

# Montgomery County, Maryland Parking Services Web Site

Program Category #14: Information Technology

## 1.0 Abstract

The Montgomery County, Maryland Department of Information Systems and Telecommunications - Geographic Information Systems (DIST-GIS) team, in cooperation with the Department of Public Works and Transportation (DPWT), Division of Traffic and Parking Services (DTPS), designed and developed a web site to facilitate parking management, to promote County transportation initiatives, and to provide parking information and mapping services to the general public. Parking rates and systems, permit descriptions, news and events, and interactive maps are provided for each of Montgomery County's four major parking districts. Contact information, frequently asked questions, a photo gallery, related web links, and search engines are also provided on the web site (<http://www.dpwt.com/parking/>). A web visitor (customer) can access the web site using a web browser such as Netscape 4+ or Internet Explorer 4+ to find a parking facility or on-street parking space in a County Parking District. The on-line parking information services available on the Parking Services web site will help to complement and support economic growth and stability in those areas.

## 2.0 Need for the Program

The Montgomery County Parking Services web site was developed to support parking management within DPWT, to promote transportation initiatives such as car pooling or public transportation, and to provide the general public with on-line parking services, information and maps. The web site is used by DPWT-DTPS managers to avoid costly duplication of effort, to support customer service programs, and to complement management strategies that are designed to maximize the usage of the available parking supply to enhance the economic development of each parking/central business district. The web site is also used as a mechanism to encourage the general public to utilize public parking services and facilities, especially in areas neither served by the private sector or by alternative transportation modes. For example, within minutes, a web visitor/customer can use their web browser to find a place to park near a restaurant or place of interest and print a parking map for each County parking district, which until recently, would have taken hours or even days to complete!

The Parking Services web site provides an effective low-cost solution for disseminating information related to parking permits, systems, rates, and operations in addition to generating maps and travel directions to and from parking lots and garages located in each parking district. The web site also enables users to provide feedback and comments in order to improve customer service. Consequently, the web site markets the services and capabilities of DPWT-DTPS and empowers the customer by providing access to the most recent parking information and maps year round.

### **3.0 Description of the Program**

The Parking Services web site was designed, created, and tested on a DIST-GIS Intranet Web Server connected to the Montgomery County Government Intranet. The Intranet, or internal web network, provided an excellent and effective forum for testing the Parking Services web site. After careful review and revision, the Intranet web site was approved by DPWT-DTPS and transferred from the DIST-GIS Intranet web server to the DPWT Internet Web Server for public access. The following sub-section describes the process used to generate and maintain the web site.

#### **Parking Services Web Site Development Process**

##### Step 1: Establish web site functional requirements

The Parking Services web site functional requirements, established by DPWT-DTPS and DIST-GIS, declared that the web site was to be designed for the novice web visitor or customer. A standard web theme was to be developed in concert with an intuitive Graphical User Interface (GUI) containing text, graphics, buttons, forms, maps, and hyperlinks to assist customers to discover the required parking information. The web site was to be configured for public access on a high-performance web server that was to be scalable, reliable, manageable, and secure. For example, the web server should support simultaneous "hits" from either Netscape 4.0 + and Internet Explorer 4 + web browsers and be able to open a web page or web map in less than 10 to 15 seconds using a standard 56k modem 361 days (99%) a year. A Parking Services web site Task Force was to be formed to review the web site and ensure that the Parking Services' functional requirements were satisfied.

##### Step 2: Provide information, documents, and data for input into the web site

The DPWT-DTPS provided information, documents and geo-spatial data related to Parking Services to DIST-GIS staff for compilation and entry into the web site. Parking permit descriptions and applications, parking systems (i.e. parking meters or CashKey) documentation, current parking rates and hours of operation, detailed parking facility photo images and descriptions, and on-street parking information were provided. In addition, information concerning Parking Services' mission, purpose, parking district summary, and management tactics were also provided. Other documents delivered to DIST-GIS characterized car pooling, residential parking, and handicapped parking.

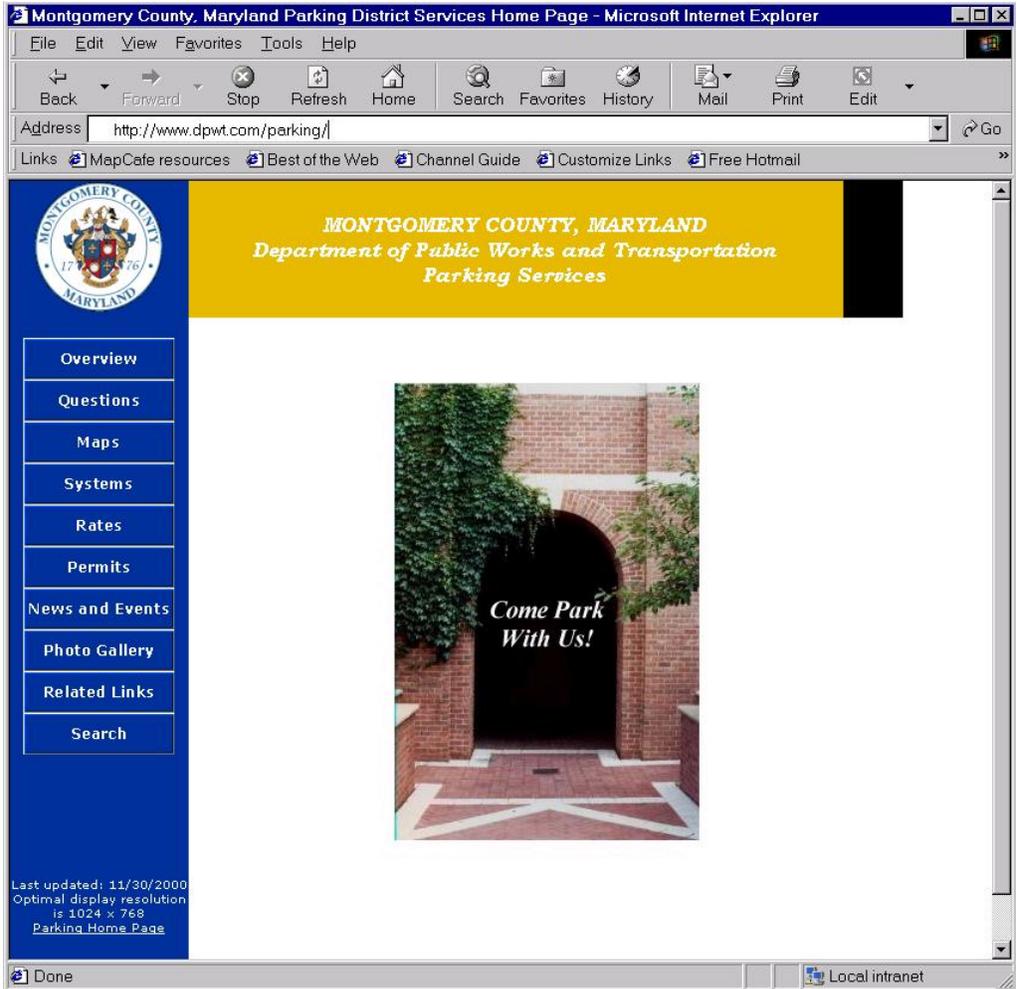
DPWT-DTPS provided geo-spatial data sets that were compatible with ESRI's ArcView GIS software. The data were revised and updated as needed by DIST-GIS staff in cooperation with DPWT-DTPS staff to ensure data accuracy and quality. The data were used to create detailed maps for parking facilities and on-street parking spaces in each parking district.

##### Step 3: Design the web site Graphic User Interface (GUI) theme

An intuitive web theme was designed using Hyper-text Markup Language (HTML), Java, and Javascript code in order to satisfy the functional requirements stated in Step 1. The web site was developed using Microsoft's Frontpage 2000 on the DIST-GIS Intranet web server, a Dell Pentium III 500mhz workstation running Microsoft's Windows NT 4.0 and Peer Web

Services. Interactive buttons were used to organize the web site content, graphics, and maps into an intuitive web site (Figure 1).

Figure 1: Parking Services Web Site Home Page



However, the Parking Services Intranet web site was to be designed in such a fashion so that it could be successfully uploaded to the DPWT UNIX-based web server. Consequently, dynamic web page development, using Active Server Page (ASP) or Cold Fusion technology, was disallowed in the web site design because the DPWT web server would not support Windows NT-based dynamic web page development languages.

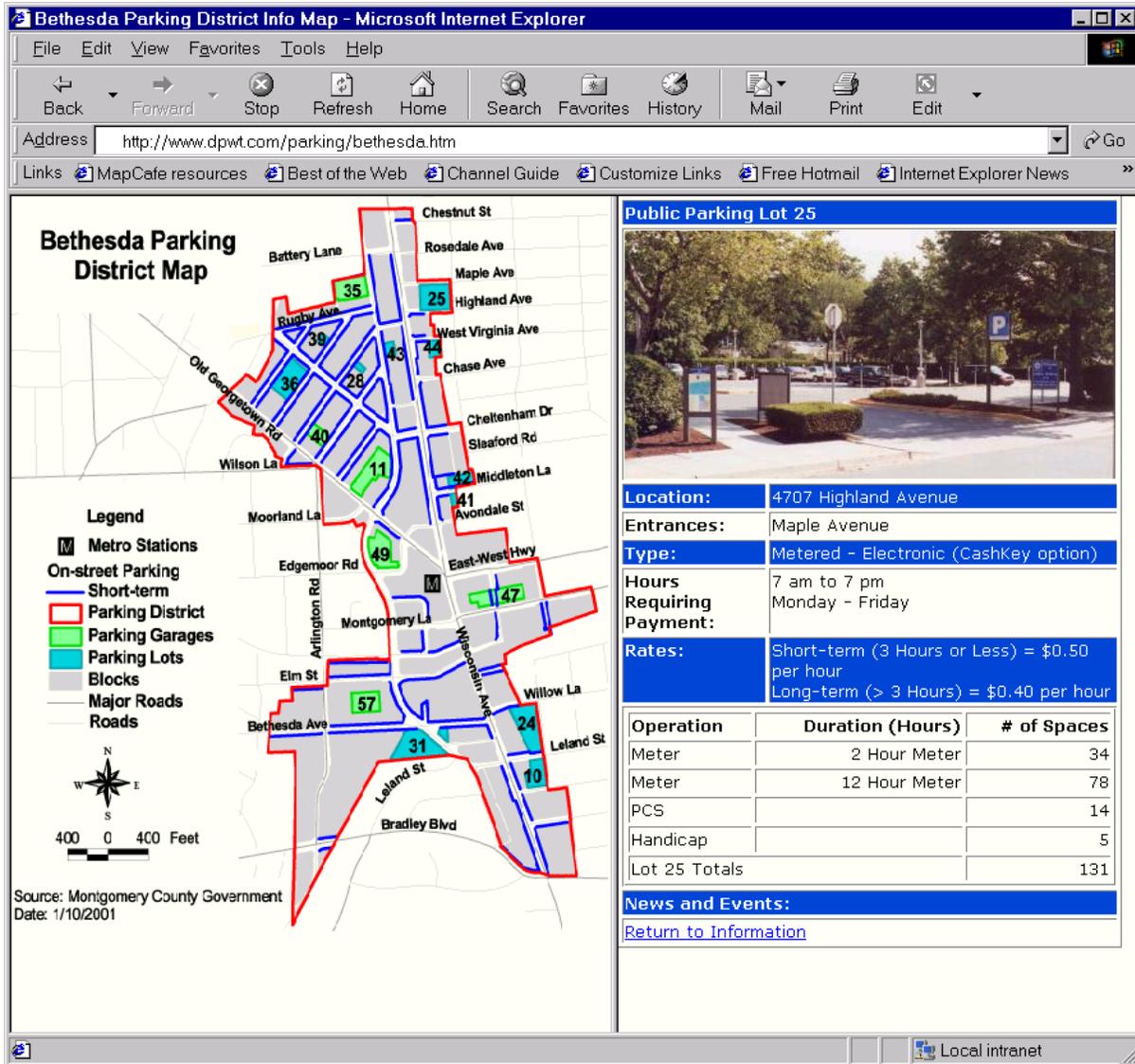
Step 4: Add code and content (graphics, text, and maps) to the web site

The documents, fact sheets, and data provided by DPWT-DTPS in Step 2 were organized and incorporated into the appropriate web site theme category. Most of the documents were delivered in a hard-copy format, reviewed for grammar and clarity, and added to the web site text. Photographs and graphics were incorporated and added where necessary.

The geo-spatial or GIS data were revised and incorporated into the interactive parking map for each parking district (Figure 2). With the click of a mouse, customers can gain access to

detailed information about a parking garage or lot. The maps also depict on-street parking areas that correspond with parking meter duration provided in the map legend.

Figure 2: The Bethesda Parking District Map



Step 5: Publish web site to the Montgomery County Government Intranet

The web site was published to the DIST-GIS Intranet web server, a node on the Montgomery County Government Intranet, so that DPWT-DTPS Task Force could review the web site. However, before DPWT staff could access the web site, their workstations had to be configured properly in order to access the Parking Services Intranet web site.

#### Step 6: Review and revise Intranet web site

The DPWT-DTPS Task Force reviewed the web site and discussed revisions. Once the revisions were “ratified” by the Task Force, they were incorporated into the web site by DIST-GIS staff and eventually approved for deployment on the DPWT web server.

#### Step 7: Deliver the web site to DPWT and publish on the DPWT Web Server

The Parking Services web site was written to a CD-ROM, delivered to DPWT-DTPS staff, and published on the DPWT web server for public access.

#### Step 8: Maintain web site content

DPWT-DTPS staff updates and maintains the web site content (graphics and text), while DIST-GIS maintains parking related geo-spatial data sets and updates interactive maps as needed.

### **4.0 Use of Technology**

Microsoft FrontPage 2000 was used as the web development software to design, program, and test HTML, Javascript, and Java code. HTML code was used to add text content for the majority of the web site, while Javascript was used to create roll-over buttons that change color, to generate animated graphics, to control web browser sizing, and to create automated time stamps. A Java program was also used to generate a vertical text scroll located on the home page of the web site.

The web site was initially published to the Montgomery County Government Intranet on a DIST-GIS Intranet web server, a Windows NT 4.0 Dell Pentium III 500mhz workstation using Microsoft's Peer Web Services. Graphics and maps developed for the web site were created using several programs including Microsoft PowerPoint 97, Corel Photopaint 8, ESRI's ArcView GIS (Version 3.2), Adobe Illustrator 9, and Acrobat 4.0. The Parking map server was generated using ArcIMS 3.0 Internet Map Server and FrontPage 2000. Data depicted in the parking district maps and map services were created and maintained using ESRI's ArcView GIS software.

### **5.0 The Cost of the Program**

The total cost to develop the Parking Services web site including staff time (programming and server maintenance), consultant fees, and software/hardware equipment is approximately \$48,400. Approximately 1,080 hours of staff time were invested into the development of the Parking Services web site at a cost of \$25,440. The Intranet web server (Windows NT 4 Workstation) cost \$3,000, while the graphic, the web publishing, and the GIS software cost approximately \$15,000. Digital photos of parking facilities, provided by a consultant, cost \$4,958. Additional equipment costs and staff time for web upgrades, revisions, and maintenance will vary according to advances in technology and to the frequency and scale of future updates. Annual web updates and server maintenance costs, not factored into the total cost of web site development, are estimated to be \$5,000. The cost of the existing DPWT web server was not factored into the budget of this project.

In order for a customer or client to use the web site, a Pentium 200 MHz or better Intel-based personal computer running Windows 95, Windows 98, Windows 2000, or Windows NT 4 with a Netscape 4 + or Internet Explorer 4+ web browser is recommended. A standard 56K modem with a connection to the Internet through an Internet Service Provider (ISP) should satisfy most user needs. Although the computer may cost over \$1,000, the web browser software is free. A color printer, costing approximately \$150, can also be used to print information and generate maps.

## **6.0 The Results/Success of the Program**

Since the web site was recently launched, the results/successes have not been fully quantified. However, the functional performance of the web site will be evaluated by using web server reporting software technology, by reviewing customer feedback forms and e-mails, and by conducting regular web site Task Force staff meetings. The web server reporting software enables DPWT staff to count the number of hits and requests to the web site, to locate the origin of the request, and to determine the date and time of day in which the client/server transaction occurred. Consequently, the frequency and duration of web server transactions can be monitored over time, so that the web server can be tuned to accommodate or balance the load of requests to the web site. The DPWT feedback or comment form enables customers to enter questions or comments concerning the web site. These comments or questions are monitored by DPWT staff and are used to measure the success or results of web site. The Parking web site Task Force will continue to host meetings to discuss and to develop guidelines on how to evaluate the effectiveness of the web site. It is anticipated that the web site will reduce the demand on staff time in responding to customer service-related questions from the general public.

## **7.0 Worthiness of an Award**

The Parking Services web site serves as a virtual forum that provides the information and applications necessary to satisfy the parking needs and mapping requests of the general public as specified by the DPWT-DTPS functional requirements. The delivery of free on-line parking information and map services empowers web visitors with the most recent information and maps year round. Therefore, County government customer service investments may be minimized. In addition, as the Internet web site begins to absorb the majority of the parking requests, DPWT-DTPS staff can focus more on updating and maintaining parking databases and web site content. In addition, the Parking Services web site could be used as a model for other counties and municipalities who provide parking services.