



Multi-Modal Traveler Information System

*Gateway
Phased Implementation Plan
Document # 19140.01*

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1.0 INTRODUCTION

1.1 PURPOSE

The purpose of this working paper is to provide the main concepts and elements that need to be addressed in the overall implementation of the Gateway, both the Initial Phase and the Ultimate Phase. This working paper addresses these concepts and elements in a generalized manner since the system design will be established by the Contractor that is responsible for the actual implementation of the Gateway.

1.1.1 Goals of This Document

This working paper has the following goals:

- Identify potential funding sources that could be used for the implementation of the Gateway.
- Identify the issues to be addressed in order to implement the Gateway.
- Identify the tasks necessary to implement the Gateway.

1.1.2 Intended Audience

The Gateway Phased Implementation Plan Document is intended for:

- The GCM Architecture, Communication and Information Work Group and Deployment Committee.
- Members of various design groups that have development responsibility for the Gateway.
- Other agencies that may have involvement in the design and implementation of the Gateway.

1.1.3 Document Organization

This document is separated into 9 different sections. Section 1 provides the Introduction to the document. Section 2 discusses funding issues involved with ITS projects including the Gateway and identifies potential funding sources. Section 3 discusses the system organization and the critical interfaces with both the Gateway and the Illinois regional hub. Section 4 addresses the types of testing that will need to be performed during the various stages of the Gateway implementation. Section 5 discusses the documents that need to be written in conjunction with the Gateway implementation. Section 6 discusses the training that needs to be performed during and after the implementation of the Gateway. Section 7 discusses the outreach programs needed to increase the visibility of the Gateway in the GCM Corridor. Section 8 outlines the schedule for implementation of the Gateway. Section 9 discusses the tasks for both phased implementation and the cut-over from the C-TIC to the Gateway.

1.2 PROJECT OVERVIEW

The Multi-Modal Traveler Information System (MMTIS) project involves a large number of Intelligent Transportation System (ITS) related tasks. It involves research of all ITS initiatives in the Gary-Chicago-Milwaukee (GCM) Corridor which are currently deployed as well as proposed ITS projects

identified in regional strategic plans and early deployment studies. This information will be used to recommend a MMTIS Corridor Architecture that best suits the characteristics of the diverse needs and resources within the Corridor.

The deployment of the MMTIS will provide a comprehensive, integrated, and multi-modal transportation system that serves the needs of travelers and operators within the GCM Corridor. This system will focus on the collection and distribution of transportation related information and the management of regional multi-modal transportation systems for the benefit of the Corridor. It will also provide the communications mechanism for the implementation of cooperative control procedures for cross agency control of ITS devices.

The Gateway Traveler Information System is the main component of the MMTIS. Regional hubs in each state will serve as collection points for transportation related data and forward this data to the Gateway. The Gateway will be responsible for distributing this data on a corridor wide basis. The Gateway will also serve as a means to allow eventual joint operation of field devices.

A two phased implementation is proposed for the Gateway. These are the Initial and the Ultimate. The primary difference between the Initial and Ultimate Phases of the Gateway is the number of data connections to the Gateway.

1.3 DEFINITIONS, ACRONYMS AND ABBREVIATIONS

Document #17100-1, MMTIS Project Glossary, contains all definitions, acronyms and abbreviations associated with this project, as well as pertinent ITS, communications, computer programming and other standards in general.

Borman ATMS	The Indiana regional hub responsible for collecting and disseminating traveler data and information to/from the various ITS subsystems within Northwestern Indiana and providing that information to the Gateway. It will also serve as the interface between these subsystems and the Gateway.
CDSI	Communication and Data System Infrastructure - The Wisconsin regional hub responsible for collecting and disseminating traveler data and information to/from the various ITS subsystems within Southeastern Wisconsin and providing that information to the Gateway. It will also serve as the interface between these subsystems and the Gateway.
Contractor	The firm responsible for detailed design, system development and system implementation of the Gateway and the Illinois regional hub.
Corridor Architecture	The standards and practices associated with the design of the MMTIS which provide a recommended design for ITS subsystems, data sharing, and cooperative control within the Corridor.

Data Pipeline	The communication network interconnecting the ITS Subsystems within the GCM Corridor.
Gateway	The physical hardware and software, resident in a central facility, that is responsible for collecting, routing and disseminating all the traveler information collected by the regional hubs.
Gateway TIS	The logical collection of regional hubs and ITS Subsystems connected within the GCM Corridor to the Gateway, excluding field devices.
ITS Subsystem	An operating agency within the GCM Corridor which is capable of providing and/or receiving traveler information to the Gateway TIS.
LRMS	The location referencing message specification that will be used throughout the GCM Corridor. The profile that will be used initially will be the Geographic Coordinate Profile (latitude, longitude, altitude and street name) with the possibility of supporting more profiles in the Ultimate Phase.
MMTIS	Multi-Modal Traveler Information System - The combination of all traveler modes and forms of transportation systems operated through various ITS Subsystems within the project limits of the GCM Corridor.
Regional Hub	The centralized facility responsible for collecting data within a defined geographic area and forwarding it to the Gateway. It also has the option of distributing data it collects within this area.

1.4 RELATED DOCUMENTS AND WORKING PAPERS

This document is part of a series of documents and working papers produced to support the design of the GCM Corridor Multi-Modal Traveler Information System.

Related documents and working papers include:

- Document #17001 - Project Operations Plan
- Document #17100-1 Project Glossary
- Document #17150 - Gateway System Definition Document
- Document #17200 - GCM Corridor Architecture Functional Requirements
- Document #17250 - Gateway Functional Requirements
- Document #17300 - GCM Corridor Architecture Interface Control Requirements
- Document #17350 - Gateway Interface Control Requirements
- Working Paper #18250 - Cellular 911 - State of the Practice
- Working Paper #18380 - Corridor User Needs and Data Exchange Elements
- Working Paper #18400 - Current and Proposed ITS Initiatives

- Working Paper #18500 - GCM MMTIS Strategic Plan
- Working Paper #18520 - Performance Criteria for Evaluating GCM Corridor Strategies and Technologies
- Working Paper #18550 - Alternative GCM Corridor Technologies and Strategies
- Working Paper #18600 - System Interfaces and Information Exchange
- Working Paper #18700 - Information Clearinghouse - Initial Administrative Network
- Working Paper #18790 - Information Clearinghouse - Final Network
- Working Paper #18830 - Weather Detection System Standard Message Sets
- Working Paper #19210 - Lessons Learned
- Working Paper #19220 - Gateway Design Options
- Working Paper #19840 - Variable Message Signs (VMS)/Highway Advisory Radio (HAR) State of the Practice
- Working Paper #19845 - Variable Message Signs (VMS)/Highway Advisory Radio (HAR) Suggested Guidelines

2.0 FUNDING

2.1 FUNDING SOURCES

2.1.1 Traditional Funding Sources

Federal surface transportation funding primarily comes from the highway trust fund. Of particular interest is the Intermodal Surface Transportation Efficiency Act (ISTEA). Title VI, Part B of the ISTEA legislation provides specifically for Intelligent Transportation Systems funding. This funding source is distributed by the FHWA Joint Project Office (JPO). Currently, \$1.9 million has been secured for procurement and installation of MMTIS equipment by the JPO. These funds were originally earmarked for the *ADVANCE* project (secured by the Illinois Department of Transportation (IDOT) from the JPO funding). In order to receive Title VI funds, a project does not need to be listed in a State's Transportation Improvement Plan (TIP).

Title I, Part A provides funding for not only the Congestion, Mitigation & Air Quality Improvement Program (CMAQ) but the Surface Transportation Program (STP) and the National Highway System (NHS) program. In order to receive Title I funds, a project needs to be listed in the TIP. According to the Chicago Area Transportation Study (CATS) (Chicago's regional MPO), there are plans to add all area ITS projects to the State of Illinois' TIP. Indiana and Wisconsin also plan to add all of their state ITS projects to their respective state TIPs.

The ISTEA legislation expires this year and is expected to be followed by new ITS funding legislation. Title VI funds, which are specifically earmarked for ITS projects, may not exist under this new legislation as it seems the federal government would like to move toward mainstreaming ITS projects. If mainstreaming occurs, all ITS projects would be required to be listed in the TIP and would not receive special funding considerations. This matter is still under discussion in Congress. It does appear however that the earmarked funds for corridors set up in ISTEA, will not be carried over to the new legislation. The exact dollars to be provided under new legislation is still under discussion in Congress.

In September 1997 the U.S. House of Representatives passed a six month extension of the 1991 ISTEA bill. ISTEA authorized \$113 million a year for ITS. A six-month extension would theoretically provide ITS with half of that or \$56.5 million.

Another piece of legislation that could be beneficial to transportation and ITS projects is the Transportation Infrastructure Finance and Innovation Act of 1997. This program would compliment the existing State Infrastructure Bank Program by directing resources to investments of critical national importance that otherwise would not be constructed at all because of their size, complexity and uncertainty over timing of revenues. Due to the requirements that would need to be in place to receive assistance from this new program, the Gateway would not be eligible. However, it is still important to mention this program because of the benefits it could have for other upcoming projects. The requirements to qualify for assistance under this program are:

- Be an eligible surface transportation project under Title 23 or chapter 53 of Title 49 of the U.S. Code.
- Be included in a state transportation plan and the approved State Transportation Improvement Program.
- Cost at least \$100 million (the threshold for intelligent transportation systems - ITS - projects is \$30 million) or 50% of the state's most recent apportionment of federal-aid highway funds, whichever is less.
- Be supported in whole or in part by user charges or other non-federal dedicated revenue sources.

2.1.2 Non-Traditional Sources

Non-traditional sources of funding could include non-transportation agencies, private partnerships, etc. The following sections provide some examples of how additional funding could be obtained.

The key to all these funding sources is to create win-win situations where all parties involved are having a need fulfilled that cannot be fulfilled in other ways.

2.1.2.1 Private Partnerships

IDOT has successfully used private partnerships in the past. The DOT has had long-standing relationships with radio and television stations that enables traffic information dissemination on a much broader scale than IDOT could perform by itself. The use of value added resellers (VAR) is one opportunity for obtaining private funds. The VARs could be used to disseminate the Gateway TIS data with a product that they developed and that travelers could purchase or lease. VARs were used successfully in the TravInfo project in California and are currently being used in the Chicago area to distribute traffic information (e.g. Shadow Traffic, Metro Traffic). There are several entities that can be considered for private partnerships including Tourism Bureaus, Advertising Agencies, News Organizations, Economic Development Agencies, Commercial Vehicle Operators, Information Service Providers, Paging Providers and Cellular Services.

The *ADVANCE* Project was also an example of a successful public-private partnership. In this case IDOT, Motorola and the Illinois Universities Transportation Research Consortium (IUTRC) joined together to provide an ITS field operations test for dynamic route guidance using probe vehicles. Currently, IDOT is partnering with Amtech Corporation for a Weigh-in-Motion demonstration with Commercial Vehicle Operators in Williamsville, Illinois.

The private sector is becoming an increasing source of funding for the state DOTs. State DOTs are performing more and more outreach in order to capture this latest funding source. Currently the Indiana Department of Transportation (InDOT) is discussing, with various communication companies, the possibility of providing use of state right-of-way in exchange for various services. InDOT would allow the communications companies to utilize existing lighting towers (or construct their own) in exchange for

services such as cellular phones and closed circuit television cameras.

In California, the TravInfo project is a public/private partnership that provides up-to-the-minute traffic information and current transit and ride-share information to Bay Area travelers. The information is provided through two means to the traveling public. TravInfo provides information direct to the public through a telephone call-in access system. TravInfo also provides the information to its private-sector participants that can then provide the data to the public through a variety of means including pagers, cell phones, on-line computer services, in-vehicle navigation systems and kiosks as VAR's. The public sector is responsible for collecting the data and providing the data in a digitized form through either a modem or a wireless data broadcast to the private sector participants. During the two-year field operations test, the public sector will provide this information to the private sector free of charge. The budget for data collection and distribution by the public sector is \$9.1 million for a two-year field operations test. The private sectors will make in-kind contributions of \$1.2 million over this same period. Additionally, the private sector will finance the data distribution research and development and will then utilize user fees once a product has been developed to realize a profit. Currently, TravInfo has an open participation policy. Through open participation, any person or entity, public or private, is able to register with TravInfo as a participant in the project and receive TravInfo data.

Another example of a public/private partnership is between the New York State Thruway Authority (NYSTA) and the Metropolitan Fiber Services (MFS) Network Technologies. The partnership will be used to develop, integrate and support a fiber optic network along the 641 mile NYSTA system. The Thruway is providing MFS with secure right-of-way for the fiber optic cables while NYSTA receives access to the fiber optic network. The Thruway's telecommunications needs include emergency management transmissions, mobile communications, electronic variable message signs and video traffic monitoring. The partnership agreement states that MFS shoulders all construction and marketing costs, and is entitled to the first \$50 million in revenues generated by the network. The Thruway is to receive 10 percent of all revenues between \$50 million and \$88 million, and 50 percent of all revenues above \$88 million.

MFS is also involved in a partnership with the Illinois State Toll Highway Authority (ISTHA). MFS is under contract with ISTHA to install third party fiber communications in ISTHA right-of-way. As part of the contract ISTHA will receive a number of the communication fibers for its own use.

Recently a high-tech traveler information service was launched in the Washington D. C. area utilizing public/private partnerships. This public/private partnership is named Partners in Motion and is composed of 25 public agencies and 12 private organizations. Under the current funding arrangement, the private sector is paying for one-third of the service's \$12.2 million cost. The service is called the SmartTravler Information System and provides travelers with up-to-the-minute traffic and transit information via a local phone number or the Internet. The information provided is route-specific and also provides construction, weather and special event information. This service covers Maryland, Virginia and the District of Columbia and is operated by SmartRoute Systems, Inc. of Cambridge, Mass., under a six-year contract to Battelle, prime Contractor for Partners in Motion. By early 1998, additional methods of receiving traveler information will be introduced. Additional means of distributing traveler information could include kiosks, pagers, cable television and in-vehicle navigation devices.

2.1.2.2 Fee for Service

While current state policy is not to charge fees for traffic data, this may change in the future. If the policies do change, it may then be possible to charge a subscription fee for fused and/or raw data to information service providers, the public, other operating agencies, etc.

2.2 FUNDING NEEDS

It is anticipated that the total capital funds necessary to design and build the initial Gateway and the associated communication systems will be approximately \$5 million. This includes hardware, commercial software, software development, other equipment and Contractor costs.

2.3 FUNDING TIME FRAME

The implementation for the Gateway will be performed in two parts. First the Initial Phase will be implemented within the next two or three years. The Ultimate Phase will commence after the Initial Phase and will actually be an ongoing effort as new system sources are added to the Gateway and new means of data distribution are implemented.

3.0 SYSTEM ARCHITECTURE AND CRITICAL INTERFACES

3.1 HARDWARE

Once the basic system architecture is determined it will be necessary to obtain the system hardware. The software development can then be done on the machines that will be actually used for the Gateway. Most likely a majority of the hardware will be purchased by IDOT through the Bureau of Information Processing (BIP) outside of the Gateway project contract.

3.1.1 Server(s)

As stated in the *Gateway Functional Requirements* (Document #17250) the Gateway shall consist of one or more server machines. The number of servers will depend on how many tasks each server will perform. It is also dependent upon whether or not the Gateway server and the Illinois regional hub server are the same machine. Once the number of servers needed is determined, it will be necessary to purchase the servers. The servers will be the first pieces of hardware purchased so that the remaining hardware and the software will all be compatible. It would be recommended that the server vendor provides on-site service in case of hardware failure.

Once the servers are obtained the necessary system components can be purchased. It may be possible to purchase the servers with the necessary components pre-installed, a decision on this can be made during the design phase. This will include such components as: a CD-ROM drive, tape backup drive, floppy drive, communication equipment and laser printer(s). These system components will need to be commercially available (e.g. 3COM, Iomega, Phillips, etc.) and easily replaceable (e.g. available from a local computer store). It may be necessary to have certain spare components available on-site in case of hardware failure.

3.1.2 Workstation Machines

At initial implementation, the Gateway will be provided with at least two operator workstation and will support up to five workstations and 10 operators. The Illinois regional hub will be provided with at least three operator workstations initially and will support up to five workstations and 10 operators.

During the design phase of the Gateway/Illinois regional hub it will be determined if the Gateway and the Illinois regional hub will be operated together or separately. Based on this decision it will then be determined how many workstations will need to be purchased. As stated above, these pieces of hardware will be purchased early on and will be common, commercially available systems.

3.1.3 Local Area Network (LAN)

The hardware necessary to create the LAN will need to be obtained shortly after the server(s) and workstations are purchased in order to allow the workstations and server(s) to communicate with each other during development.

3.1.4 Site Environment

Based on the detailed design of the Gateway, the site environment will need to be constructed. This will entail the purchase of equipment racks, non-static surfaces, fire prevention system, cable runs, and other equipment. Additional air conditioning and ventilation may also be required. It will also be necessary to establish a limited access environment. This can be established by various types of commercially available door locking systems (i.e. key, access card or combination lock).

3.1.5 Power Supply

The system will normally be powered by standard, commercially available power. It will be necessary to purchase some form of uninterruptible power supply (UPS). Additional changes may also be needed in the building wire, both at the fuse panel and at the main building panel to accommodate increased loading. This will be determined during detailed design.

3.2 SOFTWARE

The central processing component of the Gateway will include both commercial-off-the-shelf (COTS) and specifically developed application software. This software will be selected and designed to achieve the goals of the Gateway requirements. Most likely a majority of the COTS software will be purchased by IDOT through the Bureau of Information Processing (BIP) outside of the Gateway project contract.

Purchase of COTS software will take place with the hardware purchase to ensure compatibility. Applications software development is recommended to take place on the hardware purchased for this project to ensure full compatibility. The location of this development remains to be determined.

3.2.1 Operating System

The implementation of the operating system will be fairly basic since the available options are commercially available. The available options are: various Unix implementations, Microsoft Windows NT or Microsoft Windows '95. The same operating system will be utilized for all Gateway/Illinois regional hub servers and the same or a compatible operating system will be utilized for all of the Gateway/Illinois regional hub workstations.

3.2.2 DBMS (Database Management System)

The Gateway will make extensive use of COTS DBMS technology to store and retrieve data. Two main types of DBMSs will be considered by the detailed design: relational databases and object-oriented databases. In either case, the DBMS will have the same responsibility for data storage and data integrity and will need to conform to the requirements established in the Gateway Functional Requirements (Document #17250). Final selection of the DBMS will be done during detailed design.

3.2.3 Graphical User Interfaces

The software designed for the Gateway operator will be designed using COTS graphical user interface (GUI) tools. A GUI system provides standard windowing capabilities which will allow a simple and comprehensible interface between the operator and the processing software. Standard GUIs such as X-Windows or Win32 are to be used wherever practical..

3.3 CRITICAL GATEWAY INTERFACES

As noted in the project overview in Section 1.2 there are two phases of the Gateway: "Initial" and full-build-out or "Ultimate."

The Initial Phase includes what is expected to be implemented in two to three years. The Initial Phase will build off the existing connections between the Corridor Transportation Information Center (C-TIC) and the external entities/data flows.

The Ultimate Phase will be implemented after the Initial Phase is completed and will be an ongoing process as new data sources and distribution methods are implemented.

3.3.1 Illinois Regional Hub

The Illinois regional hub will collect all the data from the various agencies located in NE Illinois. It is anticipated that the Illinois regional hub will be located in the same building as the Gateway. The interfaces to this regional hub are discussed in Section 3.4.

3.3.2 Borman ATMS

Transportation related information collected for Northwest Indiana will be directed to the Gateway through the Borman ATMS which will act as the Indiana regional hub. At the same time that the Gateway/Illinois regional hub is being implemented, the Borman ATMS will need to prepare for the time in which it will start providing data to the Gateway. There are three tasks that need to be taken care of that are critical to bringing the Gateway to fully operational status. The first task is connecting the regional hub to the ITS subsystems in Indiana. The second task is for the Borman ATMS to process their data into a usable format (e.g. NTCIP, LRMS compatible), perform data filtering, data fusion, etc. The third critical task that needs to be performed by the Borman ATMS is the establishment of a data connection to the Gateway. The data connection will need to be a high speed, DS3 or greater, ATM (Asynchronous Transfer Mode) connection. This task is one of the critical tasks that needs to be performed in order for the Gateway to become fully operational and to reflect more than an Illinois presence.

3.3.3 Communication and Data System Infrastructure (CDSI)

Transportation related information collected for SE Wisconsin will be directed to the Gateway through the Communication and Data System Infrastructure (CDSI). As the Gateway/Illinois regional hub is being

designed, the CDSI will need to prepare for when data will be transmitted to the Gateway. There are three critical tasks that need to be performed simultaneously with the Gateway implementation. CDSI will first need to establish regional hub services for the ITS subsystems in Wisconsin. Secondly CDSI needs to process incoming data into a usable format (e.g. NTCIP, LRMS compatible). Finally CDSI needs to establish a data connection between itself and the Gateway. The connection will need to be a high speed, DS3 or greater, ATM connection. This task is one of the critical tasks that needs to be performed in order for the Gateway to become fully operational and to reflect more than an Illinois presence.

3.3.4 Internet Access

Prior to the cut-over from the C-TIC to the Gateway, three types of Internet service needs to be established. The first type of Internet service will not require any type of passwords and will be intended for public use. The second type of Internet service will be password protected and will be intended for use by private entities such as information service providers. The third type of Internet service will also be password protected and will be intended for use by public operating agencies. Exactly what data is shown on which Internet service needs to be determined during detailed design of the Gateway.

3.4 CRITICAL ILLINOIS REGIONAL HUB INTERFACE

The Illinois regional hub will collect data from the various data sources in the NE Illinois area. This regional hub will be located at the same facility that will house the Gateway. When implemented, the Illinois regional hub and Gateway will be configured into a Local Area Network (LAN) but will need to be designed to allow the Illinois regional hub and Gateway to be separated, if needed, at some point in the future. The Illinois regional hub will be designed and implemented in the same time frame as the Gateway. Below are the critical interfaces with their connection status and implementation issues.

3.4.1 Traffic Systems Center (TSC)

Currently the Traffic Systems Center supplies detector volumes and occupancies to the Corridor Traveler Information System (C-TIC) via an electronic connection (dedicated line). IDOT is about to begin the process of upgrading the TSC and should have the new system completed by May 1999. Prior to the cut-over from the C-TIC to the Gateway it will be necessary for this electronic connection to be a DS3 or higher bandwidth to accommodate shared video images.

It will also be necessary, prior to the Gateway becoming operational, for the TSC to establish policies that will allow the Gateway and other ITS subsystems to set messages on the TSC VMSs, operate the PTZ (pan-tilt-zoom) capabilities of its CCTV cameras and select which of the TSC cameras it wishes to receive a video feed from. The development of the TSC will need to determine whether the Gateway interface should be fully integrated or not. If not, a separate computer will be required. Regardless, it will be necessary that all data transferred to the Gateway be in the established LRMS format and be NTCIP compatible. Additionally, data from the Gateway to the TSC will be in LRMS format and NTCIP compatible. Close coordination will be required between the Gateway developer and the TSC developer.

3.4.2 IDOT District 1 - Schaumburg

Currently IDOT provides the C-TIC with electronic data (via a dedicated line) from their SSI weather system. Other information is currently provided by fax or phone only. When the Gateway becomes operational, data will continue to be transmitted in these forms. Eventually however, it will need to be a DS3 or greater connection in order to support video feeds.

Initially data to/from District 1 will need to be translated to the LRMS format and be NTCIP compatible. This could require use of a computer at the District. Eventually however, as the District 1 subsystems are upgraded, the interface should become internal.

3.4.3 Northwest Central Dispatch

Northwest Central Dispatch (NWCD) serves as the police and fire dispatch agency for six (6) cities in the northwest suburbs of Chicago. Currently NWCD provides the C-TIC with information regarding traffic related incidents via an electronic connection (dedicated line.) Once the Gateway is implemented the connection from NWCD will be transferred from the C-TIC to the Gateway. At some point in the future this connection will be upgraded to a DS0 Frame Relay circuit.

Prior to the implementation of the Gateway, the issue of filtering the data that is to be sent to the Gateway will need to be addressed. There are two types of data that need to be filtered out: confidential data and non-related data. The confidential data will include such things as names, addresses, etc. that should not be released to the public. The non-related data will include all incidents that do not directly relate to the operation of roadways or occur on non-NHS roadways. It will be necessary that all data transferred to the Gateway be in the established LRMS format and be NTCIP compatible. It is expected that data sent to the Gateway will continue to be provided from a feed to the NWCD printer and filtering, etc. be performed by a local PC. NWCD will need to determine if it is cost effective to directly integrate the return feed from the Gateway into their system.

3.4.4 Illinois State Toll Highway Authority

The Illinois State Toll Highway Authority (ISTHA) currently provides the C-TIC with construction and maintenance information for the toll roads in the northeastern Illinois region. This data is provided by fax or e-mail. When the Gateway is implemented this data will continue to be provided by fax but eventually will be provided via a data connection.

It will also be necessary, prior to the Gateway becoming operational, for ISTHA to establish policies that will allow other ITS systems within the Corridor to set messages on ISTHA VMSs, operate the PTZ capabilities of its cameras and select which of the ISTHA cameras it wishes to receive a video feed from. Other data that will be provided are travel times derived from toll tags. The developers of the ISTHA Traffic Management Center (TMC) will need to determine whether the Gateway interface should be fully integrated or not. If not, a separate computer will be required. Regardless, it will be necessary that all data transferred to the Gateway be in the established LRMS format and be NTCIP compatible. Additionally, data from the Gateway to the

TMC will be in LRMS format and be NTCIP compatible. Close coordination will be required between the Gateway developer and the TMC developer.

The data connection will need to be a DS3 or greater in order to handle a video feed.

3.4.5 *999

*999 is a cellular emergency system that covers the City of Chicago and the surrounding six counties. Currently *999 provides the C-TIC with incident information via a dedicated line. When the Gateway is implemented this connection will be switched over from the C-TIC to the Gateway. Prior to switching over to the Gateway the connection will be upgraded to a DS0 Frame Relay circuit.

Prior to the implementation of the Gateway, the issue of filtering the data that is to be sent to the Gateway will need to be addressed. There are two types of data that need to be filtered out: confidential data and non-related data. The confidential data will include such things as names, addresses, etc. that should not be released to the public. The non-related data will include all incidents that occur on non-NHS roadways. It will be necessary that all data transferred to the Gateway be in the established LRMS format and be NTCIP compatible. This will require changes in the interface at *999. *999 will need to determine if it is cost effective or desirable to directly integrate the return feed from the Gateway into their system.

3.4.6 Illinois Transit Hub

The Illinois Transit hub will serve as a distribution point for data to/from the Chicago Transit Authority (CTA), Pace and Metra. Initially each of the transit agencies will be connected separately to the Gateway via a DS1 ATM circuit. These connections will be established prior to the Gateway becoming operational. It will be necessary that all data transferred to the Gateway be in the established LRMS format and be NTCIP compatible. This in turn will require a computer at each of the transit agencies to do the data conversion and to filter out confidential data and non-related data (e.g. non-traffic related incidents and all incidents on non-NHS roadways). Eventually the Illinois Transit Hub will perform these roles. Individual transit agencies will need to determine if it is cost effective and desirable to directly integrate the return feed from the Gateway into their system.

3.4.7 IL State Police - District 15

The Illinois State Police (District 15) are currently in the process of being connected to the C-TIC via dedicated line. When the Gateway is implemented this dedicated line connection will be switched over from the C-TIC to the Gateway. It is anticipated that the District 15 State Police will share the main ISTHA connection to the Illinois regional hub. This connection needs to be via a DS3 connection or greater in order to view video feeds.

Prior to the implementation of the Gateway, the issue of filtering the data that is to be sent to the Gateway will need to be addressed. There are two types of data that need to be filtered out: confidential data and non-related data. The confidential data will include such things as names, addresses, etc. that should not be

released to the public. The non-related data will include all incidents that occur on non-NHS roadways. It will be necessary that all data transferred to the Gateway be in the established LRMS format and be NTCIP compatible. The Illinois State Police will need to determine if it is cost effective and desirable to directly integrate the return feed from the Gateway into their system.

3.4.8 Illinois State Police - District Chicago

The Illinois State Police (District Chicago) is expected to have an electronic connection to the Gateway prior to the implementation of the Initial Phase. This connection needs to be via a DS3 connection or greater in order to view video feeds.

Prior to the implementation of the Gateway, the issue of filtering the data that is to be sent to the Gateway will need to be addressed. There are two types of data that need to be filtered out: confidential data and non-related data. The confidential data will include such things as names, addresses, etc. that should not be released to the public. The non-related data will include all incidents that occur on non-NHS roadways. It will be necessary that all data transferred to the Gateway be in the established LRMS format and be NTCIP compatible. The Illinois State Police will need to determine if it is cost effective and desirable to directly integrate the return feed from the Gateway into their system.

3.4.9 Illinois Traffic Signal System

Currently there are traffic signal systems being operated by Illinois Department of Transportation, the City of Chicago and other city and county agencies throughout northeastern Illinois. It is anticipated these signal systems will be incorporated into the Ultimate Phase of the Gateway implementation. It will be necessary that all data transferred to the Gateway be in the established LRMS format and be NTCIP compatible. This may require one or more PCs at these agencies to do the conversions and act as the user interface at these sites. Local agencies will need to determine if it is cost effective and desirable to directly integrate the return feed from the Gateway into their system.

3.4.10 CDOT

When the Initial Phase of the Gateway is implemented, the Chicago Department of Transportation will continue to provide construction/maintenance data. Initially this data will be provided via fax or e-mail. In the Ultimate Phase CDOT will provide traffic signal system information. This may require one or more PCs to do the conversions and act as the user interface at these sites. CDOT is also expected to establish a connection to the Chicago Skyway in order to provide the Gateway with travel time data on the Skyway. It will be necessary that all data transferred to the Gateway be in the established LRMS format and be NTCIP compatible. CDOT will need to determine if it is cost effective and desirable to directly integrate the return feed from the Gateway into their system.

At some point in the future, CDOT may need to provide policies that will allow other ITS systems to operate the PTZ capabilities of cameras that may eventually be installed and set messages on CDOT VMSs that may eventually be installed.

3.4.11 Ports/Airports

In the Ultimate Phase of the Gateway implementation it is assumed that electronic connections will be made to northeastern Illinois airports (O'Hare, Midway and others) and ports (located on Lake Michigan). This information (transmitted by dedicated line) would include: incidents, arrival/departure schedules, etc. Initially, this could require provisions of a PC at these sites until the sources can justify the need for full system integration. It will be necessary that all data transferred to the Gateway be in the established formats. Ports/Airports will need to determine if it is cost effective to directly integrate the return feed from the Gateway into their system.

4.0 SYSTEM TESTING

Throughout the entire process of implementing and designing the Gateway there will be testing performed continuously. These tests will be performed on both the hardware and software components throughout development.

For the testing of the Gateway, three levels of acceptance should be used: Pass, Partial Acceptance and Failure. Pass will be utilized if all requirements that were established are fully met. Failure will be utilized if very few of the requirements are met and the system would suffer through the use of the component. A failed component will need to be redeveloped or upgraded from its current form. Partial Acceptance will be utilized if the component meets a majority of the requirements and the performance of the Gateway system will not be adversely affected by the components present status. Deficiency reports will be generated for both partial acceptance and failure.

To make sure that software and hardware is being developed/designed correctly periodic demonstrations will be performed to allow for modifications in design. These component demonstrations can be performed in conjunction with the system development reviews. The component demonstrations will make use of both rapid prototyping and a building block approach. Rapid prototyping will allow for the Contractor to prepare quick non-functioning versions of the actual components in order to allow IDOT to see what will eventually be developed and propose changes before a lot of time is put into the actual component. The building block approach will allow for the Contractor to demonstrate the functionality of a single component by itself and then combine components together to increase their overall functionality. This building block approach will continue until the entire system is assembled, including complete integration of all hardware and software.

It would be advisable that the staff of the Gateway (when implemented) be involved in component demonstrations so that they are as user friendly as possible when the operators begin using the system. It would also be advisable that those individuals that will be performing maintenance (if it is not the Contractor) are present in order to better understand the system. In this way operation and maintenance personnel will be intrinsically familiar with the Gateway system well in advance of the system becoming operational.

4.1 TESTING/MONITORING DURING DEVELOPMENT

In order for the hardware and software to be developed with as few problems as possible, it is necessary to test/monitor the system components as they are developed. This entails checking each piece of hardware separately as they delivered and as pieces of hardware are combined into components they are once again tested until the entire system is assembled. Similar testing will be done with the various pieces of software as they are developed and combined together. Data inputs will be simulated if real-time data is not available.

4.1.1 Test Plan

Test plans will be generated based upon the functional requirements. The test plan will consist of steps where each step is a separate test. The result of each step will result in success, partial acceptance or failure.

Failure or partial acceptance will result in a deficiency report being generated (see Section 4.3). Testing will be deemed complete when all test steps have been executed and all deficiencies corrected. By testing the functional requirements, both the software and hardware will be tested.

The test plan should detail the procedure to be used, who will be performing these component demonstrations (Illinois DOT or separate Contractor) and acceptance criteria. A draft test plan will be developed that will detail the components that will be demonstrated using the building block approach and also which elements of the Gateway system will require rapid prototyping.

The test plan for the hardware components will include an appropriate period of continuous operation wherein they will not exhibit any hardware errors. All of the Gateway Commercially Off the Shelf (COTS) software shall undergo a period of testing to determine if it meets Gateway functional and design requirements and performs its advertised features. A draft test plan will be developed that will detail the order that the individual components will be tested and the order in which they will be assembled into larger components and tested.

4.1.2 Acceptance Criteria

The acceptance criteria will be used to determine both if the hardware and software are working correctly. The acceptance criteria for the components will be based on the requirements established in the Functional Requirements Document. Rapid prototyping will be mostly utilized for the Gateway developed software and will be tested by determining if all functions, outlined in the Functional Requirements Document, are available on the "dummy" screens (since the on-screen options will not actually perform any functions.)

4.1.3 System Development Reviews

In order to make sure that hardware and software is being developed/designed as expected, design reviews will be performed on a regular basis with the Illinois Department of Transportation. These reviews will commence one month after notice to proceed and continue monthly until final system acceptance. These reviews will consist of reviews of user screens resulting from rapid prototyping, review of proposed interface designs, etc.

By performing these reviews problems can be caught early on in the implementation and allow for development to stay on course. At these reviews it would be helpful for the Gateway staff to be present in order to provide their input to allow the components to be as user friendly as possible.

4.2 FINAL ACCEPTANCE TESTING

Throughout the development of the Gateway, as stated above, all components will be continuously tested. Once the Gateway is fully assembled another series of tests will be performed to guarantee that the Gateway meets and/or exceeds all the requirements that have been established. Data inputs will consist of real-time, split feeds to the C-TIC. It is only after this final operational testing is complete that the C-TIC will be removed and the Gateway becomes fully operational.

4.2.1 Test Plan

The Test Plan will need to contain tests that will ensure that the Gateway can operate under both standard and extraordinary operating conditions. Along with this final testing software will need to be developed that will simulate data overload, bad data formats, incorrect requests, etc. Tests will also need to be performed that will take various pieces of equipment or various communication links off-line to ensure the continued operation of the Gateway.

A test report will be generated for each of the tests performed. The following pieces of information will be included in the test report:

- Who performed test
- Test #
- Step #
- Date
- Time
- System
- Sub-system
- Level of Acceptance
- Deficiency (if any)

If there are any deficiencies found for any of the tests, a deficiency report will be generated (see Section 4.3)

4.2.2 Acceptance Criteria

For the Final Testing phase of the Gateway, the Acceptance Criteria will need to include all of the requirements established in the Gateway Functional Requirements (Document #17250.) The acceptance criteria will need to define the acceptable levels of failure that will allowed without rejecting the particular component(s).

4.3 DEFICIENCY REPORTING

As part of testing it will be necessary to report any deficiencies that result during any of the testing. Deficiencies can be categorized as critical, serious and minor. A critical deficiency is one which causes a halt to the system. As an example, a divide by zero. When a critical deficiency occurs, no further testing can be accomplished. At this point a deficiency report is written up so that the developer can solve the problem with a minimum delay. Other critical deficiencies include loss of hardware.

A serious deficiency is one which produces unstable results during testing. An error in an algorithm design is an example of a serious deficiency.

A minor deficiency occurs when the result from a test is incorrect but does not impede operations or further testing. An incomplete report is an example of a minor deficiency.

A deficiency report will include the following information:

- Who performed test
- Test #
- Step #
- Date
- Time
- System
- Sub-system
- Deficiency
- Who needs to respond to deficiency
- Response
- Re-tested
- Accepted ?

5.0 DOCUMENTATION

Several Gateway documents have been developed to date. These include: Gateway TIS System Definition Document, Gateway Functional Requirements, Gateway Interface Control Requirements and Gateway Phased Implementation Plan.

Each of the documents (excluding the Detailed Design Document) will need to be developed/updated at the start of the project. Once the Detailed Design Document is developed, the other documents will need to be updated. Additionally, once the Gateway is implemented, all of the documents that have been developed will need to be reviewed by the Contractor and then finalized. The following sections present an overview of these documents along with other documents that need to be prepared for the Gateway.

5.1 GATEWAY TIS SYSTEM DEFINITION DOCUMENT

The Gary-Chicago-Milwaukee (GCM) Corridor Multi-Modal Traveler Information System (MMTIS) *Gateway TIS System Definition Document* describes the MMTIS Gateway and defines the high level processes and data flows. The *Gateway Functional Requirements* together with the *Gateway Interface Control Requirements* provide the necessary details to obtain an in-depth understanding of the system. As the Gateway design is further detailed and implemented, changes in this document will be required to reflect changing requirements, conditions, etc.

5.2 GATEWAY INTERFACE CONTROL SPECIFICATIONS

The purpose of this document is to identify and define the overall requirements for interfacing between the Gateway and components of the Corridor Architecture (specifically regional hubs and the Illinois ITS subsystems) in support of the Multi-Modal Traveler Information System.

These requirements are identified in order to support the design of the Gateway. They provide details regarding interfaces between the Gateway defined in the *Gateway TIS System Definition Document* and the remainder of the Corridor Architecture. This document, in combination with the Gateway Functional Requirements is intended to be used to gain a more complete understanding of the system. These requirements are intended as testable statements of system design and operation. As the Gateway design is further detailed and implemented, changes in this document will be required to reflect changing requirements, conditions, etc.

5.3 GATEWAY FUNCTIONAL REQUIREMENTS

The purpose of this document is to identify and define the functional requirements for the Gateway system and the Illinois regional hub components of the Corridor Architecture in support of the Multi-Modal Traveler Information System (MMTIS).

These requirements are identified in order to support the design of the Gateway system. They provide statements of needed functionality and associated design requirements for the Gateway system defined in

the *Gateway TIS System Definition Document* and the remainder of the Corridor Architecture. This document in combination with the *Gateway Interface Control Requirements* is intended to be used to gain a more complete understanding of the system. These requirements are intended as testable statements of system design and operation. As the Gateway design is further detailed and implemented, changes in this document will be required to reflect changing requirements, conditions, etc.

5.4 DETAILED DESIGN DOCUMENT

The Detailed Design Document will provide a complete in-depth overview of the entire design of the Gateway. It provides details on how the design is to be implemented to the extent that a knowledgeable person can recreate the proposed system. This document will be updated after final testing.

5.5 TRAINING MANUALS

Along with the training of the staff for the Gateway, the Contractor will need to provide training manuals for the staff. These manuals will not only be used during the training period but can be used as reference material for the everyday operation of the Gateway. The following training manuals will need to be provided:

- Gateway Operator Training Manual - This manual will provide the steps necessary to operate the system on a daily basis. This will cover the operators use of the Graphical User Interface.
- Gateway System Administrator Training Manual - This manual will provide knowledge on the operating system, database and general overview of the system components. This manual will also discuss other responsibilities such as: security and user account management, system performance monitoring, system and database report generation and system backup.
- Gateway Maintenance Training Manual - This manual will provide details on the system components, but will not go down to board level. Information will also be provided on hardware operations and COTS software in order to assist in troubleshooting.

5.6 GATEWAY OPERATOR'S USER MANUAL

The *Gateway Operator's User Manual* is designed to assist the operator at the Gateway with the navigation and use of the application programs in the Gateway. This document will concentrate solely on the external appearance and behavior of the interface from the operator's point of view.

5.7 SOFTWARE CONFIGURATION MANAGEMENT PLAN

The *Software Configuration Management Plan* will need to be developed prior to the development of the Gateway developed software. This document will outline the procedures that need to be used in the development of the software and also the standard formats that will be used in the writing of the code. This will allow for all of the software that is developed to be in a similar format.

This document should also include how software/hardware bugs will be tracked through the use of deficiency forms. This will include to whom the problems are reported to and the forms that need to be filled out to detail the error.

5.8 SOURCE CODE DOCUMENTATION

It will be necessary to include documentation in all of the source code created for the Gateway developed software. This will allow either the developer of the software or another software programmer to be able to determine what tasks each piece of the source code are performing. This aids in debugging and any upgrades that need to be performed.

5.9 IMPLEMENTATION PLAN

Due to the fact that the system design for the Gateway will be determined by the Contractor that receives the project, this version of the *Gateway Phased Implementation Plan* is general and non-specific. Based on the actual system design created for the Gateway this document, *Gateway Phased Implementation Plan*, prepared by the Contractor will be re-written with an in-depth look at the complete implementation proposed to be used in the implementation of the Gateway.

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6.0 SYSTEM STAFF AND TRAINING

6.1 STAFF

Early on in the Gateway/Illinois regional hub development it will be necessary to define the staff that will operate the Gateway/Illinois regional hub when it becomes operational. At this point in time however, it is assumed that the staff currently operating the C-TIC (system administrator and operators) should be sufficient to operate the Gateway. It is recommended these staff be involved at key times in the design reviews, particularly when GUIs are discussed. While the Gateway will be designed to run unattended, it is recommended an operator be present from 6am to 7pm weekdays with supervision by a part-time supervisor. Initially the operator may need to manually input some data but as more services are automated, the operator's role will be one of monitoring. The need for more than one operator will be assessed following the Initial Phase.

6.2 TRAINING

6.2.1 Initial Training

The staff that will be operating the Gateway should be determined at the beginning of the design phase. This will allow for them to become familiar with the equipment and also provide input for the development of various pieces of hardware and software (e.g. Graphical User Interface.) It will be necessary to provide training at the beginning of the implementation process to allow the staff to become familiar with the tasks they will be performing once the Gateway becomes operational.

6.2.1.1 Operators

The operators should be brought in for initial training as soon as the hardware and software testing begins. This will allow for the operators to become familiar with the Gateway components and also allow for the Contractor to receive input on the design from the individuals that will be using the components on a daily basis. Along with participation in the testing of the components the operators will also be trained on the various tasks they will be required to perform.

6.2.1.2 System Maintenance

System maintenance will include general upkeep of the system and periodic diagnostic checks. The diagnostic checks will be performed with the use of specially designed software. In the event of errors determined by the diagnostic checks the maintenance staff may need to replace hardware, contact the manufacturer about the error or contact the software developers.

The individuals that will be responsible for the maintenance of the Gateway will need training that includes a more detailed system-level presentation and detailed analysis of all system components.

6.2.1.3 System Administrator

The System Administrator will need to receive more detailed training that includes system-level information and detailed analysis of all system components. The system administrator should oversee all of the on-site work performed by the Contractor.

6.2.2 Final Training

Once the final operational testing for the Gateway is complete, all staff will receive final training so they are fully prepared to operate the Gateway on a daily basis. Once final training is complete, the Gateway can become operational with control being switched over from the C-TIC.

6.2.2.1 Operators

The final operator training will be performed once the final operational testing is completed, though it is possible that the operators could participate in the final testing. Once the final testing is complete, the operators will be given a final training course by the Contractor with real data being input to the Gateway while the C-TIC is still fully functional.

6.2.2.2 System Maintenance

The final maintenance training should continue the initial training as well as include a detailed look at each piece of equipment covering preventative maintenance as well as recovery and restoration should an error occur. It would be to the advantage of the system maintainers to participate in the final operational testing and also the operational cut-over from the C-TIC to the Gateway.

6.2.2.3 System Administrator

The final training for the system administrator will be a continuation of the initial training with continued emphasis on system-level information and detailed analysis of all system components. The system administrator will also need to be involved in the final operational testing and the cut-over of operations from the C-TIC to the Gateway.

7.0 OUTREACH

It is necessary in order to expand the awareness about the Gateway to establish an outreach program. Through this effort agencies that are not currently involved with the Gateway can become involved and also the public can be made aware of the efforts that are being undertaken.

7.1 OUTREACH RECIPIENTS

7.1.1 Operating Agencies

Beyond those agencies that are already involved with providing/receiving data to/from the Gateway, it is necessary to target agencies that would be able to provide helpful information to the existing users of the Gateway.

7.1.2 Media

It will be necessary to make the media aware of the services that will be made available through the implementation of the Gateway.

7.1.3 Public/Elected Officials

It will also be necessary to inform public/elected officials of the general happenings involved with the Gateway implementation. This will include the public, mayors, aldermen, etc.

7.2 DISTRIBUTION OF INFORMATION

Information should be distributed to both outreach recipients and those already involved in the Gateway.

7.2.1 Newsletters

It may be necessary to regularly distribute a newsletter relating information about the current status of the Gateway. This would be distributed to critical stakeholders in the Gateway implementation.

7.2.2 Media Briefings

As another means of keeping people informed about the Gateway implementation, it is recommended to hold regularly scheduled briefings to relate information similar to that in the newsletter.

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8.0 IMPLEMENTATION SCHEDULE

In order to guarantee that the Gateway implementation will be completed on time a complete detailed implementation schedule needs to be established. This schedule will detail the time frame in which critical elements will be performed in establishing the Gateway.

Listed below are the tasks involved in the preparing for the implementation of the Gateway while keeping the C-TIC fully operational. Figure 8-1 shows a bar chart schedule for the Gateway implementation. It is projected that implementation will require 18 months to complete.

Task 0 - Detailed Design Document

- Develop the Detailed Design Document and Update Other Design Documents Accordingly

Task 1 - Obtain Central Hardware

- Servers (number dependent on design)
- Workstations
- Hardware Components (i.e. tape backup equipment, CD-ROM drive, etc.)
- Local Area Network
- Single Processor Machines (if necessary)
- Laser Printer
- Projection System (necessity will be determined)
- Uninterruptible Power Source (UPS)

Task 2 - Obtain Commercial off the Shelf (COTS) Software

- Operating System Used by Gateway
- Graphical User Interface Platform Software
- The Database and Database Management System (DBMS)
- Interprocess Communication Software (e.g. CORBA)
- Archiving and Tape Management Software
- Any Additional COTS Components Used in Network Management or External Communication Support.

Task 3 - Test Hardware & Software

- Assemble Servers, Workstations and Other Hardware Components
- Test All Hardware Components
- Install Cots Software
- Install Gateway Developed Software
- Test All Software

Task 4 - Develop Gateway Software

- Data Acquisition Software
- Data Processing Software
- Data Dissemination Software
- Maintenance Software

Task 5 - Establish Gateway/Illinois Regional Hub LAN

- Install Ethernet/Network Cables Between Hardware Component.
- Install Network Software.
- Test Communications Between Servers.
- Test Communications Between Servers and Workstations.

Task 6 - Establish Illinois Regional Hub WAN

- Determine Which Agencies Will Be Electronically Connected to the Illinois Regional Hub When it Become Operational.
- Establish Electronic Connections to Agencies.
- Development of Application Software
- Testing of Application Software

Task 7 - Establish Gateway WAN

- Determine When Regional Hubs Will Be Ready to Establish Electronic Connections to the Gateway.
- Establish Electronic Connections to Regional Hubs

Task 8 - Establish World Wide Web Interface

- Develop Public Pages
- Develop ISP Pages
- Develop "War Map" Pages

Task 9 - Develop Data Interface Layer Database

- Identify All Data Elements
- Define Data Element Formats
- Create Translation Algorithms
- Develop Database Schema

Task 10 - Training

- Initial Training
 - Operators
 - System Maintenance
 - System Administrators
- Final Training
 - Operators
 - System Maintenance
 - System Administrators

Task 11 - Prepare External Connections

- Data Sources must Establish Data to Be Transferred
- External Connections Need to Be Established
 - Purchase Dedicated Lines
 - Purchase Communications Software/Hardware for both Data Providers and Gateway/Illinois Regional Hub.

Task 12 - Install Operating Environment

- Install Equipment Racks
- Install Furniture
- Install Uninterruptible Power Supply (UPS)
 - Test UPS
- Install Controlled Entrance Door
 - Test Controlled Entrance
- Install/Upgrade Air Conditioning Unit
- Install/Upgrade Non-Liquid Based Fire Prevention System
- Install Carpeting and Non-Static Surfaces

Task 13 - Cut-Over

[See Section 9.2]

Task 14 - Final Acceptance

- Training Completed
- Documentation Approved
- Final System Acceptance Successfully Completed

Task Name	Month																	
	01	02	03	04	05	06	07	08	09	10	11	12	13	14	15	16	17	18
Task 0 - Detailed Design Document	■																	
Task 1 - Obtain Central Hardware	■																	
Task 2 - Obtain COTS Software		■																
Task 3 - Test Hardware & COTS Software			■															
Task 4 - Develop Gateway Software				■	■	■	■	■	■	■	■	■	■	■	■	■	■	■
Task 5 - Establish Gateway/IL Hub LAN				■	■													
Task 6 - Establish IL Hub WAN								■	■	■	■	■	■	■	■	■	■	■
Task 7 - Establish Gateway WAN														■	■	■	■	■
Task 8 - Establish WWW Interfaces										■	■	■	■	■	■	■	■	■
Task 9 - Develop Data Interface Layer										■	■	■	■	■	■	■	■	■
Task 10 - Training			■														■	■
Task 11 - Prepare External Connections						■	■	■	■	■	■	■	■	■	■	■	■	■
Task 12 - Install Operating Environment														■	■	■	■	■
Task 13 - Cut-Over																		■
Task 14 - Final Acceptance																		◆

Figure 8-1 Projected Gateway Implementation Schedule

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9.0 TASKS FOR PHASED IMPLEMENTATION AND CUT-OVER

9.1 GATEWAY (INITIAL PHASE) IMPLEMENTATION

See Section 8 for the Tasks associated with the Gateway Implementation.

9.2 CUT-OVER FROM C-TIC OPERATION TO GATEWAY OPERATION

Once it has been determined that the Gateway/Illinois regional hub has been fully tested and ready for implementation, operations need to be transferred from the C-TIC to the Gateway. The following are general tasks that need to be followed to transfer control from the C-TIC to the Gateway. (note: It will be assumed that the Gateway will be placed in the same location as the C-TIC but during testing will be in an adjacent location.) Note however, that if it is physically and operationally possible to install the Gateway and the Illinois regional hub at the C-TIC site for acceptance testing, significant savings in cut-over time will result.

Task 1 - Install Central System Hardware and Network

- Install LAN (hardware)
- Install Servers
 - Connect Servers to LAN
 - Test Server
 - Test functionality of Servers
- Install Workstation(s)
 - Connect Workstation(s) to LAN
 - Test Workstation(s)
- Reconnect Network and Communication Software
 - Test Communications between Servers
 - Test Communications between Servers and Workstations

Task 2 - Relocate Existing C-TIC Equipment

- Disconnect existing external data connections to C-TIC
- Remove C-TIC server
- Remove C-TIC workstations
- Remove C-TIC LAN and cables
- Remove C-TIC operating environment (i.e. furniture and cabinets)
- Remove C-TIC hardware

Task 3 - Establish External Data Connections to Gateway/Illinois Regional Hub

- Connect External Connections to Gateway/Illinois Regional Hub
- Test Connections
- Re-Test Gateway Developed Software
 - Data Acquisition Software
 - Data Processing Software
 - Data Dissemination Software

- Data Maintenance Software
- Data Pass-Through Operation Software
- Data Archiving Software

Task 4 - Establish Internet Connections

- Re-Test Data Feed to Internet Pages
- Re-Test Internet Pages
 - Public Pages
 - ISP Pages
 - "War Map" Pages
- Re-Test Web Page Security

Task 5 - Final Operational Testing

- Re-Test Hardware
- Re-Test Software
- Re-Test Network

9.3 GATEWAY (ULTIMATE PHASE) IMPLEMENTATION

Listed below are the general tasks that may be involved in expanding the Gateway from the "Initial Phase" to the "Ultimate Phase".

- Determine which data providers(e.g. airports, signal systems, etc.) will be added to the Gateway.
- Increase the number of workstations
- Increase the number of operators
- Upgrade outdated hardware
- Upgrade communication links if necessary
- Apply new ITS technologies that have since been developed.