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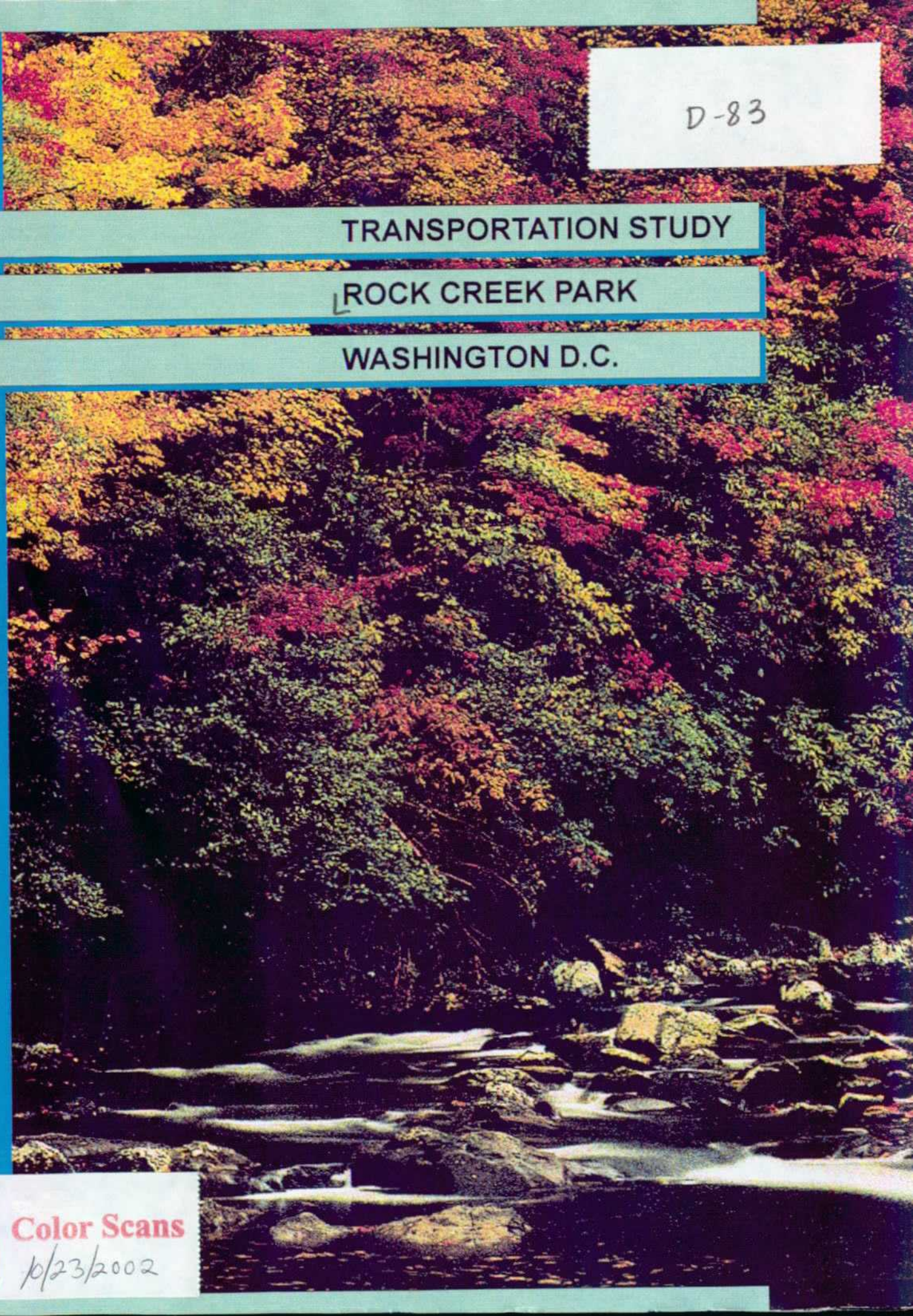
TRANSPORTATION STUDY

ROCK CREEK PARK

WASHINGTON D.C.



Transportation Study
Rock Creek Park, Washington, D.C.

United States Department of the Interior
National Park Service
Denver Service Center

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Executive Summary

This report documents the transportation study conducted in 1996 within Rock Creek Park. This study is meant to provide baseline data about the transportation system of the Park for use in the development of the General Management Plan (GMP). The GMP process is currently underway for the Park area. One of the principal objectives of this GMP is to consider ways to mitigate the effects of commuter traffic on the visitor experience. Some of the ideas under consideration include: alternative traffic flow patterns, use of High Occupancy Vehicle (HOV) designations on some Park roads, road closures, and methods of increasing the recreational potential of the Park.

Rock Creek Park is divided geographically into two logical parts. The northern portion of the Park includes everything north of the intersection of Beach Drive and Rock Creek Parkway. The Rock Creek and Potomac Parkway area includes everything south of this intersection, extending to the intersection of Ohio Drive and Parkway Drive just south of the Theodore Roosevelt bridge. For purposes of this transportation study, these two regions of the Park are often discussed separately.

During the summer and fall of 1996, the consultant conducted various traffic studies and collected a wide range of data about visitor use and traffic operations in the Park and surrounding area. Data collected falls into these categories: existing transportation facilities, visitor use, traffic volumes, travel speeds, commuter traffic patterns, intersection turning movement counts, vehicle occupancies, parking utilization, and accident history. This information was used to document existing physical and operational conditions in the Park. Future traffic projections were also included in this study - this information is provided in a separate report.

Specific operational problems identified in the study include: traffic congestion and intersection level of service problems, excessive speed, and high accident experience. A separate Traffic Safety Study was prepared to address safety concerns and deficiencies in the Rock Creek Park transportation system. In addition, an analysis of traffic-generated noise and air quality issues will be provided in early 1997.

Chapter 1. Introduction

Chapter 1: Introduction

1.1 Project Purpose and Goals

The purpose of this study is to document the existing physical and operational conditions of the transportation system of Rock Creek Park. Information and analysis contained within this report is intended to assist the National Park Service (NPS) General Management Planning Team in evaluating alternatives to current Park practices. This study is meant to be used, along with other management tools, in determining Park policy.

Specific goals of this project include the following:

- Document the existing physical characteristics of the Park transportation system;
- Discuss and quantify visitor use within the Park;
- Define and examine the current physical and operational characteristics of the Park road system;
- Provide information regarding utilization of parking facilities within the Park;
- Analyze the traffic accident history on Park roads over the past three years; and
- Project future traffic volumes on the Park road system.

Background information and data for this study was collected from various sources including: field observation and measurements, interviews with NPS personnel, and review of NPS STARS database. In addition, the following pertinent past documents were reviewed: an Engineering Study for Rock Creek Park prepared by FHWA in 1988, and an Environmental Assessment Bicycle Trail Study for National Capital Park Rock Creek Park prepared by NPS in 1980.

1.2 Project Study Area

This study includes an examination of traffic conditions within Rock Creek Park. Rock Creek Park, located in the heart of Washington D.C., is divided geographically into two logical parts. The northern portion of the Park includes everything north of the intersection of Beach Drive and Rock Creek Parkway. The Rock Creek and Potomac Parkway area includes everything south of this intersection, extending to the intersection of Ohio Drive and Parkway Drive just south of the Theodore Roosevelt bridge. For purposes of this transportation study, these two regions of the Park are often discussed separately.

The northern portion of the Park consists of approximately 1,750 acres of wooded terrain along the Rock Creek waterway between the Maryland State Line and the National Zoological Park. The southern portion of the Park is a narrow strip of parkland extending 2.6 miles along the Rock Creek and Potomac Parkway from the National Zoo to the Lincoln Memorial. A map showing the regional

location of Rock Creek Park is presented in **FIGURE 1-1**.

Beach Drive, which runs generally north and south, is the main route through the northern portion of the Park. The Rock Creek and Potomac Parkway serves as a major access route into the Park from the south, and numerous side roads provide entry from the east and west along Beach Drive and the Parkway. Two minor access points also exist along Military Road, which traverses the park from east to west. To the north, Chevy Chase and Silver Spring, Maryland serve as gateway communities to the Park. The National Zoo is located at the south end of the northern portion of Rock Creek Park, and can be accessed from Beach Drive.

1.3 Historical Perspective

1.3.1 Rock Creek Park

Rock Creek Park is one of the earliest established National Parks. The Rock Creek drainage has a long history of serving the people of Washington D.C. and the surrounding area. It also ranks as one of the largest urban parks in the world. The Park's urban setting and large size make it rather unique in the National Park system.

Rock Creek Park, consisting of 1,750-acres located between the Maryland State Line and the National Zoological Park, was approved by Congress as a National Park in 1890. The wooded valley terrain looks much the same today as it did to the early city planners of our nation's capital. The Park celebrated its centennial anniversary in 1990.

1.3.2 Rock Creek and Potomac Parkway

In 1913 Congress created the first federally authorized parkway, Rock Creek and Potomac Parkway. Construction of the Parkway began in the 1920's, and was completed in 1936. Although the original purpose of the Parkway was to provide a pleasure route for recreational drivers, its role as a major commuter artery was defined early in its history. The policy of one-way rush hour use was instituted in 1937 to relieve traffic congestion on the Parkway.

The tunnel under the National Zoological Park, completed in 1966, connected the Parkway to Rock Creek Park. This also allowed commuter traffic to extend into the main Park area. Although construction of a subway line to the northwest suburbs served to ease traffic pressure somewhat on the Parkway in the 1970's, its use as a commuter route has continued to increase since that time. Traffic volumes and driving habits on the Parkway have become so extreme that the visitor experience to the Park is significantly affected.

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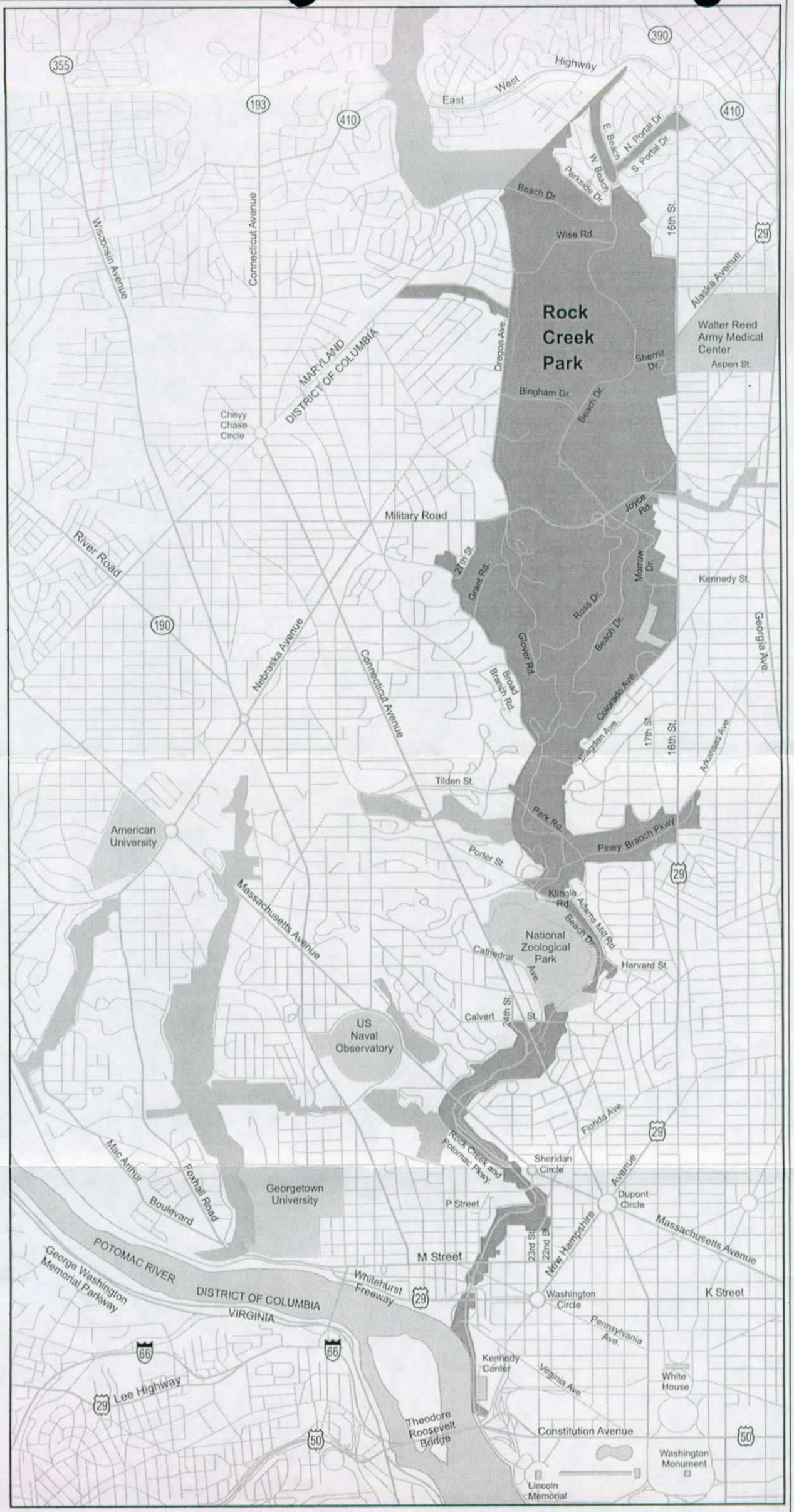
Map Scale: 1"= 0.5 Miles

Rock Creek Park



ROCK CREEK PARK

Figure 1-1
Study Area Location

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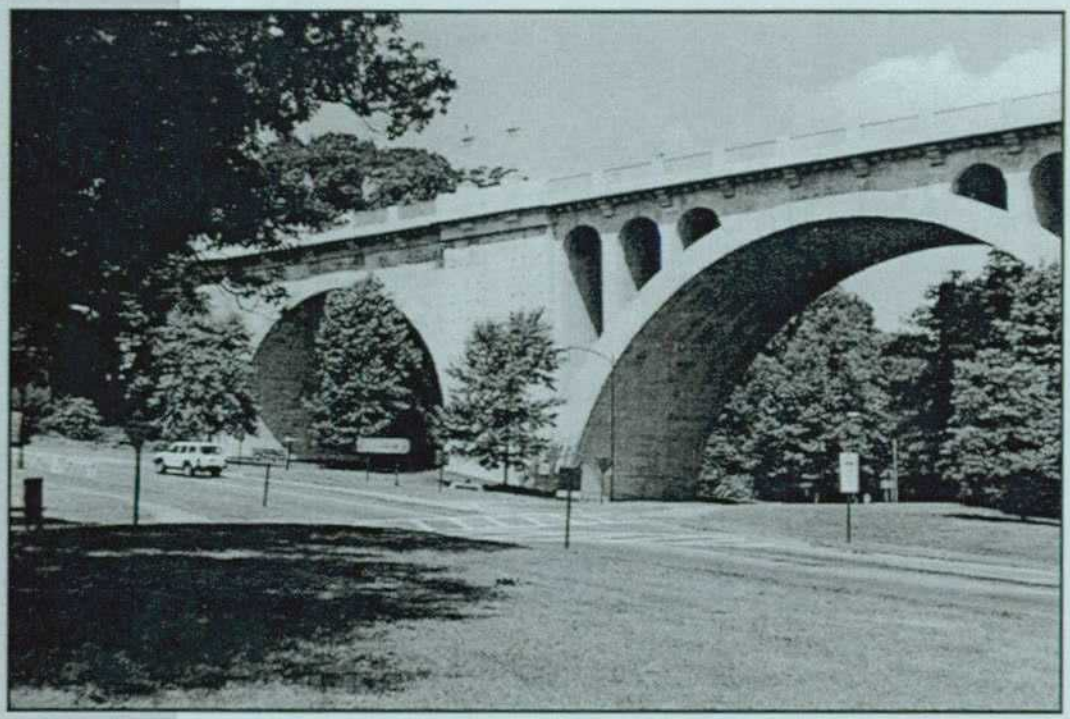
Chapter 2. Physical Characteristics



Chapter 2: Physical Characteristics

2.1 Park Road System

2.1.1 Park Access and Road Network

Visitors entering Rock Creek Park by car have typically traveled on the major arterials within the District of Columbia. These generally run parallel to the east and west Park boundaries and include Connecticut Avenue on the west, and 16th Street NW on the east.

Numerous entry routes are used to access Rock Creek Park. The access point most heavily used by visitors is the Rock Creek and Potomac Parkway. From north to south, other major points of entry include Beach Drive at the Maryland State Line, West Beach Drive, and Wise Road. There are two access points on Military Road: Glover Road and Joyce Road. Military Road crosses the Park from east to west, essentially separating the northern portion of the Park into two halves. Major access points south of Military Road include: Joyce Road, Morrow Drive, Broad Branch Road, Blagden Avenue, Park Road, Tilden Street, and the Piney Branch Parkway. Accesses along the Rock Creek and Potomac Parkway are discussed in section 2.1.3. Access to the northern portion of the Park can also be obtained via the 16th Street NW and Kennedy Street Area (location of the Tennis Center and Carter Barron amphitheater), and from the National Zoological Park.

There are approximately 18 miles of road within the northern portion of Rock Creek Park, and the Rock Creek and Potomac Parkway is an additional 2.6 miles long. Several roads, including Glover Road and Ross Drive, are fully contained within the Park. All Park roads other than the Parkway are paved, about 22-feet wide with curbs, and provide two-way operation. These roads are generally open to the driving public day and night, year-round, except during snow and maintenance closures. Some sections of the Park road system, used as recreation routes for pedestrians, bicyclists, and in-line skaters, are closed on weekend days. **FIGURE 1-1** shows the layout of the Park road system.

2.1.2 Beach Drive

Beach Drive is the primary north-south route in the northern portion of the Park, serving as the backbone of the northern Park road network. Beach Drive extends approximately 6.6 miles from the Maryland State Line at the Park's northwestern boundary to its intersection with the Rock Creek and Potomac Parkway south of the National Zoo. The roadway typically has about 22-feet of paved surface with curbs and raised channelization at major intersections. The posted speed limit along the entire length of Beach Drive is 25 mph.

Many of the other roads in the Park approach from the east or west, meeting Beach Drive at at-grade intersections. Military Road, Porter Street, and Harvard Street have grade-separated crossings over Beach Drive, with access to the Park through various ramps and access road connections. Connecticut Avenue and Calvert Street also cross the Park on grade-separated structures, but have no direct access to Beach Drive. The only traffic signal within the northern portion of the Park is located at the intersection of Beach Drive with Park Road and Tilden Street. Beach Drive provides access to and egress from the National Zoological Park, and passes through a tunnel beneath a

section of the Zoo. On weekends, portions of Beach Drive are closed to vehicular traffic to allow the roadway to be used as a recreational facility for pedestrians, bicyclists, and in-line skaters.

2.1.3 Rock Creek and Potomac Parkway

The Rock Creek and Potomac Parkway extends approximately 2.6 miles south from its intersection with Calvert Street to its intersection with Ohio Drive and Parkway Drive just south of the Theodore Roosevelt Bridge. The Parkway is a limited-access facility which currently serves as a primary urban commuter route within the District of Columbia. Except for a short two-lane segment between Calvert Street and Beach Drive, the roadway consists of a four-lane paved surface with curbs and continuous roadway lighting. Between Calvert Street and Beach Drive, as well as south of Virginia Avenue, the speed limit is 25 mph. The posted speed limit along the remaining length of the Parkway is 35 mph.

On the north end, the Parkway can be accessed at one of three at-grade intersections: the signalized intersection with Calvert and 24th Streets, or the two stop-controlled intersections at Cathedral Avenue and Beach Drive. There is also one at-grade intersection near the south end of the Parkway at the signalized intersection with Virginia Avenue. At its southern terminus, the Parkway connects with Ohio Drive and Parkway Drive south of the Theodore Roosevelt Bridge. All other access to the Parkway is provided via grade-separated interchanges at the following streets: Massachusetts Avenue, P Street, Pennsylvania Avenue, and K Street. During weekday morning and evening peak commuting hours, the Parkway operates with all four lanes one-way southbound and northbound, respectively.

A paved pedestrian/bicycle trail located on the west side of the Parkway is heavily used by recreationalists, as well as pedestrian and bicycle commuters. The Thompson Boat House, located near the southern end of the Parkway, is the other main recreational attraction which can be accessed from the Parkway at the Virginia Avenue intersection. The Parkway also provides access to and from the Kennedy Center near its southern end.

2.1.4 Intersections and Interchanges

The majority of intersections within the northern portion of the Park are at-grade "T" or "Y" intersections, where a minor side road joins a major route. Grade-separated intersections in the northern portion of the Park occur at Military Road and Harvard Street. Klingle Road provides a connection between Beach Drive and grade-separated Porter Street. The only four-way intersections within the northern portion of the Park are on Beach Drive at Park Road/Tilden Street, and at Joyce Road.

With the exception of the one signalized intersection at Beach Drive and Park Road/Tilden Street, all other major intersections within the northern portion of the Park are controlled by stop or yield signs. Painted stop bars are typically used in conjunction with stop signs on the stop approaches to an intersection. Pavement widening for turn lanes is present at several of the major intersections. In these locations, lane lines and painted arrows have been installed on the pavement to help identify the channelization at the intersection. Most of the intersections also make use of raised curbed

medians to channel traffic.

Rock Creek and Potomac Parkway intersections are split between at-grade and grade separation. Both the northern and southern ends of the Parkway have at-grade intersections, while the majority of its length in between is served by grade-separated interchanges. There are five at-grade intersections on the Parkway. Two of these are four-way, signalized intersections: Calvert Street/24th Street, and Virginia Avenue. The other three are three-way, stop-controlled intersections: Cathedral Avenue, Beach Drive, and Ohio Drive/Parkway Drive.

Use of grade-separated interchanges with on- and off-ramps along the Parkway allows for smoother traffic flows and higher travel speeds on this heavily-traveled arterial. Of the four interchanges along the Parkway, K Street has the only complete interchange. The P Street interchange has no northbound off-ramp, and there is no southbound off-ramp at Massachusetts Avenue. Pennsylvania Avenue has only a southbound on-ramp. All on-ramps are controlled by stop or yield signs, but none of them have acceleration lanes.

There are numerous intersections along the boundaries surrounding the Park. These intersections generally consist of a north/south city street and an east/west street which is split between city and Park jurisdictions at the Park boundary. The naming pattern is such that the Park leg of the east/west road will have a different name than the city leg. Although these intersections are not actually within the Park boundaries, the fact that they involve Park roads makes them relevant to this discussion. Examples of this type of intersection include: Oregon Avenue and Wise Road/Chestnut Street, Military Road and Glover Road/Oregon Avenue, 16th Street and Sherrill Drive/Aspen Street, and 16th Street and Morrow Drive/Kennedy Street. Some of these intersections are signalized. **FIGURE 1-1** shows the intersections located along the east and west boundaries of the Park.

2.1.5 Roadside Environment (See **FIGURES 2-1 and 2-2**)

For purposes of this discussion, the roadside environment, or clear zone, generally consists of the area immediately behind the curb line of a paved road surface.

The Rock Creek and Potomac Parkway is characterized by a well-defined roadway clear zone containing few fixed objects. The Parkway was constructed close to grade with the surrounding terrain, and the roadway shoulders are generally well-maintained. There is guiderail located in the median adjacent to the Parkway and guardrail along some shoulder locations. Typically the only other fixed objects located within the clear zone of the Parkway are light standards, post-mounted traffic signs, and bridge supports.

Beach Drive and most of the roads within the northern portion of the Park have a less forgiving roadside environment. Most areas adjacent to roads in the Park other than the Parkway are heavily overgrown, with vegetation and large trees encroaching up to, and sometimes beyond the curb line. It is common to find large trees located near these roadways. Other fixed objects often found within the clear zones in the northern portion of the Park include: large rocks and rock formations; wooden guiderails and steel guardrails; obsolete light standards; the entire post-mounted traffic signing system; and hinged gates. In some areas, Rock Creek or one of its tributaries is located within or

near the edge of the clear zone.

2.1.6 Signing (See **FIGURE 2-3**)

The existing signing along the Park road system consists mainly of regulatory and warning signs, with some guidance signs. It was apparent from field observations that a significant number of signs were missing from the system. At a number of locations, sign posts or post bases were evident without the corresponding sign actually being present. It seems as though signs did exist at these locations in the past, but were not replaced as they became damaged or removed over the years.

Regulatory sign applications generally consist of speed limit and intersection traffic control signs. All of the major Park roads have posted speed limits. Traffic control at all major intersections is provided by stop and/or yield signs. The approaches from large off-road parking areas are typically not controlled by stop or yield signs. Most pullouts do not have any form of traffic control.

Warning signs are used throughout the Park to alert the motorist to potential hazards or changes in driving conditions. Object markers are sometimes used to identify bridge ends or other fixed objects located adjacent to the roadway. It was observed that advance warning signs were absent for most locations where trails cross roadways within the northern portion of the Park.

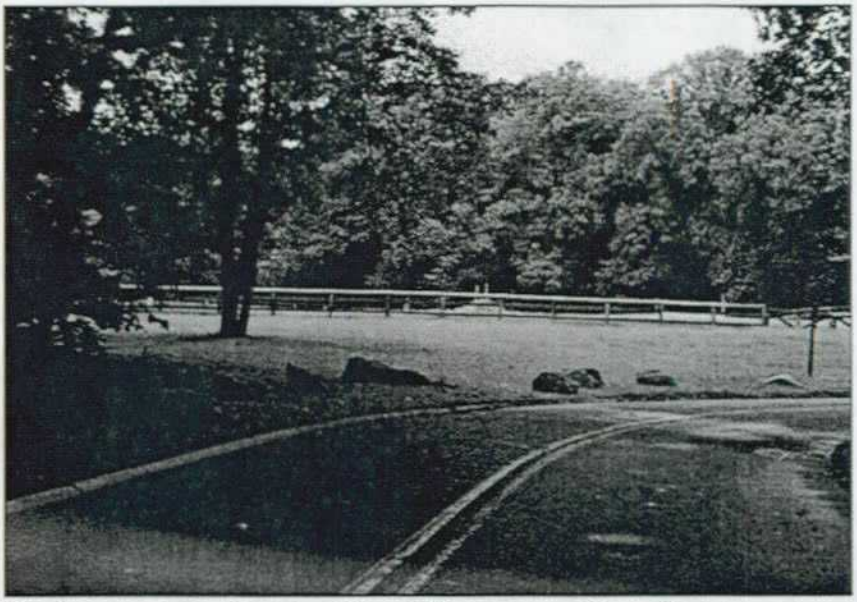
There are too few street signs and guidance signs throughout the Park road system. This lack of adequate guidance makes the Park very confusing to the newcomer. Signs unique to Rock Creek Park include the large, wooden entrance signs, and other guidance and informational signs.

Park road signing, with the exception of guidance signs, is generally in conformance with the *Manual on Uniform Traffic Control Devices* (MUTCD) and the *NPS Sign Manual.* Sign usage, with respect to regulatory and warning signs, was generally correct throughout the Park. Areas where the sign system is most often not in conformance with MUTCD or NPS Sign Manual include:

- Sign visibility - overgrown vegetation along the roadside sometimes obscures signs for approaching motorists.

- Sign maintenance - signs within the Park are generally dirty, decreasing their effectiveness, especially at night.

- Signs associated with the one-way operation of the Parkway - in an effort to accommodate the unique operating conditions on the Parkway, some of the hinged signs used during peak commuting times exhibit creative design. In some cases, these signs can actually be confusing to the motorist.



The large rocks on the shoulder of this curve on Glover Road are effective deterants to parking but are also significant roadside objects. They will compound the severity of any run-off-the-road incidents at this location. The rocks should be removed and replaced with conventional no parking signs.

Notice that the elevation of the shoulder area behind the curb on this section of Beach Drive is 4-6-inches lower than the adjacent curb. This condition can compound the severity of a run-off-the-road accident due to the grade change.

ROCK CREEK PARK

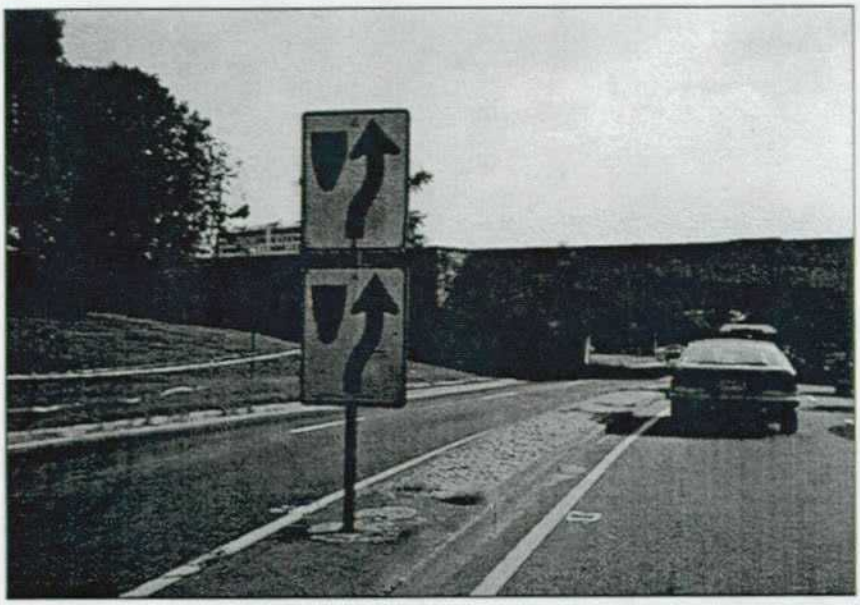
Figure 2-1

These two trees on the west side of Beach Drive south of Tilden are located immediately behind the curb line. Both trees show evidence of vehicle impacts.

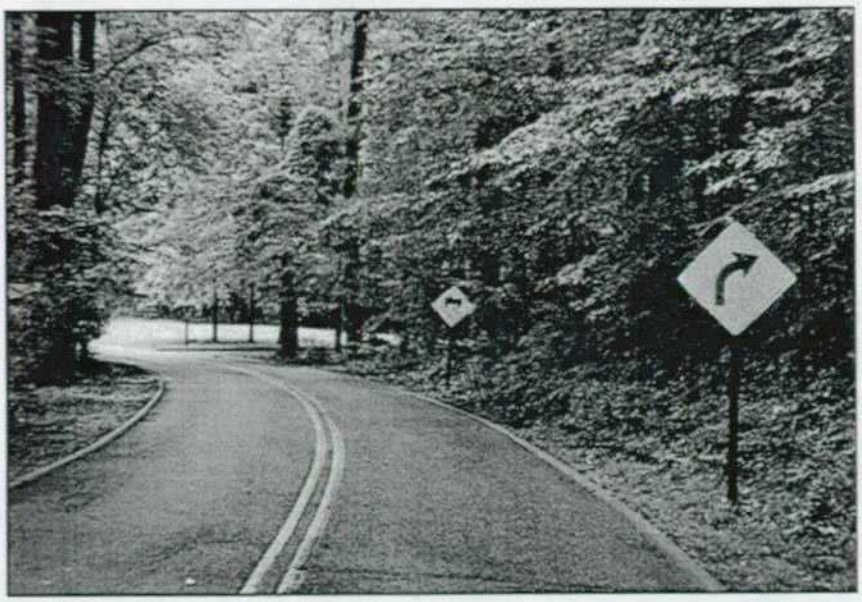
The large tree on the right is located within a foot of the curbline on the south approach to the Klingle Road intersection.

ROCK CREEK PARK

Figure 2-2



This keep right sign on the RCP is displayed twice. This is non-standard. In this case the lower sign is folded up to cover the upper sign during one-way operations in afternoons. It would be more appropriate if the lower sign was blocked out or left blank.



The curve warning sign on Glover Road indicates a curve to the right when the roadway is clearly turning to the left. It would be more appropriate if the location of this sign was switched with the slippery when wet warning sign farther along the road.

ROCK CREEK PARK

Figure 2-3

2.1.7 Striping

For the most part, pavement markings in the Park consist of extruded thermoplastic stripes. Double solid centerline striping has been applied on all Park roads. There are also broken lane lines on the four-lane portions of the Parkway. Passing is not permitted anywhere on the two-lane roadways in the Park road system. Shoulder striping is not typically used along Park roads other than the Parkway. Other pavement markings include stop bars, lane-use markings (words and symbols), pedestrian crosswalks, and delineation within parking and/or developed areas.

The use of pavement markings is generally appropriate throughout the Park, with respect to color and application. Most pavement markings are in good to fair condition. There are isolated areas, such as stop bars, lane use markings, and centerlines on the inside of curves where pavement markings have been worn down so that they are no longer visible due to repetitive wheel traffic.

A relatively unique application of pavement marking can be found near the intersection of Beach Drive and the Parkway, where white thermoplastic markings have been used to create rumble strips across the travel lanes on the Parkway.

Plowable raised pavement markings (RPMs) are used in various locations throughout the Park (See **FIGURE 2-4**). RPMs are effective in the low visibility and low-light conditions that frequently occur on Park roads during rainstorms or at night, dawn, or dusk. The RPMs are typically used for delineating the centerline of the roadway, or to highlight special channelization at intersections or interchanges.

2.1.8 Drainage

The Parkway, Beach Drive, and all other roads within the Park are constructed with curbs that are used for surface water drainage. Drainage is accommodated in the gutter sections along these curbs, which carry storm runoff into drop inlets spaced along the length of the roadways. The storm drain system on the Parkway functions reasonably well. Most culverts and bridge structures seem to be adequately sized and protected.

Beach Drive experiences flooding and ponding conditions during heavy rains when Rock Creek runs high. The curbing funnels storm water, creating a flume down the sides of the road when rains are heavy. As is indicated by ponding on the road surface, the drainage inlets within the Park seem to be inadequate or poorly maintained in some locations. Drains may be clogged, undersized, or too few in number. Numerous pavement overlays on Beach Drive over the years have decreased the water-carrying capacity of the roadway from the original design by reducing the distance between the road elevation and the elevation of the top of the curb. This has also caused many of the drainage inlet grates to be significantly lower than the adjacent road surface, creating a hazard for bicyclists and an irritant to drivers. Drivers tend to shy away from these depressed grates and hug the centerline of the road, creating the potential for conflicts with opposing traffic (See **FIGURE 2-4**).

2.1.9 Guiderails, Guidewalls, and Guardrails (See **FIGURE 2-5**)

The Park uses several types of guiderails, guidewalls, and guardrails to protect vehicles from greater roadside dangers such as steep embankments. Wooden guiderails and stone guidewalls are used in many areas of the Park. A newer application of tube steel guardrails is used on several bridges. An examination of the wooden guiderails reveals many of these structures are old and have rotten members. The rock walls and newer tube steel guardrails used on bridges are structurally sound. The end sections of most of the wooden guiderails and stone guidewalls are not rolled down or flared to the outside of the shoulder area. The tube steel guardrails on the bridges have appropriate end treatments but are located immediately adjacent to the driving lane and most show evidence of vehicle scrapes. None of the guiderails, guardrails, or guidewalls have reflectors or other delineators to help identify them at night. Appropriate object markers are used to identify the end sections of the stone guidewalls.

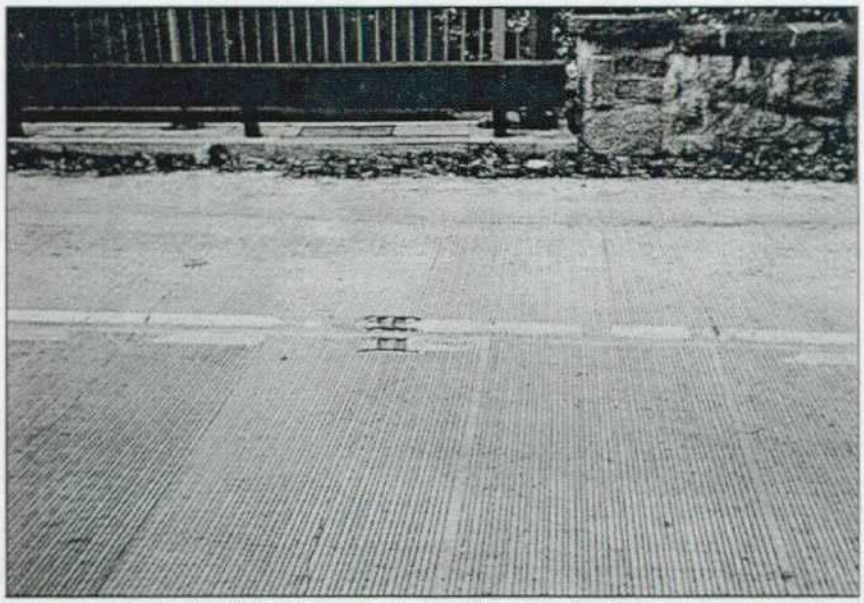
2.1.10 Temporary Road Closure Devices (See **FIGURE 2-6**)

There are two types of road closure devices in use in the Park: permanently mounted steel tube gates, and temporary wooden sawhorses used in conjunction with orange traffic cones. Permanent gates are used within the northern portion of the Park for regularly-scheduled weekend road closures, winter snow closures, closures caused by high water on the roadway, or routine maintenance-related road closures. Temporary barricades (wooden sawhorses) are used for emergency road closures within the Park, and for regular weekday peak hour directional restrictions on the Parkway.

The mounting posts for the permanent gates are appropriately offset from the road, and the steel gates seem structurally sound. The signing on the gates and advance warning signing, however, is not standard. Many of the flashing lights mounted on the steel gates are not functional and need maintenance. The gates do have reflective signs and tape to help identify them during low-light conditions. Several of these permanent gates show evidence of low speed vehicle impacts. Advance warning should be provided for these gates through the use of hinged signs. **FIGURE 2-7** shows an appropriate signing treatment for this type of gate.

With temporary barricades, consistent placement and visibility are of utmost concern. Slight variations in the locations of sawhorses and orange cones occur from day to day due to hand-placement; these inconsistencies can confuse motorists. The wooden sawhorses typically do not have any effective reflective surfaces. Reflective paint or reflective tape should be applied to the sawhorses to improve their visibility.

Both types of temporary road closure devices are occasionally in use at night. During winter months, sawhorse barricades are used during the morning and evening peak hour travel times which occur partially during dusk and dawn. Visibility of gates and sawhorses is a concern during low-light hours; any road closure device in use at low-light times should be equipped with a functioning flashing light system.



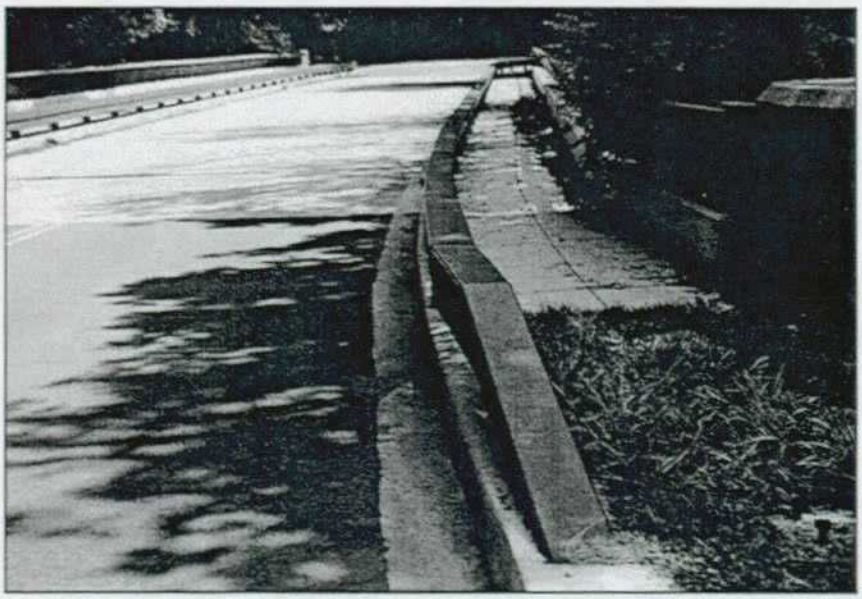
This photo shows how the concrete bridge deck on Tilden Street has been grooved to increase skid resistance. The reflectors on the center-line are plowable. Both applications are appropriate and effective. This bridge is under the jurisdiction of the DC DPW.

Leaves that block drainage grates are a common maintenance problem throughout the park. This condition can cause localized flooding during heavy rain showers.

ROCK CREEK PARK

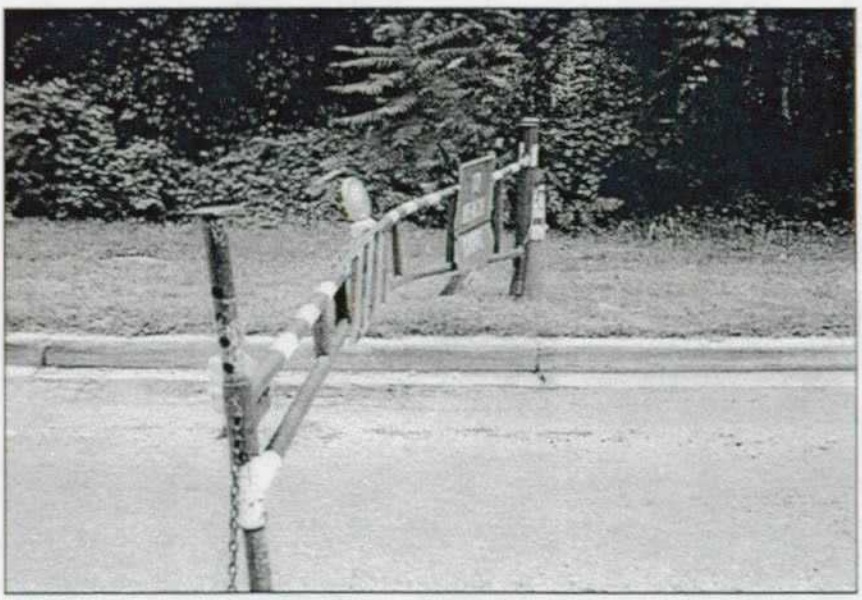
Figure 2-4

This photo of the west end of the bridge on Tilden Street shows two bridge end treatments used in the Park. The stone guidewall on the far side of the street is vertical and appropriately accompanied by a black and yellow object marker. The steel guardrail on the near side of this street is rolled down. Tilden Street and this bridge are under the jurisdiction of the DC DPW.

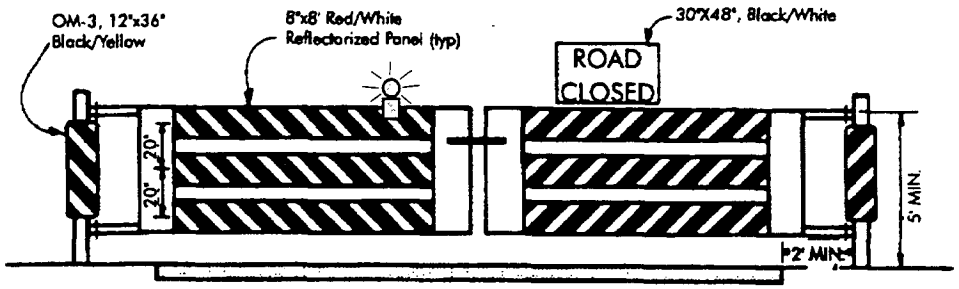


The steel guardrail on the Klingle Road bridge is located directly over the inside edge of the curb. The rail shows evidence of vehicle scrapes. Silver reflectors mounted on the face of this rail would help identify it for drivers at night. This bridge is under the jurisdiction of the DC DPW.

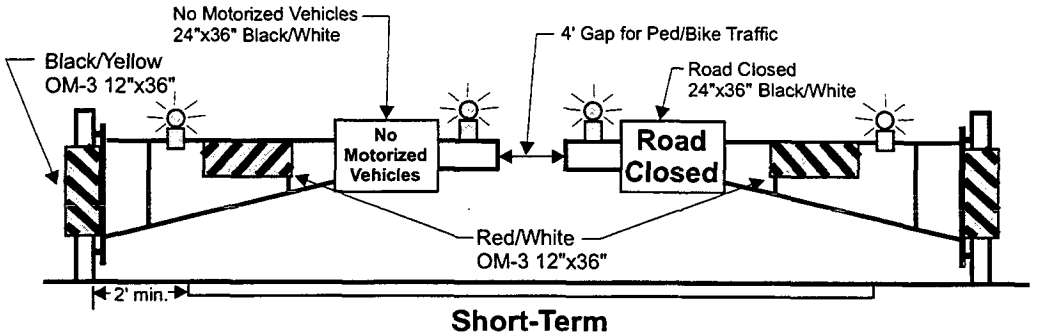
The Park uses gates like this one for temporary road closures. The supports and gate structure are well designed and appropriate for the conditions. The object marker signs on the gates should be red and white striped instead of yellow and black. Two of these object marker signs should be presented.



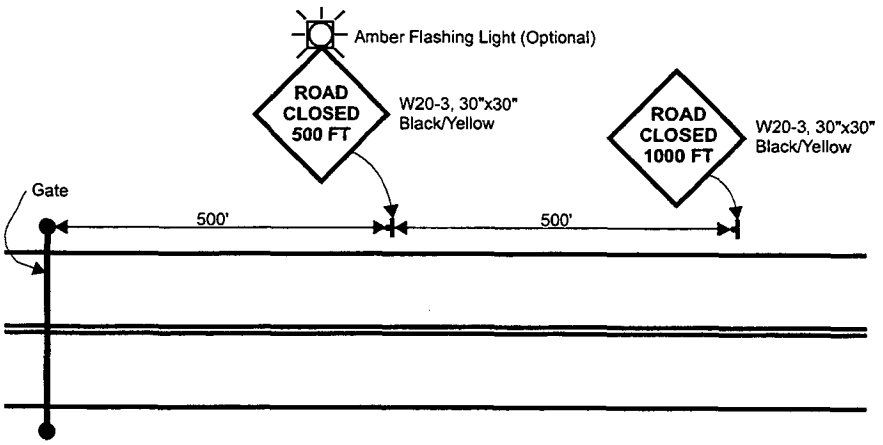
This gate shows evidence of repeated vehicle impacts. The signing on the gate is non-standard and there is inadequate advance warning signing identifying the road-closed condition.



Long-Term
Closure Gate



Short-Term
Closure Gate



Note: *In cases where there is not 1000' available advance warning distance,* one and preferably both of these signs should still be presented in advance of the gate in the location of greatest visibility to motorists.

gates.cdr

ROCK CREEK PARK

Figure 2-7
Recommended
Gate Treatment

2.1.11 Roadway Lighting

The Rock Creek and Potomac Parkway is well illuminated with corridor lighting, as well as intersection and interchange lighting throughout. This extensive lighting system provides effective nighttime visibility for motorists.

At one time the roads within the northern portion of the Park were illuminated, however, the roadway lighting system was disconnected during the energy crisis of the 1970's and is no longer functional. The ambient light level at many locations within the northern portion of the Park is low due to the presence of a full tree canopy. Although Rock Creek Park is closed to visitor use at night, the roads within the Park remain open. The majority of Park roads other than the Parkway are dark at night. Of particular concern are intersections which have raised channelization; an unfamiliar driver may not be able to see potential obstructions in the roadway.

2.2 Other Related Park Facilities

2.2.1 Developed Areas

The northern portion of the Park contains several major developed areas including: the Tennis Stadium and athletic fields near the intersection of 16th and Kennedy Streets, the Carter Barron Amphitheater, the Rock Creek Golf Course, the Rock Creek Park Horse Center, the Rock Creek Nature Center and Planetarium, and Pierce Mill. These developed areas offer a wide variety of recreational opportunities such as tennis, soccer, softball, picnicking, golf, horseback riding, hiking, nature walks, performing arts and exhibits. Information about the history of the Park area and the natural environment is also provided at several of the developed areas.

The Park Police Substation is centrally located just south of the intersection of Beach Drive and Joyce Road. Maps are available to the public, and visitor assistance is provided from this facility. The Substation is open daily from 7:00 a.m. to 4:00 p.m.

The Park Maintenance Yard is located off Glover Road near the Horse Center and Nature Center. The Maintenance Yard houses the office of the maintenance foreman, space for vehicle storage and maintenance activities, and storage areas for maintenance equipment. Maintenance facilities are open 7:00 a.m. to 3:30 p.m., Monday through Friday. Maintenance staff members are available before 7:00 a.m. during most of the year.

The Park Administrative Headquarters is in the Klingle Mansion located north of Porter Street near the west Park boundary.

The Thompson Boat House is located on the east bank of the Potomac River, and can be accessed from the Rock Creek and Potomac Parkway at its intersection with Virginia Avenue. Although the parking lot and entrance bridge are under the administration of Rock Creek Park, the Boat House itself is a concession operation of the C&O Canal National Historic Park. This popular recreation site offers bicycle, canoe and rowboat rentals. The Boat House is open to the public daily February through November, weather permitting.

2.2.1.1 Tennis Stadium Area

The area of the Park located near the intersection of 16th and Kennedy Streets is home to 15 soft-surface and 10 hard-surface tennis courts, softball fields, and a large recreation field which is suitable for soccer, softball, football, volleyball and field hockey. These facilities are generally open to the public, with the exception of the tennis courts, and some of the fields can be reserved. Tennis courts are available for a fee, by reservation only, from April through mid-November. The Tennis Stadium hosts one major professional tennis tournament on an annual basis. The Legg-Mason Professional Tennis Tournament is held during a nine-day period in July, and in 1996 hosted an attendance of 70,000.

2.2.1.2 Carter Barron Amphitheater

The Carter Barron Amphitheater hosts a variety of performing arts events during the summer months (approximately 30-40 events annually). This outdoor theater in the woods is located near the Tennis Stadium, and seats 4,000. Tickets and information about performance schedules are available at the theater box office on site. Events include Jazz and Blues musical performances, programs for children, and theater productions.

2.2.1.3 Rock Creek Golf Course

The Rock Creek Golf Course is located off Joyce Road west of 16th Street. The course offers 18-holes of play with a clubhouse, club and cart rentals, lockers, and a snack bar. The golf course is open to the public for a fee year-round, except Christmas day.

2.2.1.4 Rock Creek Park Horse Center

The Horse Center is located near the Nature Center off Glover Road. The Center offers horse rentals for guided trail rides and lessons, as well as a therapeutic riding program for the disabled.

2.2.1.5 Rock Creek Nature Center and Planetarium

The Nature Center is located off the east fork of Glover Road south of Military Road. The wheelchair-accessible Center serves as the main focus for information and activities related to the Park's natural and cultural history. It offers wildlife and forest exhibits, guided and self-guided nature walks, and astronomy programs. The facility and its staff are available to teachers and youth groups during the week. The Nature Center is open from 9:00 a.m to 5:00 p.m. Wednesday through Sunday, and is closed on holidays.

2.2.1.6 Pierce Mill

The Pierce Mill complex, including the Mill, a Carriage House, and a Springhouse, is located just west of the intersection of Beach Drive and Tilden Street. The Mill is staffed by park rangers and is open to the public from 8:00 a.m. to 4:30 p.m. Wednesday through Sunday except on holidays. The Mill is not wheelchair-accessible.

The Carriage House adjacent to Pierce Mill is occupied by the Rock Creek Gallery. The Gallery displays exhibits of local artists' work, as well as providing frequent drawing lessons and other art activities. This facility is open from 10:00 a.m. to 5:00 p.m. Wednesday through Sunday, and is closed on holidays.

2.2.2 Picnic Areas

There are 30 designated picnic areas scattered throughout Rock Creek Park. Picnic areas are classified as either group or individual sites. The ten group picnic areas can be reserved through the D.C. Department of Recreation for use by groups up to 100. The group picnic areas have larger, off-road parking lots, and four are equipped with restrooms. Individual picnic areas are available for smaller gatherings on a first-come, first-served basis. The individual picnic sites typically have short, on-road pullout areas for parking. A notable exception is individual Picnic Area #2, which has a large, off-road parking lot. All picnic sites in the Park are equipped with picnic tables and trash cans, most have stone fireplaces, and four have rain shelters.

Some of the picnic parking areas were found to be undersized for the summer demand. This situation results in parking shortages and other typical parking problems at these locations.

There are three potential safety concerns associated with the picnic areas in the Park.

- Restrooms for the group picnic areas along Beach Drive are typically located across the road from the picnic facilities. This situation forces picnickers to cross a busy roadway to reach restroom facilities, creating potential conflicts between pedestrians and vehicles traveling on Beach Drive.

- Although they are not signed for one-way operation, the access roads for off-road parking lots are too narrow for two-way traffic. This is a problem because signing is not clear whether one access should be used as an entrance and the other as an exit, and if so which is which.

- The individual picnic parking areas are not clearly separated from the adjacent travel lane. In some cases, depressed concrete curb parallels Beach Drive between the travel lane and the adjacent parking area. In most cases, however, no pavement markings or other delineation system exist to clearly delineate the parking pullouts from the roadway.

2.2.3 Pedestrian and Bicycle Facilities

The Park contains an extensive network of paved and unpaved trails. These trails are designated for either pedestrian use only, or pedestrian and bicycle use. Pedestrians are also welcome on the horse trails. Bicycles are limited to designated paved trails or roadway use.

The asphalt path running parallel to portions of Beach Drive and Rock Creek, extending south adjacent to the Parkway is the most heavily used pedestrian and bicycle facility in the Park. A 1.5 mile segment of this trail south of Calvert Street is set up as an exercise course. In addition, a series

of hiking trails within the Park is maintained by the Potomac Appalachian Trail Club.

In many areas, "volunteer trails" have been worn into the grass along Park roadways, particularly on Beach Drive between Bluff Bridge and Porter Street. Volunteer trails also appear along Morrow Drive, Piney Branch Parkway and Blagden Avenue. The existence of these types of paths indicates a need for additional pedestrian and bicycle facilities, particularly adjacent to roadways. When pedestrians or bicyclists are forced to use the roadway due to lack of available trails, conflicts with motor vehicles are a resulting problem.

Within the Park, where pedestrian trails cross a roadway, painted pedestrian crosswalks are provided at most locations. Unfortunately, advance warning signs are not provided for most of these crossings, and pedestrian crossing signs are missing at some of these locations. Appropriate signs at all crossings would alert drivers to pedestrian presence and encourage vehicles to yield.

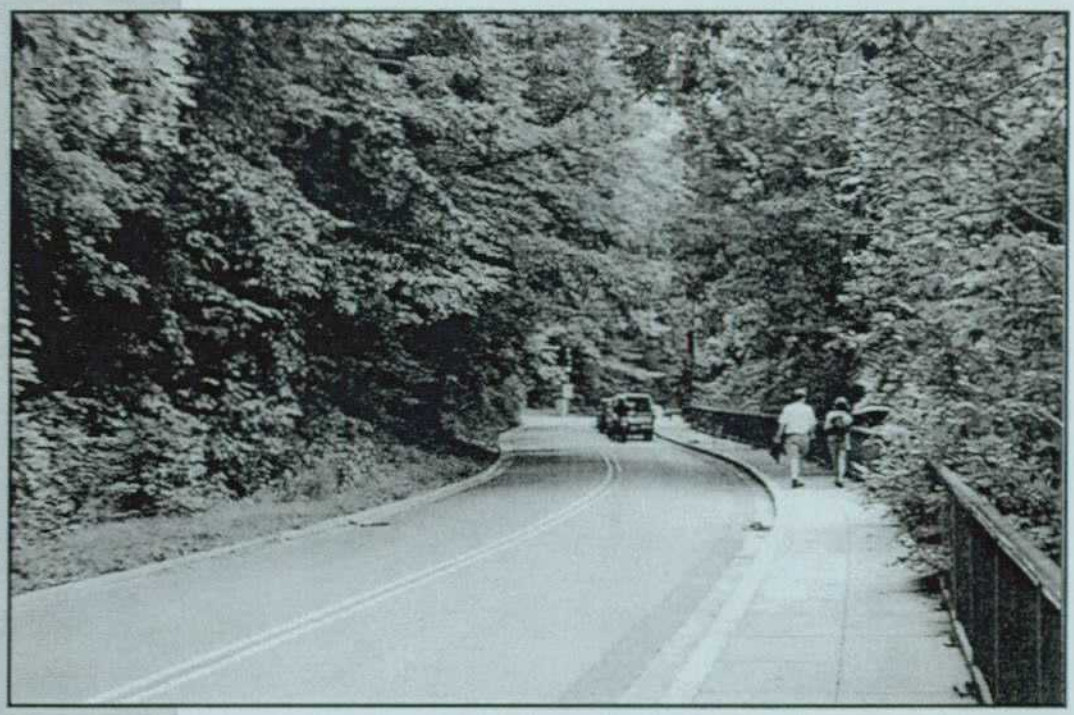
The portions of Beach Drive between Wise Road and Picnic Area #10, and between the Park Police Substation and Broad Branch Road, as well as Bingham and Sherrill Drives, are closed to motorized traffic from 7:00 a.m. Saturday to 7:00 p.m. Sunday, and on holidays. During closure times, these portions of Beach Drive serve as important recreational corridors for use by pedestrians, bicyclists, and others.

2.2.4 Equestrian Trails

A network of wide dirt and gravel bridle trails traverses the back country of the Park, mainly in the northern portion. The equestrian trail system connects such facilities as the Horse Center, the Park Police Stables, and the Equitation Field on Glover Road.

There are several places where horse trails cross Park roadways. These locations are identified with horse crossing signs for vehicles traveling on the road, but advance warning signs are not provided. Of some concern are the horse crossings that occur in locations without good sight distance for motorists and riders.

Chapter 3. Visitor Use



Chapter 3: Visitor Use

3.1 Park Visitation

Rock Creek Park attracts a wide variety of visitor use due to the diversity of recreational opportunities and attractions available in the Park. Visitors arrive by automobile, or on foot, bicycle, in-line skates, or horseback from the surrounding residential areas. People come to the Park to watch an athletic, musical or theater performance; exercise on the playing fields, tennis courts or trails; socialize and eat in the picnic areas; relax and cool off in the creek side shade; or learn about the natural environment or history of the Park. Others simply enjoy the scenic views as they pass through the Park on their way to work or play elsewhere.

Park trails, picnic areas, and other visitor attractions are open for use during daylight hours only. Traffic is permitted on Park roads 24 hours a day, although trucks and buses are prohibited. Other regulations for visitor use are listed below.

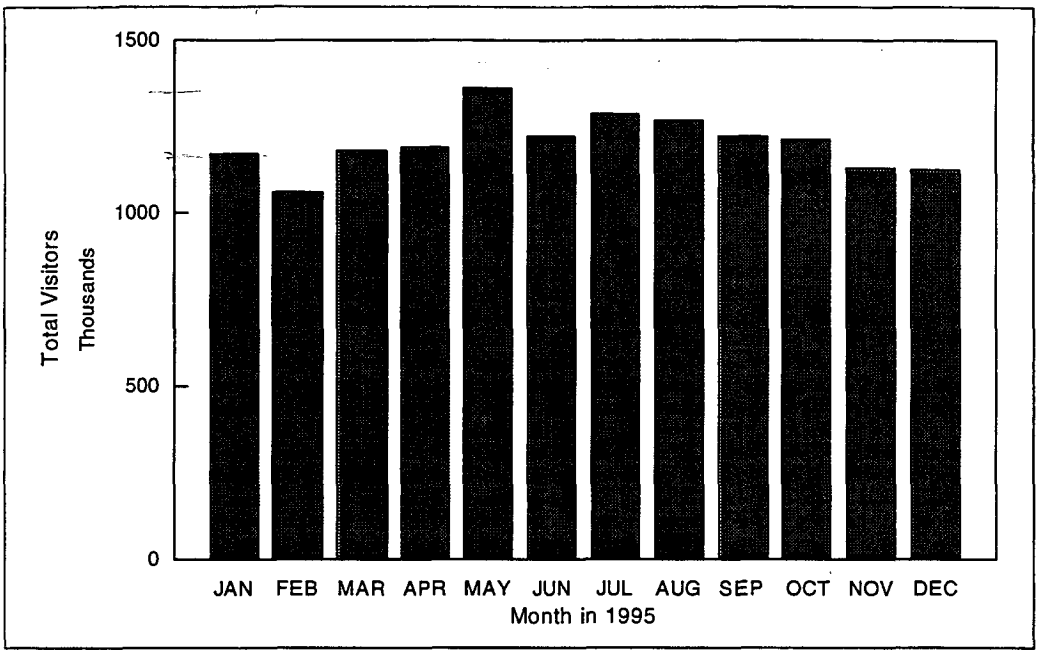
- Overnight camping is not allowed.
- Pets are required to be kept on a leash at all times.
- Fires are only permitted in grills or fireplaces.
- Removal or disturbance of natural or cultural objects is prohibited.
- Hiking is allowed only on marked trails.
- Bicycles are permitted only on paved bike trails or roads.
- Parking is restricted to designated areas.

Visitor assistance and Park maps are provided at the Park Police Substation, located on Beach Drive just south of its intersection with Joyce Road.

Overall visitation data is collected for Rock Creek Parkway by the National Park Service (NPS). The most recent annual data available indicates that the Parkway received a total of approximately 14.4 million visitors in 1995. This figure includes both recreational and non-recreational visitors.

Seasonal variations in Parkway visitation can be identified by examining NPS monthly statistics for the most recent year. Visitor use of the Parkway peaks during the late spring and summer months when the weather is nice and outdoor recreation opportunities abound. Total numbers of visitors to the Parkway in 1995 are shown by month in **FIGURE 3-1**.

FIGURE 3-1
1995 Total Visitors by Month



3.2 Use of Major Developed Areas

Major areas within the Park developed for visitor use include: the Tennis Stadium and athletic fields, the Carter Barron Amphitheater, the Rock Creek Golf Course, the Rock Creek Park Horse Center, the Rock Creek Nature Center and Planetarium, Pierce Mill, and the Art Barn/Carriage House. These sites offer a variety of recreational opportunities such as tennis, soccer, softball, picnicking, golf, horseback riding, hiking, nature walks, performing arts and exhibits. Park history and information about the natural environment can be found at several developed areas. In addition, the Thompson Boat House offers bicycle and boat rentals on the Potomac River near the intersection of the Parkway and Virginia Avenue.

Each major developed area is examined in more detail in the following paragraphs. The NPS conducted a visitor use count during the week of Saturday, August 17, 1996 to help identify the levels of visitor use that occur at each area.

Tennis Stadium Area

The 16th Street NW and Kennedy Street area has 15 soft-surface and 10 hard-surface tennis courts. A fee is charged for use of the tennis courts; and reservations must be made in person through Guest Services, Inc. April through mid-November. During the rest of the year, the hard-surface courts are free to the public on a first-come, first-served basis. NPS daily visitation data for a typical week in August 1996 ranged from 66 visitors to the Tennis Center on a Saturday to 112 visitors on Thursday, August 22, 1996.

Other recreational facilities near the intersection of 16th and Kennedy Streets include softball fields, and a large recreation field suitable for soccer, football, volleyball and field hockey. These facilities are generally open to the public, although some of the fields can be reserved by contacting the D.C. Department of Recreation.

The Tennis Stadium hosts a major professional tennis tournament every summer. NPS visitation data shows that the Legg-Mason Professional Tennis Tournament, held July 13, 1996 through 21 1996 had an attendance of 70,000 (including one rained-out day). The highest attendance during this tournament occurred on Wednesday, July 17, 1996 when nearly 13,500 people were recorded at the stadium.

Carter Barron Amphitheater

The Carter Barron Amphitheater is a 4,000-seat outdoor theater located near the 16th Street and Kennedy Street area. The amphitheater hosts in the range of 30-40 performing arts events during the summer months, including musical performances, children's programs and theater productions. **FIGURE 3-2** depicts a typical event in progress at Carter Barron. A "Friends" group schedules and runs performances at the amphitheater, while food is a park concession operation. Tickets and performance information are available at the theater box office. NPS visitation data shows an attendance of 1,273 at Carter Barron on Saturday, August 17, 1996 and 3,000 on Monday, August 19, 1996.

Rock Creek Golf Course

The Rock Creek Golf Course is an 18-hole public course located off Joyce Road west of 16th Street NW. The course is operated as a concession operation of the Park. Golf course amenities include a clubhouse, club and cart rentals, lockers, and a snack bar. A fee is charged for course play. The course is open to the public from dawn to dusk daily, except for Christmas Day. NPS daily visitation data for the golf course during a typical week in August averaged 172 visitors per day, with a high of 233 on Sunday August 18, 1996.

Rock Creek Park Horse Center

The Horse Center, with stables and an equestrian ring, is located off Glover Road near the Nature Center. This facility operates as a park concession. A fee is charged to rent horses for guided trail rides, lessons, and therapeutic riding for the disabled. Daily visitation data received from the NPS for a typical week in August at the Horse Center showed a range of 47 visitors on a Monday, to 103 visitors on Saturday August 17, 1996.

Rock Creek Nature Center and Planetarium

The Nature Center, focal point of the Park's natural and cultural history, is located off Glover Road south of Military Road. The facility offers a variety of information and activities including: a natural history library, wildlife and forest exhibits, guided and self-guided nature walks, and astronomy programs. The Nature Center is open Wednesday through Sunday from 9:00 a.m. to 5:00

p.m., closed holidays. Use of the Center's resources by teachers and youth group leaders is encouraged during the week; reservations are required for groups. NPS daily visitation data for a typical week in August ranged from 39 visitors to the Nature Center on a Thursday, to 136 visitors on Sunday, August 18, 1996.

Pierce Mill

The Pierce Mill complex, including the Mill, a Carriage House, and a Springhouse, are located on Tilden Street just west of Beach Drive. The Mill is open to the public and is staffed by Park rangers. The old stone mill building has exhibits showing the operation of an historic mill house dating back to the 1820's. Mill hours are Wednesday through Sunday 8:00 a.m. to 4:30 p.m., closed holidays. According to NPS data, daily visitation to Pierce Mill during a typical August week ranged from ten visitors on a Thursday, to 101 visitors on Saturday, August 17, 1996.

Art Barn

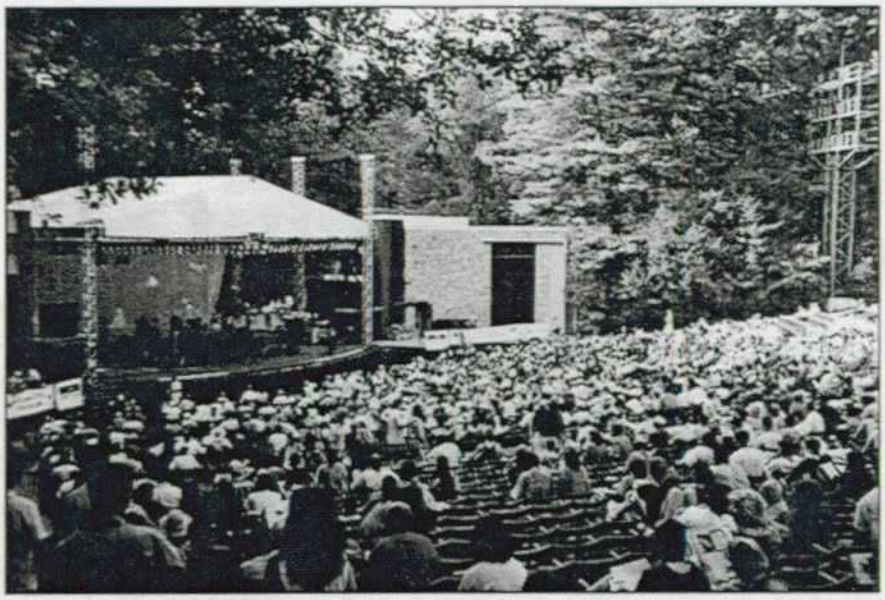
The Carriage House, also known as the Art Barn, is located in the Pierce Mill complex just west of the intersection of Beach Drive and Tilden Street. The Carriage House is occupied by the Rock Creek Gallery, which exhibits the work of local artists and hosts a variety of other art lessons and activities. The facility is open Wednesday through Sunday 10:00 a.m. to 5:00 p.m., closed holidays. No NPS visitation data was available for the Art Barn.

3.3 Picnic Area Use

There are 30 designated picnic areas spread throughout Rock Creek Park. Some picnic areas are designated for group use, while the remaining sites are available for general public use. Picnic areas include a variety of amenities. All picnic sites in the Park have some parking and are equipped with picnic tables and trash cans. Most picnic areas have stone fireplaces, and some have rain shelters. Some are located adjacent to Rock Creek or one of its tributaries, while others are without water access. Certain sites have large grassy playing areas, others offer smaller more secluded settings.

Visitors to the Park use picnic areas for a wide variety of activities. Groups of many sizes utilize picnic areas for events as diverse as family gatherings, roller hockey games, weddings and bird watching. Activities observed in these sites on a typical summer day include: sunbathing, tai chi, barbeques and picnics, car washing, frisbee, football and volleyball games, reading, wading, in-line skating, conversation, nature viewing, and fly casting.

There are ten group picnic areas in Rock Creek Park. Group picnic areas can be reserved for use by groups up to 100; reservations must be made in person. Information is available from the D.C. Department of Recreation. The group sites have large, off-road parking lots, and are equipped with restrooms in addition to the normal picnic area amenities. Typically, these areas are heavily used during the afternoon and early evening hours on summer weekends. **FIGURE 3-2** shows a group picnic area in use on a typical Saturday or Sunday in August.



The Carter Barron Amphitheater is popular with the D.C. residents. This facility has about 4,000 seats and hosts numerous musical events during the spring, summer, and fall. The amphitheater is also the site of plays and events for children.

The group picnic areas are heavily used thoughout the summer. Group reservations can be arranged through the D.C. Department of Recreation.

ROCK CREEK PARK

Figure 3-2

There are 20 "individual" picnic areas in the Park. Individual picnic areas are available for general public use on a first-come, first-served basis. These sites typically have short, on-road pullout areas for parking. A notable exception is individual Picnic Area #2, which has a large off-road parking lot.

3.4 Pedestrian, Bicycle, and In-Line Skating Activity

The Park contains an extensive network of paved and unpaved trails. The trail network offers a variety of uses and levels of terrain. In addition to the Park trail network, portions of Beach Drive are effectively converted into wide, paved multi-use trails on weekends and holidays.

Pedestrians are allowed on all Park trails. Some pedestrian trails are for foot use only, while others allow for shared-use with bicyclists or horses. Bicyclists are limited to using designated paved trails, which are all designated for shared-use with pedestrians. There are approximately six miles of paved trail open to bicycle use within the Park, with nearly three miles more along the Parkway. Horses and riders are restricted to specially designated equestrian trails. All equestrian trails are designated for shared-use with pedestrians. No specific designations are made on Park maps for use of trails by in-line skaters, but common sense limits this activity to paved trails.

There is a significant gap in the paved trail corridor between Broad Branch Road and Military Road. Pedestrians have a choice of trails to use in this area, but the only alternative for bicyclists is to use a Park road to bridge the gap. Although there is no posted restriction against bicycling on Park roads, the practice is not safe due to narrow paved roadway widths. High traffic volumes on certain Park roads, particularly during commuting hours, increases the hazard.

The asphalt path running parallel to Beach Drive and the Rock Creek and Potomac Parkway from Broad Branch Road to the Theodore Roosevelt Bridge, is the most heavily used pedestrian and bicycle facility in the Park. This path is used for both recreational and commuter bicycle traffic. In addition, an exercise course extends out along 1.5 miles of this trail south from Calvert Street.

The portions of Beach Drive between Wise Road and Picnic Area #10, and between the Park Police Substation and Broad Branch Road, receive heavy recreational use by pedestrians, bicyclists and in-line skaters on weekends and holidays. **FIGURES 3-3** and **3-4** show examples of weekend recreational activities on the closed portions of Beach Drive.

In addition to the more heavily-used pedestrian/bicyclist routes in the Park, other pieces of the trail system provide access to less-trafficked areas of the Park, and connections between main trails and the surrounding neighborhoods. A series of hiking trails maintained by the Potomac Appalachian Trail Club are important for nature walks. In many areas, "volunteer trails" have been worn into the grass along Park roadways, indicating significant amounts of pedestrian and bicycle activity where no designated facilities exist.

At locations where pedestrian and bicycle trails cross roadways within the Park, painted crosswalks have typically been provided. However, these crosswalks are not all currently supplemented by both pedestrian crossing and advance warning signs.

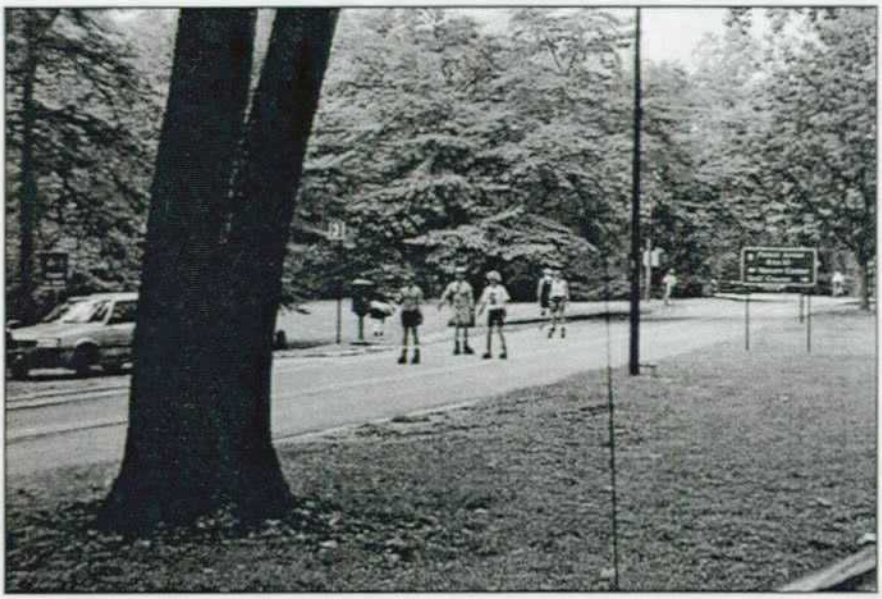
On weekdays, pedestrians and bicyclists are most active during morning and evening peak commuter times. This accounts for not only commuting travelers, but also the before- and after-work exercise crowd. Weekends are geared more toward recreational activity, with pedestrian and bicycle use sporadic early in the morning and becoming heavier as the day progresses, peaking by late afternoon. In-line skating, often referred to as rollerblading, is growing in popularity, but is more common as a weekend recreational activity.

3.5 Visitor Count Summary

A visitor use study was conducted in Rock Creek Park in August, 1996. Two types of visitor counts were done: site counts and corridor counts. Both types of counts were conducted for eight hours on a weekend day (Saturday, August 17) and a weekday (Thursday, August 22). The study period was from 7:00 a.m. - 10:00 a.m., 11:00 a.m. - 1:00 p.m., and 3:00 p.m. - 6:00 p.m. **FIGURE 3-5** shows the locations of site and corridor counts conducted during the August visitor survey.

Site counts were conducted at all picnic areas in the Park which were accessible by car, as well as at selected other visitor use areas. Picnic areas along closed portions of Beach Drive and Bingham Drive were not counted on the weekend day, since vehicle access was required to complete each survey loop on a one-hour schedule. Most site counts were done by making a spot check of each location once every hour during the study period. A few of the sites were surveyed once every half hour. The spot check consisted of determining how many people were using the site and classifying each visitor as a picnicker or other user. The number of visitors observed at any given time was averaged for each day's counts to come up with an average weekday or weekend spot visitation number.

Site counts are summarized in **TABLE 3-1**. This table shows clearly that visitor use within the Park is significantly higher on the weekends than during the week. Picnic Area #30 was the only site with higher observed visitor use on the weekday studied. This was the result of one large observation during a single site check that day.



In-line skating has become popular in the last several years. Field observations indicate that skaters take up a wider portion of the road than bikers or joggers. It appears that an in-line skater requires about 6-feet of road width when in full stride.

Gates are used to close portions of Beach Drive on the weekends. They create a wonderful recreational corridor for visitors seeking exercise, or a break from the traditional city environment surrounding the Park.

The sections of Beach Drive closed to vehicle traffic on the weekend are heavily used by bicyclists, joggers, walkers, and in-line skaters of all ages.

Rock Creek is a cool sanctuary for many visitors during the hot summer months. It is common to see families enjoying the areas along the creek during spring, summer, and fall.

ROCK CREEK PARK

Figure 3-4

Map Scale: 1" = 0.5 Miles

Legend
- Site Count Location
- Corridor Count Location
- Weekend Road Closure (open to ped/bike traffic only)
- Rock Creek Park

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ROCK CREEK PARK

Figure 3-5
Visitor Use Count Locations

TABLE 3-1
Visitor Use - Site Count Summary

Site Location	Average Weekday Spot Visitation	Average Weekend Spot Visitation
Picnic Area #1 (group)	6	26
Pierce Mill/Art Barn	2	9
Picnic Area #2	5	9
Picnic Area #3	0	n/a
Picnic Area #4	1	n/a
Pullout area 4/5	0	n/a
Picnic Area #5	1	1
Picnic Area #6 (group)	3	25
Milkhouse Ford	0	0
Picnic Area #7 (group)	1	30
Picnic Area #8 (group)	1	19
Picnic Area #9 (group)	2	6
Picnic Area #10 (group)	1	21
Picnic Area #11	0	n/a
Picnic Area #12	0	n/a
Picnic Area #13 (group)	1	17
Picnic Area #14 (group)	0	15
Picnic Area #15	0	1
Picnic Area #16	1	0
Picnic Area #17	0	3
Picnic Area #18	0	1
Picnic Area #19	0	1
Picnic Area #20	1	1
Pullout area 20/21	1	1
Picnic Area #21	0	1
Picnic Area #22	1	2
Picnic Area #23 (group)	0	14
Tennis Center area	41	48
Picnic Area #24 (group)	6	31
Picnic Area #25	1	1
Picnic Area #26	0	2
Picnic Area #27	1	1

Site Location	Average Weekday Spot Visitation	Average Weekend Spot Visitation
Picnic Area #28	1	2
Beach/Broad Branch area	1	3
Picnic Area #29	1	12
Picnic Area #30	5	0

Note: Visitor surveys were conducted Saturday, 8/17/96 & Thursday, 8/22/96 from 7:00-10:00 am, 11:00 am-1:00 pm & 3:00-6:00 pm on a spot-check basis.

Corridor counts were conducted at three locations on Beach Drive and one location on Rock Creek Parkway, in addition to several adjacent trail locations. The procedure for corridor counts was to count each visitor passing the survey location, regardless of travel direction, and total these volumes each half hour during the study period. Visitors were classified as either pedestrians, bicyclists, in-line skaters, or horseback riders. The observed totals for each half hour of the study period were averaged for each day to come up with average weekday and weekend half-hourly volumes. A summary of the corridor counts is shown in **TABLE 3-2**.

TABLE 3-2
Visitor Use - Corridor Count Summary

Site Location	Average Weekday Hourly Volume	Average Weekend Hourly Volume
Beach Dr. @ Picnic Area #10	no data	230
Beach Dr. N of Joyce Rd.	22	no data
Beach Dr. S Of Joyce Rd.	22	298
Joyce Rd. E of Beach Dr.	8	no data
Joyce Rd. or path W of Beach Dr.	14	no data
Beach Dr. NE of Broad Branch Rd.	14	270
foot/horse trail NW of Beach/Broad Branch	4	22
bike/foot trail S of Beach/Broad Branch	34	184
Rock Creek Pkwy. bike/foot path S of P St.	112	166
bike/foot path on P St. ramp	no data	42

Note: Visitor surveys were conducted Saturday 8/17/96 & Thursday 8/22/96; 7-10 am, 11 am-1 pm & 3-6 pm.

This data shows significantly higher corridor volumes during the study hours on the weekend than on the weekday. Use of the bike/foot path paralleling the Parkway is 50% higher on the weekend, and as expected, weekend counts on the main closed portion of Beach Drive show even greater increases. The portion of Beach Drive between Joyce Road and Broad Branch Road receives 13-20 times as much visitor use on the weekend than it does when motorized vehicle traffic is allowed on the road.

Also interesting to note is the combination of user types observed in the corridor study. **TABLE 3-3** shows the breakdown of visitor classification for the Beach Drive and Parkway path corridor locations.

TABLE 3-3
Visitor Use - Corridor Classification Summary

Site Location visitor classification	Average % of Weekday Users	Average % of Weekend Users
Beach Dr. @ Picnic Area #10	no data	
pedestrian		9%
bicyclist		65%
in-line skater		25%
Beach Dr. N of Joyce Rd.		no data
pedestrian	18%	
bicyclist	82%	
in-line skater	0%	
Beach Dr. S Of Joyce Rd.		
pedestrian	18%	19%
bicyclist	82%	55%
in-line skater	0%	26%
Beach Dr. NE of Broad Branch Rd.		
pedestrian	14%	22%
bicyclist	86%	56%
in-line skater	0%	23%
R.C.P. bike/foot path S of P St.		
pedestrian	45%	28%
bicyclist	54%	70%
in-line skater	2%	2%

Note: Visitor surveys were conducted Saturday 8/17/96 & Thursday 8/22/96; 7-10 am, 11 am-1 pm & 3-6 pm

This data shows the predominance of bicycle use and the absence of in-line skating within the northern portion of the Park during the week, giving way to higher volumes of pedestrians and skaters on the weekend. Parkway data shows a different trend, with nearly equal amounts of pedestrians and bicyclists during the week, transitioning to greater numbers of bicyclists on the weekends. In-line skating use on the Parkway path is consistently low regardless of the day of the week. This may be due to the fact that skaters tend to need a wider space for full striding than is provided on this path.

Chapter 4. Operational Characteristics

Chapter 4: Operational Characteristics

4.1 General

The operational characteristics of the transportation system in Rock Creek Park can be best defined by reviewing available historical traffic count data, and by performing traffic studies that measure the use of the existing system. A proper assessment of visitor usage and the operation of the road system is fundamental to identifying traffic safety problems or deficiencies.

4.2 Weekday A.M. and P.M. Road-Use Changes

In order to accommodate peak hour commuter traffic, the Rock Creek and Potomac Parkway is designated as a one-way facility on weekday mornings and evenings. In the mornings between 6:45 a.m. and 9:30 a.m., the Parkway serves southbound traffic only. The road is one-way northbound between 3:45 a.m. and 6:30 p.m. It is important to note that the practice of manually converting the Parkway to one-way operation for weekday commuter traffic began in 1937.

The process of changing the Parkway to a one-way facility is labor intensive, involving sawhorses, traffic cones, hinged signs, and United States Park Police officers. Signing and traffic operations and at most of the intersections and interchanges along the Parkway must be modified during each peak period to achieve the desired result. Beach Drive, near the intersection with the Parkway, is the only other road in Rock Creek Park that requires traffic control modification to accomplish the one-way operation. However, the traffic impacts of this practice affect most of the roads in the Park, as well as numerous city streets and other park roads in the Washington D.C. area.

4.3 Weekend Road Closures

Several Park roads are closed to vehicular traffic on weekends from 7:00 a.m. on Saturday until 7:00 p.m. on Sunday. The roads affected are as follows: Beach Drive from Broad Branch Road to Joyce Road, Beach Drive from Picnic Area 10 to Wise Road, Beach Drive north of West Beach Drive, Bingham Drive, and Sherrill Drive. Between Joyce Road and Picnic Area 10, Beach Drive is open to vehicles only for the purpose of providing access to group picnic areas and parking lots. All of the closures serve to make Beach Drive available as a recreational facility for pedestrians, bicyclists, and in-line skaters. The road closures are achieved using gates and are also in effect on holidays.

4.4 Traffic Volumes

Traffic volumes are the best indicator of the use of a highway system. Traffic volume data is collected by the District of Columbia for the roads in the vicinity of the Park. The average annual weekday traffic volumes for the region are presented in **FIGURE 4-1.**

Traffic volume data is also the primary indicator of vehicle utilization of the Park roads. Historical traffic volumes were obtained for two permanent NPS traffic counters: one at the intersection of Beach Drive and Joyce Road, the second on the Parkway north of Waterside Drive. These volumes were supplemented with temporary machine counts collected by the consultant at various locations throughout the Park in August and December, 1996. All count locations are shown in **FIGURE 4-2.**

4.4.1 Seasonal Variations

FIGURES 4-3 and **4-4** present a breakdown of monthly traffic in 1995 at the two permanent NPS counter locations. As shown in the figures, seasonal variations in traffic volumes at Rock Creek Park are not as extreme as those that might be seen at a traditional rural park. This consistency in traffic volumes is due to the high number of commuters using Park roads, and the Park's location within a large metropolitan community. The Parkway data shows even more consistent use throughout the year than does the Beach Drive data.

FIGURE 4-3

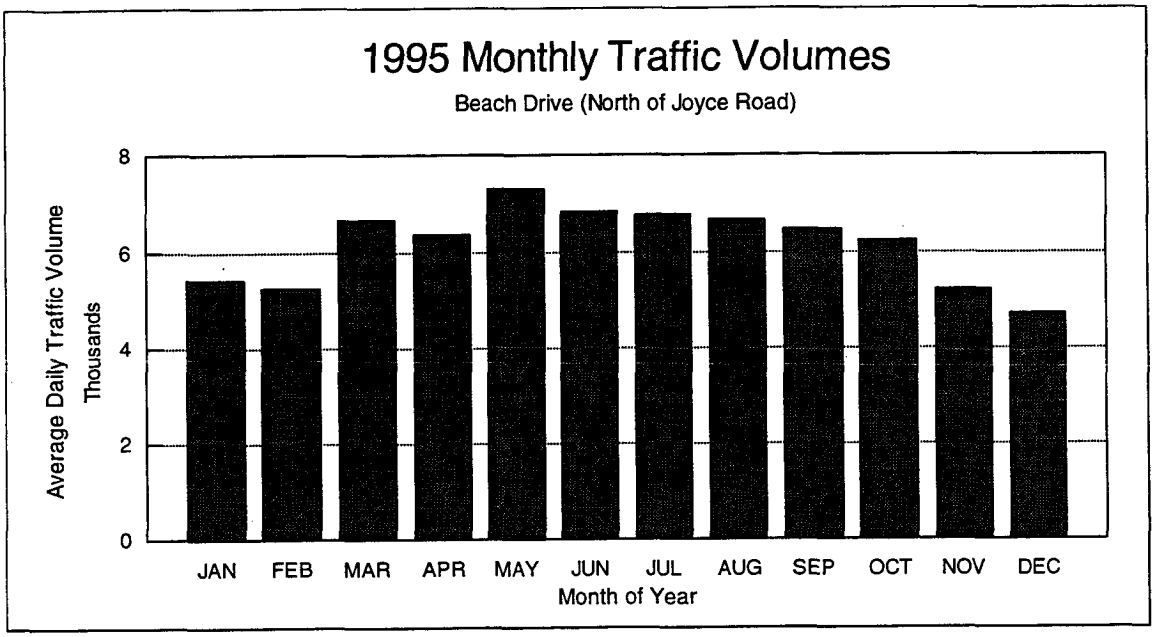
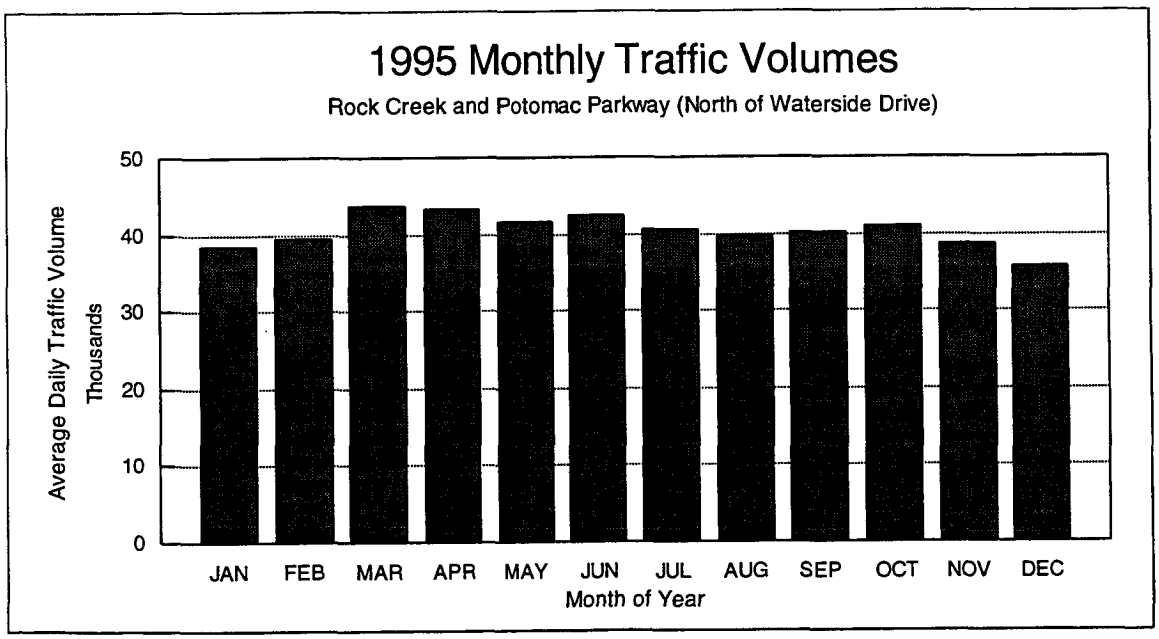
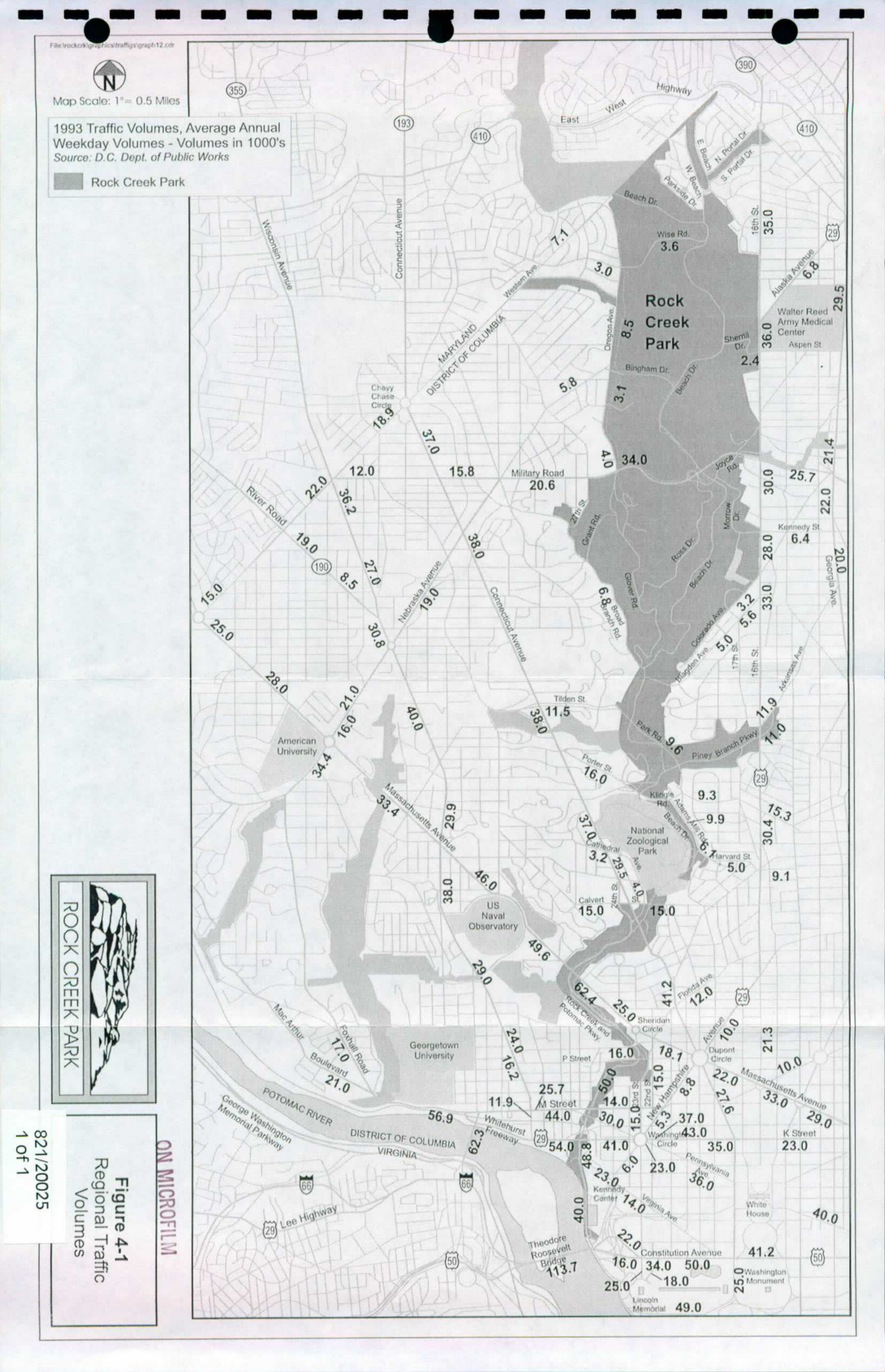


FIGURE 4-4



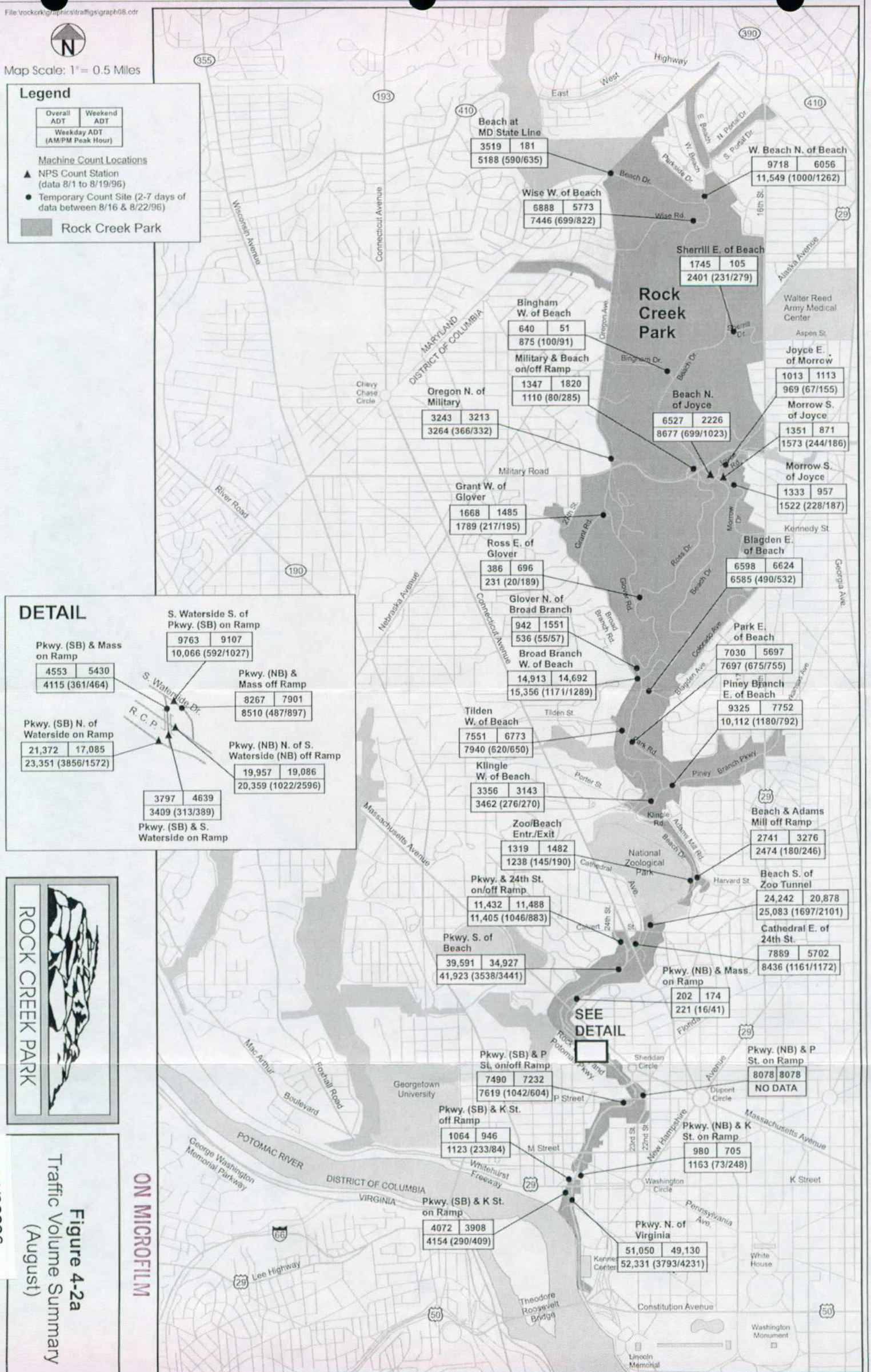


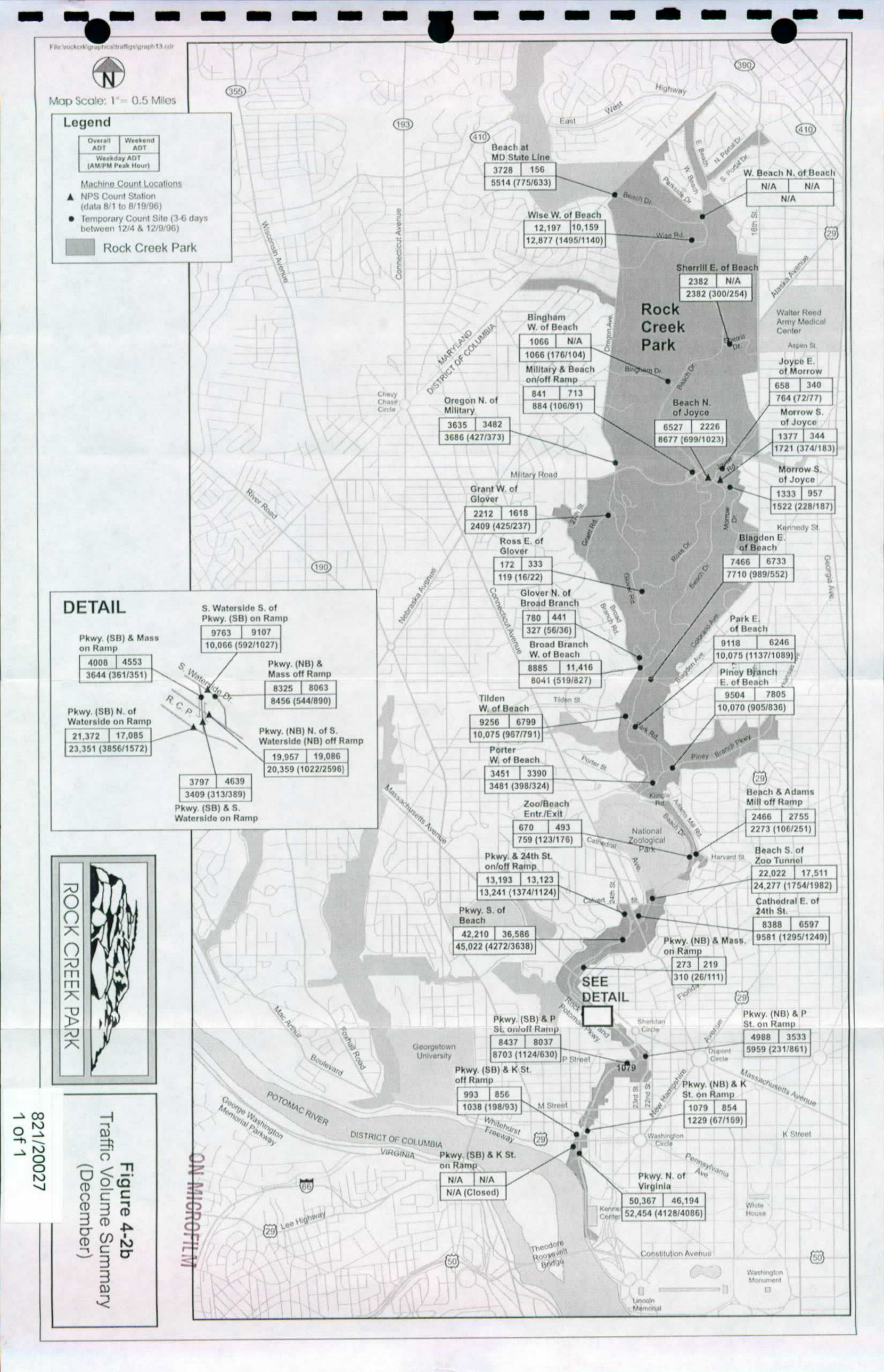
ROCK CREEK PARK

Figure 4-1
Regional Traffic Volumes

ON MICROFILM

821/20025
1 of 1


File:\rockcrk\graphics\trafflgs\graph08.cdr
Map Scale: 1" = 0.5 Miles
Legend
Overall ADT | Weekend ADT
Weekday ADT (AM/PM Peak Hour)
Machine Count Locations
NPS Count Station (data 8/1 to 8/19/96)
Temporary Count Site (2-7 days of data between 8/16 & 8/22/96)
Rock Creek Park
Beach at MD State Line
3519 | 181
5188 (590/635)
W. Beach N. of Beach
9718 | 6056
11,549 (1000/1262)
Wise W. of Beach
6888 | 5773
7446 (699/822)
Sherrill E. of Beach
1745 | 105
2401 (231/279)
Rock Creek Park
Bingham W. of Beach
640 | 51
875 (100/91)
Military & Beach on/off Ramp
1347 | 1820
1110 (80/285)
Oregon N. of Military
3243 | 3213
3264 (366/332)
Beach N. of Joyce
6527 | 2226
8677 (699/1023)
Joyce E. of Morrow
1013 | 1113
969 (67/155)
Morrow S. of Joyce
1351 | 871
1573 (244/186)
Morrow S. of Joyce
1333 | 957
1522 (228/187)
Grant W. of Glover
1668 | 1485
1789 (217/195)
Ross E. of Glover
386 | 696
231 (20/189)
Blagden E. of Beach
6598 | 6624
6585 (490/532)
Glover N. of Broad Branch
942 | 1551
536 (55/57)
Broad Branch W. of Beach
14,913 | 14,692
15,356 (1171/1289)
Park E. of Beach
7030 | 5697
7697 (675/755)
Piney Branch E. of Beach
9325 | 7752
10,112 (1180/792)
Tilden W. of Beach
7551 | 6773
7940 (620/650)
Klingle W. of Beach
3356 | 3143
3462 (276/270)
Zoo/Beach Entr./Exit
1319 | 1482
1238 (145/190)
Beach & Adams Mill off Ramp
2741 | 3276
2474 (180/246)
Pkwy. & 24th St. on/off Ramp
11,432 | 11,488
11,405 (1046/883)
Beach S. of Zoo Tunnel
24,242 | 20,878
25,083 (1697/2101)
Cathedral E. of 24th St.
7889 | 5702
8436 (1161/1172)
Pkwy. S. of Beach
39,591 | 34,927
41,923 (3538/3441)
Pkwy. (NB) & Mass. on Ramp
202 | 174
221 (16/41)
SEE DETAIL
Pkwy. (SB) & P St. on/off Ramp
7490 | 7232
7619 (1042/604)
Pkwy. (NB) & P St. on Ramp
8078 | 8078
NO DATA
Pkwy. (SB) & K St. off Ramp
1064 | 946
1123 (233/84)
Pkwy. (NB) & K St. on Ramp
980 | 705
1163 (73/248)
Pkwy. (SB) & K St. on Ramp
4072 | 3908
4154 (290/409)
Pkwy. N. of Virginia
51,050 | 49,130
52,331 (3793/4231)
DETAIL
S. Waterside S. of Pkwy. (SB) on Ramp
9763 | 9107
10,066 (592/1027)
Pkwy. (SB) & Mass on Ramp
4553 | 5430
4115 (361/464)
Pkwy. (NB) & Mass off Ramp
8267 | 7901
8510 (487/897)
Pkwy. (SB) N. of Waterside on Ramp
21,372 | 17,085
23,351 (3856/1572)
Pkwy. (NB) N. of S. Waterside (NB) off Ramp
19,957 | 19,086
20,359 (1022/2596)
3797 | 4639
3409 (313/389)
Pkwy. (SB) & S. Waterside on Ramp
S. Waterside Dr.
R. C. P.
ROCK CREEK PARK
Figure 4-2a
Traffic Volume Summary
(August)
ON MICROFILM
821/20026
1 of 1


File:\rockcrk\graphics\traffigs\graph13.cdr
N
Map Scale: 1" = 0.5 Miles
Legend
Overall ADT | Weekend ADT
Weekday ADT (AM/PM Peak Hour)
Machine Count Locations
NPS Count Station (data 8/1 to 8/19/96)
Temporary Count Site (3-6 days between 12/4 & 12/9/96)
Rock Creek Park
Beach at MD State Line
3728 | 156
5514 (775/633)
W. Beach N. of Beach
N/A | N/A
N/A
Wise W. of Beach
12,197 | 10,159
12,877 (1495/1140)
Sherrill E. of Beach
2382 | N/A
2382 (300/254)
Rock Creek Park
Bingham W. of Beach
1066 | N/A
1066 (176/104)
Military & Beach on/off Ramp
841 | 713
884 (106/91)
Oregon N. of Military
3635 | 3482
3686 (427/373)
Beach N. of Joyce
6527 | 2226
8677 (699/1023)
Joyce E. of Morrow
658 | 340
764 (72/77)
Morrow S. of Joyce
1377 | 344
1721 (374/183)
Morrow S. of Joyce
1333 | 957
1522 (228/187)
Grant W. of Glover
2212 | 1618
2409 (425/237)
Ross E. of Glover
172 | 333
119 (16/22)
Glover N. of Broad Branch
780 | 441
327 (56/36)
Broad Branch W. of Beach
8885 | 11,416
8041 (519/827)
Blagden E. of Beach
7466 | 6733
7710 (989/552)
Park E. of Beach
9118 | 6246
10,075 (1137/1089)
Piney Branch E. of Beach
9504 | 7805
10,070 (905/836)
Tilden W. of Beach
9256 | 6799
10,075 (967/791)
Porter W. of Beach
3451 | 3390
3481 (398/324)
Zoo/Beach Entr./Exit
670 | 493
759 (123/176)
Pkwy. & 24th St. on/off Ramp
13,193 | 13,123
13,241 (1374/1124)
Pkwy. S. of Beach
42,210 | 36,586
45,022 (4272/3638)
Beach & Adams Mill off Ramp
2466 | 2755
2273 (106/251)
Beach S. of Zoo Tunnel
22,022 | 17,511
24,277 (1754/1982)
Cathedral E. of 24th St.
8388 | 6597
9581 (1295/1249)
Pkwy. (NB) & Mass. on Ramp
273 | 219
310 (26/111)
SEE DETAIL
Pkwy. (SB) & P St. on/off Ramp
8437 | 8037
8703 (1124/630)
Pkwy. (NB) & P St. on Ramp
4988 | 3533
5959 (231/861)
Pkwy. (SB) & K St. off Ramp
993 | 856
1038 (198/93)
Pkwy. (NB) & K St. on Ramp
1079 | 854
1229 (67/169)
Pkwy. (SB) & K St. on Ramp
N/A | N/A
N/A (Closed)
Pkwy. N. of Virginia
50,367 | 46,194
52,454 (4128/4086)
DETAIL
S. Waterside S. of Pkwy. (SB) on Ramp
9763 | 9107
10,066 (592/1027)
Pkwy. (SB) & Mass on Ramp
4008 | 4553
3644 (361/351)
Pkwy. (NB) & Mass off Ramp
8325 | 8063
8456 (544/890)
Pkwy. (SB) N. of Waterside on Ramp
21,372 | 17,085
23,351 (3856/1572)
Pkwy. (NB) N. of S. Waterside (NB) off Ramp
19,957 | 19,086
20,359 (1022/2596)
3797 | 4639
3409 (313/389)
Pkwy. (SB) & S. Waterside on Ramp
S. Waterside Dr.
R.C.P.
ROCK CREEK PARK
Figure 4-2b
Traffic Volume Summary
(December)
821/20027
1 of 1
ON MICROFILM
Beach Dr.
Wise Rd.
Bingham Dr.
Military Road
Tilden St.
Porter St.
Kennedy St.
Aspen St.
Harvard St.
P Street
M Street
K Street
Florida Avenue
Massachusetts Avenue
Pennsylvania Ave.
Constitution Avenue
Connecticut Avenue
Wisconsin Avenue
Nebraska Avenue
Georgia Ave.
16th St.
Alaska Avenue
Walter Reed Army Medical Center
National Zoological Park
Georgetown University
Sheridan Circle
Dupont Circle
Washington Circle
Kennedy Center
White House
Washington Monument
Lincoln Memorial
Theodore Roosevelt Bridge
George Washington Memorial Parkway
Whitehurst Freeway
Lee Highway
Rock Creek and Potomac Parkway
Mac Arthur Boulevard
Foxhall Road
POTOMAC RIVER
DISTRICT OF COLUMBIA
VIRGINIA
MARYLAND
Chevy Chase Circle
River Road
Piney Branch Pkwy
Klingle Rd.
Adams Mill Rd.
Calvert St.
New Hampshire Ave.
22nd St.
24th St.
Grant Rd.
Glover Rd.
Ross Dr.
Broad Branch Rd.
Colorado Ave.
Blagden Ave.
Kansas Ave.
Morrow Dr.
Oregon Ave.
Beach Dr.
Park Rd.
Parkside Dr.
E. Beach Dr.
W. Beach Dr.
N. Portal Dr.
S. Portal Dr.
Sherrill Dr.
Joyce Rd.
355
193
410
390
29
66
50
190

4.4.2 Daily Variations

The permanent traffic counter data was used to further identify traffic volume characteristics on the Park road system. The typical daily traffic volume distributions shown in **FIGURES 4-5** and **4-6** are based on traffic volumes recorded on Beach Drive and the Parkway in August of 1996. The data indicates that there is little variation in traffic volumes during weekdays, when peak commuting conditions occur. Because the Beach Drive counter is located on a segment of road that is closed to through traffic, Saturdays and Sundays have significantly less traffic than an average weekday. The Parkway shows a slight drop in use on the weekends. At both locations, Thursdays had the highest traffic volume of all the days in the week.

FIGURE 4-5

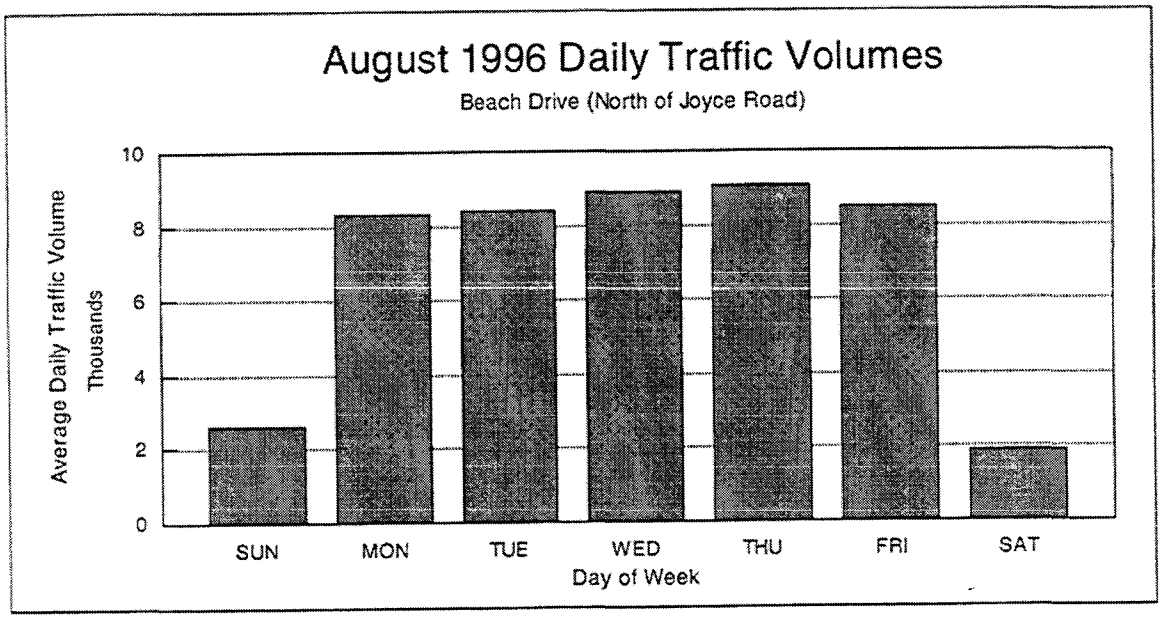
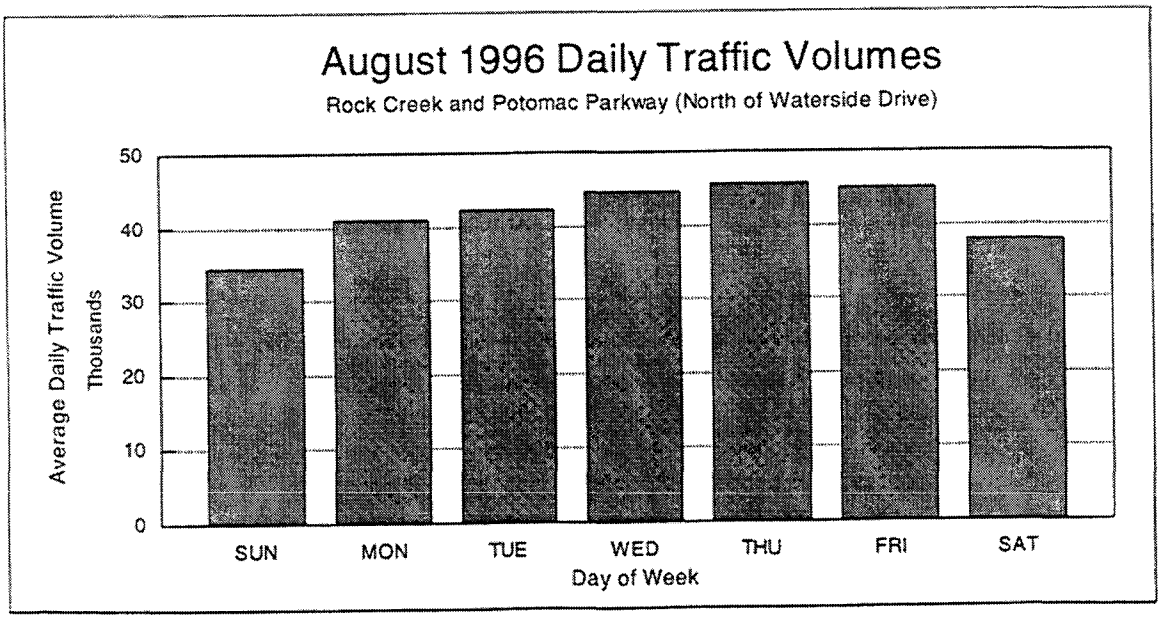


FIGURE 4-6



4.4.3 Hourly Variations

The typical daily traffic distributions by hour were developed from the NPS counts taken in August of 1996. **FIGURES 4-7** and **4-8** show the hourly variations in average daily traffic volumes (all seven days of the week were included) on Beach Drive and the Parkway. Both locations exhibit well defined A.M. and P.M. peaks that are characteristic of typical urban area travel patterns. The peak travel hours generally occur between 7:00 a.m. and 10:00 a.m. and 3:00 p.m. and 7:00 p.m. due to commuter traffic. Traffic volumes are extremely light between midnight and 6:00 a.m.

FIGURE 4-7

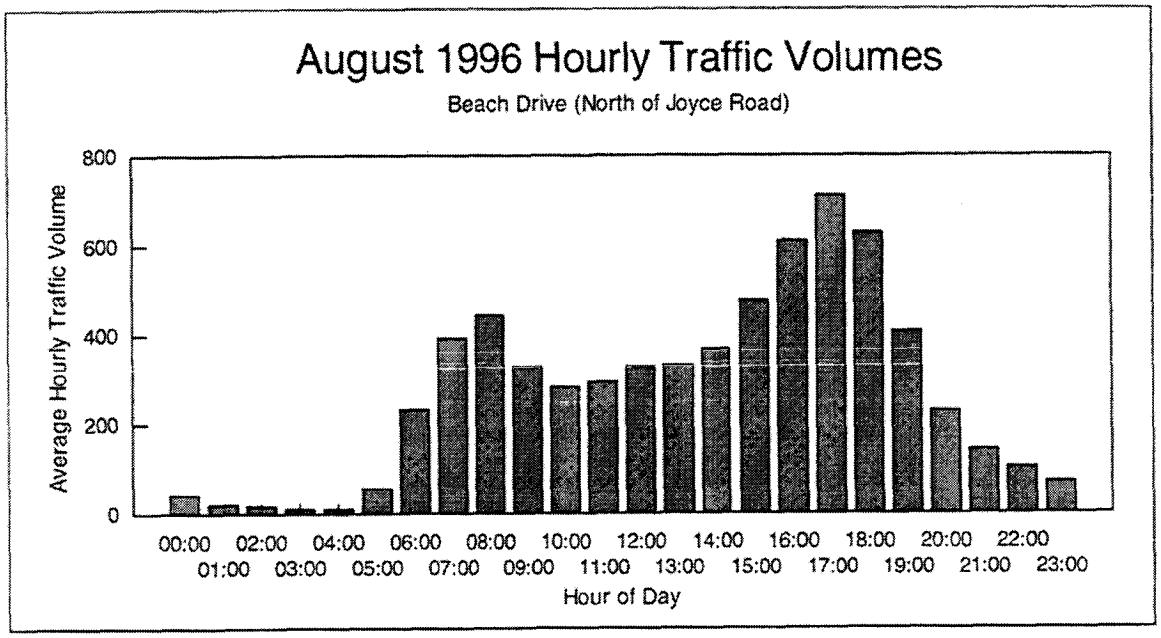
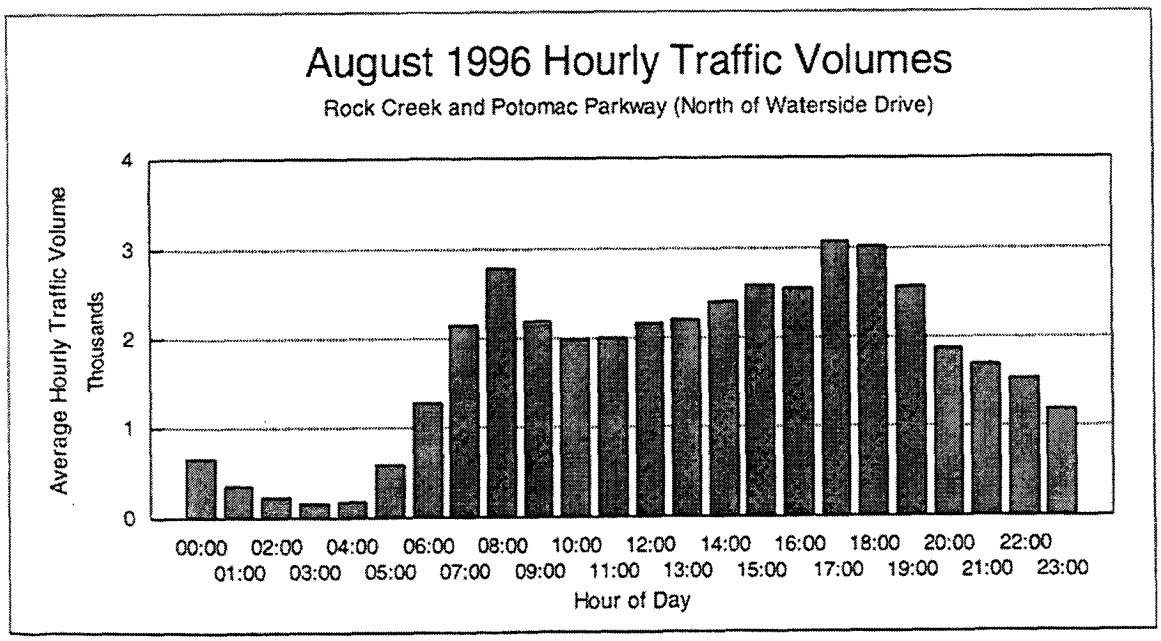


FIGURE 4-8



4.5 Turning Movement Counts

Turning movement counts were collected at 19 locations: seven intersections within the northern portion of the Park, four intersections along the Parkway, two intersections south of the Parkway, and six intersections adjacent to the Park. The counts were performed during morning, noon, and evening peak hours on Tuesday, August 20, Wednesday August 21, and Friday, August 23, 1996. The locations at which turning movement counts were performed are shown in **FIGURE 4-9**. Turning movement count summaries for each of the locations can be found in Appendix A. Turning movement count data was used to develop the level of service analysis and to assist in estimating commuter travel patterns.

4.6 Level of Service

All of the major intersections within the Park were evaluated to determine the current Level of Service (LOS). The Level of Service analysis is used to determine how well the intersections are functioning, given the existing lane-use configuration, traffic control and traffic volumes. The current procedures outlined in the Transportation Research Board's ***Highway Capacity Manual - Special Report 209*** were used in the evaluation of each intersection.

Different calculations are used for signalized intersections and unsignalized intersections, but the rating scheme is the same. This rating method assigns LOS values ranging from A for intersections with excellent operation to F for intersections operating at or beyond capacity. An analysis was conducted for each subject intersection using the existing conditions. An additional analysis was conducted using a possible all-way stop configuration for the unsignalized intersections and possible signalization of the intersection of Beach Drive and the Parkway. A summary of the LOS for the major unsignalized intersections in the Park is shown in **TABLE 4-1**. **TABLE 4-2** presents a summary of the LOS for signalized intersections in or near the Park.

TABLE 4-1
Unsignalized Intersection Level of Service Summary

	Existing Control			All-Way Stop		
	A.M.	Noon	P.M.	A.M.	Noon	P.M.
Beach/West Beach	C	---	F	F	---	F
Beach/Joyce	B	---	F	---	---	---
Beach/Broad Branch	A	---	A	B	---	F
Beach/Blagden	F	---	A	F	---	F
Beach/Piney Branch	F	---	A	F	---	F
Beach/Klingle	B	---	F	F	---	F
Beach/Parkway	---	F	---	---	F	---

TABLE 4-2
Signalized Intersection Level of Service Summary

	Existing Signal			Possible Signal		
	A.M.	Noon	P.M.	A.M.	Noon	P.M.
Military/Glover/Oregon	B	---	C	---	---	---
Beach/Park/Tilden	D	---	F	---	---	---
Beach/Parkway	---	---	---	---	B	---
RCP/Virginia	---	B	---	---	---	---
Connecticut/Tilden	B	---	B	---	---	---
Connecticut/Cathedral	C	---	C	---	---	---
16th/Kennedy/Morrow	F	---	C	---	---	---
16th/Colorado	B	---	A	---	---	---

4.7 Vehicle Speeds

The quality of travel is most often associated with speed or travel time. Travel speed is an important consideration because the rate of speed has bearing on the safety and service aspects of a roadway. Travel speeds may be expressed in terms of spot speeds, which represent the instantaneous speed of a given traffic sample at a specific location. The following narrative discusses the speed studies conducted for this project and summarizes major findings.

4.7.1 Average Travel Speeds

A travel time and delay study was conducted on Beach Drive and the Parkway. This study consists of driving the corridors using the average car method, in which the test car matches the speed of the other vehicles traveling along the corridor. The results of this study provide a reasonable idea as to the average vehicle speeds occurring on various segments of the corridors. The average vehicle speeds determined in the travel time and delay study are presented graphically in **FIGURE 4-10.**

4.7.2 Spot Speed Studies

Spot speed studies are designed to measure the speed characteristics of a specified traffic sample at a particular location on the road network. A total of 38 spot speed studies were performed at 12 different locations within the northern portion of the Park and two locations on the Parkway during August of 1996. The locations of the spot speed tests are depicted in **FIGURE 4-11**.

Vehicle travel speed distributions were plotted for each of the spot speed study locations. From these distributions, a number of important travel speed characteristics were obtained. These characteristics include: the 85th percentile speed, the pace, and the average travel speeds. The 85th percentile speed is the speed at or below which 85 percent of the traffic is moving. This speed is the one characteristic of traffic speeds that is most indicative of a safe and reasonable speed limit.

File:\rockcrk\graphics\traffigs\graph01.cdr

Map Scale: 1"= 0.5 Miles

Legend

- ● Tuesday 8/20/96
  6:30-9 am, 11 am-1 pm, 3:30-6:30 pm
- ▲ Wednesday 8/21/96
  6:30-9 am, 11 am-1pm, 3:30-6:30 pm
- ■ Friday 8/23/96
  7-8 am & 4-5 pm or 8:15-9:15 am & 5:15-6:15 pm
- Rock Creek Park

Figure 4-9
Turning Movement
Count Locations

ON MICROFILM

821/20028
1 of 1


Rock Creek Park
34.6
36.0
34.3
38.3
34.0
36.6
31.7
29.6
29.9
30.5
35.1
33.0
39.4
41.4
41.9
42.4
44.3
43.6
41.5
40.8
Georgia Ave.
Walter Reed Army Medical Center
National Zoological Park
US Naval Observatory
Georgetown University
American University
Connecticut Avenue
Massachusetts Avenue
Nebraska Avenue
Military Road
Tilden St.
Glover Rd.
Broad Branch Rd.
Beach Dr.
Rock Creek and Potomac Pkwy.
Theodore Roosevelt Bridge
POTOMAC RIVER
George Washington Memorial Parkway
Whitehurst Freeway
DISTRICT OF COLUMBIA
MARYLAND
VIRGINIA
Chevy Chase Circle
Dupont Circle
Washington Circle
White House
Washington Monument
Lincoln Memorial
Kennedy Center

Legend

Segment Checkpoint

Average Speed (Northbound) 36.0

Average Speed (Southbound) 34.6

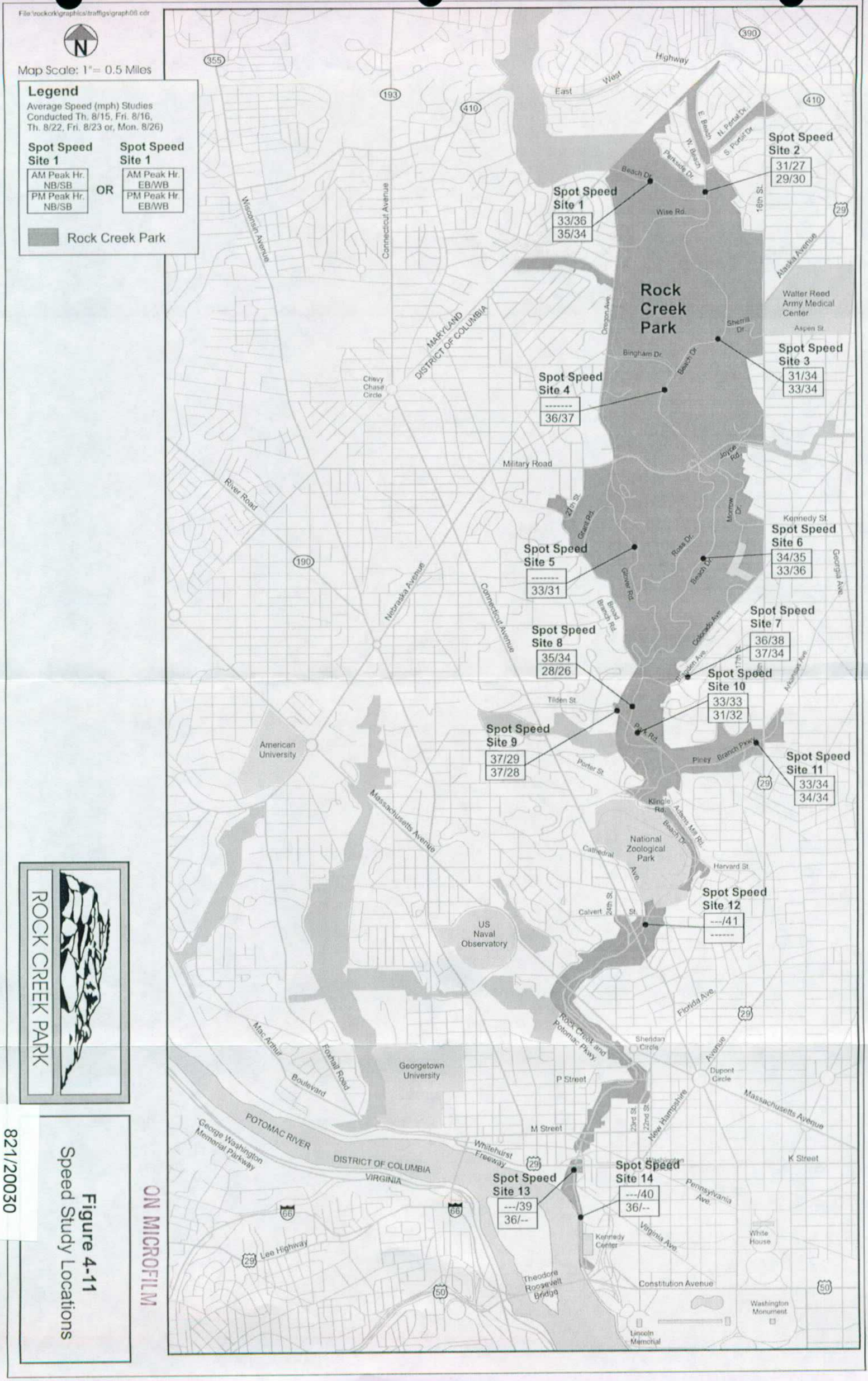
Rock Creek Park

Map Scale: 1" = 0.5 Miles

ROCK CREEK PARK

Figure 4-10
Average Travel Speeds
(RCP/Beach Dr.)

File:\rockcrk\graphics\traffgis\graph06.cdr



ROCK CREEK PARK

Figure 4-11
Speed Study Locations

821/20030
1 of 1

ON MICROFILM

The pace of a sample group represents a ten mile per hour range of speeds containing the largest number of observations. A normal speed distribution will have approximately 70 percent of the sample within the pace and 15 percent above and below it. The average speed of the total sample is always within the pace, while the 85th percentile speed is typically within two miles per hour of the upper limit of the pace.

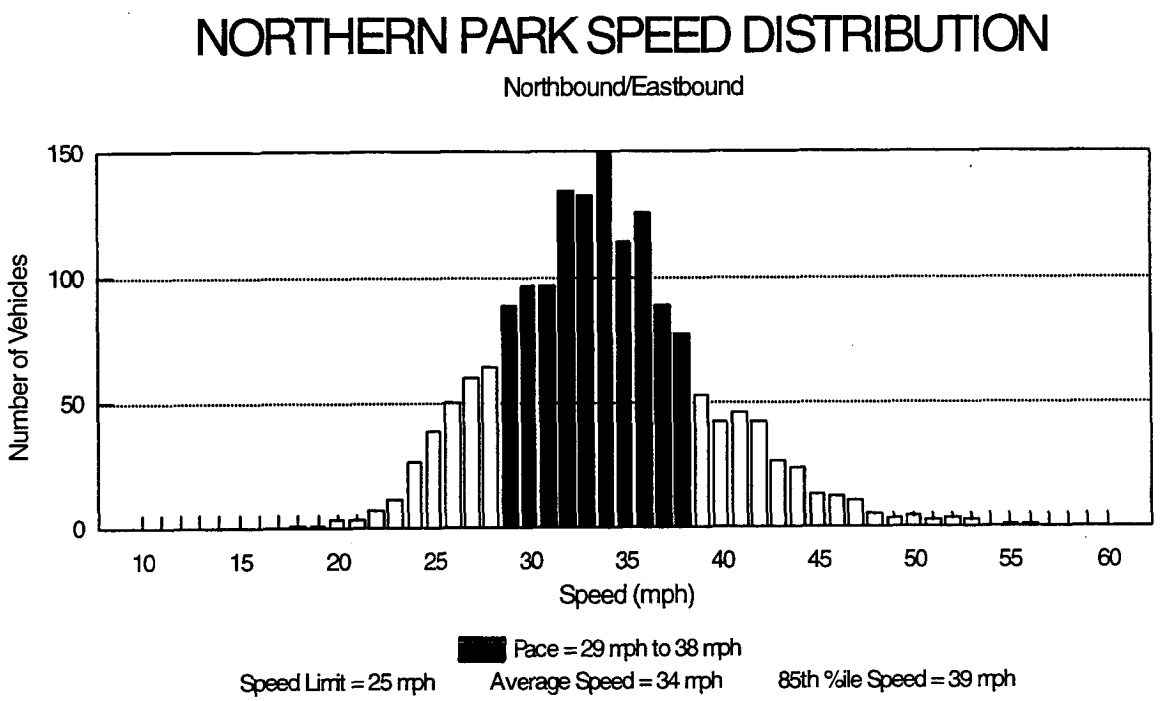
The average speeds recorded at each location during the morning peak and evening peak are displayed in **FIGURE 4-11**. Average speed distributions for all speed studies performed in the northern portion of the Park and on the Parkway are shown graphically in **FIGURES 4-12** and **4-13**. The characteristics of the vehicle speeds observed during each of the studies are presented in **TABLES 4-3** and **4-4**.

It should be noted in the interpretation of the spot-speed data that the distribution of vehicle speeds is a general indication of traffic patterns and driving habits. In cases where the majority of the traffic is traveling within the pace, the frequency of passing is less, thereby minimizing potential conflicts that are created when slower vehicles are overtaken. Alternately, a distribution containing a wide range of vehicle speeds with a larger percentage of the sample speeds outside the pace indicates a less desirable situation with greater potential between fast and slow-moving vehicles.

There is no significant difference in free flow travel speeds during peak hours as compared to non-peak hours. There are, however, greater delays at certain intersections during peak hours because of higher traffic volumes. Most visitors drive at or above the posted speed limits on Park roads. The speed data indicates that the average 85th percentile speed on the northern Park roads is 39 to 40 mph, which is 15 mph over the posted speed limit. The average 85th percentile speed on the Parkway was 42 to 43 mph, which is eight mph over the posted speed limit.

Drivers in Rock Creek Park tend to be more aggressive than the average visitor at a rural Park. Visitors who are unfamiliar with the Park are often distinguishable from daily commuters by their lower speed. Drivers who maintain a travel speed within 10 mph of the speed limit are likely to develop a queue of cars behind them. During a moving observation, the test car was passed on Beach Drive (which has a full-length no passing zone) while traveling at 35 mph and a trailing vehicle queue was present for the entire drive of the Beach Drive corridor.

FIGURE 4-12


NORTHERN PARK SPEED DISTRIBUTION
Northbound/Eastbound
Number of Vehicles
150
100
50
0
10
15
20
25
30
35
40
45
50
55
60
Speed (mph)
Pace = 29 mph to 38 mph
Speed Limit = 25 mph
Average Speed = 34 mph
85th %ile Speed = 39 mph

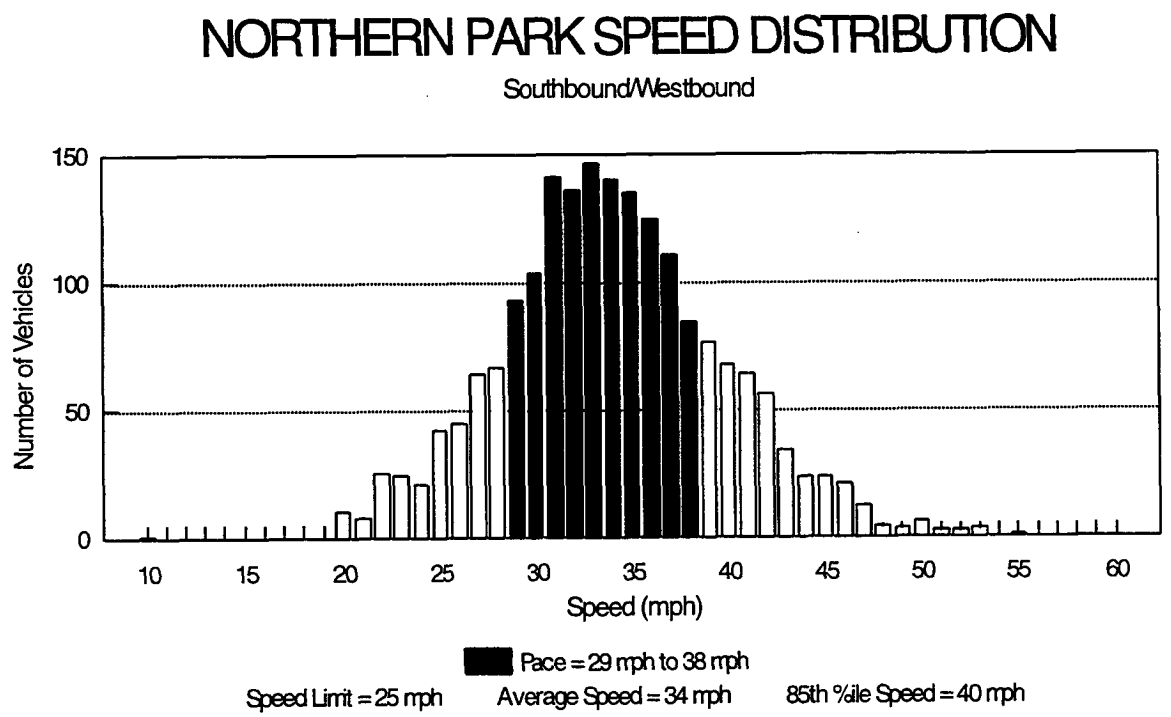
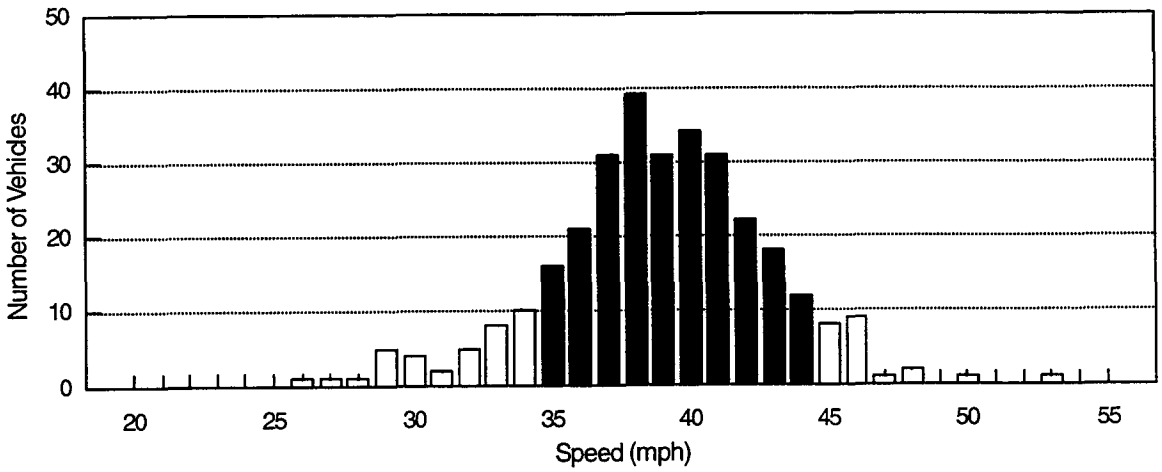

NORTHERN PARK SPEED DISTRIBUTION
Southbound/Westbound
Number of Vehicles
150
100
50
0
10
15
20
25
30
35
40
45
50
55
60
Speed (mph)
Pace = 29 mph to 38 mph
Speed Limit = 25 mph
Average Speed = 34 mph
85th %ile Speed = 40 mph

FIGURE 4-13

PARKWAY SPEED DISTRIBUTION

Southbound

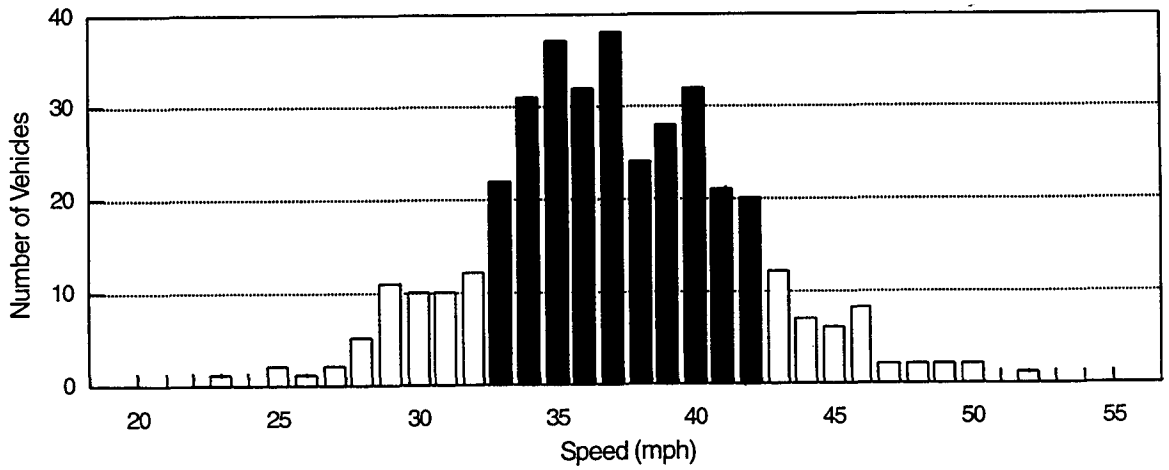


Pace = 35 mph to 44 mph

Speed Limit = 35 mph Average Speed = 39 mph 85th %ile Speed = 43 mph

PARKWAY SPEED DISTRIBUTION

Northbound



Pace = 33 mph to 42 mph

Speed Limit = 35 mph Average Speed = 37 mph 85th %ile Speed = 42 mph

TABLE 4-3
Northern Park Speed Analysis*

Location	Description	Date	Time	Northbound/Eastbound							Southbound/Westbound						
				85th	%+	Pace	%-	Avg.	% Over Limit	% Over 35 mph	85th	%+	Pace	%-	Avg.	% Over Limit	% Over 35 mph
1	**Beach Drive**	8/23/96	7:40 A	37	0	29 - 38	8	33	96	20	41	11	32 - 41	21	36	100	63
	West of	8/23/96	1:30 P	38	9	29 - 38	10	33	99	23	38	10	29 - 38	8	34	99	33
	West Beach	8/15/96	5:15 P	39	18	29 - 38	5	35	99	39	37	7	29 - 38	3	34	100	33
2	**West Beach Drive**	8/23/96	8:00 A	35	13	26 - 35	4	31	96	13	32	34	20 - 29	0	27	57	0
	South of	8/15/96	10:15 A	35	3	27 - 36	10	31	91	7	32	3	24 - 33	13	28	74	2
	Parkside	8/23/96	4:55 P	34	12	25 - 34	15	29	80	5	34	13	25 - 34	7	30	84	11
3	**Beach Drive**	8/23/96	7:10 A	37	20	25 - 34	0	31	80	20	36	2	30 - 39	11	34	98	25
	South of	8/15/96	2:50 P	37	11	28 - 37	11	33	98	29	39	17	29 - 38	8	34	100	43
	Sherrill	8/15/96	3:40 P	37	2	29 - 38	14	33	95	26	37	8	29 - 38	9	34	99	29
4	**Beach Drive**	8/23/96	5:15 P	39	3	32 - 41	7	36	100	47	41	0	35 - 44	14	37	100	57
	South of Bingham																
5	**Glover Road**	8/23/96	12:05 P	38	8	29 - 38	23	32	85	31	39	24	27 - 36	12	32	92	32
	North of Ross Drive	8/22/96	6:05 P	38	15	27 - 36	12	33	88	19	37	0	28 - 37	18	31	11	31
6	**Beach Drive**	8/23/96	6:40 A	36	13	27 - 36	0	34	100	25	38	6	30 - 39	2	35	100	45
	South of	8/16/96	2:00 P	38	7	30 - 39	7	35	100	41	41	6	32 - 41	20	36	100	51
	Police Substation	8/23/96	5:30 P	36	11	27 - 36	0	33	100	23	41	16	31 - 40	5	36	100	63
7	**Blagden Avenue**	8/23/96	8:40 A	38	0	29 - 38	0	36	100	50	42	8	34 - 43	9	38	100	74
	East of	8/23/96	11:20 A	42	25	30 - 39	3	37	100	57	40	8	31 - 40	8	36	95	49
	Beach Drive	8/23/96	4:20 P	42	12	33 - 42	20	37	100	57	37	6	28 - 37	0	34	100	23
8	**Beach Drive**	8/23/96	6:15 A	38	0	30 - 39	0	35	100	50	38	9	29 - 38	3	34	100	34
	North of	8/16/96	1:20 P	36	11	27 - 36	6	32	95	19	36	12	27 - 36	2	32	100	19
	Park Road	8/16/96	5:30 P	30	4	23 - 32	2	28	78	2	30	6	22 - 31	6	26	56	0
9	**Tilden Street**	8/23/96	9:05 A	42	12	33 - 42	10	37	96	69	34	7	26 - 35	17	29	83	7
	West of	8/23/96	1:30 P	42	9	33 - 42	15	37	100	57	32	18	22 - 31	3	28	83	1
	Beach Drive	8/23/96	3:50 P	41	7	33 - 42	7	37	100	61	31	13	22 - 31	3	28	77	3
10	**Park Road**	8/26/96	7:10 A	36	9	29 - 38	5	33	98	16	37	8	29 - 38	9	33	96	30
	East of	8/23/96	2:10 P	40	8	32 - 41	21	39	97	49	36	15	27 - 36	9	33	98	23
	Beach Drive	8/16/96	3:00 P	36	8	27 - 36	10	31	94	16	36	6	28 - 37	12	32	94	18

TABLE 4-3
Northern Park Speed Analysis*

Location	Description	Date	Time	Northbound/Eastbound							Southbound/Westbound						
				85th	%+	Pace	%-	Avg.	% Over Limit	% Over 35 mph	85th	%+	Pace	%-	Avg.	% Over Limit	% Over 35 mph
11	Piney Branch	8/26/96	8:00 A	42	48	24 - 33	0	33	78	35	38	12	29 - 38	6	34	98	28
	East of	8/23/96	10:40 A	42	6	34 - 43	23	37	98	60	41	27	29 - 38	6	36	98	46
	Beach Drive	8/23/96	3:20 P	38	5	31 - 40	22	34	93	32	41	23	27 - 36	4	34	96	32
12	Beach Drive	8/16/96	7:50 A	---	---	---	---	---	---	---	45	5	37 - 46	5	41	100	98
	South of Nat'l Zoo	8/16/96	12:30 P	47	14	38 - 47	8	43	100	98	42	7	34 - 43	6	39	100	85
AVERAGE				39	17	29 - 38	16	34	94	35	40	21	29 - 38	16	34	93	37
				Based on 1648 Observations							Based on 1914 Observations						

* All roads in the Park have a posted speed limit of 25 mph

TABLE 4-4
Parkway Speed Analysis**

Location	Description	Date	Time	Northbound/Eastbound							Southbound/Westbound						
				85th	%+	Pace	%-	Avg.	% Over Limit	% Over 45 mph	85th	%+	Pace	%-	Avg.	% Over Limit	% Over 45 mph
13	Parkway	8/26/96	8:40 A	---	---	---	---	---	---	---	43	10	34 - 43	11	39	79	4
	North of	8/16/96	10:15 A	41	10	33 - 42	5	38	70	3	42	8	34 - 43	6	38	84	2
	Virginia	8/16/96	4:40 P	41	8	33 - 42	17	36	53	2	---	---	---	---	---	---	---
14	Parkway	8/16/96	9:15 A	---	---	---	---	---	---	---	43	4	36 - 45	0	40	100	4
	North of	8/16/96	9:35 A	45	22	33 - 42	6	40	79	12	44	4	37 - 46	11	40	90	7
	Kennedy Center	8/16/96	4:00 P	41	10	32 - 41	15	36	57	3	---	---	---	---	---	---	---
AVERAGE				42	11	33 - 42	14	37	62	4	43	7	35 - 44	12	39	83	4
				Based on 381 Observations							Based on 314 Observations						

**The Parkway has a posted speed limit of 35 mph

4.8 Commuter Traffic Patterns

The roads through Rock Creek Park present commuters with an attractive alternative to driving on the busy streets of the District of Columbia. Park roads provide a more relaxing, scenic route with fewer potential stopping points than adjacent city streets. During the summer months, the Park also serves as an oasis from the heat of the City.

Rock Creek and Potomac Parkway

The Rock Creek and Potomac Parkway flows with the pulse of the City, south in the mornings and north in the evenings. Directional volumes are reasonably balanced during the middle of the day. Most vehicles on the Parkway are essentially passing through the Park facilities on their way to another final destination. Traffic volumes and parking studies confirm that the Parkway is utilized almost entirely by commuter traffic. The only exceptions are people using the Parkway to access the Thompson Boat House facility, the Kennedy Center, or Rock Creek Park when the Park is their final destination.

Rock Creek Park

It is much more difficult to document the amount and patterns of commuter traffic through the northern portion of the Park. During August of 1996, a special cut-through study was performed to determine the extent at which commuters use the northern Park roads. A license plate survey was conducted to identify travel patterns and a parking lot study was used to ascertain the number of vehicles that stop and use the Park facilities during the commute hours of the average weekday. The results of this study indicate that only 4.5 percent of all vehicles entering this part of the Park during the morning commute hours stop and use the facilities in the Park. During the evening commute the percentage is slightly lower at 3.5 percent. It is likely that this rate drops even lower during the shoulder and winter seasons when the weather is less conducive to outdoor activities. The data clearly indicates that over 95 percent of all traffic that enters the northern portion of the Park during the weekday commute hours passes through the property without stopping.

Commuter travel patterns were estimated by analyzing the license plate survey data in combination with the parking study and the turning movement counts. A summary of this analysis is presented in **TABLE 4-5**. This table shows where vehicles traveling on Beach Drive come from and go to during the A.M. and P.M. commuter periods of the average weekday. Much of the traffic on the side roads in the Park is also related to this north-south progression on Beach Drive, although a significant number of commuters traverse the Park from east to west. Even on weekends, the objective of most drivers in the Park is to get to the other side rather than to stop within. Several major east-west commuter routes were identified as a result of this study. These routes include: Wise/West Beach, Tilden/Park, and Piney Branch/Klingle/Porter.

TABLE 4-5
Commuter Patterns

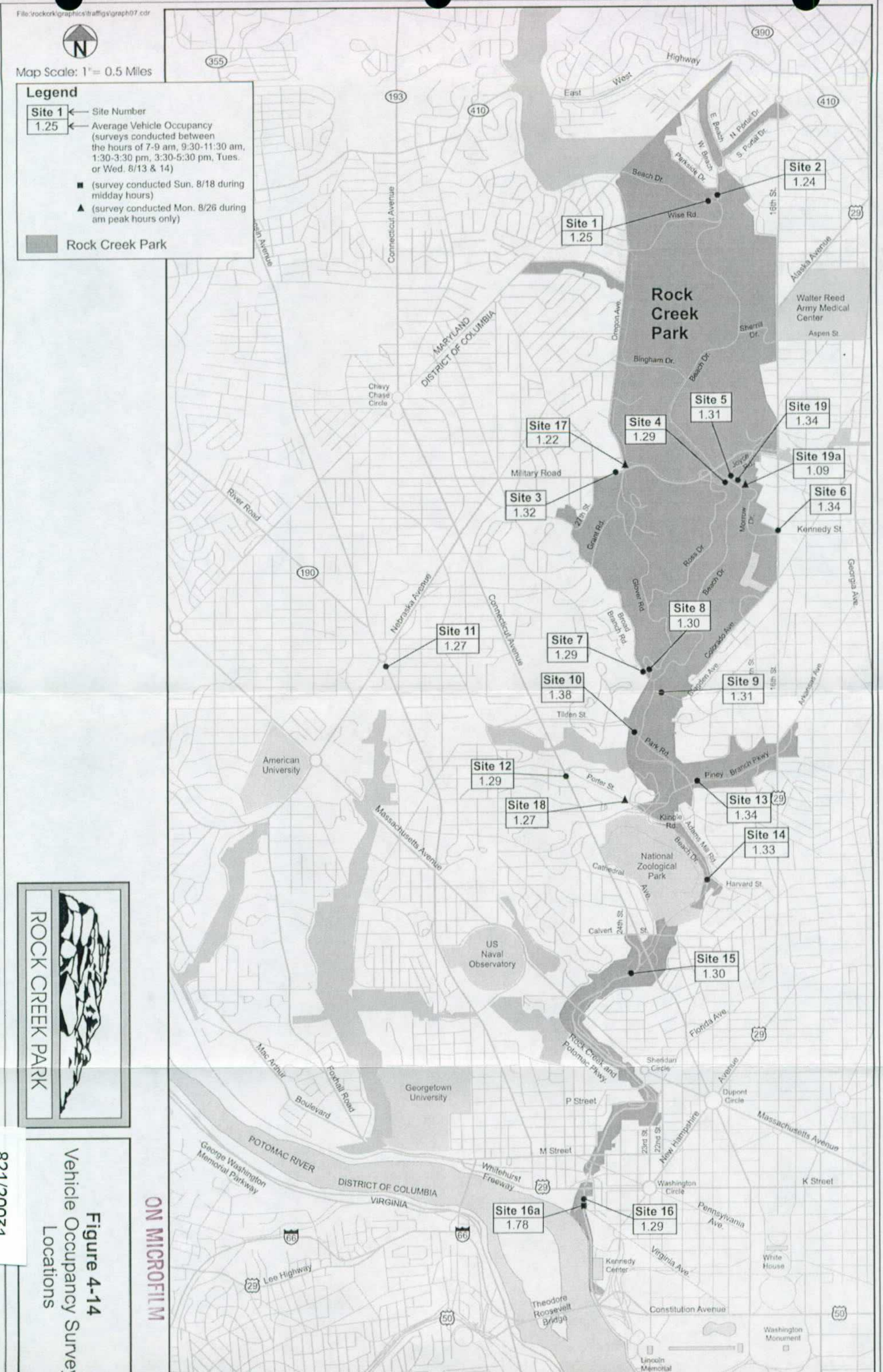
Location	% of Vehicles that Entered the Park at the Location Shown During the AM and Exited onto the Parkway	% of Vehicles that Entered from the Parkway During the PM and Exited the Park at the Location Shown
Beach at Maryland State Line	3%	1%
West Beach Drive	3%	3%
Wise Road	1%	3%
Bingham Drive	*	*
Joyce East of Beach	1%	3%
Joyce West of Beach	1%	*
Glover Road at Military	1%	5%
Grant Road	*	2%
Broad Branch	17%	18%
Blagden Avenue	20%	19%
Park Road	1%	2%
Tilden Street	4%	4%
Piney Branch Parkway	34%	33%
Porter Street	6%	2%
Zoo/Harvard Street	8%	5%

* Less than 1%

4.9 Vehicle Occupancy

A vehicle occupancy study was conducted by the consultant in August of 1996. The study consisted of recording the number of people in each vehicle passing an observation point. The study was conducted on a Monday, Tuesday, and Wednesday during morning, noon, and evening peak commuter hours on several local streets, as well as northern Park roads and the Parkway. A single count was performed on the Parkway on a Sunday during the middle of the day. Over 44,000 vehicles were observed during the four-day count period. The count locations are shown in **FIGURE 4-14**.

The average vehicle occupancy on northern Park roads during weekday commuter periods ranged from a low of 1.09 on Morrow Drive, to a high of 1.38 on Tilden Street. The counts taken on the city streets during weekday commuter hours ranged from 1.22 people per vehicle on Oregon Avenue, to 1.34 on 16th Street NW. The single Sunday count on the Parkway resulted in a vehicle occupancy of 1.78. This is in contrast to an occupancy rate of 1.29 at the same location during weekday commuter hours.



ROCK CREEK PARK

Figure 4-14
Vehicle Occupancy Survey Locations

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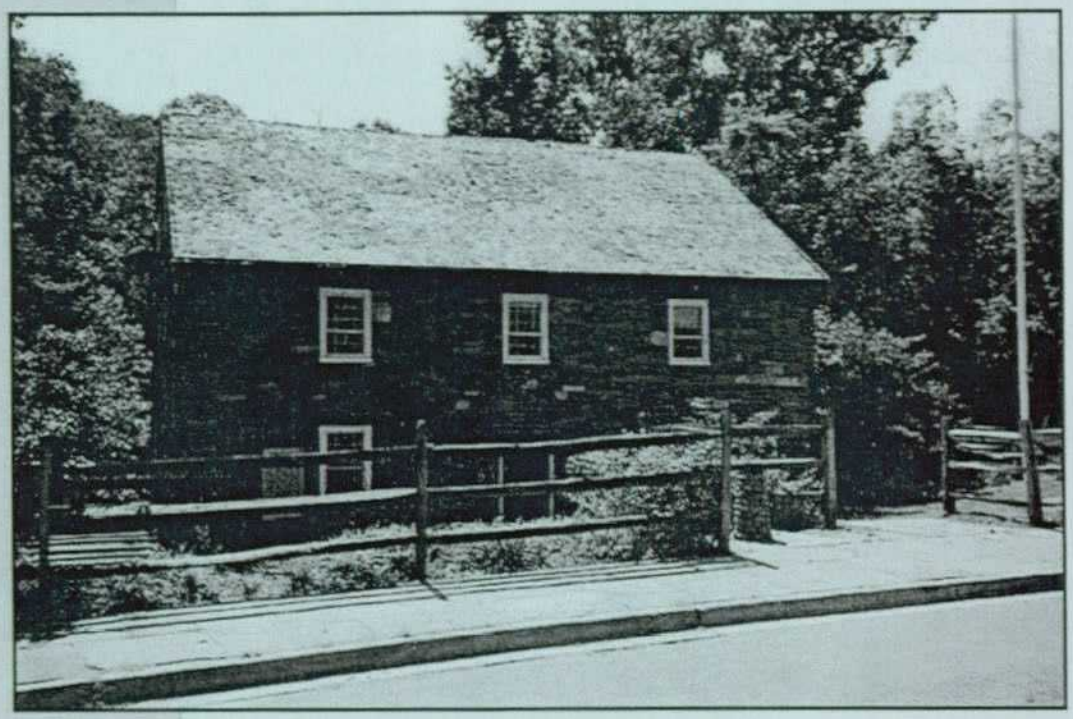
1 of 1

ON MICROFILM

Chapter 5. Parking Analysis



Chapter 5: Parking Analysis

5.1 Parking Lot Locations

Vehicle parking is available at various locations throughout Rock Creek Park. Each of the 30 picnic areas in the Park has paved parking. Most have their own lots, but a few share parking with an adjacent picnic area. Parking for the group picnic sites is generally in the form of larger, off-road lots. Individual picnic areas and other locations along Park roads have pullout areas adjacent to the roadway.

In addition, parking is provided at developed areas within Rock Creek Park, and at the Thompson Boat House near the south end of the Parkway. Developed areas with their own parking lots include the Park Police Substation, the Park Maintenance Yard, the Rock Creek Golf Course, the Horse Center, the Nature Center and Planetarium, Pierce Mill and the Art Barn, and the 16th Street NW and Kennedy Street area. Employee parking is also available at both Park Police Stable locations, although these sites were not included in the Parkwide parking study.

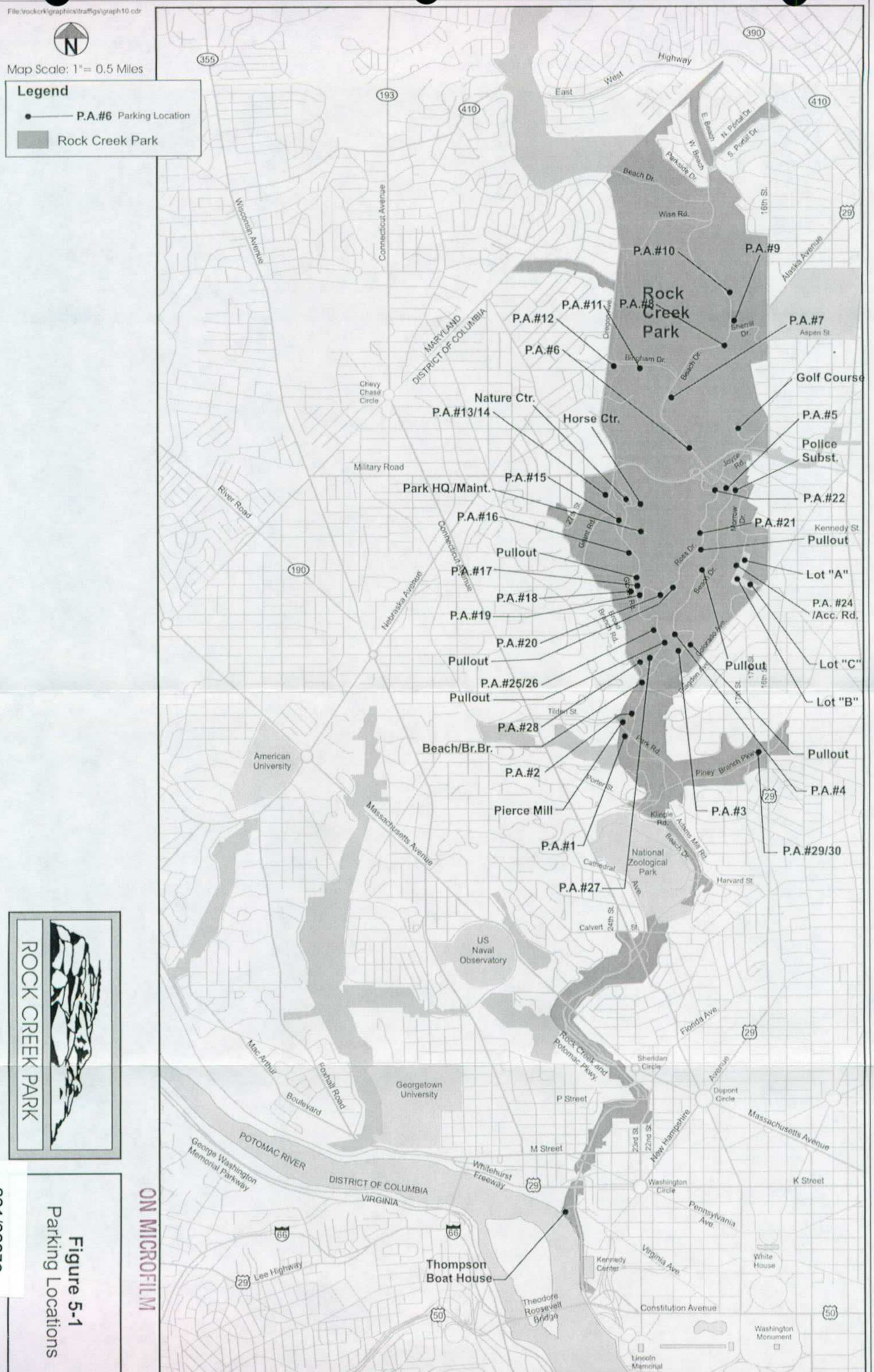
Parking locations within the study area are shown in **FIGURE 5-1**.

5.2 Parking Capacity

Rock Creek Park has a total parking capacity of nearly 1,800 vehicles in the locations shown in **FIGURE 5-1**. As mentioned previously, our study of parking within the Park did not include the Park Police Stable parking lots, nor any parking at the National Zoological Park.

Parking for the group picnic sites, as well as for Picnic Area #2 is provided in off-roadway lots with a separate entry and exit. These lots are paved and curbed, with parking spaces marked with paint. The group parking lots range in size from 28 to 88 spaces. Most individual picnic areas, as well as a few unmarked locations along Park roads, have parking in pullout areas adjacent to the roadway. No pavement markings are provided in these parking pullouts, although they are curbed. Pullout areas in the Park hold between three and 12 cars. Smaller off-roadway, single-access parking lots are provided at Picnic Area #27 and at the intersection of Beach Drive and Broad Branch Avenue.

Developed areas such as the Park Police Substation and the Park Maintenance Yard mainly provide parking for Park employees. These parking lots do receive some visitor use, however, due to their locations. By far the largest parking lots in the Park are located at the 16th Street NW and Kennedy Street area. These lots have a capacity of more than 800 vehicles and are used during events at the Tennis Center and Carter Barron Amphitheater. The 16th Street and Kennedy Street lots are also used for commuter park-and-ride during weekdays, and provide additional satellite bus parking for the National Zoological Park. The Rock Creek Golf Course and the Nature Center and Planetarium have the next largest parking lots in the Park, with space for around 130 vehicles each.



ROCK CREEK PARK

Figure 5-1
Parking Locations

ON MICROFILM

821/20032
1 of 1

The parking lot serving the Horse Center provides parking for about 20 vehicles, but this capacity is easily supplemented with the nearby Nature Center lot. Pierce Mill and the Art Barn/Carriage House share an 11-space parking lot with a single access point on Tilden Street. One of these spaces is reserved for handicapped use. There is sidewalk in place between this lot and the nearby parking lot for Picnic Area #2, and Picnic Area #1 is located directly across the road.

There is little visitor parking available along Rock Creek Parkway. The exception is the Thompson Boat House which has a large paved and curbed parking lot which can be accessed from the Parkway at Virginia Avenue. The Boat House lot has space for about 92 parked vehicles, although individual spaces are not marked with paint. Parking in this lot is restricted to two-hours; two or three spaces are reserved for handicapped use.

TABLE 5-1 contains a summary of the capacity of the parking lots discussed here and shown in **FIGURE 5-1**.

TABLE 5-1
Parking Capacity in the Park

Location	Lot Capacity
Picnic Area #1 (group)	30
Pierce Mill/Art Barn	11
Picnic Area #2	38
Picnic Area #3	5
Pullout N of PA#3	3
Picnic Area #4	10
Pullout between PA#4&5	5
Park Police Substation	29
Picnic Area #5	4
Public Golf Course	133
Picnic Area #6 (group)	88
Picnic Area #7 (group)	70
Picnic Area #8 (group)	32
Picnic Area #9 (group)	28
Picnic Area #10 (group)	30
Picnic Area #11	5
Picnic Area #12	3
Picnic Areas #13/14 (group)	80
Picnic Area #15	5
Park Maintenance Yard	51

Location	Lot Capacity
Horse Center	22
Nature Center & Planetarium	126
Picnic Area #16	5
Pullout N of PA#17	5
Picnic Area #17	5
Picnic Area #18	5
Picnic Area #19	3
Picnic Area #20	6
Pullout N of PA#20	6
Pullout S of PA#21	2
Picnic Area #21	5
Picnic Area #22	6
Tennis Center lot "A"	150
Tennis Center lot "B"	385
Tennis Center lot "C"	298
Picnic Area #24/TC access road	46
Picnic Areas #25/26	12
Pullout between PA#26&27	5
Picnic Area #27	5
Picnic Area #28	7
Lot @ Beach/Broad Branch int.	20
Picnic Areas #29/30	12
Thompson Boat House	92

5.3 Parking Utilization

A parking study was conducted at the locations identified in **FIGURE 5-1** within Rock Creek Park. The first part of the study involved counting the number of vehicles parked in each parking area at regular intervals during the day. This occupancy study was conducted for 12 hours (8:00 a.m. until 8:00 p.m.) on one weekend day (Sunday, August 18, 1996) and one weekday (Monday, August 19, 1996). Counting intervals ranged from one-half hour to one hour, depending on traffic conditions and how full the lots were at various times of the day. As in the visitor use survey, weekend counts were not made at those picnic and pullout areas which were located on closed road segments. It was assumed that there would be no vehicle use of these parking areas while road access is prohibited by motorized vehicles.

The spot checks made at each parking area throughout each day were averaged to determine an average number of vehicles using that site. This number was compared to the capacity of the lot to calculate an average percentage occupancy for each parking area. Average parking occupancies are summarized in **TABLE 5-2** for both weekday and weekend conditions.

TABLE 5-2
Parking Occupancy in Park Lots

Location	Avg Weekday % Occupancy	Avg Weekend % Occupancy
Picnic Area #1 (group)	24%	89%
Pierce Mill/Art Barn	21%	101%
Picnic Area #2	11%	37%
Picnic Area #3	0%	n/a
pullout N of PA#3	8%	n/a
Picnic Area #4	3%	n/a
Pullout between PA#4&5	13%	n/a
Park Police Substation	36%	42%
Picnic Area #5	8%	7%
Public Golf Course	37%	41%
Picnic Area #6 (group)	2%	45%
Picnic Area #7 (group)	2%	26%
Picnic Area #8 (group)	5%	24%
Picnic Area #9 (group)	4%	22%
Picnic Area #10 (group)	6%	21%
Picnic Area #11	13%	n/a
Picnic Area #12	13%	n/a
Picnic Areas #13/14 (group)	4%	23%
Picnic Area #15	5%	19%
Park Maintenance Yard	48%	2%
Horse Center	26%	85%
Nature Center & Planetarium	3%	7%
Picnic Area #16	9%	9%
Pullout N of PA#17	2%	5%
Picnic Area #17	5%	20%
Picnic Area #18	1%	10%
Picnic Area #19	5%	32%
Picnic Area #20	2%	8%

Location	Avg Weekday % Occupancy	Avg Weekend % Occupancy
Pullout N of PA#20	8%	8%
Pullout S of PA#21	8%	17%
Picnic Area #21	8%	10%
Picnic Area #22	10%	59%
Tennis Center lot "A"	13%	21%
Tennis Center lot "B"	1%	10%*
Tennis Center lot "C"	6%	5%*
Picnic Area #24/TC access road	15%	20%
Picnic Areas #25/26	3%	11%
Pullout between PA#26&27	6%	26%
Picnic Area #27	15%	35%
Picnic Area #28	5%	68%
Lot @ Beach/Broad Branch int.	15%	97%
Picnic Areas #29/30	6%	10%*
Thompson Boat House	52%	68%

Note: Occupancy counts were conducted Sunday 8/18/96 & Monday 8/19/96, from 8:00 am-8:00 pm.
* Weekend occupancies for PA #29/30 & Tennis Center lots "B" & "C" are based on partial counts only.

The table shows significantly higher use of most parking areas on the weekend as compared to the weekday studied. This is to be expected, since more people are likely to have the time to recreate in the Park outside of their normal work week. The only lot which was busier during the week was the Park Maintenance Yard. As was mentioned previously, the Park Maintenance Yard lot is used mainly by Park employees, who typically do not work on the weekends. The Nature Center and Planetarium is closed on Mondays, therefore the parking study does not reflect maximum weekday use of this parking lot.

5.4 Parking Duration

The second part of the parking study consisted of a license plate survey conducted at each parking area at regular intervals during the day. Counting intervals ranged from one-half to one hour, depending on traffic conditions and how full the lots were at various times of the day. The license plate study took place on the same days and times as the occupancy study. The study period was from 8:00 a.m. until 8:00 p.m., Sunday, August 18, 1996 and Monday, August 19, 1996. Again, data was not collected at parking areas located in weekend road closure areas.

The state and last three digits of each license plate number were recorded at each spot check in order to estimate an arrival and departure time for individual vehicles. Vehicles observed in a lot at 8:00 a.m. were assumed to have arrived at 7:45 a.m., and those observed at 7:30 p.m. were assumed to have departed at 7:45 p.m. During the day, vehicles were assumed to have arrived or departed

midway between the times of the two adjacent spot checks. The arrival and departure data was used to determine the approximate duration of each individual vehicle's stay at a parking area. Once durations were calculated for each vehicle at one parking area on one study day, these times were averaged to determine an average length of stay. This number is only as accurate as the frequency of spot checks, and is only applicable to the 12-hour study period. For example, the minimum duration studied was 30 minutes; vehicles which arrived at a lot after one check and left before the next check were never included in the study.

Average parking durations are summarized in **TABLE 5-3** for both weekday and weekend conditions.

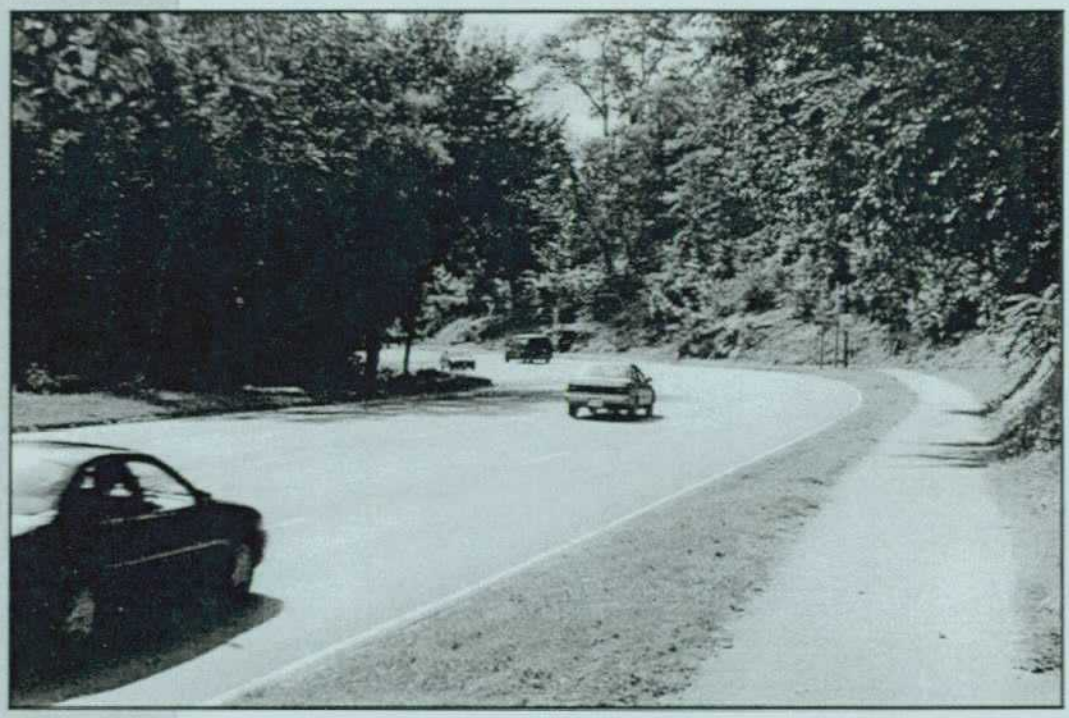
TABLE 5-3
Parking Duration in Park Lots

Location	Avg Weekday Pkg Duration	Avg Weekend Pkg Duration
Picnic Area #1 (group)	1 hr 15 min	2 hrs 30 min
Pierce Mill/Art Barn	45 min	1 hr 30 min
Picnic Area #2	1 hr 30 min	1 hr 30 min
Picnic Area #3	0 min	n/a
pullout N of PA#3	1 hr 30 min	n/a
Picnic Area #4	30 min	n/a
Pullout between PA#4&5	1 hr	n/a
Park Police Substation	5 hrs 0 min	5 hrs 30 min
Picnic Area #5	45 min	45 min
Public Golf Course	3 hrs 0 min	3 hrs 0 min
Picnic Area #6 (group)	45 min	2 hrs 0 min
Picnic Area #7 (group)	45 min	2 hrs 30 min
Picnic Area #8 (group)	1 hr 30 min	2 hrs 45 min
Picnic Area #9 (group)	45 min	2 hrs 15 min
Picnic Area #10 (group)	45 min	2 hrs 0 min
Picnic Area #11	1 hr 30 min	n/a
Picnic Area #12	45 min	n/a
Picnic Areas #13/14 (group)	45 min	2 hrs 0 min
Picnic Area #15	45 min	1 hr 30 min
Park Maintenance Yard	5 hrs 15 min	2 hrs 0 min
Horse Center	2 hrs 15 min	2 hrs 15 min
Nature Center & Planetarium	2 hrs 0 min	1 hr 30 min
Picnic Area #16	1 hr 0 min	1 hr 45 min

Location	Avg Weekday Pkg Duration	Avg Weekend Pkg Duration
Pullout N of PA#17	30 min	1 hr 0 min
Picnic Area #17	45 min	1 hr 15 min
Picnic Area #18	30 min	1 hr 0 min
Picnic Area #19	45 min	1 hr 45 min
Picnic Area #20	30 min	1 hr 30 min
Pullout N of PA#20	45 min	1 hr 0 min
Pullout S of PA#21	30 min	1 hr 0 min
Picnic Area #21	45 min	1 hr 0 min
Picnic Area #22	1 hr 0 min	1 hr 30 min
Tennis Center lot "A"	1 hr 45 min	1 hr 30 min
Tennis Center lot "B"	1 hr 30 min	not available
Tennis Center lot "C"	5 hrs 30 min	not available
Picnic Area #24/TC access road	1 hr 30 min	1 hr 15 min
Picnic Areas #25/26	45 min	1 hr 0 min
Pullout between PA#26&27	45 min	1 hr 15 min
Picnic Area #27	45 min	1 hr 15 min
Picnic Area #28	1 hr 15 min	1 hr 15 min
Lot @ Beach/Broad Branch int.	1 hr 15 min	1 hr 15 min
Picnic Areas #29/30	1 hr 15 min	no data
Thompson Boat House	2 hrs 45 min	2 hrs 0 min

Note: License plate surveys were conducted Sunday 8/18/96 & Monday 8/19/96, from 8:00 am-8:00 pm.
* Weekend occupancies for Tennis Center lots "B" & "C" are based on partial counts only.

Chapter 6. Traffic Safety Evaluation



Chapter 6: Traffic Safety Evaluation

6.1 General

An analysis of recent motor vehicle accidents on the Rock Creek Park road system was performed to identify trends and patterns that may be indicative of traffic safety problems. The accident analysis required a detailed review of all reported motor vehicle accidents that occurred on Park roads during a three-year period beginning January 1, 1993, and ending on December 31, 1995.

6.2 Accident Analysis Methodology

Accident records were obtained from STARS for the period January 1, 1993 through December 31, 1995. STARS information was obtained from three separate National Park databases: Rock Creek Park (Park #3450, Park Code "ROCR"), National Capitol Parks - Central Area (Park #3400, Park Code "NACC"), and John F. Kennedy Center (Park #3600, Park Code "JOFK"). Portions of all three databases were required to include all reported accidents occurring within the Rock Creek Park study area. A total of 1,175 accidents were reported within Rock Creek Park during the three-year study period.

The records were initially sorted by accident location into two distinct categories for analysis: Rock Creek and Potomac Parkway, and all other Park roads (the northern portion of the Park). Accidents occurring on Beach Drive were subsequently sorted from the northern Park database for separate analysis. The information provided in STARS was used to map accident locations, as well as to analyze various accident characteristics. The analysis of accidents in each area allows for the identification of patterns and trends which may indicate traffic safety problems within the Park. The Parkway, northern Park, and Beach Drive accident summaries compose the remainder of this chapter. A more detailed accident analysis is contained in a separate Traffic Safety report.

Through examination of the accident data and discussions with Park personnel, 11 specific sites within the study area were identified for more detailed analysis. These sites are listed below:

- Intersection of Beach Drive and West Beach Drive
- Wise Road Curve and intersection of Wise Road and Oregon Avenue/Chestnut Street
- Intersection of Beach Drive and Broad Branch Road
- Intersection of Beach Drive and Blagden Avenue
- Intersection of Beach Drive and Park Road/Tilden Street
- Bluff Bridge Curve (segment of Beach Drive)
- Intersection of Beach Drive and Piney Branch Parkway
- Intersection of Beach Drive and Klingle Road
- Intersections of Beach Drive and Cathedral Avenue with Rock Creek and Potomac Parkway
- Intersection of Rock Creek and Potomac Parkway with P Street
- Intersection of Rock Creek and Potomac Parkway with Virginia Avenue

Discussions of these sites, including analyses of their accident characteristics are contained in a

separate Traffic Safety report.

From a historical perspective, it is interesting to note that many of these same locations were identified as high accident areas in the 1988 Engineering Study for Rock Creek Park prepared by FHWA. That study examined accident data for years 1980 through 1984 and identified the following nine sections of roadway as high accident areas:

- Rock Creek and Potomac Parkway at K Street and Virginia Avenue
- Rock Creek and Potomac Parkway at P Street
- Rock Creek and Potomac Parkway at South Waterside Drive
- Rock Creek and Potomac Parkway at Beach Drive
- Beach Drive from Klingle Road to Park Road
- Beach Drive at Park Road
- Beach Drive south of Boulder Bridge
- Beach Drive near Alvin's Rock
- Beach Drive at West Beach Drive

6.3 Rock Creek and Potomac Parkway

6.3.1 Accident Summary

Accident Severity

A total of 657 accidents were reported on the Rock Creek and Potomac Parkway between Calvert Street and Ohio Drive during the three-year study period, January, 1993 through December, 1995. Two of the accidents resulted in fatalities, and 155 caused injuries. Fatality and injury accidents accounted for nearly 24 percent of all reported accidents on the Parkway. Accident severity statistics are summarized by year in **TABLE 6-1**.

TABLE 6-1
Parkway Severity Summary

	1993	1994	1995	Totals
Fatal Accidents	2	0	0	**2**
(# of fatalities)	2	0	0	**2**
(# of people injured)	0	0	0	**0**
Injury Accidents	49	60	46	**155**
(# of people injured)	88	91	81	**260**
P.D.O. Accidents	155	159	186	**500**
Totals	**206**	**219**	**232**	**657**

A review of the two fatal accidents occurring on the Parkway showed the following characteristics:

- the first occurred southbound on the Parkway near K Street, the other on the Parkway near Virginia;

- both occurred mid-week, late in the evening;
- the first occurred in September and the other in October, both in rainy weather on wet roads;
- both were collisions with pedestrians, and in both instances the fatality was a pedestrian;
- both accidents occurred at night, in lighted areas; and
- contributing factors for both: pedestrian illegally on the roadway, and clothing not visible.

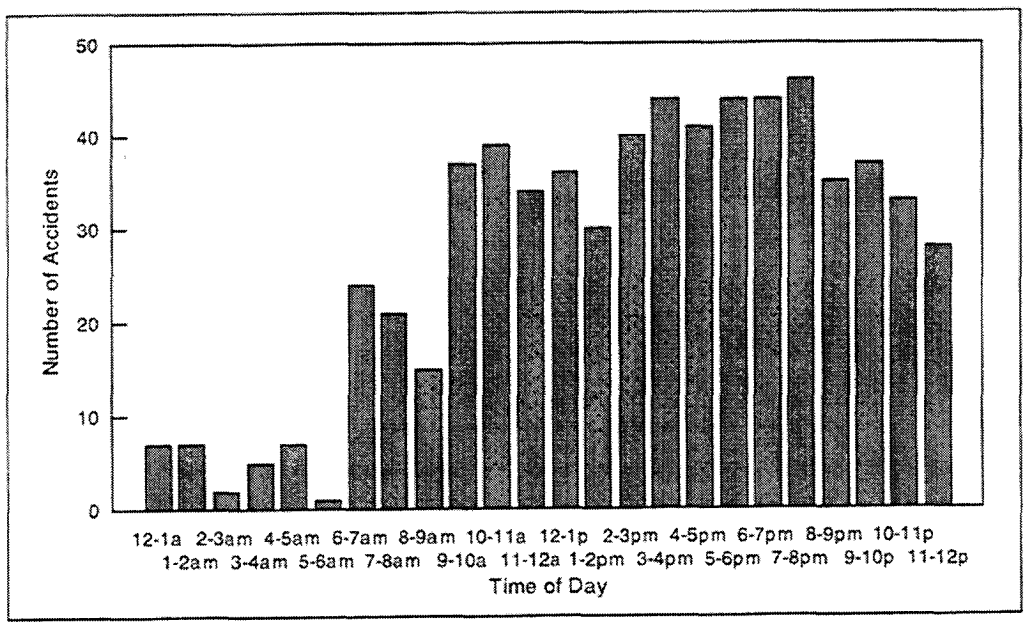
Accident Locations

FIGURE 6-1 shows the locations of all accidents included in the STARS database which occurred on the Parkway during the study period. The severity of each accident is also identified on the map.

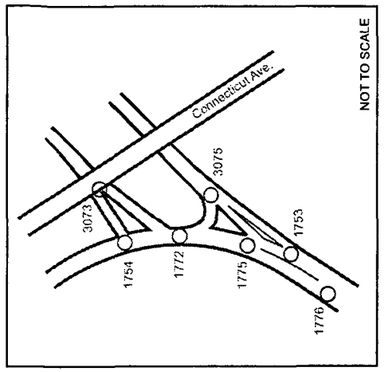
Variations by Time of Occurrence

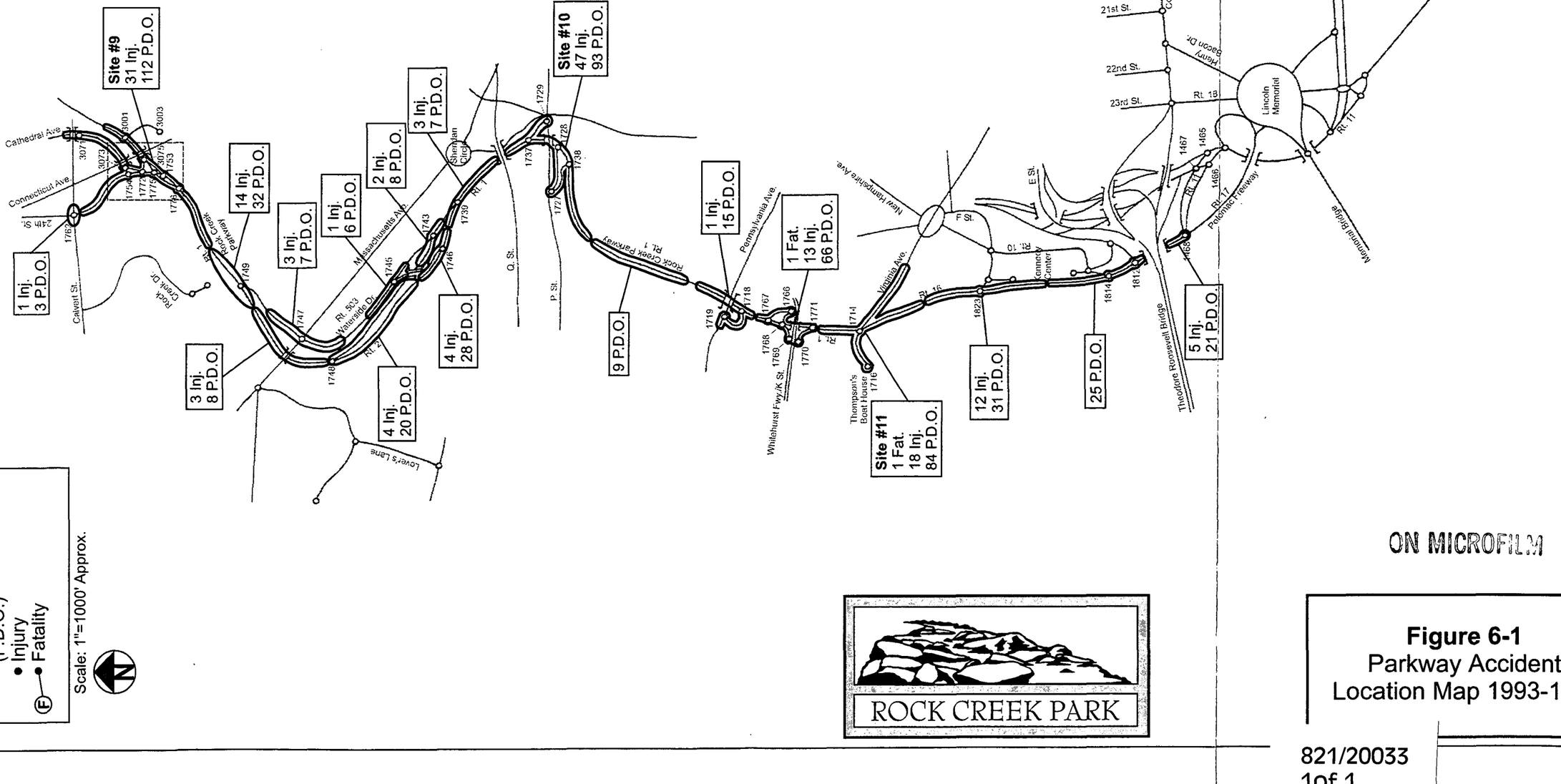
A review was made of the time of day that Parkway accidents occurred. The hourly distribution of accident data is shown in **FIGURE 6-2.**

FIGURE 6-2
Hourly Distribution of Parkway Accidents



Parkway accidents were also reviewed for the day of occurrence during the week. **FIGURE 6-3** shows the daily distribution of accidents.





Legend
- ○ Property Damage Only (P.D.O.)
- ● Injury
- Ⓕ Fatality

Scale: 1"=1000' Approx.

File:\rockcrk\graphics\traffigs\graph04.cdr

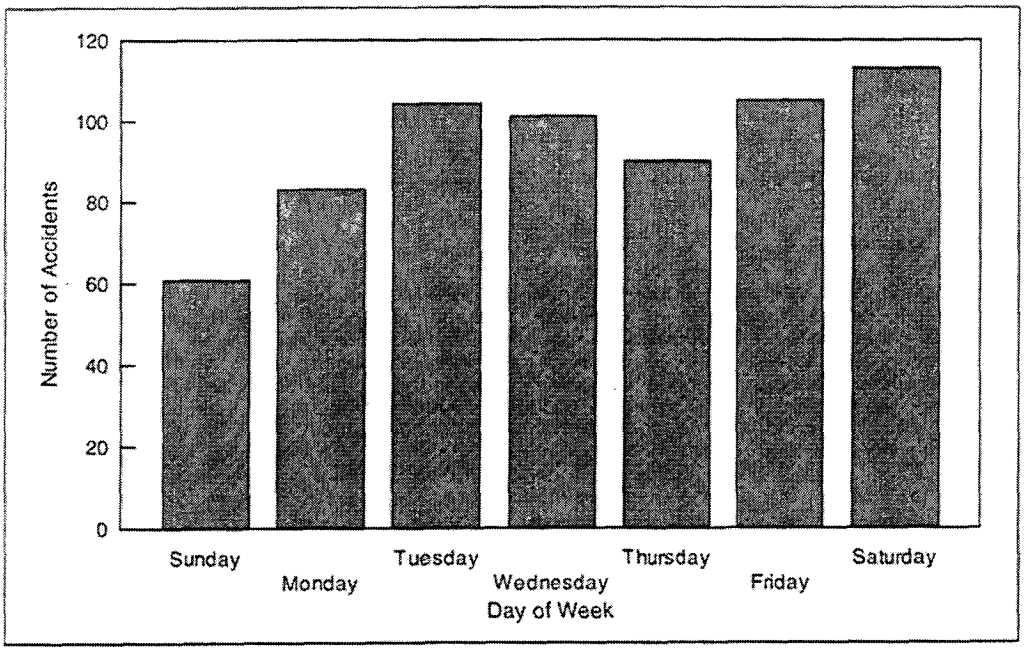
ROCK CREEK PARK

ON MICROFILM

Figure 6-1
Parkway Accident
Location Map 1993-1995

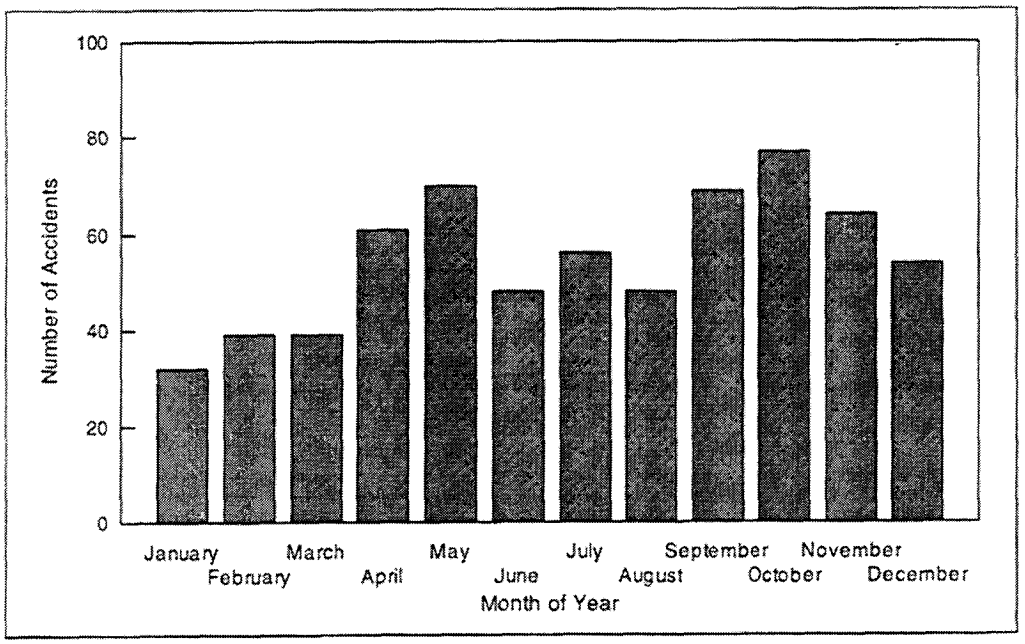
821/20033
1of 1

FIGURE 6-3
Daily Distribution of Parkway Accidents



Seasonal variations were analyzed by reviewing the month in which each reported accident occurred. The monthly distribution of accidents on the Parkway is shown in **FIGURE 6-4**

FIGURE 6-4
Monthly Distribution of Parkway Accidents



6.3.2 Primary Accident Characteristics

Accident information from the STARS databases was compiled to determine the primary characteristics of accidents occurring on the Parkway during the three year study period.

Accident Class

The database showed the following breakdown in type of accident:

•	Non-collision	25 accidents (3.8%)
•	Collision with other motor vehicle	518 accidents (78.8%)
•	Collision with fixed object	93 accidents (14.2%)
•	Collision with pedestrian	6 accidents (0.9%)
•	Collision with bicycle	4 accidents (0.6%)
•	Collision with animal	1 accident (0.2%)
•	Collision with other object	8 accidents (1.2%)
•	Collision - unknown	2 accidents (0.3%)

Of the accidents involving collisions with another motor vehicle, rear-end collisions (43%) were most commonly reported. Angle accidents between vehicles accounted for 15 percent of collisions, followed by head-on collisions (7%), sideswipe collisions between overtaking vehicles (6%), and sideswipe collisions between opposing vehicles (5%).

Of the 93 accidents involving collisions with fixed objects, the objects most frequently struck were the following:

•	Pole, Sign	32 accidents (34.4%)
•	Tree/Shrub	28 accidents (31.2%)
•	Guardrail/Barrier	7 accidents (7.5%)
•	Rock/Stone Wall, Boulder	7 accidents (7.5%)
•	Bridge Structure	5 accidents (5.4%)
•	Ditch, Backslope	4 accidents (4.3%)
•	Barricade	1 accident (1.1%)

Accident Location

A total of 188 (29%) Parkway accidents occurred on the roadway at an intersection, parking/driveway access, or interchange. Only six percent of all accidents occurred at an off-roadway location.

Pedestrian and Bicyclist Accidents

There were 11 accidents involving pedestrians or bicyclists reported on the Parkway. Six of these were classified as collisions with pedestrians, four were classified as collisions with bicycles, and one listed a pedestrian/cyclist contributing factor. Two of the 11 accidents were fatalities, both of

which killed a pedestrian; six resulted in injuries, three of which injured a pedestrian or bicyclist. Seven of the pedestrian/bicyclist accidents occurred mid-week (Tuesday through Thursday). Five accidents involving pedestrians or bicyclists occurred during low-light conditions. Contributing factors included: "pedestrian/cyclist illegally in roadway" (six accidents), "pedestrian/cyclist disregarded traffic control" (three accidents), and "pedestrian/cyclist clothing not visible" (two accidents).

6.3.3 Accident Rates

The accident rate compares the number of accidents that occur on a road during a period of time with the number of vehicle-miles that are traveled on the road over the same time period. The accident rate for a road segment is described in terms of accidents per million vehicle-miles traveled (ACC/MVMT). Corresponding accident rates can also be determined for fatality and injury accidents on a road segment. These are generally presented in terms of accidents per hundred-million vehicle-miles traveled (ACC/100MVMT) since they are of significantly smaller magnitude.

Accident rates were calculated for the Parkway between Calvert Street and Ohio Drive. The three-year accident rate is based on the number of accidents and estimated traffic volumes for the period 1993-1995. The 1993-1995 accident rates for Rock Creek and Potomac Parkway are listed below:

Fatality Accident Rate	1.6 ACC/100MVMT
Injury Accident Rate	127.4 ACC/100MVMT
Total Accident Rate	5.40 ACC/MVMT

6.4 All Other Park Roads

6.4.1 Accident Summary

Accident Severity

A total of 518 accidents were reported on the road system within the northern portion of Rock Creek Park during the three-year study period, 1993-1995. Two of the accidents resulted in fatalities, and 120 involved injuries. Together, fatality and injury accidents accounted for nearly 24 percent of all reported accidents in the northern portion of the Park. The accident severity statistics are summarized by year in **TABLE 6-2**. The data in the table has been separated into three levels of severity: fatal accidents, accidents resulting in injury, and those resulting in property damage only (P.D.O.).

TABLE 6-2
Northern Park Severity Summary

	1993	1994	1995	Totals
Fatal Accidents	0	1	1	**2**
(# of fatalities)	0	1	1	**2**
(# of people injured)	0	0	4	**4**
Injury Accidents	41	43	36	**120**
(# of people injured)	57	64	62	**183**
P.D.O. Accidents	150	119	127	**396**
Totals	**191**	**163**	**164**	**518**

A review of the two northern Park fatality accidents indicated the following characteristics:

- the first occurred on Morrow Drive south of Joyce, the other on Beach Drive near Blagden;
- both occurred mid-week, late in the evening;
- the first occurred in March in clear weather on dry roads, the other in November on wet roads in sleet, hail or freezing rain;
- both were fixed object collisions, occurring in the dark and involving a single vehicle;
- driving too fast for conditions was a contributing factor in the second accident.

Accident Locations

FIGURE 6-5 shows the locations of all accidents included in the STARS database which occurred within the northern portion of the Park during the study period. The severity of each accident is also identified on the map.

Accident records are coded by route number, allowing a sort to determine the routes within the northern portion of the Park where the majority of accidents occurred. Beach Drive, the major north-south road through the northern portion of the Park was the site of the majority of the northern Park accidents. The number of accidents by route is summarized below.

- Beach Drive (Route 10) - 294 accidents (nearly 57% of total)
- Piney Branch Parkway (Route 24) - 43 accidents (8%)
- Glover Road (Route 19) - 31 accidents (6%)
- Wise Road (Route 12) - 24 accidents (5%)
- Stage Road (Route 18) - 22 accidents (4%)
- Park Road/Tilden Street (Route 23) - 20 accidents (4%)
- Blagden Avenue (Route 22) - 17 accidents (3%)
- Morrow Drive (Route 17) - 15 accidents (3%)
- Sherrill Drive (Route 13) - 11 accidents (2%)

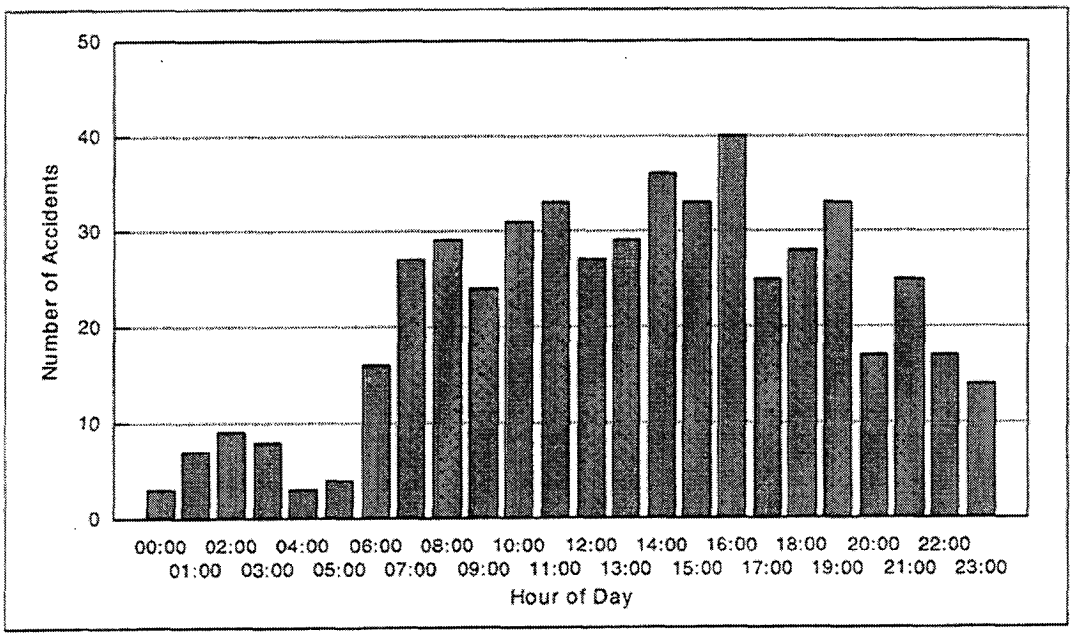
Additional characteristics of accidents occurring on Beach Drive are summarized later in this chapter.

Figure 6-5
Northern Park Accident Location Map 1993-1995

Variations by Time of Occurrence

A review was made of the time of day that accidents occurred in the northern portion of the Park. The hourly distribution of accident data is shown in **FIGURE 6-6**.

FIGURE 6-6
Hourly Distribution of Northern Park Accidents



The hour of the day during which the most accidents occurred was 4:00 to 5:00 p.m. Forty of the 518 northern Park accidents (7.7%) took place during this hour. The percentages of accidents occurring at various time frames throughout the day are as follows: midnight to 6:00 a.m. (6.6%), 6:00 to 10:00 a.m. (18.5%), 10:00 a.m. to 3:00 p.m. (30.1%), 3:00 to 7:00 p.m. (24.3%), and 7:00 p.m. to midnight (20.5%).

The day of the week that accidents occurred was also reviewed. **FIGURE 6-7** shows the daily distribution of northern Park accidents.

As shown on the graph, the highest percentage of accidents (17.4%) occurred on Fridays. Weekday northern Park accidents account for 72.6 percent, while 27.4 percent of the accidents took place on weekends.

Northern Park seasonal variations were analyzed by reviewing the month in which each reported accident occurred. The monthly distribution of accidents is shown in **FIGURE 6-8**.

FIGURE 6-7
Daily Distribution of Northern Park Accidents

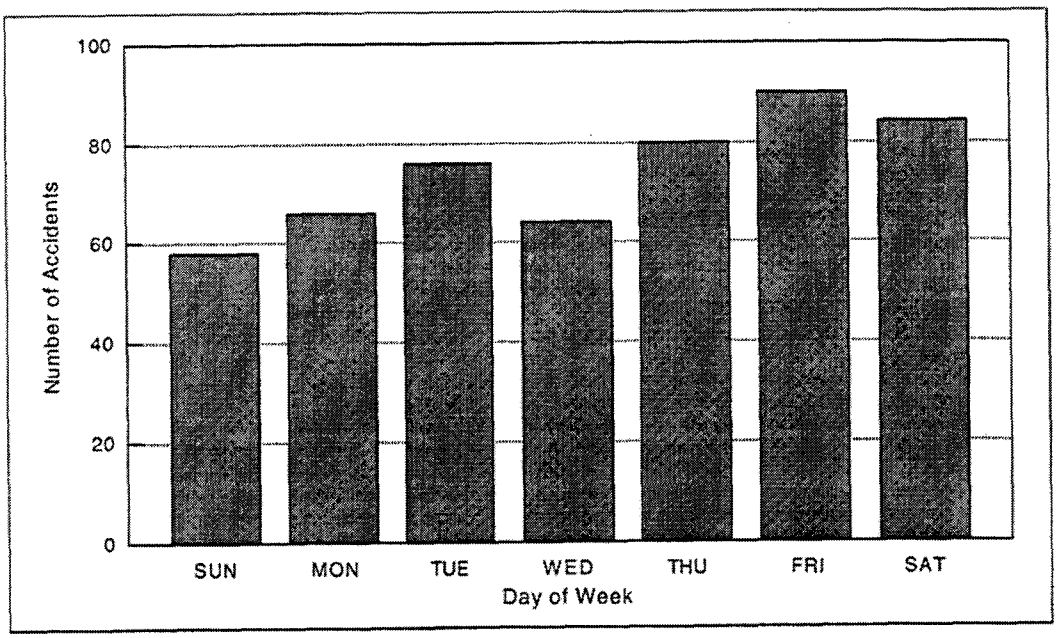
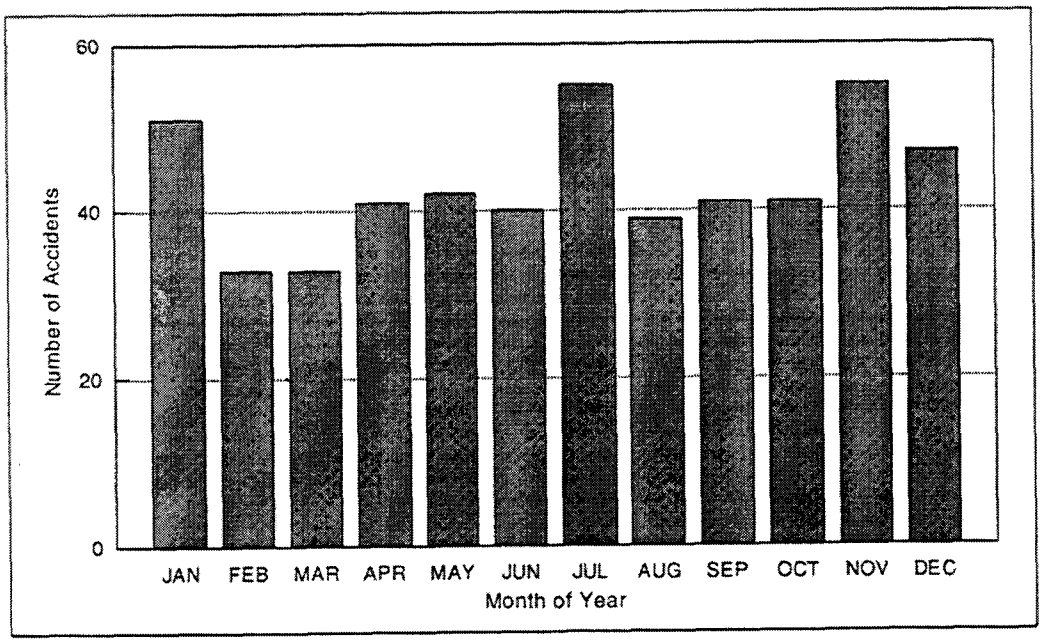


FIGURE 6-8
Monthly Distribution of Northern Park Accidents



January (51 accidents), July (55 accidents), and November (55 accidents) have noticeably higher accident frequencies than the other months of the year. Approximately 40 accidents took place during each of the other months. January is traditionally a bad weather month in the Washington area, and July sees high visitor use. There is no clear explanation for the high frequency of accidents in November.

6.4.2 Primary Accident Characteristics

Accident information was compiled from the STARS database in order to identify the primary characteristics of accidents occurring within the northern portion of the Park during the three-year study period. In addition to severity, location and time of occurrence, important characteristics include: number of vehicles involved, collision type, accident class, fixed object struck, location in relation to the road, road character, roadway surface condition, light and weather conditions, and contributing factors.

Vehicle Involvement

Two-vehicle accidents were most prevalent in the northern portion of the Park during the study period, accounting for 310 (60%) of the reported accidents. Single-vehicle accidents accounted for 183 (35%) of the total, while more than two vehicles were involved in only 25 (5%) accidents during the study period.

Of the accidents involving more than one vehicle, angle collisions (36%) were the most common collision reported. Rear-end collisions (24%) were closely followed by sideswipe collisions between opposing vehicles (21%); head-on accidents accounted for 16 percent of vehicle collisions.

Accident Class

The database showed the following breakdown by type of accident:

• Non-collision	18 accidents (3.5%)
• Collision with other motor vehicle	320 accidents (61.8%)
• Collision with fixed object	134 accidents (25.9%)
• Collision with pedestrian	5 accidents (1.0%)
• Collision with bicycle	12 accidents (2.3%)
• Collision with parked vehicle	7 accidents (1.4%)
• Collision with animal	5 accidents (1.0%)
• Collision with other object	11 accidents (2.1%)
• Collision - unknown	6 accidents (1.2%)

Of the 134 accidents involving collisions with fixed objects, the objects most frequently struck are:

• Tree/Shrub	55 accidents (41.0%)
• Guardrail/Barrier	22 accidents (16.4%)
• Pole, Sign	20 accidents (14.9%)
• Rock/Stone Wall, Boulder	17 accidents (12.7%)
• Ditch, Backslope	13 accidents (9.7%)
• Drainage Structure	5 accidents (3.7%)
• Bridge Structure	2 accidents (1.5%)

Accident Location

A total of 161 (31%) of the northern Park accidents occurred on the roadway at an intersection, parking/driveway access, or interchange. The accidents which occurred off of the roadway, on a roadside or median, or in a parking area accounted for 19 percent.

Pedestrian and Bicyclist Accidents

There were 17 accidents involving pedestrians or bicyclists reported within the northern portion of the Park. Five of these were classified as collisions with pedestrians, while 12 were classified as collisions with bicycles. Of the 17 accidents, 11 resulted in injuries, four of which injured a pedestrian or bicyclist. All but one of the 17 accidents involved two or more vehicles. Ten of the pedestrian/bicyclist accidents occurred on a Saturday or Sunday. Only two accidents involving a pedestrian or bicyclist occurred during low-light conditions. Common factors contributing to these accidents included: "driver failed to yield right of way" (five accidents), and "driver disregarded traffic signs, signals, or road markings" (three accidents).

6.5 Beach Drive

6.5.1 Accident Summary

Accident Severity

Of the 518 accidents occurring in the northern portion of the Park, a total of 294 accidents were reported on Beach Drive between the Maryland State Line and Rock Creek and Potomac Parkway during the study period. One of these accidents caused a fatality, and 75 resulted in injuries. Fatality and injury accidents accounted for almost 26 percent of all reported accidents on Beach Drive. Severity statistics for these accidents are summarized by year in **TABLE 6-3**.

TABLE 6-3
Beach Drive Severity Summary

	1993	1994	1995	Totals
Fatal Accidents	0	0	1	1
(# of fatalities)	0	0	1	1
(# of people injured)	0	0	4	4
Injury Accidents	22	27	26	75
(# of people injured)	32	41	42	115
P.D.O. Accidents	77	67	74	218
Totals	**99**	**94**	**101**	**294**

A review of the one fatality accident which occurred on Beach Drive showed the following characteristics:

- the accident occurred on Beach Drive near Blagden Avenue;
- it occurred around 8:30 p.m. on a Tuesday;
- it occurred in November, in sleet/hail/freezing rain, on a wet road surface;
- it was classified as a collisions with a fixed object, and the object struck was a tree or shrub;
- the accident occurred in the dark, in an unlighted area;
- the main contributing factor listed for the accident was driving "too fast for conditions".

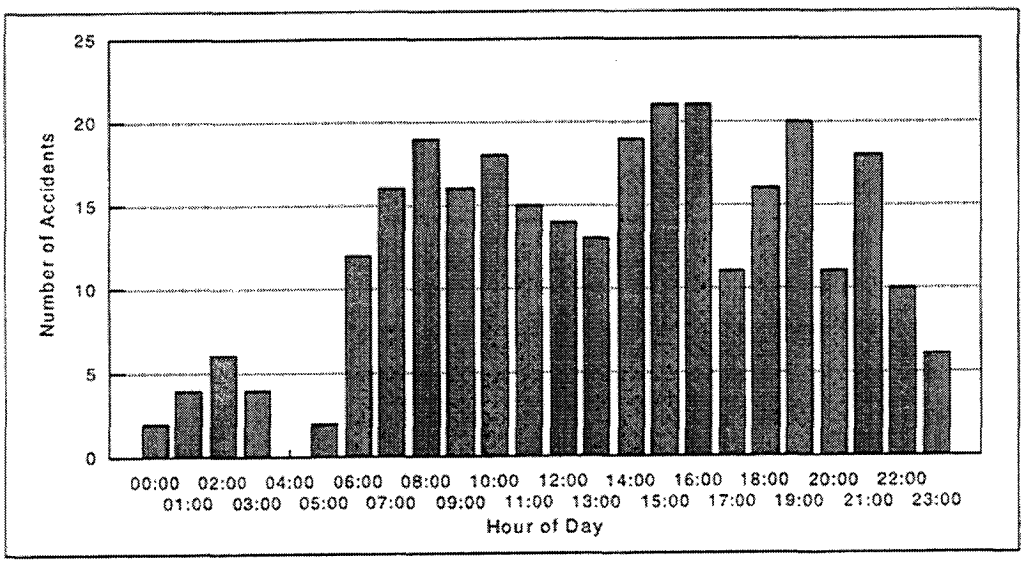
Accident Locations

The locations and severity of accidents in the STARS database which occurred on Beach Drive during the study period are included in **FIGURE 6-5**.

Variations by Time of Occurrence

Beach Drive accidents were reviewed to determine what time of day they occurred. The hourly distribution of accident data is shown in **FIGURE 6-9.**

FIGURE 6-9
Hourly Distribution of Beach Drive Accidents



42 accidents occurred between 3:00 and 5:00 p.m., accounting for 14.3 percent of all accidents on Beach Drive.

The day of the week when accidents occurred on Beach Drive was also reviewed. **FIGURE 6-10** shows the daily distribution of accidents.

Seasonal variations were analyzed by reviewing the month in which each reported accident occurred. The monthly distribution of accidents on Beach Drive is shown in **FIGURE 6-11**.

FIGURE 6-10
Daily Distribution of Beach Drive Accidents

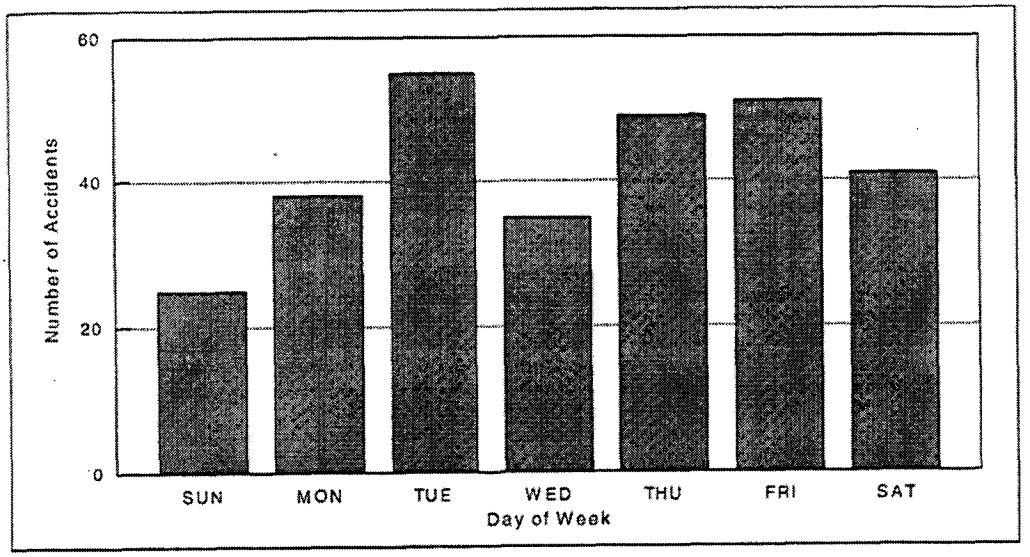
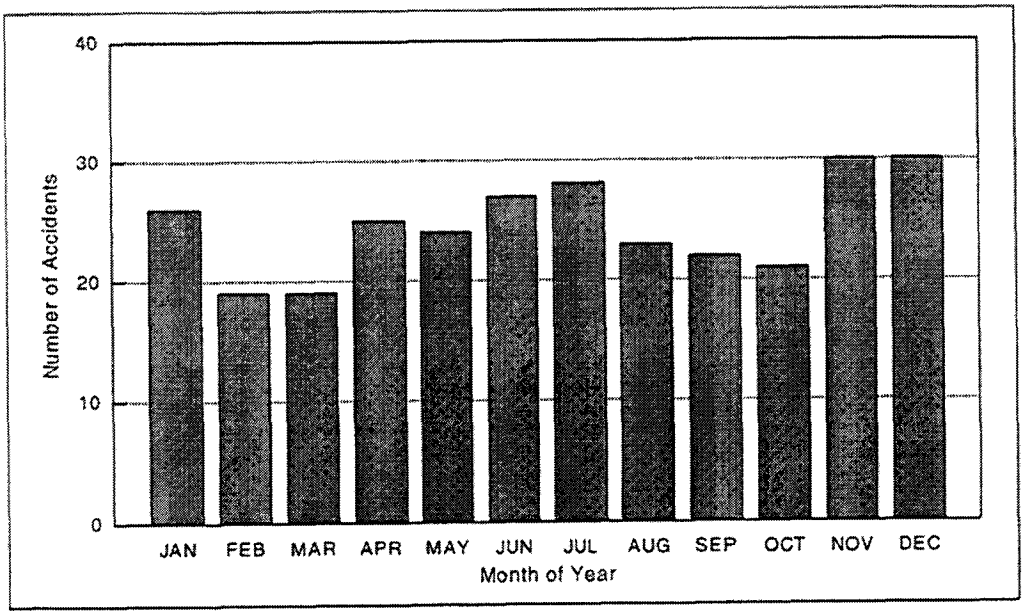


FIGURE 6-11
Monthly Distribution of Beach Drive Accidents



More accidents occurred during the winter months of November, December and January than during the other months of the year. June and July also had relatively high accident rates.

6.5.2 Primary Accident Characteristics

Accident information from the STARS database was compiled to determine the primary characteristics of accidents occurring on Beach Drive within the northern portion of the Park during

the 1993-95 study period.

Vehicle Involvement

Two-vehicle accidents occurred most often on Beach Drive during the study period, accounting for 199 (68%) of the 294 reported accidents. Single-vehicle accidents accounted for 85 (29%) of the total, while only ten (3%) of the accidents during the study period involved more than two vehicles.

Of the accidents involving more than one vehicle, angle collisions (36%) were the most common collision reported. Sideswipe collisions between opposing vehicles (24%) were followed by rear-end collisions (19%) and head-on collisions (18%); while sideswipe accidents between vehicles accounted for only two percent of vehicle collisions.

Accident Class

The database showed the following breakdown by type of accident:

•	Non-collision	8 accidents (2.7%)
•	Collision with other motor vehicle	200 accidents (68.0%)
•	Collision with fixed object	58 accidents (19.7%)
•	Collision with pedestrian	4 accidents (1.4%)
•	Collision with bicycle	9 accidents (3.1%)
•	Collision with parked motor vehicle	1 accident (0.3%)
•	Collision with animal	2 accidents (0.7%)
•	Collision with other object	8 accidents (2.7%)
•	Collision - unknown	4 accidents (1.4%)

Of the 58 accidents involving collisions with fixed objects, the objects most frequently struck were the following:

•	Tree/Shrub	22 accidents (37.9%)
•	Rock/Stone Wall, Boulder	12 accidents (20.7%)
•	Pole, Sign	7 accidents (12.1%)
•	Guardrail/Barrier	7 accidents (12.1%)
•	Ditch, Backslope	5 accidents (8.6%)
•	Drainage Structure	3 accidents (5.2%)
•	Bridge Structure	1 accident (1.7%)

Accident Location

A total of 110 (37%) Beach Drive accidents occurred on the roadway at an intersection, parking/driveway access, or interchange. 40 accidents (14%) occurred at an off-roadway location.

Pedestrian and Bicyclist Accidents

There were 13 accidents involving pedestrians or bicyclists reported on Beach Drive. Four of these were classified as collisions with pedestrians, and nine were classified as collisions with bicycles. Eight of the 13 accidents resulted in injuries, three of which injured a pedestrian or bicyclist. Eleven of these pedestrian/bicyclist accidents occurred on a Monday. Only one accident involving a pedestrian or bicyclist occurred during low-light conditions. The most common contributing factor was "driver failed to yield right of way" (five accidents); one of the pedestrian collisions listed "animal contributing" as a factor.

6.5.3 Accident Rates

The accident rate compares the number of accidents that occur on a road during a period of time with the number of vehicle-miles that are traveled on the road over the same time period. The accident rate for a road segment is described in terms of accidents per million vehicle-miles traveled (ACC/MVMT). Corresponding accident rates can also be determined for fatality and injury accidents on a road segment. These are generally presented in terms of accidents per hundred-million vehicle-miles traveled (ACC/100MVMT) since they are of significantly smaller magnitude.

Accident rates were calculated for Beach Drive between the Maryland State Line and its intersection with Rock Creek and Potomac Parkway south of the National Zoo. The three-year accident rate is based on the number of accidents and estimated traffic volumes for the period 1993-1995. The 1993-1995 accident rates for Beach Drive are listed below:

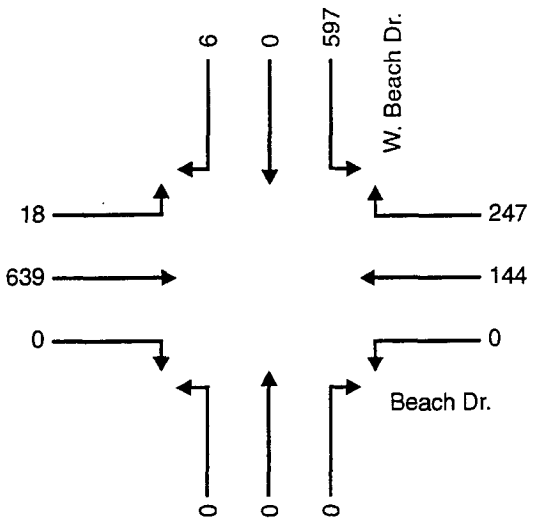
Fatality Accident Rate	1.3 ACC/100MVMT
Injury Accident Rate	98.7 ACC/100MVMT
Total Accident Rate	3.87 ACC/MVMT

Appendix

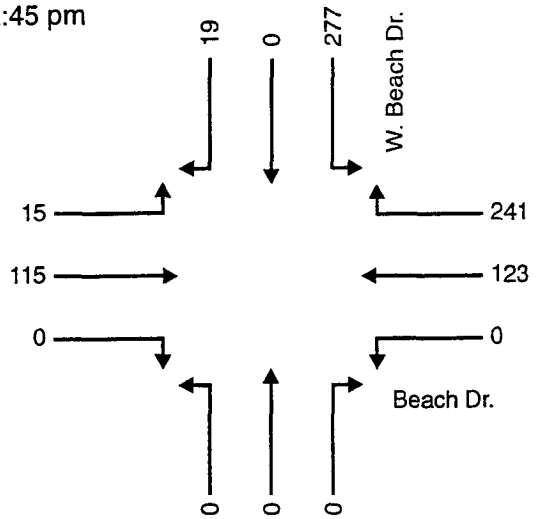
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Beach Drive & West Beach Drive Date: Wed. 12/4/96 & Thurs. 12/5/96

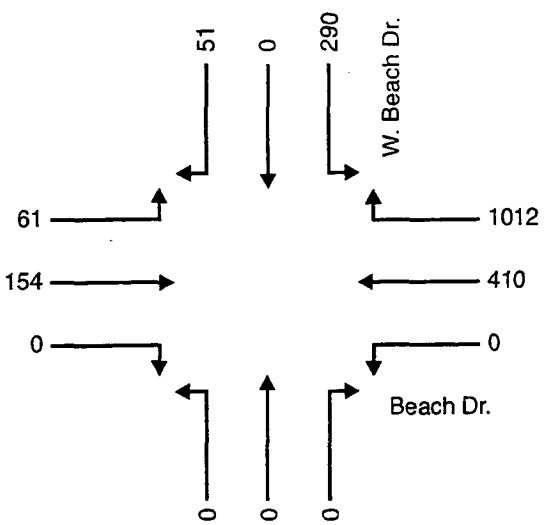
AM Peak: 7:45-8:45 am



Noon Peak: 11:45 am-12:45 pm



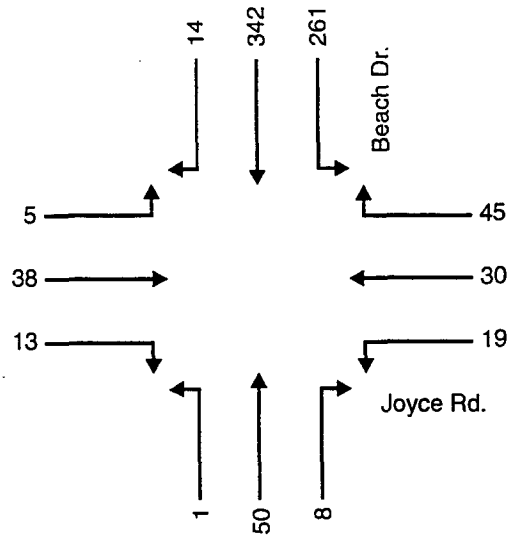
PM Peak: 4:45-5:45 pm



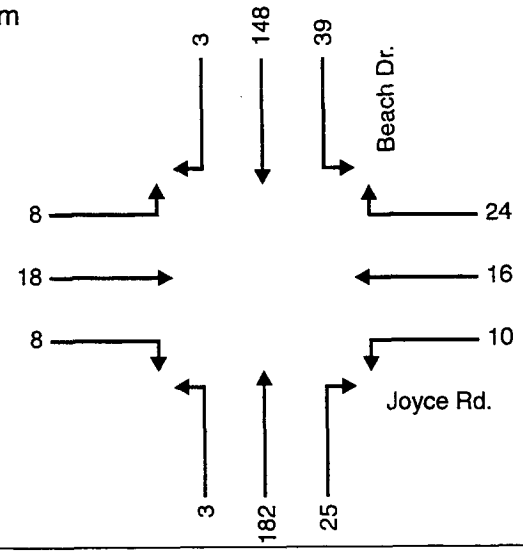
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Beach Drive & Joyce Road Date: Wed. 12/4/96 & Thurs. 12/5/96

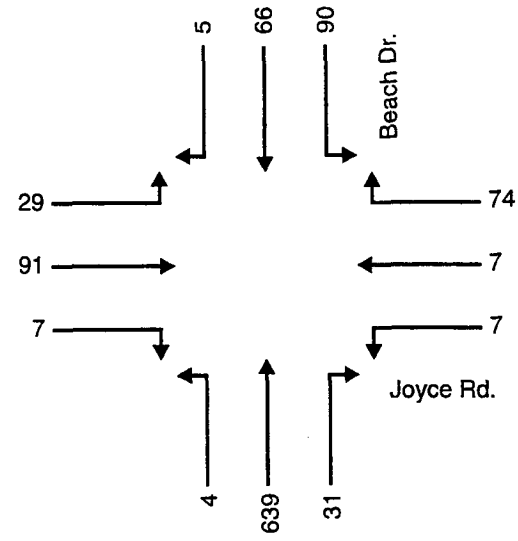
AM Peak: 7:45-8:45 am



Noon Peak: 12:00-1:00 pm



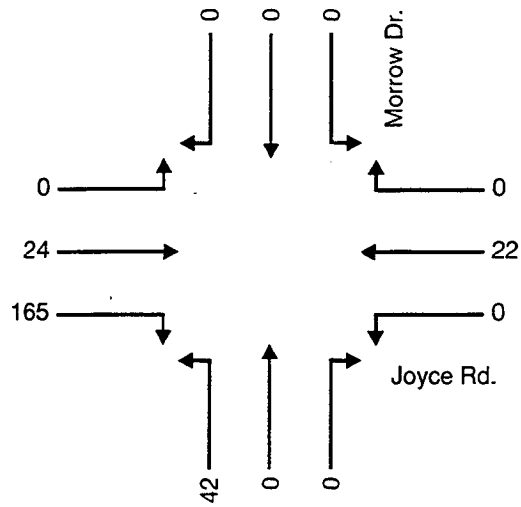
PM Peak: 4:15-5:15 pm



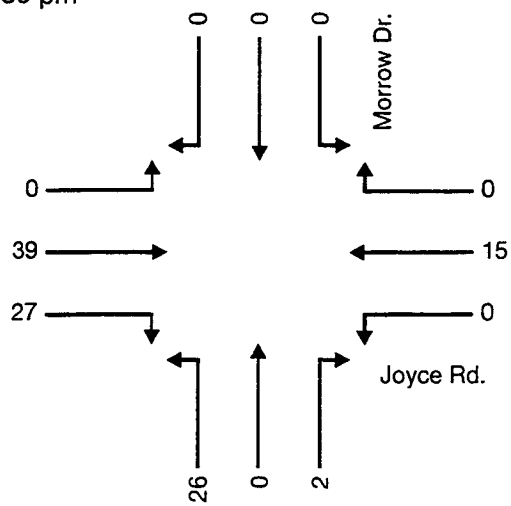
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Joyce Road & Morrow Drive Date: Tues. 8/20/96

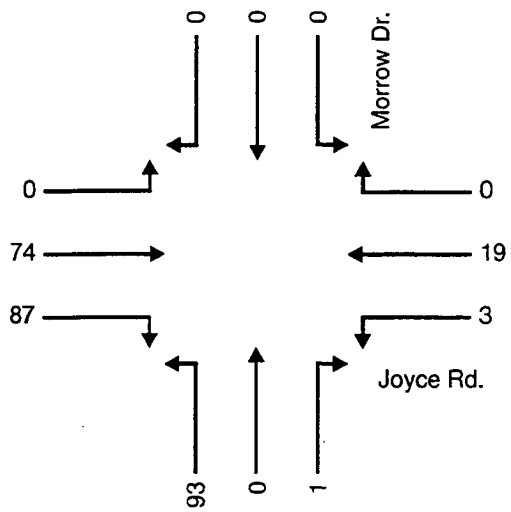
AM Peak: 8:00-9:00 am



Noon Peak: 11:30 am-12:30 pm

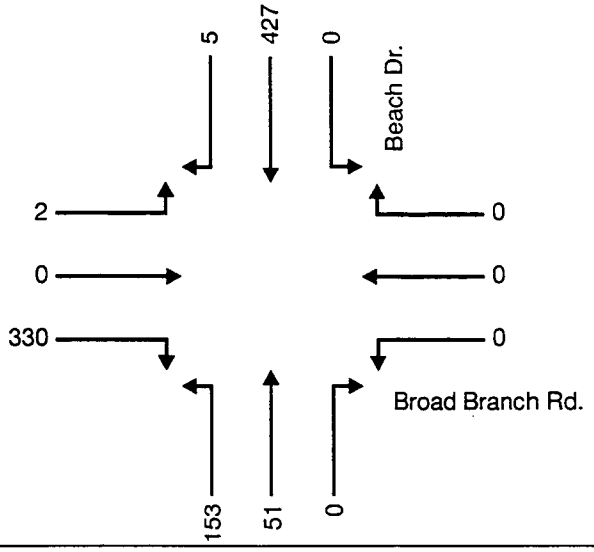


PM Peak: 5:00-6:00 pm

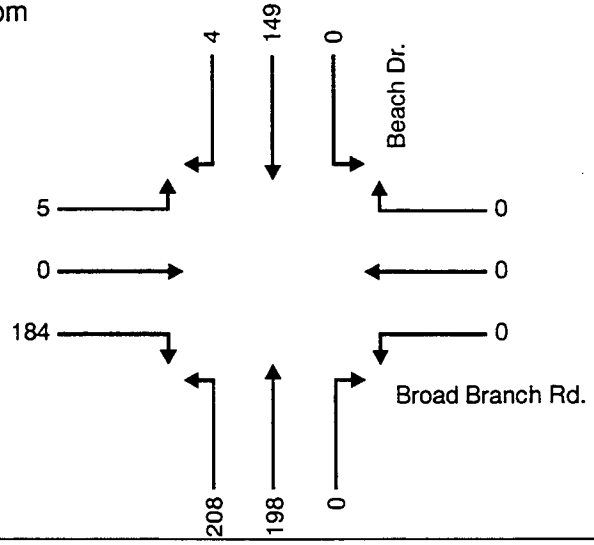


Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.
Intersection: Beach Drive & Broad Branch Road Date: Tues. 8/20/96

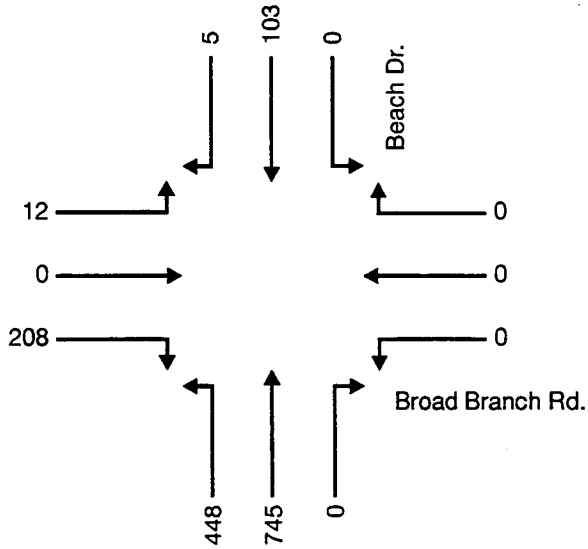
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm



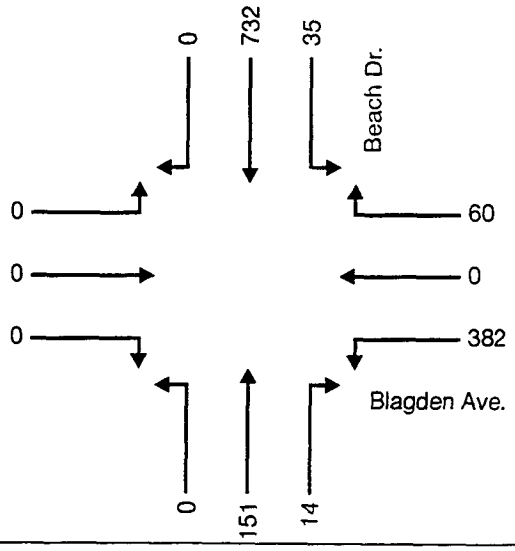
PM Peak: 5:15-6:15 pm



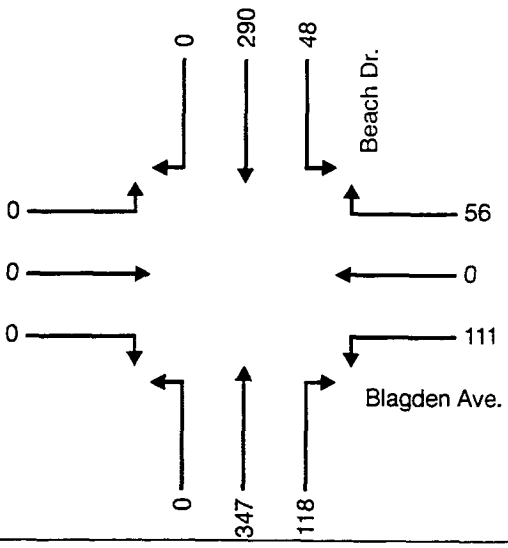
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Beach Drive & Blagden Avenue Date: Tues. 8/20/96

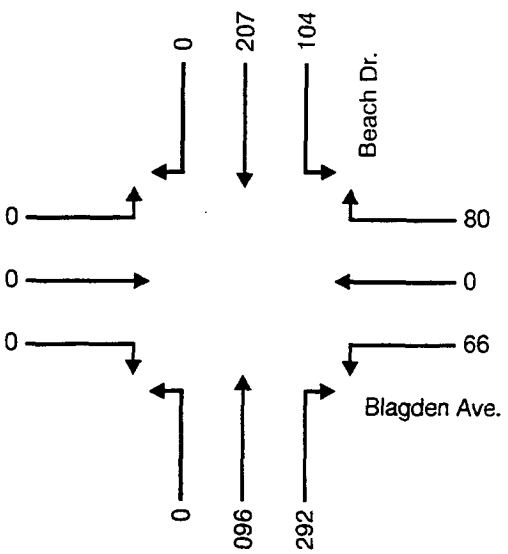
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm



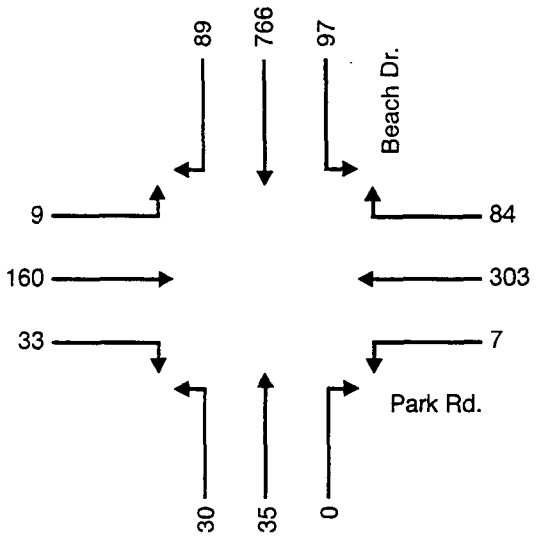
PM Peak: 5:15-6:15 pm



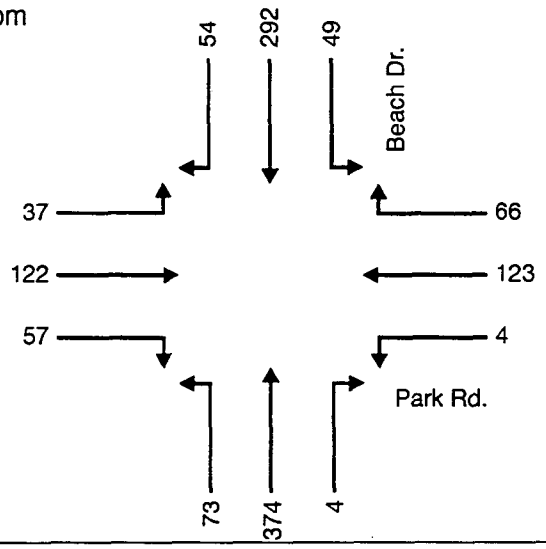
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Beach Drive & Park Road Date: Wed. 8/21/96

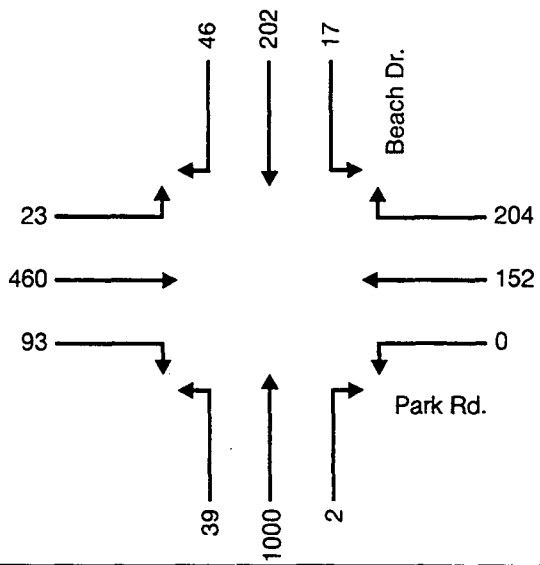
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm



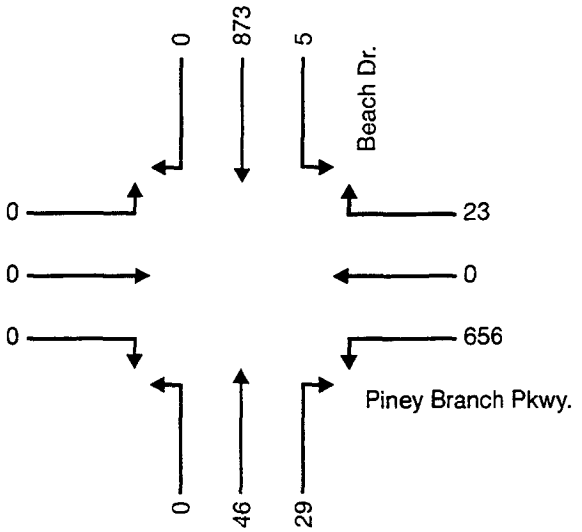
PM Peak: 5:30-6:30 pm



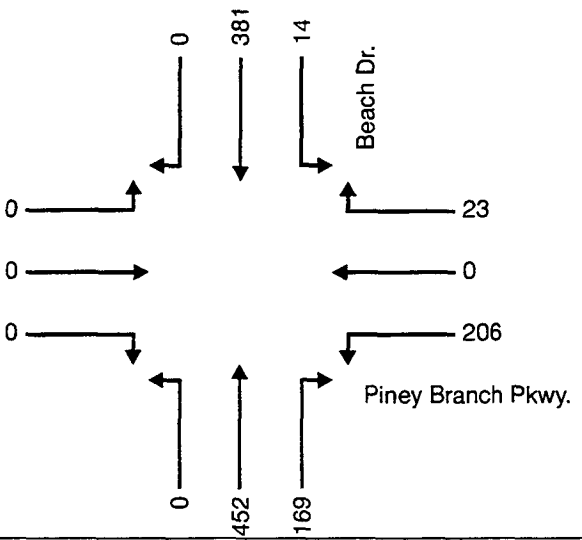
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Beach Drive & Piney Branch Parkway Date: Wed. 8/21/96

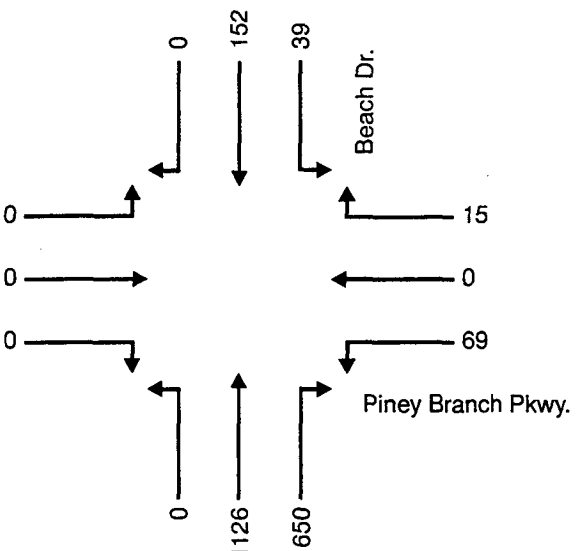
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm

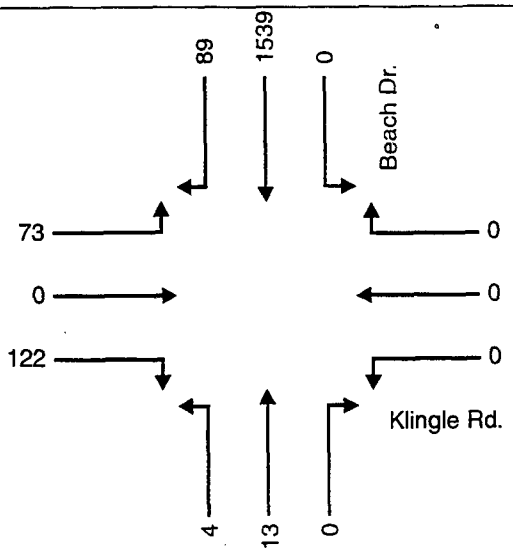


PM Peak: 4:45-5:45 pm

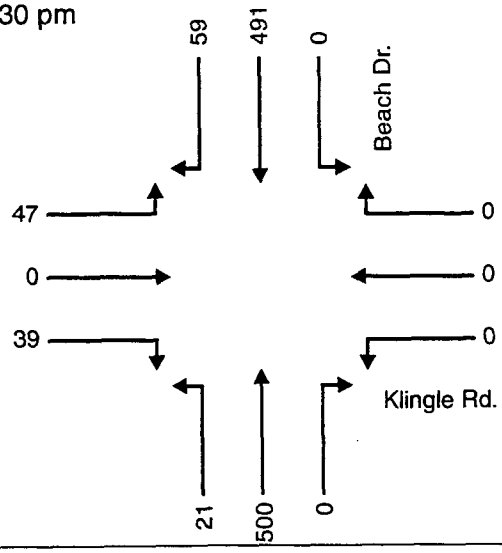


Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.
Intersection: Beach Drive & Klingle Road Date: Wed. 8/21/96

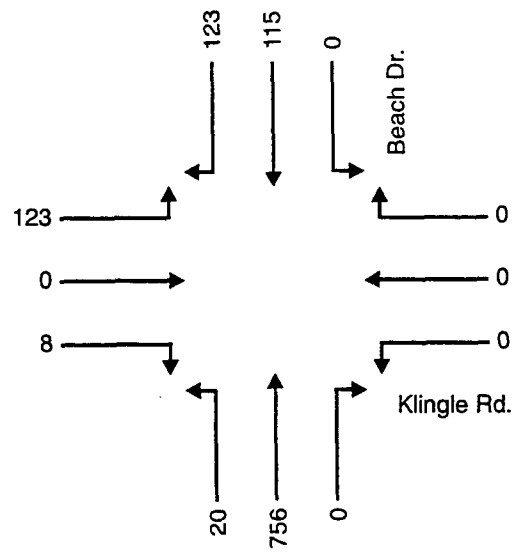
AM Peak: 8:00-9:00 am



Noon Peak: 11:30 am-12:30 pm



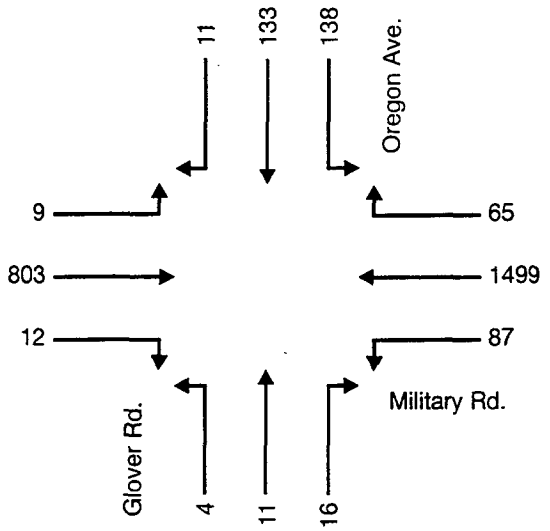
PM Peak: 5:15-6:15 pm



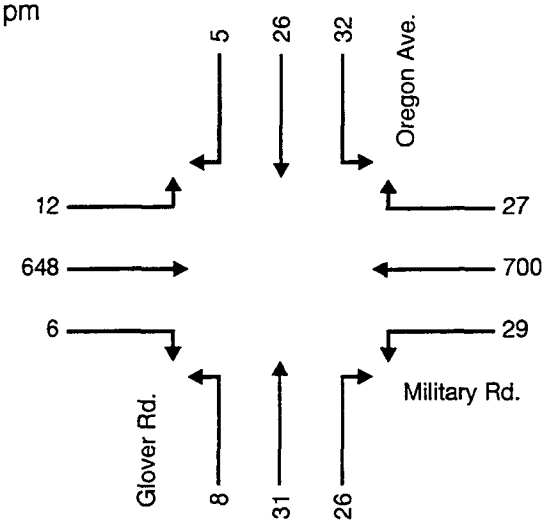
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Military Road & Glover Road/Oregon Avenue Date: Tues. 8/20/96

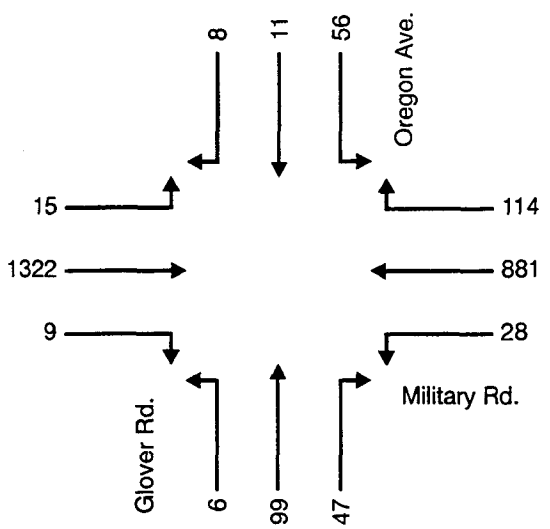
AM Peak: 7:45-8:45 am



Noon Peak: 12:00-1:00 pm



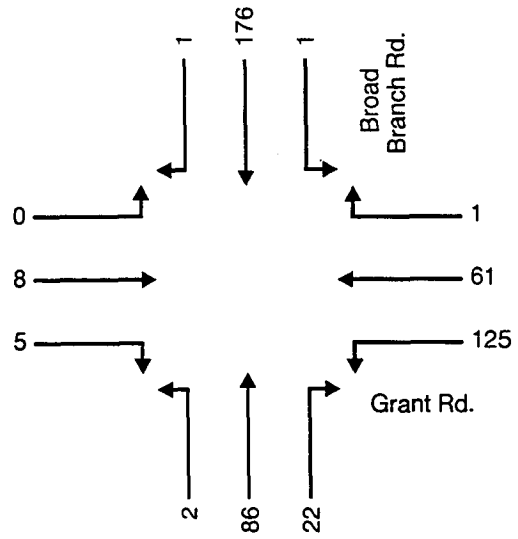
PM Peak: 5:00-6:00 pm



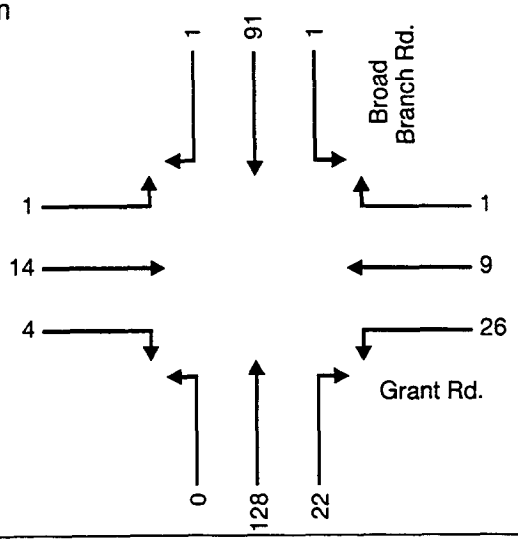
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Broad Branch Road & Grant Road Date: Tues. 8/20/96

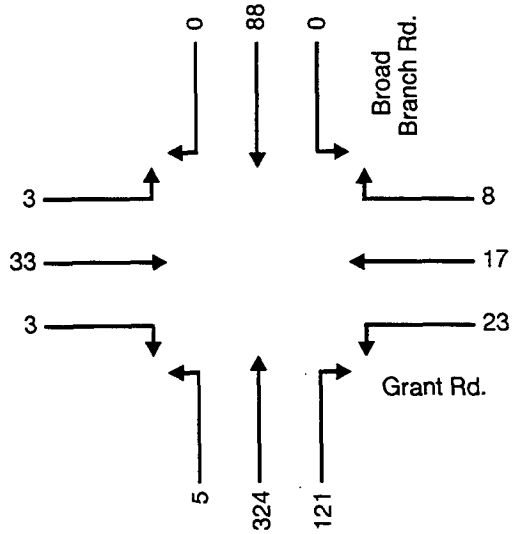
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm

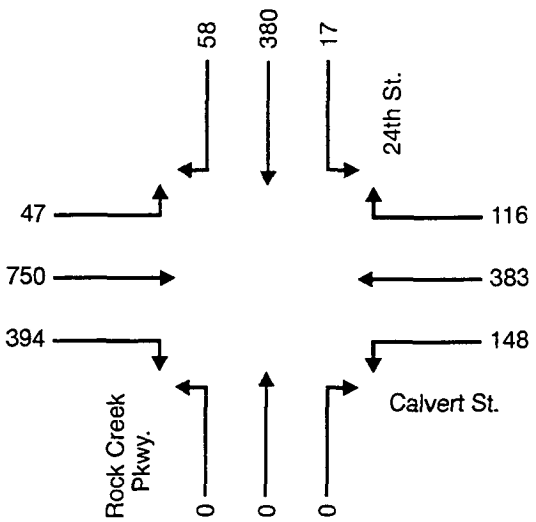


PM Peak: 5:30-6:30 pm

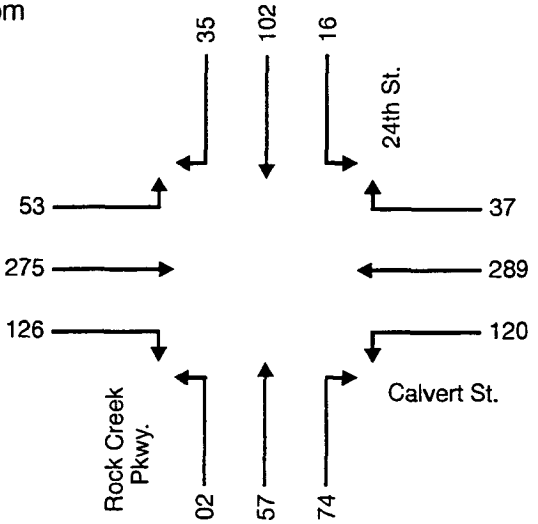


Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.
Intersection: Rock Creek Parkway/24th Street & Calvert Street Date: Wed. 8/21/96

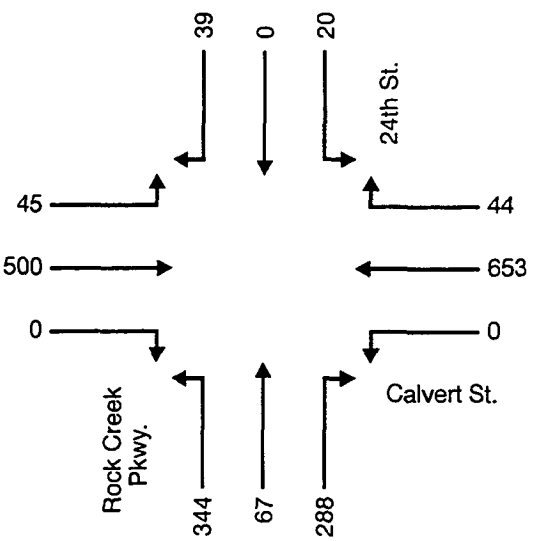
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm



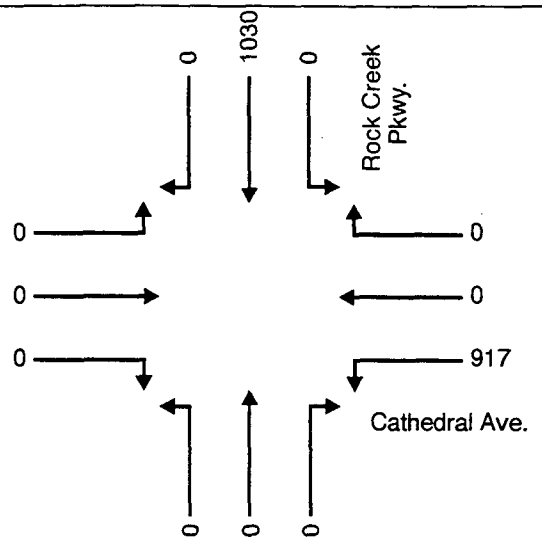
PM Peak: 5:15-6:15 pm



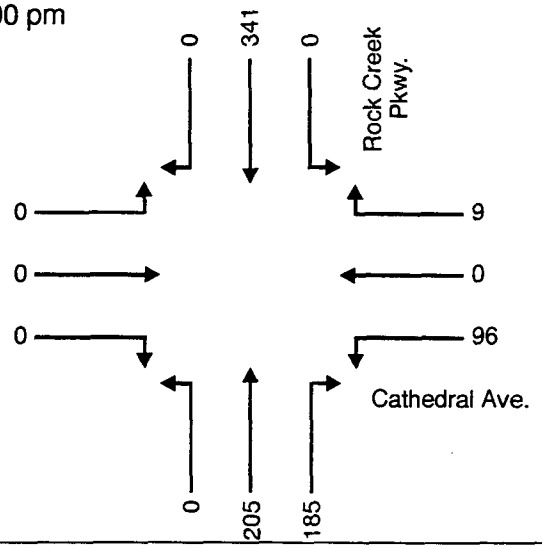
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Rock Creek Parkway & Cathedral Avenue Date: Wed. 8/21/96

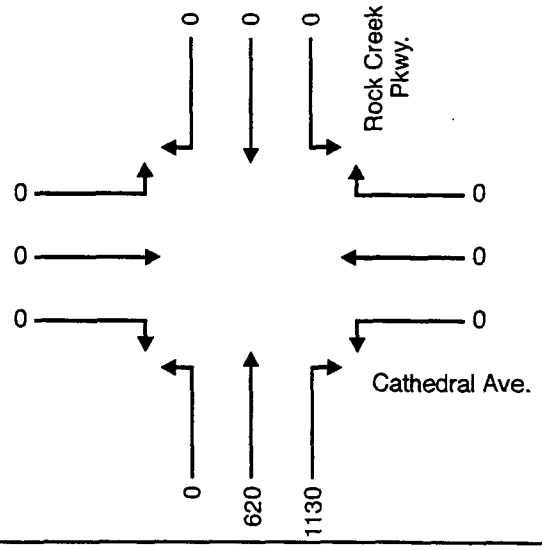
AM Peak: 8:00-9:00 am



Noon Peak: 11:00 am-12:00 pm



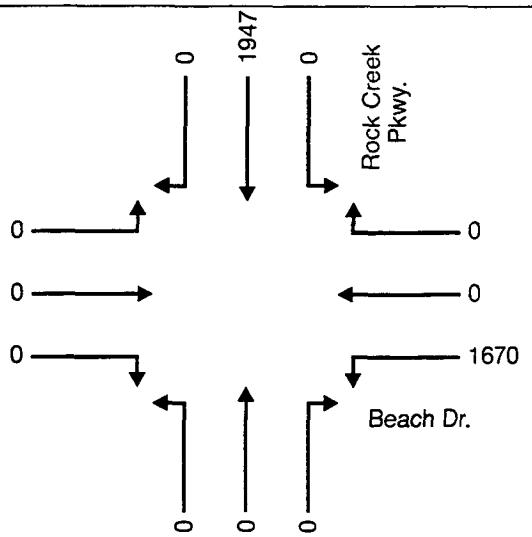
PM Peak: 5:15-6:15 pm



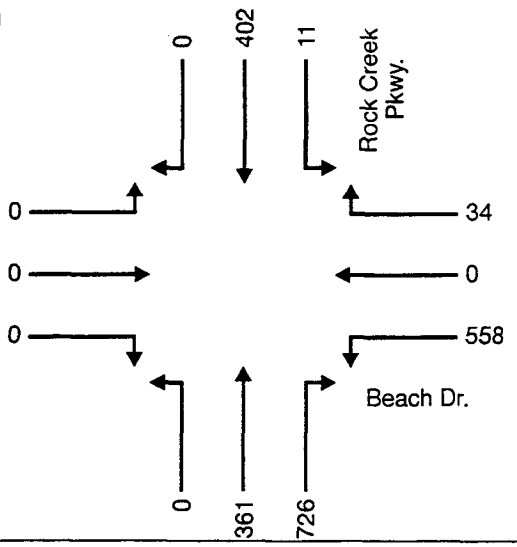
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Rock Creek Parkway & Beach Drive Date: Wed. 8/21/96

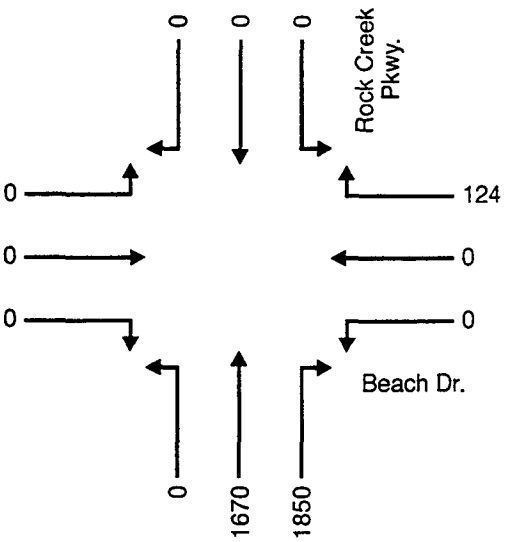
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm



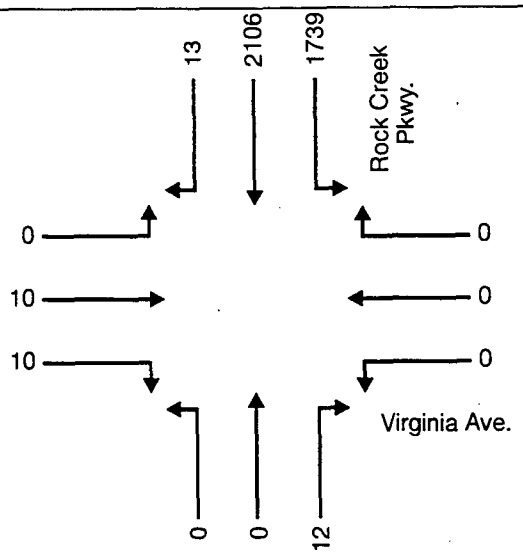
PM Peak: 5:15-6:15 pm



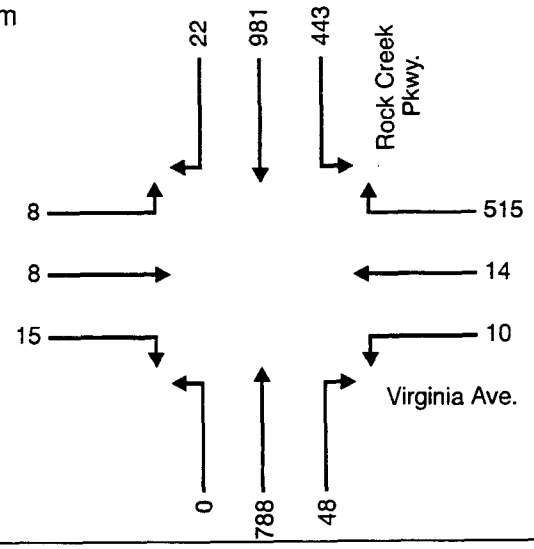
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Rock Creek Parkway & Virginia Avenue Date: Wed. 8/21/96

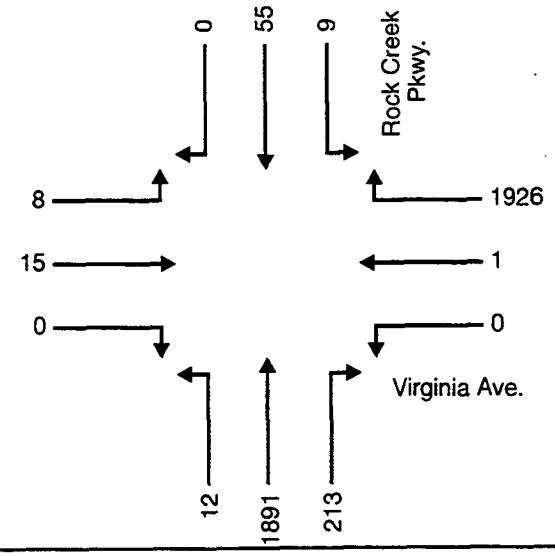
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm



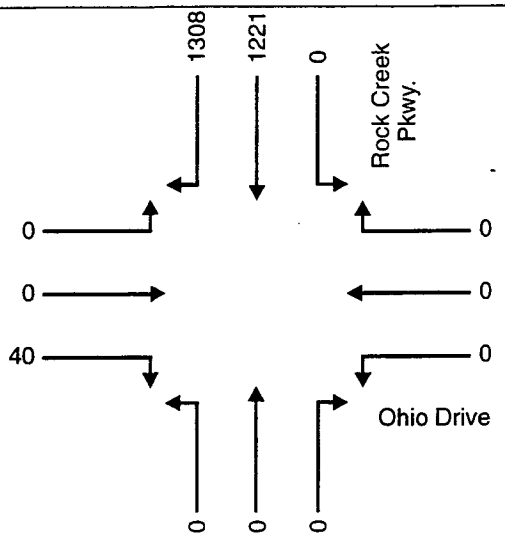
PM Peak: 5:30-6:30 pm



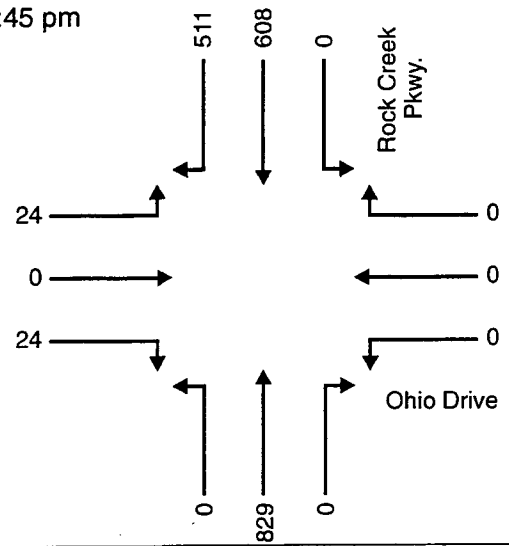
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Rock Creek Parkway & Ohio Drive Date: Wed. 8/21/96

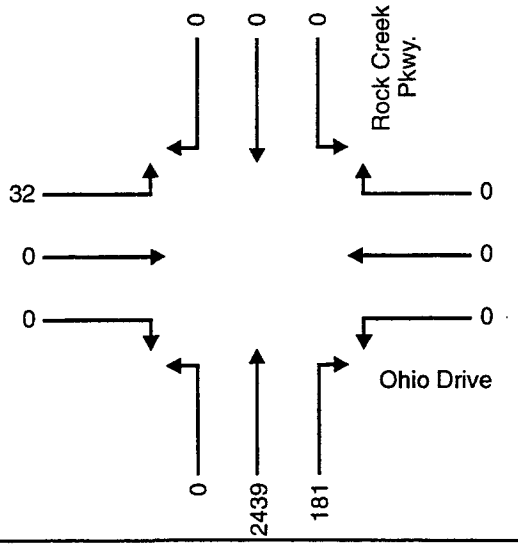
AM Peak: 8:00-9:00 am



Noon Peak: 11:45 am-12:45 pm

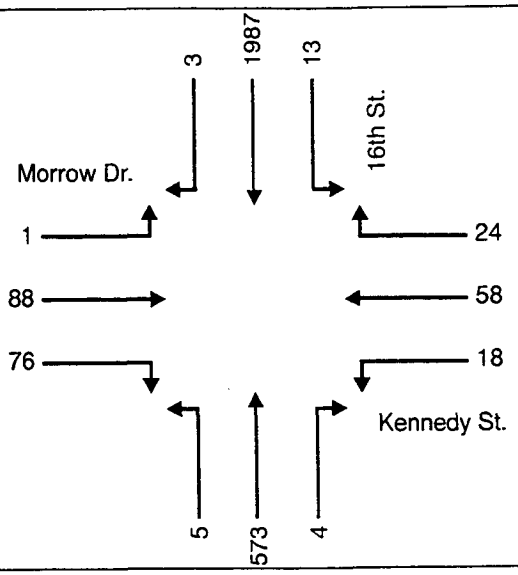


PM Peak: 5:00-6:00 pm

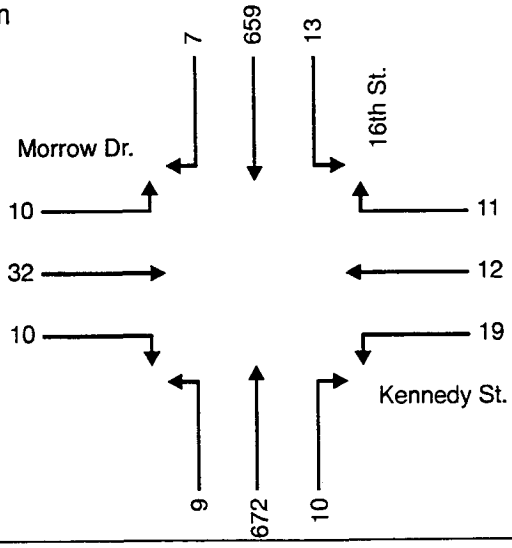


Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.
Intersection: 16th Street & Morrow Drive/Kennedy Street Date: Tues. 8/20/96

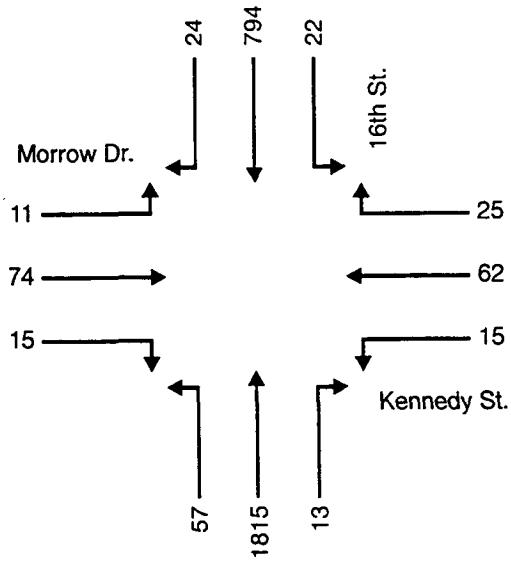
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm



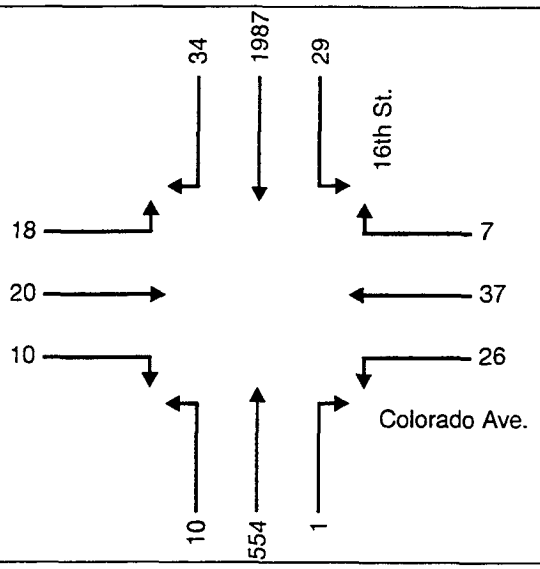
PM Peak: 5:15-6:15 pm



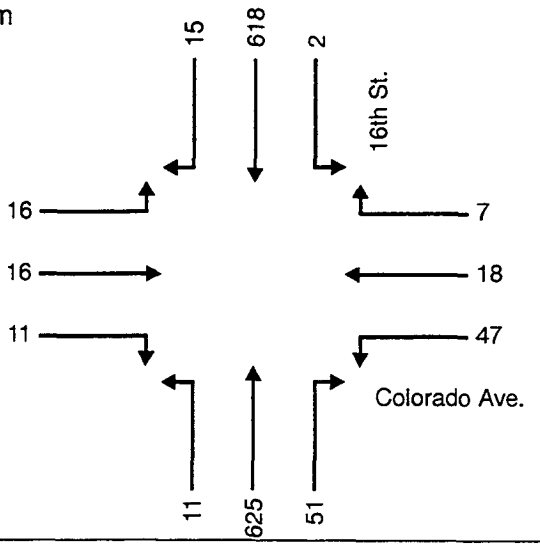
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: 16th Street & Colorado Avenue Date: Tues. 8/20/96

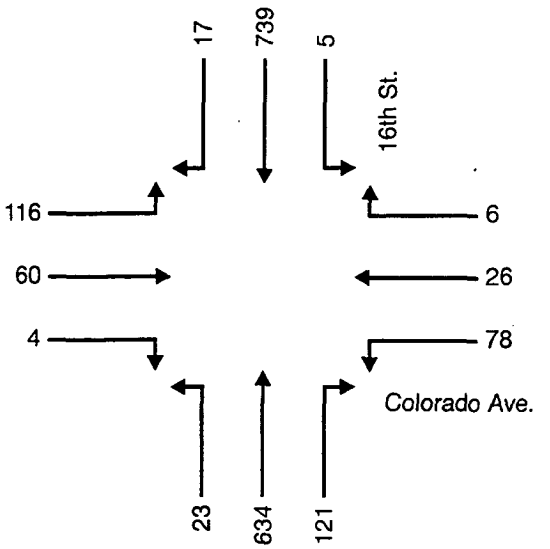
AM Peak: 8:00-9:00 am



Noon Peak: 12:00-1:00 pm

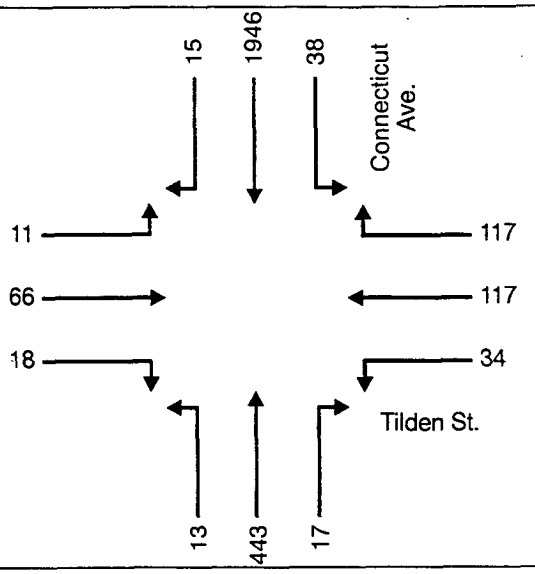


PM Peak: 5:00-6:00 pm



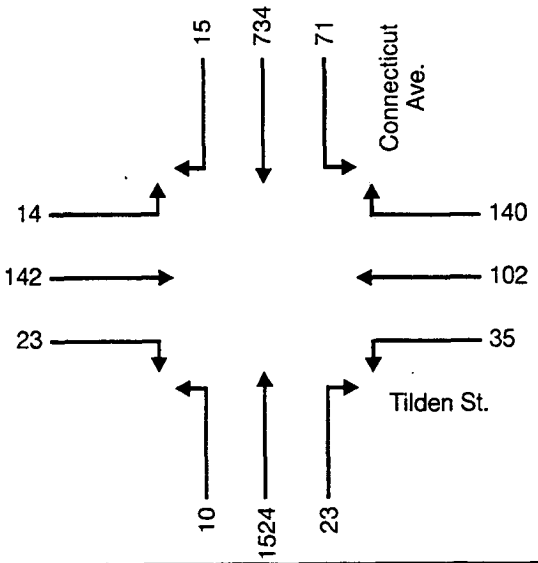
Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.
Intersection: Connecticut Avenue & Tilden Street Date: Fri. 8/23/96

AM Peak: 7:00-8:00 am



Noon Peak: (not counted)

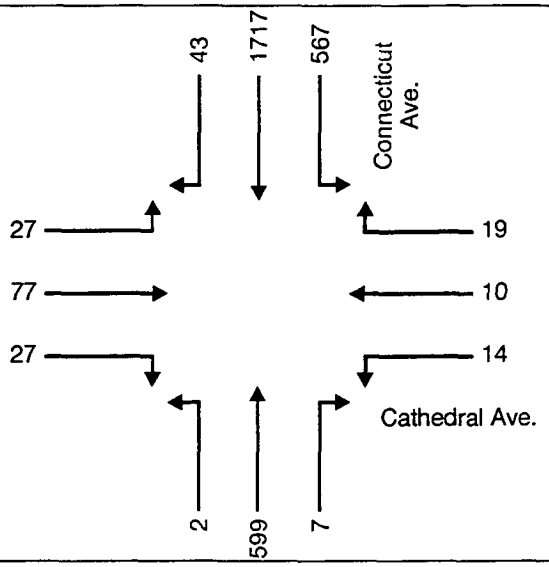
PM Peak: 4:00-5:00 pm



Turning Movement Count Summary - Peak Hour Volumes
Rock Creek Park, Washington D.C.

Intersection: Connecticut Avenue & Cathedral Avenue Date: Fri. 8/23/96

AM Peak: 8:15-9:15 am



Noon Peak: (not counted)

PM Peak: 5:15-6:15 pm