White House Area Transportation Study

Final Report

June 2011

Study Purpose and Overview

The 2003 Omnibus Appropriations Act (P.L. 108-7) directs the Federal Highway Administration (FHWA), in consultation with the National Capital Planning Commission (NCPC), to study ways "to address traffic problems in the immediate vicinity of the White House, including an engineering design to alleviate congestion resulting from street closures in that area."

Streets were closed and traffic was restricted around the White House, the Capitol, and the State Department following the 1995 Murrah Federal Building bombing and the September 11, 2001, tragedies. The largest and most significant closures are adjacent to the White House along Pennsylvania Avenue and E Street between 15th and 17th Streets. Their removal from the cross-town street grid increases congestion throughout downtown and makes travel less reliable. The closures strain a surface transportation system operating near the limits of its capacity. Travel conditions in the future are expected to deteriorate as downtown employment, commercial activity, and residential population grow.

The study evaluates the overall health and resiliency of the downtown transportation system and reports on an array of potential actions to compensate for the closures. Some actions would repair and reinforce the street grid while others are aimed at operating the remaining system more effectively. Street and transit improvements are considered. The study addresses travel across a variety of modes. The benefits of candidate actions are reported across modes with respect to all downtown travelers.

Study Participants

To conduct the study, FHWA established a working partnership among local and Federal agencies with jurisdiction in the affected area. Cooperating agencies included the NCPC, National Park Service (NPS), District of Columbia Department of Transportation (DDOT), District of Columbia Office of Planning (DCOP), U.S. Secret Service (USSS), Washington Metropolitan Area Transit Authority (WMATA), and Metropolitan Washington Council of Governments (MWCOG).

Executive Summary

Background

Numerous streets in downtown Washington, DC closed to vehicular traffic following the 1995 Oklahoma City and September 11, 2001, terrorist attacks. Most notably, Pennsylvania Avenue and E Street were closed adjacent to the White House to safeguard its occupants and operations.

The White House street closures block east-west vehicular traffic for almost two-thirds of a mile across the heart of Washington. An array of private and commercial downtown travelers including bus riders, delivery personnel, taxicabs, commuters, and residents are inconvenienced. (The exception is metrorail riders, who are not measurably impacted by the closures.) The majority of downtown's half a million workers, visitors, and residents who did not travel near the closures suffered minor delays. Travel times for those who regularly used the streets rose as much as 12 minutes per trip.

When compared to pre-closure conditions, traffic congestion, especially during peak travel periods, is more widespread, intense, and of a longer duration. Overall travel conditions are less reliable. In response to worsening conditions, about 200,000 people re-oriented their trips into the downtown core or avoided downtown entirely. Although fewer people travel downtown, the amount of time spent traveling has increased. Along with this reduction in mobility, the closures have reduced accessibility to the downtown core.

The travel inconveniences precipitated by the closures are partially attributable to the nature of the city's downtown streets. Numerous discontinuities have been introduced into the street grid since the L'Enfant plan was adopted at the turn of the nineteenth century. The fragmented street system has lost some of the redundancy needed to make it strong. Each time a street is closed,

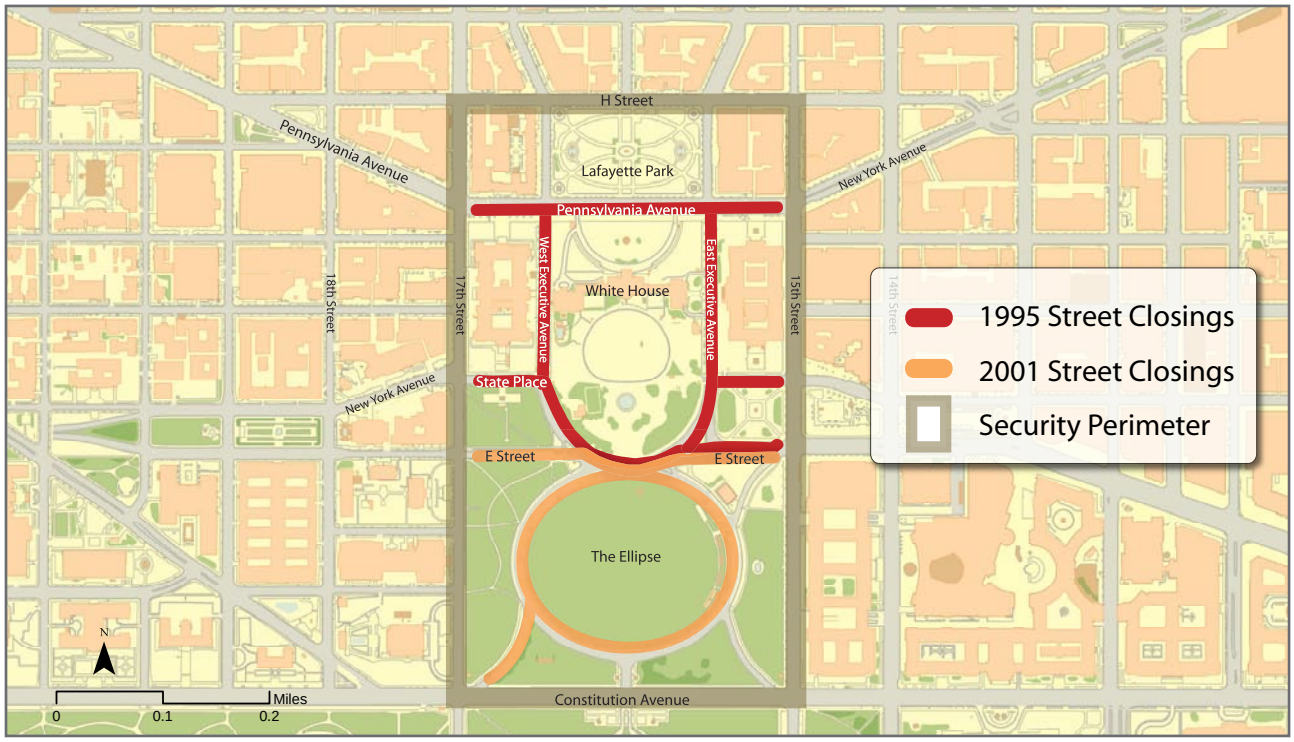


Figure 1 – White House Area Street Closures

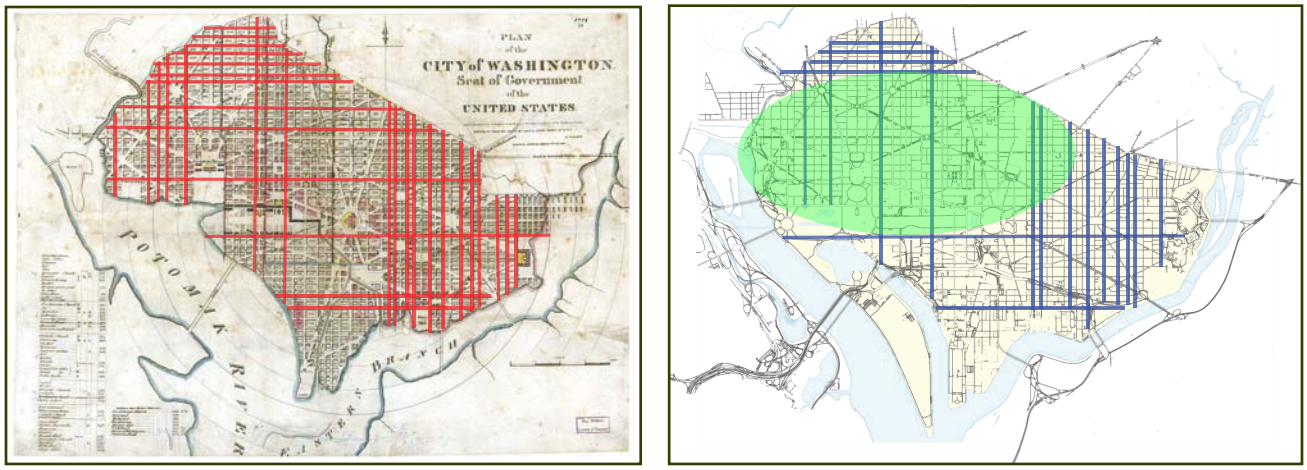


Figure 2 – L'Enfant Plan uninterrupted streets (left) and present day uninterrupted streets (right). Many crosstown streets have been eliminated from the adopted plan, especially in the city's commercial core.

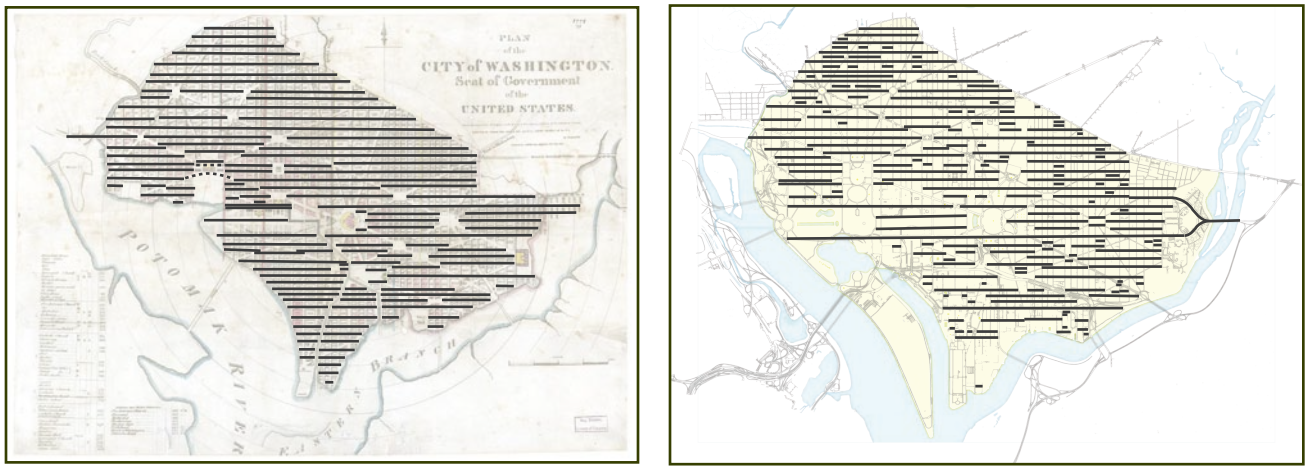


Figure 3 – L'Enfant Plan east-west streets (left) and present day east-west streets (right). Today's street system is fractured and discontinuous compared to the adopted plan.

the remaining streets carry higher loads, are subject to greater stresses, and are more prone to periodic failure.

Despite the closures, downtown Washington, as well as the entire city and region is forecast to experience healthy residential and commercial growth. The increased travel associated with new growth will exacerbate existing conditions. The study evaluates the extent to which various infrastructure, transit, and operations alternatives can alleviate projected levels of congestion in the area impacted by the street closures.

Repairing the Street Grid

The study evaluated several tunnel configurations under E Street and Pennsylvania Avenue, designed to repair and reinforce the street grid. The conversion of numerous one-way street pairs to two-way streets was also examined. A tunnel connecting the E Street Expressway to the eastern portion of downtown performed measurably better than shorter tunnel alternatives and has the potential to largely mitigate the closure effects. A long tunnel would reduce travel time, lower idling time at traffic signals, capture traffic that shifted to surrounding neighborhoods in response to the closures, improve accessibility, and increase resiliency. The associated costs of this alternative are high. Capital costs for a long tunnel range from half a billion to more than a billion dollars. (The high cost range is directly related to its length, the uncertainty of subsurface conditions, the complexity of construction, and the maintenance of traffic during construction.) Tunnel construction would entail large-scale disruption in an historic area. In addition, tunneling downtown streets is inconsistent with District goals to maintain street-level activity and to encourage transit and non-motorized trips. An expanded two-way street system was found to have serious negative travel impacts.

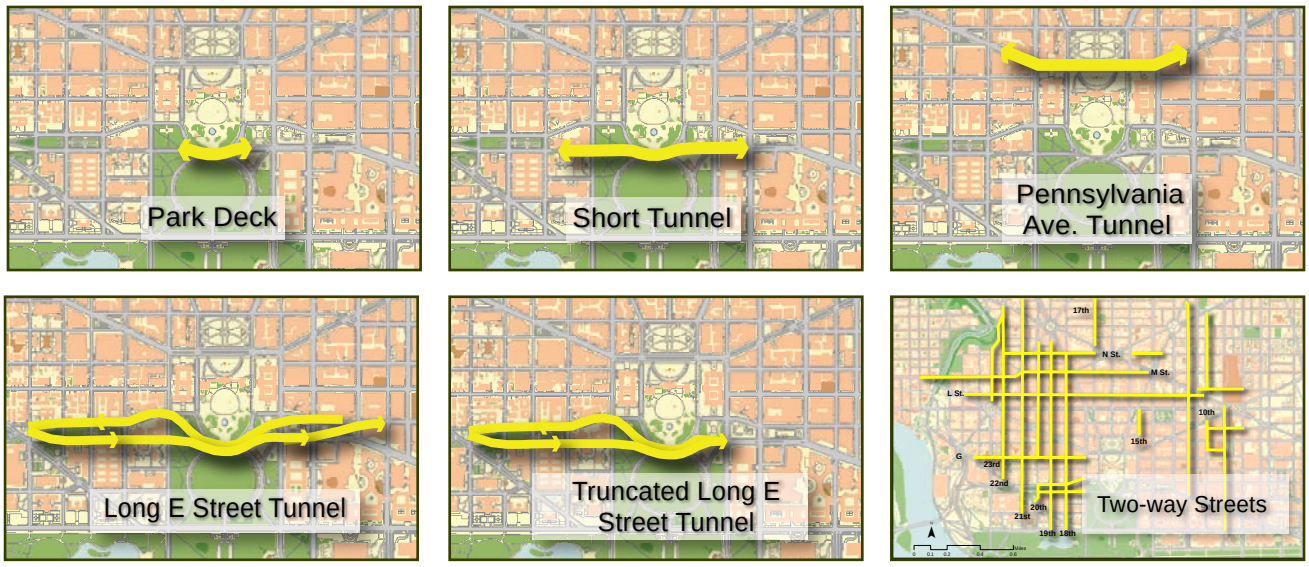


Figure 4 – Options considered by the study to repair the street grid.

Improving Operations

Operating the transportation system more efficiently has the potential to offset some of the closure impacts and help accommodate downtown employment and population growth. Transit and traffic operations improvements are not a substitute for re-opening streets as they cannot restore the directness, simplicity, and flexibility of an uninterrupted street grid. The primary benefits of operational improvements lie in alleviating the growth in congestion and unreliability following the street closures.

Transit Operations

The study considered several transit options including expanding the DC Circulator system, introducing a transitway (with bus and streetcar variants) along the center of K Street, and potentially implementing a downtown free-fare zone within the transitway. Bus service schedules, bus stop locations, and traffic signal operations were tailored to each alternative.

Expanding surface transit is a priority for the District and meets the District's goals to foster sustainable transportation. The District has outlined numerous direct and indirect benefits of an expanded system. The transit options considered through this study would improve travel time and reliability for many transit travelers; however, these benefits would generally accrue outside the central business district.

The study found that a transitway in the median of K Street NW would result in slightly longer travel times for bus riders crossing downtown in the vicinity of the White House. Delays at bus stops and intersections inside the transitway would limit its potential travel time savings. Congestion would increase at the transitway approaches and slow buses entering the transitway. The transitway's physical footprint would reduce capacity for other vehicular traffic and alter K Street's functionality. Traffic would shift onto adjacent streets. Downtown

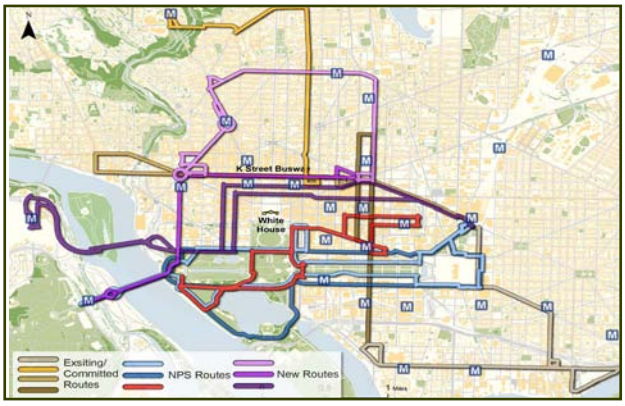


Figure 5a – Expanded DC Circulator routes

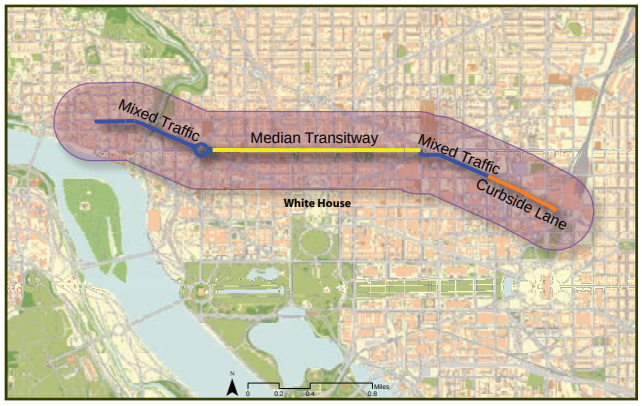


Figure 5b – K Street transitway.

streets, already taxed by the closures, could not readily absorb the displaced traffic. Bus travel time would increase across a screenline drawn along 16th street from M Street to Constitution Avenue. Outside of the transitway, bus travel conditions would improve; however, every hour of travel time savings accruing to bus riders throughout the day would be offset by two to fourteen hours of additional delay to other vehicular traffic.

The K Street transitway's impact reflects the street network's lack of redundancy and resiliency. The closures left fewer crosstown travel paths on an already fragmented street grid. The remaining streets would be more heavily used and thus more susceptible to breakdowns. The traffic displaced from K Street would result in a disproportionate growth in congested, unstable conditions.

Traffic Operations

The study convened an expert panel to recommend ways to improve street operations and system stability. The panel observed that downtown lacks obvious or functional east-west crosstown travel paths. The lack of crosstown paths led the panel to suggest the adoption of a preferred vehicular travel route around the downtown core. The route would use L and M Streets NW to the north, complemented by Virginia and Constitution Avenues NW to the west and south. Successful implementation of the concept would require the elimination of bottlenecks at various locations along the route's circumference. Parking restrictions during peak hours and traffic signal timing adjustments would be necessary. The operations alternative requires these improvements to be effective.

Traffic operations improvements would reduce travel times, queues, cycle failures, and delays, all of which grew following the closures. If the actions outlined by the panel were deployed, about 60 percent of the travelers displaced by the closures would return to the central core. Overall travel times would improve and there would be a marked reduction in travel under congested conditions (defined in this study as travel times that are three times longer than free flowing conditions).

Bus riders would save about 500 hours per day across the screenline and 800 hours per day in the downtown study area. Other vehicular traffic would save about 5,200 hours per day across the screenline and 23,700 hours per day in the study area. The difference in travel time benefits is attributable to how people travel downtown. Metrorail carries the vast majority of the study area's 710,000 transit riders. Metrorail riders would not

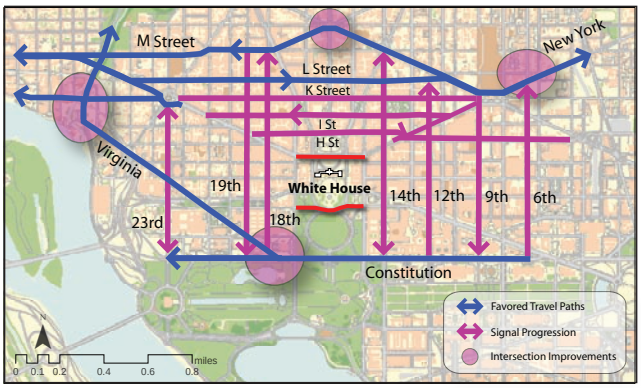


Figure 6a – Traffic operations option.

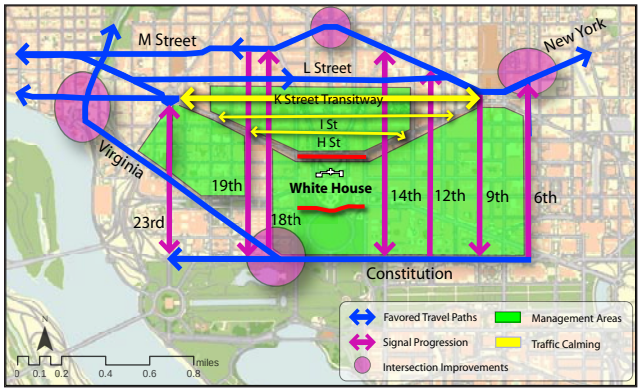
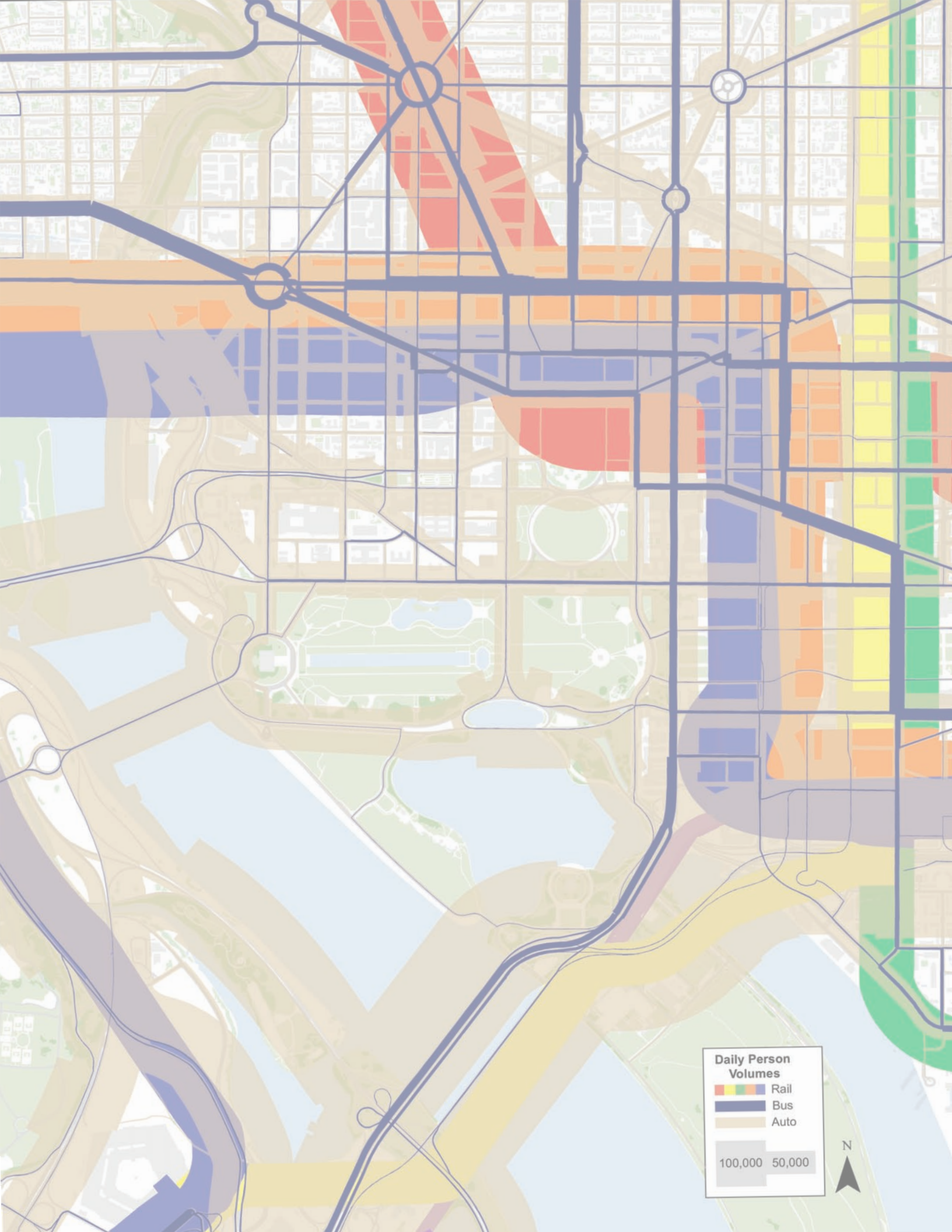


Figure 6b – Traffic management option.

experience travel time benefits from the traffic operations improvements. By contrast, most of the 790,000 vehicular trips would benefit from traffic operations improvements.

Conclusion

The historic and symbolic nature of the federal core shapes the type of actions that can be taken to improve travel conditions caused by the White House area street closures. A long tunnel connecting the E Street Expressway to the eastern half of downtown could mitigate many negative travel impacts but would carry high costs and entail large-scale disruption. Transit operational improvements can facilitate more reliable east-west bus service but would not benefit riders in the vicinity of the White House closures. The adoption of traffic operations improvements would provide numerous travel time benefits and offset many of the travel problems caused by the closures. The street network would regain a degree of resiliency and provide some flexibility for implementing transit improvements in the future.


Daily Person Volumes
Rail
Bus
Auto
100,000
50,000
N

U.S. Department of Transportation
Federal Highway Administration

Publication No. FHWA-FLH-11-004
HFL/6-11/(500)EW
June 2011