Prepared by Pulsar Advertising

Bus Stop Customer Information Program

Technical Report February 2010

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Executive Summary, Bus Stop Customer Information Study

This section is a brief overview of the bus stop information report's findings and recommendations.

PROGRAM PURPOSE

The main purpose of the Bus Stop Customer Information Study (BSCIS) is to improve customer experience through the provision of a consistent, reliable and effective system of customer information at Metrobus stops. By looking at Metro's current bus stop customer information system, reviewing best practices of the leading transit agencies and applying the experience of a professional transit information team, the study presents recommendations for developing and implementing a standardized and uniform program for an effective Metrobus stop information system.

The BSCIS has the following goals and objectives:

Goals

- To provide the information necessary for customers and potential customers to be comfortable with at-stop information.
- Present an on-street information system as a positive element of WMATA's effort to provide its constituencies with critical at-stop content.
- Present WMATA's service as an integral part of the local community.
- Change the on-street information system to a more consumer oriented design.
- Streamline the internal production process for maximum efficiency.

Objectives

- Increase awareness of reliable stop-based information.
- Have the traveling public report confidence in on-street information.
- Upgrade the information protocol design applications.

METHODOLOGY

The following methodology is used to carry out the study:

- A thorough review of the existing Metrobus bus stop customer information system including:
    a. A review of the existing production system
    b. On-site inspections of the existing system
    c. An overview of how the existing bus stop information is integrated with other elements of the Metro passenger information system
    d. Interview with staff and jurisdictional stakeholders
- A review of best practices of other transit agencies' bus stop information systems
- A public outreach effort to incorporate input from riders, jurisdictional partners and stakeholder groups
- Review of the latest in production and software technologies applicable to Metrobus
- Prepare recommendations

FINDINGS SUMMARY

- Readability of the current signage is a serious issue:
    a. The current bus stop flag route numbers are shown in the smallest typefaces found in any system, well below the standard two to three inch high lettering.
    b. A more significant problem exists with schedule box information. By trying to post a timetable type format showing schedule information for the timepoints of an entire route and multiple routes, in many cases typefaces are shrunk to less than 4 points. This would be considered "fine print" on a printed document, let alone one that has to displayed through a laminate, a plexiglass shield in poor lighting or in some cases with rain on the display – it is unacceptable.
- The small type is not compatible with new ADA sensitivities and an aging population.
- Some Metro stops have ten to fifteen routes serving them, and the current schedule holder box system is not adaptable for this many routes.
- Where Metro shares stops with other transit carriers each uses its own flag and in some cases schedule holder. This leads to clutter and confusion.

- New state of the art technologies for both the actual appearance of the signage and information displays and the efficient management of the system have not been applied.
- Maintenance of schedule information at stops is handled in a unique and difficult to manage manner. The schedule information is placed by the agency's transit advertising firm as a value added feature of their contract. There is little reason for them to be particularly diligent about upgrading the system

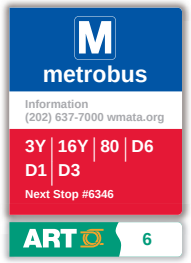
RECOMMENDATIONS

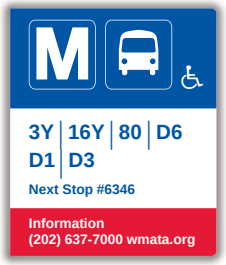
Based on a review of best practices within other systems and the unique environment Metro operates in a series of important steps are recommended to update the readability, quality and maintainability of the Metrobus bus stop information system.

The basic recommendations are elaborated and illustrated more fully in the recommendations section of the full report.

Key recommendations include:

- Develop readability standards for printed and signing materials to be utilized in the system.
- At a minimum, utilize a larger flag blank and 2.5-inch high lettering.
- The minimum typeface font of 12 point should be applied to all schedule information at the stops. Typefaces as small as 10 points might be applied to support information copy.
- Establishing a typeface minimum drives some other recommendations – in some cases, it may be impossible to squeeze all the timepoint information for an entire route in each schedule box.
- This is especially true for multiple route stops. The logical alternative is to show only next bus information for each route serving a stop. This opens up considerable display space for the most important information to be displayed in a readable form at most stops.
- To provide running time information to the next stop information, employ a schematic to display the running times to the next timepoints.





- For multiple route stops another approach should be used. Specifically develop larger integrated kiosks (perhaps in two or three sizes) to be used to display the large amounts of information needed at these locations effectively.
- The new flag signs at stops should be better branded with the rest of Metro brand system. The current signs don't even carry the Metro logo.
- Adopt a modular approach to the flags, utilizing individual insets for each specific route. This approach will not only allow easy updates of information, but where other systems share a stop, this will also allow Metro to help eliminate multiple sign clutter and confusion.
- The electronic next bus sign numbering signage should be incorporated in to the flag and kiosk identity.
- Metro should plan to bring the entire on-street information program in-house. This is the most popular approach with most large successful systems and its model should be used to replace the cumbersome system Metro now uses with two outside contractors. The current distribution and production can be incorporated into the existing program structure.

Metro needs to rebuild its software interface and adopt new technological approaches to adapting schedule database information into actual on-street information displays. This will be especially critical if a stop-specific information approach is adopted. This system should not only produce final art in a turnkey integrated approach but also provide for system management tools such as organizing output by stop and route I.D. systems.

- Metro needs to revisit a more standardized approach to signing with other carriers that operate in its service areas.
- Metro should incorporate its Next Bus top identification system and apply it universally as an integrated feature of new sign design.

Bus Stop Customer Information Study

INTRODUCTION

The Washington Metropolitan Area Transit Agency (Metro) employs a comprehensive customer information program to ensure the provision of consistent, accurate and timely bus service information to customers at bus stops. A variety of practices have been or are being employed regarding customer information at bus stops across the region resulting in an inconsistent customer experience at Metrobus stops. The Regional Bus Study recommended standardization of practices and suggested a hierarchy of facility and information based on rider activity at bus stops.

With bus stop flags at nearly 9,000 stops, and comprehensive schedule information and maps posted at the majority of stops, Metro has one of the most comprehensive on-street bus stop information programs in the nation. The agency has always recognized that providing accessible and easily understandable customer information is a key component of its service. The bus stop customer information system was initiated over twenty years ago.

However, with the advance of both technology and new demands on the system it is showing signs of age and is in need of an update. Since the Metrobus passenger information system was established, many major transit systems have accumulated a great deal of experience with a variety of approaches to on-street information systems. Many suppliers have also made significant production and technological advances in the types and ways on-street information can be provided. The Metro operating environment has also changed significantly because of increased ridership, the growth of a variety of local transit systems within its service area, a changing population and an increased sensitivity to the needs of customers with special information needs.

The Bus Stop Customer Information Study (BSCIS) was commissioned to examine best practices in the industry, review the current status of the existing Metro system and make recommendations as to how Metro can update and improve its current information system to better meet the needs of its customer.

The study is structured to develop new approaches to providing information to Metro's current and

potential customers. A thorough review of the transportation industry's state of the art in providing bus stop information within a hierarchy of customer information systems was completed. Twenty systems were reviewed as part of this project. The case studies presented in the report will review in detail three systems (MTA, New York; Metro, Seattle; and Tri-Met, Portland) which were considered to have the most applicable and advanced approaches that could be adapted to the WMATA environment.

The study has also reviewed the following items:

- Appropriate Information Hierarchy
- Bus Stop (Static) Information
- Hardware
- Bus Stop Technology Applications

This technical memorandum presents alternate solutions to the information challenges faced in presenting quality bus top information using a variety of approaches to various stop configurations that exist in the Metro service area. The report will conclude by proposing a number of recommendations that are designed to address the goals and objectives of the study. Purpose The main purpose of the BSCIS is to improve customer experience through the provision of a consistent, reliable and effective system of customer information at Metrobus stops. By looking at Metro's current bus stop customer information system and reviewing best practices of the leading transit agencies, the study prepares recommendations for developing and implementing a standardized and uniform program for an effective bus stop information system.

GOALS AND OBJECTIVES

The program is based on achieving specific goals and objectives, which are designed to focus efforts and provide evaluation checkpoints for each step of the project. After a comprehensive evaluation of the systems identified to review for this study, the following goals and objectives have been defined.

Goals

- Provide the information necessary for customers and potential customers to be comfortable with at-stop information.
- Present an on-street information system as a positive element of WMATA's effort to provide its constituencies with critical at-stop content.
- Present WMATA's service as an integral part of the local community.
- Change the on-street information system to a more consumer oriented design.
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METRO'S ON-STREET INFORMATION SYSTEM DESCRIPTION

Background: Metro and their Customers First Meet

With approximately 9,000 stops with flags and poles, up to 7,000 bus stop information cases and some 3,133 bus stop shelters, Metro has one of the most comprehensive and effective on-street transit information programs in the nation. On-street customer information has proven to be one of the most effective marketing and information delivery methods for most of the systems in the country.

Though Metro has one of the most comprehensive bus stop information programs in the country its basic design and operational features have not been changed significantly in decades. This has led to certain system deficiencies as Metro's operating environment has grown more complex with additional carriers operating in its service area. Its own services have grown more complex with the addition of new types of branded express and limited stop services.

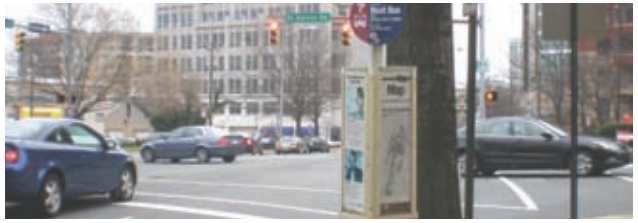
Current Limitations and Operational Challenges

After reviewing Metro's bus stop customer information system, the following limitations and operational challenges were observed.

- One of the issues facing Metro is that a lot of stops are served by as many as 13 or 14 different bus routes. The current one-size-fits-all approach, combined with the use of standard sized schedule boxes at its stops and a policy of showing all the timepoints for all the routes serving a stop, can lead to extremely small type sizes (down to 4 points at some stops). In many cases, even with small type, there simply is not enough room to display schedules for all the routes that serve a stop, even if two schedule boxes are installed.

- Because of the complex variety of carriers operating within the Metro service area, some esthetic issues have developed at bus stops. Many stops have a confusing array of flags, schedule displays and other information in different formats, because of the different graphic systems each carrier uses. This clutter becomes particularly noticeable in downtown Washington locations and some of the busier inner suburbs (Arlington, Bethesda etc.).

- Metro also faces some unique challenges in the way that its current on-street information system is maintained. Today the schedule information posted at the stops is compiled based on the agencies' Trapeze scheduling system in house in a collaborative effort between scheduling, planning, marketing, and its print and sign shops. This is not unlike many other large transit agencies.



The unique characteristic of the process is that the actual posting of schedule information is the responsibility of the agency's transit advertising contractor, Clear Channel Advertising. They in turn subcontract the actual work to J. Perez and Associates. The problem with the arrangement is that the service is provided by Clear Channel as a value-added feature to their advertising contract and the expenses associated with the program impacts their bottom line. They have little or no encouragement to update or improve their performance of providing on-street information.

The disconnect in responsibility for what actually finally appears on the street and what Metro would like to appear is both cumbersome and leads to serious control and efficiency problems. This structure that may have been a good idea at the time – an on street information system that appeared virtually free – has lead to a system which doesn't fulfill Metro's goal of providing the highest quality customer information possible. Another reality facing Metro is that the current advertising contractor, or virtually any other similar contractor, is not likely to be willing to include this perk in a bid package, especially in today's economic environment. Even if they did, the current experience with one of the largest providers of transit advertising media providers is not encouraging. Metro will have to consider bringing the program in-house.

• The current system's operational roots are based on generations of old software and a logistic process. It is labor intensive and has not been significantly updated in over five years. Currently the process, though based on a sophisticated computerized scheduling database, requires numerous manual steps to translate that database information to what actually appears on the street. As a result, the reliability and clarity of on-street information has suffered.

• In addition, customer expectations have risen. In this information driven age, consumers tend to assume that quality information should be readily available wherever and whenever they need it. There are also rising concerns about readability of information from both an ADA (American Disability Act) perspective and dealing with an aging population.

• Design issues: One other basic factor facing Metro is the current on-street signage system is graphically out-of-date and doesn't reflect what has been learned about the importance of on-street information or the changing image of Metro itself and the area it serves. It also is not designed to be integrated with the latest technologies (PDAs, real time GPS or digital display systems.) There are also a variety of other service providers in the Metropolitan Washington area that have their own on-street information programs.

New Technologies Available

New technologies, methodologies and standards have been developed both by private suppliers and transit systems throughout the country, including better software for more easily producing camera-ready art directly from a database. Software has also been developed that could allow Metro to post stop-specific schedule information at all of its stops.

Metro has experimented with a few of these technologies, such as Next Bus, but has yet to fully integrate the new technologies with its printed schedule information system.

On the hardware side, new technologies, such as Metro's GPS equipped fleet, and new display systems now allow for providing real time schedule information at stops. PDAs and advanced cell phones also can be used to expand this capability.

Best Practices Review

To develop a picture of the latest approaches and technologies available, a literature review and telephone contact was conducted to identify the most promising approaches that might be applied to the Metrobus system. This effort was supplemented by sight visits to major systems with the most advanced on-street information programs in place. These included Metro New York, Metro Seattle and Portland Tri-met.

OVERALL TRENDS

The best practices study revealed some trends that were developing in the on-street information system approaches nationally. The study also revealed that there is a great deal of diversity in the solutions that different agencies have come up with to address their on-street passenger information and marketing challenges.

Key findings are:

- Virtually all major systems (operating 500 or more buses) contacted had significant on-street programs with a minimum of at least a bus stop flag with route numbers, system I.D. and contact numbers.
- Approximately half had significant schedule information programs.

- Of agencies with market research, all listed bus stop information as a key source of transit information.
- Database linkups for producing on-street information have been major challenges for all the systems.
- Major systems view on-street information as an important component of multi-tiered information system, which includes printed timetables, telephone information, websites and other printed information. Most program managers felt no singular element can fulfill all of a transit customer's or a potential customer's needs.
- 25% of systems are at least experimenting with applications of new real time information systems at stops including LED, PDA and cell phone solutions. Most said they planned to study the additional electronic information.
- Most systems have kept the operation of their on-street information systems in-house. A few contract out the production of paper schedule inserts and we found only one that contracted out the insertion and placement of schedules or signs.
- Stop-specific next bus schedule displays were somewhat more common than the full route timepoint schedule displays.
- Virtually all the systems had larger flag displays than Metro buses. This allows for much larger route number displays resulting in easier reading from greater distances, especially for the visually impaired.

Applying Lessons Learned

This section of the report will outline graphic examples applying the lessons learned as part of the current study, and recommend what might be applied to Metro system. These are not final recommendations but rather suggestions as to what directions might be worth developing further and to raise issues that may require additional research. **Of note:** one of the key findings of the upfront research into this project is that there is very little quality research available nationally or internationally as to the relative effectiveness of various alternatives.

DIVERSITY IN PURPOSE

The way in which-street information is provided at bus stops by various transit systems is as diverse as the nature of the transit systems themselves. Different agencies take radically different approaches to providing the information, based on a variety of factors. These include:

Perception of the importance of bus stop information – Transit agencies have varying perceptions about the importance of bus stop information. Some view the bus stop as an operation or legal necessity, and see no reason to provide much more than a bus stop flag with minimal information. Other systems view the bus stop as a key component of the transit agencies information systems equally, if not more important than timetables, telephone information, or a web site.

Some also view the bus stop as a marketing tool that provides on-street advertising and community identity for the transit agency. Large agencies with internal marketing departments are more likely to have comprehensive on-street information systems including schedule information dissemination. Systems that are committed to comprehensive bus stop information programs (including schedules, maps etc.) view a bus stop as a multi-purpose facility related to the transit system's information system, passenger convenience and safety, and an important part of the system's operation.

They view the stop's functions as:

- A place where the bus stops
- A place to wait for the bus
- A place to access transportation
- A community asset
- A point of purchase branding tool
- A part of the overall information system
- The place where a transit system is introduced to potential and existing customers

The operational characteristics of the system – Large systems with very high frequency services (5 to 15 minutes) often take the position that only minimal information is needed when buses run every few minutes. Whereas systems where frequencies are low (30 minutes or more) are more likely to feel more comprehensive information is needed at stops. Also, the stability of a transit system's schedules can have an impact on the solutions adopted to solve the information challenge at bus stops. Agencies with frequent schedule or routing changes may take different approaches as to what types of information is available

at bus stops, as well as how the information is updated.

The nature of the overall information system – Transit systems have a wide variety of ways of distributing critical schedule and routing information to their customers and potential customers. The bus stop is part of this overall, more complex system and should be designed to work as a cohesive part of it. The overall information systems are designed to provide the right information at the right point in a customer's or potential customer's decision to the ride or trip planning process. There are differences in the information needed, and the way it is obtained differs between new or potential customers and established regular riders. The information system is usually customized to anticipate those needs.

Budgetary Considerations – The amount and types of information displayed and the frequencies of updates are often more a function of budget limitations than a desire of whether or not to provide information at the stops. Most agencies could explain what their information systems cost, but virtually none prepared any cost analysis between different elements of their information programs.

Scheduling Database and Software Interfaces – Large transit systems use a number of different scheduling systems (Trapeze & Hastus based systems being the most common). In addition, there are a wide variety of ways these scheduling databases are translated into scheduling and mapping information which can be displaced at stops. These include:

- Prepackaged add-on software for the scheduling system
- Custom designed in-house software
- Manual input into standard graphics programs


Primary information sources include:

Potential/New Customer	Existing Customers
Pre-Trip Decisions	
Advertising and word-of-mouth lead to the decision to consider riding	Pre-disposed to ride but need new trip ideas on board, as well as promotional materials & internet motivators
In order to seek information on schedules, how-to-ride tips, routes and fares they utilize: • Telephone Information • Website • Timetable & collateral Materials • Friends • Bus stop information	Need basic route and schedule information: • Timetables • Website • Bus stop information • Telephone information
Pre-Trip Decisions	
• Bus stop information • Exterior bus systems (Destination signs audio) • Timetables • Drivers • PDA's Cell Phones • On board information systems (Audio, LED)	• Bus stop information • Exterior bus systems (Destination signs, audio) • Timetables • PDA's, Cell Phones • Drivers • On board information systems (Audio, LED)

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Research Findings

Though existing market research about transit information systems is relatively scarce, it is almost non-existent when it comes to bus stops. Specifically, some insights can be gained by a review of the results from these few studies, as well as the anecdotal information provided by those interviewed for this study and other sources. For this study we reviewed the bus stop information systems of large transportation systems which faced similar challenges to WMATA. Of this group, (all operating fleets of more than 500), there was a general understanding of the importance of bus stops as part of a system's information program and operations.

Of those major systems, all had formal on-street programs

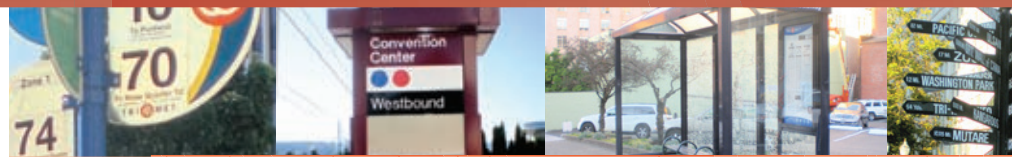
- All had a minimum of bus stop flags with route I.D.s
- 50% had some form of schedule information programs
- 50% had maps and other supplemental information
- 25% had some form of electronic information available at stops, either schedule database based or GPS real time based
- 80% of systems with formal marketing programs had schedule information systems at stops
- Of those with market research on the subject, 80% listed the bus stop information as a key source of transit information

Though there is a lack of up-to-date consumer market research, some insights can be found in small sample national surveys, and research done on systems of similar complexity. One consistent finding expressed in various ways is that accessible, accurate transit information is one of the most important services a transit agency can provide.

SPECIFIC RESEARCH FINDINGS:

A survey conducted by the University of Minnesota indicated that passengers would pay higher fares for better transit information (up to 90 cents). A study undertaken by Seattle Metro (when they last redesigned their on-street information system and reconfirmed by a study last year) indicated that having schedule information at stops was seen as very valuable to over 80% of passengers. Nearly 75% said it was where they normally would go to find transit information. In agencies where bus stop information system findings were found in secondary research, it was reported that when rated for importance by passengers, between 40 and 80% of passengers thought the information provided at bus stops was somewhat, to very important. The lowest rates were for systems that provided the least amounts of information – the highest were for those systems with the most advanced programs, including an option for real time display of schedule information on PDA / Cell Phone / GPS.

Information System Solutions



Based on the various factors listed above, transportation agencies have come up with a wide variety of solutions to on-street information programs, but the issues underlying all of them can be summarized into basic categories:

- Amount and types of information to be provided
- Developing an information hierarchy
- Conventional street hardware issues (poles, flags, schedule holders)
- Conventional Information display formats
- Production and distribution systems for changing bus stop materials (includes software and interface with scheduling systems)

TYPES OF INFORMATION

The first decisions that transit agencies have to make is what types of information should or realistically be displayed at a stop, and this may vary by the type of stop. With some agencies these choices have been made haphazardly, while other agencies have made a very structured analysis of what types of information are appropriate.

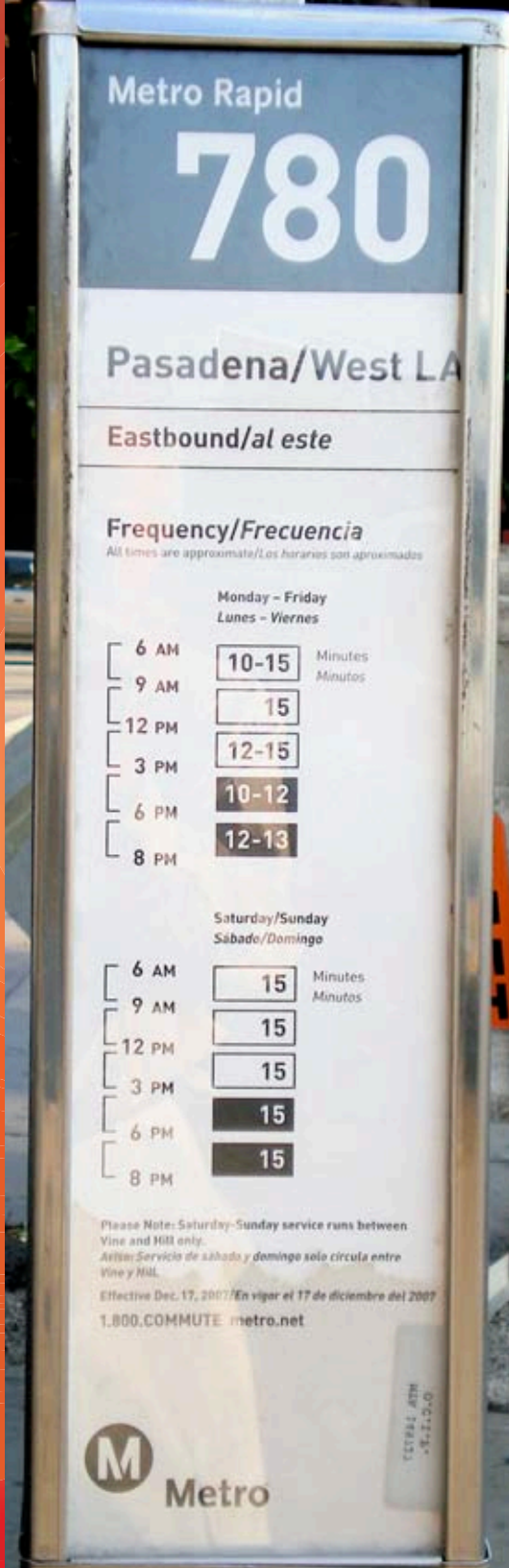
The types of information most commonly displayed with varying levels of prominence are:

- A bus stop flag with system identification and usually numbers for those routes serving the stop
- A phone number
- A website address
- Route name identification (usually relating to the bus destination sign for that route, which helps with directional decisions)
- Printed schedule information
  - Full line schedules
  - Timepoint group specific
  - Stop specific schedules
  - Frequency tables
- Maps
  - Route specific
  - System maps
  - Area locator maps
- Electronic information
  - Real time or scheduled
  - LED or CRT displays
- Interactive
- Unique stop numbers for use with automated schedule information systems
- Stop location information (i.e.: 16th St. / K St. NW)
- Accessible I.D.
- Braille information
- Fare information
- How-to-ride information
- Marketing promotional postings
- Distribution racks for timetable and promotional materials
- Service change bulletins


BUS
19
24
33
250
252
255
257
260
261
265
266
268
311
545
METRO
Downtown Metro Service


NO STANDING
Javits Center/
42 St Pier
West Harlem
M42
M10


8
10
Zone 1
70
77


Metro Rapid
780
Pasadena/West LA
Eastbound/al este
Frequency/Frecuencia
All times are approximate/Los horarios son aproximados
Monday – Friday
Lunes – Viernes
6 AM
9 AM
12 PM
3 PM
6 PM
8 PM
10-15
15
12-15
10-12
12-13
Minutes
Minutos
Saturday/Sunday
Sábado/Domingo
6 AM
9 AM
12 PM
3 PM
6 PM
8 PM
15
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15
15
Minutes
Minutos
Please Note: Saturday-Sunday service runs between Vine and Hill only.
Atención: Servicio de sábado y domingo solo circula entre Vine y Hill.
Effective Dec. 17, 2007/En vigor el 17 de diciembre del 2007
1.800.COMMUTE metro.net
Metro

Developing an Information Hierarchy

Virtually no system displays all the information listed in this report at each stop. Most reported giving a great deal of thought to developing a hierarchical approach to what information should be most prominent for riders to easily navigate the system.

THE INFORMATION HIERARCHY PROCESS

Most agencies interviewed said developing this hierarchy should:

- Be driven by how a customer or potential customer is likely to approach their need for information at a stop
- Consider the nature of the service and how its operating patterns might impact the need and type of information provided at the stops
- Factor in stop configurations as well as financial factors in developing the final solutions

The first step is to consider what types of information are needed by what kinds of riders or potential riders. Making sure that high priority information is most prominently and frequently displayed can be accomplished by a variety of graphic design approaches. The general consensus as to what the most critical information elements are – with virtually all the system managers interviewed – were placed in the following priority order:

- A bus stop flag with system identification – The bus stop flag serves multiple purposes: it is a way to identify where passengers should safely board the bus, it identifies the agency providing the service and it can serve as a marketing tool by identifying where bus service is being provided, so people not familiar with an area can immediately identify the option of transit.
- Route numbers serving the stop – The numbers serve as a critical navigation tool in that they relate the sign to the more comprehensive information system. Without knowing the route number serving, it's difficult to obtain the right timetable, web or phone information. It's also a reassuring device to let passengers know they're at the right stop.
- Route names – displayed in conjunction route numbers. The route name usually reflects the overall route name but is frequently used to connote direction in conjunction with the bus destination sign.
- A phone number – For a potential user who just saw the sign it can connect him to the transit agency's information system for the first time. It can also serve regular users to obtain schedule or other information.
- A website address – Can serve the same purpose as the phone number, and with the increasing reliance on the web and the increased use of PDAs and sophisticated cell phones, it's a feature that's becoming more important.
- Printed schedule information – Virtually all the managers interviewed spoke of the popularity of this information with customers. Where research existed, it supported this anecdotal evidence.
- Route specific maps – These serve to both help riders locate themselves and to navigate where they are going. When there is more than one route at a stop or service patterns are complex, these are almost critical for the rider to make the right choice.
- Unique stop numbers – For use with automated schedule information systems in some areas over 80% of the population carry cell phones, a unique stop I.D. provides easy access to automated scheduled information or even real time information. The stop numbers can also be useful in system maintenance and updated activities.
- Accessible information – It is seen as increasingly important, although actual standards have not been developed. At a minimum,

systems are now placing accessible symbols at stops that truly have accessible access. Some systems also provided Braille postings of where route and schedule information can be obtained.

Where available, displayed electronic information (especially GPS real time information has proven very popular), virtually all the information managers interviewed indicated that they were pursuing electronic information systems. However, currently only a small percentage of stops in any system provided electronic information displays. The other types of information mentioned earlier in this report are largely seen as optional enhancements that make sense at busier stops and important transit hubs, but are optional based on system characteristics.

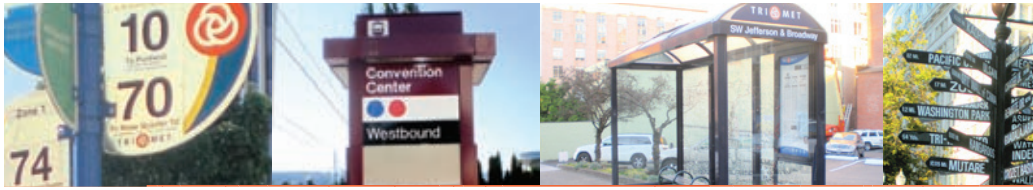
PRESENTING THE INFORMATION IN AN EFFECTIVE MANNER

Just focusing on the top ten types of information at a typical bus stop presents challenges in design and maintenance. Different systems have come up with a wide variety of solutions, but the thinking behind the solutions tends to be similar.

The priority and function of a few principles are generally applied:

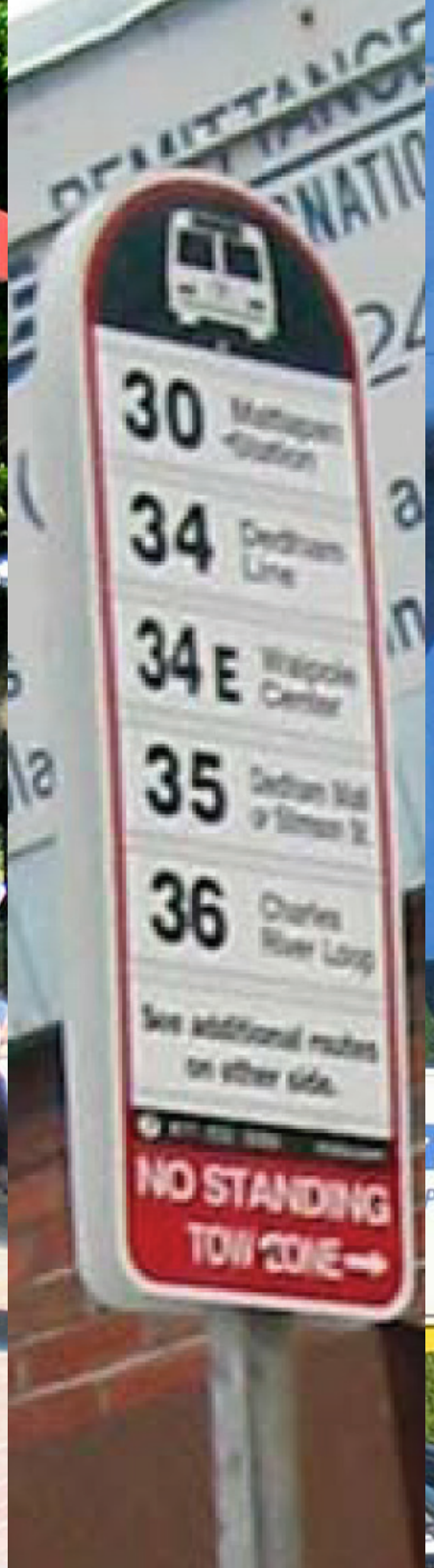
- **The system identification flag** is considered crucial and generally the most prominent feature of a stop. The flag not only serves as part of a transit agency's branding effort, but also ties it to communities letting people know exactly where bus service is available, and identifies specific services offered. The flags almost always include the system's name, logo or some graphic element to clearly tie it into the system's brand. Most bus stop flag signs are larger than those used by Metro, with most being approximately two feet high by 20" to 24" wide. Virtually all used reflector type material.

  In some systems, major stops have signs that are even more prominent with large pylon displays replacing the standard bus stop. In most cases these pylons incorporate schedule information and mapping.



- **Route numbers** were displayed on the flags in large type to show the routes – two to three inches high being the norm.
- **Route names**, where used, were usually displayed in conjunction with the route numbers in approximately the same type size. Smaller type was used to indicate specialized categories of service such as express or limited.
- **Phone numbers and website addresses** were usually included in relatively smaller type – three quarters of an inch to one and one quarter of an inch high – at the bottom of the bus stop flag, if the stop did not have a schedule information holder. At stops with schedule information holders or panel displays, the phone numbers and website addresses are usually included in the changeable printed pieces.
- **Printed schedule information** was presented in a wide variety of formats. The differences in the formats were largely based on four basic approaches to presenting the information.


Lloyd Center
NE 11th Ave
Westbound
TRIMET
Lloyd Center
NE 11th Ave
Westbound


30
34
34 E
35
36
NO STANDING
TOW ZONE


140
Burien
191
Downtown Seattle
174
Downtown Seattle
194
Downtown Seattle
180
Burien
King County
METRO
206-553-3000
transit.metrokc.gov


BUS
RIDE
FREE
AREA
METRO
10
11
15
LOCAL & EXPRESS
18
LOCAL & EXPRESS
CUSTOMER
INFORMATION

Complete Route Schedule Information

In about half of the systems, the schedule information presented at the stops showed essentially a timetable schedule block showing schedule information for the entire line serving the stop.

The advantages cited for this format by those who use it is that it makes trip planning more convenient because it provides passengers with the ability to calculate the time of arrival at a destination. This approach is also somewhat easier to adapt to, in that the same information piece can be used for an entire line. This simplifies tracking, inventory and installation.

The primary disadvantage of this approach is that unless the schedule holders are large enough, print size can get very small. To avoid this, it is usually necessary to either offer a variety of display sizes at stops, or install multiple schedule holders at stops with numerous routes. Otherwise, either schedule readability deteriorates, or certain route schedules have to be deleted at stops.

Timepoint Specific Schedule Information

Timepoint specific information is provided by most of the rest of the systems. This is where the schedule shows departure times, the closest timepoint prior to the specific stop. The advantage to this format is that it provides the most important information needed by the passenger (what times the next bus arrives) prominently. It also cuts down confusion because it does not provide an overload of information by showing times for every stop on the line.

A significant advantage of this approach is that by limiting the amount of timepoint information provided to just the related stop, type sizes can be larger and more routes can be shown in a specific schedule holder.

Stop Specific Schedule Information

New York's MTA is unusual in that it provides stop specific schedule information at virtually all of its 14,000 stops. This approach has the advantage of providing passengers with exactly the most important information they need: what time the next bus is scheduled to arrive at their specific stop. They don't have to calculate distances and running times from the previous timepoint.

This approach does require a fairly advanced software package, to not only calculate the schedules for every individual stop, but to actually produce thousands of unique stop displays.

Frequency Schedule Charts

Some systems post only the frequency of service available at specific times of day. The advantages of this approach is that it is the simplest approach – in terms of the amount of information presented to the passenger – and it is the easiest system to maintain because the information doesn't have to be routinely replaced with schedule adjustments.

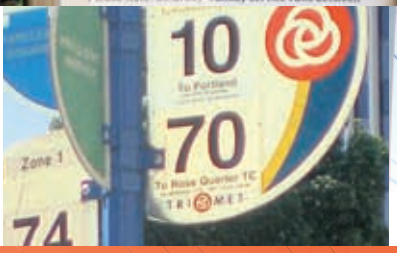
This approach has only been applied to lines with very high frequencies (better than every 15 minutes) or on lines with memory fixed interval headways (i.e. every 30 minutes starting at 8:00 a.m.)

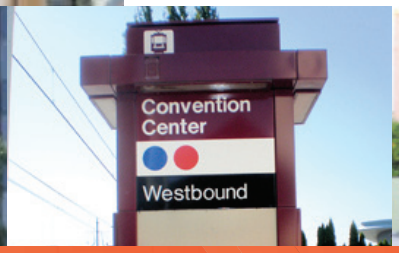
Unique Stop Identification Numbers

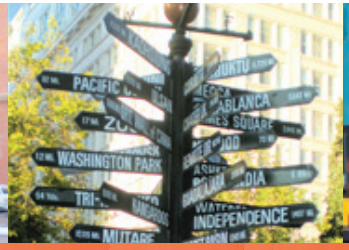
Stop identification numbers are used by systems that have various types of automated information systems, such as automated telephone schedules, real time information or PDA/ cell phone digital services. Usually they are displayed with a similar prominence to the telephone number on all flags in the system.

The advantage to this approach is that, when linked to a GPS real time or automated schedule information system, complete schedule information is available at every stop in the system. Tri-Met is actually replacing printed schedule information at some of its less used stops with this system.

The systems can also be instantly updated with schedule or service change information







Different Agencies Have Different Hierarchy Approaches

Because many systems similar to Metro operate very complex service patterns, they've had to develop different hierarchies of information for different types of stops.

For example: Tri-Met in Portland Oregon uses a number of criteria to determine which of its four information configurations are applied to different stops. Some factors that go into the amount and types of information at stops include:

THE LOCATION OF A STOP

Stops near the end of the line in the out-bound direction get the most basic information configuration for Tri-Met consisting of: A bus flag with a system logo, bus route number and destination, bus stop number identification and a phone number.

- Low volume single route inbound stops include the same flag information plus a schedule holder that shows a line map.

- Higher volume or multiple route stops add printed line specific schedule information.

- Stops with the highest volume of passenger traffic, such as in downtown areas or at transit centers, get customized treatments including large pylons that replace the standard flags, real time schedule information CRT displays for all the routes serving the stop, system maps and area locator maps.

THE FUNCTION OF THE STOP

- Stops that serve as transfer points for other bus lines include printed area maps, line maps and schedule information for the routes serving the stop. Some also have real time LED arrival information.

- Stops with a lot of tourist or visitor traffic also have printed schedules, line maps and area locator maps.

Approach To Street Hardware

The choices that have been made in street hardware including poles, flags and schedule holders reflect the wide variety of informational priorities facing the systems studied. The one element that is universal is the bus stop pole with a flag on top.

BUS STOP FLAGS

Most systems use a relatively standard sized flag usually from off-the-shelf metal blanks with basic design applied with a vinyl application or various silk screen techniques. The route number, and other changeable information such as stop numbers, is applied with vinyl applications. The base signs are usually produced in mass with appropriate stop specific information applied as needed.

Some systems use stylized custom cut blanks as part of branding scheme to make their signs stand out from normal traffic signs and also to distinguish special services (i.e. Los Angeles, Portland).

New York's bus stop flag system is different than most systems. Instead of a simple single element flag, New York uses a modular system. The flag is a circular sign at the top of the pole featuring the international symbol for a bus, and are customized for each stop. Individual small panels are used to show the route number and name as well as the specific stop location.

SCHEDULE HOLDERS

Those systems that do display schedule information at stops normally use a metal or plastic information holder attached to the flag stanchion pole. They utilize paper or laminated paper inserts to actually display schedule and other data. Most systems use off the-shelf commercially available schedule holders. One of the most common of these is the schedule box used by WMATA and other major systems such as New York and Metro LA, but there are a variety of other commercial systems available.

Other systems use custom components developed as part of branding programs. These include London, Seattle and Portland. Most of these custom systems were developed from the ground up and involve different fabrications for different stop types. They function not only to provide customized information for each stop but also to link the transit brand to the environment it operates in.

One property (Metro, Los Angeles) uses a unique vinyl application to the bus stop flag pole to display a frequency schedule along high frequency routes.

BUS STOP SHELTERS

Many systems incorporate their bus stop shelter program with their bus stop information program. For example: Tri-Met's stop criteria specify that shelters should be installed at certain volume stops and at those same stops it requires that schedule and map information be placed in the shelter, not on the bus flag pole. The advantage of this approach is that in-shelter schedule displays provide more space for schedule information and maps.

Production Technology

SYSTEM SOFTWARE

All the systems reviewed have computerized scheduling software which serves as the base for their on-street information schedule information programs. However the interfaces between the schedule database to the actual display is the most important part of the information system. According to the information system managers, their goal with all these interfaces is to minimize the manual manipulation of data in transferring data from the scheduling database to the displayed bus stop information piece. Yet all to one degree or another have some element of manual formatting or editing involved in the process.

The most sophisticated systems keep the level of manual manipulation to a minimum. The three most sophisticated systems we discovered with least amount of manual manipulation were MTA New York, TriMet Portland and Metro Seattle.

In these systems, all based on Hastus scheduling databases, went seamlessly, from database to bus stop schedule printouts with minimal formatting.

The interfaces with the database were all different however. In the case of Portland, which displays a complete timetable schedule block printout, they have created an internally developed software program package for the translation. The program's final product includes an installer's printout that describes exactly where each schedule is to be posted. It also customizes the printout by schedule holder design and the number of different schedules to be displayed in the schedule holder.

Metro Seattle also uses an in-house developed system, (which they admit is dated and slow), which produces timepoint specific schedules and master format schedules identified by those timepoints. To get to the final printouts the master outputs have to be manually sorted for specific stops and schedule holder formats.

MTA New York's system produces schedules that are stop specific. The system utilizes the most sophisticated computer management system investigated. It's based on an off-the-shelf module of the Hastus scheduling software designed specifically for bus stop information. However MTA invested a significant amount in customizing the software for the New York agency's needs. The resulting package provides the following features:

- It not only provides posted schedules by timepoint, but stop specific based on an internal algorithm that predicts the running time between timepoints and individual stops.
- The program produces stop specific final graphic format schedules for all of the system's 14,000 stops with schedule information.
- It produces printouts in stop order as a continuous automated process or selectively by a full line, stop or line segment with location identification on the printouts.
- In the case of emergency reroutes, the system automatically shifts the running time for a route and readjusts the schedules for each stop.

STOP PRINTOUTS

The actual printing of materials for posting is similar at most properties. Most print text files from their schedule database and transfer it to a standard graphics program to create the actual postings in the graphics program. Most also use standard laser printers to print materials out. This frequently requires trimming materials manually for placement in various types of schedule holders. Most systems also go through an additional step of laminating the paper printouts to make them more weather resistant.

Maps posted at stops are usually produced independently of the schedules on in a standard graphics program.

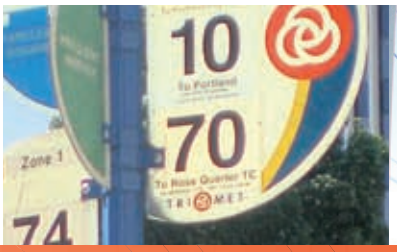
Exceptions were found to this procedure. MTA, New York schedules are printed fully-formatted and to size, directly from an add-on to their scheduling database. There is no manual interface except for proofing and correction purposes. MTA's scheduling database is also used to produce initial route maps, which are then edited and formatted utilizing a standard graphics program.

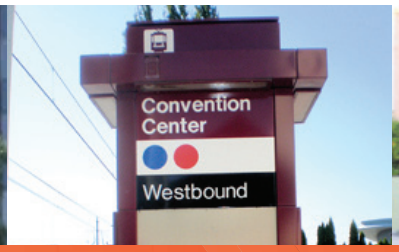
Interestingly, rainy Seattle does not laminate its paper outputs. Instead it uses a unique "Right in the Rain" paper, which allows it to skip this laminating step.

POSTING THE INFORMATION

The differences in the procedures systems used to actually post stop schedule and map is based largely on how often they change schedules and their sense of how fast they feel schedules should be changed out. Seattle changes out every schedule at 8,000 stops during three service changes and they do it over three-day periods. This requires up to 30 staff members working full-time during service changes. The staff that accomplishes this includes 4 full-time members who work on general system upkeep during the year, and 26 bus drivers from Metro's part-time driver pool.

Portland, Oregon changes out only those schedules on routes that have schedule changes and need specific schedules during three service changes. They accomplish this by using 6 full-time employees from their stop information staff.





Advanced System Sight Visits

What follows is an overview of systems which have developed the most comprehensive state of the art on-street information systems in the country. Much of their experience and many of their solutions to providing on street information can be applied to the Metro environment.

MTA NEW YORK, NY MTA

New York operates one of the most complex and comprehensive systems in the nation. It's noteworthy that its application software technology allows it to both produce and manage the system and it also to produce stop-specific schedules at nearly 18,000 stops and produce the actual inserts in one fully automated process, based on its Hastus scheduling system. The schedules are changed three times a year, as needed, at fixed service change intervals. During any given service change, 30% to 80% of schedules at stops are changed.

BUS STOP INFORMATION CONFIGURATION

By limiting the schedule information to stop-specific stop times, MTA is able to put schedule information for more routes in the same size schedule boxes as used by Metro. It also allows them to keep typefaces at a readable size. However, New York's schedule time blocks are displayed in a unique format that probably is not directly applicable to the Metrobus operating environment.

New York uses a modular flag system that shows all the routes and destination services at a particular stop. The flag displays are considerably larger than Metro stops. MTA's modular flag system also allows it to easily identify the stops unique location (Broadway and 42nd).

The system's schedule boxes are the same as used by Metrobus and each contains complete schedule and map information for all the lines serving a stop. Two unique characteristics for a large system that makes use of the same size displays at all stops possible are:

1. New York's bus route system is extremely linear, relating to the city's grid street layouts; therefore very few stops have more than two or three routes serving a single stop.
2. Where there is a likelihood of a large variety of routes going by a particular stop, MTA creates multiple stops in a staggered pattern along a city block.

The information elements provided at each stop include:

A multiple element flag at the top each pole that includes:

- A circular universal sign at the top of the sign pole featuring an international bus symbol and a no parking message

- Modular component route number and route name panels with four inch high route numbers and slightly smaller route name type. The number components also serve to indentify which carrier serves the stop by color coding and letter codes (i.e.: M29 means and MTA route number 29, NJ30 means a New Jersey Transit route number 30)

A schedule box (the same as WMATA's) which includes:

- Complete schedules customized for the estimated arrival time for each route that serves the specific stop
- Color coding is used to identify specific types of service (i.e.: express, limited or school tripper service)

- Schedules are supplemented by individual route maps for routes serving the stop
- At some stops, where space permits, some of the panels are used for promotional or how-to information
- With a few exceptions, virtually all the stops in the system use exactly the same configuration

PRODUCTION METHODOLOGY

New York's MTA system is the largest and most complex in the nation and its schedule information production is designed to deal with the challenges of providing customized information at 14,000 stops. The task is accomplished by utilizing a sophisticated adaptation of scheduling management software package called Hastus. The package is the schedule development program for the entire MTA system including rail and bus.

Two modules – somewhat customized – have been added to base software to specifically generate the bus stop schedule. The modules accomplish two critical functions that dramatically improve the detail level of the schedule information at each stop.

One module includes an algorithm, which takes the scheduling system timepoints, and accurately generates schedules specific to individual stops. The geocode-based system even allows automatic updates of all the schedule holders on a route for an emergency re-routing of a line by pointing and dragging on a route map. This allows MTA update all the schedule boxes on a line in two or three days. Most of the time spent updating the schedule boxes is actually spent in the installation of the new schedules.

Another module formats the individual generated schedules into the standardized graphic presentation of the information including elements such as logos and layout to fit in the schedule boxes without having to manipulate the material in a graphics program. The geocode elements of the system also produce the base maps used for the route maps. These maps are, however, formatted using a traditional graphics program. The system output goes directly to the printer and is produced in final postable format.

In addition, the system produces output for entire lines, stop by stop, in order, in a one stroke process. It also allows a program manager to print out single stop schedules or line segment. The individual and segment printing feature is used for maintenance and unanticipated schedule changes.

The completed schedule panels are then laminated for placement by full-time bus stop maintenance crews. The whole process is monitored by a database connected to the central schedule database. Another module in the system is used to produce the schedule blocks for timetables and posting on the agency's website. The entire process is maintained by in-house staff.

METRO, SEATTLE, WA

Metro, Seattle has one of the oldest large-scale schedule information systems in place, and has had their system in place since early 1980. The system covers approximately 6,000 of its 8,000 stops with timepoint specific information at that stop. Unlike New York, it does not provide unique schedules for each stop, but shows the nearest proceeding timepoint so that three to six stops may be grouped together by timepoint.

BUS STOP INFORMATION CONFIGURATION

Unlike the New York MTA, Metro does not attempt to apply "a one size fits all approach" to its system signage hardware. There are essentially five categories of stops, each with a different hardware configuration. These are:

1. Sheltered stops with customized large multi-route schedule kiosks featuring system and area maps. There are multiple size configurations for these kiosks as well as shelter sizes.

2. Sheltered stops with customized schedule holders, standard flag branding pole with route numbers.

3. Unsheltered stops with a branded flagpole and stop customized schedules, in a variety of schedule holder sizes.

4. Non-sheltered stops with just the branding flag pole and no schedule holder.

5. Bus tunnel (Metro operates a large number of its suburban services buses through a tunnel under Seattle's downtown) and light rail stops with customized and interior signage

The basic information presented at each of the stops includes:
A single or multiple element flag at the top of each pole that includes:

- An international bus symbol
- An accessible status statement or symbol
- Route numbers serving that stop
- A Metro logo
- A schedule holder (the size and number of these schedule holders vary according to the number or complexity of the routes serving the stop) display includes:
  - o Complete schedules customized by nearest timepoint. The location of that timepoint is noted in the schedule.
  - o The schedule holder material also includes the stop's unique stop number. This number is used to access an automated schedule information system (not real time) and in sign and schedule maintenance activities.
- At busier stops larger (multiple size) kiosks display the same information as listed above, but add either a system map or at some locations:
  - o Schedules are supplemented by individual route maps for routes serving the stop.
  - o Panels are used for promotional or how-to information.

A basic consideration that drives the large number of schedule holder and kiosk sizes, and showing estimated arrival times only is Metro's commitment to maintaining large point sizes (12 to 14-points in schedule blocks).

PRODUCTION METHODOLOGY

Though the Seattle system is the oldest large scale on-street information system in the country, it has been upgraded consistently over the last 25 years. The basic sign and hardware designs as well as the formatting of information were completely redesigned approximately 15 years ago, and are now being upgraded again. All upgrades have been based on extensive market research and technology adaptations.

The software has been updated over time to reflect those redesigns and improved technologies. The original scheduling database was developed in-house. The original bus stop schedule had to be manually entered into the stop signage program as well as the timetable schedules. The system was later upgraded to provide a text transfer of schedule database information directly to timetable and schedule information programs, but still required manual formatting of the information into a variety of timetable and schedule holder formats. The reformatting was done with standard graphics programs.

The current system is based on Hastus schedule planning program adopted by Metro to replace its older in-house system database. Metro determined that adopting new bus stop scheduling and timetable formatting would be more problematic than developing new systems in-house or buying off-the-shelf modules for the system.

Maps posted at stops were developed conventionally using standard computer graphics program. The actual assembly of specific stop information packages is a manual process, though it is managed and tracked through a database.

One unique feature of the Metro process is that in rainy Seattle, Metro does not laminate its bus stop schedule materials. Instead they use a "Right in the Rain" paper, which is designed to resist water damage, and Metro contracts out the actual printing of the individual paper schedules.

Metro also has a somewhat unique approach as to how it manages to change every schedule holder in the system three times a year over a 3-day period. It has a small crew of 4 to 6 full time field crew members in the marketing department, but during schedule changes this crew is increased by utilizing 30 to 35 bus operators (recruited from Metro's part-time driver pool).

TRIMET, PORTLAND, OR

TriMet in Portland, OR has one of the more complex total passenger information found as part of this study. It posts passenger information it posts schedule and map information at 90% of its stops, and also relies heavily on real-time information systems via cell phone/PDA and electronic signs at a large number of its stops. TriMet also has a complex number of configurations for its stop information and signage depending upon function and location.

BUS STOP INFORMATION CONFIGURATION

TriMet's bus stop hardware configurations are complex because of six primary considerations:

1. TriMet's street furniture design is based on a commitment to integrate stop appearance with urban design.

2. The downtown system's appearance is integrated with an urban art program as well as basic urban planning goals. TriMet is also committed to branding itself clearly in relation to the community.

3. TriMet operates an extensive light rail system which is fully integrated with the bus system and requires special information system adaptations.

4. The agency is trying to adopt as many new technology applications to provide real-time information at stops based on Portland's technology-savvy populations, as well as the high penetration of the population carrying cell phones or PDA devices.

5. TriMet's fleet and scheduling is 100% GPS monitored.

6. Research indicates that even with advances in technology, a large percentage of their riders are not technologically sophisticated enough to use electronic information systems. Printed hard copy information is still important.

The resulting hardware involves a variety of stop configurations incorporating a variety of branding, urban design integration, and information technologies.

The most basic traffic stop includes a customized component flag system with panels that include:

- TriMet's logo
- An international bus symbol flag
- Route numbers
- Other system logos where appropriate

- A unique bus stop identification number for use with a real time GPS schedule information system

The next level stop, based on passenger volume adds:

- An information holder with route map
- Additional how-to information specifically related

The next level upgrades the information includes:

- An information holder with route map and a full lineup of schedules for the routes servicing that stop.
- These stops may include multiple information holders on the same pole depending on the number of routes.
- Stops that have shelters based on traffic volumes change the hardware configuration to include the basic branding pole flags and signage, and place schedule information panels and individual maps on display inside the shelters.
- LRT Rail/Bus Stop interfaces use standard bus stop branding flags, but also more complex LED displays and rail system-related information.
- In downtown Portland, rail and bus stops provide custom advanced real-time information for all rail and bus operations at the stop, as well as area locater maps and additional how-to-ride information.
- TriMet is currently redesigning its downtown stops to provide advanced LCD flat panels in shelter displays and large kiosk information pylons.
- Some higher volume shelter stops outside Portland's downtown area may also include real-time LED displays showing the next bus arrivals for the routes serving that stop.

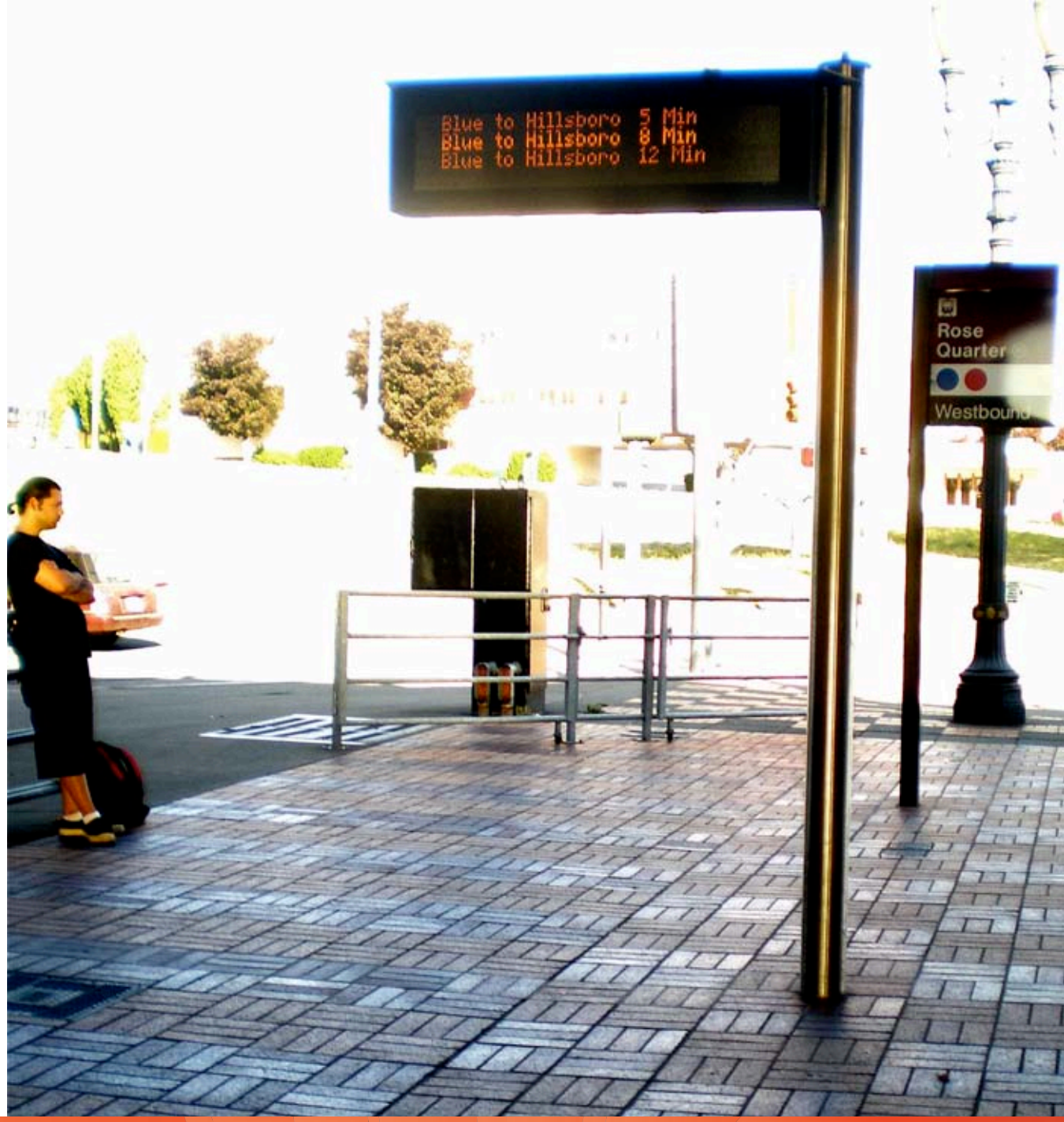
PRODUCTION METHODOLOGY

Portland has been developing an information system over a number of years. Most software behind the multi-faceted program was developed in-house as an integrated program. Elements driven by the program include:

- A printed schedule information display program driven from a scheduling database. The program produces schedule blocks on a route-by-route basis generated by the system's timetables.
- A website system based on the same database which provides trip planning capability and real-time status information for PDAs.
- A real-time output that works by providing automated verbal information for cell phones and landline phones based on unique stop numbers.
- A yet-to-be installed advanced LCD display system for downtown stops providing a variety of formats.

TriMet's IT division, in conjunction with its marketing department, maintains the electronic elements of the system.

A permanent crew of marketing's bus information group distributes the on-street printed matter. On-street information is replaced only when there has been an actual service change. The Portland program also uses a GPS-based location system that automatically provides crews in the field with the information they need to change at a particular stop. The system enters actual activity into a centralized database to maintain an accurate inventory of each stop.



Implications

Viewed in the context of how other sophisticated on-street information programs are designed and maintained, Metro's program is similar in many ways and by its very scale one of the more impressive of the programs, but there are significant differences.

Metro can learn from these differences and apply some of the approaches of the other systems to improve its own program.

Metro shares the commitment that the other major systems are based on in that it believes on-street information is an important part of its actual service and can be a marketing tool to support trial ridership. However it differs from the three case study selected cities in very important ways:

1. It does not actually service its on-street information program in the field, but relies on its transit advertising contractor to maintain the display materials. This contractor in turn sub-contracts this activity to another small group to do the actual display updating. There is very little incentive for the current Metro contractor to dedicate much effort to the program. All the case study agencies keep the entire operational aspects, including the placement of materials in-house for better control.

2. Metro has not reviewed its program for a number of years, where the state-of-the-art case study agencies have gone through two or three major design and software upgrades of their programs in the last 10 to 15 years.

3. All the case study agencies use a Hastus scheduling database which offers off the shelf timetable and on street schedule information derivatives to translate the scheduling database directly into customer information materials.

4. Metro operates in a more complex multi-jurisdictional system than most of the other systems (MTA New York being an exception.)

CHALLENGES

All of the systems studied face some of the same basic issues Metro does in providing quality on-street information. These include:

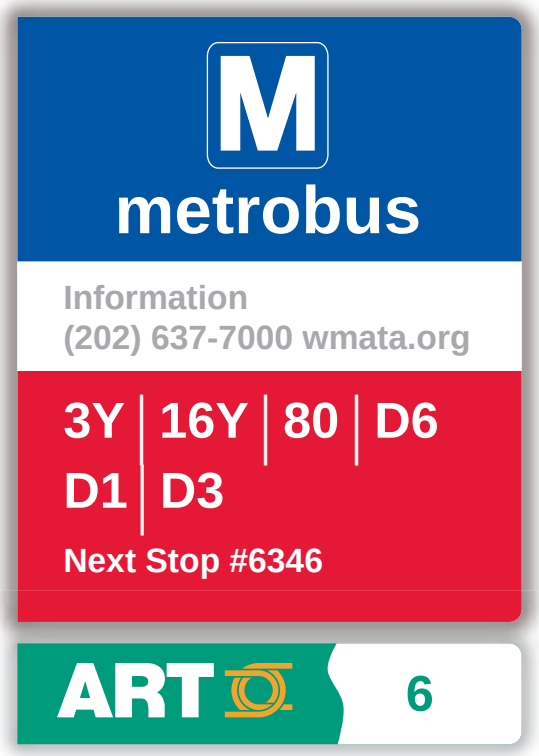
- How much information is too much information and what isn't enough?
- How does the on-street program relate to other information sources (i.e. timetables, web)?
- What sort of resources should be applied to the program?

Possible Approaches To illustrate the variety of ways Metro might address the challenges of providing a customer or potential customer with appropriate information at a bus stop this memorandum includes the following formats for providing essentially the same information. Each format has advantages and disadvantages.

BUS STOP FLAGS

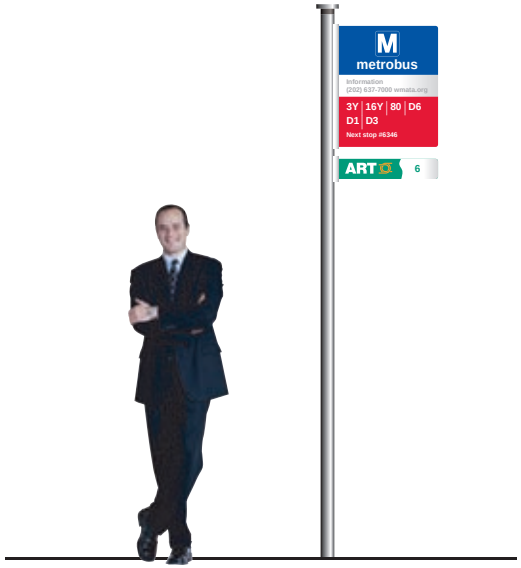
All of the approaches to the Metro bus stop flags utilize a design similar to what is now on street. However they all more than double the size of the existing flags. Metro's current flags are the smallest of any system studied and limit type sizes to the point where route numbers are almost unreadable from a distance. All the new formats also include a dramatic missing element from the exiting signs, a Metro logo.

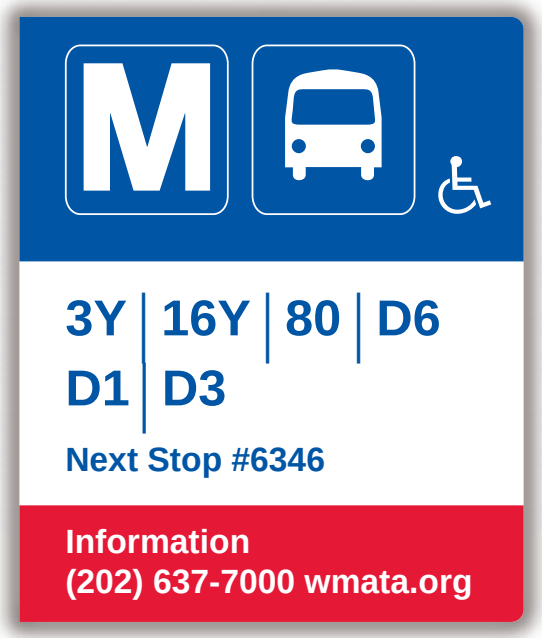
They all also include a unique bus stop identification number (based on the existing Next Bus program but adaptable to other electronic information systems.) The current Next Bus signs are inconsistent with the flags above them and add to clutter on the poll.



BUS STOP FLAG #1

This is a basic configuration for the sign but displays how a secondary system route I.D. can be incorporated as a matching small flag maintaining a local system's identity. This format could be reversed where the sign owner and system operator would display Metro the way ART is in this example.





BUS STOP FLAG #2

This configuration adds an international symbol for a bus and an accessible symbol to help individuals identify safe access stops.

BUS STOP FLAG #3

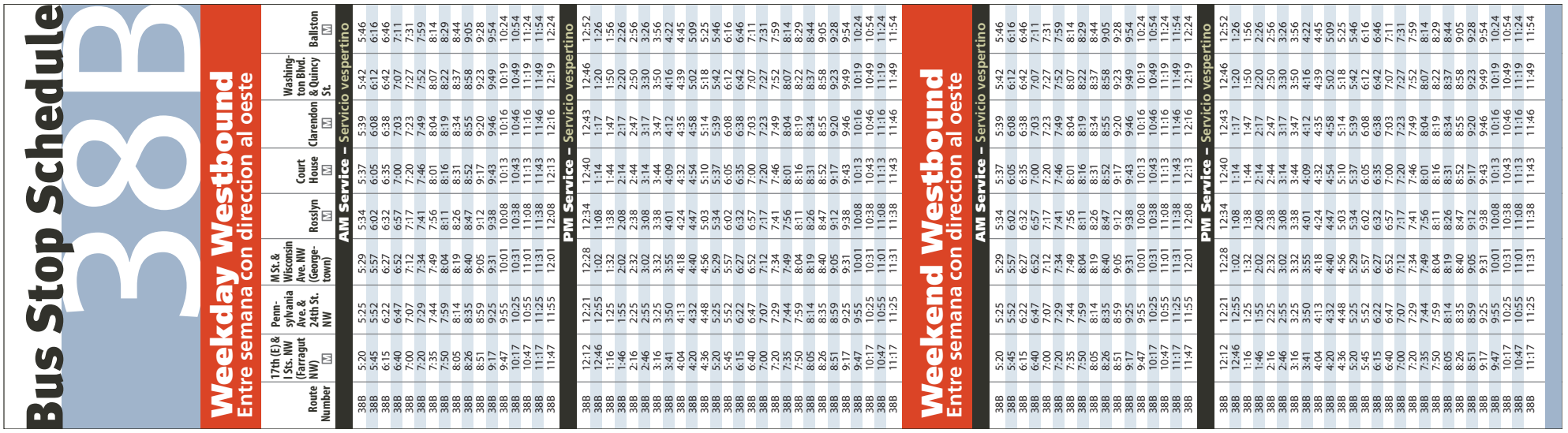
This configuration incorporates all the elements of version 2, and adds modular route signs or inserts below the base sign. The modular signs include route numbers and names as well as indications of which Metro rail lines the route serves.

SCHEDULE INFORMATION DISPLAYS

There are a variety of approaches to providing schedule information at stops. All the variations shown here assume that they would be accompanied by route specific maps. Each variation makes compromises between the amount of information provided and the realistic limitations of how much readable information can be displayed in the standard Metro schedule box.

SCHEDULE VARIATION 1

This is a configuration of how Metro currently displays schedule information showing all the stops along the route and all the trips during the day. The route chosen operates on typical frequencies for Metro. The display indicates how this information would fit into one panel of the existing bus stop schedule boxes. Higher frequency routes would result in reduced type sizes. The font at scale shown here would be about 12 points (the same as you are now reading) more complex routes would use smaller type faces.



SCHEDULE VARIATION 2

This version emulates a format used by New York's MTA. The times shown represent departure times from a particular stop and no others.

BUS STOP SCHEDULE

Destination:
Westbound/Ballston M

This Stop:
17th (E) & I Sts. NW (Farragut NW)

38B

Posted Date:
January 2009

Weekday

Hours of operation from 6:20 AM to 11:17 PM

Hours		Frequency of service
AM	12:	-
	1:	-
	2:	-
	3:	-
	4:	-
	5:	**20, 45**
	6:	**15, 40**
	7:	**00, 35, 50**
	8:	**05, 26, 51**
	9:	**17, 47**
	10:	**17, 47**
	11:	**17, 47**
PM	12:	**12, 46**
	1:	**16, 46**
	2:	**16, 46**
	3:	**16, 41**
	4:	**04, 20, 36**
	5:	**20, 25**
	6:	**15, 40**
	7:	**00, 20, 35, 50**
	8:	**05, 26, 51**
	9:	**17, 47**
	10:	**17, 47**
	11:	**17**

Weekend

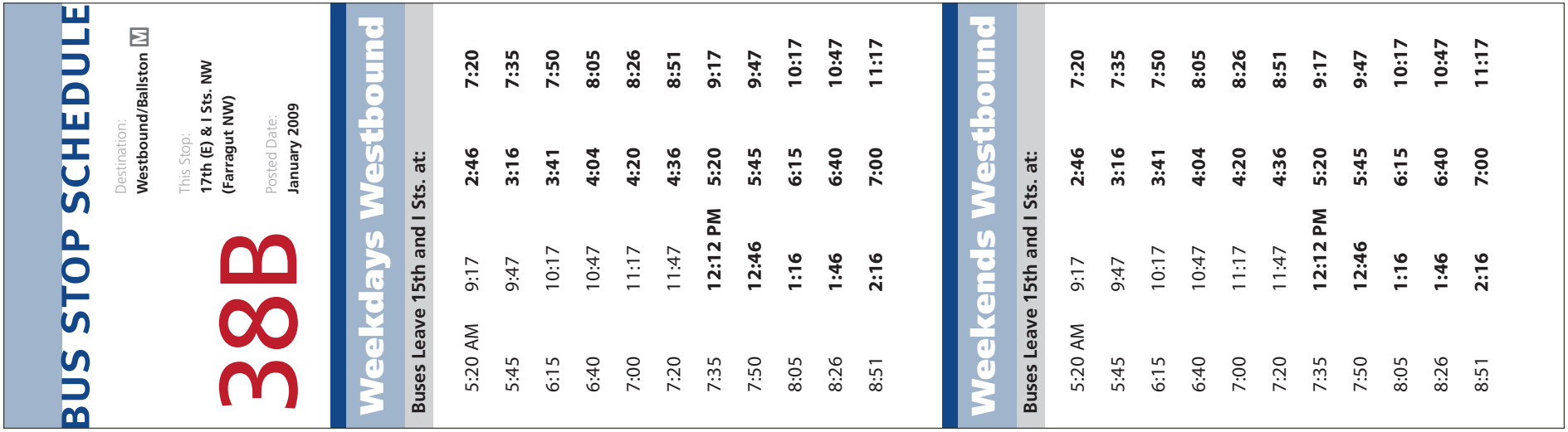
Hours of operation from 6:20 AM to 11:17 PM

Hours		Frequency of service
AM	12:	-
	1:	-
	2:	-
	3:	-
	4:	-
	5:	**20, 45**
	6:	**15, 40**
	7:	**00, 35, 50**
	8:	**05, 26, 51**
	9:	**17, 47**
	10:	**17, 47**
	11:	**17, 47**
PM	12:	**12, 46**
	1:	**16, 46**
	2:	**16, 46**
	3:	**16, 41**
	4:	**04, 20, 36**
	5:	**20, 25**
	6:	**15, 40**
	7:	**00, 20, 35, 50**
	8:	**05, 26, 51**
	9:	**17, 47**
	10:	**17, 47**
	11:	**17**

Note:

SCHEDULE VARIATION 3

This configuration applies a format similar to Seattle's that shows schedule information for the nearest preceding timepoint to a specific stop. This approach allows larger font sizes (in this case 14 points or larger) or placing more route information in a single panel.



BUS STOP SCHEDULE

Destination: **Westbound/Ballston** M

This Stop: **17th (E) & I Sts. NW (Farragut NW)**

38B

Posted Date: **January 2009**

Weekdays Westbound

Buses Leave 15th and I Sts. at:

5:20 AM	9:17	**2:46**	**7:20**
5:45	9:47	**3:16**	**7:35**
6:15	10:17	**3:41**	**7:50**
6:40	10:47	**4:04**	**8:05**
7:00	11:17	**4:20**	**8:26**
7:20	11:47	**4:36**	**8:51**
7:35	**12:12 PM**	**5:20**	**9:17**
7:50	**12:46**	**5:45**	**9:47**
8:05	**1:16**	**6:15**	**10:17**
8:26	**1:46**	**6:40**	**10:47**
8:51	**2:16**	**7:00**	**11:17**

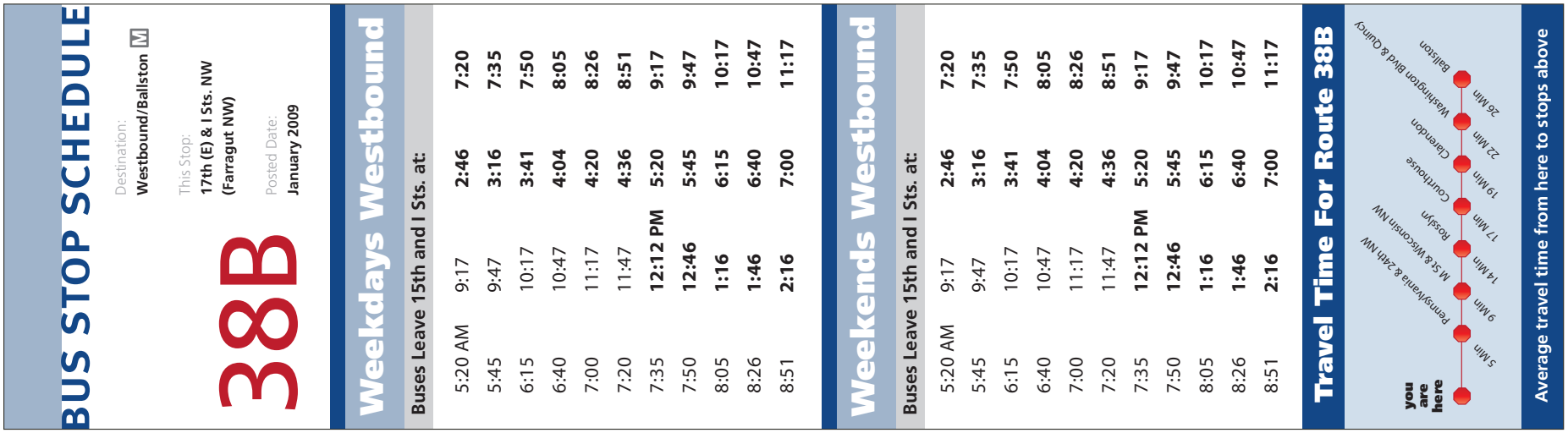
Weekends Westbound

Buses Leave 15th and I Sts. at:

5:20 AM	9:17	**2:46**	**7:20**
5:45	9:47	**3:16**	**7:35**
6:15	10:17	**3:41**	**7:50**
6:40	10:47	**4:04**	**8:05**
7:00	11:17	**4:20**	**8:26**
7:20	11:47	**4:36**	**8:51**
7:35	**12:12 PM**	**5:20**	**9:17**
7:50	**12:46**	**5:45**	**9:47**
8:05	**1:16**	**6:15**	**10:17**
8:26	**1:46**	**6:40**	**10:47**
8:51	**2:16**	**7:00**	**11:17**

SCHEDULE VARIATION 4

This approach uses the same format as variation 3 but includes a travel time chart that allows users to determine how long it will take them to get to the next timepoint (essentially the same information provided by the current full schedule approach Metro uses).



SCHEDULE VARIATION 5

This format provides additional space for multiple routes by using a repeat headway note to save down on the amount of type that must be presented.

Bus Stop Schedule

38B

Weekday Westbound
Entre semana con direccion al oeste

Route Number	17th (E) & I Sts. NW (Farragut NW) M	Pennsylvania Ave. & 24th St. NW	M St. & Wisconsin Ave. NW (Georgetown)	Rosslyn M	Court House M	Clarendon M	Washington Blvd. & Quincy St.	Ballston M
AM Service – Servicio vespertino								
38B	5:20	5:25	5:29	5:34	5:37	5:39	5:42	5:46
38B	5:45	5:52	5:57	6:02	6:05	6:08	6:12	6:16
38B	6:40	6:47	6:52	6:57	7:00	7:03	7:07	7:11
- And then every thirty minutes until -								
38B	10:40	10:57	11:52	11:57	11:00	11:03	11:07	11:11
38B	11:17	11:25	11:31	11:38	11:43	11:46	11:49	11:54
38B	11:47	11:55	12:01	12:08	12:13	12:16	12:19	12:24
PM Service – Servicio vespertino								
38B	12:12	12:21	12:28	12:34	12:40	12:43	12:46	12:52
38B	12:46	12:55	1:02	1:08	1:14	1:17	1:20	1:26
38B	1:16	1:25	1:32	1:38	1:44	1:47	1:50	1:56
- And then every thirty minutes until -								
38B	7:16	7:21	7:32	7:38	7:44	7:47	7:50	7:56
38B	7:35	7:44	7:49	7:56	8:01	8:04	8:07	8:14
38B	7:50	7:59	8:04	8:11	8:16	8:19	8:22	8:29
38B	8:05	8:14	8:19	8:26	8:31	8:34	8:37	8:44
38B	8:26	8:35	8:40	8:47	8:52	8:55	8:58	9:05
38B	8:51	8:59	9:05	9:12	9:17	9:20	9:23	9:28
38B	9:17	9:25	9:31	9:38	9:43	9:46	9:49	9:54
38B	9:47	9:55	10:01	10:08	10:13	10:16	10:19	10:24
38B	10:17	10:25	10:31	10:38	10:43	10:46	10:49	10:54
38B	10:47	10:55	11:01	11:08	11:13	11:16	11:19	11:24
38B	11:17	11:25	11:31	11:38	11:43	11:46	11:49	11:54

Weekend Westbound
Entre semana con direccion al oeste

AM Service – Servicio vespertino								
38B	5:20	5:25	5:29	5:34	5:37	5:39	5:42	5:46
38B	5:45	5:52	5:57	6:02	6:05	6:08	6:12	6:16
38B	6:40	6:47	6:52	6:57	7:00	7:03	7:07	7:11
- And then every hour until -								
38B	10:40	10:57	11:52	11:57	11:00	11:03	11:07	11:11
38B	11:17	11:25	11:31	11:38	11:43	11:46	11:49	11:54
38B	11:47	11:55	12:01	12:08	12:13	12:16	12:19	12:24
PM Service – Servicio vespertino								
38B	12:12	12:21	12:28	12:34	12:40	12:43	12:46	12:52
38B	12:46	12:55	1:02	1:08	1:14	1:17	1:20	1:26
- And then every hour until -								
38B	7:16	7:21	7:32	7:38	7:44	7:47	7:50	7:56
38B	7:35	7:44	7:49	7:56	8:01	8:04	8:07	8:14
38B	7:50	7:59	8:04	8:11	8:16	8:19	8:22	8:29
38B	8:05	8:14	8:19	8:26	8:31	8:34	8:37	8:44

Recommendations

The systems reviewed as part of the best practices report have one thing in common – they are all committed to try and provide their customers with the highest level of valuable travel information possible. Secondarily, some of them see bus stop information as an important element of their marketing and branding efforts. However, the ways they accomplish this varies importantly both in terms of formats, operations and information system philosophy.

The recommendations that follow are based on basic communications protocols, research and the best practices review conducted as part of this study. The design for the new system is based on the following assumptions:

- On-street information systems are one of the most important sources of customer information, brand image and new customer development.
- The new on-street information system will be based on a transitional approach using as many of the current resources and systems now in place, as possible.
- There is a need to upgrade the system to reflect the new image of Metro to its service area. The current on-street information design and image is decades old and doesn't reflect the updated image of a core regional transportation provider.

Information at each stop should be:

- Comprehensive, reflecting all the lines that stop at a particular stop.
- Readable, accepting un-codified but common ADA practices and industry type size standards.
- Easily maintainable through maximum use of technology.
- Adaptable to incorporate other system information new technologies.

PROGRAM DIRECTION

To accomplish this, it is proposed for the new system to include:

- An Operational Structure Change
- A New At Stop Information Format

The concept of providing all the information presented in a printed timetable creates a number of problems for Metro's information system. For example, at many locations there is a limit to how much

readable information can be presented in the existing schedule holders. As a result Metro has developed a number of "band-aide" fixes to accomplish this.

The original Metrobus stop information was not designed the way the current program operates. It was based on providing next bus stop specific information. By not including all the schedule information for a particular line at each stop, much of which is irrelevant, it greatly reduced the space needed to display readable information.

Research at other systems, however, has indicated that Metro's original approach of trying to make the most critical type of information people want at a stop (next bus), was the most desirable way to provide the most important information in the most readable format. Most other major systems with comprehensive on-street information systems have also developed a hierarchy of display modules designed to handle different types of stops with various levels of service.

I. FIRST STEPS

To upgrade the current system the most important efforts will include:

1. Developing a new set of graphic standards to better reflect information hierarchy of customer needs and be more readable at stops, especially for elderly and visually impaired individuals.
2. Create a smoother interface with the existing schedule database so materials can be produced in a less labor-intensive method, and yet be reliably stop customized.
3. Develop a new approach to providing a variety of displays based on the information needs of specific stops.
4. Anticipate the discontinuance of the present arrangement of the transit advertising agency maintaining the on-street information system, and bringing the operation in house.
5. Provide route number identification for all routes serving each individual stop.
6. Wherever possible provide departure information and maps for each route serving a stop.

II. GRAPHIC APPROACH

It's recommended that a new design be developed, which will present the most dominant information needs at a stop in priority order. The new design information hierarchy will provide information in the following order of priority:

1. **System Identity**: The current on-street bus signage system doesn't even include WMATA's system logo, the "M." It is recommended that the new system incorporate a large logo as well as the word Metrobus to identify the type of service. Metro's corporate identity is currently not displayed at thousands of its most important point of purchase locations.
2. **Route identification numbers**: The current route identification numbers are among the smallest of any system studied, yet they are critical for an individual to know they are standing at the right stop. The recommended goal is 2.5" to 3" tall for the route numbers. This is likely to require that existing flag sizes will have to be larger; they are currently among the smallest in North America.
3. **A larger minimum type size** for schedule information is ideally 12-points or better. But with some flexibility on this, under no circumstances should type size drop below 8-point. To accomplish

this, it is recommended that the Next Bus approach be adopted to save space for larger type sizes. This approach would only show departure times from that stop, not complete timetable schedule blocks. To provide travel time estimates to destination stops down the line, it's recommended that schematic maps show travel times to key time points.

4. **Route maps** – Schematic or geographic maps should be included at stops as they are important navigation tools.
5. **Route names** – Route names are frequently used in conjunction with route numbers by a number of passengers, so if space permits, they should be included in either the flag/kiosk design or in the schedule block displays.
6. **Stop number I.D.s** – for Next Bus and future electronic information systems as well as easier system information maintenance.
7. Metro phone information and website.
8. **A handicapped accessible logo** – Implement where appropriate and include a tactile information panel noting route numbers and information regarding access information for the visually impaired.
9. **Basic how to ride information** – "Exact change," "bus departure time approximate."
10. **Promotional messages**

III. SYSTEM HARDWARE

The proposed suggested system should be based on modular information components that are interchangeable as possible. For example:

- Schedule information display areas should always be the same width so they can be used in existing schedule information holders, as well as in the larger proposed major stop kiosks.
- Route number or numbers and names should be screened on the same size interchangeable pieces that can easily be removed or installed at either kiosks or bus poles.
- Kiosk or high activity bus stop designs should be a minimum. Analyzing existing stop patterns it appears that no more than two sizes of large information kiosks and one flag stop configuration should be needed.

INTEGRATING WITH OTHER SERVICES

There are many stops within the Metro service area in which a number of other service providers serve the same stops. Currently each agency posts (or doesn't) their own information flag, schedule holders or other information pieces. This can result in clutter in the visual environment and can cause confusion. This is especially a problem in downtown Washington, DC, but the problem also pops up in busy suburban stops.

At major Metro managed stops, it is suggested that provisions be made to include other carrier I.D.s and route numbers as part of the modular concept. Other carriers would be included in the modular route number elements with their systems indentified, based on their branding platform including, at a minimum, the route numbers for their various services. Schedules for their services should be incorporated in the Metro schedule information format. Where Metro serves stops whose on-street information is managed by other systems a similar approach might be applied. There's also the possibility that all the systems in the region could adopt versions of the Metro system.

IN-SHELTER INFORMATION

In Washington a new program managed by DDOT includes installing new information panels inside new shelters. Because of streetscape issues, the city may want these displays to carry schedule and other transit information. While using the same size and display criteria for the bus stop flag/schedule holder and kiosk program can help provide schedule and map information in these in-shelters, the displays are no substitute for the service identification elements of the flags and kiosks. In some cases, they don't have enough space to display readable information for Metro and other carriers that might serve at the stop.

SPECIAL SERVICE BRANDING

Metro has and is considering future branding for the various types of service it operates, such as express routes or particularly important lines ("The 30s" or the 38B.) These service brands should be incorporated into the modular schedule number elements of both schedule holders and kiosks, as well as in the schedule sections of the stop displays.

ON-STREET HARDWARE FABRICATION

It's recommended that Metro maintain the basic off-the-shelf schedule boxes now installed at the vast majority of its stops. Any changes to their appearance would be based on the printed material that is inserted in them. The idea of using double schedule holders as certain bus stops should also be continued. Changing all the schedule boxes would be prohibitively expensive and really cannot be justified. However, the bus stop identification flags should be changed out over time for a number of reasons.

- They don't even include a Metro logo, a branding fundamental.
- They are virtually the smallest signs used by any major system and provide visibility issues, especially for the visually impaired.
- They don't allow for large enough route number displays.
- At high activity stops (shelter & kiosk base stops) it is recommended that as part of the installation process power be accessed for possible future use of electronic display applications.

  These signs should be changed out route by route (busiest to least used) or as major service changes are introduced. All new stops should have new format signs installed.

KIOSK SIGNS AT BUSIER STOPS

At major stops where the existing service levels and the number of routes exceed the ability of the schedule box system to display readable information, larger freestanding kiosk displays should be installed. On an as needed basis, these larger kiosks could also be used to incorporate electronic display systems (i.e. Next Bus). These signs & kiosks can be obtained in a number of different ways:

- Custom fabrication
- By buying existing commercial off-the-shelf systems (i.e. the TrueForm system)
- Adopting contemporary hardware fabricated and in use by other existing transit systems (i.e. new designs by Seattle, Portland or other Metropolitan Washington carriers)

EQUIPMENT UPGRADES

Though equipment used for managing and manipulating layout and content at Metro's facilities is relatively up to date, it's also used to manage timetable production. The equipment and support used at the advertising subcontractors is extremely out of date, slow and requires too many error-prone manual steps. To bring the process in-house, one or two new PC computers should be purchased with larger displays. Because of the volumes needed to be produced, new laser printers should also be purchased. (These can also produce full-size schedule box displays in color.)

Finally, because the limited number of large-sized inserts to be used in the proposed kiosks, it's anticipated that large inkjet printers, now used in the Metro sign shop, could continue to be used.

IV. Software Upgrades

The current software for Metrobus information is outdated and doesn't make maximum use of the existing Metro schedule database. The goal should be to develop a custom system or use off-the-shelf software to minimize manual manipulation of data and formats. In the most efficient on-street schedule information systems printed pieces are printed out directly in final posted form with the only manual effort being in laminating and actually posting at the stop. In Seattle, there's not even a laminating step.

TECHNOLOGY EVOLUTION

The final design and management plan for the modular system should also address anticipated and unanticipated advances in information technologies. Metro already has a fairly sophisticated number of technology tools which have implications to its at-stop and other customer information programs. One program is its Next Bus program based on its fleet's GPS capable fleet. Currently the Next Bus program requires that each stop carry a specific identification number. The stops that are covered as part of the program are identified by a special small custom stop sign. The sign carries a stop number that, via a PDA device, can be used to provide real time Next Bus information at the stop or PC-based information in the office or home. There are also LED electronic displays that are available for the Next Bus system or plasma and LCD signs that can also be used for at-stop information. However, the small signs have a branding element that uses colors other than the primary Metro system colors, and adds clutter to the bus stop flag polls.

- It is recommended that a universal bus stop identification number system be incorporated into all the new flag/schedule holders, kiosks and shelter information displays. This number can also be used for maintenance and application to other real time and schedule database purposes. Over time the existing next bus disk would be replaced.
- As PDA cell phone penetration increases, it's also suggested that Metro develop a scheme for gradually cutting back on printed schedule information at outlying and low use stops. Portland, OR, a city with very tech savvy cell-linked populations, is already taking this step. Even in that town, they view this as a five-to-ten year process. Not as much the case with Metro, but they view their market segments as extremely varied in its need for certain types of mention, from visual electronic displays to PDAs to traditional printed information, so there is no need to take a go-slow approach to the transition.

V. MARKET RESEARCH

The recommendations made in this report are based on comparing what is known about the existing Metro system along with the experience and market research accumulated with other systems. However, the proposed approaches are not exactly like any other system's approach and will have a long term impact on how Metro customers and potential customers view Metro and the transit experience. To evaluate the proposed approach it's recommended that:

- At a minimum, focus groups or intercept interviews be conducted, to evaluate the proposed approaches with regional citizens.
- Prototype installations of all the program elements are installed before a full rollout. This step is designed to not only evaluate customer reaction, but also to evaluate maintenance management experience for fine-tuning.
- Baseline tracking information of various Metro system information components be conducted on a regular basis for fine tuning the system over the next few years.

Metro Bus Stop Information Program Budget Scenarios

The launch of the new bus stop information program is based on a phased introduction of recommended approach. This is designed to minimize the immediate fiscal impact of launching the suggested program. Even though a "go slow" approach is suggested, there are still substantial first year startup costs associated with launching the new program. The budget scenario, which follows, is primarily based on the following factors:

- That Metro assumes the functions of the existing schedule insert fabrication and installation process and brings them in-house.
- The cost of installing new software so as to fully automate the process as possible (the current program is very labor intensive).
- The design and production of the final recommended signage formats. Purchasing new necessary equipment (i.e. printers and computers)

The primary expenditure categories include:

Insert Production

This includes the production of new information box insert materials including a new format schedule insert. This category includes bringing the final insert material production in-house, hiring the required personnel and purchasing the production hardware and software to support this effort. It's assumed that two new production workstations, two printers and one laminating machine will be purchased as part of this effort and that the staff responsible for this activity will be headquartered in Metro's general offices. This production group would be responsible for producing the actual insets through lamination as well as organizing them by route for distribution. This estimate is based on a staff of three full-time employees.

First Year Annual Budget: $367,050

Schedule Insert Distribution

This estimate also assumes that the schedule insert distribution process will also be brought in-house. It is assumed that the group of four people responsible for this activity would be based with the signing crews now responsible for maintaining the existing sign system hardware.

First Year Annual Budget: $345,794

New Flags
It's recommended that new flags be installed over a period of years. Using the 2,000 flag rate suggested for the first year the entire Metro flag system could be replaced in about five years. It is recommended that flags be replaced on a route-by-route basis (or when existing flags are damaged) starting with the busiest routes first. The estimated costs shown here include final design, fabrication and installation.
First Year Annual Budget: $377,475

New Kiosks
As with the new flag program, we are recommending a go-slow phased introduction of a new type of larger stop information displays in the form of kiosks. It's recommended that 20 kiosks be installed at Metro's busiest multi-route stops. Other busy multi-route stops will be addressed over time. The estimated costs shown here include final design, fabrication and installation.
First Year Annual Budget: $160,425

New Software
All the above recommendations are based on a major upgrade of the software linking Metro's scheduling database to the final production actual on-street information pieces. Without this improved software package, the recommended two approaches or budget scenarios are proposed. The final choice of the best direction will have to wait for a more complex technical and financial analysis to be conducted, beyond the scope of this project. The scenarios:

Scenario 1 – Build on Existing System: Create a custom addition to the current scheduling system. The current software supplier does not have an off-the-shelf. However, the supplier has provided an approximate estimate at $75,000.
First Year Annual Budget: $91,900

Scenario 2 – Purchase New System: Purchase a completely new scheduling system that includes a fully integrated bus stop information-generating capability. The manufacturer of a package that currently accomplishes this, estimates the cost at approximately $350,000.
First Year Annual Budget: $463,100

Total First Year Annual Budget
Scenario 1: $1,342,644
Scenario 2: $1,713,844
During the first year it is estimated that one-time costs to gear up for the new program, such as new software, training and equipment costs would be incurred. Subsequent annual budget would likely be lower. However, until hands-on experience is accumulated with the new information system, estimating future budgets may be difficult.