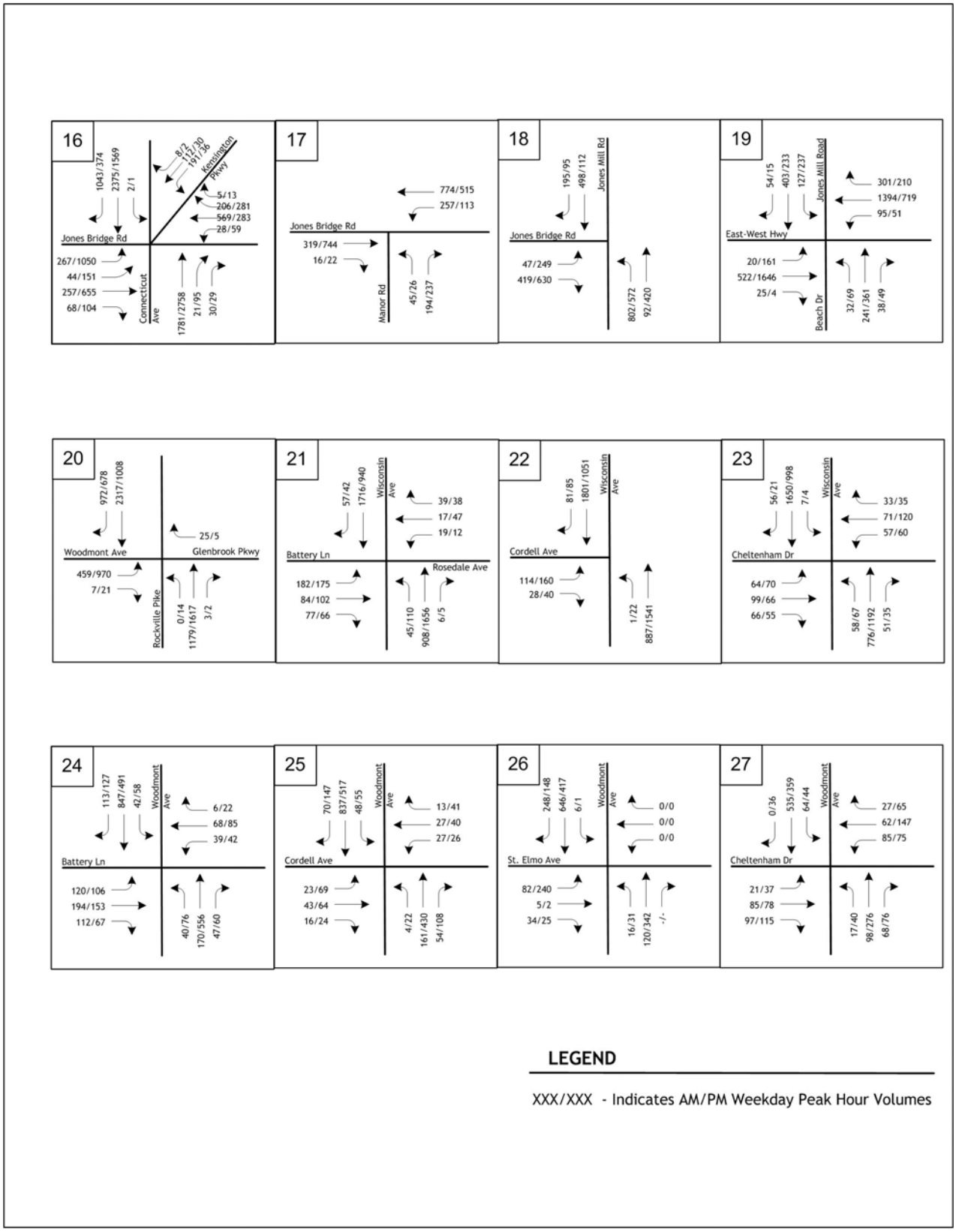

Figure 22b – Projected Total (2011) Traffic Situation Including I-495 Access

4.4 Total Future Capacity Analysis

The projected total (2011) traffic situation was analyzed using the Critical Lane Volume (CLV) analysis technique, as was done for the existing and background traffic conditions. The capacity analysis results are summarized in Table 14. The analysis worksheets and LOS figures are included in the Appendix J.

The capacity analysis results for total future (2011) traffic conditions show that five (5) intersections would operate above the County CLV standards. These are:

- Rockville Pike and Cedar Lane (CLV: 2,100) in AM Peak Hour
- Rockville Pike and North Drive (CLV: 1,605) in AM Peak Hour
- Rockville Pike and Cedar Lane (CLV: 1,822) in PM Peak Hour
- Jones Bridge Road and Rockville Pike (CLV: 1,722) in PM Peak Hour
- Cedar Lane and Old Georgetown Road (CLV: 1,857) in PM Peak Hour
- Jones Bridge Road and Connecticut Avenue (CLV: 2,078) in PM Peak Hour

The remaining study area intersections and campus access points would operate within the established CLV standards**.** Capacity analyses for the future (2011) traffic situation, including the slip ramp access off I-495, indicate that provision of this improvement would help to reduce the potential impacts of the site trips on the local area roadway network. However, the I-495 access would not fully mitigate the impact of site trips at the study area intersections, except the Rockville Pike at North Drive intersection. Tables 14 and 15 compare the CLV and LOS results for the future situations without and with the freeway access.

Ref. #	Intersection	AM PEAK CLV						PM PEAK CLV						LATR STD.	Policy Area
		Existing	Background	Total Alternative I and II (BRAC Action)	Total Alternative I and II (with Addi. Lane) *	Total Alternative I and II (with Slip Ramps) **	Total Alternative I and II (with spot improvements)***	Existing	Background	Total Alternative I and II (BRAC Action)	Total Alternative I and II (with Addi. Lane) *	Total Alternative I and II (with Slip Ramps) **	Total Alternative I and II (with spot improvements)***		
1	Rockville Pike & Tuckerman north	1216	1235	1245	1245	1240	1245	1255	1283	1307	1307	1295	1307	1550	North Bethesda
2	Rockville Pike & Tuckerman south	1017	1076	1099	1099	1087	1099	965	1030	1054	1054	1042	1054	1550	North Bethesda
3	Rockville Pike & Grosvenor Lane	1256	1308	1331	1331	1320	1331	1002	1073	1097	1097	1085	1097	1550	North Bethesda
4	Rockville Pike & Pooks Hill Road	1489	1539	1562	1562	1551	1562	1348	1407	1430	1430	1442	1430	1600	Bethesda/Chevy Chase
5	Rockville Pike & West Cedar Lane	2011	2048	2100	1881	2079	1698	1702	1784	1822	1546	1841	1735	1600	Bethesda/Chevy Chase
6	Old Georgetown Road & West Cedar La	1189	1324	1324	1212	1324	1324	1496	1660	1857	1671	1706	1653	1600	Bethesda/Chevy Chase
7	West Cedar Lane & West Drive	448	549	626	626	588	626	438	513	705	705	609	705	1600	Bethesda/Chevy Chase
8	Rockville Pike & North Drive	1486	1503	1605	1301	1494	1605	1240	1269	1375	1115	1344	1375	1600	Bethesda/Chevy Chase
9	Rockville Pike & North Wood Road	1137	1154	1401	1299	1164	1401	1337	1366	1557	1329	1494	1557	1600	Bethesda/Chevy Chase
10	Rockville Pike & Wilson Drive	1415	1432	1446	1220	1443	1446	1502	1536	1593	1397	1581	1593	1600	Bethesda/Chevy Chase
11	Rockville Pike & South Wood Road	1150	1167	1187	1005	1187	1187	1135	1146	1244	1095	1215	1244	1600	Bethesda/Chevy Chase
12	Rockville Pike & Jones Bridge Road	1347	1351	1365	1205	1365	1371	1598	1680	1722	1580	1722	1669	1600	Bethesda/Chevy Chase
13	Jones Bridge Road & Gunnel Road	801	808	1093	1093	1047	1093	926	956	1170	1170	1111	1170	1600	Bethesda/Chevy Chase
14	Jones Bridge Road & Grier Road	721	728	844	844	844	844	1071	1101	1319	1319	1232	1319	1600	Bethesda/Chevy Chase
15	Jones Bridge Road & University Drive	736	743	859	859	859	859	1002	1031	1167	1167	1106	1167	1600	Bethesda/Chevy Chase
16	Connecticut Avenue & Jones Bridge Ro	1437	1476	1559	1392	1543	1563	1927	1994	2078	1877	2038	1992	1600	Bethesda/Chevy Chase
17	Jones Bridge Road & Manor Road	694	713	804	804	804	804	795	823	919	919	887	919	1600	Bethesda/Chevy Chase
18	Jones Bridge Road & Jones Mill Road	1245	1268	1335	1335	1330	1335	854	878	945	945	756	945	1600	Bethesda/Chevy Chase
19	East - West Highway & Jones Mill Road	1163	1190	1211	1211	1203	1211	1452	1496	1535	1535	1518	1535	1600	Bethesda/Chevy Chase
20	Rockville Pike & Woodmont Avenue	1054	1071	1104	1104	1104	1104	1067	1097	1115	1115	1115	1115	1600	Bethesda/Chevy Chase
21	Rockville Pike & Battery Lane	886	915	921	921	921	921	846	888	895	895	895	895	1800	Bethesda CBD
22	Rockville Pike & Cordell Ave	737	752	759	759	759	759	621	655	662	662	662	662	1800	Bethesda CBD
23	Rockville Pike & Cheltenham Dr.	957	972	979	979	979	979	725	760	767	767	767	767	1800	Bethesda CBD
24	Woodmont Ave & Battery Lane	762	776	814	814	814	814	592	623	655	655	655	655	1800	Bethesda CBD
25	Woodmont Ave & Cordell Ave	582	583	594	594	594	594	528	531	559	559	559	559	1800	Bethesda CBD
26	Woodmont Ave & St. Elmo Dr.	568	569	580	580	580	580	544	548	575	575	575	575	1800	Bethesda CBD
27	Woodmont Ave & Cheltenham Dr.	576	577	589	589	589	589	552	555	575	575	575	575	1800	Bethesda CBD

Ref. Reference
STD. Standard
Intersections operating above capacity

* Refers to suggested mitigation measure of adding a lane in each direction along Rockville Pike between Cedar Lane and Jones Bridge Road; A reversible Lane along the approaches of Old georgetown Road at West Cedar Lane and a Reversible Lane along the aprroaches of Connecticut Avenue at Jones Bridge Road.

** Refers to suggested mitigation measure of a proposed right in and right out, slip ramp entrance/exit off I-495 (Beltway).

*** Refers to suggested spot improvements at specific intersections like, adding a left turn lane on eastbound and westbound approaches of Cedar Lane at Rockville Pike, replacing the eastbound right turn only lane at Jones Bridge Road and Rockville Pike with a left only lane, adding a left turn lane in the southbound approach of Old Georgetown Road and Cedar Lane and making the eastbound approach of Connecticut Avenue and Jones Bridge Road a shared left and through.

Table 14 – CLV Results Comparison Table

Table 15 – LOS Results Comparison Table

Ref. #	Intersection	AM PEAK LOS						PM PEAK LOS						Policy Area
		Existing	Background	Total Future (BRAC Action)	Total Future (with Addi. Lane) *	Total Future (with Slip Ramps) **	Total Future (with spot improvements)***	Existing	Background	Total Future (BRAC Action)	Total Future (with Addi. Lane) *	Total Future (with Slip Ramps) **	Total Future (with spot improvements)***	
1	Rockville Pike & Tuckerman north	C	C	C	C	C	C	C	C/D	C/D	C/D	C/D	C/D	North Bethesda
2	Rockville Pike & Tuckerman south	A/B	B	B	B	B	B	A	B	B	B	B	B	North Bethesda
3	Rockville Pike & Grosvenor Lane	C	C/D	D	D	C/D	D	A/B	B	B	B	B	B	North Bethesda
4	Rockville Pike & Pooks Hill Road	E	E	E	E	E	E	D	D	D/E	D/E	D/E	D/E	Bethesda/Chevy Chase
5	Rockville Pike & West Cedar Lane	F	F	F	F	F	F	F	F	F	E	F	F	Bethesda/Chevy Chase
6	Old Georgetown Road & West Cedar	C	D	D	C	D	D	E	F	F	F	F	F	Bethesda/Chevy Chase
7	West Cedar Lane & West Drive	A	A	A	A	A	A	A	A	A	A	A	A	Bethesda/Chevy Chase
8	Rockville Pike & North Drive	E	E	E/F	C/D	E	E/F	C	C	D	B	D	D	Bethesda/Chevy Chase
9	Rockville Pike & North Wood Road	B/C	B/C	D	C/D	B/C	D	D	D	E	D	E	E	Bethesda/Chevy Chase
10	Rockville Pike & Wilson Drive	D	D/E	D/E	C	D/E	D/E	E	E	E/F	D	E/F	E/F	Bethesda/Chevy Chase
11	Rockville Pike & South Wood Road	B/C	B/C	C	A/B	C	C	B/C	B/C	C	B	C	C	Bethesda/Chevy Chase
12	Rockville Pike & Jones Bridge Road	D	D	D	C	D	D	E/F	F	F	E/F	F	F	Bethesda/Chevy Chase
13	Jones Bridge Road & Gunnel Road	A	A	B	B	B	B	A	A	B/C	B/C	B	B/C	Bethesda/Chevy Chase
14	Jones Bridge Road & Grier Road	A	A	A	A	A	A	B	B	C/D	C/D	C	C/D	Bethesda/Chevy Chase
15	Jones Bridge Road & University Driv	A	A	A	A	A	A	A/B	B	B/C	B/C	B	B/C	Bethesda/Chevy Chase
16	Connecticut Avenue & Jones Bridge	D/E	E	E	D	E	E	F	F	F	F	F	F	Bethesda/Chevy Chase
17	Jones Bridge Road & Manor Road	A	A	A	A	A	A	A	A	A	A	A	A	Bethesda/Chevy Chase
18	Jones Bridge Road & Jones Mill Roa	C	C	D	D	D	D	A	A	A	A	A	A	Bethesda/Chevy Chase
19	East - West Highway & Jones Mill R	B/C	C	C	C	C	C	D/E	E	E	E	E	E	Bethesda/Chevy Chase
20	Rockville Pike & Woodmont Avenue	B	B	B	B	B	B	B	B	B	B	B	B	Bethesda/Chevy Chase
21	Rockville Pike & Battery Lane	A	A	A	A	A	A	A	A	A	A	A	A	Bethesda CBD
22	Rockville Pike & Cordell Ave	A	A	A	A	A	A	A	A	A	A	A	A	Bethesda CBD
23	Rockville Pike & Cheltenham Dr.	A	A	A/B	A/B	A/B	A/B	A	A	A	A	A	A	Bethesda CBD
24	Woodmont Ave & Battery Lane	A	A	A	A	A	A	A	A	A	A	A	A	Bethesda CBD
25	Woodmont Ave & Cordell Ave	A	A	A	A	A	A	A	A	A	A	A	A	Bethesda CBD
26	Woodmont Ave & St. Elmo Dr.	A	A	A	A	A	A	A	A	A	A	A	A	Bethesda CBD
27	Woodmont Ave & Cheltenham Dr.	A	A	A	A	A	A	A	A	A	A	A	A	Bethesda CBD

Ref. Reference

STD. Standard

Intersections operating above capacity

* Refers to suggested mitigation measure of adding a lane in each direction along Rockville Pike between Cedar Lane and Jones Bridge Road. A reversible Lane along the approaches of Old georgetown Road at West Cedar Lane and a Reversible Lane along the aprroaches of Connecticut Avenue at Jones Bridge Road.

** Refers to suggested mitigation measure of a proposed right in and right out, slip ramp entrance/exit off I-495 (Beltway).

*** Refers to suggested spot improvements at specific intersections like, adding a left turn lane on eastbound and westbound approaches of Cedar Lane at Rockville Pike, replacing the eastbound right turn only lane at Jones Bridge Road and Rockville Pike with a left only lane, adding a left turn lane in the southbound approach of Old Georgetown Road and Cedar Lane and making the eastbound approach of Connecticut Avenue and Jones Bridge Road a shared left and through.

4.5 Transportation Improvement Considerations

The foregoing data, analysis and discussion have identified several existing and future transportation constraints and deficiencies. It was also noted that the BRAC Action and other campus development would have adverse traffic impacts on the existing study area roadway network. Further analyses, and extensive discussions with State and County transportation staff, have identified a list of potential improvements including the provision of slip ramp access off the Capital Beltway.

The potential improvements are presented below under the headings "Potential Mitigation Measures" and "Potential Long Term Improvements". "Potential Mitigation Measures" are short term (0 - 5 years) or intermediate term (5 – 10 years) improvements required to mitigate the impacts of trips generated by proposed action. The Navy will support the implementation of these measures together with other involved public agencies. However, the Navy is allowed to use its DoD funds to support any such improvements only within military land. "Potential Long Term Improvements" are intermediate term (5 – 10 years) or long term (more than 10 years) measures that need to be further studied and implemented by the public agencies in order to improve the overall congestion level of the study area intersections. These are not aimed at mitigating the impacts of BRAC Action, but for improving the already congested transportation system to operate at better levels of service. Hence, the Navy is not responsible for further analysis of these recommendations. Appendix K includes the analysis worksheets showing the short term and long term improvements at the failing study area intersections adversely impacted by the BRAC Action. The improvements are as follows:

4.5.1 Potential Mitigation Measures (to Address Impacts from NNMC Actions)

External Mitigation Measures

These would "mitigate" the traffic impacts on the external study area intersections by the trips generated by the BRAC Action Alternatives. This mitigation improves future traffic conditions to and beyond the "Background" capacity/congestion levels that would occur without the development alternatives. However, the improvements may not fully eliminate projected capacity deficiencies to achieve conditions that satisfy established congestion/capacity thresholds.

- Rockville Pike (MD 355) at Cedar Lane
  - Provide an additional left-turn lane along the eastbound and westbound approaches of Cedar Lane (Short Term).
- Old Georgetown Road (MD 187) at Cedar Lane
  - Provide an additional left-turn lane along the southbound approach of Old Georgetown Road and eliminate parking along Cedar Lane eastbound to provide an additional receiving lane (Short Term)

- Rockville Pike (MD 355) at North Wood Road

    - Conduct a full intersection study, including a traffic signal warrant analysis for this location, and implement identified geometric and/or signalization improvements. (Short Term)

- Rockville Pike (MD 355) at Jones Bridge Road Intersection

    - Provide pavement marking improvements along the eastbound approach to designate the inner lane for exclusive left-turn movements and the outer lane for shared through/ right-turn movements. (Short Term)

- Connecticut Avenue (MD 185) at Jones Bridge Road Intersection

    - Provide additional left-turn lane along the eastbound approach of Jones Bridge Road (Short Term)
    - Provide a separate right-turn lane along the southbound approach of Connecticut Avenue. (Short Term)

Internal Mitigation Measures

For all gates, a safety and security analysis is being conducted by DOD to improve security, safety, improve queuing on-site and reduce queuing off-site, and reduce damage to gates and guard houses. These following additional measures would mitigate the roadway operational constraints that would occur within the NNMC campus.

- Robert Brown Road at North Palmer Road

    - Widen the northbound approach of the intersection and provide a separate left-turn lane and a shared through/right turn lane. (Short Term)

    - Widen the eastbound approach of the intersection and provide a separate right-turn lane and a shared through/left turn lane. (Short Term)

- North Wood Road Gate

    - Conduct a full intersection study including a signal warrant analysis for this location, and implement identified geometric and/or signalization improvements. (Short Term)

    - Expand the number of lanes from two lanes to three lanes. These would operate as two inbound and one outbound in the morning peak hour, and two outbound and one inbound in the evening peak hour. (Short Term)

- Grier Road Gate (Navy Lodge Gate)

  - Widen Grier Road and provide pavement markings to delineate a separate right-turn lane and a left-turn lane for outbound traffic movements, and a single lane for inbound movements. (Short Term)

- Perimeter Road

  - Widen and improve within NNMC to improve internal circulation. (Short Term)

- NIH Commercial Vehicle Inspection Station

  - Conduct a study at the NIH Commercial Vehicle Inspection Station on Rockville Pike to determine if a traffic signal is warranted and suitable for submission of a request to state and local transportation authorities for funding and implementation. (Short Term)

4.5.2 Potential Long Term Improvements

These are potential measures for addressing existing and future regional transportation issues and should be studied and implemented by the appropriate public agencies if found warranted.

- Potential I-495 Slip Ramp Access

  Analyses undertaken as part of this study show that the provision of this access would not significantly improve traffic congestion levels along the study area roadways, but may have site trip-mitigation benefits, with respect to existing and future NNMC trips. However, the operation of this access may affect traffic conditions along I-495 and the adjacent interchanges, and may also not satisfy the FHWA Interstate Access Point Approval (IAPA) requirements including a minimum one-mile separation from an adjacent interchange. Table 16 shows the number of peak hour trips in both alternatives that will be removed from local access routes to NNMC and moved to the ramp entrance/exit.

Table 16 – Proposed Slip Ramp Peak Hour Trips

Trips	Alternative One and Two	
	AM Peak Hour	PM Peak Hour
In	298	86
Out	77	188
Total	375	274

Source: G/SA

- Fringe Parking

  The M-NCPPC transportation staff has identified two parcels of land owned by the State which could be improved as fringe parking lots for use by NNMC employees. These parcels are located within the northeast quadrant of the I-495 at Connecticut Avenue Interchange. A preliminary study conducted by M-NCPPC staff indicates that the total capacity of the lots could be approximately 250 spaces. The fringe parking could reduce NNMC employee trips and related local area congestion impacts. It is noted that this potential fringe parking improvement was recommended by the Bethesda Chevy Chase Master Plan (see page 43 of this report).

- Pedestrian Improvements

  - Provide sidewalks with five-feet minimum of pedestrian clear space along with a four-feet minimum curbside buffer along both sides of all study area arterials (particularly along the east side of MD 355 adjacent to NNMC, Old Georgetown Road adjacent to NIH, and both sides Jones Bridge Road between Connecticut Avenue and Rockville Pike).
  - Provide ADA-compliant curb-ramps at all pedestrian crossings.
  - Provide high-visibility white in-lay tape "ladder" or "zebra" pattern crosswalks at all controlled and uncontrolled pedestrian crossings, (particularly along Rockville Pike and Old Georgetown Road in the vicinity of NIH and NNMC).
  - Provide pedestrian count-down signals at all controlled pedestrian crossings (particularly along Rockville Pike and Old Georgetown Road adjacent to NIH and NNMC).

- Bicyclist Improvements

  - Eliminate gaps in the study area bicycle network, particularly along Old Georgetown Road adjacent to NIH as well as between the Georgetown Branch Trail and East-West Highway along Pearl Street.
  - Implement maintenance and geometric improvements to Rock Creek Park Trail north of East-West Highway.
  - Provide better lighting along many study area trails, particularly along Rock Creek and Georgetown Branch Trails.
  - Provide a comprehensive system of bicycle wayfinding signage and maps throughout the study area, particularly along Woodmont Avenue in Downtown Bethesda.

- Transit Improvements

  - Provide a pedestrian connection (in the form of a bridge or tunnel) between the Metro station and NNMC. This would significantly eliminate pedestrian exposure to unsafe

crossing conditions along Rockville Pike in the vicinity of the NNMC South Gate/Metro station Area. This will create safe access to metro-rail and bus users of NNMC without having to cross the wide section of Rockville Pike.
- Improve bus stop waiting experience with shelters and seating throughout the study area.
- Provide more extensive bus route information, including route schedules, maps and real-time next bus information at all bus stops.

- Potential Bethesda Chevy-Chase and Bethesda Downtown Master Plan Improvements

  - Provide an additional lane in each direction along Rockville Pike between Jones Bridge Road and Cedar Lane, in keeping with the Bethesda Chevy Chase Master Plan (see page 39 of this report) (Long Term)
  - Provide an additional through lane in each direction along the Old Georgetown Road approaches to Cedar Lane, in keeping with the Bethesda Chevy Chase Master Plan (see page 39 of this report) (Long Term)

4.6 Transportation Management Plan

The National Capital Planning Commission (NCPC) established the requirement that federal agencies with master plan implementation projects resulting in increases of over 500 employees prepare and implement an effective Transportation Management Plan (TMP). The NNMC TMP will be updated as part of the ongoing Master Plan Update.

TMP Goal

The main goal of the NNMC TMP is to influence the travel choices of the users of the NNMC site towards reducing their potential adverse impacts on local area traffic congestion and air pollution.

TMP Objective

The main objective of the NNMC TMP is to reduce single occupant vehicle (SOV) trips to the NNMC campus, particularly during weekday morning and evening peak periods. This objective can be approached by setting goals and tracking progress on some of the means used to reach the objectives.

These include:

- Increase information availability and awareness among the NNMC users about various TMP strategies.
- Increase average vehicle occupancy (AVO) by ride sharing programs.
- Increase transit mode share from existing to greater.
- Reduce parking supply and demand ratio by employing parking management programs.
- Employ telecommuting/flextime programs to remove peak hour trips to NNMC.

TMP Strategies

Specific strategies that could be employed to achieve above goals are:

Base Transportation Coordinator (BTC): An NNMC Transportation Services Coordinator (BTC) position could be established to coordinate and administer the transportation issues and TMP strategies at the NNMC campus, including all tenants. The BTC would be responsible for conducting research on traffic patterns and the various modes used by staff, patients, contractors, and visitors and conducting surveys of personnel and patients. The BTC would track the changes in traffic patterns and modes of travel and prepare reports as requested or required (e.g., NCPC and Montgomery County). The BTC would have regular interaction with security and facilities on road and parking lot closings, problems, requirements, and related topics. This person would be responsible for interacting with applicable regulatory and transportation agencies and groups. The BTC would coordinate all efforts. In addition, in order to reduce emissions the BTC would work with the Environmental Programs Division's Air Program Manager to develop strategies that work toward accomplishing this objective.

Employee Transportation Services Coordinator (ETC): An Employee Transportation Services Coordinator (ETC) position could be established to administer the TMP strategies for employees. The ETC would be responsible for developing and administering a promotional program for ridesharing and transit usage by employees, residents, and visitors. This person would develop and distribute informational and promotional brochures regarding ridesharing and various transit services, provide information on the campus parking permit program, and develop and administer a ridesharing database and information matching system. The ETC would stress the convenience factor, environmental and economic benefits, and the traffic reduction benefits to carpooling, vanpooling and transit.

Ridematching (Carpool and Vanpool): Carpooling occurs when two or more people share a ride in a private vehicle. Carpools generally consist of persons who live in the same neighborhood or along the same route, and use a private vehicle to reach a common or nearby destination. Vanpools consist of seven or more people who share a ride in a prearranged van that could be owned or leased by the riders or the employer. The ETC would be required to take an active role in promoting and facilitating these strategies though the maintenance of an accurate database listing all of the participants, and arranging ridesharing matches. Finally, a pre-tax benefit could be offered for carpool and vanpool expenses (per Section 1 of Executive Order 13150).

Parking Cash-Out Program: Offering a parking cash-out program (assigning a value to each parking space and paying employees for not using one) would be a suitable alternative to reducing the number of parking spaces. This transit subsidy program for employees could also be implemented up to the maximum tax-free benefit allowable by law.

Parking Management: Priority parking spaces would be served for employees arriving by carpool or vanpool, or even those arriving during the less-congested times of the day. This parking could include assigned spaces near building entrances, level-one spaces in a structured facility or a priority position on a parking space waiting list. Employees and visitors would also be required to pay for parking. In addition, a parking management company may be retained to manage the employee parking, provide valet parking and other related assistance. Disincentives to discourage violation of carpool preference regulations could be created.

Shared Parking with other Federal Agencies: This program has the objective of adding park-and-ride facilities in the Beltway corridor along with other north-south and east-west corridors for use by NNMC and other Federal agency employees. NNMC would seek to "trade" on-campus employee parking spaces with other agencies located near the Beltway and a Metrorail station. Then, NNMC and other participating agencies would identify employees who will volunteer to park at the agency nearest their home, and take Metrorail or another mode of transit to their place of employment. Special shuttles could also connect park-and-ride lots in locations that do not have direct and/or easy transit access to the NNMC campus.

Reserved Parking at Existing and New Park-and-Ride Facilities: M-NCPPC transportation staff has identified two parcels of land owned by the State which could be improved as fringe parking lots for use by area commuters. These parcels are located within the northeast quadrant of the I-495 at Connecticut Avenue Interchange. In addition a number of park-and-ride lots will be built along with the new planned BRT and LRT transit corridors extending along I-270, Georgia Avenue, and along east-west arterials - including the Bi-County Transitway and the Corridor Cities Transitway. NNMC would identify employees who will volunteer to park at these lots and then take transit to the NNMC Bethesda campus. Special shuttles could also connect park-and-ride lots in locations that do not have direct and/or easy transit access to the NNMC campus.

Guaranteed Ride Home: This program, sponsored by the Metropolitan Washington Council of Governments, would be used to provide reliable and free emergency ride home from work for commuters who regularly carpool, vanpool, and bicycle, walk, or take transit to work.

Flextime/Compressed Work Week Programs: The flextime program would allow employees to arrive and depart to and from work during the off-peak periods. The compressed workweek program would provide employees the opportunity to work the same number of hours in fewer days per week, or per pay period.

Telecommuting: Some employees, whose jobs allow working remotely, could be given the opportunity to work from home one day or more days a week, maintaining contact with their office via fax machine, e-mail, and/or telephone.

Transit Amenities and Subsidies: The NNMC campus is situated adjacent to the WMATA Medical Center Metrorail Station. The campus also has very easy access to WMATA and Montgomery County Ride-On bus transit routes along Rockville Pike (MD 355) and Jones Bridge Road. Employees and residents of the campus could therefore be encouraged to use those transit facilities and services through the issuance of transit subsidies, Metrochecks, etc.

Work With State and County to Improve Pedestrian and Bike Access and Bus Conditions: Improved pedestrian connections between the campus and the Medical Center Metrorail Station would make Metrorail and bus service more convenient to employees, residents, and visitors. Over 53 percent of the employees surveyed live in Montgomery County. The Red Line provides service to Medical Center Metrorail station; Montgomery county riders will need to get to a Metrorail station. As an example, a rider traveling from the Twinbrook Station in Montgomery County would take only 7 minutes by transit to reach Medical Center Metro Station, while driving from the station would take approximately ½ hour. Therefore, Metrorail can provide a realistic way to make transit as a primary mode of transportation. Similar changes can or should be incorporated into the Purple Line if approved. Improvements to Bus Stops such as providing shelters on- base and off-base are ways to make commutes more enjoyable. Working with the counties in the area to identify potentially more useful routes or route changes can improve service to the employees and reduce commute times.

Shuttle Bus Services: NNMC currently provides shuttle bus service to it users. This service would be coordinated with those of adjacent medical institutions, particularly NIH, which currently operates such a service with stops at the Medical Center Metrorail Station portal and on- and off- campus locations (source: 2001 NIH Master Plan). Quick and frequent shuttle connections to Downtown Bethesda, where extensive dining, retail, services, and other amenities are located, would help discourage single occupant driving. One option would be to extend the route of the existing free Bethesda Circulator to the Medical Center Metrorail Station. The Bethesda Circulator provides frequent all-day weekday and Saturday evening/night service to all key points in Downtown Bethesda. Finally, 10-minute peak period shuttle headways in additional to transit stop amenities including real-time shuttle bus arrival information, posted transit route maps and schedules, and shelter and seating on all area shuttle routes would enhance the user experience and make the shuttle system more attractive to non-users.

4.7 Future Parking Provision

For the BRAC alternatives, some of the existing parking lots will be demolished either completely or partially. These include, Lot A, Lot W, Lot G or Lot H (varies between the two alternatives), Lot E and Lot L. These demolished lots, as all well as parking potentially being demolished near new buildings that are not defined as lots, would lead to a loss of approximately 700 parking spaces. This

loss of parking spaces together with new developments would generate a demand for new parking lots and garages. The BRAC alternatives add a total of approximately 2,500 spaces in the three parking garages under the alternatives, resulting in a net addition of approximately 1,800 parking spaces when parking spaces lost are considered. Slightly more than 50 percent of the new parking would be for use by patients and visitors. As the operation of the medical care facility is 24 hours per day, with changing shifts, and with the nearby mass transit, it can be concluded that sufficient parking will be available within the NNMC campus to accommodate the alternatives.

APPENDICES

(Persons Requesting Appendices Should Contact the BRAC Officer in Charge)