Real Time
Customer Information Systems

Final Report
(03/31/08)

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Executive Summary

Metro Transit has made a significant investment in the procurement of the Siemens TransitMaster Computer Aided Dispatch (CAD)/ Automatic Vehicle Location (AVL) software package for improved fleet management and security. Since installation in 2002, agency efforts have focused largely on fleet management, system performance, security, and service supervision.

As an agency, we continue to develop and refine our operational performance measurement, investigation and analysis systems to improve service, staff productivity and reduce the cost of providing high quality service.

Currently, the agency provides scheduled service information at the bus shelters and transit centers, on-line trip planning and schedules, telephone scheduled information and printed hand schedules for the convenience of our customers.

The next step to further leverage the investment for the CAD/ AVL system is to provide real time next bus arrival/ departure information to our customers at the bus shelters and transit centers with signs, on-line with web enabled devices such as computers, Blackberries and cell phones, and via telephone using the TransitLine system.

Our goal is to increase ridership by providing real time in-route information for our customers in order to reduce anxiety when disruptions or a change of their itinerary occur. Knowing when the next bus will arrive reduces the uncertainty and results in a perception of faster, more reliable service.

Customers have identified access to real time transit arrival/ departure information as a key need in a recently conducted Metro Transit survey.

A Customer Information project began with a solicitation to Mn/DOT for ITS project ideas under the Guidestar grant program. Minnesota Guidestar is the state's intelligent transportation systems (ITS) program. Its mission is to research, test, and deploy advanced transportation technology to save lives, time, and money.

Minnesota Guidestar is administered by the Minnesota Department of Transportation's Office of Traffic, Security and Operations (OTSO) in partnership with the Federal Highway Administration (FHWA), University of Minnesota, numerous other public and private partners, and ITS Minnesota, the state chapter of ITS America. Current Minnesota Guidestar initiatives include improving traveler information, improving safety at rail crossings, testing systems on vehicles to assist drivers, and creating statewide operations centers for managing the transportation system. This project is focused on improving traveler information.

Metro Transit continues to seek projects that enhance the transit system operational performance, customer safety/ convenience, and the return on the significant investment in the TransitMaster system. This project purpose is to test, implement and/
or evaluate a link to real time bus arrival/departure information. This project is separated into three distinct CIS system tasks. The three tasks are dependent on the Siemens TransitMaster interface for real time information, described below. The implementation of the Siemens TransitMaster interface will be in two phases:

- **Siemens TransitMaster Interface**
  
  **Phase 1** – In phase 1, the base functionality of the interface will be built. This interface will return estimated real time arrival times at time points. Phase 1 will not return terminal letter information. The interface will be used by TransitLine, which does not need the terminal letter from the interface, as it already gets the terminal letter from the existing Sybase interface.

  **Phase 2** – In phase 2, the base functionality will be supplemented with the addition of the terminal letter in the response. Phase 2 is needed by WebWatch and Real time Signage, as they do not get the terminal letter from any other data source.

**Task Descriptions, Current Status/ Key points**

- **TransitLine/ Integrated Voice Response (IVR)** - This task is intended to integrate real time bus arrival/Departure information with the automated service schedule to the region’s transit customers via the telephone.
  
  **Current Status/ Key Points** - Detailed specifications have been approved, hardware has been purchased, and contract for installation is completed. The Siemens interface is complete and tested, additional changes are anticipated with the voice response upgrade. DDV continues to integrate the real-time information into the program logic.

- **WebWatch** - This task is intended to integrate real time bus arrival/Departure data with a web based passenger information system on the agency’s website.
  
  **Current Status/ Key Points** - Computer server and WebWatch software are installed in TCC prototype test system. Marketing and Information Services are examining customization options for the Metro Transit website. Public roll-out date is dependant on agency decisions regarding real time bus arrival/Departure webpage function and feel that are determined to be the final customer experience. An additional project to enhance WebWatch has been submitted to 2008 CIP.

- **Real time Arrival/Departure Signs/Displays** - This task is intended to integrate real time arrival/Departure information at bus shelters, park & rides and transit centers.
  
  **Current Status/ Key Points** - Pilot systems are installed and working correctly at Uptown Transit Station, 63rd and County Road 73 Park & Ride. Before the project moves ahead, a sign diagnostics system needs to be developed by Siemens and a discussion about agency spending priorities needs to occur. This will determine an installation schedule. In addition, discussions need to
take place on integrating this technology into facility and schedule Kiosk design.

Downtown locations for Minneapolis, St Paul and University of Minnesota campus are not included in this task due to the special nature or plans for these locations.

Task groups were assembled to address each of the project areas. Task group members were comprised of Metro Transit Staff from Transit Control, District Supervision, Service Development, Marketing, Engineering, Transit Information, Maintenance and Information Services staff from Metropolitan Council.

This report focuses on the implementation plan for CIS systems at Metro Transit, key discoveries, issues, and recommendations that have been made by project staff for each of the three tasks and decision points requiring further discussion and guidance from senior staff.

Implementation of CIS at Metro Transit will need to carefully coordinate with complementary projects such as; Urban Partnership Agreement (UPA), Integrated Corridor Management (ICM), Access Minneapolis, Downtown Street Furniture (Minneapolis), Central Corridor and any St Paul initiatives in the future.

The following sections of this report are organized by each of these tasks with supporting appendices providing more detailed descriptive information. For ease of reading, each of these sections can be read as a separate report providing information regarding timelines, current status, and recommendations for each project.
Customer Information System (CIS) Implementation

Overview

Project Origin/ Background

Due to obsolete equipment and vendor abandonment of the legacy communication software, a replacement system was needed for continued communication with our buses. An RFP competitive bid process was used for vendor selection. Metro Transit selected and installed the Siemens TransitMaster Computer Aided Dispatch/ Automatic Vehicle Location (CAD/ AVL) system on its entire fixed route bus fleet. Utilizing the concurrently installed supporting hardware, software and radio infrastructure, the system provides real time bus schedule adherence information to the Transit Control Center (TCC) and to other internal agency users.

The installed TransitMaster system serves as a base system upon which other Intelligent Transportation System (ITS) applications can be added. Some examples of these are: Automatic Passenger Counters (APC’s), Voice Annunciators and real time Passenger Information Systems.

Metro Transit responded to a solicitation by Mn/DOT for ITS project ideas under the Guidestar grant program. The submitted and subsequently accepted ITS project has a defined purpose to test, implement and/or evaluate a link to real time bus arrival/departure information to the following CIS systems: 1) TransitLine (i.e., telephone dial up route departure information), 2) Metro Transit Web page, and 3) public message signs deployed at various bus shelters.

Minnesota Guidestar is the state’s Intelligent Transportation Systems (ITS) program. Its mission is to research, test, and deploy advanced transportation technology to save lives, time, and money. Minnesota Guidestar is administered by the Minnesota Department of Transportation's Office of Traffic, Security and Operations (OTS0) in partnership with the Federal Highway Administration (FHWA), University of Minnesota, numerous other public and private partners, and ITS Minnesota, the state chapter of ITS America. Current Minnesota Guidestar initiatives include improving traveler information, improving safety at rail crossings, testing systems on vehicles to assist drivers, and creating statewide operations centers for managing the transportation system.

Project funding is provided by FHWA funds and Mn/DOT local funds match. Mn/DOT provides project oversight, financial management and FHWA reporting, Metro Transit provides project management, purchasing and project team.

The project scope and deliverables were finalized with Mn/DOT and an interagency agreement was signed on August 25, 2005.

An internal Metro Transit meeting was held to discuss the project and the personnel assignments. A team was decided upon and approved by Division Directors; Jan
Homan, Rich Rovang and Sam Jacobs. A member of IS was requested and approved to be a part of the team as the IS project member.

**Administration**
- Scope and goals have been reviewed and approved by Directors from Bus Transportation, Bus Maintenance, Engineering & Facilities, Customer Service & Marketing and Met Council IS.
- Scope and goals have been reviewed and approved by FTA, FHWA, JPO and Mn/DOT.
- Directors have assigned personnel to project team.
- Project funding is approved in 2005 CIP.
- Project funding was approved in Council Budget Amendment dated March 9, 2005.

**Funding**
- Mn/DOT project funds ($300,000) are composed of $150,000 from Congressional earmarked Guidestar funds and $150,000 from Mn/DOT local match.
- Metro Transit capital projects funds.
- Metro Transit Operating funds.

**Agreements**
- Mn/DOT Cooperative Agreement.

This project greatly expands Metro Transit’s organizational capabilities for real time bus location for passenger information delivery. The project is broken down into three tasks:
- Interface to the current Transit Line project for real time information via telephone
- Web interface with real time information via Internet.
- Passenger information signs for arrival/ departure information.

The following chapters provide greater task break-down for each of the real time arrival/ departure components.
Project 1 - TransitLine Real Time/ Interactive Voice Response System

Purpose
To provide Metro Transit customers the ability to receive real time next bus arrival / departure information via the telephone through the agency’s TransitLine/ Integrated Voice Response (IVR) system and to benefit the agency through continued enhancement to the return on investment of the SMARTCoM System.

Overview/ Background

TransitLine

TransitLine was installed in 1991. At the time it was the first IVR bus schedule system in the US.

Using a touchtone phone, customers can access schedule information 24/7. TransitLine also gives other transit related information such as State Fair transit information, and Snow Reroute information when applicable. TransitLine provides visually impaired customers with equal access to schedules.

The system has been extremely popular with customers. The system has handled over 2 million calls in each of the last 4 years. There was a 6.8% increase in call volume in 2005, and a 12.2% increase in 2006. 2.4 million calls were handled in 2006.

Customers dial 612-373-3333 and press option 1, or dial TransitLine directly at 612-341-4287. Customers then use their touchtone phones to follow the prompts they are given by the system. For example:

- Choose service for today or another day.
- Enter their route number choice.
- Choose the direction they are going: northbound press 1, southbound press 2.
- The system then gives the time point options for the route: for example MOA, press 1, 28th Avenue Station, press 2, etc.

The system then lists the departure times for the chosen time point for the balance of the day. The system does this by querying a Metro Transit Sybase schedule database.

With the addition of limited voice response technology, the customer will be given the option of pressing or saying their number choice at each step of the process.

IVR/ TransitMaster Interface

Metro Transit has installed the Siemens TransitMaster CAD/AVL system on its entire fixed route bus fleet. Utilizing the concurrently installed supporting hardware, software, and radio infrastructure, the system provides real time bus schedule adherence information to the Transit Control Center (TCC) and to other internal agency users.
The installed TransitMaster system serves as a base core system upon which other Intelligent Transportation System (ITS) applications/modules can be added. The TransitMaster to TransitLine / IVR interface is one of these add-on integrated applications.

This project is intended to integrate real time bus arrival/ departure data with the agency’s current TransitLine / IVR phone system provided by Digital Data Voice (DDV) and enhance the agency's return on investment of current Siemens TransitMaster system.

Project team includes representatives from the TCC, Transit Information Center (TIC), and Information Services (IS). This Project Team met on a regular basis and worked with Siemens Engineering and DDV staff to develop hardware and interface specifications.

See Appendix B for more detailed description and server configuration.

**Project Goals**
The project goals are as follows:

- Provide interface/ link from agency’s TransitLine/ IVR system to Siemens TransitMaster system to provide real time next arrival information to public via the agency’s TransitLine/ IVR system.
- Define and document the interface standards used in this project to meet the requirements of the Regional ITS Architecture.

With the addition of access to real time information, when customers are looking for next bus information, the IVR system will query the Siemens SMARTCoM system in addition to the Sybase schedule database. The data from the two systems will be matched up with each other within a certain timeframe and give the caller access to real time bus times if they are available, otherwise the system will default to giving scheduled times.

**Timelines**
The timelines for rolling the service out to customers are as follows (see Appendix A for further schedule detail):

- Siemens has competed and tested the interface for TransitLine, additional testing and modification will occur with DDV TransitLine upgrade.
- DDV will develop the application logic to add real time information to TransitLine and the limited voice response technology. The work done by Siemens and DDV should have some overlap.

**Current Status**
The Siemens interface is developed and tested, additional modifications will occur with the implementation of the DDV TransitLine upgrade. Final contract approval and notice to proceed is complete for DDV. DDV is currently writing code to include the real-time data into the program logic.
Discoveries

- To date Siemens has not implemented a similar interface for another transit property. However, this TransitMaster/IVR interface uses the same prediction engine software as is used for the TransitMaster WebWatch system. As a result of this, substantial development/implementation time and cost savings have been achieved in this interface design. Because of the mature nature of this prediction software, implementation of this interface poses little risk to the agency and provides consistency in the information provided to the public.

- For TransitLine, the TransitMaster version upgrade will not be required in order to provide route terminal letter/destination information to the customer. This will be accomplished within the DDV queries by matching the scheduled route, direction, and time to block numbers provided by each involved system.

- Current TransitMaster Version (19.2.8.1) installed at the agency does not support route terminal letter information to be displayed to the customer for any TransitMaster-related CIS system. Terminal letter information is very critical to the agency to provide the proper route, schedule and real-time arrival information to the customer. Therefore, this project includes a Phase 2 where the Siemens TransitMaster interface will be upgraded to support route terminal letter information, which is necessary for the WebWatch and Real Time Signage components of this project. The upgraded interface subsequently will provide the same benefit to all future CIS systems implemented by the agency. This interface upgrade will be incorporated into a TransitMaster version upgrade to be installed by the end of 2nd Quarter, 2008.

Issues

- Real time arrival/departure information is currently provided at the time point level. Bringing real time information to the bus stop level will require additional time and money. There are no projects planned at this time.

Action Items

None

Personnel Allocations (Staffing Needs for Success)

No additional FTEs have been requested to implement and provide ongoing support at the present time. However, the following FTEs of existing staff are estimated to implement and support this system.

TCC & TIC

- Installation phase will require ¼ - ½ FTE for hardware and software installation.
- Testing/Implementation phase will require ½ to 1 FTE test data quality, scenario test, etc.
- After final implementation, ongoing support of this interface will require less than ¼ FTE.
**Decision Points**

- Meetings with DDV will be held to make decisions in such areas as the scope of voice recognition; will it be limited to “press or say 1”, will it include directional indicators and/or time of day, etc.
- As the DDV work proceeds a decision will be made as to when the testing period will begin, how long the testing period will be, and who will be involved (different voices for voice recognition testing).
- Once the testing period is laid out, a tentative implementation date can be set and coordination will have to take place with Marketing as to how this will be rolled out to the public.

**Conclusions**

Interface specification is developed. Hardware has been purchased. Implemented system will provide a valuable service to transit customers giving them real time estimated next arrival information.

**Recommendations**

Project is moving forward, no change
Project 2 - WebWatch

Purpose
To provide Metro Transit customers real time next bus arrival / departure information on the agency’s website (www.metrotransit.org) by integrating the Siemens TransitMaster (SMARTCoM) real time bus arrival/departure data with a web based customer information system called WebWatch. This provides benefit to the agency by providing real time passenger information systems utilizing the significant investment in the SMARTCoM system and its capabilities.

Overview/ Background
Metro Transit has installed the Siemens TransitMaster CAD/AVL system on its entire fixed route bus fleet. Utilizing the concurrently installed supporting hardware, software, and radio infrastructure, the system provides real time bus schedule adherence information to the Transit Control Center (TCC) and to other internal agency users.

The installed TransitMaster system serves as a base core system upon which other Intelligent Transportation System (ITS) applications/modules can be added. TransitMaster WebWatch is one of these add-on integrated applications. This Siemens VDO proprietary software integrates real time bus arrival/departure data from the base TransitMaster system with a web based passenger information system application and will be tested then displayed on the agency’s website (www.metrotransit.org).

After Notice to Proceed was received, purchased computer server hardware was shipped to Siemens for software installation and testing. When testing was completed, the installed servers were delivered to TCC for prototype installation and on-site testing. During this time the project team was formed and has met and communicated on a regular basis to implement the system. This is still ongoing.

Project Goals
The project goals are as follows:
• Provide link from agency website to Siemens TransitMaster WebWatch application to provide real time schedule information to public via agency website.
• Define and document the interface standards used in this project to meet the requirements of the Regional ITS Architecture.

Timelines
• Standard view version of Webwatch is complete and tested
• Agency customized version of WebWatch webpage development – to be completed within 3rd Qtr, 2008.
• Public Rollout – to be completed by the end of 4th Qtr, 2008.
• Phase 2 TransitMaster version upgrade (includes Route Terminal Letter enhance for WebWatch – to be completed by the end of 2nd Qtr, 2008.

See Appendix A for further schedule detail.
Current Status

Computer Server and WebWatch software have been installed in the TCC. Prototype (off-the-shelf) WebWatch application is working and testing is complete to confirm data and next arrival prediction accuracy. Siemens has provided training on WebWatch mapping application and procedures. Agency web developers are reviewing WebWatch coding for familiarity and design flexibility. Marketing/ Graphics staff will be providing a prototype modified WebWatch front end to better match the agency’s webpage look/feel and how customers interact with the website. Once final testing has taken place, project issues resolved, and application is ready to be made available to the public, the server will be moved to the Office of Enterprise Technologies (OET).

Discoveries/ Issues

- After purchase and installation of WebWatch, it was discovered that the web map viewer used by Siemens (Adobe SVG Viewer) would no longer have customer support provided by Adobe, beginning January 1, 2008. What this means is that Adobe will no longer be developing the application further, but will keep the SVG downloader available to customers on its website as long as customers are reliant upon it. There are other viewers available. But, to date testing has not produced a suitable alternative. For further information on this SVG Viewer issue, please refer to Appendix C - SVG Downloader Issue.

- The WebWatch supported Adobe SVG Map Viewer does not work for MAC computer users or users of the Firefox browser. Project staff estimates this currently amounts to approximately 10 – 15% of customer users of the agency’s www.metrotransit.org website.

- Current TransitMaster version (19.2.8.1) installed at the agency does not support route terminal letter information to be displayed to the customer for any TransitMaster-related CIS system. Terminal letter information is very critical to the agency to provide the proper route, schedule and real time arrival information to the customer. Therefore, to resolve this issue, Phase 2 of the TransitLine / IVR interface project will include an interface upgrade to support route terminal letter information. This interface upgrade also supports the WebWatch system and will be incorporated into a larger TransitMaster version upgrade to be installed by the end of 2nd Quarter, 2008.

- Beyond above stated SVG map viewing concerns, testing has shown that the WebWatch real time arrival/ departure prediction engine software does produce valid results.

- Project staff review of code and testing, along with discussions with Siemens, have shown that WebWatch software design does provide the agency with flexibility and opportunities to re-design the WebWatch front end web pages to better match the agency’s webpage look / feel.

- Real time arrival/ departure information can currently only be provided at the time point level. In order to provide customers with bus stop level estimated arrival times, changes by Service Development will need to be made in HASTUS and schedule interface to TransitMaster to allow this capability.
**Action Items**

- Develop prototype agency-oriented WebWatch webpage.
- Relocate/ install WebWatch server at the OET
- Complete data quality/ scenario tests.
- Complete internal agency review of WebWatch webpage and make recommended changes to final design.
- Rollout final design to public.

**Personnel Allocations (Staffing Needs for Success)**

No additional FTEs have been requested to implement and provide ongoing support at the present time. However, the following FTEs of existing staff are estimated to implemented and support this system.

**Short Term**

- TCC – Server relocation to the OET will require ¼ FTE for hardware and software installation.
- IS – Server relocation to the OET will require ¼ FTE for hardware and software installation.
- TCC – Testing/ Implementation phase will require ¼ to ½ FTE test data quality, scenario test, etc. after relocation of server to the OET.
- Web Developers – Final development / implementation of agency webpage supporting WebWatch will require ¼ to ½ FTE up to final implementation.

**Long Term/ Ongoing**

- TCC – After final implementation, ongoing support of this system will require less than ¼ FTE. If mapping component is implemented, there is significant ongoing work to keep the maps updated. This will require another ¼ to ½ FTE.
- Web Developers – After final implementation, ongoing support of the webpage will require less than ¼ FTE.
- IS – Server support will require less than ¼ FTE for ongoing server support and troubleshooting.

**Decision Points**

- Does the agency want to implement the SVG map and viewer as is, while at the same work towards a more workable global solution to fit the needs of the customer base?
- Does the agency put the live mapping component on hold until a more workable global solution is found to fit the needs of the customer base?

**Conclusions**

- Testing has shown that the WebWatch Real time arrival/ departure Prediction Engine software does produce valid results and is ready for implementation.
• WebWatch software design does lend itself to webpage design flexibility that the agency seeks. Technical staff will be defining framework and limitations of this flexibility.
• It is clear from testing and discussions with the project team members that there remain issues with the mapping component of WebWatch. Project staff will continue to work with Siemens to enhance this component of WebWatch.

Recommendations
• Implement WebWatch without SVG mapping component.
• Project staff will work with Siemens along with other agencies that also have TransitMaster WebWatch installed on a long term solution to mapping issues that meets the agency's and customer's needs and expectations.
• Pursue WebWatch enhancements to include common map base.
Project 3 – Real Time Arrival/ Departure Signs/ Displays

Purpose
To provide Metro Transit customers real time next bus arrival/ departure information at the bus stop or Transit Center. This provides benefit to the agency by providing real time passenger information systems utilizing the significant investment in the SMARTCoM system and its capabilities.

Overview/ Background
Metro Transit has installed the Siemens TransitMaster CAD/ AVL system on its entire fixed route bus fleet. The system provides real time bus schedule adherence information to the Transit Control Center (TCC).

The hardware and software for the Siemens TransitMaster "SMARTCoM" system was originally purchase and installed in 2001 through a competitive bid process. The AVL data provides opportunities for real time and historical data distribution.

The TransitMaster system serves as a base core system upon which other Intelligent Transportation System (ITS) applications/ modules can be added. Next bus arrival/ departure information is one of these add-on-integrated applications.

This component transforms the schedule adherence information from TransitMaster into a passenger information delivery system for arrival and departure information at the bus stop or Transit Center. The information delivery method has been tested for wireless communication via a Metro Transit proprietary 800MHz analog data radio and an internal local area network.

During the latest Capital Improvement Plan (CIP) review, Transportation submitted a budget request for passenger information technology purchases. Brian Lamb stated he is interested in accelerating the technology investment and real time passenger information. Brian has requested a full deployment plan and cost estimate before we move ahead.

An internal work group has been established with partners from Marketing, Transit Information/ Customer Service, Information Services, Engineering, Bus Maintenance, Transit Control Center, Street Operations, Transportation Management and Service Development.

Project Goals
The project goals are as follows:

- Review technologies available with associated costs.
- Develop guidelines for location type technology application (See Appendix D for details).
- Develop weighted criteria for implementation priority (See Appendix E for details).
The deliverable for our efforts will be a draft plan for real time customer information for full deployment with cost estimates.

Define and document the interface standards used in this project to meet the requirements of the Regional ITS Architecture.

**Timelines**

- Pilot systems are installed and working correctly. Current purchasing delivery time for signs is 12 weeks.
- System-wide installation is planned for three to four years.

**Current Status**

**Discoveries**

- Current sign technology does not provide an automated verification or system status check. The method currently is to physically observe the sign to verify normal operations.
- Siemens is aware of the lack of technical feedback from the signs and displays. They are willing to put in an internal project request to develop a diagnostics function for real time signs and displays.
- Sign and display equipment will need to be verified for any time point association changes every pick, to ensure accurate data.

**Issues**

- With the number of potential signs or displays which Metro Transit and the Regional Partners may install in the future, an automated system health verification and information status needs to be developed in order to reduce the amount of personnel time to ensure normal operation of next bus displays.
- TransitMaster version upgrade will be required to provide route terminal letter destination information to the sign or display. A software upgrade install is planned by the end of 2\textsuperscript{nd} quarter 2008.
- There is no current process in place at Metro Transit to incorporate real time sign and display technology into transit center, transit shelter, or bus stop design.
- There are no current standards in place to incorporate/ integrate real time sign and display technology with schedule/ marketing kiosk/ displays at transit centers, transit shelters, or bus stops.
- Real time arrival/ departure information can currently only be provided at the time point level. In order to provide customers with bus stop level estimated arrival times, changes by Service Development will need to be made in HASTUS and schedule interface to TransitMaster to allow this capability.

**Action Items**

- Partner with Siemens to develop technical requirements for sign and display diagnostics.
• Submit budget request in CIP for sign and display implementation.
• Identify support costs for warranty and repair support.
• A report will need to be developed to compare time point changes from pick to pick.

**Personnel Allocation**
Internal staff time for project management, work group participation and support. No additional FTE’s requested for implementation phase.

**Decision Points**
• What is the scope of system-wide deployment?
• What are the political and budget considerations?
• How do we instill systemic engineering design into future facilities?
• How do we ‘Brand’/ market this to the customer? What do we call this real time capability for the riding public? ETA, Next arrival, etc.

**Conclusions**
Current deployment of sign and display system can be viewed at: TCC building, Uptown Transit Station, 63rd Park & Ride and County Road 73 Park & Ride.

**Recommendations**
• Begin purchase and installation of system-wide real time signs and displays.
• Pursue display enhancement to include arrival and departure information.
Appendix A – CIS Project Schedules/ Timelines

Project 1 - TransitLine Real Time/ Interactive Voice Response System

- Siemens NTP
- Siemens Interface Development
- DDV Upgrade NTP
- Install/ Test Siemens Interface SW
- DDV SW Development
- **Upgraded TransitLine Rollout**

Project 2 - WebWatch

- NTP
- Ship Servers to TCC/ Install/ Testing
- Siemens Conducts Training
- MC Webpage Development
- MC Webpage Testing
- **Phase 1 Public Rollout**
- TM SW Version Upgrade
- MC Webpage Phase 2 Testing
- **Phase 2 Public Rollout**

Project 3 - Real time Arrival/ Departure Signs/ Displays

- Pilot Site Install/ Test
- CIS Prioritized Deployment Plan (PDP) Finalized
- Phase 1 – Sign/ Display Procurement/ Manufacture
- TM SW Version Upgrade
- **Phase 1 – Install/ Public Rollout**
- Phase 2 – Sign/ Display Procurement/ Manufacture
- **Phase 2 – Install/ Public Rollout**
Appendix B - TransitLine/ IVR Interface Server Configuration

TransitLine Server Configuration

1. A customer will call 612-373-3333 and choose 1 for TransitLine, or dial direct to 612-349-7423.
2. This call will go to the PBX which will route the call to the TransitLine production server. If the production server is off-line and we have failed-over to the backup server then the call goes to the backup server instead of the production server.
3. The production server will present the customer with a series of prompts from which it will get information on route, direction, timepoint, etc. The customer will have the option of answering these prompts with touch-tone phone or voice (press 0 or say 1, etc.).
4. If the customer answers the prompt with voice the production server will send the response to the speech server. The speech server will interpret the speech and send the result back to the production server.
5. When the production server has the needed information on route, direction, timepoint, etc. it will query the Trapeze Sybase database to get the scheduled bus times. Another SOAP query will be sent concurrently to the Siemens TransitMaster server.
6. When these two queries have returned to the production server it will match the times returned from the Trapeze Sybase database with the times returned from the Siemens TransitMaster server based on the block number returned with the query. The scheduled times and real-time times will be spoken back to the customer.

The above call flow is the same for the developer calling the system except the phone number is different and the call will be routed to the Development server instead of the production or backup server.
Appendix C - SVG Downloader Issue

Adobe to Discontinue Adobe SVG Viewer

Adobe has decided to discontinue support for Adobe SVG Viewer. There are a number of other third-party SVG viewer implementations in the marketplace, including native support for SVG in many Web browsers. The SVG language and its adoption in the marketplace have both matured to the point where it is no longer necessary for Adobe to provide an SVG viewer.

SVG is an established vector imaging format. Adobe currently supports SVG in several of its authoring and server products, including Illustrator, InDesign, GoLive, Version Cue, Graphics Studio, FrameMaker, and FrameMaker Server.

Adobe customer support for Adobe SVG Viewer will be discontinued on January 1, 2009.

For more information on this decision and answers to questions about the discontinuation of Adobe SVG Viewer, please see the Adobe SVG Viewer End of Life FAQ.
ASV EOL FAQ
Adobe® SVG Viewer
End of Life
Frequently Asked Questions

This document provides answers to frequently asked questions about Adobe’s decision to discontinue support for Adobe SVG Viewer ("ASV").

Why did Adobe decide to discontinue support for ASV? ................................................................. 1
When will Adobe discontinue customer support for ASV? ......................................................... 1
When will Adobe remove ASV from the download area? ............................................................ 1
Can I host the ASV installer on my own web site? .................................................................. 1
Will Adobe provide future security patch releases of ASV? ................................................... 2
Will Adobe support future SVG specifications in its authoring products? .............................. 2
Will ASV install and run on Microsoft Windows Vista? ............................................................... 2
Can I create my own installer for ASV? .................................................................................... 2
What products can I use instead of ASV? ............................................................................... 2
Will Adobe release the source code for ASV? ......................................................................... 3
Will Adobe still participate in the SVG working group? ......................................................... 3
Where can I find more information? ...................................................................................... 3
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Why did Adobe decide to discontinue support for ASV?
There are a number of other third-party SVG viewer implementations in the marketplace, including native support for SVG in many Web browsers. The SVG language and its adoption in the marketplace have both matured to the point where it is no longer necessary for Adobe to provide an SVG viewer.

When will Adobe discontinue customer support for ASV?
Adobe Customer Support will no longer provide support for Adobe SVG Viewer as of January 1, 2008.

When will Adobe remove ASV from the download area?
Adobe does not currently have plans to remove Adobe SVG Viewer from the Adobe.com download area. Adobe recognizes that customers have built Web applications that depend on ASV being available for download, and although Adobe does not plan to
ASV EOL FAQ

develop ASV further, we plan for the existing versions to be available for download as long as our customers rely on them.

Can I host the ASV installer on my own web site?
You may post the Adobe SVG Viewer installer only on intranet sites. Currently, the Adobe SVG Viewer End User License Agreement does not allow you to post the ASV installer on public Internet sites. For more information, please see the Adobe SVG Viewer Distribution Agreement http://www.adobe.com/svg/distribute.html.

Will Adobe provide future security patch releases of ASV?
No, Adobe will not provide any more security patch releases of Adobe SVG Viewer.

Will Adobe support future SVG specifications in its authoring products?
Adobe Illustrator was one of the first commercial illustration tools to support SVG Full and SVG Tiny. While Adobe does not publicly disclose future product directions, we will continue to evaluate the authoring needs for vector formats like SVG Full, SVG Basic, SVG Tiny, and any successors.

Will ASV install and run on Microsoft Windows Vista?
Adobe SVG Viewer is not certified to install on Vista. In addition, users who install ASV on an older version of Windows and then upgrade to Vista should be aware that some features of ASV will not function correctly on Vista. Features of ASV that are currently known to not work on Vista include (but are not limited to) the View Source command, and support for audio.

Can I create my own installer for ASV?
You may not create your own installer for Adobe SVG Viewer. The Adobe SVG Viewer End User License Agreement does not permit the user to repackaged the product components. Among other reasons, this is because custom-made installers could include bugs that cause problems for Adobe's customers, and those customers would then turn to Adobe for help. In addition, incorrectly installed ASV components could cause other previously installed Adobe products to malfunction.

What products can I use instead of ASV?
For an extensive list of third-party SVG viewer implementations, please see the SVG wiki: http://wiki.svg.org/Viewer_Implementations.
You may also want to consider converting your SVG application to an Adobe Flex application. For more information on Adobe Flex, please see http://www.adobe.com/flex.
ASV EOL FAQ

Will Adobe release the source code for ASV?
Adobe does not have plans to release the source code for Adobe SVG Viewer.

Will Adobe still participate in the SVG working group?
Adobe is currently a member of the W3C SVG working group, and will continue to monitor the development of SVG specifications relevant to our product needs. We anticipate no change in our participation with the SVG working group at this time.

Where can I find more information?
More information, as it becomes available, will be posted at http://www.adobe.com/svg.

What SVG and ASV community forums are available?
The Adobe SVG forum:
http://www.adobeforums.com/cgi-bin/webxr?14eae-eeef227

The Yahoo! SVG Developers group:
http://groups.yahoo.com/group/svg-developers/messages

The SVG Wiki:
http://wiki.svg.org/Main_Page

List of SVG communities:
http://wiki.svg.org/SGV_Communities

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Appendix D – Real time Arrival/ Departure Sign/ Display Type and Criteria

Not included in this analysis is the downtown core of Minneapolis, downtown core of St Paul or University of Minnesota. We feel these require additional analysis due to ongoing projects (access Minneapolis and Central Corridor), ownership and funding issues as well as political/cityscape consideration.

**Metro Transit shelter with electricity that is timepoint**
- Number of routes
- Customer impact
- Major transfer point/ meet
- Number of days/ type of service
- Location of shelter on the route (good geo-code)

CIS preference
- First choice - Two line or four line sign on shelter

**Transit Center with electricity/ in-door waiting area**
- Number of routes
- Customer impact
- Major transfer point/ meet
- Number of days/ type of service
- Location of shelter on the route (good geo-code)

CIS preference
- First choice - Arrival/ departure display inside passenger waiting area
- Second choice - Two line or four line sign at bay

**Park & Ride location with electricity/ in-door waiting area/ shelter**
- Number of routes
- Customer impact
- Major transfer point/ meet
- Number of days/ type of service
- Location of shelter on the route (good geo-code)

CIS preference
- First choice - Arrival/ departure display inside passenger waiting area
- Second choice - Two line or four line sign at bay

**Sign criteria**

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<th>Number of routes</th>
<th>Message Frequency</th>
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<tr>
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<td>&gt; 8 minutes</td>
</tr>
<tr>
<td>Four line</td>
<td>Max 6</td>
<td>&gt; 4 – 8 minutes</td>
</tr>
<tr>
<td>Arrival / Departure Display</td>
<td>&gt; 6</td>
<td>&lt;= 4 minutes</td>
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### Prioritized CIS Sign/ Display Cost Summary

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<th>Priority 2</th>
<th>Priority 3</th>
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<th>Total</th>
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<td>Transit Centers</td>
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<td>Shelters</td>
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<tr>
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### MT Shelters with Electricity that are Timepoints By Priority

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<tr>
<th>Rank</th>
<th>Site on</th>
<th>Site at</th>
<th>Routes Served</th>
<th>Id #</th>
<th>Primary Install</th>
<th># signs</th>
<th>Type</th>
<th>Extended Cost</th>
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<td>1</td>
<td>66 ST W</td>
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<td>OLSON MEM HWY</td>
<td>5 22</td>
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</tr>
<tr>
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<td>GRAND AV</td>
<td>DALE ST</td>
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<td>17</td>
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<tr>
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<td>14 ST</td>
<td>68 71</td>
<td>616</td>
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<td>CLEVELAND AV</td>
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<td>$110,008</td>
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## MT Shelters with Electricity that are Timepoints By Priority Rank

<table>
<thead>
<tr>
<th>Priority</th>
<th>Site on</th>
<th>Site at</th>
<th>Routes Served</th>
<th>Id #</th>
<th>Primary Install</th>
<th># signs</th>
<th>Sign Type</th>
<th>Extended Cost</th>
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<tr>
<td>3</td>
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<td>BROADWAY EMERSON AV N</td>
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### Grand Total

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<td>43</td>
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## Park & Rides By Priority Rank

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<tr>
<th>Priority</th>
<th>Site on</th>
<th>Site at</th>
<th>Routes Served</th>
<th>Id #</th>
<th>Primary Install</th>
<th># signs</th>
<th>Type</th>
<th>Extended Cost</th>
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<tbody>
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<td>Bottineau Blvd</td>
<td>675, 673, 652</td>
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<td>2 line</td>
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<tr>
<td>1</td>
<td>CR 73 P&amp;R SOUTH</td>
<td>BAY A</td>
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<td>Sign (1)</td>
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</tr>
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<td>HWY 61</td>
<td>CR C P&amp;R</td>
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<td>GEN MILLS BLVD P&amp;R</td>
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<td>385</td>
<td>Sign (1)</td>
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** Total: **

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Page 30 of 34
## Park & Rides By Priority Rank

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<th>Routes Served</th>
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**Grand Total** 17  $135,144
## Transit Centers By Priority Rank

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<th>Primary Install</th>
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** Total: **

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<th><strong>Site at</strong></th>
<th><strong>Routes Served</strong></th>
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<th><strong>Primary Install</strong></th>
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## Transit Centers By Priority Rank

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