

Traffic Impact Study

Eisenhower Memorial Site Study Washington, D.C.

Prepared for:

Gensler
2020 K Street, NW, Suite 200
Washington, DC 20006

Under contract with:

Dwight D. Eisenhower Memorial Commission
1629 K Street, NW, Suite 801
Washington, DC 20006

Prepared by:

Earth Tech, Inc.
7870 Villa Park Drive, Suite 400
Richmond, Virginia 23228

May 3, 2006

Earth Tech Project No. 88364

Table of Contents

EXECUTIVE SUMMARY	1
1.0 PROJECT OVERVIEW	3
2.0 PROPOSED DEVELOPMENT	4
2.1. Description.....	4
2.2 Location and Vicinity Map	4
2.3 Site Plan	5
2.4 Existing Land Use.....	5
2.5 Proposed Land Use	5
2.6 Planned Roadway Improvements in Vicinity of Project.....	5
2.7. Phasing and Timing of Project.....	5
3.0 EXISTING CONDITIONS	6
3.1 Study Area.....	6
3.2 Roadway Inventory.....	6
3.3 Existing Traffic Volumes.....	7
3.4 Traffic Capacity Analysis	8
3.5 Public Transportation.....	11
4.0 TRIP GENERATION AND DISTRIBUTION	13
4.1 Affected Roadway Network.....	13
4.2 Trip Generation	13
4.3 Trip Distribution and Assignment.....	14
5.0 FUTURE ROADWAY CONDITIONS YEAR 2013.....	15
5.1 Planned Roadway Improvements.....	15
5.2 Future Traffic Volumes Year 2013	15
5.3 Traffic Capacity Analysis	15
5.4 Comparison of the No-Build and Build alternative	18
6.0 SAFETY ANALYSIS	20
7.0 PEDESTRIAN AND BICYCLE FACILITIES.....	21
7.1 Pedestrian Analysis	21
7.2 Bicycle Analysis	23
8.0 PARKING ANALYSIS.....	24
8.1 Existing Parking Inventory	25
8.2 Existing Parking Demand and Occupancy.....	26
8.3 Future Parking Analysis.....	27
8.4 Future Parking Demand	28
8.5 Tour bus Parking and Drop-Off Area.	29
8.6 Parking Findings	30
9.0 CONCLUSIONS AND RECOMMENDATIONS	31
9.1 Vehicular Traffic.....	31

9.2	Pedestrian Circulation	31
9.3	Parking	31

Figures

Figure 1.	Project Area Map	3
Figure 2.	Project Location Map.....	4
Figure 3.	Project Study Area	6
Figure 4.	Public Transportation Service in Vicinity of Proposed Eisenhower Memorial	12
Figure 5.	Existing and Future Traffic Patterns	13
Figure 6.	Pedestrian-Bicycle Access Circulation and Safety	23
Figure 7.	Existing Parking Spatial Distribution	24
Figure 8.	Existing Parking Occupancy	26
Figure 9.	Modes of Visitor Transportation to NPS sites.	28

Tables

Table 1.	Level of Service (LOS) Values Signalized vs. Unsignalized Intersections	9
Table 2.	Traffic Analysis Results: Existing Conditions Peak Hour LOS (Year 2006)	10
Table 3.	Trip Generation Summary (Year 2013)	14
Table 4.	Traffic Analysis Results: No-Build Conditions Peak Hour LOS (Year 2013)	16
Table 5.	Traffic Analysis Results: Build Conditions Peak Hour LOS (Year 2013).....	17
Table 6.	Traffic Analysis Results: Comparison of Scenarios Peak Hour LOS	18
Table 7.	Accident Data Summary for Study Area.....	20
Table 8.	Pedestrian Counts Existing (Year 2006)	21
Table 9.	Existing Parking Inventory	25
Table 10.	Created On-Street Metered Parking Spaces	27
Table 11.	Future Parking Supply.....	28
Table 12.	Future Parking Generation	29
Table 13.	Future Parking Demand	29
Table 14.	Future Parking Analysis Results	30

Exhibits

Exhibit A	EXISTING SITE LAYOUT
Exhibit B	EXISTING CONDITIONS VOLUMES AM
Exhibit C	EXISTING CONDITIONS VOLUMES MIDDAY
Exhibit D	EXISTING CONDITIONS VOLUMES PM
Exhibit E	EXISTING CONDITIONS VOLUMES SATURDAY
Exhibit F	SITE-GENERATED VEHICLE TRIPS AND THEIR ASSIGNMENT
Exhibit G	TRAFFIC DIVERSION
Exhibit H	YEAR 2013 NO-BUILD TRAFFIC AM
Exhibit I	YEAR 2013 NO-BUILD TRAFFIC MIDDAY
Exhibit J	YEAR 2013 NO-BUILD TRAFFIC PM
Exhibit K	YEAR 2013 NO-BUILD TRAFFIC SATURDAY
Exhibit L	YEAR 2013 BUILD TRAFFIC AM
Exhibit M	YEAR 2013 BUILD TRAFFIC MIDDAY
Exhibit N	YEAR 2013 BUILD TRAFFIC PM

Exhibit O YEAR 2013 BUILD TRAFFIC SATURDAY

Appendices

- Appendix A Highway Capacity Analysis Printouts
- Appendix B Signal Timing Plans
- Appendix C Accident Summary Reports
- Appendix D Turning Movement and Pedestrian Counts
- Appendix E References and Footnotes

EXECUTIVE SUMMARY

The Eisenhower Memorial Commission (EMC) is evaluating a site for a memorial to Dwight D. Eisenhower, to be located at the intersection of Independence and Maryland Avenues SW. The site approval process is currently underway. The National Capitol Memorial Advisory commission approved the site on November 8, 2005.

The site is currently bisected by Maryland Avenue, which intersects Independence Avenue midway between 4th Street SW and 6th Street SW. A spur road from Maryland Avenue to 4th Street SW further splits the site. Maryland Avenue in the vicinity of the Eisenhower Memorial runs diagonally from 7th Street SW to Independence Avenue for about two city blocks. To create a suitable space for the memorial, it is proposed to close Maryland Avenue between 4th Street SW and 6th Street SW, along with the spur road. This action would alter vehicle travel patterns within and adjoining the site. Existing on-street parking spaces along Maryland Avenue would be eliminated. Closing Maryland Avenue will result in limited increases in traffic volumes and delays in the study area intersections, but not in degradation of intersections Level of Service. Pedestrian safety will be improved with uninterrupted sidewalks along Independence Avenue, 4th Street SW and 6th Street SW.

A Traffic Impact Study (TIS) was conducted to measure the effects of closing Maryland Avenue, as well as to determine what roadway or traffic operational improvements may be required because of this action. The TIS also includes a parking analysis to determine the number of lost parking spaces, and the potential for their replacement. The study area for the TIS encompasses the street network in the immediate vicinity of the proposed site to include the following six intersections:

- 1 - Independence Avenue with 4th Street SW
- 2 - Independence Avenue with Maryland Avenue
- 3 - Independence Avenue with 6th Street SW
- 4 - Maryland Avenue with 6th Street SW
- 5 - Independence Avenue with 7th Street SW
- 6 - Maryland Avenue with 7th Street SW

Two scenarios are being considered for this site: Scenario A would develop site as a landscaped plaza with a ranger kiosk and up to 5 fulltime employees; and Scenario B would have a landscaped plaza, plus a potential adjoining 50,000 square-foot visitor center with up to 10 on-site employees. EMC has estimated that 600,000 visitors would use the site under either scenario.

Vehicular Traffic Conclusions

Peak period vehicle and pedestrian traffic counts were taken at these intersections, from which AM, Mid-Day, PM and Saturday peak hours were derived. The intersections were analyzed to determine the Level of Service (LOS) for Existing Conditions under all peak hours. Analysis indicates that all intersections within the study area operate at a good overall LOS (LOS C or better) for each of the four peak hours.

Assuming the Eisenhower Memorial is completed by Year 2012, a No-Build Condition Year 2013, and Build Condition Year 2013 were also analyzed. For analysis purposes the Build Condition assumed the worst case scenario (Scenario B). Analysis results for these future conditions indicates virtually no difference in LOS between No-Build and Build alternatives, with a small increase in delay under the Build alternative due the an increase in traffic volumes.

Pedestrian Circulation Findings

Closing Maryland Avenue between 6th Street and Independence Avenue would remove an unsignalized intersection and redirect this element of traffic through protected signalized intersections. Pedestrian access would also be improved by removing three pedestrian/vehicle conflict points and increasing uninterrupted segments of sidewalks along Independence Avenue, 4th Street and 6th Street.

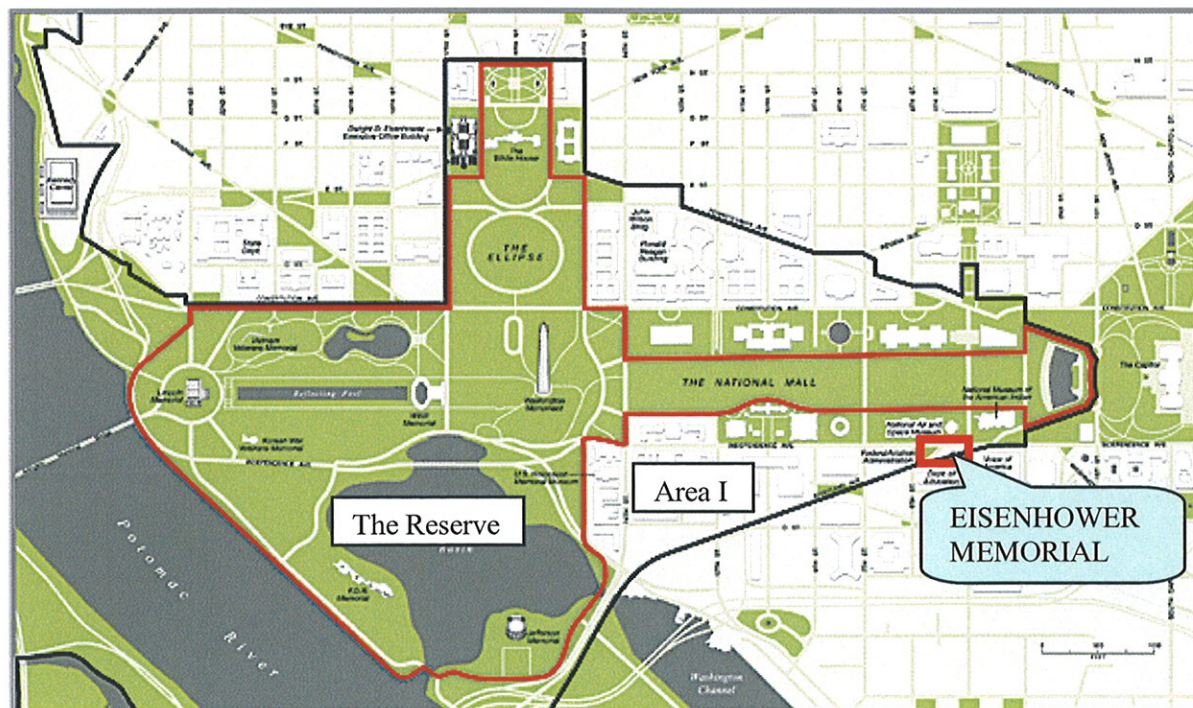
Parking Analysis Results

Existing parking spaces along Maryland Avenue would be eliminated under the Build alternative. However, some of these spaces may be replaced in areas along where the old intersection approaches are removed (on Independence Avenue, 4th Street, and 6th Street). The proposed Eisenhower Memorial site will remove supply of 69 spaces while creating the opportunity for 14 on-street curb metered parking spaces. Therefore the existing parking supply will have a net reduction of 55 spaces (metered and permit only). The District of Columbia will reduce its parking revenues by elimination of 40 net metered parking spaces. The new demand created by the proposed Eisenhower Memorial will be 18 parking spaces. The remaining spaces, as well as new spaces for Memorial visitors and employees can be absorbed by available capacity in nearby public parking garages.

1.0 PROJECT OVERVIEW

The Eisenhower Memorial Commission (EMC) was created by the US Congress to design and build a permanent national memorial to Dwight D. Eisenhower. After considerable study a site was chosen at the intersection of Independence and Maryland Avenues SW, which lies south of the National Air and Space Museum and north of the Department of Education (DoED) building (see Figure 1). This preferred site is part of the Memorials and Museums Master Plan by the National Capital Planning Commission. The Eisenhower Memorial is tentatively scheduled to be completed by Year 2012.

Figure 1. Project Area Map



Since Maryland Avenue and a spur road to 4th Street SW split the site, an alternative is being pursued to close Maryland Avenue and the related spur road between 4th and 6th Streets SW which would produce sufficient space on which to build the memorial. Closing Maryland Avenue as noted above would change traffic patterns in the vicinity of the proposed site. To assess the impact to traffic operations because of this action, a Traffic Impact Study (TIS) was performed for roadways in the vicinity of the site.

2.0 PROPOSED DEVELOPMENT

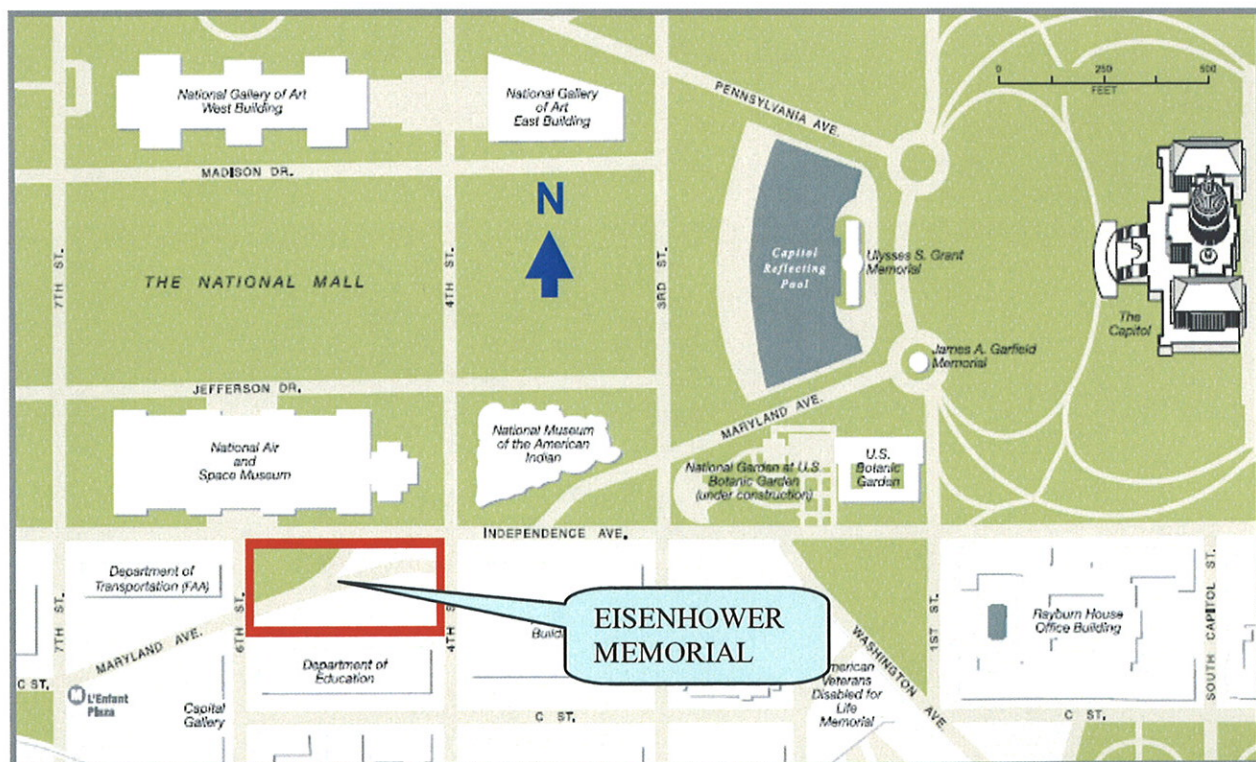
2.1 Description

Two scenarios are currently being considered for the site. Scenario A would have a landscaped plaza. There could be a kiosk for a park ranger that includes a bathroom and a small work area. No more than five fulltime employees would be at the site. Scenario B would also be a landscaped plaza, but include an adjoining visitor center of up to 50,000 square feet, with a maximum of ten full-time employees. Under either scenario EMC has estimated that 600,000 visitors annually would use the site. The design of the memorial has not begun; therefore, a detailed site plan is unavailable at this time.

2.2 Location and Vicinity Map

The Eisenhower Memorial preferred site is located on the south side of Independence Avenue, between 4th Street SW and 6th Street SW, and adjacent to the existing Department of Education (DoED) building to the south. (See outlined area outlined in Figure 2).

Figure 2. Project Location Map



2.3 Site Plan

A generalized layout of the proposed Memorial site is shown in Exhibit A. There will be no parking or vehicular access to the site except for emergency and maintenance vehicles. Nearby public parking decks will provide parking for employees and visitors.

2.4 Existing Land Use

The existing site is on Federal land and contains two parcels of land separated by a third parcel Maryland Avenue. These parcels have jurisdiction allocated to National Park Service, General Services Administration and the District of Columbia. Currently under the National Park Service jurisdiction, the western parcel is a park that contains a community garden and a fitness equipment area. The eastern parcel is under the jurisdiction of General Services Administration, and much of the parcel is used as a parking area for DoED employees and visitors. The remainder land is within the Maryland Avenue right of way which is Federal land under the administrative jurisdiction of the District of Columbia.

2.5 Proposed Land Use

While the land use will change from an undeveloped park to memorial site, the land will remain federally owned.

2.6 Planned Roadway Improvements in Vicinity of Project

There are no roadway improvements proposed in the foreseeable future within the study area. A roadway resurfacing project is listed in the Year 2006 – 2011 DC Department of Transportation (DDOT) Transportation Improvement Program (TIP) for 4th Street SW, south of the Eisenhower Memorial site. However, the roadway resurfacing project will have no effect on the roadway capacity of 4th Street SW.

2.7. Phasing and Timing of Project

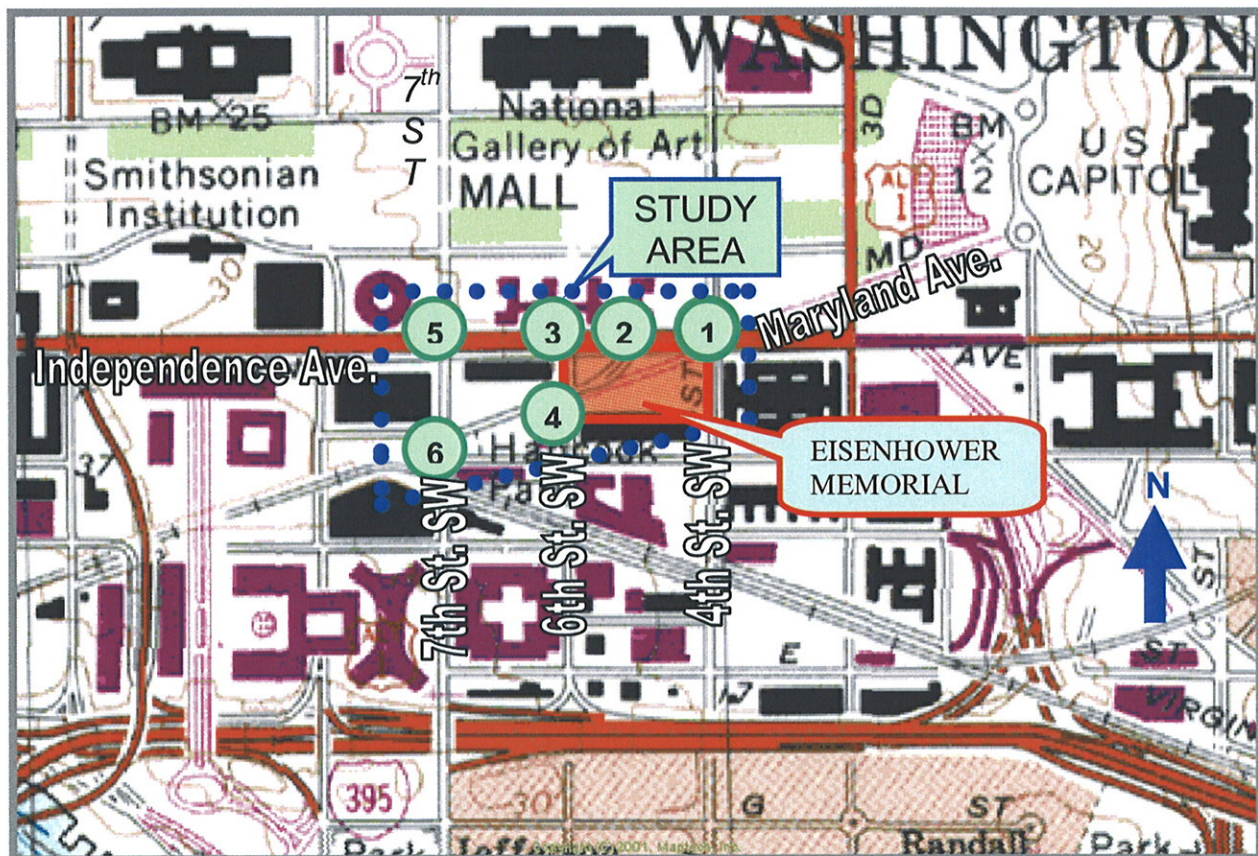
The Eisenhower Memorial is anticipated to be completed by 2012.

3.0 EXISTING CONDITIONS

3.1 Study Area

The Study Area is bounded by Independence Avenue on the north, 4th Street SW on the east, the DoED building on the south, and 7th Avenue SW on the west, as shown in Figure 3. Numbers in a circle designate intersections included in the traffic analysis.

Figure 3. Project Study Area



3.2 Roadway Inventory

Based on traffic pattern evaluation the roadways within the study area that are directly impacted by the proposed project are discussed as follows:

Independence Avenue is functionally classified as a Minor Arterial street, and is an east-west, eight-lane, undivided street carrying approximately 24,000 vehicles per day (vpd). No on-street parking is allowed during peak hours (Monday-Friday, 7:00 – 9:30 AM and 4:00 – 6:30 PM). During off-peak periods, when parking is allowed, Independence Avenue operates as a six-lane roadway. Within the study area, Independence Avenue intersects with 4th, Maryland Avenue, 6th, and 7th Streets SW.

Maryland Avenue carries 2,400 vpd within the study area and runs diagonally between 7th Street SW and Independence Avenue for about two city blocks, and is classified as a Collector facility. From 7th Street

SW to a point 150 feet east of 6th Street SW, this facility is a two-lane street with parking prohibited during the peak periods noted above. The remainder of Maryland Avenue eastward to Independence Avenue is a six-lane divided urban street. When parking is not prohibited this section operates as a four-lane street.

Maryland Avenue intersects with Independence Avenue mid-block between 6th and 4th Streets SW as a YIELD-controlled intersection. Traffic then, can only egress and ingress Maryland Avenue during gaps in traffic flow along Independence Avenue. Dual right turn movements are allowed from northbound Maryland Avenue to eastbound Independence during AM and PM peak periods, and it is unusual to have a YIELD traffic control for this situation.

A one-way eastbound Spur Road runs from Maryland Avenue along the northern edge of the DoED building site to 4th Street SW, just south of its intersection with Independence Avenue. The Spur Road provides egress from a small parking lot to the north and has curb parking along the south side.

4th Street SW is functionally classified as a Collector facility that runs in a north-south direction along the east side of the DoED building, and forms an intersection with Independence Avenue. A minor intersection is also formed with the Maryland Avenue spur road. 4th Street SW operates as a two-lane street with parking allowed on the east side during off-peak hours.

6th Street SW, functionally classified as a Collector, is a north-south four-lane street with no on-street parking allowed during peak hours. During off-peak periods, 6th Street SW operates as a two-lane street. Within the study area, 6th Street SW intersects with Maryland Avenue and Independence Avenue.

7th Street SW is an important north-south, six-lane Collector street, with intersections at Maryland Avenue and Independence Avenue in the study area. During off-peak periods, when parking is permitted, the street operates as a four-lane facility.

3.3 Existing Traffic Volumes

To determine existing traffic operations in the study area, manual traffic turning movement counts (including pedestrian counts) were taken on September 7 and 8, 2005, for AM (6:45-8:45), Mid-Day (11:45AM -1:45PM), and PM (3:45-5:45) peak periods at the following four intersections:

<u>Intersection No.</u>	<u>Description</u>
1	Independence Avenue with 4 th Street SW
2	Independence Avenue with Maryland Avenue
3	Independence Avenue with 6 th Street SW
4	Maryland Avenue with 6 th Street SW

Supplemental traffic counts were taken on January 7, 11, and 12, 2006, at the two additional intersections noted below during AM, Mid-Day, PM, and Saturday Peak (11:00AM-2:00PM) periods. These supplemental counts also included Saturday Peak counts for the four intersections previously counted on September 7 and 8, 2005.

<u>Intersection No.</u>	<u>Description</u>
5	Independence Avenue with 7 th Street SW
6	Maryland Avenue with 7 th Street SW

A determination of the AM, PM, Mid-Day, and Saturday Peak Hours was based upon counts taken during AM, Mid-Day, PM, and Saturday peak periods. Turning movement counts were analyzed to determine the four highest consecutive 15-minute volumes (the Peak Hour) during each peak period. The peak hours were determined to be:

- AM Peak Hour: 7:45-8:45 AM
- Mid-Day Peak Hour: 12:15-1:15 PM
- PM Peak Hour: 4:45-5:45 PM
- Saturday Peak Hour: 1:00-2:00PM

It should be noted that because some intersections were counted on different days and even different months, the raw turning movement volumes between intersections varied somewhat. In order to provide consistency within the study area, the raw volumes were balanced, or adjusted between one intersection and another. In cases where a slight difference occurred between the exiting and entering volumes at two intersections, the highest values were assumed in the balancing, in order to be conservative. Balanced Existing Conditions volumes were calculated for each peak hour and depicted in Exhibits B through E.

Average Daily Traffic (ADT) volumes for roadway links were derived from DDOT 2002 Traffic volumes adjusted to Year 2006, using an annual growth rate of +1%. Where link volumes were unavailable, ADT volumes were extrapolated from turning movement volumes. The ADT of a roadway is the typical daily traffic volume in both directions. The ADT volumes and threshold capacity are also shown in Exhibits B through E, with the threshold capacity shown for off-peak operations (with parking allowed) to be conservative. Threshold capacity for link ADT volumes is based upon the following DDOT guidelines:

<u>Facility Type</u>	<u>Lanes</u>	<u>Threshold Capacity in ADT</u>
Minor Collector	2	10,000
Major Collector/Minor Arterial	4	20,000
Major Arterial	4	30,000
Major Arterial	6	45,000

Most of the facilities in the TIS analysis operate with all lanes open during the AM and PM peaks. At all other times the outside lane is used for parking. To be conservative, threshold capacity volumes are shown for roadway links, assuming off-peak use.

3.4 Traffic Capacity Analysis

Using the existing traffic volumes shown in Exhibits B through E, the intersections were analyzed using the procedures set forth in the Highway Capacity Manual (HCM), Transportation Research Board, Update 2000. To facilitate this analysis, the HCM module of the *Synchro 6* traffic modeling program was utilized to determine traffic operational Levels of Service. Existing traffic signal timings provided by DDOT were used in all analysis.

Level of Service (LOS) is a quality measurement of traffic flow in terms of speed and travel time, freedom to maneuver, comfort, and convenience. There are six LOS measures, designated by the letters

A through F, with LOS A representing the best operating conditions and LOS F the worst. Levels of Service for intersections are measured in terms of vehicle delay, with somewhat different values for signalized intersections and unsignalized intersections as shown in Table 1.

Table 1. Level of Service (LOS) Values Signalized vs. Unsignalized Intersections

Signalized Intersections		Unsignalized Intersections	
<u>Level of Service (LOS)</u>	<u>Vehicle Delay (Secs.)</u>	<u>Level of Service (LOS)</u>	<u>Vehicle Delay (Secs.)</u>
A	Less than 10	A	Less than 10
B	>10-20	B	>10-15
C	>20-35	C	>15-25
D	>35-55	D	>25-35
E	>55-80	E	>35-50
F	More than 80	F	More than 50

The LOS for signalized intersections can reflect the average delay for the entire intersection, and the delay for individual movements; while for unsignalized intersections, LOS reflects the delay for side street traffic attempting to enter the mainline. All intersections in this analysis are signalized, except the intersection of Independence Avenue and Maryland Avenue. Additional results provided by the analysis are delay per vehicle in seconds, and v/c ratios. The v/c ratio is a comparison between the volume of traffic entering the intersection from one or all approaches and the possible capacity of one or all approaches. Analysis results of LOS C or better is the desirable goal for a roadway facility. However, in major urban areas such as Washington, D.C., LOS D is acceptable. LOS E and F results are considered to be at or below capacity and are generally unacceptable.

A summary of LOS results, including delay and v/c ratios, is shown in Table 2 for Existing Conditions. Overall intersection LOS results are also shown in Exhibits B through E. The analysis takes into account differing lane uses during peak and off-peak periods, where the outside lane operates as a combination through/right lane during the AM and PM peak hours, but as a right turn lane/bus stop during off-peaks. Results of the analysis show that all intersections in the study area operate at an overall LOS C, except for the unsignalized intersection of Independence Avenue with Maryland Avenue, which operates at a LOS D. At some of the other intersections certain approach traffic movements also operate at LOS D.

Table 2. Traffic Analysis Results: Existing Conditions Peak Hour LOS (Year 2006)

Intersection		Approach	Movement	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			Saturday Peak Hour			Remarks
#	Location			v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	
1	Independence Avenue with 4 th Street SW	EB ^a	LTR	0.47	18	B	0.45	34	C	0.77	17	B	0.25	26	C	
		WB ^a	LTR	0.63	14	B	0.26	11	B	0.39	10	B	0.20	10	B	
		NB	LTR	0.38	36	D	0.26	25	C	0.54	40	D	0.16	24	C	
		SB	LT	0.15	33	C	0.19	24	C	0.47	39	D	0.09	23	C	
		SB	R	0.06	32	C	0.15	24	C	0.27	36	D	0.12	23	C	
		Intersection		0.55	18	B	0.37	24	C	0.66	19	B	0.21	19	B	
2	Independence Avenue with Maryland Avenue	EB	TR	-	-	-	-	-	-	-	-	-	-	-	-	Unsignalized Intersection ^b
		WB	TL	-	-	-	-	-	-	-	-	-	-	-	-	
		NB	LR	0.13	29	D	0.10	17	C	0.18	11	B	0.08	18	C	
		Intersection		-	-	-	-	-	-	-	-	-	-	-	-	
3	Independence Avenue with 6 th Street SW	EB	TR	0.29	6	A	0.31	8	A	0.39	4	A	0.18	6	A	
		WB	LT	0.45	12	B	0.25	15	B	0.32	7	A	0.21	5	A	
		NB	LR	0.12	38	D	0.34	41	D	0.28	33	C	0.17	30	C	
		Intersection		0.35	11	B	0.32	13	B	0.36	8	A	0.20	7	A	
4	Maryland Avenue with 6 th Street SW	EB	LTR	0.14	19	B	0.09	15	B	0.26	41	D	0.05	9	A	
		WB	LTL	0.30	30	C	0.06	22	C	0.05	28	C	0.05	22	C	
		NB	LTR	0.10	11	B	0.25	11	B	0.22	11	B	0.08	9	A	
		SB	LTR	0.10	1	A	0.12	3	A	0.02	12	B	0.05	10	B	
		Intersection		0.17	14	B	0.19	11	B	0.23	20	B	0.07	12	B	
5	Independence Avenue with 7 th Street SW	EB ^a	LTR	0.39	12	B	0.35	11	B	0.59	16	B	0.26	10	B	
		WB	LTR	0.58	9	A	0.39	11	B	0.57	17	B	0.30	7	A	
		NB	L	0.20	21	C	0.30	24	C	0.49	32	C	0.03	13	B	
		NB	TR	0.35	21	C	0.33	23	C	0.28	19	B	0.28	14	B	
		SB	L	0.31	35	C	0.54	36	D	0.59	43	D	0.27	27	C	
		SB ^a	TR	0.27	31	C	0.27	25	C	0.41	32	C	0.19	24	C	
		Intersection		0.48	15	B	0.45	16	B	0.59	20	C	0.29	13	B	
6	Maryland Avenue with 7 th Street SW	EB	LTR	0.02	26	C	0.03	24	C	0.14	28	C	0.08	25	C	
		WB	LTR	0.33	21	C	0.18	23	C	0.12	23	C	0.07	18	B	
		NB	LTR	0.33	13	B	0.30	10	A	0.26	12	B	0.17	9	A	
		SB	LTR	0.25	10	A	0.24	3	A	0.27	6	A	0.16	3	A	
		Intersection		0.33	13	B	0.26	8	A	0.22	11	B	0.14	8	A	

^a During Off-Peak Hours Bus Stop Area serves as Right Turn Lane

^b For Unsignalized Intersections Delays/LOS are measured on Side Streets Only

3.5 Public Transportation

The Washington Metropolitan Area Transit Authority (WMATA or Metro) offers convenient access to the proposed Eisenhower Memorial site by many Metrobus routes as well two Metrorail stations (See Figure 4). Other services include the Virginia Rail Express, which provides regional rail access, and tourist-oriented shuttle buses. These transit services are as follows:

Metrorail

- L'Enfant Plaza Station: Entrance located Maryland Avenue and 7th Street SW (one block southwest of Eisenhower Memorial site), served by Orange, Blue, Yellow, and Green Lines.
- Federal Center Station: Entrance located at 3rd Street SW and on D Street SW (two blocks southeast of Eisenhower Memorial site).

Metrobus

- Eight bus routes (#30, #32, #34, #35, #36, #P17, #P19, #W13, #W14) provide service along Independence Avenue, on the north side of the proposed site.
- Three bus routes (#P1, #P2, #P6) provide service along 4th Street SW, on the east side of the proposed site.
- One bus route (#54) provides service along 6th street SW, on the west side of the proposed site.
- Eleven bus routes (#13A, #13B, #13F, #13G, #A42, #A46, #A48, #V8, #70, #71, #CIRCULATOR) provide service within one block west of the proposed site.

Circulator

The Circulator provides access to downtown cultural, entertainment and business destinations. Circulator runs North-South on 7th St. Nearest bus stops are at 7th Street SW and Independence Avenue and 7th Street SW and Maryland Avenue one block west of the Eisenhower Memorial. The fare is \$1.00 and the hours of operation 9:30 AM to 6:00 PM with 5 to 10 minutes headway.

Virginia Rail Express (VRE)

L'Enfant Station: Entrance located on C Street SW, between 6th Street SW and 7th Street SW. (Only morning and afternoon peak hour service is provided by VRE at this location.)

Tourist Buses

Old Town Trolley, operated by Historic Tours of America, operates trolley tours every thirty minutes with hop-on and hop-off privileges. The trolleys operate between the hours of 9:00 AM and 5:30 PM (4:30PM during the winter). The National Mall and Downtown Loop route would provide service within one block of the Eisenhower Memorial. Nearest Old Town Trolley bus stop is at Independence Avenue and 6th St. SW. Trolley runs East-west on Independence Avenue.

Tourmobile Sightseeing, under license by the NPS, operates a continuous American Heritage Tour between 9:30 AM and 4:30 PM hours. The tour features a circular route with stops at important tourist sites at approximately 30 minute intervals. Included is a stop at the National Air and Space Museum, located one block from the proposed Eisenhower Memorial site.

4.0 TRIP GENERATION AND DISTRIBUTION

4.1 Affected Roadway Network

Closing Maryland Avenue between 6th Street SW and Independence Avenue will alter vehicle travel patterns in the immediate area. Figure 5 shows the existing travel patterns and the traffic currently using the section of Maryland Avenue to be closed, along with the new travel patterns and the diverted traffic volumes. As can be seen, there would be a reduction in traffic for some turning movements, with an increase for other turning movements.

Figure 5. Existing and Future Traffic Patterns



4.2 Trip Generation

Trip generation data are not included in the Institute of Traffic Engineers (ITE) Trip Generation Manual for a site use such as the Eisenhower Memorial. The following data was provided by EMC as a basis for trip generation:

Scenario A

Land Use is Park
Landscaped Plaza
No Driveways
No On-site parking
Kiosk for Ranger with Bathroom
Up to 5 Full-time Employees
Limited Retail supporting Memorial
Public Restrooms
600,000 Annual Visitors

Scenario B

Land Use is Park
Landscaped Plaza
No Driveways
No On-site parking
Adjoining 50,000 square-foot Visitor Center
Up to 10 Full-time Employees
Kiosk for Ranger with Bathroom
Public Restrooms
600,000 Annual Visitors

Scenario B is the worst case scenario and was used for the TIS analysis. Trip generation figures for Build Year 2013 based using Scenario B data are based upon the following methodology and assumptions:

Employees

- Employee modal split is assumed to be 50/50 between private automobile and transit.
- Employees using automobiles will drive alone.
- Most employees will enter during the AM peak hour and leave during the PM peak hour.
- Employee Mid-Day trips are minimal.

Visitors

- Daily Visitor trips are assumed to be 1% of Annual Visitation.
- Hourly Visitor trips are 10% of Daily trips.
- Visitor trips by automobile make up 16% of all Visitor trips^{iv}.
- Average Visitor automobile occupancy rate is Three.

A trip generation summary based upon the above assumptions is shown in Table 3.

Table 3. Trip Generation Summary (Year 2013)

	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			Saturday Peak Hour			ADT
	In	Out	Total	In	Out	Total	In	Out	Total	In	Out	Total	
Total Trips Employees	8	2	10	2	2	4	2	8	10	2	2	4	24
Transit Reduction Employees	4	1	5	1	1	2	1	4	5	1	1	2	12
Total Vehicle Trips Employees	4	1	5	1	1	2	1	4	5	1	1	2	12
Visitor Vehicle Trips	0	0	0	16	16	32	0	32	32	16	16	32	320
Net Vehicle Trips	4	1	5	17	17	34	1	36	37	17	17	34	332

4.3 Trip Distribution and Assignment

Additional trips generated by the memorial were distributed as existing traffic distributes. Exhibit F depicts site-generated vehicle trips and their assignment. All additional trips were assumed to begin or end at the intersection of Maryland Avenue and 6th Street SW, where a public garage is located. Exhibit G depicts the traffic diversion as a result of closing a portion of Maryland Avenue.

5.0 FUTURE ROADWAY CONDITIONS YEAR 2013

5.1 Planned Roadway Improvements

There are no known planned roadway improvements in the vicinity of the proposed Eisenhower Memorial site that would be impacted; however, closing Maryland Avenue between 6th Street SW and Independence Avenue would alter traffic patterns in the area.

5.2 Future Traffic Volumes Year 2013

Future traffic volumes were generated for Year 2013 under No-Build and Build conditions.

- A 1.0% annual growth rate was applied to existing Year 2006 traffic volumes to produce Year 2013 No-Build traffic volumes.
- Build traffic volumes were the result of adding traffic generated by the Eisenhower Memorial site to Year 2013 No-Build traffic volumes, and redistributing those volumes based on closing Maryland Avenue between 6th street SW and Independence Avenue.

Year 2013 No-Build traffic is shown in Exhibits H through K, and Year 2013 Build Traffic is shown in Exhibits L through O for the four established Peak Hours.

5.3 Traffic Capacity Analysis

Using Year 2013 traffic volumes, the intersections were analyzed using the HCM module of the *Synchro 6* traffic modeling program to determine LOS for No-Build and Build conditions. Existing traffic signal timings provided by the City were used in the analysis for both conditions to allow a direct comparison. Table 4 shows the LOS results of the Year 2013 No-Build condition. Overall intersection LOS results are also depicted on Exhibits H through K. The No-Build analysis results indicates LOS results very similar to existing conditions, with slightly more delay, consistent with normal traffic growth. Results of the analysis indicate that all intersections in the study area would operate at an overall LOS C or better, with some approach movements operating at LOS D.

Table 4. Traffic Analysis Results: No-Build Conditions Peak Hour LOS (Year 2013)

Intersection		Approach	Movement	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			Saturday Peak Hour			Remarks
#	Location			v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	
1	Independence Avenue with 4 th Street SW	EB ^a	LTR	0.51	18	B	0.49	35	C	0.84	19	B	0.27	25	C	
		WB ^a	LTR	0.68	15	B	0.29	11	B	0.42	11	B	0.21	10	B	
		NB	LTR	0.41	36	D	0.28	25	C	0.59	41	D	0.18	24	C	
		SB	LT	0.16	33	C	0.20	24	C	0.51	40	D	0.10	23	C	
		SB	R	0.06	32	C	0.16	24	C	0.29	36	D	0.13	23	C	
		Intersection		0.60	18	B	0.40	24	C	0.72	20	C	0.23	19	B	
2	Independence Avenue with Maryland Avenue	EB	TR	-	-	-	-	-	-	-	-	-	-	-	-	Unsignalized Intersection ^b
		WB	TL	-	-	-	-	-	-	-	-	-	-	-	-	
		NB	LR	0.14	31	D	0.11	17	C	0.19	11	B	0.06	18	C	
		Intersection		-	-	-	-	-	-	-	-	-	-	-	-	
3	Independence Avenue with 6 th Street SW	EB	TR	0.31	6	A	0.34	9	A	0.42	4	A	0.20	7	A	
		WB	LT	0.49	12	B	0.27	15	B	0.34	7	A	0.23	5	A	
		NB	LR	0.13	38	D	0.37	41	D	0.30	33	C	0.19	30	C	
		Intersection		0.38	11	B	0.34	14	B	0.39	8	A	0.22	7	A	
4	Maryland Avenue with 6 th Street SW	EB	LTR	0.16	19	B	0.10	16	B	0.28	42	D	0.05	13	B	
		WB	LTR	0.32	31	C	0.06	23	C	0.05	28	C	0.05	22	C	
		NB	LTR	0.11	11	B	0.27	11	B	0.24	11	B	0.08	9	A	
		SB	LTR	0.11	1	A	0.13	3	A	0.03	13	B	0.05	10	B	
		Intersection		0.19	14	B	0.21	11	B	0.25	20	B	0.07	12	B	
5	Independence Avenue with 7 th Street SW	EB ^a	LTR	0.42	12	B	0.38	11	B	0.64	17	B	0.29	11	B	
		WB	LTR	0.62	9	A	0.42	12	B	0.61	18	B	0.33	8	A	
		NB	L	0.22	21	C	0.33	26	C	0.57	37	D	0.04	20	B	
		NB	TR	0.38	21	C	0.35	24	C	0.29	20	B	0.30	22	C	
		SB	L	0.36	37	D	0.59	39	D	0.65	48	D	0.30	28	C	
		SB ^a	TR	0.29	31	C	0.29	26	C	0.45	32	C	0.20	25	C	
		Intersection		0.51	15	B	0.49	17	B	0.64	21	C	0.32	14	B	
6	Maryland Avenue with 7 th Street SW	EB	LTR	0.02	26	C	0.03	24	C	0.15	28	C	0.09	25	C	
		WB	LTR	0.36	22	C	0.20	24	C	0.12	23	C	0.08	18	B	
		NB	LTR	0.36	13	B	0.32	10	A	0.28	12	B	0.18	9	A	
		SB	LTR	0.27	9	A	0.26	3	A	0.29	6	A	0.17	3	A	
		Intersection		0.36	13	B	0.28	8	A	0.24	11	B	0.15	8	A	

^a During Off-Peak Hours Bus Stop Area serves as Right Turn Lane

^b For Unsignalized Intersections Delays/LOS are measured on Side Streets Only

Table 5 shows the LOS results for the Year 2013 Build condition. Overall intersection LOS results are also depicted on Exhibits L through O. Similar to the Year 2013 No-Build condition, all intersections will operate at an overall LOS of C or better, with some approach movements reduced to LOS D

Table 5. Traffic Analysis Results: Build Conditions Peak Hour LOS (Year 2013)

Intersection		Approach	Movement	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			Saturday Peak Hour			Remarks
#	Location			v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	
1	Independence Avenue with 4 th Street SW	EB ^a	LTR	0.52	17	B	0.49	33	C	0.84	22	C	0.28	26	C	
		WB ^a	LTR	0.68	15	B	0.29	11	B	0.42	11	B	0.22	10	B	
		NB	LTR	0.41	36	D	0.28	25	C	0.59	41	D	0.18	24	C	
		SB	LT	0.16	33	C	0.20	24	C	0.51	40	D	0.10	23	C	
		SB	R	0.06	32	C	0.17	24	C	0.29	36	D	0.14	24	C	
		Intersection		0.60	18	B	0.40	24	C	0.72	22	C	0.24	19	B	
2	Independence Avenue with Maryland Avenue	This Intersection is Eliminated under Build Conditions														
3	Independence Avenue with 6 th Street SW	EB	TR	0.32	7	A	0.35	9	A	0.44	5	A	0.21	7	A	
		WB	LT	0.62	15	B	0.29	15	B	0.36	7	A	0.25	5	A	
		NB	LR	0.19	40	D	0.64	53	D	0.68	38	D	0.34	27	C	
		Intersection		0.49	13	B	0.43	16	B	0.50	10	B	0.27	8	A	
4	Maryland Avenue with 6 th Street SW	EB	LR	0.07	30	C	0.07	12	B	0.20	53	D	0.05	12	B	
		NB	LT	0.11	11	B	0.27	11	B	0.25	11	B	0.11	10	A	
		SB	TR	0.15	1	A	0.15	3	A	0.03	14	B	0.07	13	B	
		Intersection		0.12	8	A	0.20	9	A	0.23	20	B	0.08	11	B	
5	Independence Avenue with 7 th Street SW	EB ^b	LTR	0.42	12	B	0.39	11	B	0.64	17	B	0.28	10	B	
		WB	LTR	0.74	10	A	0.46	13	B	0.69	19	B	0.22	9	A	
		NB	L	0.22	21	C	0.34	27	C	0.56	37	D	0.04	19	B	
		NB	TR	0.41	22	C	0.39	25	C	0.33	21	C	0.30	21	C	
		SB	L	0.38	38	D	0.62	41	D	0.71	52	D	0.30	28	C	
		SB ^b	TR	0.29	31	C	0.29	26	C	0.45	32	C	0.20	25	C	
		Intersection		0.59	16	B	0.52	18	B	0.70	22	C	0.29	14	B	
6	Maryland Avenue with 7 th Street SW	EB	LTR	0.02	26	C	0.03	24	C	0.18	28	C	0.09	25	C	
		WB	LTR	0.17	27	C	0.13	24	C	0.11	23	C	0.09	13	B	
		NB	LTR	0.34	13	B	0.34	10	B	0.27	12	B	0.19	9	A	
		SB	LTR	0.32	10	B	0.27	4	A	0.28	5	A	0.16	3	A	
		Intersection		0.28	12	B	0.27	8	A	0.24	11	B	0.15	8	A	

^a During Off-Peak Hours Bus Stop Area serves as Right Turn Lane

5.4 Comparison of the No-Build and Build alternative

A comparison of the Year 2013 No-Build and Year 2013 Build results reveals no degradation in LOS and very minor increases in delay for some traffic movements. Table 6 summarizes the comparison of the traffic analysis results for existing, no-build and build scenarios.

Table 6. Traffic Analysis Results: Comparison of Scenarios Peak Hour LOS

#	Intersection Location	Scenario	Year	AM Peak Hour			Mid-Day Peak Hour			PM Peak Hour			Saturday Peak Hour			Remarks
				v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	v/c ratio	Delay(secs)	LOS	
1	Independence Avenue with 4 th Street SW	Existing	2006	0.55	18	B	0.37	24	C	0.66	19	B	0.21	19	B	PM LOS same as No-Build
		No-Build	2013	0.60	18	B	0.40	24	C	0.72	20	C	0.23	19	B	
		Build	2013	0.60	18	B	0.40	24	C	0.72	22	C	0.24	19	B	
2	Independence Avenue with Maryland Avenue	Existing	2006	0.13	29	D	0.10	17	C	0.18	11	B	0.08	18	C	Conflict points eliminated
		No-Build	2013	0.14	31	D	0.11	17	C	0.19	11	B	0.06	18	C	
		Build	2013	*	*	*	*	*	*	*	*	*	*	*	*	
3	Independence Avenue with 6 th Street SW	Existing	2006	0.35	11	B	0.32	13	B	0.36	8	A	0.20	7	A	PM LOS changes to B
		No-Build	2013	0.38	11	B	0.34	14	B	0.39	8	A	0.22	7	A	
		Build	2013	0.49	13	B	0.43	16	B	0.50	10	B	0.27	8	A	
4	Maryland Avenue with 6 th Street SW	Existing	2006	0.17	14	B	0.19	11	B	0.23	20	B	0.07	12	B	Mid-Day, AM LOS improves
		No-Build	2013	0.19	14	B	0.21	11	B	0.25	20	B	0.07	12	B	
		Build	2013	0.12	8	A	0.20	9	A	0.23	20	B	0.08	11	B	
5	Independence Avenue with 7 th Street SW	Existing	2006	0.48	15	B	0.45	16	B	0.59	20	C	0.29	13	B	
		No-Build	2013	0.51	15	B	0.49	17	B	0.64	21	C	0.32	14	B	
		Build	2013	0.59	16	B	0.52	18	B	0.70	22	C	0.29	14	B	
6	Maryland Avenue with 7 th Street SW	Existing	2006	0.33	13	B	0.26	8	A	0.22	11	B	0.14	8	A	
		No-Build	2013	0.36	13	B	0.28	8	A	0.24	11	B	0.15	8	A	
		Build	2013	0.28	12	B	0.27	8	A	0.24	11	B	0.15	8	A	

*Intersection eliminated during Build Scenario

The effects of the Build alternative on each of the analyzed intersections are discussed below:

Intersection #1 - Independence Avenue with 4th Street SW

There would be a slight increase in traffic through this intersection, but the delay and LOS results would essentially be the same as No-Build.

Intersection #2 - Independence Avenue with Maryland Avenue SW

During the AM peak hour the northbound right turn approach of this unsignalized intersection operates at LOS D. The Build alternative would eliminate this intersection, thereby removing a conflict point with through traffic and pedestrians along Independence Avenue.

Intersection #3 - Independence Avenue with 6th Street SW

Closing Intersection #2 would divert a significant amount of traffic through this intersection, causing a slight increase in delay. However, there would be no degradation in the LOS under the Build alternative (the average LOS at all intersections would B or better).

Intersection #4 - Maryland Avenue with 6th Street SW

There would be a significant reduction in traffic due to the closure of Maryland Avenue east of this intersection, and the intersection configuration would be changed from a four-legged intersection to a "T" intersection. This would eliminate a pedestrian/vehicle conflict point. The Build LOS would improve from LOS B to LOS A, except during the PM peak hour when the LOS would be the same as No-Build.

Intersection #5 - Independence Avenue with 7th Street SW

Traffic at this intersection would increase due to diverted traffic from closing Maryland Avenue east of Intersection #4, as well as additional traffic generated by the proposed development (Eisenhower Memorial). However, while there would be a slight increase in delay at the intersections, the overall LOS would remain the same (LOS C or better).

Intersection #6 - Maryland Avenue/C Street SW with 7th Street SW

Diverted traffic, as a result of closing Maryland Avenue east of intersection #4, would cause a decrease in turning traffic to and from Maryland Avenue, and an increase in through traffic on 7th Street SW. This would result in a slight decrease in delay at the intersection, but the overall LOS would remain the same as No-Build.

6.0 SAFETY ANALYSIS

The most recent accident data available were secured from the DDOT covering the period from January 1, 2002, through December 31, 2004. These data are presented in Table 7. A review of these data indicates that a majority of the accidents are either angle-type or rear-end accidents. Such accidents are typical in the vicinity of signalized intersections.

The Institute of Traffic Engineers (ITE) recommends that improvements be evaluated for intersections with a crash rate of over 2 crashes per million entering vehicles (MEV). As can be seen in Table 7, all intersections have accident rates of 0.66 or less, which is well below the ITE safety threshold of 2 MEV.

Table 7. Accident Data Summary for Study Area

Intersection		Collision Type											Accident Rates	
#	Location	Right Angle	Left Turn	Right Turn	Rear End	Side Swiped	Parked	Fixed Object	Pedestrian	Other	Total Accidents ^a	Total Injuries	Million Entering Vehicles (MEV) ^b	Accident Rate Per MEV
1	Independence Avenue SW with 4 th Street SW	6 30%	2 10%	2 10%	3 15%	4 20%	0	0	1 5%	2 10%	20	10	11.10	0.60
2	Independence Avenue SW with Maryland Avenue SW	No Accident Data Available												
3	Independence Avenue SW with 6 th Street SW	1 13%	1 13%	0	2 25%	3 37%	1 13%	0	0	0	8	2	11.53	0.23
4	Maryland Avenue SW with 6 th Street SW	No Accident Data Available												
5	Independence Avenue SW with 7 th Street SW	9 31%	3 10%	2 7%	7 24%	6 21%	0	0	0	2 7%	29	10	14.75	0.66
6	Maryland Avenue SW with 7 th Street SW	0	0	0	2 40%	0	1 20%	1 20%	0	1 20%	5	4	5.73	0.29
Totals		16	6	4	14	13	2	1	1	5	62	26		

^a Total Accidents for a Three-year Period

^b MEV for a One-year Period

7.0 PEDESTRIAN AND BICYCLE FACILITIES

This section of the study evaluates the existing pedestrian and bicycle facilities and what effect the permanent closure of Maryland Avenue will have on these facilities.

Sidewalks, crosswalks, pedestrian signals, proximity of National Mall trails, open park space, museums and other pedestrian attractions create a pedestrian friendly environment. Sidewalks exist along all streets in the study area. Pedestrian signals exist at all crosswalks except at the intersection of Maryland Avenue and 6th St. SW.

7.1 Pedestrian Analysis

Pedestrian counts were taken on September 7 and 8, 2005, with supplemental counts taken on January 7, 11 & 12, 2006, during the following peak periods:

- Morning (6:45 AM-8:45 AM),
- Midday (11:45 AM-1:45 PM)
- Afternoon (3:45 PM-5:45 PM)
- Saturday (11:30 AM-2:30 PM)

Table 8 summarizes the hourly pedestrian counts along the crosswalks at 6 intersections in the study area.

Table 8. Pedestrian Counts Existing (Year 2006)

Intersection	Approach	AM	Midday	PM	Saturday
Independence Avenue with 4 th Street SW	EB	70	329	170	142
	WB	109	187	129	256
	SB	68	203	138	51
	NB	161	223	131	129
Independence Avenue with Maryland Ave.	EB	0	0	0	0
	WB	0	0	0	0
	SB	-	-	-	-
	NB	21	156	62	192
Independence Avenue with 6 th Street SW	EB	71	178	279	188
	WB	3	14	22	7
	SB	-	-	-	-
	NB	38	143	60	151
Maryland Avenue with 6 th Street SW	EB	90	190	174	116
	WB	17	80	39	46
	SB	11	59	26	21
	NB	141	232	150	64
Independence Avenue with 7 th Street SW	EB	119	236	120	145
	WB	85	187	114	135
	SB	104	89	111	11
	NB	68	189	83	103
Maryland Avenue with 7 th Street SW	EB	152	287	131	73
	WB	300	273	194	100
	SB	260	276	117	11
	NB	382	317	535	25
		1767	2558	1854	1001

Pedestrian accidents records for the 1997-1999 period show two locations with safety concerns. The two intersections are:

- Independence Avenue at 4th Street SW and
- C street SW at 4th Street SW.

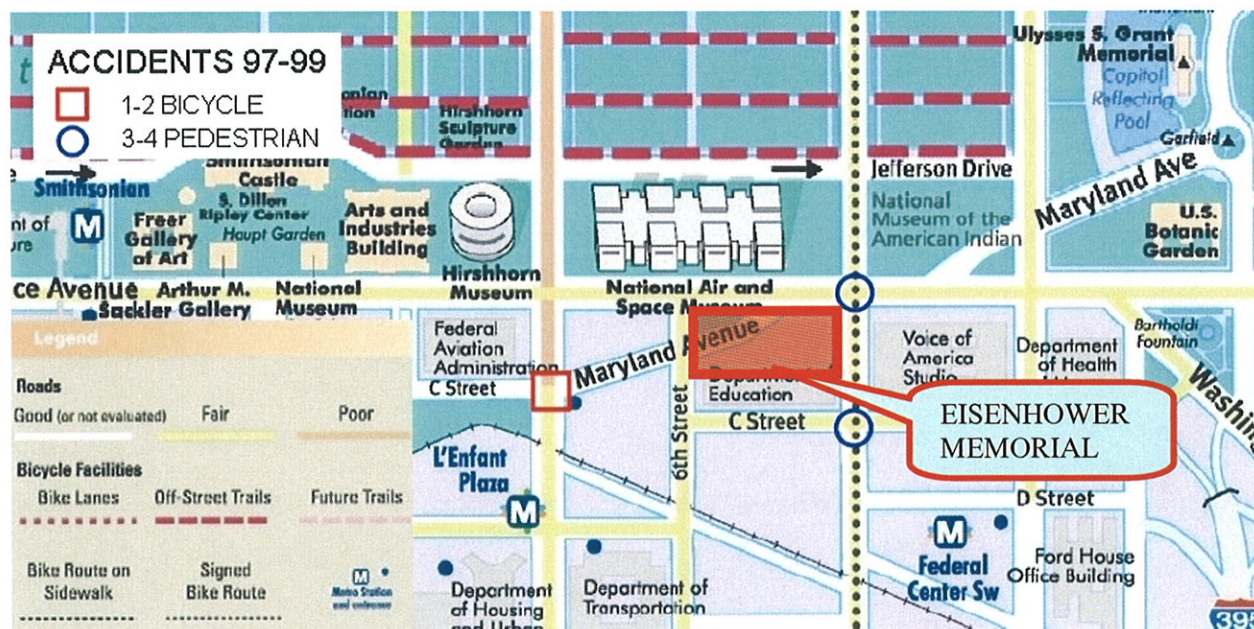
As shown on Figure 6 about 3-4 pedestrian accidents were observed at each location. Removing the section of Maryland Avenue between 6th Avenue and Independence Avenue will eliminate two pedestrian/automobile conflict points.

Closing Maryland Avenue will produce continuous sidewalks along Independence Avenue between 6th Street SW and 4th Street SW, and along 6th Street SW between Independence Avenue and C Street, thereby enhancing pedestrian access to the Eisenhower Memorial site as well as the Department of Education building. The Eisenhower Memorial design should provide pedestrian access to the site at the three adjacent intersections. Future urban planning efforts could further enhance pedestrian attraction to the Eisenhower Memorial.

7.2 Bicycle Analysis

The Eisenhower Memorial proposed location encourages bicycle use. A signed bike route along 4th Street SW provides direct bicycle access to the Eisenhower Memorial site. This signed bike route connects to a nearby bike trail located on the National Mall. This bike trail runs along Jefferson Drive SW, one block to the north of Independence Avenue. Restrictions on riding bicycles on the sidewalks exist in downtown Washington DC.

Figure 6. Pedestrian-Bicycle Access Circulation and Safety



Accident records during 1997-1999 include only one location with a bicycle accident within the study area. This location is at the intersection of 7th St. SW and Maryland Avenue.

The DC Bicycle Master Planⁱ proposes 4th Street SW to include a bike lane shared with vehicular traffic and Independence Avenue east of 4th St. SW to incorporate a signed bicycle route. Potential addition of bike racks at the Eisenhower Memorial would assist bicycle parking and encourage bicycle use.

8.0 PARKING ANALYSIS

The parking section of this study evaluates the existing and future parking supply and demand before and after the permanent closure of Maryland Avenue.

The acceptable walking distance from parking to destination defines the parking study area for this report. This study uses the walking distance of one city block as discussed below. Generally the accepted walking distance from parking varies with trip purpose, duration and type of facility. For example, work trip parkers usually are willing to walk longer distances to their destination than shoppers. Also, the acceptable walking distance is greater when a public garage is available. According to location characteristics and using the Parking Principlesⁱⁱ publication, the acceptable walking distances from parking to final trip destination applicable for this study are:

- 390 feet for curb parking
- 700 feet for garage parking

The available parking supply and demand within the defined study area was evaluated.

Figure 7. Existing Parking Spatial Distribution



8.1 Existing Parking Inventory

Parking facilities observed in the study area include curb metered parking, taxi zones, bus zones, public agency permit (GSA) and public garage. Figure 7 shows the spatial distribution of the existing parking inventory.

The proposed Eisenhower Memorial site currently has 69 parking spaces total (54 metered and 15 permitted). The parking spaces are distributed along:

- Maryland Avenue (24 metered),
- Maryland Avenue spur to 4th St. SW (10 metered and 11 permitted) and the
- One-way parking area (20 metered and 4 permitted).

A public parking garage is located at 600 Maryland Avenue. The capacity of the garage with stacked parking is 634 vehicles. During stacked operation the customers leave the keys with the attendant to park the car. The hours of operation are 6:00 AM - 9:00 PM on weekdays and 9:00 AM- 6:00 PM on weekends.

Table 9. Existing Parking Inventory

Sector	From	To	Curb Metered	Temp. Work Zone*	Permit Only	Govern-ment Only	Public Garage	Taxi/ bus
Proposed site	6 th St. SW	4 th St. SW	54	0	15	0	0	0
Independence	7 th St. SW-	6 th St. SW	13	0	0	0	0	0
Independence	6 th St. SW	4 th St. SW	12	17	0	0	0	1
Independence	4 th St. SW	east	13	0	0	0	0	0
Maryland Ave	7 th St. SW-	6 th St. SW	21	10	13	0	0	0
4 th St. SW	C St. SW	Independence	33	0	0	0	0	1
4 th St. SW	Independence	North	17	0	0	0	0	0
6 th St. SW	C St. SW	Maryland Ave	15	0	0	0	0	0
6 th St. SW	Maryland Ave	Independence	7	0	0	0	0	0
C St. SW	6 th St. SW	4 th St. SW	25	0	46	6	0	7
7 th St. SW	Maryland Ave	Independence	18	0	0	0	0	0
Public Garage	600 Maryland	-	0	0	0	0	634	0
TOTAL (978)	-	-	228	27	74	6	634	9

*Not included in occupancy rate calculations.

The curb metered parking supply within walking distance is 255 spaces (including 54 inside the site). The curb metered parking duration in the area has generally a limit of two hours. Curb metered parking is restricted Monday - Friday during the following peak periods:

- 7:00 AM - 9:30 AM
- 4:00 PM - 6:30 PM

The overall total supply is 978 parking spaces (including parking garage). Table 9 summarizes the existing parking inventory.

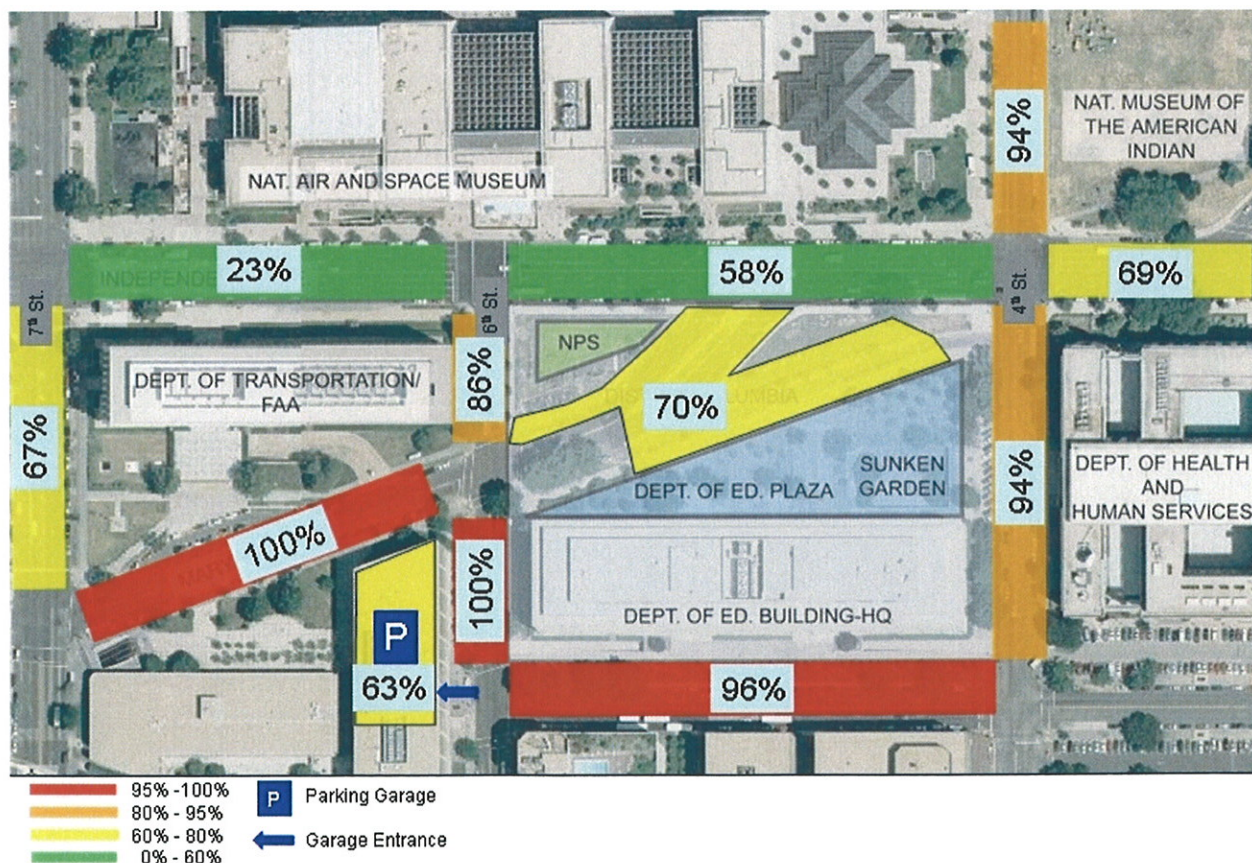
8.2 Existing Parking Demand and Occupancy

A parking occupancy study was conducted to determine the number of parked vehicles in the vicinity of the memorial site. The study was conducted between the hours of 11:00 AM and 1:00 PM on Tuesday January 17, 2006. Field observations during site visits showed peak demand for parking is around Noon.

The study noted occupied curb metered spaces and available unused curb metered spaces during this weekday peak hour. This limited study shows the parking situation on a specific time only.

The rate of parking utilization was calculated for different sectors of the study area. Occupancy percentage is the proportion of occupied curb metered spaces compared to available curb metered spaces. Figure 8 shows the existing parking occupancy for different sectors of the study area.

Figure 8. Existing Parking Occupancy



The parking garage facility at 600 Maryland Avenue operates at 63% occupancy during weekdays and much lower on weekends according to management records. An average unused supply of 236 spaces exists during the day.

The spatial representation of occupancy rates on the map shows a difference in the curb metered parking utilization between the south and north sectors of the study area. South of the site the curb metered parking is at capacity while the public garage has available spaces. The short term parkers probably prefer the on-street curb parking instead of the garage. Parking is underutilized along Independence Avenue, north of the proposed Eisenhower Memorial site. The following list presents the curb metered parking occupancy study results and the parking garage record analysis:

- Existing curb metered parking demand is 182 spaces.
- Total on-street curb parking demand is 271 spaces including metered, permitted, government, taxi and bus.
- Overall existing curb metered parking occupancy is approximately 80%. (Without using 27 curb metered spaces closed temporarily for construction)
- Assuming maximum efficient curb metered parking occupancy 95% the available unused curb metered parking supply is 60 spacesⁱⁱⁱ.
- Existing parking garage demand is 398 spaces.
- Available parking garage supply is 236 spaces.

8.3 Future Parking Analysis

The proposed Eisenhower Memorial development will remove 69 parking spaces, including metered and permitted parking. Closing Maryland Avenue between 6th St. SW and Independence Avenue will create on-street parking in three areas. These areas are where existing Maryland Ave intersects Independence Avenue and 6th Street SW, and where the Maryland Avenue spur intersects 4th Street SW. The new on- street curb metered parking spaces are assumed to have 23-foot stall lengths. Table 10 summarizes the created parking spaces.

Table 10. Created On-Street Metered Parking Spaces

Location	Available Length	Street Parking Spaces
6 th Street SW	118 ft	5
Independence Avenue	164 ft	7
4 th Street SW	48 ft	2
Total	-	14

As a result of the Maryland Avenue closure, there will be net loss of 55 on-street parking spaces. Table 11 summarizes the future parking supply.

Table 11. Future Parking Supply

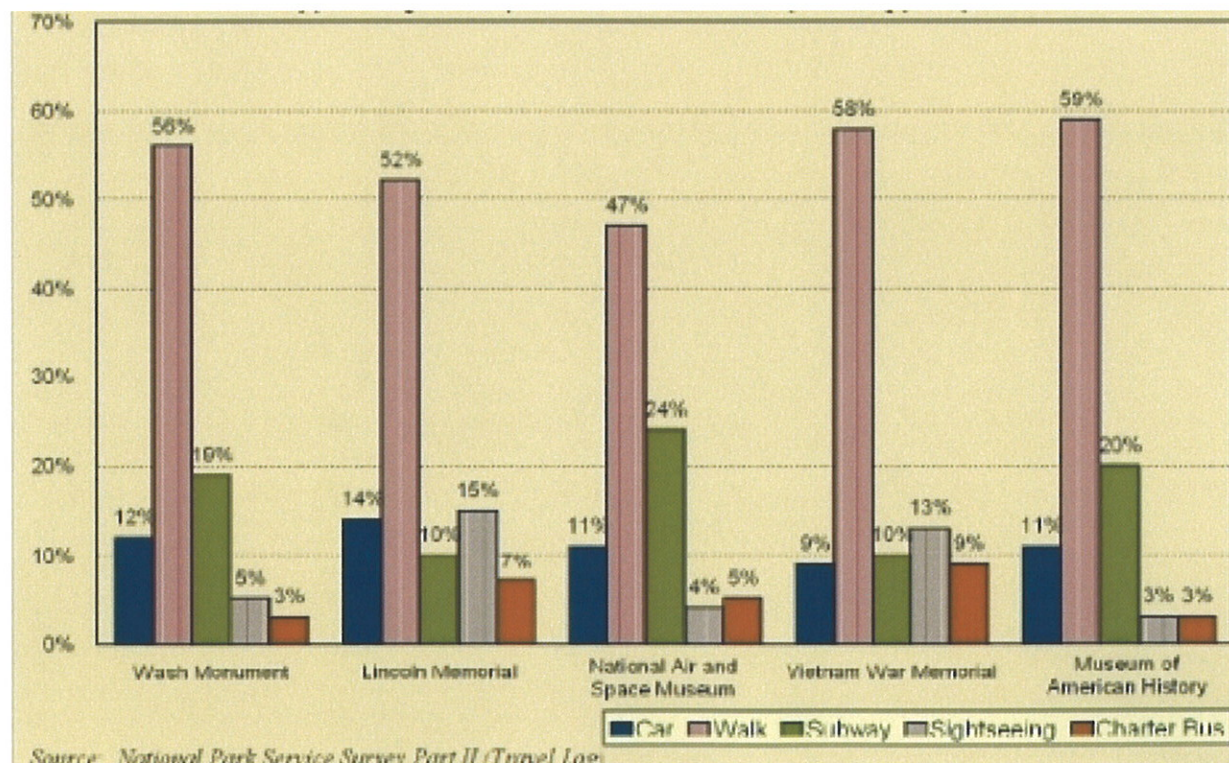
Parking Supply	Existing Supply	Parking Removed	Parking Added	Future Supply
Curb Metered	255	-54	+14	215
Curb Others	89	-15	0	74
Public Garage	634	0	0	634
Total	978	-69	+14	923

8.4 Future Parking Demand

The majority of the visitors to the Eisenhower Memorial will be drawn from nearby museums and attractions. Relevant parking generation characteristics documented in a National Park Service 2003 visitor transportation survey^{iv} for the central Washington, DC area are as follows:

- Only 16% of visitors to downtown Washington DC attractions used cars.
- Only 11% of visitors to the National Air and Space Museum used cars (see figure 9).
- Survey responders visited an average of 5 attractions per day.
- 87% traveled with family members, friends or business associates.

Figure 9. Modes of Visitor Transportation to NPS sites.



The following assumptions were used to estimate the parking needs for the Eisenhower Memorial.

- 600,000 annual visitors (estimated 10% draw from National Air and Space Museum - 4.9 millions and National Museum of the American Indian -1.7 millions).

- Visitors will share parking among two or three museums and memorials within walking distance. They will then visit other nearby attractions as pedestrians. Shared parking assumption is 2.5 places.
- Vehicle occupancy for tourist trips is 3 persons per vehicle^v.

Table 12 presents the future parking generation of the Eisenhower Memorial.

Table 12. Future Parking Generation

Annual Visitors	Peak Daily Visitors 1%	Peak Hour Visitors 10%	Modal Split 16% by automobile	Occupancy 3 persons per Vehicle	Shared Parking 2.5 places
600,000 persons	6,000 persons	600 persons	96 persons	32 cars	13 parking spaces

It is estimated that 13 parking spaces are needed for the Eisenhower Memorial visitors. An additional 5 spaces are needed for the 10 employees since 50% is using transit. The future parking demand is calculated for 2013 using an annual growth rate of 1.0% and adding the Eisenhower Memorial Parking generation. Table 13 summarizes the future parking demand for the Eisenhower Memorial parking study area.

Table 13. Future Parking Demand

Parking Demand	Existing Demand	Parking Generation	Future Demand
Curb Metered	182	18	213
Curb Others	89	0	95
Public Garage	398	0	427
Total	669	18	735

8.5 Tour Bus Parking and Drop-Off Area.

An area for tour bus drop-off currently exists at most memorials. Tour Bus Parking or standing with engine running at the memorials is not allowed at any time except drop-off only.

Nearest tour bus parking to the Eisenhower Memorial exists at Botanical Garden 300 Jefferson Dr SW south side, 1 space with hours 7:00 AM- 6:30 PM daily. Other locations include RFK (150 spaces) and Old convention Center site (30 spaces.)

A Tour-Bus drop-off area could be provided for the Eisenhower Memorial along 6th Street SW or 4th Street SW.

8.6 Parking Findings

Table 14 summarizes the future parking analysis results for the Eisenhower Memorial parking study area.

Table 14. Future Parking Analysis Results

Parking	Future Supply	Future Demand	Shortage/Surplus
Curb Metered	215	213	+2
Curb Others	74	95	-21
Public Garage	634	427	+207
Total	923	735	+188

A summary of the parking evaluation follows:

- The overall future supply of 923 parking spaces will satisfy the future demand of 735 spaces.
- The proposed Eisenhower Memorial site will add demand for 18 parking spaces, will remove supply of 69 spaces and will create opportunity for 14 on-street curb metered parking spaces.
- The future on-street curb parking shortage will be marginal and could be absorbed by the existing parking garage.
- The development of the proposed Eisenhower site will not require any additional parking spaces.

9.0 CONCLUSIONS AND RECOMMENDATIONS

9.1 Vehicular Traffic

Closing Maryland Avenue between 6th Street SW and 4th Street SW will not significantly degrade the LOS in the study area. Such an action will create a suitable rectangular land parcel for a public memorial and improve traffic operations on Independence Avenue by removing a potentially confusing intersection midway between two signal-controlled intersections. This intersection may be confusing to some drivers who may not anticipate a dual right turn movement controlled by a YIELD sign.

The closure of Maryland Avenue will significantly reduce the volume of vehicle traffic passing through the Maryland Avenue/6th Street SW intersection, and converting this intersection of to a "T" intersection will remove a pedestrian/vehicle conflict point.

Four other intersections that will have no physical changes will have small increases in traffic volumes, but would not experience a degradation of LOS.

9.2 Pedestrian Circulation

The proposed road closure would mitigate an existing mid-block intersection condition and thereby improve pedestrian circulation along Independence Avenue sidewalks. Currently pedestrians may diagonally cross the proposed site using sidewalks along Maryland Avenue but the Independence Avenue, 4th Street SW and 6th Street SW sidewalks are interrupted at the intersections with Maryland Avenue and its spur. Constructing the Eisenhower Memorial will likely remove pedestrian/vehicle conflicts along the south side of Independence Avenue, on the west side of 4th Street, and on the east side of 6th Street providing continues sidewalks.

9.3 Parking

The proposed Eisenhower Memorial site will remove 69 existing parking spaces. The memorial will generate the need for 13 parking spaces. Closing the two intersections will allow space for 14 on-street curb metered parking spaces, which will satisfy the added demand. The future on-street curb parking shortage will be marginal and could be absorbed by existing area parking garages. Therefore, the development of the proposed Eisenhower site will not require additional parking spaces.

Exhibits