

Wastewater Treatment Division

Appendix F: Projects and Subprojects

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Westin Engineering, Inc. Project 6251

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1. PROJECT DEVELOPMENT

1.1. Introduction

The results of the Computer Systems Planning Study are documented in this Computer Systems Master Plan, which consists of:

- Executive Summary
- Master Plan
- Appendix A – Cost Saving Benefits
- Appendix B – IT Staffing
- Appendix C – IT Standards
- Appendix D – IT Architecture
- Appendix E – Existing Condition Assessment
- *Appendix F – Projects and Subprojects.*

This is Appendix F – Project and Subprojects. The purpose of the Appendix is to provide a brief overview of the study project and to provide cost, schedule and detailed project descriptions for each of the nine projects and their associated subprojects.

1.2. Methodology

Figure F-1 shows Westin's approach to this project. First, the current condition of WTD computer systems were assessed followed by a series of needs assessment workshops. The prioritized needs were then analyzed and allocated to nine improvement initiatives. Next a set of computer system solution alternatives were developed, a solution architecture was selected. Using this architecture as a technology framework, the nine improvement initiatives were transformed into nine major projects and 45 subprojects. Westin then developed an implementation strategy and project costs per WTD capital planning budget procedures. A productivity analysis was performed to determine the cost benefits and a series of management presentations were made to gain approval to proceed with the resultant Computer Systems Master Plan.

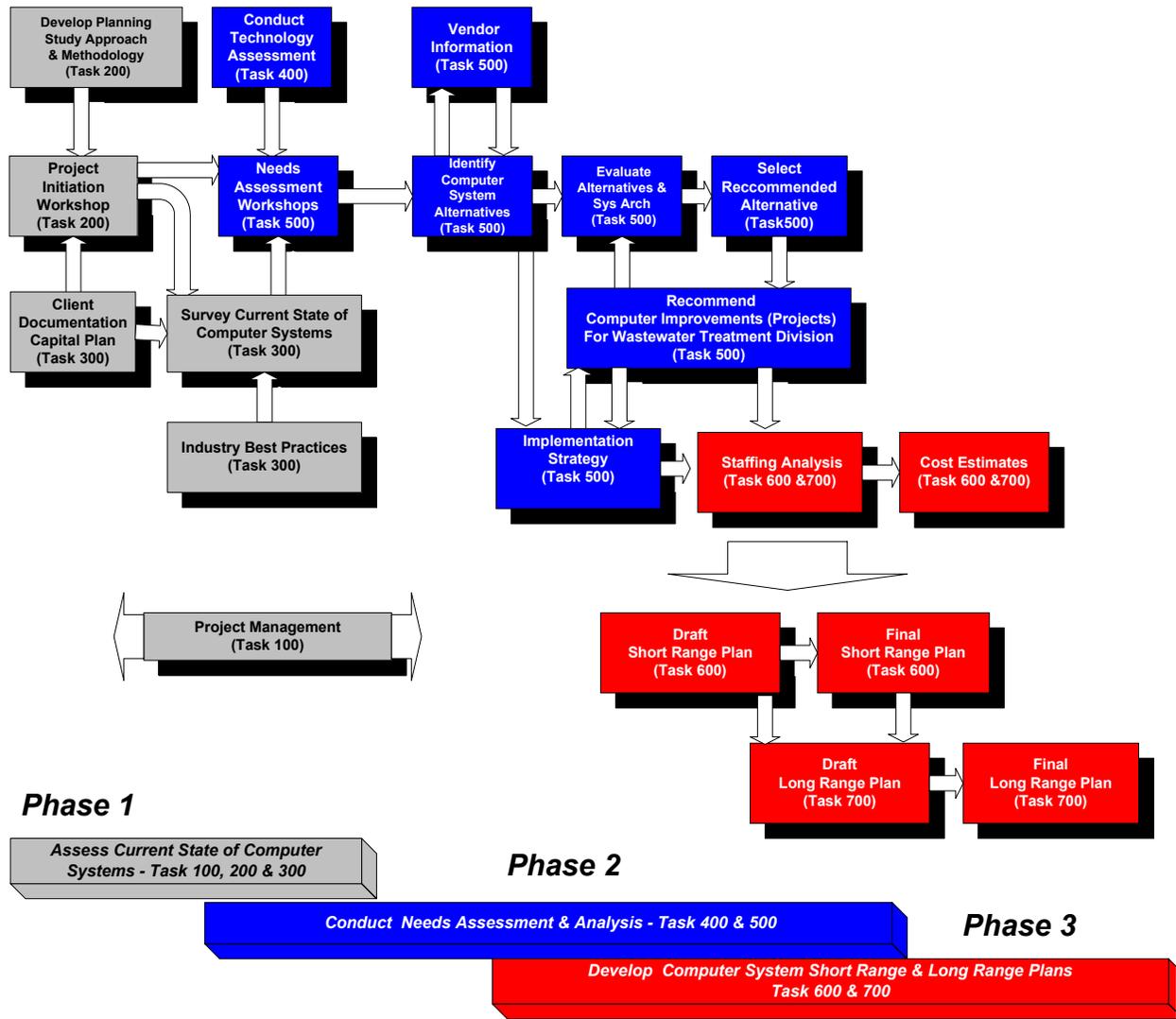


Figure F-1: Computer Systems Master Plan Methodology

1.3. Improvement Initiatives

The needs assessment workshops were instrumental in driving out the needs and prioritizing them. Analysis of these needs and the current systems condition assessment resulted in the development of nine improvement initiatives. These initiatives are shown in Figure F-2: Improvement Initiatives.



Figure F-2: Improvement Initiatives

Highlights of the objectives for these initiatives are as follows:

Asset/Maintenance Management

- Establishes a Full Life-Cycle Asset Management Program within the Division meshed with a Division-wide Maintenance Management Program
- Establishes Best Practices for both Asset Management and Maintenance Management
- Implements a consistent set of business processes, practices, and procedures for Asset Management and Maintenance Management throughout the Division
- Implements Asset Valuation and Condition Reporting critical to compliance with new regulations (e.g., GASB-34 and EPA's CMOM Audits).

Business Management Support

- Automates data feeds to and from the County Financial and Human Resources Systems
- Establishes requirements for Service Agreement from County for financial and HR information management services.

Computing Infrastructure

- Implements a WTD Information Portal for managing WTD's Intranet; automating the sharing of Division data, documents, and reports; and significantly improving the accessibility of County financial and human resources data and reports
- Extends and improves the Division's Server/Network Infrastructure
- Provides automated, real-time, data integration among Division information and control systems
- Provides infrastructure for automating workflow within the Division, thereby enabling major productivity improvements
- Establishes requirements for Service Agreement from County for I-NET services.

Human Resources

- Implements the WTD Employee Information System as a web-enabled application on WTD's Intranet
- Implements improvements to Division training programs
- Implements improvements to Division safety programs.

Infrastructure Data Management

- Implements improved engineering document management capabilities
- Merges important wastewater infrastructure data from numerous systems, including CAD; dramatically reduces the number of systems that need to be maintained to manage infrastructure data
- Improves accessibility of data about WTD facilities and equipment.

Plant & Offsite Control

- Replaces existing plant and offsite control systems
- Replaces LARS and provides a decision support system for WTD operations, maintenance and management
- Implements control systems for Brightwater Treatment Plan.

Project Control

- Implements a Capital Improvements Program Reporting & Information System for easy access via the WTD Intranet
- Implements a set of integrated, web-enabled applications for Project Management and Control.

Productivity Metrics

- Defines the requirements for supporting the Productivity Initiative and establishes what needs to be measured for that purpose
- Implements a Productivity Metrics Information System, linking business plans and rolling up business process metrics into an e-Scorecard application that can be accessed via the WTD Intranet
- Implements a web-enabled Budget Planning and Tracking System accessible via the WTD Intranet.

Water Quality Management

- Implements a Division-wide laboratory data repository linked to source laboratory systems and accessible via the WTD Intranet.

These nine Improvement Initiatives contain 45 recommended projects within the program. In total, these nine initiatives address major business drivers in four areas:

- Plants
- Projects
- Assets
- Productivity.

The initiatives were structured as a continuous improvement program that contains the 45 recommended projects (i.e., program elements). The results of implementing these projects are shown in Figure F-3: Improvement Initiative Relationships and Results.

All of the initiatives contribute in some specific way to the construction of an integrated, Division-wide, computer and networking architecture. The major components of that architecture: – User Interface,

Systems/Applications, Data/Maps/Documents, and Communications and Computing Infrastructure – are discussed in detail in Appendix D.

The program has been separated into smaller elements to more effectively manage the program, and to provide funding flexibility. This will allow for sequential implementation of program elements without embarking on a single monolithic project that is completed over a 10 year planning period.

The contract procurement strategy to satisfy the core business needs of WTD is to focus on implementing the Master Plan in a series of three-year approved tactical projects. When approved, a contract will be advertised to obtain a consultant to work with WTD staff to develop the system requirements and specifications for the computer systems that will be implemented over the first three-year period. The consultant will also provide technical support during installation of each computer system to ensure that it was installed as specified. The last six months of the contract will be used to create another set of three-year approved tactical projects and update the strategic ten-year plan to address the most beneficial needs at that time.

The new set of three-year tactical projects (using the set of 45 subprojects in this Master Plan as a base) will then be used to create another contract advertisement and the process will be repeated. The result being continuous quality improvement of the computer infrastructure asset and a constant focus on emerging technologies. Consequently, the plan will allow staff to proactively position WTD to use technology to meet the business needs of the Division.

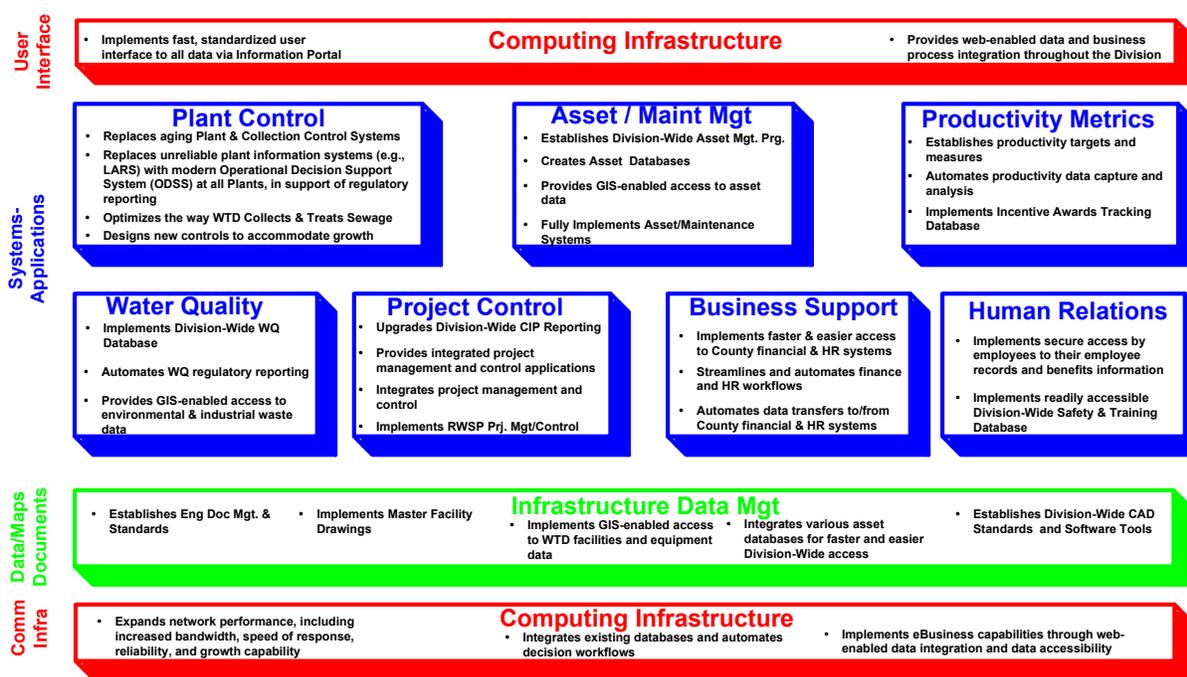


Figure F-3: Improvement Initiative Relationship and Results

1.4. Current Systems Relationship to Initiatives

Westin published a WTD Information Systems Assessment document (100 pages) in March 2001, documenting each of the current systems now in use within WTD, and DNR organizations which receive support from WTD. In it, each of the assessed applications is described, its owners and maintainers are identified, technical platforms are described, inputs and outputs are identified, current plans for the application are reviewed, and unresolved issues are highlighted.

A summary of the WTD Information Systems Assessment findings is presented in Appendix E, along with Figure E-1: Current Information Systems Interaction Diagram showing all the information systems that were assessed, their interaction with each other and their replacement or upgrade priority. Figure E-3: WTD Computer Systems Planning Study Improvement Initiatives, highlights several aspects of the overall assessment and shows the relationship between the recommended improvement initiatives and these existing systems.

Please refer to Appendix E for a more complete description of the interrelationships among the current WTD Information Systems, and their association with the improvement initiatives described in Section 1.1 of this Appendix.

1.5. Master Plan Projects

The IT projects that need to be implemented over the next ten years, as part of this Computer Systems Master Plan, are documented in this Appendix. They consist of nine Replacement and New Projects, plus a number of Deferred Projects that will be candidates for the next planning cycle three years from now.

1.5.1. Replacement Projects

The Replacement projects are briefly listed here for your immediate reference. For each Replacement Projects that is planned to be initiated over the next ten years, the following subprojects are included:

Plant & Conveyance Control Project

- Subproject No. 10-101A – SCS Control System - Interim
- Subproject No. 10-101B – SCS Control System and West SCADA Final System
- Subproject No. 10-102 – CSO Predictive Control System
- Subproject No. 10-103A – West SCADA System - Interim
- Subproject No. 10-103B – West SCADA System PLC Replacement
- Subproject No. 10-104 – Forney Control Replacement, South Plant & East SCADA
- Subproject No. 10-105 – Forney SCADA Replacement, East Collection System
- Subproject No. 10-106 – Operations Decision Support System, Part I: Replaces LARS

Project Control Systems Project

- Subproject No. 20-101 – CIP Reporting
- Subproject No. 20-102 – Project Management and Control Applications, Part I
- Subproject No. 50-101 – Engineering Document Management, Part I

Water Quality Management Project

- Subproject No. 30-101 – LIMS Upgrade

Wide Area Network (WAN) and Local Area Network (LAN) Upgrade Project

- Subproject No. 90-101 – Network Enhancements, Part I

- Subproject No. 90-102 – Network Enhancements, Part II
- Subproject No. 90-103 – Network Enhancements, Part III

1.5.2. New Projects

New Plant & Offsite Control Project

- Subproject No. 10-107 – Operations Decision Support System, Part II
- Subproject No. 10-108– Operations Decision Support System, Part III
- Subproject No. 10-109– Brightwater Plant and Conveyance Control System

Water Quality Database Project

- Subproject No. 30-103 – Water Quality Data Repository

Asset / Maintenance Management Project

- Subproject No. 40-101 – Asset Management System
- Subproject No. 40-102 – Maintenance Management System, Part I
- Subproject No. 40-103 – Maintenance Management System, Part II

Data Management Project

- Subproject No. 50-102 – Engineering Document Management, Part II
- Subproject No. 50-103 – Engineering Document Management, Part III
- Subproject No. 50-105– Data Management System - Part I
- Subproject No. 50-106– Data Management System - Part II
- Subproject No. 50-109– West Point Plant Facilities Data Repository

Network Enhancement Project

- Subproject No. 90-104 – Information Portal, Part I
- Subproject No. 90-105 – Information Portal, Part II
- Subproject No. 90-106 – Information Portal, Part III
- Subproject No. 90-108 – Integration Bus Part I
- Subproject No. 90-109 – Integration Bus Part II
- Subproject No. 90-110 – Mobile Connectivity, Part I
- Subproject No. 90-111 – Mobile Connectivity, Part II

1.5.3. Deferred Projects

Project Control Systems Project

- Subproject No. 20-103 – Project Management and Control Applications, Part II
- Subproject No. 20-104 – Project Management and Control Applications, Part III

Water Quality Management Project

- Subproject No. 30-102– PIMS Septage Bio-solids Integration

Asset / Maintenance Management Project

- Subproject No. 40-104 – Maintenance Management System, Part III

Data Management Project

- Subproject No. 50-104– Engineering Document Management, Part IV
- Subproject No. 50-107– Data Management System - Part III & IV

Human Resources Project

- Subproject No. 60-101– WTD Employee Information System

Business Support Project

- Subproject No. 70-101– County Finance and HR Integration – Part I
- Subproject No. 70-102– County Finance and HR Integration – Part II

Productivity Metrics Project

- Subproject No. 80-101 – Budget Planning and Tracking System
- Subproject No. 80-102 – Productivity Metrics

Network Enhancement Project

- Subproject No. 90-107 – e-Business
- Subproject No. 90-112 – Mobile Connectivity, Part III.

1.6. Structuring

Information Technology (IT) projects are inherently complex and require professional, experienced IT project management. Some aspects of IT project management are similar to project management methods and tools used in construction. However, IT project management is significantly different in many aspects. There are a number of critical success factors that should be used in planning and guiding IT project management. The Master Plan projects and project sequencing were defined taking into account the following considerations:

- **Planning and Design.** Information Technology projects require significant planning and design efforts to ensure that all dimensions are addressed – the technologies, the needs of the users, the business processes and workflow, training of several kinds, and business objectives.
- **Implementation.** Where possible, projects are defined with an implementation (construction and other) time of approximately 18 months. Shorter implementation phases are less complex, and more readily managed, and result in more successful overall projects.
- **Early wins.** There are a number of urgent issues confronting the WTD that need to be addressed soon. For this reason, the projects are defined to solve the most urgent problems early in the overall program. The successful solution of these urgent problems will promote the factors of success (i.e., on time, on budget, expected functionality). This rewards team members and demonstrates the factors that engender success.
- **Useful results.** Projects are defined to provide an easily demonstrable service to the organization at their conclusion. This creates a sense of payback for the investment and project momentum because users can directly perceive the value of the project. These projects will provide direct support for many of the Division’s business and operational efforts, such as the Asset Management Project.
- **Involvement of Division personnel.** All the projects assume that Division personnel will be involved for the entire project along with the contracted services provided by vendors and consultants. By working along side the contractors Division staff will be familiar with the project design and implementation and will acquire the skills and experience to effectively maintain and support the implemented systems.
- **Projects complement one another.** Where possible, projects are designed and sequenced so that they build on one another. Instead of one monolithic project to implement a single, monolithic solution for the Division, several modular projects are used to achieve the end result. This results in faster and less costly adjustments than are normally experienced over the course of large Information Technology implementations. Project dependencies do exist and are illustrated later in this section.
- **Modern tools.** It is essential to use current state of the art project management, business process and data modeling, database design and application configuration tools to promote the progress of the team and efficiency of the entire project. Project structures, scheduling and costs have been formulated so as to reflect this requirement.

1.7. Sequencing of Projects

The projects and their associated subprojects detailed in Appendix G, Section 4 were defined using the following guidelines:

- Projects and project steps have been formulated so as to contribute to later steps in the same and in other projects. The most urgent needs are addressed first, but with consideration on how to promote success for later projects as well.
- The Computer Systems Master Plan has been designed to provide the opportunity to use the learning achieved in earlier projects for later projects.
- Projects are developed in an order designed to decrease the probability of rework that may be necessitated by subsequent projects.

1.8. Schedule Considerations

Projects are started at the earliest possible time consistent with the interdependencies between projects. When determining the duration of a project, it was assumed that the staffing resources would be available as required. As such, this yields the best possible implementation time for a project. Less than this assumed level of resources will naturally extend the duration of a project. Each subproject description includes a cost table showing the WTD and Consultant labor costs required to complete each phase of work.

2. PROJECT AND SUBPROJECT SUMMARY

2.1. Computer Systems Master Plan

The following Table F-1: Computer Systems Master Plan Schedule and Project Identification, presents the list of the projects and subprojects included in the Computer Systems Master Plan that are described in this Appendix. Subproject identifier numbers are listed here, and the years identified that are currently planned to perform the work.

Table F-1: Computer System Master Plan Schedule and Project Identification

Replacement Projects		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Project No.	Project Name										
423R10	Replacement of Existing Plant and Conveyance Control Systems										
Subproject No.	Subproject Name										
423R10 / 101A	Interim Replacement of West Point SCS Control System										
423R10 / 101B	Final West Plant and Conveyance Control System										
423R10 / 102	CSO Predictive Model										
423R10 / 103A	Interim Replacement of West Forney SCADA Control System										
423R10 / 103B	Replacement of West SCADA PLCs										
423R10 / 104	South Plant and East SCADA Forney Control Systems										
423R10 / 106	ODSS Part I: Replaces LARS										
RWSP-R20	Project Control Systems Project										
Subproject No.	Subproject Name										
RWSP-R20 / 101	CIP Reporting										
RWSP-R20 / 102	Project Management & Control Part I										
RWSP-R50 / 103	Engineering Management Part I										
423R30	Replacement of Existing Water Quality Systems - LIMS Upgrade										
Subproject No.	Subproject Name										
423R30 / 101	LIMS Upgrade										
423R90	WAN & LAN Upgrades										
Subproject No.	Subproject Name										
423R90 / 101	Networks Enhancement Part I										
423R90 / 102	Networks Enhancement Part II										
423R90 / 103	Networks Enhancement Part III										
New Projects		2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Project No.	Project Name										
423N10	Plant and Conveyance Control Systems										
Subproject No.	Subproject Name										
423N10 / 107	ODSS Part II										
423N10 / 108	ODSS Part III										
423N10 / 109	Brightwater Plant & Convey Control Sys										
423N30	Water Quality Database										
Subproject No.	Subproject Name										
423N30 / 103	Water Quality Data Repository										
423N40	Asset & Maintenance Management Sys										
Subproject No.	Subproject Name										
423N40 / 101	Asset Management System										
423N40 / 102	Maintenance Mgt System: Part I										
423N40 / 103	Maintenance Mgt System: Part II										
423N50	Data Management Systems										
Subproject No.	Subproject Name										
423N50 / 101	Engineering Document Mgt: Part I										
423N50 / 102	Engineering Document Mgt: Part II										
423N50 / 103	Engineering Document Mgt: Part III										
423N50 / 104	Infrastructure Data Mgt: Part I										
423N50 / 105	Infrastructure Data Mgt: Part II										
423N50 / 106	West Point Facilities Data Repository										
423N90	Network Enhancement Project										
Subproject No.	Subproject Name										
423N90 / 101	Information Portal: Part I										
423N90 / 102	Information Portal: Part II										
423N90 / 103	Information Portal: Part III										
423N90 / 104	Integration Bus: Part I										
423N90 / 105	Integration Bus: Part II										
423N90 / 106	Mobile Connectivity Part I										
423N90 / 108	Mobile Connectivity Part II										

2.2. Replacement Projects - Subproject Summary

The following four replacement projects are presented in this section. Each of these projects are essential to WTD continued efficient operation, and must be implemented to avoid near term staff increases, and risk of pollution of more than one overflow per site per year in the immediate future. The four-upgrade and replacement projects are as follows:

- Plant and Conveyance Control Systems
- Project Control
- Water Quality Systems
- Wide Area Network (WAN) and Local Area Network (LAN)

2.2.1. Plant and Conveyance Control Systems Project - Subproject Summary

The plant and conveyance control systems allow staff to operate and control the treatment plants and conveyance regulator and pump stations. This project will maintain, upgrade and replace the existing systems by completing the following sequence of subprojects.

Sub Project Sequence	Result
1. Interim Replacement of West Point Control System–10-101A	Provides interim West Point control system and eliminates the need for the failing CCM and UHA equipment in each of the 13 plant processes.
2. Interim Replacement of Forney West SCADA– 10-103A	Provides interim West Collection System SCADA to replace the decommissioned Forney West SCADA. Reactive control capability remains, without any predictive control. Frees up MicroVAX computers for use at South Plant.
3.South Plant & East SCADA Forney Control System Replacement	Provides common requirements and design specifications for all WTD control systems, plus procures and implements this design for the South Plant and East Section Conveyance Control System replacement.
4. CSO Predictive Control Model- 10-102	Provides CSO modeling development capability, as part of the West Plant Control System, to update existing CSO algorithms with and prepare for actual CSO Predictive Control to supplement the current CSO reactive control strategies that are now in use.
5.ODSS Part I: Replaces LARS	Develops requirements and design specifications for the replacement Laboratory Analysis Reporting System (LARS) and implements it as the first stage of WTD’s Operational Decision Support System (ODSS).
6. Replacement of West Collection System TI PLC’s – 10-103B	West Collection System TI PLC’s will be replaced with the same PLC’s that are currently being procured for the East Collection System. Prior to the West PLC’s being replaced, the decommissioned TI-PLC’s from the East will be used as spare parts in the West to extend their life.
7. Final West Plant & Conveyance Control System – 10-101B	Provides for West Plant Control System replacement, and for the West SCADA replacement as part of one combined system. This will result in a full featured advanced capability West Point Plant control system with complete West Collection System SCADA reactive and CSO predictive control capability.

Subprojects

This project consist of the following subprojects:

Interim Replacement of West Point Plant Supervisory Control System (10-101). This subproject will upgrade the Supervisory Control System at the West Point Treatment Plant with a interim S3 Control system for each of its 13 process control areas. The current system will be replaced in a series of 13 upgrades; one process at a time until the new interim control system is in place.

Interim Replacement of West Conveyance Forney Control System (10-103). This subproject will replace the existing West Conveyance Forney Control System with an interim system that will free up the Forney MicroVAX computers for use at South Plant. It will be installed as an interim system that will provide conveyance control functions, flow calculations, alarm sensor detection and report generations. Then the SCADA will be upgraded into the Division standard control system developed in 10-104.

This system will use the existing TI PM550 PLC's. The TI PLC spare parts that will become available from the East Collection System PLC replacement project (to be completed in 2002- now in the bid stage), will be used to extend the life of the existing West Collection TI PLC's.

South Plant & East Conveyance Forney Control System Replacement (10-104, 10-105). This subproject has five main objectives:

- 1) Upgrade or replace the Forney Control System (10-104);
- 2) Upgrade or replace the Forney Conveyance System;
- 3) Combine the plant and conveyance control functions;
- 4) Interface the new East Conveyance System PLC's with the new South Plant Control System; and
- 5) Establish the control system standard for the Division.

CSO Predictive Control Model (10-102). This subproject has three main objectives:

- 1) Provide new hardware for the CSO software;
- 2) Move the CSO software to the new hardware platform; and
- 3) Update the CSO control algorithms to reflect changes in the conveyance system.

ODSS Part I: Replaces LARS (Operations Decision Support System) – Part I (10-106). This subproject replaces the Lab Analysis Reporting System (LARS) at South Plant and the Plant Report System at West Plant. It also provides the core technical elements to address Division-wide data analysis and reporting needs.

Replacement of West Conveyance System TI PLC's (10-103B). This subproject replaces the West Conveyance System TI PLC's. The West Collection System TI PLC's will be replaced with the same PLC's that are selected for the East Collection System.

Final West Point & Conveyance Control System (10-101B). This subproject will replace the Plant and Conveyance Control System at West Point with a system that meets the Division standards established in 10-104. It will have the same look and feel as the control systems at South Plant and will serve as the design base for the new Brightwater Control systems. After completing this subproject the Division will be in the position to remotely control Brightwater on a limited bases from West Point or South Plant.

2.2.2. Project Control Project - Subproject Summary

The existing project control system cannot meet the new program management and reporting requirements. The systems installed in the project will allow the Division to these new requirements. The funding for this project is included in the RWSP – consequently, the funds required to implement this project are not shown. This project is currently in progress.

The work of developing the new systems has already begun via a Program Management Services Contract with URS Construction Services. The recommendation of this planning study, is that URS:

- Determine the project control system requirements for all of WTD
- Establish standards for the project control systems to ensure system integration
- Reduce the total number of project control systems from the current 14 system databases to 3 or 4 systems
- Apply the computer technology architecture guidelines established in Appendix D, for this project.

It is critical that the new project control computer systems be developed to easily integrate into the WTD Division wide computer network and incrementally build the project control system of the future.

Subprojects

This project consist of the following subprojects:

CIP Reporting (20-101). This project implements a Division-wide, web-enabled, Capital Improvement Program (CIP) Reporting & Information System, enabling the sharing of CIP information throughout the Division and between the Division and other County agencies. This project will improve existing work processes and applications used for CIP reporting; define CIP reporting requirements, now and in the future; develop a web-based CIP Reporting application; and deploy the CIP Reporting & Information applications via an Information Portal. All users will be able to access the CIP information via the Information Portal quickly and spend more time concentrating on real problems rather than searching for information.

Project Management and Control Applications – Part I (20-102). Part I establish consistent, Division-wide standards, procedures and work process for project management and control. This project also evaluates and selects software to support the standards. And, finally, it implements at least some of the applications listed above.

Engineering Document Management – Part I (50-101). This project establishes standards for documents and document management. It also extends the web-enabled RWSP Engineering Document Management System for use throughout the Division.

2.2.3. Water Quality Systems Project - Subprojects Summary

The water quality systems allow staff to collect, analyze and report regulatory compliance data. This project will replace the existing water quality systems.

Subprojects

This project consists of the following subproject:

LIMS Upgrade (30-101). This subproject will replace the Laboratory Information Management System (LIMS) at the Environmental Laboratory and create a database to collect all water quality data in the wastewater program.

2.2.4. Wide Area Network (WAN) and Local Area Network (LAN) Project - Subprojects Summary

This project will upgrade the WAN and LAN as required to serve new applications. The WAN and LAN are the physical components of the computer infrastructure, the actual wires, fiber optic cables, routers and servers that transfer data from point to point. This project is an extension of existing business practices to maintain and upgrade the Division's computer infrastructure. The upgrades completed in this subproject provide the foundation for all projects recommended in the Study.

Subprojects

This project consists of the following subprojects:

Network Enhancements – Part I (90-101). This subproject will implement the following improvements to the Division's LANs and WAN:

- Install Gigabit Ethernet at each of the major facilities within the Division
- Provide the foundation for migration to Gigabit and 10 Gigabit Ethernet
- Connect all major Division facilities to the WAN backbone
- Implement initial wireless network pilot within the Division.

Information Portal – Part I (90-104). The subproject will replace the existing Division Intranet and Web technologies and practices and make the WTD Intranet the channel for all communications among WTD staff and the WTD Internet the channel for all communication between WTD staff and external agencies and contractors. Implement the software tools required to efficiently publish and share data and deploy new applications over the Web.

2.3. New Computer System Projects - Subproject Summary

The following five new computer system projects in this section are tactical projects that support efficient operations of the Division in the near future and provides the technology tools to meet computer needs of 2006-2011. These projects will enable WTD to generate savings in labor to offset the capital investment required for implementation and will contribute significantly toward enforcing the Productivity Initiative. The five new computer system projects are as follows:

- Brightwater Plant and Conveyance Control Systems
- Water Quality Database
- Asset and Maintenance Management Systems
- Data Management Systems
- Network Enhancement.

2.3.1. Brightwater Plant and Conveyance Control System Project

This Project will integrate the computer systems associated with the Brightwater into the existing control systems developed in the Upgrade and Replacement Plant and Conveyance Control System Project. The control system standards and the level of remote control desired will be used to determine the control system for the Brightwater plant and conveyance systems.

Note: The Brightwater plant and conveyance control systems are funded in the RSWP Budget and are not included in this report.

This project will also extend the initial capabilities developed in LARS and use operations and management decision support tools to create a Division-wide Operational Decision Support System (ODSS). The ODSS is a tool that uses the information in the water quality database, CSO modeling data and other operational databases to assist management and plant staff in the daily operations of the plant and conveyance system. The information in this system will be used in the decision making process to optimize operations at the treatment plant and to generate regulatory reports.

Subprojects

This project consists of the following subprojects:

Brightwater Plant and Conveyance Control System (10-109). The Brightwater plant and conveyance control project will use systems similar to the existing plants at South Plant and West Point. The instrumentation and control design will incorporate functions common to all three-treatment plants. This subproject includes the design and procurement of the operator workstations, the historical data system, equipment to interface to the existing field controllers, plant instrumentation, design and installation of the communication system that links the control system components, and the support computer structure (servers) to operate the control system.

Operations Decision Support System Project - Part II (10-107). This subproject provides the tools needed to effectively plan, schedule, and manage plant and offsite facilities by providing the necessary operations decision support information in a timely manner. The information required for effective operations decision support is currently stored in a wide variety of disparate databases, which will be used to create a uniform common database of certified information which is readily available to users via web based tools. Part II provides a centralized reporting system for the Predictive CSO derived data.

Operations Decision Support System Project - Part III (10-108). This subproject will provide the Brightwater with the required reporting and analytical applications and integrate them with existing applications.

2.3.2. Water Quality Database Project

The new water quality database will serve as the warehouse for all water quality data collected in the Wastewater Program. It will provide standards for collecting, storing and reporting water quality data. It will be a certified database with quality data. Internal and external staff will use the information in the database to produce daily, weekly, monthly and annual reports.

Subprojects

This project consist of the following subprojects:

Water Quality Data Repository (30-103). The Water Quality Data Repository will provide a centralized source of certified data on biological and chemical analyses completed by the Division's various process laboratories as well as by the Environmental Laboratory. Historical laboratory data from the Environmental Lab's LIMS, as well as historical data from the various plant process laboratories, will be stored within this data repository. A web-based analytical application will be deployed via the Information Portal so that this laboratory data can be accessed and utilized for decision-making purposes. The data repository will contain raw laboratory data, as well as derived (calculated, summarized, and/or consolidated) data. In many instances, end-users will be able to quickly access and use the stored data without having to perform further manipulation. Further, for end-users that do need to perform more

additional data derivations, a web-based analytical application embedded within the Information Portal can be used or data can be automatically downloaded into spreadsheets.

2.3.3. Asset and Maintenance Management Systems Project - Subproject Summary

The asset and maintenance management systems will provide the computer systems required to implement the new Asset Management section.

Subprojects

This project consist of the following subprojects:

Project: Asset Management System (40-101). Effective asset management requires significant utilization of information technology. The thrust of this project is to implement an Asset Management System that enables the Division to conduct effective asset management in-order to:

- Optimize asset life
- Reduce unnecessary maintenance
- Smooth year-to-year CIP spending
- Improve asset (and operations) reliability.

Maintenance Management System – Part I (40-102). This project implements a Division-wide Computerized Maintenance Management System (CMMS) in support of the Division’s Asset Management Program. It has yet to be decided if the Division’s existing CMMS software will be re-implemented to better fit the Division’s needs, or whether a completely new CMMS software package will be selected. Nevertheless, a thorough evaluation and selection process will be conducted to ensure the Division’s future needs are fulfilled.

The Division needs to address a number of urgent matters with regard to its maintenance management system. First, the Division needs to establish consistent, Division-wide, maintenance and work management standards, procedures and work processes to guide the effective implementation of a CMMS. Second, the Division has new requirements from outside agencies to report on all maintenance activities as they relate to the condition of Division facilities and equipment. These needs are addressed by this project, which consists of three distinct efforts delineated here as Part I, Part II, and Part III.

This is Part I, which establishes consistent, Division-wide standards, procedures and work processes for maintenance and work management. This step also evaluates the software required to support the newly established standards, procedures and work processes. During Part I, a web-based CMMS as well as various maintenance and work management applications will be deployed via the Information Portal.

Maintenance Management System Project - Part II (40-103). The Division’s Maintenance Management needs is addressed by this project, which consists of three distinct efforts delineated here as Part I, Part II, and Part III. Part II implements automated, real-time, data-level integration of the CMMS to other information systems such as Finance, Human Resources, Inventory Control, Engineering Document Management, CAD/GIS, and the Operations Decision Support System.

2.3.4. Data Management Systems Project

The data management systems will provide the computer systems to manage the Divisions documents, specification and drawings.

- Engineering Document Management System – Master Facility Drawings
- Wastewater Program GIS Database

- GIS-enabled applications via the Information Portal
- West Point Plant Facilities Data Repository- CAD Drawings.

Subprojects

This project consist of the following subprojects:

Engineering Document Management System - Part II (50-102). The Engineering Document Management System is to be implemented in four steps, referred to as Part I, Part II, Part III, and Part IV. Part I is recommended to be done in the Plan which establishes engineering document standards and document identification labeling standards. It also moves existing CAD files to *.pdf* format for viewing by appropriate staff throughout the Division via the Information Portal.

This project is Part II, which upgrades the Division's existing AutoCAD system to the newest web-enabled version to enable the viewing of dynamic CAD maps by appropriate staff throughout the Division via the Information Portal.

Engineering Document Management System - Part III (50-103). The Engineering Document Management System is to be implemented in four steps, referred to as Part I, Part II, Part III, and Part IV. This project is Part III, which implements a web-based application – to be deployed via the Information Portal – for the viewing and collaborative editing of CAD drawings.

Infrastructure Data Management System - Part I (50-105). The implementation of a GIS-centric Infrastructure Data Management System is to take place in four steps, referred to as Parts I, II, III, and IV. Part I implements the Wastewater Program GIS Database, including database design, data standards, and data conversion. The GIS Database is to be hosted by the GIS Team, which is a part of the IT group of the Department of Natural Resources (DNR).

Infrastructure Data Management System - Part II (50-106). The implementation of a GIS-centric Infrastructure Data Management System is to take place in four steps, referred to as Parts I, II, III, and IV.

Part II implements an initial series of priority GIS-enabled applications via the Information Portal. The applications implemented in this step will support asset and maintenance management.

West Point Plant Facilities Data Repository (50-109). This project is to complete long overdue work on the completion of CAD drawings for the West Point Treatment Plan. It is assumed that much of the labor associated with completing these drawings can and will be out sourced.

The data contained in West Point Plant CAD databases are essential for the on-going operations management, as well as the asset and maintenance management of the West Point Plant. In addition, this data will prove highly valuable to the Division as a whole for planning and other business purposes.

2.3.5. Network Enhancement Project

The WAN and LAN are the physical components of Division's computer infrastructure. The actual wires, fiber optic cables routers and servers allow data to be transferred from point to point. This project will upgrade these components as required to serve new applications. Additionally, new technologies will be introduced to the network allowing it to function more efficiently and incorporate such features as:

- Information Portal to allow quick access to user data in the format they want
- Integration Bus to integrate disparate databases
- Web access to data, independent of location

- Mobile communications to allow more effective use of WTD resources and quicker response to emergencies
- Interface to INET.

Increased bandwidth will also result, allowing for full use of video conferencing and other media requiring significant network resources.

Subprojects

This project consist of the following subprojects:

Network Enhancements - Part II (90-102). This project enhances WTD computing networks in three steps over the planning period. Part I is recommended to be done in the Plan which will implement, or in some cases activate existing, Gigabit Ethernet LANs within the Division. It also extends I-NET connectivity to all of the Division's major facilities.

This project is Part II, which expands the Division WAN bandwidth (i.e., I-NET bandwidth utilized by the Division) from the existing OC-3 level to a minimum required level of OC-48

Network Enhancements - Part III (90-103). This project enhances WTD computing networks in three steps over the planning period. This is Part III of the project that further expands the Division WAN bandwidth upwards to OC-156 or higher

Information Portal - Part II (90-105). This is a three-part project, in which Part I is recommended to be done in the Plan. Part I includes implementing prototype web-based Information Portal applications for CIP Reporting, data graphing, data analysis, static viewing of Balanced Scorecard data, static viewing of GIS maps, and viewing of historical data from IBIS and PeopleSoft. Also it links the Information Portal to the basic messaging capabilities of the Integration Bus.

This is Part II of the project, which deploys applications for Asset Management, Maintenance Management, Project Management and Control, Operations Decision Support, and preliminary Budget Tracking via the Information Portal. It also links the Information Portal to the Data Integration capabilities of the Integration Bus.

Information Portal - Part III (90-106). This is a three-part project, in which Part I is recommended to be done in the Plan. Part I includes implementing prototype web-based Information Portal applications for CIP Reporting, data graphing, data analysis, static viewing of Balanced Scorecard data, static viewing of GIS maps, and viewing of historical data from IBIS and PeopleSoft. Also it links the Information Portal to the basic messaging capabilities of the Integration Bus.

This is Part III of the project which, via the Information Portal, deploys applications for Engineering Document Management, Budget Reporting & Information, dynamic viewing of Balanced Scorecard information, and dynamic viewing of GIS maps. It also links the Information Portal to the Workflow Automation capabilities of the Integration Bus.

Integration Bus - Part I (90-108). The Integration Bus is to be implemented in two steps referred to as Part I and Part II. This is Part I of the project, which implements the data-level integration components of the Integration Bus, enabling priority applications within WTD to access WTD databases regardless of the data structure, data format, or database technology.

Integration Bus - Part II (90-109). The Integration Bus is to be implemented in two steps referred to as Part I and Part II. This is Part II of the project, which implements the workflow automation components of the Integration Bus; enabling the automation of application-to-application links and reducing the reliance on human intervention to establish and maintain integrated applications.

Mobile Connectivity - Part I (90-110). Mobile Connectivity is to be implemented in three steps, referred to as Part I, Part II and Part III. This project is Part I, which implements the mobile information distribution capabilities of the Information Portal, delineates WTD authorized wireless devices, and configures those mobile devices for access to the Information Portal.

Mobile Connectivity - Part II (90-111). Mobile Connectivity is to be implemented in three steps, referred to as Part I, Part II and Part III. This project is Part II, which implements enhanced mobile information distribution capabilities, especially graphical information such as CAD and GIS; Part II also implements 3rd-Generation mobile devices within the WTD.

2.4. Deferred Projects - Subproject Summary

These deferred subprojects are described briefly below. They are potential extensions to the projects that have already been identified in Sections 2.2 and 2.3. However due to lower priority ratings, and lack of funds, these projects have been deferred to the future. They will be reviewed each time the Master Plan is updated to evaluate their need and benefit to WTD, which is planned to occur on a three-year cycle. They are listed below by the major project they most likely will be associated with.

2.4.1. Project Control Systems Project

As part of the Master Plan recommended projects, Part I establishes consistent, Division-wide standards, procedures and work processes for Project management and control. It also evaluates and selects software to support the standards. And, finally, it implements at least some of the applications listed above. The following deferred subprojects extend this capability by providing data level integration of many of the business functions within the Division, and implements workflow tools to expedite decision making and automatic many work processes.

Project Management and Control Applications Part II (20-103). Part II implements data-level integration of the Project Management & Control Applications to other information systems such as Finance, Human Resources, Inventory Control, Engineering Document Management, CAD/GIS, and others.

Project Management and Control Applications Part III (20-104). Part III automates many of the data-level integration links and some of the significant workflow(s) associated with the Project Management & Control Applications, especially those associated with coordination, collaboration, review and approval, and document routing.

2.4.2. Water Quality Project

This is an initial project in the Master Plan. The following subprojects associated with it were deferred to the next planning period. Summarized below are the subprojects associated with it:

PIMS - Septage Biosolids Integration (30-102). The project will make use of both the Information Portal and the Integration Bus to (a) integrate LIMS, PIMS, Septage, Biosolids, and GIS; and (b) publish data from these applications for use by other Division staff and outside agencies.

2.4.3. Asset and Maintenance Management Systems Project

This is an initial project in the Master Plan. The following subprojects associated with it were deferred to the next planning period. Summarized below are the subprojects associated with it:

Maintenance Management System Project - Part III (40-104). The Division's Maintenance Management needs are addressed by this project, which consists of three distinct efforts delineated here as Part I, Part II, and Part III. Part III automates the various workflow associated with the CMMS, especially those associated with integration of CMMS with other information systems, as well as with coordination, collaboration, review and approval, and document routing.

2.4.4. Data Management Systems Project

This is an initial project in the Master Plan. The following subprojects associated with it were deferred to the next planning period. Summarized below are the subprojects associated with it:

Engineering Document Management System - Part IV (50-103). The Engineering Document Management System is to be implemented in four steps, referred to as Part I, Part II, Part III, and Part IV. This project is Part IV, which implements document version control deployed via the Information Portal and automates workflow associated with engineering document management.

Infrastructure Data Management System - Part III (50-107). The implementation of a GIS-centric Infrastructure Data Management System is to take place in four steps, referred to as Parts I, II, III, and IV. Part III implements an additional series of GIS-enabled applications, making use of both the Information Portal and the Integration Bus. The applications implemented in this step require the data-level integration of GIS with such systems as PIMS, Repair/Replacement, Facility Inspection, and Inflow & Infiltration.

Infrastructure Data Management System - Part IV (50-108). The implementation of a GIS-centric Infrastructure Data Management System is to take place in four steps, referred to as Parts I, II, III, and IV. Part IV implements upgrade modeling applications – such as conveyance modeling – using both the Information Portal and the Integration Bus.

2.4.5. Training Support Systems Project

This is a potential new project in the next Master Plan. It was deferred in the initial plan. Summarized below are the subprojects associated with it:

WTD Employee Information System (60-101). This project is focused on web-enabling the WTD Employee Information System in-order to make it more easily available to supervisors, managers, and personnel. It also addresses current access problems and will improve system response times accordingly.

2.4.6. Business Support Project

This is a potential new project in the next Master Plan. It was deferred in the initial plan. Summarized below are the subprojects associated with it:

County Finance and HR Integration – Part I (70-101). Information provided by the County's Finance and HR systems is essential to the effectiveness of Division operations. There are a number of Division information systems that need to be integrated with the County's Finance and HR system, including Maintenance Management, Asset Management, Project Management & Control, and others. The

utilization of the Integration Bus and the Information Portal will enable integration that will enhance the value of the County systems by providing expanded access to the County Finance and HR systems.

The integration of County Finance & HR systems with Division information systems is to be implemented in two steps, referred to as Part I and Part II. This is Part I, which implements data-level integration via the Integration Bus and the Information Portal.

County Finance and HR Integration – Part II (70-102). The integration of County Finance & HR systems with Division information systems is to be implemented in two steps, referred to as Part I and Part II. Part II implements workflow automation via the Integration Bus and the Information Portal.

2.4.7. Productivity Metrics Project

This is a potential new project in the next Master Plan. It was deferred in the initial plan. Summarized below are the subprojects associated with it:

Budget Planning & Tracking System (80-101). This project implements a Division-wide system to provide information and coordination support for WTD business unit budgeting and budget tracking processes. Budgeting process status updates, budgeting analyses, and actual-to-budget tracking via the WTD Information Portal is included.

Productivity Metrics (80-102). This project implements a Productivity Metrics Reporting & Information System to support the management of WTD and its Productivity Initiative. By embedding this executive reporting system within the WTD Information Portal, relevant productivity data can be assembled from a variety of data sources throughout the Division and other agencies and presented to Division management in highly visual formats to support business decisions. In this way, the status and progress towards Productivity Initiative goals and objectives can be viewed and assessed quickly and easily. Relevant business data will be rolled up into a dynamic Balanced Scorecard presentation that provides Division management with the up-to-the-minute status of the Division. Benchmarking data can be readily shared via the Information Portal as well.

2.4.8. Network Enhancement Project

This is an initial project in the Master Plan. The following subprojects associated with it were deferred to the next planning period. Summarized below are the subprojects associated with it:

eBusiness: eCommerce / eProcurement Project (90-107). This project implements eCommerce and eProcurement for the WTD, enabling WTD staff to procure basic or indirect supplies over secure Internet links from their desktop Information Portals.

Mobile Connectivity - Part III (90-112). Mobile Connectivity is to be implemented in three steps, referred to as Part I, Part II and Part III. This project is Part III, which extends the capabilities of the wireless devices available and distribute this capability WTD wide.

3. COST AND SCHEDULE

3.1. Cost Summary

A cost model was prepared for all 45 Subprojects using WTD FY2002 capital cost estimating spreadsheets in April 2001, and the results input to Microsoft Project. Two cost models were developed and used in determining each projects cost for inclusion in the Computer System Master Plan. One cost model was created using WTD's capital estimating Excel spreadsheets which resulted in the by phase, by category costs for each estimated project. The other model was done in Microsoft Project, which has time duration and by year costs. Both cost models were used interactively to arrive at the cost tables shown herein. A 450 page notebook was created, that documented the cost estimates resulting from use of WTD's costing tool, which included 10 pages for each of the 45 Subprojects.

All 45 Subprojects are described in this Appendix, but only those Subprojects that have been approved by WTD Management to be included in the Master Plan funding request are included in the following cost summary tables and figures. The remaining Subprojects have been included in the deferred projects section of this Appendix for consideration during the next planning cycle three years from now.

The following figures show the cost summary graphically to illustrate:

- Figure F-4: Implementation Costs by year
- Table F-2: Replacement Projects Cost Summary
 - By year cost of each Replacement Project and its associated Subprojects
- Table F-3: New Projects Cost Summary
 - By year cost of each New Project and its associated Subprojects
- Table F-4: Cost Summary Totals
 - By year cash flow for the ten-year planning period for:
 - Replacement Projects
 - New Projects
 - All Projects

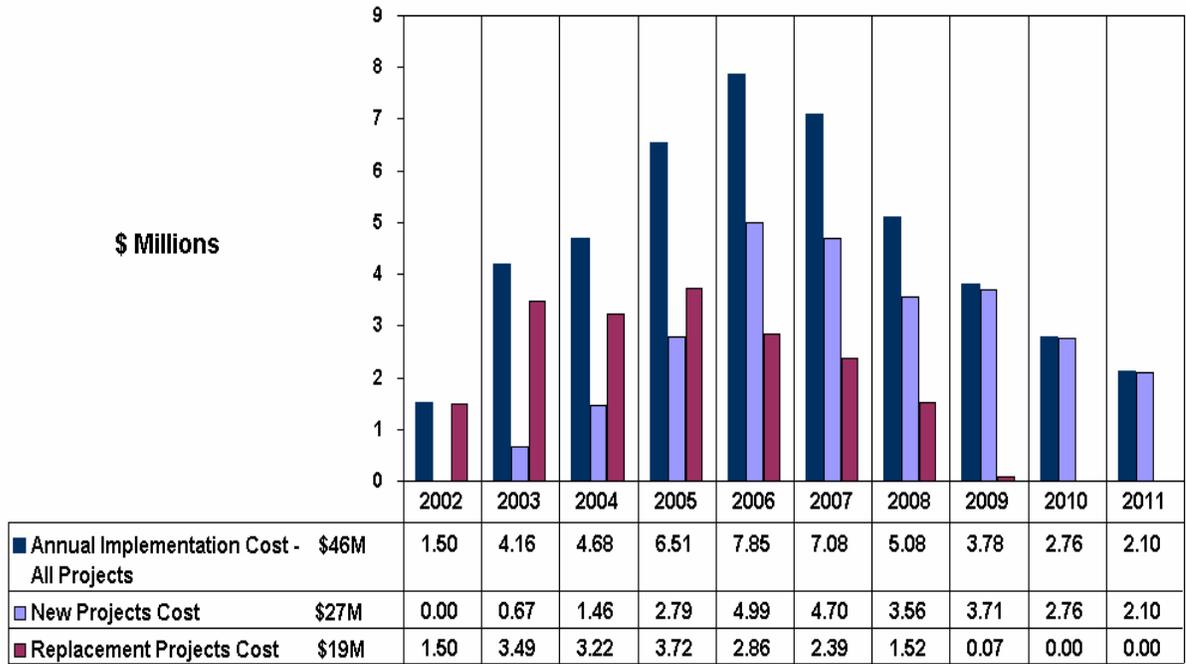


Figure F-4: Implementation Costs

Table F-2: Replacement Projects Cost Summary

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423R10	Replacement of Existing Plant and Conveyance	\$15,475,000	\$1,500,000	\$3,090,000	\$2,875,000	\$3,240,000	\$2,375,000	\$1,630,000	\$765,000			
Subproject No.	Subproject Name											
423R10 / 101A	Interim Replacement of West Point SCS Control System	\$1,300,000	\$900,000	\$400,000								
423R10 / 101B	Final West Plant and Conveyance Control System	\$3,195,000					\$1,110,000	\$1,320,000	\$765,000			
423R10 / 102	CSO Predictive Model	\$1,785,000			\$715,000	\$710,000	\$360,000					
423R10 / 103A	Interim Replacement of West Forney SCADA Control System	\$1,000,000	\$300,000	\$700,000								
423R10 / 103B	Replacement of West SCADA PLCs	\$2,000,000			\$130,000	\$780,000	\$780,000	\$310,000				
423R10 / 104	South Plant and East SCADA Forney Control Systems	\$5,075,000	\$300,000	\$1,550,000	\$1,550,000	\$1,550,000	\$125,000					
423R10 / 106	ODSS Part I: Replaces LARS	\$1,120,000		\$440,000	\$480,000	\$200,000						
<hr/>												
Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423R30	Replacement of Existing Water Quality Systems -	\$910,000						\$420,000	\$420,000	\$70,000		
<hr/>												
Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423R90	Existing LAN & WAN Upgrades	\$2,375,000		\$400,000	\$345,000	\$480,000	\$480,000	\$335,000	\$335,000			
Subproject No.	Subproject Name											
423R90 / 101	Network Enhancements: Part I	\$745,000		\$400,000	\$345,000							
423R90 / 102	Network Enhancements: Part II	\$745,000				\$400,000	\$345,000					
423R90 / 103	Network Enhancements: Part III	\$745,000						\$400,000	\$345,000			
Replacement Project Totals		\$18,760,000	\$1,500,000	\$3,490,000	\$3,220,000	\$3,720,000	\$2,855,000	\$2,385,000	\$1,520,000	\$70,000	\$0	\$0

Table F-3: New Projects Cost Summary

Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N10	New Plant and Conveyance Control Systems	\$1,480,000						\$130,000	\$130,000	\$470,000	\$375,000	\$375,000
Subproject No.	Subproject Name											
423N10 / 107	ODSS Part II	\$355,000						\$130,000	\$130,000	\$95,000		
423N10 / 108	ODSS Part III	\$1,125,000								\$375,000	\$375,000	\$375,000
423N10 / 109	Brightwater Plant and Conveyance Control Systems	\$0										
Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N30	New Water Quality Database	\$1,330,000				\$665,000	\$665,000					
Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N40	New Asset & Maintenance Management Systems	\$6,205,000		\$665,000	\$1,125,000	\$1,390,000	\$1,140,000	\$790,000	\$185,000	\$550,000	\$360,000	\$0
Subproject No.	Subproject Name											
423N40 / 101	Asset Management System	\$1,950,000		\$400,000	\$600,000	\$600,000	\$350,000					
423N40 / 102	Maintenance Mgt System: Part I	\$3,160,000		\$265,000	\$525,000	\$790,000	\$790,000	\$790,000				
423N40 / 103	Maintenance Mgt System: Part II	\$1,095,000							\$185,000	\$550,000	\$360,000	
Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N50	New Data Management Systems	\$6,720,000				\$325,000	\$1,720,000	\$1,875,000	\$1,340,000	\$1,160,000	\$300,000	
Subproject No.	Subproject Name											
423N50 / 101	Engineering Document Mgt: Part I	\$0										
423N50 / 102	Engineering Document Mgt: Part II	\$620,000					\$155,000	\$310,000	\$155,000			
423N50 / 103	Engineering Document Mgt: Part III	\$1,450,000							\$425,000	\$725,000	\$300,000	
423N50 / 104	Infrastructure Data Mgt: Part I	\$1,930,000				\$325,000	\$640,000	\$640,000	\$325,000			
423N50 / 105	Infrastructure Data Mgt: Part II	\$870,000							\$435,000	\$435,000		
423N50 / 106	West Point Facilities Data Repository	\$1,850,000					\$925,000	\$925,000				
Project No.	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
423N90	Network Enhancement Project	\$10,975,000			\$330,000	\$410,000	\$1,465,000	\$1,900,000	\$1,900,000	\$1,530,000	\$1,720,000	\$1,720,000
Subproject No.	Subproject Name											
423N90 / 101	Information Portal: Part I	\$740,000			\$330,000	\$410,000						
423N90 / 102	Information Portal: Part II	\$1,935,000					\$645,000	\$645,000	\$645,000			
423N90 / 103	Information Portal: Part III	\$1,205,000								\$275,000	\$465,000	\$465,000
423N90 / 104	Integration Bus: Part I	\$1,815,000					\$605,000	\$605,000	\$605,000			
423N90 / 105	Integration Bus: Part II	\$1,815,000								\$605,000	\$605,000	\$605,000
423N90 / 106	Mobile Connectivity Part I	\$1,515,000					\$215,000	\$650,000	\$650,000			
423N90 / 108	Mobile Connectivity Part II	\$1,950,000								\$650,000	\$650,000	\$650,000
New Project Totals		\$26,710,000		\$665,000	\$1,455,000	\$2,790,000	\$4,990,000	\$4,695,000	\$3,555,000	\$3,710,000	\$2,755,000	\$2,095,000

Table F-4: Cost Summary Totals

	Project Name	Total Cost	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011
Replacement Project Totals												
		\$18,760,000	\$1,500,000	\$3,490,000	\$3,220,000	\$3,720,000	\$2,855,000	\$2,385,000	\$1,520,000	\$70,000	\$0	\$0
New Project Totals												
		\$26,710,000		\$665,000	\$1,455,000	\$2,790,000	\$4,990,000	\$4,695,000	\$3,555,000	\$3,710,000	\$2,755,000	\$2,095,000
Combined Project Totals												
		\$45,470,000	\$1,500,000	\$4,155,000	\$4,675,000	\$6,510,000	\$7,845,000	\$7,080,000	\$5,075,000	\$3,780,000	\$2,755,000	\$2,095,000

3.2. Roadmap

The implementation strategy for the nine Improvement Projects and their associated Subprojects are illustrated in the following Figure F-5: WTD Computer Systems Master Plan Implementation Roadmap. It shows when each project is planned and its interdependencies with the other projects over the ten-year planning period.

The Subprojects associated with each Project are shown in the color noted on the figure's legend for ease of tracking. All improvement Subprojects have been identified according to there Subproject number (10-101 for example).

All projects shown are defined in this Appendix F.

Appendix F: Projects and Subprojects

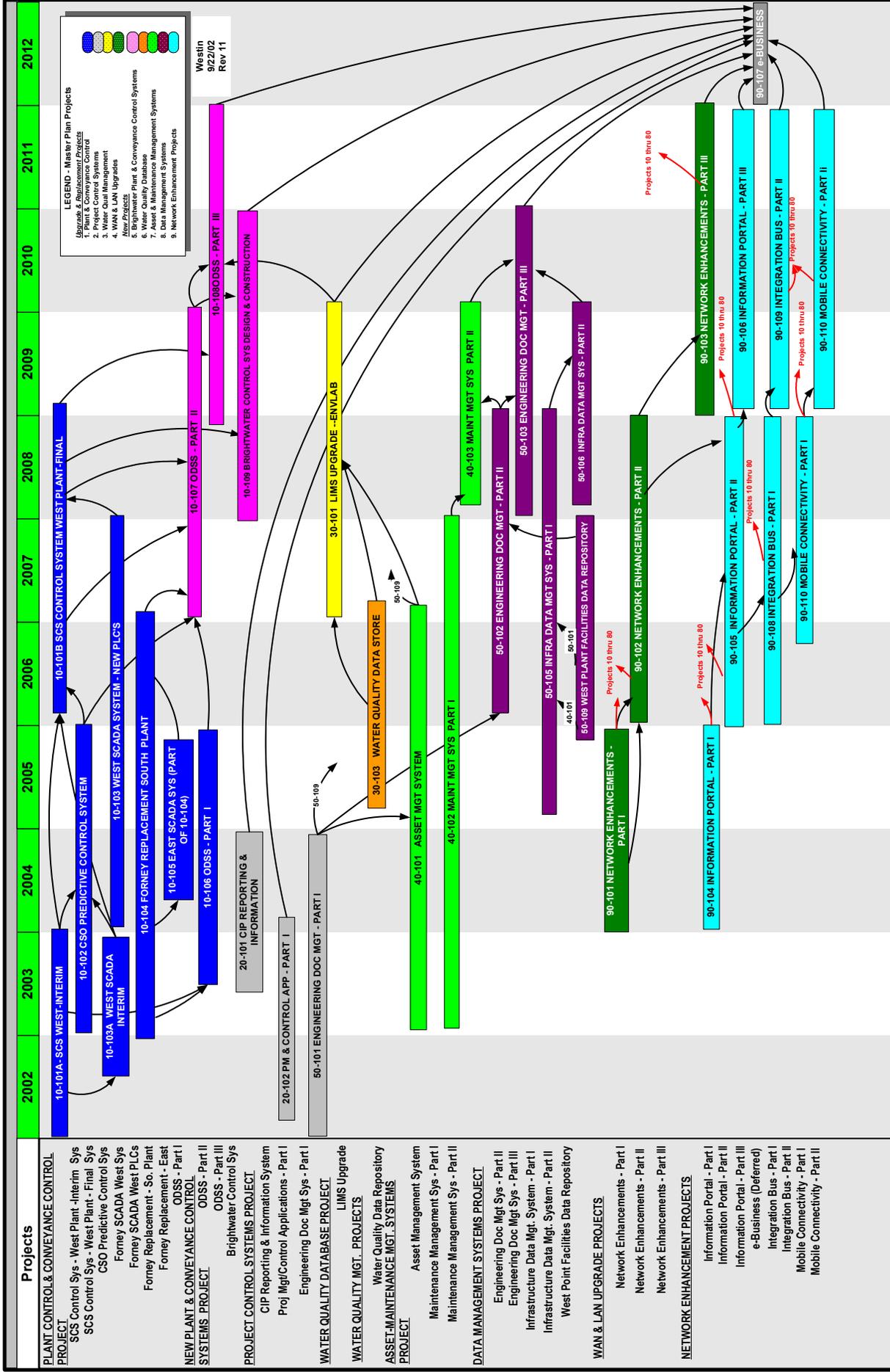


Figure F-5: WTD Computer Systems Master Plan Implementation Roadmap

4. REPLACEMENT PROJECTS – SUBPROJECT DEFINITIONS

4.1. Replacement Projects

The Replacement projects are briefly listed here for your immediate reference. For each Replacement Project, the subprojects associated with it are included.

Plant & Offsite Control Project

- Subproject No. 10-101A – SCS Control System - Interim
- Subproject No. 10-101B – SCS Control System and West SCADA Final System
- Subproject No. 10-102 – CSO Predictive Control System
- Subproject No. 10-103A – West SCADA System - Interim
- Subproject No. 10-103B – West SCADA System PLC Replacement
- Subproject No. 10-104 – Forney Control Replacement, South Plant & East SCADA
- Subproject No. 10-105 – Forney SCADA Replacement, East Collection System
- Subproject No. 10-106 – Operations Decision Support System, Part I: Replaces LARS

Project Control Project

- Subproject No. 20-101 – CIP Reporting
- Subproject No. 20-102 – Subproject Management and Control Applications, Part I
- Subproject No. 50-101 – Engineering Document Management, Part I

Computing Infrastructure Project

- Subproject No. 90-101 – Network Enhancements, Part I
- Subproject No. 90-101 – Network Enhancements, Part II
- Subproject No. 90-101 – Network Enhancements, Part III

Each Subproject is described in detail in the following Sections. Each Subproject description includes the following:

- Subproject overview
- Subproject identifier number
- Project association identifier
- Subproject sponsor (usually a Section Manager or Supervisor that is the primary beneficiary of the Subproject)
- Subproject justification
- Subproject objectives
- Description of the Subproject phases required in implementing it.

4.2. Subproject: SCS Control System

The existing SCS control system will be replaced. The Subproject will include replacement of the operator workstation portion of the treatment plant control system that provides the operators with plant status and allows them to control and coordinate plant operations. The replacement includes operator

workstations, the historical data system, equipment to interface to the existing field controllers, communication links to the analog controls and between all system components, and the support computer structure (servers) to operate the control system. The new system will come with new software to support the required functions. The existing database will be reconfigured and migrated into the new control system. The SCS control system replacement will take place in a series of steps in-order to minimize its impact on current operations, manage limited capital funds, and most importantly quickly solve immediate problems.

The sequence consist of:

Subproject Sequence	Result
1. Interim Replacement of West Point Control System–10-101A	<i>Provides interim West Point control system and eliminates the need for the failing CCM and UHA equipment in each of the 13 plant processes.</i>
2. Interim Replacement of Forney West SCADA– 10-103A	Provides interim West Collection System SCADA to replace the decommissioned Forney West SCADA. Reactive control capability remains, without any predictive control. Frees up MicroVAX computers for use at South Plant.
3.South Plant & East SCADA Forney Control System Replacement	Provides common requirements and design specifications for all WTD control systems, plus procures and implements this design for the South Plant and East Section Conveyance Control System replacement.
4. CSO Predictive Control Model- 10-102	Provides CSO modeling development capability, as part of the West Plant Control System, to update existing CSO algorithms with and prepare for actual CSO Predictive Control to supplement the current CSO reactive control strategies that are now in use.
5.ODSS Part I: Replaces LARS	Develops requirements and design specifications for the replacement Laboratory Analysis Reporting System (LARS) and implements it as the first stage of WTD’s Operational Decision Support System (ODSS).
6. Replacement of West Collection System TI PLC’s – 10-103B	West Collection System TI PLC’s will be replaced with the same PLC’s that are currently being procured for the East Collection System. Prior to the West PLC’s being replaced, the decommissioned TI-PLC’s from the East will be used as spare parts in the West to extend their life.
7. Final West Plant & Conveyance Control System – 10-101B	Provides for West Plant Control System replacement, and for the West SCADA replacement as part of one combined system. This will result in a full featured advanced capability West Point Plant control system with complete West Collection System SCADA reactive and CSO predictive control capability.

4.2.1. Subproject ID

423493-10-101

Includes 10-101A, 10-101B

4.2.2. Project Association

Plant Control Project

4.2.3. Subproject Sponsor(s)

West Section Manager; Major Capital Improvements Section Manager

4.2.4. Subproject Justification

The SCS control system at the West Plant provides the operators the interface and control required to run the plant. The operator workstations and the historical information reporting systems use Digital Equipment Company Alpha computers running a very outdated operating system. The link between the control computers in the treatment plant (programmable logic controllers) and the operator workstations is not able to be repaired or replaced and is a critical link in the control system. Failure of this link will cause significant control problems at the plant and require significant increase in staff to manually operate the plant. Other parts of the control system are also in peril due to advances in technology moving away from the existing installed equipment. It is becoming impossible to keep the control system and parts of the treatment plant interconnected and operational due to hardware and software components aging with no path for replacement or repair.

4.2.5. Subproject Objectives

The primary objective of this Subproject is to replace the existing SCS Control System at West plant, and integrate into it the new West Collection System SCADA, and the new Predictive CSO System. This will all be done in two major steps. Initially it will be implemented as an interim system with the very basic control and monitoring capabilities of an in plant control system, and SCADA with CSO Predictive modeling development capability. Then the initial Plant Control System and SCADA will be upgraded into a full-featured advanced control system with full predictive control capability.

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management.

4.2.6. Overview of Subproject Phases

Note:

The Subproject phases included herein provide a complete set of steps for implementing a Control or SCADA System Subproject. The steps are identical for the following Subprojects except as noted in each individual Subproject Description:

1. 10-101 SCS Control System – West Plant
2. 10-102 CSO Predictive Control System
3. 10-103 Forney SCADA West Collection System
4. 10-104 Forney Control Replacement – South Plant
5. 10-105 Forney SCADA Replacement – East Collection System
6. 10-109 Brightwater Control System

Since this is the first control's Subproject described, it contains all tasks. Most of these tasks are needed by this Subproject, however the few that aren't needed are so noted. This was done to reduce the repetition between Subprojects and make the descriptions more to the point, and reduce the total number of pages in the plan.

Planning Phase

Subproject Planning. The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject. Procurement issues need to be addressed relative to this Subproject allowing for rapid procurement of this critical

interim plant control and SCADA system. The opportunity to procure a replacement interim system from the current SCS vendor exists, which may provide the most attractive path for WTD to take. This needs to be reviewed in detail and decisions made as to how to proceed.

Pre-Design Phase

The requirements and functional specifications for the control system need to be developed to clearly identify what specific features, functions, and operation and maintenance needs are to be included in the design specifications.

A standard design specification format needs to be established in this step which all subsequent control system procurements will follow over the next ten years. This initial procurement will be the first step in establishing commonality of equipment standards through out WTD, that impact all short term and long term control procurements for South and West Plants, East and West Conveyance system, and long term Brightwater control procurements as well.

The first step will be to review the existing MicroVAX—based control system installed in early 1990 by Metso (then Valmet Controls). Then identify the shortcoming or deficiencies of the current system, as well as features that have worked well and must be maintained with the system upgrade. Next, WTD needs to establish the Control system and communications requirements necessary to meet WTD current and future requirements. The first phase of the Control system upgrade will be limited to remote sites associated with the existing West Plant and West Collection system. However, future WTD plans to add other sites to the West Control system must also be included. As such, the Pre-Design tasks will address not only the requirements of the initial upgrade, but also the significant requirements for future phases leading to full implementation.

Next, investigate technical alternatives and generate recommendations for implementation. During this task, WTD will carefully evaluate the advantages and disadvantages of upgrading to Metso's most current product offering. Converting to a completely new software platform will also be evaluated. The Pre-Design process will result in the generation of a Pre-Design Report and a System Implementation Plan. These reports will serve as the guidelines for moving forward with system design and implementation.

There are some significant issues concerning the approach for the Control System upgrade that must be resolved during the Preliminary Design phase. These decisions can have a large impact on the specific scope for the Design and Construction phases. The major issues or needs to be addressed include:

The following tasks are required to complete the Pre-Design Phase:

Gather Control System Data. Accumulate and organize various data that documents the existing Instrumentation and Control systems for the plant. This includes all technical documentation associated with the existing wastewater treatment plant facilities needed for pre-design activities.

Control system requirements will also be identified for planned and future process additions/expansions including areas not currently being served by the control system.

A key element of this task will be to identify the level of enhanced monitoring and control that is appropriate for each process system. Even though no significant site electrical or instrumentation improvements are anticipated to be included in this phase of the Subproject, information about desired electrical/instrumentation improvements needs to be documented.

The various requirements for information exchange between the plant control system and other WTD information systems need to be documented in-order to be able to specify these interfaces in the design specification.

Establish Control System Requirements. Establish the functional requirements for the Control System upgrade by assimilating the information garnered through review of the existing documentation, existing site conditions, and through analysis of the information gathered during requirements meetings. This information will be organized and documented in the system requirement's document.

The requirements document will discuss strengths and deficiencies of the existing system and the requirements for the upgraded Control System. It will also identify the sites and facilities currently not being served by the existing system, as well as Control System requirements necessary to support future process additions and expansions. The document will also review recommended improvements, additions and modifications to process instrumentation and system equipment required for upgrade/expansion of the Control System. Areas to be covered in the requirement's document include:

- Key features of the existing Control System
- Additional features for new system
- Plant Control and monitoring requirements
- West Collection System interim SCADA requirements
- CSO predictive Control System interim requirements
- Control Communications Requirements
- Support of Multiple Communication Protocols
- LAN/WAN Requirements
- Data Integration Requirements
- Control Center and Backup Control Center
- Desired Pumping/Storage optimization strategies
- New PLC needs, including redundancy, battery backup
- Smart Instrumentation
- Cut-over methodology
- Staffing requirements.

Perform Communications System Study. Investigate and recommend alternatives for upgrading/expanding the existing communication system to meet the requirements of the expanded Control system, beyond the current telecommunications media.

WTD needs to assemble copies of all documentation and data that describe the current configuration of the existing communication system. WTD will also need to provide a preliminary list of remote sites that may be added to the Control System in future phases. The list should contain information about each site including site type (pumping, regulator, etc.), street address, latitude, and longitude, etc. Once the list has been finalized, it will be used throughout the design process. Review this information and then conduct site visits to each of the potential repeater locations.

The various types of radio systems currently available in the marketplace are listed below along with some technology issues to consider:

- Licensed and unlicensed point to multi-point radio systems
- Spread spectrum radios
- Direct sequence
- Synchronous frequency hopping
- Asynchronous frequency hopping
- Inter-relationship between protocols and radio technologies
- Use of network concepts for Control communications

- Implications of unsolicited vs. polled data reporting
- Time stamping of data as affected by choice in protocol and communications media.

WTD staff needs to review these communication technologies relative to WTD communication requirements for the Control system upgrade/expansion. Some capabilities to take into consideration are listed below:

- Frequency of update from each type of site
- Required response times for commands
- Required notification time for alarms
- Communications related costs – initial and on-going
- Peer to peer messaging such as regulator station to pump stations
- Local, automatic control of remote facilities
- Communications to a backup master site
- Replacement of remaining phone links with appropriate radio technology
- Providing alternate, backup media for critical stations
- Data buffering at the PLC during communications outages.

Document these findings and recommend the preferred communications approach to take for this Subproject.

Analyze Technical Alternatives. Investigate and recommend alternatives to meet the Control System and Communications System requirements. The Control System Requirements document and the Communications Systems Requirements Report will document the requirements for the Control system upgrade/expansion as well as the associated communications system. Some general system alternatives to be considered include:

- Control System Upgrade from Metso
- Control System Replacement with Large Scale System
- Control System Replacement with PC based system
- Interim monitoring system for West SCADA
- Interim CSO Predictive Control System
- Communication system expansion alternatives
- Interface to WTD Information Systems
- Types of PLCs to be used (currently in procurement process for East Collection System SCADA)
- PLC replacement methods (future need).

Factors to be evaluated will include:

- Cost, initial purchase and life cycle
- Ease of maintenance
- Ease of use
- Reliability
- Product maturity/stability
- Compliance with open architecture standards
- Scalability.

The alternative evaluations and recommendations need to be documented.

Develop Pre-Design Report. Develop a design report to document the preliminary design process by incorporating the requirements developed in the previous tasks. In addition to the information from the requirement's document, the report will contain an executive summary with appendices containing detailed information and data.

Develop System Implementation Plan. Develop a system implementation plan for the design and implementation of the expanded Control System.

In addition to the technical issues defined previously, issues to be reviewed and discussed will include:

- Procurement Method (low bid, High Tech Procurement, etc.)
- Pre-qualification of Vendors
- Level Of Design Detail
- System Configuration Approach
- Phased Implementation.

The plan will present a multi-step process for implementing the upgrade and expansion of the Control System, which will include provisions for including interim West Collection SCADA and CSO Predictive Control capability.

Final Design Phase

The final design phase is very heavily influenced by the requirements and alternatives brought forward from the pre-design phase. The tasks listed below represent the typical tasks included in a control system replacement.

Perform Site Investigations – Currently Monitored Sites. Perform site investigations at the WTD facilities currently monitored by the existing control system in-order to provide the information necessary for PLC replacement within the existing PLC Panels.

Perform Site Investigations – Expansion Sites. Perform site investigations at the WTD facilities to be added to the Control system for the purpose of developing the necessary site plans and methodology for the installation of PLC panels at the new sites. This will require development of typical site and floor plans, determination of the maximum panel size, development of detailed I/O connection information, and identification of power sources.

It may be possible to develop a limited number of typical installation site plans if a sufficient degree of similarity is present between the types of sites.

Develop Communications System Design. Develop the communications system design for the WTD facilities to be added to the Control System.

The communication system design will need to consider the ultimate Control System, not just the sites to be incorporated into the first phase of the upgrade. In order perform a complete design, site visits and path surveys will be required to as many sites as possible. If radio communications are selected, then the communications design will consist of:

- Performing radio path testing in the field to all new and existing sites to determine routes and antenna height requirements
- Identify and site new and/or replacement repeater locations, if needed
- Develop specifications for radios, antennas, installation details, radio system testing, protocol usage and diagnostic tools.

Develop Control Room Design. Define the layout and functional requirements for the control room (if other than the existing control center, or if it needs to be upgraded)

The pre-design process will identify the locations for the proposed new control center (if required) and proposed backup control center (if needed). With these locations provided, the next step is to develop

control center room and console layouts. Recommendations for further electrical system requirements and physical improvements (building layouts) will be required.

Develop System Configuration Requirements. Develop a definition of the system configuration requirements (database, graphic displays, control strategies, and reports) for the replacement system.

The definition of the system configuration requirements need to be complete enough for the system integrator's responding to the RFP to fully understand and be able to accurately estimate the costs of the system configuration tasks.

I/O Point List. An I/O Point List will be developed during the system design phase and will be included as part of the RFP documents. This list (implemented in Microsoft Access) will define the basic attributes of the physical I/O points associated with the new system. These point attributes include the point ID, point description, engineering units and range for analog points, alarm limits for analog points, alarm severity for analog and discrete alarms, etc. To the greatest extent possible, this information will be extracted from the existing real-time database(s).

Process Graphic Displays. Define the process graphic displays that will enable system operators to monitor and control WTD's processing facilities.

Establish a set of graphics conventions to be used in building new displays. These conventions will address issues such as standard screen layout, color conventions, text type and size, etc. These conventions will also incorporate any standards that exist as a result of the existing system displays.

Develop a detailed list of the displays to be developed and design a set of typical display formats to be used as guidelines. Then generate typical formats (using AutoCAD or Visio) for all displays to be developed.

Control Strategy Definition. Define control strategies that may be implemented at the supervisory level or may be incorporated as local control strategies in the PLC's. Review existing local control strategies and identify possible revisions that may be implemented as part of coordinated plant-wide strategies (i.e. energy management).

Report Definition. Define the content and format of the required reports and develop preliminary layouts of each general type of report.

Develop Detailed Design Specifications. Develop design documents (specifications and drawings) for the replacement system, using the CSI format to document the technical requirements for Control and Communications Systems upgrade. The specifications will address the following type of issues:

- Primary and Backup Controls and Control Centers
- Local Area Network Design
- Wide Area Network Design
- PLC data communications
- Control System software and hardware requirements
- System configuration requirements
- System performance requirements
- Training Requirements
- System Test, Installation and Acceptance Requirements.

Develop RFP Documents. Develop the Request for Proposal (RFP) documents to be used for the procurement of the replacement system.

WTD will need to provide their standard terms and conditions and general requirements (Division 0 and 1) sections. These sections will be combined with the design specifications and drawings to produce the final RFP documents.

Provide Procurement Services. WTD will need to provide procurement services during the Control System procurement process and to use the previously developed Proposal Evaluation Criteria to recommend the most cost-effective system.

Proposal evaluations will be performed using the proposal evaluation procedures previously developed to determine the most responsive and cost effective system from the proposals received.

The basic method used for procurement of a control system will be:

- Attend pre-proposal meeting and answer questions concerning the technical requirements of the RFP documents
- Develop RFP amendments as necessary
- Perform preliminary evaluation of all proposals to determine the general level of supplier compliance and the proposed system/services acceptability
- Elimination from further consideration those proposals with major technical, commercial, or price deficiencies based on point scales from the proposal evaluation criteria
- Evaluate and rank proposals to develop a short list of suppliers (up to three)
- Attend system demonstrations at WTD facilities for each of the short list of suppliers (up to three)
- Rank each short-listed proposal and select the most cost-effective proposal
- Recommend the selected vendor to WTD management for approval
- Proceed to negotiate the contract and award to the selected vendor.

Implementation (Construction) Phase

This phase includes activities to administer the Control System Upgrade/Replacement as described below.

Construction Subproject Management. This task includes performing the following activities:

- Request for Information (RFI) Processing
- Change Order Cost Review
- Monthly Progress Reports
- Meeting Attendance
- Subproject Kickoff Meetings
- Progress Meetings.

Submittal Review. Review and process submittals required in the contract documents and specifications.

The categories of submittals that are expected include:

- Administrative Submittals- Progress Schedule, Management Plan, and Monthly Reports
- Design Submittals- Product Information, Connection Diagrams, Interconnection Diagrams, Panel Fabrication and Layout Drawing, Functional Design Documentation, Detailed Design Documentation, and Installation Drawings
- System Documentation Submittals- O&M Manuals, System Operators Manual, Software Engineer's Manual, System Configuration Inventory List, and Record Documents
- Testing Submittals- System Test Plan, Test Procedures, and Test Reports
- Training Submittals- Training Plan, Course Outlines, Training Manuals.

The submitted documents will be reviewed for general conformance with the specifications and scheduling requirements.

Witness Communications System Testing. Witness the tests associated with expansion and improvements to the Communications System. Work on the communications infrastructure needed to support the expanded Control System may be installed and tested prior to the remainder of the Control System. The witnessing of the required tests and demonstrations will be done under this task.

The specific tests that will be required for the communications system will be determined during the system design phase, however some typical tasks include:

- Factory Acceptance Test (FAT)
- Site Demonstration Test (SDT), which may include re-testing for new baseline data for the existing radio sites
- System Availability Test (SAT) for the full communications system.

Conduct Control System Site Visits and Testing. Witness and document the results of tests and demonstrations as required of the Control System Supplier in the specifications. The tests will include:

- Factory Demonstration Test (FDT)
- Site Demonstration Test (SDT)
- System Availability Test (SAT).

Contract Closeout. Upon completion of all contractual requirements the system will be officially accepted as complete and the contract closeout process initiated.

Implementation (Other) Phase

Implement New Work Processes. This step implements the new work processes associated with the effective day-to-day use of the new Control System.

Design and Implement System Maintenance Practices and Procedures. In order for the Division to achieve its return on investment and to support productivity objectives, Control System databases and applications need to be kept current and must meet response and total in-service time objectives. For these purposes, this step establishes the practices and procedures for the effective, on-going maintenance of the this system. It establishes practices and procedures – including documentation – for database backups, software updates, fail-over, recovery, access control, as well as for review and adjustment of work processes to effectively use the applications.

Deployment and Training. Potential users of the Operations Decision Support System need to be trained in the tools used to access it, and also in the organization and content of the System's database. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for Operations Decision Support System users. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training, which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

4.2.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-101A SCS West- Interim														
Phase	Tax & Construct		In-House						Other Fixed		Land	TOTAL	Project	TOTAL with
	Construct	Conting	Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Costs	ROW	PROJECT	Conting	Contingency	
1 Plan	0	0	0	0	0	0	9188	3968	644	0	13,800	0	13,800	
2 Pre-Design	0	0	9665	38662	3866	0	11722	7275	644	0	71,834	0	71,834	
3 Final Desi	0	0	16109	64436	3866	12887	15524	11242	1289	0	125,354	0	125,354	
4 Impl Cons	644362	115985	0	0	0	0	0	0	0	0	760,347	0	760,347	
4 Impl other	0	0	6444	25774	27063	96654	12356	11375	1933	0	181,599	0	181,599	
5 Close Out	0	0	0	0	3926	19632	8365	8149	1963	0	42,036	0	42,036	
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0	
7 Contingen	0	0	0	0	0	0	0	0	0	0	0	105031	105031	
TOTALS:	644,362	115,985	32,218	128,872	38,722	129,173	57,154	42,008	6,474	0	1,194,969	105,031	1,300,000	

4.3. Subproject: Final West Control System and Conveyance Control System

The existing SCS control system will be replaced. The Subproject will include replacement of the operator workstation portion of the treatment plant control system that provides the operators with plant status and allows them to control and coordinate plant operations. The replacement includes operator workstations, the historical data system, equipment to interface to the existing field controllers, communication links to the analog controls and between all system components, and the support computer structure (servers) to operate the control system. The new system will come with new software to support the required functions. The existing database will be reconfigured and migrated into the new control system. The SCS control system replacement will take place in a series of step's in-order to minimize its impact on current operations, manage limited capital funds, and most importantly quickly solve immediate problems.

The sequence consist of:

Subproject Sequence	Result
1. Interim Replacement of West Point Control System–10-101A	Provides interim West Point control system and eliminates the need for the failing CCM and UHA equipment in each of the 13 plant processes.
2. Interim Replacement of Forney West SCADA– 10-103A	Provides interim West Collection System SCADA to replace the decommissioned Forney West SCADA. Reactive control capability remains, without any predictive control. Frees up MicroVAX computers for use at South Plant.
3.South Plant & East SCADA Forney Control System Replacement	Provides common requirements and design specifications for all WTD control systems, plus procures and implements this design for the South Plant and East Section Conveyance Control System replacement.
4. CSO Predictive Control Model- 10-102	Provides CSO modeling development capability, as part of the West Plant Control System, to update existing CSO algorithms with and prepare for actual CSO Predictive Control to supplement the current CSO reactive control strategies that are now in use.
5.ODSS Part I: Replaces LARS	Develops requirements and design specifications for the replacement Laboratory Analysis Reporting System (LARS) and implements it as the first stage of WTD's Operational Decision Support System (ODSS).
6. Replacement of West Collection System TI PLC's – 10-103B	West Collection System TI PLC's will be replaced with the same PLC's that are currently being procured for the East Collection System. Prior to the West PLC's being replaced, the decommissioned TI-PLC's from the East will be used as spare parts in the West to extend their life.
7. Final West Plant & Conveyance Control System – 10-101B	<i>Provides for West Plant Control System replacement, and for the West SCADA replacement as part of one combined system. This will result in a full featured advanced capability West Point Plant control system with complete West Collection System SCADA reactive and CSO predictive control capability.</i>

4.3.1. Subproject ID

423493-10-101

Includes 10-101B in Strategic Plan

4.3.2. Project Association

Plant Control Project

4.3.3. Subproject Sponsor(s)

West Section Manager; Major Capital Improvements Section Manager

4.3.4. Subproject Justification

The SCS control system at the West Plant provides the operators the interface and control required to run the plant. The operator workstations and the historical information reporting systems use Digital Equipment Company Alpha computers running a very outdated operating system. The link between the control computers in the treatment plant (programmable logic controllers) and the operator workstations is not able to be repaired or replaced and is a critical link in the control system. Failure of this link will cause significant control problems at the plant and require significant increase in staff to manually operate the plant. Other parts of the control system are also in peril due to advances in technology moving away from the existing installed equipment. It is becoming impossible to keep the control system and parts of the treatment plant interconnected and operational due to hardware and software components aging with no path for replacement or repair.

4.3.5. Subproject Objectives

The primary objective of this Subproject is to replace the existing SCS Control System at West plant, and integrate into it the new West Collection System SCADA, and the new Predictive CSO System. This will all be done in two major steps. Initially it will be implemented as an interim system with the very basic control and monitoring capabilities of an in plant control system, and SCADA with CSO Predictive modeling development capability. Then the initial Plant Control System and SCADA will be upgraded into a full-featured advanced control system with full predictive control capability.

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management.

4.3.6. Overview of Subproject Phases

Note:

The Subproject phases included herein provide a complete set of steps for implementing a Control or SCADA System Subproject. The steps are identical for the following Subprojects except as noted in each individual Subproject Description:

1. 10-101 SCS Control System – West Plant
2. 10-102 CSO Predictive Control System
3. 10-103 Forney SCADA West Collection System
4. 10-104 Forney Control Replacement – South Plant
5. 10-105 Forney SCADA Replacement – East Collection System
6. 10-109 Brightwater Control System

Since this is the first control's Subproject described in the Ten-year Strategic Plan, it contains all tasks. Most of these tasks are needed by this Subproject, however the few that aren't needed are so noted. This was done to reduce the repetition between Subprojects and make the descriptions more to the point, and reduce the total number of pages in the plan.

Planning Phase

Subproject Planning. The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject. Procurement issues need to be addressed relative to this Subproject allowing for rapid procurement of this critical interim plant control and SCADA system. The opportunity to procure a replacement interim system from the current SCS vendor exists, which may provide the most attractive path for WTD to take. This needs to be reviewed in detail and decisions made as to how to proceed.

Pre-Design Phase

The requirements and functional specifications for the control system need to be developed to clearly identify what specific features, functions, and operation and maintenance needs are to be included in the design specifications.

A standard design specification format needs to be established in this step which all subsequent control system procurements will follow over the next ten years. This initial procurement will be the first step in establishing commonality of equipment standards through out WTD, that impact all short term and long term control procurements for South and West Plants, East and West Conveyance system, and long term Brightwater control procurements as well.

The first step will be to review the existing MicroVAX—based control system installed in early 1990 by Metso (then Valmet Controls). Then identify the shortcoming or deficiencies of the current system, as well as features that have worked well and must be maintained with the system upgrade. Next, WTD needs to establish the Control system and communications requirements necessary to meet WTD current and future requirements. The first phase of the Control system upgrade will be limited to remote sites associated with the existing West Plant and West Collection system. However, future WTD plans to add other sites to the West Control system must also be included. As such, the Pre-Design tasks will address not only the requirements of the initial upgrade, but also the significant requirements for future phases leading to full implementation.

Next, investigate technical alternatives and generate recommendations for implementation. During this task, WTD will carefully evaluate the advantages and disadvantages of upgrading to Metso's most current product offering. Converting to a completely new software platform will also be evaluated. The Pre-Design process will result in the generation of a Pre-Design Report and a System Implementation Plan. These reports will serve as the guidelines for moving forward with system design and implementation.

There are some significant issues concerning the approach for the Control System upgrade that must be resolved during the Preliminary Design phase. These decisions can have a large impact on the specific scope for the Design and Construction phases. The major issues or needs to be addressed include:

The following tasks are required to complete the Pre-Design Phase:

Gather Control System Data. Accumulate and organize various data that documents the existing Instrumentation and Control systems for the plant. This includes all technical documentation associated with the existing wastewater treatment plant facilities needed for pre-design activities.

Control system requirements will also be identified for planned and future process additions/expansions including areas not currently being served by the control system.

A key element of this task will be to identify the level of enhanced monitoring and control that is appropriate for each process system. Even though no significant site electrical or instrumentation improvements are anticipated to be included in this phase of the Subproject, information about desired electrical/instrumentation improvements needs to be documented.

The various requirements for information exchange between the plant control system and other WTD information systems need to be documented in-order to be able to specify these interfaces in the design specification.

Establish Control System Requirements. Establish the functional requirements for the Control System upgrade by assimilating the information garnered through review of the existing documentation, existing site conditions, and through analysis of the information gathered during requirements meetings. This information will be organized and documented in the system requirement's document.

The requirements document will discuss strengths and deficiencies of the existing system and the requirements for the upgraded Control System. It will also identify the sites and facilities currently not being served by the existing system, as well as Control System requirements necessary to support future process additions and expansions. The document will also review recommended improvements, additions and modifications to process instrumentation and system equipment required for upgrade/expansion of the Control System. Areas to be covered in the requirement's document include:

- Key features of the existing Control System
- Additional features for new system
- Plant Control and monitoring requirements
- West Collection System interim SCADA requirements
- CSO predictive Control System interim requirements
- Control Communications Requirements
- Support of Multiple Communication Protocols
- LAN/WAN Requirements
- Data Integration Requirements
- Control Center and Backup Control Center
- Desired Pumping/Storage optimization strategies
- New PLC needs, including redundancy, battery backup
- Smart Instrumentation
- Cut-over methodology
- Staffing requirements.

Perform Communications System Study. Investigate and recommend alternatives for upgrading/expanding the existing communication system to meet the requirements of the expanded Control system, beyond the current telecommunications media.

WTD needs to assemble copies of all documentation and data that describe the current configuration of the existing communication system. WTD will also need to provide a preliminary list of remote sites that may be added to the Control System in future phases. The list should contain information about each site including site type (pumping, regulator, etc.), street address, latitude, and longitude, etc. Once the list has

been finalized, it will be used throughout the design process. Review this information and then conduct site visits to each of the potential repeater locations.

The various types of radio systems currently available in the marketplace are listed below along with some technology issues to consider:

- Licensed and unlicensed point to multi-point radio systems
- Spread spectrum radios
- Direct sequence
- Synchronous frequency hopping
- Asynchronous frequency hopping
- Inter-relationship between protocols and radio technologies
- Use of network concepts for Control communications
- Implications of unsolicited vs. polled data reporting
- Time stamping of data as affected by choice in protocol and communications media.

WTD staff needs to review these communication technologies relative to WTD communication requirements for the Control system upgrade/expansion. Some capabilities to take into consideration are listed below:

- Frequency of update from each type of site
- Required response times for commands
- Required notification time for alarms
- Communications related costs – initial and on-going
- Peer to peer messaging such as regulator station to pump stations
- Local, automatic control of remote facilities
- Communications to a backup master site
- Replacement of remaining phone links with appropriate radio technology
- Providing alternate, backup media for critical stations
- Data buffering at the PLC during communications outages.

Document these findings and recommend the preferred communications approach to take for this Subproject.

Analyze Technical Alternatives. Investigate and recommend alternatives to meet the Control System and Communications System requirements. The Control System Requirements document and the Communications Systems Requirements Report will document the requirements for the Control system upgrade/expansion as well as the associated communications system. Some general system alternatives to be considered include:

- Control System Upgrade from Metso
- Control System Replacement with Large Scale System
- Control System Replacement with PC based system
- Interim monitoring system for West SCADA
- Interim CSO Predictive Control System
- Communication system expansion alternatives
- Interface to WTD Information Systems
- Types of PLCs to be used (currently in procurement process for East Collection System SCADA)
- PLC replacement methods (future need).

Factors to be evaluated will include:

- Cost, initial purchase and life cycle
- Ease of maintenance
- Ease of use

- Reliability
- Product maturity/stability
- Compliance with open architecture standards
- Scalability.

The alternative evaluations and recommendations need to be documented.

Develop Pre-Design Report. Develop a design report to document the preliminary design process by incorporating the requirements developed in the previous tasks. In addition to the information from the requirement's document, the report will contain an executive summary with appendices containing detailed information and data.

Develop System Implementation Plan. Develop a system implementation plan for the design and implementation of the expanded Control System.

In addition to the technical issues defined previously, issues to be reviewed and discussed will include:

- Procurement Method (low bid, High Tech Procurement, etc.)
- Pre-qualification of Vendors
- Level Of Design Detail
- System Configuration Approach
- Phased Implementation.

The plan will present a multi-step process for implementing the upgrade and expansion of the Control System, which will include provisions for including interim West Collection SCADA and CSO Predictive Control capability.

Final Design Phase

The final design phase is very heavily influenced by the requirements and alternatives brought forward from the pre-design phase. The tasks listed below represent the typical tasks included in a control system replacement.

Perform Site Investigations – Currently Monitored Sites. Perform site investigations at the WTD facilities currently monitored by the existing control system in-order to provide the information necessary for PLC replacement within the existing PLC Panels.

Perform Site Investigations – Expansion Sites. Perform site investigations at the WTD facilities to be added to the Control system for the purpose of developing the necessary site plans and methodology for the installation of PLC panels at the new sites. This will require development of typical site and floor plans, determination of the maximum panel size, development of detailed I/O connection information, and identification of power sources.

It may be possible to develop a limited number of typical installation site plans if a sufficient degree of similarity is present between the types of sites.

Develop Communications System Design. Develop the communications system design for the WTD facilities to be added to the Control System.

The communication system design will need to consider the ultimate Control System, not just the sites to be incorporated into the first phase of the upgrade. In order perform a complete design, site visits and path

surveys will be required to as many sites as possible. If radio communications are selected, then the communications design will consist of:

- Performing radio path testing in the field to all new and existing sites to determine routes and antenna height requirements
- Identify and site new and/or replacement repeater locations, if needed
- Develop specifications for radios, antennas, installation details, radio system testing, protocol usage and diagnostic tools.

Develop Control Room Design. Define the layout and functional requirements for the control room (if other than the existing control center, or if it needs to be upgraded)

The pre-design process will identify the locations for the proposed new control center (if required) and proposed backup control center (if needed). With these locations provided, the next step is to develop control center room and console layouts. Recommendations for further electrical system requirements and physical improvements (building layouts) will be required.

Develop System Configuration Requirements. Develop a definition of the system configuration requirements (database, graphic displays, control strategies, and reports) for the replacement system.

The definition of the system configuration requirements need to be complete enough for the system integrator's responding to the RFP to fully understand and be able to accurately estimate the costs of the system configuration tasks.

I/O Point List. An I/O Point List will be developed during the system design phase and will be included as part of the RFP documents. This list (implemented in Microsoft Access) will define the basic attributes of the physical I/O points associated with the new system. These point attributes include the point ID, point description, engineering units and range for analog points, alarm limits for analog points, alarm severity for analog and discrete alarms, etc. To the greatest extent possible, this information will be extracted from the existing real-time database(s).

Process Graphic Displays. Define the process graphic displays that will enable system operators to monitor and control WTD's processing facilities.

Establish a set of graphics conventions to be used in building new displays. These conventions will address issues such as standard screen layout, color conventions, text type and size, etc. These conventions will also incorporate any standards that exist as a result of the existing system displays.

Develop a detailed list of the displays to be developed and design a set of typical display formats to be used as guidelines. Then generate typical formats (using AutoCAD or Visio) for all displays to be developed.

Control Strategy Definition. Define control strategies that may be implemented at the supervisory level or may be incorporated as local control strategies in the PLC's. Review existing local control strategies and identify possible revisions that may be implemented as part of coordinated plant-wide strategies (i.e. energy management).

Report Definition. Define the content and format of the required reports and develop preliminary layouts of each general type of report.

Develop Detailed Design Specifications. Develop design documents (specifications and drawings) for the replacement system, using the CSI format to document the technical requirements for Control and Communications Systems upgrade. The specifications will address the following type of issues:

- Primary and Backup Controls and Control Centers
- Local Area Network Design
- Wide Area Network Design
- PLC data communications
- Control System software and hardware requirements
- System configuration requirements
- System performance requirements
- Training Requirements
- System Test, Installation and Acceptance Requirements.

Develop RFP Documents. Develop the Request for Proposal (RFP) documents to be used for the procurement of the replacement system.

WTD will need to provide their standard terms and conditions and general requirements (Division 0 and 1) sections. These sections will be combined with the design specifications and drawings to produce the final RFP documents.

Provide Procurement Services. WTD will need to provide procurement services during the Control System procurement process and to use the previously developed Proposal Evaluation Criteria to recommend the most cost-effective system.

Proposal evaluations will be performed using the proposal evaluation procedures previously developed to determine the most responsive and cost effective system from the proposals received.

The basic method used for procurement of a control system will be:

- Attend pre-proposal meeting and answer questions concerning the technical requirements of the RFP documents
- Develop RFP amendments as necessary
- Perform preliminary evaluation of all proposals to determine the general level of supplier compliance and the proposed system/services acceptability
- Elimination from further consideration those proposals with major technical, commercial, or price deficiencies based on point scales from the proposal evaluation criteria
- Evaluate and rank proposals to develop a short list of suppliers (up to three)
- Attend system demonstrations at WTD facilities for each of the short list of suppliers (up to three)
- Rank each short-listed proposal and select the most cost-effective proposal
- Recommend the selected vendor to WTD management for approval
- Proceed to negotiate the contract and award to the selected vendor.

Implementation (Construction) Phase

This phase includes activities to administer the Control System Upgrade/Replacement as described below.

Construction Subproject Management. This task includes performing the following activities:

- Request for Information (RFI) Processing
- Change Order Cost Review
- Monthly Progress Reports

- Meeting Attendance
- Subproject Kickoff Meetings
- Progress Meetings.

Submittal Review. Review and process submittals required in the contract documents and specifications. The categories of submittals that are expected include:

- Administrative Submittals- Progress Schedule, Management Plan, and Monthly Reports
- Design Submittals- Product Information, Connection Diagrams, Interconnection Diagrams, Panel Fabrication and Layout Drawing, Functional Design Documentation, Detailed Design Documentation, and Installation Drawings
- System Documentation Submittals- O&M Manuals, System Operators Manual, Software Engineer's Manual, System Configuration Inventory List, and Record Documents
- Testing Submittals- System Test Plan, Test Procedures, and Test Reports
- Training Submittals- Training Plan, Course Outlines, Training Manuals.

The submitted documents will be reviewed for general conformance with the specifications and scheduling requirements.

Witness Communications System Testing. Witness the tests associated with expansion and improvements to the Communications System. Work on the communications infrastructure needed to support the expanded Control System may be installed and tested prior to the remainder of the Control System. The witnessing of the required tests and demonstrations will be done under this task.

The specific tests that will be required for the communications system will be determined during the system design phase, however some typical tasks include:

- Factory Acceptance Test (FAT)
- Site Demonstration Test (SDT), which may include re-testing for new baseline data for the existing radio sites
- System Availability Test (SAT) for the full communications system.

Conduct Control System Site Visits and Testing. Witness and document the results of tests and demonstrations as required of the Control System Supplier in the specifications. The tests will include:

- Factory Demonstration Test (FDT)
- Site Demonstration Test (SDT)
- System Availability Test (SAT).

Contract Closeout. Upon completion of all contractual requirements the system will be officially accepted as complete and the contract closeout process initiated.

Implementation (Other) Phase

Implement New Work Processes. This step implements the new work processes associated with the effective day-to-day use of the new Control System.

Design and Implement System Maintenance Practices and Procedures. In order for the Division to achieve its return on investment and to support productivity objectives, Control System databases and applications need to be kept current and must meet response and total in-service time objectives. For these purposes, this step establishes the practices and procedures for the effective, on-going maintenance of the this system. It establishes practices and procedures – including documentation – for database backups, software updates, fail-over, recovery, access control, as well as for review and adjustment of work processes to effectively use the applications.

Deployment and Training. Potential users of the Operations Decision Support System need to be trained in the tools used to access it, and also in the organization and content of the System’s database. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for Operations Decision Support System users. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training, which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

4.3.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-101B-SCS WEST & Final SCADA													
Phase	Tax & Construct		In-House		In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting	Eng	Consult Eng									
1 Plan	0	0	0	0	0	0	22580	9752	1584	0	33,916	0	33,916
2 Pre-Design	0	0	23755	95019	9502	0	28809	17878	1584	0	176,546	0	176,546
3 Final Desi	0	0	39591	158364	9502	31673	38153	27630	3167	0	308,080	0	308,080
4 Impl Cons	1583643	285056	0	0	0	0	0	0	0	0	1,868,699	0	1,868,699
4 Impl other	0	0	15836	63346	66513	237546	30366	27965	4751	0	446,314	0	446,314
5 Close Out	0	0	0	0	9650	48249	20559	20028	4825	0	103,310	0	103,310
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingen	0	0	0	0	0	0	0	0	0	0	0	258134	258134
TOTALS:	1,583,643	285,056	79,182	316,729	95,167	317,468	140,468	103,244	15,910	0	2936866	258134	3195000

4.4. Subproject: CSO Predictive Control System

This Subproject will provide the CSO Predictive Control software with a dedicated computer platform, moving the existing software from the Forney SCADA control system computers. This Subproject will provide three new local workstations, and two remote workstations, and mass storage to support the CSO Predictive Control. The main portion of this Subproject is related to moving the software from the existing MicroVAX computers to new computer platforms and operating systems. Re-coding the four existing Fortran programs will be required. Some software development is also anticipated.

The SCS control system replacement Subproject, 10-101, will take place in a series of step's in-order to minimize its impact on current operations, manage limited capital funds, and most importantly quickly solve immediate problems. In step 4, noted below, the CSO Predictive Control system will be moved to the new interim SCS Control System, and the current Forney MicroVAX's will be decommissioned and made available to South Plant as spare parts for its Forney System.

One of the problems it will solve is providing a new home for the CSO Predictive Control System models, in-order to provide a development platform that can be used to update WTD's model of the collection system control algorithms.

The sequence consists of:

Subproject Sequence	Result
1. Interim Replacement of West Point Control System-10-101A	Provides interim West Point control system and eliminates the need for the failing CCM and UHA equipment in each of the 13 plant processes.
2. Interim Replacement of Forney West SCADA- 10-103A	Provides interim West Collection System SCADA to replace the decommissioned Forney West SCADA. Reactive control capability remains, without any predictive control. Frees up MicroVAX computers for use at South Plant.
3.South Plant & East SCADA Forney Control System Replacement	Provides common requirements and design specifications for all WTD control systems, plus procures and implements this design for the South Plant and East Section Conveyance Control System replacement.
4. CSO Predictive Control Model- 10-102	<i>Provides CSO modeling development capability, as part of the West Plant Control System, to update existing CSO algorithms with and prepare for actual CSO Predictive Control to supplement the current CSO reactive control strategies that are now in use.</i>
5.ODSS Part I: Replaces LARS	Develops requirements and design specifications for the replacement Laboratory Analysis Reporting System (LARS) and implements it as the first stage of WTD's Operational Decision Support System (ODSS).
6. Replacement of West Collection System TI PLC's – 10-103B	West Collection System TI PLC's will be replaced with the same PLC's that are currently being procured for the East Collection System. Prior to the West PLC's being replaced, the decommissioned TI-PLC's from the East will be used as spare parts in the West to extend their life.

Subproject Sequence	Result
7. Final West Plant & Conveyance Control System – 10-101B	Provides for West Plant Control System replacement, and for the West SCADA replacement as part of one combined system. This will result in a full featured advanced capability West Point Plant control system with complete West Collection System SCADA reactive and CSO predictive control capability.

4.4.1. Subproject ID

423493-10-102

4.4.2. Project Association

Plant Control Project

4.4.3. Subproject Sponsor(s)

West Section Manager; Major Capital Improvements Section Manager

4.4.4. Subproject Justification

The CSO predictive control software is loaded and running in the hardware platform at the West Plant that operates the Forney SCADA control system. Four Fortran programs (custom) have been developed to support the predictive control portion of the SCADA system. Flow calculations, predictive model sensor program, predictive control program and a storm program have been developed to help reduce CSO events by utilizing storage in the system. Due to hardware problems related to the age of the computer equipment the Predictive Model is not running in either control or advisory mode. The two MicroVAX's that run the software are in need of replacement, are integral to the Forney SCADA control system, and utilize other Forney hardware that is also in need of replacement. Storage media for historical data has failed and can't be repaired by the manufacturer due to age. The MicroVAX's are using outdated operating software and the workstations (Forney Engineering) use special video cards that are only available through a single vendor at a very high cost. Custom-built hardware and software that provides redundancy between the two MicroVAX's is failing. Software upgrades are not possible due to age of the platforms. Interfacing with new IT software and management systems very difficult due to software incompatibility.

4.4.5. Subproject Objectives

This Subproject has three main objectives; 1) provide new hardware for the CSO software and; 2) move the CSO software to the new hardware platform, and 3) update the CSO control algorithms to reflect changes to WTD's conveyance system infrastructure.

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Specific elements of this Subproject are described in the next section on Subproject Phases.

4.4.6. Overview of Subproject Phases

Note:

1. *The Subproject phases and task descriptions are included in Subproject 10-101's Subproject phase/task descriptions*

2. *Most of the tasks described in 10-101 are needed by this Subproject, however the few that aren't needed are so noted, along with those tasks that are different.*
3. *This was done to reduce the repetition between Subprojects and make the descriptions more to the point, and reduce the total number of pages in the plan.*

Planning Phase

Subproject Planning. The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject. Procurement issues need to be addressed relative to this Subproject allowing for rapid procurement Subproject 10-101, SCS West Plant interim plant control and SCADA system, which will provide the replacement computers for the existing MicroVAX's that currently are used for CSO Predictive Control.

The opportunity to procure a replacement interim system from the current SCS vendor exists, which may provide the most attractive path for WTD to take. This needs to be reviewed in detail and decisions made as to how to proceed. The replacement CSO computers are included in the SCS Subproject 10-101 procurement.

Pre-Design Phase

The requirements and functional specifications for the CSO Predictive Control System replacement computers need to be included in the SCS Control System Subproject.

The requirements and functional specification for the West Collection PLC Replacement (10-103B) needs to be done in this Subproject, 10-103.

A standard design specification format needs to be established in 10-101 that will be used by all subsequent control system procurements over the next ten years. This Subproject will follow the standards established in 10-101.

The following tasks are required to complete the Pre-Design Phase for this Subproject:

Gather Control System Data. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Establish Control System Requirements. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Perform Communications System Study. Not Required

Analyze Technical Alternatives. Investigate and recommend alternatives to meet the CSO Predictive Control modeling and operational needs. The Requirements document will document the requirements to convert the existing CSO control strategies from their current FORTRAN language format to a new one. Some general system alternatives to be considered include:

- Re-code CSO algorithms in FORTRAN
- Re-code in another language for long term maintenance considerations
- Extent of new modeling required to reflect changes in the WTD collection system infrastructure.

Factors to be evaluated will include:

- Initial purchase costs and complete life-cycle costs
- Ease of maintenance

- Ease of use
- Reliability
- Product maturity/stability
- Compliance with open architecture standards
- Scalability
- Portal capabilities
- Software used by the system for database functions.

The alternative evaluations and recommendations need to be documented.

Develop Pre-Design Report. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Develop System Implementation Plan. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Final Design Phase

The final design phase is very heavily influenced by the requirements and alternatives brought forward from the pre-design phase. The tasks listed below represent the typical tasks included in a Control system replacement.

Perform Site Investigations – Currently Monitored Sites. Not Required

Perform Site Investigations – Expansion Sites. Not Required

Develop Communications System Design. Not Required

Develop Control Room Design. Not Required

Develop System Configuration Requirements. Develop a definition of the system configuration requirements (database, graphic displays, control strategies, and reports) for the replacement system. The definition of the system configuration requirements need to be complete enough for the system integrator's responding to the RFP to fully understand and be able to accurately estimate the costs of the system configuration tasks.

I/O Point List. An I/O Point List will be developed during the system design phase and will be included as part of the RFP documents. This list (implemented in Microsoft Access) will define the basic attributes of the physical I/O points associated with the new system. These point attributes include the point ID, point description, engineering units and range for analog points, alarm limits for analog points, alarm severity for analog and discrete alarms, etc. To the greatest extent possible, this information will be extracted from the existing real-time database(s). This list will be used in identifying the parameters available in developing the CSO predictive control strategies.

Process Graphic Displays. Define the process graphic displays that will enable system operators to monitor and control the WTD processing facilities.

Establish a set of graphics conventions to be used in building new displays. These conventions will address issues such as standard screen layout, color conventions, text type and size, etc. These conventions will also incorporate any standards that exist as a result of the existing system displays.

Develop a detailed list of the displays to be developed and design a set of typical display formats to be used as guidelines. Then generate typical formats (using AutoCAD or Visio) for all displays to be developed.

Control Strategy Definition. Define CSO predictive control strategies that may be implemented at the supervisory level and augment the reactive control strategies implemented in the PLC's.

Report Definition. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Develop Detailed Design Specifications. Develop design documents (specifications and drawings) for the replacement system, using the CSI format to document the technical requirements for Control Systems upgrade. The specifications will address the following type of issues:

- CSO control strategy conversion software and hardware requirements
- System configuration requirements
- System performance requirements
- Training Requirements
- System Test, Installation and Acceptance Requirements.

Develop RFP Documents. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Provide Procurement Services. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Implementation (Construction) Phase

This phase includes activities to administer the Control System Upgrade/Replacement as described below.

Construction Subproject Management. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Submittal Review. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Witness Communications System Testing. Not Required

Conduct Control System Site Visits and Testing. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Contract Closeout. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Implementation (Other) Phase

Implement New Work Processes. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Design and Implement System Maintenance Practices and Procedures. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

Deployment and Training. Same task as used for 10-101, except apply it to the CSO Predictive Control System.

4.4.7. Cost and Schedule

Refer to Figure F-1: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-102 CSO Predictive & Interim W SCADA													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	12615	5448	885	0	18,948	0	18,948
2 Pre-Des	0	0	13271	53086	5309	0	16095	9988	885	0	98,634	0	98,634
3 Final De	0	0	22119	88476	5309	17695	21315	15437	1770	0	172,120	0	172,120
4 Impl Co	884758	159257	0	0	0	0	0	0	0	0	1,044,015	0	1,044,015
4 Impl ot	0	0	8848	35390	37160	132714	16965	15618	2654	0	249,349	0	249,349
5 Close O	0	0	0	0	5391	26956	11486	11189	2696	0	57,718	0	57,718
6 Land Ac	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Conting	0	0	0	0	0	0	0	0	0	0	0	144216	144216
TOTALS:	884,758	159,257	44,238	176,952	53,168	177,365	78,477	57,681	8889	0	1640784	144216	1785000

4.5. Subproject: Forney SCADA West Collection System

The existing Forney SCADA control system will be replaced. The Subproject will include replacement of the operator workstations that provide the operators with the collection system status and allows them to monitor and control collection system operations. The replacement includes operator workstations, the historical data system, replacement of the programmable logic controllers in the stations, upgrade and replacement of the communication system that links the pump and regulator stations to the West Plant, and the support computer structure (servers) to operate the SCADA system. The new SCADA control system would come with new software to support the required functions. The existing database would be reconfigured and migrated into the new SCADA system.

The SCS Control System replacement Subproject, 10-101, will take place in a series of step's in-order to minimize its impact on current operations, manage limited capital funds, and most importantly quickly solve immediate problems.

In step 2, Subproject 10-103A noted below, the West Collection SCADA system will be replaced with an interim SCADA. The current Forney MicroVAX's will be decommissioned and made available to South Plant as spare parts for its Forney System. At this time the existing West Collection System TI PLC's will remain in operation. The decommissioned TI PLC's from the East Collection System will be used as spare parts for the West SCADA PLC's. The decommissioned East Collection System PLC's will be made available at the end of 2002; procurement of their replacement is now underway.

In step 6, Subproject 10-103B noted below, the West Collection System TI PLC's will be replaced with the same PLC's that are selected for the East Collection System.

The sequence consist of:

Subproject Sequence	Result
1. Interim Replacement of West Point Control System-10-101A	Provides interim West Point control system and eliminates the need for the failing CCM and UHA equipment in each of the 13 plant processes.
2. Interim Replacement of Forney West SCADA- 10-103A	<i>Provides interim West Collection System SCADA to replace the decommissioned Forney West SCADA. Reactive control capability remains, without any predictive control. Frees up MicroVAX computers for use at South Plant.</i>
3.South Plant & East SCADA Forney Control System Replacement	Provides common requirements and design specifications for all WTD control systems, plus procures and implements this design for the South Plant and East Section Conveyance Control System replacement.
4. CSO Predictive Control Model- 10-102	Provides CSO modeling development capability, as part of the West Plant Control System, to update existing CSO algorithms with and prepare for actual CSO Predictive Control to supplement the current CSO reactive control strategies that are now in use.
5.ODSS Part I: Replaces LARS	Develops requirements and design specifications for the replacement Laboratory Analysis Reporting System (LARS) and implements it as the first stage of WTD's Operational Decision Support System (ODSS).

Subproject Sequence	Result
6. Replacement of West Collection System TI PLC's – 10-103B	West Collection System TI PLC's will be replaced with the same PLC's that are currently being procured for the East Collection System. Prior to the West PLC's being replaced, the decommissioned TI-PLC's from the East will be used as spare parts in the West to extend their life.
7. Final West Plant & Conveyance Control System – 10-101B	Provides for West Plant Control System replacement, and for the West SCADA replacement as part of one combined system. This will result in a full featured advanced capability West Point Plant control system with complete West Collection System SCADA reactive and CSO predictive control capability.

4.5.1. Subproject ID

423493-10-103

Includes 10-103A ; 10-103B will be done latter as part of the Ten-year Strategic Plan Subprojects

4.5.2. Project Association

Plant Control Project

4.5.3. Subproject Sponsor(s)

West Section Manager; Major Capital Improvements Section Manager

4.5.4. Subproject Justification

The Forney SCADA system provides data collection from pump and regulator stations and displays the data on workstations at the West Plant allowing operators to monitor and control the West collection system. The SCADA control system is a very proprietary SCADA control system that is getting too old to repair. Specific components that are integral to the equipment are no longer manufactured and can no longer be repaired by the manufacturer. Part of the SCADA control system uses Digital Equipment Company's MicroVAX computers that have several hardware problems and repair parts can no longer be found. Workstations are still using versions of operating software that does not support today's software packages. Special video cards are used in the workstations that are only available through a single vendor at a very high cost. Identical storage media at the South Plant used for historical data has failed and can't be repaired by the manufacturer due to age. The MicroVAX platforms that run the historical processing system also provides predictive CSO control using Fortran programs to support the predictive control and other related CSO functions. These platforms are hard to or impossible to maintain due to unavailability of parts. Software upgrades are not possible due to age of the platforms. Interfacing with new IT software and management systems is very difficult due to software incompatibility.

4.5.5. Subproject Objectives

The primary objective of this Subproject is to: 1) replace the existing Forney West Collection System SCADA (10-103A) using the existing TI PLC's, 2) procure and integrate it with the replacement SCS Control System at West plant, 3) integrate it with the replacement Predictive CSO System (10-102), and 4) procure new West Collection SCADA PLC's (10-103B) to replace the aging TI PLC's, latter as part of the Strategic Plan Subprojects.

Initially it will be implemented as an interim system with very basic control and monitoring capabilities of an in plant control system and SCADA, with CSO Predictive modeling development capability. Then the initial Plant Control System and SCADA will be upgraded into an advanced Control and SCADA System with full predictive control capability as part of Subproject 10-101B.

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Specific elements of this Subproject are described in the next section on Subproject Phases / Tasks.

4.5.6. Overview of Subproject Phases

Note:

- 1. The Subproject phases and task descriptions are included in Subproject 10-101's Subproject phase/task descriptions*
- 2. Most of the tasks described in 10-101 are needed by this Subproject, however the few that aren't needed are so noted, along with those tasks that are different.*
- 3. This was done to reduce the repetition between Subprojects and make the descriptions more to the point, and reduce the total number of pages in the plan.*

Planning Phase

Subproject Planning: The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject. Procurement issues need to be addressed relative to this Subproject allowing for rapid procurement of this critical interim plant control and SCADA System (10-103A) as part of Subproject 10-101. The opportunity to procure a replacement interim Control and SCADA System from the current SCS vendor exists, which may provide the most attractive path for WTD to take. This needs to be reviewed in detail and decisions made as to how to proceed.

Replacement of the existing TI PLC's is planned to take place after the East Collection System PLC replacement which is now in progress. The spare parts from the East will be used to keep the TI PLC's in the West maintained and extend their life by several years. The new West PLC's are the main procurement that will take place in this Subproject, 10-103B.

Part of the funds for the West SCADA (10-103A) have been allocated to Subproject 10-101, to procure system hardware. The funds remaining in This Subprojects budget are for software procurement, SCADA communications, and configuration services using the SCS replacement control system computers as its host.

Pre-Design Phase

The requirements and functional specifications for the West SCADA Collection System (10-103A) replacement computers need to be included in the SCS Control System Subproject (10-101A), in-order to size the computers provided in 10-101A large enough to handle West SCADA functions along with SCS Control replacement functions

The requirements and functional specification for the West Collection System PLC Replacement (10-103B) will be done latter in the Strategic Plan Subprojects. It will re-visit the pre-design work done to upgrade the East Collection System PLC's which is currently in progress. Much of this work is reusable.

A standard design specification format needs to be established in 10-101 that will be used by all subsequent control system procurements over the next ten years. This Subproject, 10-103, will follow the standards established in 10-101.

The following tasks are required to complete the Pre-Design Phase as they apply to the West SCADA:

Gather Control System Data: Same task as used for 10-101, except apply it to the West SCADA.

Establish Control System Requirements: Establish the functional requirements for the West Collection System SCADA replacement, by assimilating the information garnered through review of the existing documentation, existing site conditions, and through analysis of the information gathered during requirements meetings. This information will be organized and documented in the system requirement's document.

The requirements document will discuss strengths and deficiencies of the existing system and the requirements for the replacement SCADA. It will also identify the sites and facilities currently not being served by the existing system, as well as requirements necessary to support future process additions and expansions. Areas to be covered in the requirement's document include:

- Key features of the existing PLC's
- Additional features for new PLC's to be procured as part of the Strategic Plan Subprojects
- Plant Control and monitoring requirements
- West Collection System SCADA requirements
- CSO predictive Control System requirements
- Control Communications Requirements
- Support of Multiple Communication Protocols.

Perform Communications Study: Same task as used for 10-101, except apply it to the West SCADA.

Analyze Technical Alternatives: Investigate and recommend alternative SCADA software capabilities to meet the Control System and Communications System requirements. The Requirements Report and the Communications Systems Requirements Report will document the requirements for the SCADA upgrade/expansion as well as the associated communications system.

Factors to be evaluated include:

- Cost, initial purchase and life cycle
- Ease of maintenance
- Ease of use
- Reliability
- Product maturity/stability
- Compliance with open architecture standards
- Scalability.

The alternative evaluations and recommendations need to be documented.

Develop Pre-Design Report: Same task as used for 10-101, except apply it to the West SCADA.

Develop System Implementation Plan: Same task as used for 10-101, except apply it to the West SCADA.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a Control system replacement.

Perform Site Investigations- Currently Monitored Sites: Same task as used for 10-101, except apply it to the West SCADA.

Perform Site Investigations – Expansion Sites: Same task as used for 10-101, except apply it to the West SCADA.

Develop Communications System Design: Same task as used for 10-101, except apply it to the West SCADA.

Develop Control Room Design: Not required.

Develop System Configuration Requirements: Same task as used for 10-101, except apply it to the West SCADA.

Report Definition: Same task as used for 10-101, except apply it to the West SCADA.

Develop Detailed Design Specifications: Develop design documents (specifications and drawings) for the replacement SCADA, using the CSI format to document the technical requirements. The specifications will address the following type of issues:

- SCADA data communications and installation requirements
- Control strategy software and hardware requirements
- System configuration requirements
- System performance requirements
- Training Requirements
- System Test, Installation and Acceptance Requirements.

Develop Request For Proposal Documents (RFP): Same task as used for 10-101, except apply it to the West SCADA.

Provide Procurement Services: Same task as used for 10-101, except apply it to the West SCADA..

Implementation Construction Phase

This phase includes activities to administer the SCADA replacement as described below.

Construction Subproject Management: Same task as used for 10-101, except apply it to the West SCADA.

Submittal Review: Same task as used for 10-101, except apply it to the West SCADA.

Witness Communications System Testing: Same task as used for 10-101, except apply it to the West SCADA.

Computer Systems Planning Study

Conduct Control System Site Visits and Testing: Same task as used for 10-101, except apply it to the West SCADA.

Contract Closeout: Same task as used for 10-101, except apply it to the West SCADA.

Implementation (Other) Phase

Implement New Work Processes: This step implements the new work processes associated with the effective day-to-day use of the new Control System and the capabilities of the new SCADA.

Design and Implement System Maintenance Practices and Procedures: In order for the Division to achieve its return on investment and to support productivity objectives, SCADA databases and control strategy development applications need to be kept current and must meet response and total in-service time objectives. For these purposes, this step establishes the practices and procedures for the effective, on-going maintenance of the SCADA. It establishes practices and procedures – including documentation – for database backups, software updates, recovery, access control, as well as for review and adjustment of work processes to effectively use maintain the SCADA and their associated control strategies.

Deployment and Training: Potential users of the SCADA need to be trained in the tools used to access it, and also in the organization and content of the SCADA database. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for the SCADA. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training, which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

4.5.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-103A-SCADA WEST Interim													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consur CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	7067	3052	496	0	10,615	0	10,615
2 Pre-Design	0	0	7435	29740	2974	0	9017	5596	496	0	55,257	0	55,257
3 Final Design	0	0	12392	49566	2974	9913	11941	8648	991	0	96,426	0	96,426
4 Impl Constr	495663	89219	0	0	0	0	0	0	0	0	584,882	0	584,882
4 Impl other	0	0	4957	19827	20818	74349	9504	8750	1487	0	139,692	0	139,692
5 Close Out	0	0	0	0	3020	15101	6435	6268	1510	0	32,335	0	32,335
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingenc	0	0	0	0	0	0	0	0	0	0	0	80793	80793
TOTALS:	495,663	89,219	24,783	99,133	29,786	99,364	43,965	32,314	4,980	0	919,207	80,793	1,000,000

4.6. Subproject: Forney SCADA West Collection System and PLC Replacement

The existing Forney SCADA control system will be replaced. The Subproject will include replacement of the operator workstations that provide the operators with the collection system status and allows them to monitor and control collection system operations. The replacement includes operator workstations, the historical data system, replacement of the programmable logic controllers in the stations, upgrade and replacement of the communication system that links the pump and regulator stations to the West Plant, and the support computer structure (servers) to operate the SCADA system. The new SCADA control system would come with new software to support the required functions. The existing database would be reconfigured and migrated into the new SCADA system.

The SCS Control System replacement Subproject, 10-101, will take place in a series of step's in-order to minimize its impact on current operations, manage limited capital funds, and most importantly quickly solve immediate problems. The procurement of the West Collection Interim SCADA will be done as part of 10-101.

In step 2, Subproject 10-103A noted below, an interim West Collection SCADA system will be procured. This will allow the current Forney MicroVAX's to be decommissioned and made available to South Plant as spare parts for its Forney System. At this time the existing West Collection System TI PLC's will remain in operation. The decommissioned TI PLC's from the East Collection System will be used as spare parts for the West SCADA PLC's. The decommissioned East Collection System PLC's will be made available at the end of 2002; procurement of their replacement is now underway.

In step 6, Subproject 10-103B noted below, the West Collection System TI PLC's will be replaced with the same PLC's that are selected for the East Collection System.

The sequence consist of:

Subproject Sequence	Result
1. Interim Replacement of West Point Control System–10-101A	Provides interim West Point control system and eliminates the need for the failing CCM and UHA equipment in each of the 13 plant processes.
2. Interim Replacement of Forney West SCADA– 10-103A	Provides interim West Collection System SCADA to replace the decommissioned Forney West SCADA. Reactive control capability remains, without any predictive control. Frees up MicroVAX computers for use at South Plant.
3.South Plant & East SCADA Forney Control System Replacement	Provides common requirements and design specifications for all WTD control systems, plus procures and implements this design for the South Plant and East Section Conveyance Control System replacement.
4. CSO Predictive Control Model- 10-102	Provides CSO modeling development capability, as part of the West Plant Control System, to update existing CSO algorithms with and prepare for actual CSO Predictive Control to supplement the current CSO reactive control strategies that are now in use.

Subproject Sequence	Result
5.ODSS Part I: Replaces LARS	Develops requirements and design specifications for the replacement Laboratory Analysis Reporting System (LARS) and implements it as the first stage of WTD's Operational Decision Support System (ODSS).
6. Replacement of West Collection System TI PLC's – 10-103B	<i>West Collection System TI PLC's will be replaced with the same PLC's that are currently being procured for the East Collection System. Prior to the West PLC's being replaced, the decommissioned TI-PLC's from the East will be used as spare parts in the West to extend their life.</i>
7. Final West Plant & Conveyance Control System – 10-101B	Provides for West Plant Control System replacement, and for the West SCADA replacement as part of one combined system. This will result in a full featured advanced capability West Point Plant control system with complete West Collection System SCADA reactive and CSO predictive control capability.

4.6.1. Subproject ID

423493-10-103

Includes 10-103A and 10-103B

4.6.2. Project Association

Plant Control Project

4.6.3. Subproject Sponsor(s)

West Section Manager; Major Capital Improvements Section Manager

4.6.4. Subproject Justification

The Forney SCADA system provides data collection from pump and regulator stations and displays the data on workstations at the West Plant allowing operators to monitor and control the West collection system. The SCADA control system is a very proprietary SCADA control system that is getting too old to repair. Specific components that are integral to the equipment are no longer manufactured and can no longer be repaired by the manufacturer. Part of the SCADA control system uses Digital Equipment Company's Micro VAX computers that have several hardware problems and repair parts can no longer be found. Workstations are still using versions of operating software that does not support today's software packages. Special video cards are used in the workstations that are only available through a single vendor at a very high cost. Identical storage media at the South Plant used for historical data has failed and can't be repaired by the manufacturer due to age. The MicroVAX platforms that run the historical processing system also provides predictive CSO control using Fortran programs to support the predictive control and other related CSO functions. These platforms are hard to or impossible to maintain due to unavailability of parts. Software upgrades are not possible due to age of the platforms. Interfacing with new IT software and management systems is very difficult due to software incompatibility.

4.6.5. Subproject Objectives

The primary objective of this Subproject is to: 1) replace the existing Forney West Collection System SCADA (10-103A) using the existing TI PLC's, 2) procure and integrate it with the replacement SCS Control System at West plant, 3) integrate it with the replacement Predictive CSO System (10-102), and 4) procure new West Collection SCADA PLC's (10-103B) to replace the aging TI PLC's.

Initially it will be implemented as an interim system with very basic control and monitoring capabilities of an in plant control system and SCADA, with CSO Predictive modeling development capability. Then the initial Plant Control System and SCADA will be upgraded into an advanced Control and SCADA System with full predictive control capability as part of Subproject 10-101B.

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Specific elements of this Subproject are described in the next section on Subproject Phases / Tasks.

4.6.6. Overview of Subproject Phases

Note:

- 1. The Subproject phases and task descriptions are included in Subproject 10-101's Subproject phase/task descriptions*
- 2. Most of the tasks described in 10-101 are needed by this Subproject, however the few that aren't needed are so noted, along with those tasks that are different.*
- 3. This was done to reduce the repetition between Subprojects and make the descriptions more to the point, and reduce the total number of pages in the plan.*

Planning Phase

Subproject Planning: The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject. Procurement issues need to be addressed relative to this Subproject allowing for rapid procurement of this critical interim plant control and SCADA System (10-103A) as part of Subproject 10-101. The opportunity to procure a replacement interim Control and SCADA System from the current SCS vendor exists, which may provide the most attractive path for WTD to take. This needs to be reviewed in detail and decisions made as to how to proceed.

Replacement of the existing TI PLC's is planned to take place after the East Collection System PLC replacement which is now in progress. The spare parts from the East will be used to keep the TI PLC's in the West maintained and extend their life by several years. The new West PLC's are the main procurement that will take place in this Subproject, 10-103B.

The funds for the West SCADA (10-103A) have been allocated to Subproject 10-101.

Pre-Design Phase

The requirements and functional specifications for the West SCADA Collection System (10-103A) replacement computers need to be included in the SCS Control System Subproject (10-101A).

The requirements and functional specification for the West Collection System PLC Replacement (10-103B) will be done in this Subproject. It will re-visit the pre-design work done to upgrade the East Collection System PLC's which is currently in progress. Much of this work is reusable.

A standard design specification format needs to be established in 10-101 that will be used by all subsequent control system procurements over the next ten years. This Subproject, 10-103, will follow the standards established in 10-101.

The following tasks are required to complete the Pre-Design Phase as they apply to PLC replacement:

Gather Control System Data: Same task as used for 10-101, except apply it to the West PLC's.

Establish Control System Requirements: Establish the functional requirements for the West Collection System PLC replacement, by assimilating the information garnered through review of the existing documentation, existing site conditions, and through analysis of the information gathered during requirements meetings. This information will be organized and documented in the system requirement's document.

The requirements document will discuss strengths and deficiencies of the existing system and the requirements for the upgraded PLC's. It will also identify the sites and facilities currently not being served by the existing system, as well as requirements necessary to support future process additions and expansions. The document will also review recommended improvements, additions and modifications to process instrumentation and system equipment required for upgrade/expansion of the PLC's at each pump and regulator station. Areas to be covered in the requirement's document include:

- Key features of the existing PLC's
- Additional features for new PLC's
- Plant Control and monitoring requirements imposed on the new PLC's
- West Collection System SCADA PLC requirements
- CSO predictive Control System PLC requirements
- Control Communications Requirements of the new PLC
- Support of Multiple Communication Protocols
- Desired Pumping/Storage optimization strategies required by each PLC
- New PLC needs, including redundancy, and battery backup
- Smart Instrumentation at the pump and regulator stations for adaptive control
- Cut-over methodology from existing PLC's to the new ones
- WTD staffing requirements to support installation and testing of the PLC's.

Perform Communications Study: Same task as used for 10-101, except apply it to the West PLC's.

Analyze Technical Alternatives: Investigate and recommend PLC alternatives to meet the Control System and Communications System requirements. The Requirements Report and the Communications Systems Requirements Report will document the requirements for the PLC upgrade/expansion as well as the associated communications system. Some general system alternatives to be considered include:

- Types of PLC's to be used (already selected for East Collection System SCADA)
- PLC Replacement methods
- Redundant / non-redundant issue – current experience indicates PLC reliability is sufficiently high enough to preclude the need for redundant PLC's.

Factors to be evaluated include:

- Cost, initial purchase and life cycle
- Ease of maintenance
- Ease of use
- Reliability
- Product maturity/stability
- Compliance with open architecture standards
- Scalability.

The alternative evaluations and recommendations need to be documented.

Develop Pre-Design Report: Same task as used for 10-101, except apply it to the West PLC's.

Develop System Implementation Plan: Same task as used for 10-101, except apply it to the West PLC's.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a Control system replacement.

Perform Site Investigations- Currently Monitored Sites: Same task as used for 10-101, except apply it to the West PLC's.

Perform Site Investigations – Expansion Sites: Same task as used for 10-101, except apply it to the West PLC's.

Develop Communications System Design: Same task as used for 10-101, except apply it to the West PLC's.

Develop Control Room Design: Not required.

Develop System Configuration Requirements: Same task as used for 10-101, except apply it to the West PLC's.

Report Definition: Not required.

Develop Detailed Design Specifications: Develop design documents (specifications and drawings) for the replacement PLC's, using the CSI format to document the technical requirements. The specifications will address the following type of issues:

- PLC data communications and installation requirements
- Control strategy software and hardware requirements
- System configuration requirements
- System performance requirements
- Training Requirements
- System Test, Installation and Acceptance Requirements
- PLC transition plan.

Develop Request For Proposal Documents (RFP): Same task as used for 10-101, except apply it to the West PLC's.

Provide Procurement Services: Same task as used for 10-101, except apply it to the West PLC's.

Implementation Construction Phase

This phase includes activities to administer the PLC replacement as described below.

Construction Subproject Management: Same task as used for 10-101, except apply it to the West PLC's.

Submittal Review: Same task as used for 10-101, except apply it to the West PLC's.

Computer Systems Planning Study

Witness Communications System Testing: Same task as used for 10-101, except apply it to the West PLC's.

Conduct Control System Site Visits and Testing: Same task as used for 10-101, except apply it to the West PLC's.

Contract Closeout: Same task as used for 10-101, except apply it to the West PLC's.

Implementation (Other) Phase

Implement New Work Processes: This step implements the new work processes associated with the effective day-to-day use of the new Control System and the capabilities of the new PLC's.

Design and Implement System Maintenance Practices and Procedures: In order for the Division to achieve its return on investment and to support productivity objectives, PLC databases and control strategy development applications need to be kept current and must meet response and total in-service time objectives. For these purposes, this step establishes the practices and procedures for the effective, on-going maintenance of the PLC's. It establishes practices and procedures – including documentation – for database backups, software updates, recovery, access control, as well as for review and adjustment of work processes to effectively use maintain the PLC's and their associated control strategies.

Deployment and Training: Potential users of the PLC's need to be trained in the tools used to access it, and also in the organization and content of the PLC database. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for the PLC's. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training, which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

4.6.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-103 SCADA West- PLC's Only													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	14135	6104	991	0	21,230	0	21,230
2 Pre-Design	0	0	14870	59480	5948	0	18034	11192	991	0	110,514	0	110,514
3 Final Design	0	0	24783	99133	5948	19827	23883	17296	1983	0	192,852	0	192,852
4 Impl Construct	991326	178439	0	0	0	0	0	0	0	0	1,169,765	0	1,169,765
4 Impl other	0	0	9913	39653	41636	148699	19009	17500	2974	0	279,383	0	279,383
5 Close Out	0	0	0	0	6041	30203	12870	12537	3020	0	64,670	0	64,670
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	161586	161586
TOTALS:	991,326	178,439	49,566	198,265	59,572	198,728	87,930	64,628	9,960	0	1838414	161586	2000000

4.7. Subproject: Forney Control Replacement – South Plant & East SCADA

The existing Forney Plant Control System and SCADA control system will be replaced. The Subproject will include replacement of the operator workstations that provide the operators with the collection system status and allows them to monitor and control collection system operations. The replacement includes operator workstations, the historical data system, replacement of the programmable logic controllers in the stations, upgrade and replacement of the communication system that links the pump stations, and the support computer structure (servers) to operate the SCADA system. The new SCADA control system would come with new software to support the required functions. The existing database would be reconfigured and migrated into the new SCADA system.

The Forney Control System replacement Subproject, 10-104, will take place in a series of step's in-order to minimize its impact on current operations, manage limited capital funds, and most importantly quickly solve immediate problems. The procurement of the East Collection SCADA will be done as part of 10-104.

The sequence of steps to complete this Subproject is shown below.

- In step 1, the East Collection System PLC Replacement Subproject (not part of this plan) is currently underway. It will replace the East Collection System PLC's in 2002, making available the decommissioned TI PLC's for use as spare parts in the West Collection System SCADA.
- In step 2, Subproject 10-104 noted below, the Forney Control System at South Plant will be replaced, and provisions made in its contract to incorporate the East SCADA System into it.
- In step 3, Subproject 10-105 noted below, the East Collection SCADA system will be procured and integrated as part of the Forney Control System Replacement Subproject at South Plant. At this time the PLC's currently being procured in step 1, will be moved to the new East SCADA System.

An important part of this project is its role in establishing a common design for all WTD control systems, while procuring and implementing this design for the South Plant and East Section Conveyance Control System replacement.

The sequence consist of:

Subproject Sequence	Result
1. East Collection System PLC Replacement Subproject	The 18 PLC's currently communicating with the Forney SCADA System at South Plant are in the process of being replaced with new PLC's. This replacement will occur in 2002, and make available the decommissioned TI PLC's for use as spare parts in the West Collection System SCADA. This Subproject has been in progress since 1999, and is not included in the Subproject descriptions covered by this plan.
2. Forney Control System Replacement –South Plant –10-104	<i>Provides South Plant replacement control system and East SCADA for the aging Forney System. It will use the new PLC's noted in step 1, as pump station remotes to control the collection system flows to the South Plant., and new PLC's procured under this contract to control plant processes. While this system is being designed, the MicroVAX(s) made available from the West Plant, will be used as spare parts for the aging South Plant MicroVAX(s). Also provides for inclusion of West Collection SCADA</i>

Subproject Sequence	Result
3. Merge East SCADA into South Plant Control System– 10-104, 10-105	Provides East Collection System SCADA as part of the South Control System to replace the decommissioned Forney East SCADA.

4.7.1. Subproject ID

423493-10-104

4.7.2. Project Association

Plant Control Project

4.7.3. Subproject Sponsor(s)

South Section Manager; Major Capital Improvements Section Manager

4.7.4. Subproject Justification

The Forney control system is a very proprietary system that is becoming difficult to repair and service. Components that are integral to some of the equipment are no longer available and even the manufacturer can no longer repair critical parts used in many of the control system's devices. Part of the control system uses Digital Equipment Company's MicroVAX computers that are experiencing hardware problems and repair parts can no longer be found. Workstations are still using versions of operating software that does not support today's software packages. Special video cards are used in the workstations that are only available through a single vendor at a very high cost. Storage media for historical data has failed and can't be repaired by the manufacturer due to age.

4.7.5. Subproject Objectives

The primary objective of this Subproject is to: 1) replace the existing Forney Control System at South Plant (10-104); 2) replace the existing Forney SCADA System at South Plant which is the monitor and control system for the East Collection System; 3) combine the control and SCADA functions into one system with separate operator stations all under this Subproject; 10-104; and 4) interface the new East Collection System PLC's to the new South Plant Control System.

The East Collection SCADA System replacement is documented under a separate Subproject; 10-105, but is funded under this Subproject; 10-104. Originally it was planned to do them separately, but funding limitations required the two systems to be merged. The funds for the SCADA System replacement have been moved from 10-105 to 10-104 for planning purposes.

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Specific elements of this Subproject are described in the next section on Subproject Phases.

4.7.6. Overview of Subproject Phases

Note:

1. *The Subproject phases and task descriptions are included in Subproject 10-101's Subproject phase/task descriptions*

- 2. Most of the tasks described in 10-101 are needed by this Subproject, however the few that aren't needed are so noted, along with those tasks that are different.*
- 3. This was done to reduce the repetition between Subprojects and make the descriptions more to the point, and reduce the total number of pages in the plan.*

Planning Phase

Subproject Planning. The Computer System Planning Study will serve as this Subproject's initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject. Procurement issues need to be addressed relative to this Subproject allowing for rapid procurement of this critical plant control and SCADA System (10-105) as part of Subproject 10-104. The opportunity to procure a replacement Control and SCADA System from the current SCS vendor exists, which may provide the most attractive path for WTD to take. This needs to be reviewed in detail and decisions made as to how to proceed. The West Plant SCS Control System and SCADA replacement Subproject 10-101, will be awarded by the time the final design is completed on the South plant Controls Subproject. At that time, the decision to use the same vendor as is selected for the West Controls Subproject, will need to be made for the South Plant Control Systems. Overall this is a very important decision since it is a unique opportunity to provide commonality of control equipment throughout most of WTD's control systems.

Replacement of the existing MicroVAX(s) in the West Collection Forney System will make available MicroVAX spare parts to keep the MicroVAX(s) at South Plant maintained and extend their life by several years.

The funds for the East SCADA (10-105) have been allocated to Subproject 10-104.

Pre-Design Phase

The requirements and functional specifications for the East SCADA Collection System, 10-105, replacement computers need to be included in the South Plant Forney Replacement Control System Subproject 10-104.

A standard design specification format needs to be established in 10-101 that will be used by all subsequent control system procurements over the next ten years. This Subproject, 10-104, will follow the standards established in 10-101.

The following steps are required to complete the Pre-Design Phase as they apply to the South Plant Forney Control System and SCADA Replacement Subproject; 10-104:

Gather Control System Data. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Establish Control System Requirements. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Perform Communications Study. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Analyze Technical Alternatives. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Develop Pre-Design Report. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Develop System Implementation Plan. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Final Design Phase

The final design phase is very heavily influenced by the requirements and alternatives brought forward from the pre-design phase. The steps listed below represent the typical steps included in a Control system replacement.

Perform Site Investigations- Currently Monitored Sites. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Perform Site Investigations – Expansion Sites. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Develop Communications System Design. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Develop Control Room Design. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Develop System Configuration Requirements. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Report Definition. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA

Develop Detailed Design Specifications. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Develop Request For Proposal Documents (RFP). Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Provide Procurement Services. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Implementation Construction Phase

This phase includes activities to administer the South Plant Forney Control System and East SCADA Collection System replacement as described below.

Construction Subproject Management. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Submittal Review. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Witness Communications System Testing. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Conduct Control System Site Visits and Testing. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Contract Closeout. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Implementation (Other) Phase

Implement New Work Processes. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Design and Implement System Maintenance Practices and Procedures. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

Deployment and Training. Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA.

4.7.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-104 Control South Plant													
Phase	Construct	Tax & Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
1 Plan	0	0	0	0	0	0	35867	15490	2515	0	53,872	0	53,872
2 Pre-Design	0	0	37732	150929	15093	0	45761	28399	2515	0	280,430	0	280,430
3 Final Design	0	0	62887	251549	15093	50310	60602	43889	5031	0	489,361	0	489,361
4 Impl Const	2515489	452788	0	0	0	0	0	0	0	0	2,968,278	0	2,968,278
4 Impl other	0	0	25155	100620	105651	377323	48235	44405	7546	0	708,934	0	708,934
5 Close Out	0	0	0	0	15328	76639	32657	31812	7664	0	164,100	0	164,100
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	410025	410,025
TOTALS:	2,515,489	452,788	125,774	503,098	151,164	504,273	223,121	163,994	25,272	0	4664975	410,025	5,075,000

4.8. Subproject: Forney SCADA Replacement – East Collection System

The existing Forney Plant Control System and SCADA control system will be replaced. The Subproject will include replacement of the operator workstations that provide the operators with the collection system status and allows them to monitor and control collection system operations. The replacement includes operator workstations, the historical data system, replacement of the programmable logic controllers in the stations, upgrade and replacement of the communication system that links the pump stations, and the support computer structure (servers) to operate the SCADA system. The new SCADA control system would come with new software to support the required functions. The existing database would be reconfigured and migrated into the new SCADA system.

In step 3, Subproject 10-105 noted below, the East Collection SCADA system will be included in the new South Plant Control System.

The sequence consist of:

Subproject Sequence	Result
1. East Collection System PLC Replacement Subproject	The 18 PLC's currently communicating with the Forney SCADA System at South Plant are in the process of being replaced with new PLC's. This replacement will occur in 2002, and make available the decommissioned TI PLC's for use as spare parts in the West Collection System SCADA. This Subproject has been in progress since 1999, and is not included in the Subproject descriptions covered by this plan.
2. Forney Control System Replacement – South Plant –10-104	Provides South Plant replacement control system and East SCADA to replace the aging Forney System. It will use the new PLC's noted in step 1, as pump station remotes to monitor the collection system flows to the South Plant., and new PLC's procured under this contract to control plant processes. While this system is being designed, the MicroVAX(s) made available from the West Plant SCS replacement, will be used as spare parts for the aging South Plant MicroVAX(s). Also provides for inclusion of West Collection SCADA
3. Merge East SCADA into South Plant Control System– 10-105	<i>Provides East Collection System SCADA as part of the South Control System to replace the decommissioned Forney East SCADA. This Subproject;10-105, has been combined with the South Plant Forney Control Replacement Subproject, 10-104. All funds associated with Subproject 10-105 have been re-assigned to 10-104.</i>

4.8.1. Subproject ID

423493-10-105

4.8.2. Project Association

Plant Control Project

4.8.3. Subproject Sponsor(s)

South Section Manager; Major Capital Improvements Section Manager

4.8.4. Subproject Justification

The Forney SCADA system collects pump station status and displays the status on workstations located in the South Plant control room. The East Side SCADA system uses the same type of equipment, and for some functions the same equipment, as the South Plant's control system and is subject to the same problems. The SCADA control system is a very proprietary SCADA control system that is getting too old to repair. Specific components that are integral to the equipment are no longer manufactured. These parts are used in many of the control system's devices and can no longer be repaired, even by the manufacturer. Part of the SCADA control system uses Digital Equipment Company's Micro VAX computers that have several hardware problems and repair parts are no longer provided by the manufacturer. Workstations are still using versions of operating software that does not support today's software packages. Special video cards are used in the workstations that are only available through a single vendor at a very high cost. Storage media for historical data has failed and can't be repaired by the manufacturer due to age. The MicroVAX platforms that run the historical processing system use FORTRAN programs to support CSO control functions. These platforms are hard to or impossible to maintain due to unavailability of parts. Software upgrades are not possible due to age of the platforms. Interfacing with new IT software and management systems is very difficult due to software incompatibility. The Forney interface with the new equipment recently installed in the pump station, is not stable and will not be able to handle future expansion with the North Plant.

4.8.5. Subproject Objectives

The primary objective of this Subproject is to: 1) replace the existing Forney SCADA System at South Plant which is the monitor and control system for the East Collection System; 2) combine the control and SCADA functions into one system with separate operator stations all under Subproject; 10-104; 3) interface the new East Collection System PLC's to the new South Plant Control and SCADA System.

The East Collection SCADA System replacement is documented herein as a separate Subproject; 10-105, but is funded under the South Plant Controls Subproject; 10-104. Originally it was planned to do them separately, but funding limitations required the two systems to be merged. The funds for the SCADA System replacement have been moved from 10-105 to 10-104 for planning purposes. As a result this Subproject Description serves to maintain the identity of the East Collection System SCADA and explain the need to replace it.

This Subproject will be implemented as part of 10-104. As a means of maintaining the identity of the East Collection System SCADA and describing its need to be replaced, this Subproject description has been retained. All the funds associated with it have been moved to the South Plant Control system replacement Subproject; 10-104. No further planning, pre-design, design or implementation will take place under this Subproject.

4.8.6. Overview of Subproject Phases

All tasks associated with this Subproject will be done in the South Plant Forney Control System Replacement Subproject; 10-104.

4.8.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-105 SCADA East- Combined with South Plant													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	0	0	0	0	0	0	0
2 Pre-Design	0	0	0	0	0	0	0	0	0	0	0	0	0
3 Final Design	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Impl Construct	0	0	0	0	0	0	0	0	0	0	0	0	0
4 Impl other	0	0	0	0	0	0	0	0	0	0	0	0	0
5 Close Out	0	0	0	0	0	0	0	0	0	0	0	0	0
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS:	0	0	0	0	0	0	0	0	0	0	0	0	0

4.9. Subproject: Operations Decision Support System – Part I

Process flow data, as well as the data from biological and chemical analyses, are collected by WTD plants and used in the management of the plant facilities and processes. Data within each plant is collected by manual means, from laboratory analyses, and from monitoring instruments. The use of this data for managing plant facilities and processes comes under the category of decision support. That is, this data is used by professional plant managers and supervisors in making decisions about the planning, scheduling, and dispatching of equipment and facilities within the plants.

The existing means of storing and accessing operations decision support information in WTD plants is outdated and is far more labor-intensive than more modern means already in fairly common use today. The hardware and software in use by WTD is 4-5 years beyond a well-managed replacement program. The implementation of an Operations Decision Support System for each major operational facility will replace all existing plant data management systems. The implementation will take place in three Parts:

- Part I replaces the existing Lab Auto Reporting System (LARS) at South Plant and the Plant Report System (“Lab System”) at West Plant. It replaces these existing systems with a standards-setting system that includes both state-of-the-art database and web-based software applications. The technical architecture and components to be deployed with the Operations Decision Support System are intended to serve as the standards for all decision support – that is, all analytical and reporting processes – throughout the Division. The technical architecture and components will also be acquired and implemented so as to be consistent with Countywide information technology standards.
- Part II implements a centralized decision support system – including analytical and reporting elements – for the Predictive CSO derived data. That Subproject is included in the Ten-year Strategic Plan Section of this document.
- Part III provides the Operations Decision Support System – including analytical and reporting applications – for the new Brightwater Plant and other new conveyance facilities.

The existing systems used for the planning, scheduling, and dispatching of plant and offsite facilities are outdated and fail to provide critical operations decision support information in a timely manner. The information required for effective operations decision support is currently stored in a wide variety of disparate databases, including some that are stand-alone on individual desktop workstations. This Subproject addresses this need through the implementation of a standard set of computerized decision support software tools at each of WTD’s plants.

The operations decision support toolset at each plant will include a set of standardized, web-based applications on the front-end, and a standard SQL-compliant database for storing relevant decision support data. It is anticipated a core set of software tools for decision support will be utilized, not only to address the needs of operations but also the needs of asset management, water quality management, Subproject control and management, and Division productivity monitoring. On top of this core set of decision support software tools, applications designed to address the specific needs of operations will be developed and deployed. These applications, and the decision support tools on which they are based, will all be web-based and eventually deployed via the Information Portal.

4.9.1. Subproject ID

423493-10-106

4.9.2. Project Association

Plant Control Project

4.9.3. Subproject Sponsor(s)

East Section Manager; West Section Manager; Major Capital Improvements Section Manager

4.9.4. Subproject Justification

The existing systems used for the planning, scheduling, and dispatching of plant and offsite facilities are outdated and fail to provide critical operations decision support information in a timely manner. The information required for effective operations decision support is currently stored in a wide variety of disparate databases, including some that are stand-alone on individual desktop workstations. This Subproject addresses this need through the implementation of a standard set of computerized decision support software tools at each of WTD's plants.

4.9.5. Subproject Objectives

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Specific elements of this Subproject listed as follows will be in effect for each plant:

- Acquisition of all necessary hardware and network connectivity
- Acquisition of all necessary software for database management, web-based application management, and decision support applications
- The capture and encoding of plant process calculations and rules into modern database technologies for use by decision support applications
- Direct linkage of raw and derived plant data to decision support processes through database-driven, web-based applications
- Specification and acquisition of analytical and reporting applications for decision support
- Design and implementation of automated data processing software for certifying and publishing decision support data
- Migration of existing applications and informational data stores to the new system within each plant
- Redesign and implementation of work processes to maximize the effectiveness of the new system for each plant
- Design and implementation of applications and processes to provide for updating, backup, recovery, and fail-over
- Training for users and support personnel for software and the stored data
- This Subproject will also specify, evaluate, procure and install a comprehensive set of analytical and reporting software applications to be used within each plant. To accomplish this, the acquisition process will include:
 - Elicitation and documentation of the requirements for plant data analysis and reporting
 - Analysis of the requirements and selection of potential vendors to supply each of the necessary applications for analysis and reporting
 - Evaluation and selection of vendors and products
 - Acquisition, installation, and configuration of hardware and selected software to provide the required functionality's
 - Design and implementation of work processes to make effective use of the new analytical and reporting applications, and the associated documentation activities to capture design decisions.

4.9.6. Overview of Subproject Phases

Planning Phase

Subproject Planning. A Subproject plan will be developed and reviewed with the Division to ensure it meshes with other Division Subprojects and activities. The Subproject will be linked to all other relevant program elements and managed within the program management structure. A Subproject team will be assembled and initiated in the program-standard procedures and practices for Subproject management and control.

Pre-Design Phase

Requirements & Functional Specification. The requirements and functional specifications for the Operations Decision Support System will be elicited, analyzed, and documented. These specifications will provide standards, architecture, and component definitions for a Division-wide Operations Decision Support System that can be configured to meet the specific needs of the Division's various major facilities. During this step, the existing operations decision support systems – including LARS and Plant Report System – will be analyzed to determine what data and applications functionality's need to be present in the new system.

Document Operations Rules and Data Derivations. Operations information – including relevant facility attributes, operations rules, and calculations used to derive data – will be formally specified in digital form. This effort captures all operations information and documents in both text and data model diagrams, creates a data dictionary, and provides a guide for navigating the system and its applications. For each major facility, a data model will be developed to document data definitions, operational rules, process calculations, and work process specifications that have been substantially validated by key personnel.

Final Design Phase

Select Core Application Software. Software solutions will be evaluated and selected for each of the core system application components. These software solutions will provide access to operations data, transformation and transfer of operations data into required data formats and structures, as well as reporting and analytical solutions. It is expected that the selected software applications would be used throughout the Division eventually for other reporting and analytical purposes.

Select Database and Data Management Software. The Operation Decision Support System will require a relational database system to store its data and data management software. During this phase, the relational database management engine and the data management software to be used in support of the Operation Decision Support System will be selected.

Select Hardware. During this step, the hardware will be evaluated and selected for the Operations Decision Support System, including database servers, application servers, file servers, and web servers for each major WTD facility.

Detailed Implementation Planning. A detailed implementation plan will be developed for hardware and software implementation.

Implementation (Construction) Phase

Procurement Support. Support will be provided to the Division during the procurement of all hardware and software components.

Implement Hardware. This step implements and integrates all servers, including database servers, application servers, file servers, and web servers for each WTD facility.

Implement Networking. This step networks all relevant hardware servers.

Implement Data Collection and Data Conversion Tools and Procedures. This step implements the tools and procedures for initial and on-going data collection and data conversion. Relevant data from existing systems, such as LARS and Lab Report System, will be converted and transferred into the database of the new system.

Implement Database and Data Management. This step accomplishes the configuration of the relational database management system based on plant data models and populates the databases with actual facility data.

Implement New Applications. This effort installs the new application software on the server hardware, links the applications to the database and data management system, and initiates testing process.

Configure New Applications. This effort configures the new applications to ensure that all relevant operations rules and data structures are utilized by the new applications.

Implementation (Other) Phase

Complete Application Acceptance Testing. During this step, a thorough acceptance testing process will be utilized.

Implement New Work Processes. This step implements the new work processes associated with the effective day-to-day use of the Operations Decision Support System.

Design and Implement System Maintenance Practices and Procedures. In order for the Division to achieve its return on investment and to support productivity objectives, Operations Decision Support System databases and applications need to be kept current and must meet response and total in-service time objectives. For these purposes, this step establishes the practices and procedures for the effective, on-going maintenance of the Operation Decision Support System. It establishes practices and procedures – including documentation – for database backups, software updates, failover, recovery, access control, as well as for review and adjustment of work processes to effectively use the applications.

Deployment and Training. Potential users of the Operations Decision Support System need to be trained in the tools used to access it, and also in the organization and content of the System's database. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for Operations Decision Support System users. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training,

which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

4.9.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-106 ODSS Part I (LARS)													
Phase	Construct	Tax & Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
1 Plan	0	0	0	0	0	0	9532	3038	452	0	13,021	0	13,021
2 Pre-Des	0	0	6774	47419	2710	0	12161	5569	452	0	75,085	0	75,085
3 Final De	0	0	11290	79032	2710	20323	16105	8607	903	0	138,970	0	138,970
4 Impl Co	451613	81290	0	0	0	0	0	0	0	0	532,903	0	532,903
4 Impl oth	0	0	4516	31613	18968	152419	12818	8708	1355	0	230,397	0	230,397
5 Close O	0	0	0	0	2735	30763	8624	6199	1367	0	49,688	0	49,688
6 Land Ac	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Conting	0	0	0	0	0	0	0	0	0	0	0	79935	79935
TOTALS:	451,613	81,290	22,581	158,065	27,122	203,505	59,240	32,121	4,529	0	1040065	79935	1120000

4.10. Subproject: CIP Reporting

This Subproject implements a Division-wide, web-enabled, Capital Improvement Program (CIP) Reporting & Information System, enabling the sharing of CIP information throughout the Division and between the Division and other County agencies.

This Subproject will improve existing work processes and applications used for CIP reporting; define CIP reporting requirements, now and in the future; develop a web-based CIP Reporting application; and deploy the CIP Reporting & Information applications via an Information Portal.

All users will be able to access the CIP information via the Information Portal quickly and spend more time concentrating on real problems rather than searching for information.

4.10.1. Subproject ID

423493-20-101

4.10.2. Project Association

Subproject Control Project

4.10.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

4.10.4. Subproject Justification

The Division is experiencing a rapidly expanding need to share CIP information, with both the number of CIP data users and CIP Subprojects growing. The existing CIP information systems would require far too much staff support to make them a viable means of meeting the expanded requirements. Without this new CIP Reporting & Information System, it is expected that an emergency situation will occur as CIP information requirements fail to be addressed. In summary, this Subproject will improve the reliability and efficiency of CIP data creation and data sharing, increase data integrity, streamline work processes associated with CIP data generation and sharing, increase productivity, and improve the speed of CIP data distribution.

4.10.5. Subproject Objectives

The major Subproject objectives include:

- Improvement of existing work processes and applications used for CIP reporting
- Define CIP reporting requirements, now and in the future
- Develop a web-based CIP Reporting application
- Deploy the CIP Reporting & Information applications via an Information Portal.

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management.

Specific elements of this Subproject are described in the next section on Subproject Phases.

4.10.6. Overview of Subproject Phases

The following work needs to be accomplished within this Subproject, which is standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems in order to determine the functionality that needs to be retained and what needs to be improved or replaced; formulation of desired workflow and data architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and steps.

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase as they apply to the CIP Reporting System Subproject; 20-101:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

Final Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications

- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation (Construction) Phase

This phase includes activities to administer the CIP Reporting System Subproject; 20-101:

- Construction Subproject Management
- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

4.10.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information. This Subproject is included in the RWSP Project; therefore no costs estimates have been included in this Master Plan for it.

4.11. Subproject: Project Management and Control Applications – Part I

The Division is experiencing a rapidly expanding need for Project management and Project control applications to support its Capital Improvement Programs. The Division needs to take a series of steps to address this need and avoid an emergency situation. This Subproject implements, in three steps (Part I, Part II, and Part III), the applications that will be required to avoid an emergency situation. These applications include, but are not limited to, the following functionality's:

- Program & Project Identity and Characteristics
- Program & Project Budgeting
- Contract Administration
- Project Planning & Scheduling
- Project & Activity Cost Tracking
- Construction Management
- Program & Project Document/Records Control & Tracking
- Certification & Approval
- Permit Status
- Compliance Issues & Deadlines
- Required Actions & Improvements.

Part I of this Subproject is shown in step 1 in the table below:

The sequence consist of:

Subproject Sequence	Result
1. 20-102- Part I	<i>Part I establishes consistent, Division-wide standards, procedures and work processes for Project management and control. This step also evaluates and selects software to support the standards. And, finally, it implements at least some of the applications listed above.</i>
2. 20-103 Part II (Deferred)	Part II implements data-level integration of the Project Management & Control Applications to other information systems such as Finance, Human Resources, Inventory Control, Engineering Document Management, CAD/GIS, and others. (Deferred Subproject)
3. 20-104 Part III (Deferred)	Part III automates many of the data-level integration links and some of the significant workflow(s) associated with the Project Management & Control Applications, especially those associated with coordination, collaboration, review and approval, and document routing.(Deferred Subproject)

4.11.1. Subproject ID

423493-20-102

4.11.2. Project Association

Project Control Project

4.11.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

4.11.4. Subproject Justification

The Division is experiencing a rapidly expanding need for Project management and Project control applications to support its Capital Improvement Programs. There exists over 14 different databases and a dozen or more applications that are currently used to track Projects, prepare invoices, plan for capital improvements, track transmittals, process change orders, schedule Projects, and more in the course of managing WTD capital Projects. Many of these databases have duplicate information in them that need to be reconciled before the information is actually usable. The WTD staff involved spends considerable time gathering the information they need to do their job, from the data needed, to the drawings and schedules used.

Its this problem that has created an information emergency within WTD, and needs to be addressed quickly as WTD enters a period of increased Project workload and increased capital dollar expenditures over what is being experienced today. This Subproject will address these needs systematically; gradually improving the data accessibility, accuracy, and currency of certified information used daily to manage these Projects.

4.11.5. Subproject Objectives

The major Subproject objectives for Part I include:

- Establish consistent, Division-wide standards, procedures and work processes for Project management & control
- Implement a standard set of web-based applications for Project management and control
- Deploy the applications via the Information Portal.

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Specific elements of this Subproject are described in the next section on Subproject Phases.

4.11.6. Overview of Subproject Phases

The work within this Subproject is standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support

- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and steps:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase as they apply to the Project Management and Control Applications – Part I Subproject; 20-102:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

Final Design Phase

The final design phase is very heavily influenced by the requirements and alternatives brought forward from the pre-design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation (Construction) Phase

This phase includes activities to administer the Project Management and Control Applications – Part II Subproject; 20-103:

- Construction Subproject Management
- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

4.11.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information. This Subproject is included in the RWSP Project; therefore no costs estimates have been included in this Master Plan for it.

4.12. Subproject: LIMS Upgrade

The Environmental Laboratory completed implementation its current Laboratory Information Management System (LIMS) in 1999. By 2007, that system will be over eight years old and ready for upgrade and/or replacement. Technology changes and changes in the way in which software applications are designed in the future will make the current LIMS obsolete by 2007. This Subproject implements the new LIMS for the Environmental Laboratory.

4.12.1. Subproject ID

423493-30-101

4.12.2. Project Association

Water Control Project

4.12.3. Subproject Sponsor(s)

Environmental Laboratory Director

4.12.4. Subproject Justification

In order to keep the Environmental Lab's LIMS from being obsolete, this Subproject will upgrade the LIMS. In addition to avoiding an urgent situation with technical obsolescence, the new upgraded LIMS will offer web-based applications that are easier to maintain and easier to deploy via the Information Portal. This will result in cost savings by lowering software maintenance requirements, increasing end-user productivity, and decreasing training needs. The new LIMS will provide better support for the Water Quality Data Repository and faster and easier regulatory reporting.

4.12.5. Subproject Objectives

The primary objective is to upgrade or replace the existing Environmental Labs' LIMS. This is consistent with information technology best practices associated with Total Cost of Ownership. These best practices identify seven stages of software product life: leading edge, vital, mature, aging/legacy, obsolete, critical (non-support), and terminal (no longer operating). Studies of thousands of systems like LIMS indicate that each of these life-cycle stages lasts approximately 18-24 months. In 1997/1998, the LabVantage product was a Leading-Edge software package; by 2007, this product will clearly be obsolete.

In addition to avoiding a critical replacement situation, the new LIMS will enable:

- Complete web-based architecture, making it easier to deploy LIMS applications and distribute LIMS data
- Ease of maintenance, ease of deployment, and ease of use – due to web-based architecture and deployment via the Information Portal
- Enhanced regulatory reporting.

4.12.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

4.12.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

30-101 LIMS Upgrade													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	8424	2685	399	0	11,507	0	11,507
2 Pre-Design	0	0	5987	29934	2395	0	10747	4922	399	0	54,384	0	54,384
3 Final Design	0	0	9978	49890	2395	13969	14233	7606	798	0	98,870	0	98,870
4 Impl Construct	399123	71842	0	0	0	0	0	0	0	0	470,965	0	470,965
4 Impl other	0	0	3991	19956	16763	104770	11328	7696	1197	0	165,702	0	165,702
5 Close Out	0	0	0	0	2420	21177	7633	5487	1210	0	37,926	0	37,926
6 Land Acq	0	0	0	0	0	0	0	0	0	0	-	0	-
7 Contingency	0	0	0	0	0	0	0	0	0	0	-	70645	70,645
TOTALS: #####	71,842	19,956	99,781	23,973	139,916	52,365	28,395	4,004	-	839,355	70,645	910,000	

4.13. Subproject: Engineering Document Management – Part I

The Engineering Document Management System is to be implemented in four steps, referred to as Part I, Part II, Part III, and Part IV. These steps are described below.

- Part I establishes engineering document standards and document identification labeling standards. It also moves existing CAD files to *.pdf* format for viewing by appropriate staff throughout the Division via the Information Portal.
- Part II upgrades the Division's existing AutoCAD system to the newest web-enabled version to enable the viewing of dynamic CAD maps by appropriate staff throughout the Division via the Information Portal.
- Part III implements a web-based application – to be deployed via the Information Portal – for the viewing and collaborative editing of CAD drawings
- Part IV implements document version control – deployed via the Information Portal – and automates workflow associated with engineering document management.

4.13.1. Subproject ID

423493-50-101

4.13.2. Project Association

Infrastructure Data Management Project

4.13.3. Subproject Sponsor(s)

Asset Management Section Manager

4.13.4. Subproject Justification

This Subproject will provide the following benefits to the Division:

- Increases productivity; reduces paper; automates workflow; reduces time spent locating maps and documents associated with infrastructure assets
- Unifies all engineering document management efforts within the Division
- Improves support for changes to as-built drawings
- Facilitates collaborative efforts among engineering, plant, and planning staff
- Improves the speed and accuracy of infrastructure planning and change decisions.

4.13.5. Subproject Objectives

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. The objectives of this Subproject include:

- Establish standards for engineering documents and engineering document management
- Provide easy access to engineering documents regardless of document format
- Implement a Division-wide, web-enabled Engineering Document Management System having two major application components – a web-based visual data access; and document version control
- Provide web-enabled viewing and collaboration of drawings in 2D and 3D formats for both AutoCAD and InterGraph drawings
- Provide text searches on CAD drawings from the WTD Information Portal
- Provide queries based on drawing attributes in a CAD file via the WTD Information Portal.

4.13.6. Overview of Subproject Phases

The following work needs to be accomplished within this Subproject, which is standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems in order to determine the functionality that needs to be retained and what needs to be improved or replaced; formulation of desired workflow and data architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and steps.

Planning Phase

The Computer System Planning Study will serve as this Subproject's initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase as they apply to this Subproject:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

Final Design Phase

The final design phase is very heavily influenced by the requirements and alternatives brought forward from the pre-design phase. The tasks listed below represent the typical tasks included in a system replacement

Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation (Construction) Phase

This phase includes system implementation activities, as well as the following activities to administer this Subproject:

- Construction Subproject Management
- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

4.13.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information. This Subproject is included in the RWSP Project; therefore no costs estimates have been included in this Master Plan for it.

4.14. Subproject: Network Enhancements – Part I

The Division's Information Technology Three-year Tactical and Ten-year Strategic Plans will need to take into account the requirements for greater network bandwidth, not only to meet current unmet needs but to provide for future needs. Current needs can only be met by moving the Division as fast as possible towards a WAN backbone and LANs operating at high bandwidth speeds. Until these networking technologies are put in place, the Division will continue to be severely constrained in its ability to integrate information systems.

The Division wants to expand the efficient sharing of data and documents among all facilities and organizational units, as well as between the Division and outside agencies. To this end, the Division is already taking advantage of networking technologies, including web technologies being utilized on the Division's Intranet. The Division's Intranet – a private network based on web technologies – forms the basis for a powerful computing infrastructure. It is this Intranet that must continue to be enhanced and expanded if the Division is going to achieve its computing and productivity objectives. The Division's Intranet is the fundamental technical foundation on which all other computing efforts depend. This is the major Ten-year Strategic focus of this Subproject and the other network enhancement Subprojects.

There are two critical elements of the Division's Intranet:

- The Local Area Networks, or LANs, that connect computers within a specific facility (such as a plant or a downtown office tower); and
- The Wide Area Network, or WAN, that connects all the Division's LANs together. The Division has elected to utilize King County's I-NET to serve its WAN needs.

The Subprojects designated as Part I, II, III of Network Enhancements, these Subprojects are focused on expansions and improvements of the Division's Intranet foundation. These Subprojects will result in improvements to both the LANs and the WAN. With regard to the LANs, it is essential that all personnel within a facility be able to access the critical data and applications that support effectiveness and productivity within that facility. With regard to the WAN, it is essential that appropriate personnel be able to access critical data about any facility from any location.

4.14.1. Subproject ID

423493-90-101

4.14.2. Project Association

Computing Infrastructure Project

4.14.3. Subproject Sponsor(s)

All Section Managers

4.14.4. Subproject Justification

The expansion of the Division's networks using Gigabit Ethernet technology will provide a solid foundation for deploying Division-wide, web-enabled, databases and applications. Without this expansion, the Division will not be able to maintain the quality of computing services required for normal Division business and operations.

The Division is currently utilizing standard 10 Mbps Ethernet (or simply Ethernet) and 100 Mbps Ethernet (termed Fast Ethernet). However, in order to achieve the kinds of performance required to

effectively support the Division's Intranet, the Division's LANs need to be upgraded to 1,000 Mbps Ethernet – termed Gigabit Ethernet – in the short-term and to 10,000 Mbps Ethernet – termed 10 Gigabit Ethernet – in the long-term.

Two decades old, Ethernet has become the most widely deployed and well-known internetworking topology in the world. Throughout its existence, Ethernet has evolved from supporting simple workgroup environments to serving as the primary communications medium for entire corporate campuses. At the same time, its line speed has surged from 10 to 100 Mbps—and, now, to 1000 Mbps. This incredible scalability has allowed Ethernet to continue to meet the needs of companies that deploy increasingly sophisticated applications. Of all current networking protocols, Ethernet has, by far, the highest number of installed ports and provides the greatest cost performance relative to Token Ring, Fiber Distributed Data Interface (FDDI), and ATM.

The Gigabit Ethernet standard allows for tremendous flexibility in the LAN, while providing a path to higher bandwidth WAN connectivity. This standard can be deployed in three parts of a LAN:

- *Switch uplinks*—The Gigabit Ethernet standard provides high-bandwidth connectivity from desktop switches to the next point of aggregation. With such uplinks, switches can be linked to servers and other resources at gigabit-per-second speeds. These connections can substantially relieve network congestion—improving access to high-bandwidth applications and data.
- *Server connectivity*—The Gigabit Ethernet standard links can be used to connect high-performance servers to the switch. This use dramatically improves traffic flow.
- *Desktop connectivity*—The Gigabit Ethernet standard should also be implemented at the desktop as well. Initially, high-power desktop users should be upgraded to this level. Over time, Gigabit Ethernet can be migrated gradually to the desktop as prices decrease.

Gigabit Ethernet builds on top of the Ethernet protocol, but increases speed tenfold over Fast Ethernet to 1000 Mbps, or 1 gigabit per second (Gbps). Since Gigabit Ethernet significantly leverages on the Division's existing Ethernet networking infrastructure, the Division will be able to leverage their existing knowledge base to manage and maintain gigabit networks.

Linking all Division facilities to the County-wide I-NET is required in order to ensure access to all relevant databases and applications by staff. The lack of pervasive Division-wide access to I-NET places significant constraints on staff productivity and efficiency. Once the Division has implemented Gigabit Ethernet on both LANs and WAN, the County-wide I-NET will provide network redundancy that will prove invaluable for disaster recovery.

4.14.5. Subproject Objectives

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management.

This Subproject – Network Enhancements, Part I – implements significant improvements to the Division's LANs and WAN as follows:

- It improves the performance of existing LANs via the implementation of Gigabit Ethernet at each of the major facilities within the Division and lays the foundation for later migration to Gigabit and 10 Gigabit Ethernet as the Division's WAN standard as well.
- It improves accessibility to the Division's WAN backbone – the County-wide I-NET – by connecting all major Division facilities to this WAN backbone.
- It also implements an initial wireless network pilot within the Division, improvements to Division-wide network management, and Disaster Avoidance and Recovery for networks within the Division.

4.14.6. Overview of Subproject Phases

Planning Phase

Subproject Planning. A Subproject plan will be developed and reviewed with the Division to ensure it meshes with other Division Subprojects and activities. The Subproject will be linked to all other relevant program elements and managed within the program management structure. A Subproject team will be assembled and initiated in the program-standard procedures and practices for Subproject management and control.

Pre-Design Phase

Network Specification. A detailed network specification will be formulated and used to guide design and implementation efforts. Requirements for LANs, the Division-wide WAN, I-NET connectivity, network management systems, and application support will be developed. Requirements for the support of outsourcing Projects will also be considered. The network specification will take into consideration recent and future Division requirements, recent and future technology trends, and the fit to application support needs. This specifications will include network standards, a Division-wide network architecture, and LAN architectures for each of the major facilities within the Division. Disaster avoidance and recovery needs will also be taken into consideration, including network performance monitoring, network security policies, off-site back-up, and off-site restart.

Final Design Phase

Formulate Disaster Avoidance and Recovery Policies and Procedures. A set of disaster avoidance and recovery policies and procedures will be prepared for review by Division management and to provide guidance to the selection of networking and network management technologies.

Select Networking Hardware. Networking hardware that fully addresses the requirements and specifications will be selected, including repeaters, routers, and switches. Network servers appropriate to the Division's requirements will also be selected.

Select Network Management Software. Network Management software that fully addresses the requirements and specifications will be selected, including network performance monitoring, network intrusion monitoring, computer systems monitoring, and software license tracking applications.

Design Mobile Computing Pilot. An appropriate pilot of mobile computing within the Division will be developed. This mobile computing pilot will enable the Division to round out its overall Division-wide networking architecture and plans for the future. The potential pilot should be associated with another one of the Projects defined in this Computer System Planning Study. For example, the pilot could provide direct support to the development of a complete conveyance infrastructure asset database, utilizing GPS-enabled laptops connected via wireless links to a central asset management database system.

Detailed Implementation Planning. A detailed implementation plan will be developed for networking hardware and software implementation.

Implementation (Construction) Phase

Computer Systems Planning Study

Implement Networking Hardware. This step acquires, implements and integrates all networking hardware selected in the Final Design Phase of this Subproject.

Implement Network Management Applications. This step acquires, implements and integrates all network management software.

Implement Network Management Practices and Procedures. This step implements the practices and procedures for initial and on-going network management, including systems training of select Division staff.

Implement Disaster Avoidance and Recovery Practices and Procedures. This step implements the practices and procedures for effective disaster avoidance and recovery of the Division's networks.

Implementation (Other) Phase

Complete Network Testing. During this step, a thorough acceptance testing process will be utilized.

Implement New Work Processes. This step implements the new work processes associated with the effective day-to-day management of Division networks and networking systems.

Implement Mobile Computing Pilot. This step implements the selected mobile computing pilot. A report of the results and findings of the pilot will be presented to the Division's Steering Committee, including next steps and review of wireless and mobile technology trends. This pilot will lay the foundation for future network enhancements in later Subprojects.

4.14.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-101 Network Enhancements Part I													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	7382	2353	350	0	10,084	0	10,084
2 Pre-Design	0	0	5246	26232	2099	0	9418	4313	350	0	47,659	0	47,659
3 Final Design	0	0	8744	43721	2099	6995	12473	6666	700	0	81,397	0	81,397
4 Impl Construct	349765	62958	0	0	0	0	0	0	0	0	412,723	0	412,723
4 Impl other	0	0	3498	17488	14690	52465	9928	6744	1049	0	105,862	0	105,862
5 Close Out	0	0	0	0	2128	10640	6711	4824	1064	0	25,366	0	25,366
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	61908	61908
TOTALS:	349,765	62,958	17,488	87,441	21,015	70,100	45,912	24,900	3,512	0	683092	61908	745000

4.15. Subproject: Network Enhancements - Part II

This Subproject enhances WTD computing networks in three steps over the planning period.

Part I – Implements, or in some cases activates existing, Gigabit Ethernet LANs within the Division; in addition, extends I-NET connectivity to all of the Division’s major facilities

Part II – Expands the Division WAN bandwidth (i.e., I-NET bandwidth utilized by the Division) from the existing OC-3 level to a minimum required level of OC-48

Part III – Further expands the Division WAN bandwidth upwards to OC-156 or higher

4.15.1. Subproject ID

423493-90-102

4.15.2. Project Association

Computing Infrastructure Project

4.15.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

4.15.4. Subproject Justification

The Division’s networks, both WAN and LANs, will need to gradually upgraded in order to maintain information technology services required for normal Division business and operations. This Subproject accomplishes one of the necessary upgrades to Division networks: the expansion of the Division’s WAN bandwidth.

4.15.5. Subproject Objectives

The objectives of this Subproject are:

- Assess WAN bandwidth requirements of the Division and the Wastewater Program to determine the extent of needed bandwidth expansions
- Evaluate, select, and acquire the required WAN networking equipment
- Implement the WAN networking equipment to address bandwidth enhancement needs.

4.15.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection

Computer Systems Planning Study

- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- **Establish Subproject Mission**
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

4.15.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-103 Network Enhancements Part II													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	5265	2274	369	0	7,908	0	7,908
2 Pre-Design	0	0	5539	22156	2216	0	6718	4169	369	0	41,167	0	41,167
3 Final Design	0	0	9232	36927	2216	7385	8896	6443	739	0	71,837	0	71,837
4 Impl Construct	369269	66468	0	0	0	0	0	0	0	0	435,737	0	435,737
4 Impl other	0	0	3693	14771	15509	55390	7081	6519	1108	0	104,070	0	104,070
5 Close Out	0	0	0	0	2250	11251	4794	4670	1125	0	24,090	0	24,090
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	60191	60191
TOTALS:	369,269	66,468	18,463	73,854	22,191	74,026	32,754	24,074	3,710	0	684,809	60,191	745,000

4.16. Subproject: Network Enhancements - Part III

This Subproject enhances WTD computing networks in three steps over the planning period.

Part I – Implements, or in some cases activates existing, Gigabit Ethernet LANs within the Division; in addition, extends I-NET connectivity to all of the Division’s major facilities

Part II – Expands the Division WAN bandwidth (i.e., I-NET bandwidth utilized by the Division) from the existing OC-3 level to a minimum required level of OC-48

Part III – Further expands the Division WAN bandwidth upwards to OC-156 or higher

4.16.1. Subproject ID

423493-90-103

4.16.2. Project Association

Computing Infrastructure Project

4.16.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

4.16.4. Subproject Justification

The Division’s networks, both WAN and LANs, will need to gradually upgraded in order to maintain information technology services required for normal Division business and operations. This Subproject implements the on-going expansion of the Division’s WAN bandwidth.

4.16.5. Subproject Objectives

The objectives of this Subproject are:

- Assess WAN bandwidth requirements of the Division and the Wastewater Program to determine the extent of needed bandwidth expansions
- Evaluate, select, and acquire the required WAN networking equipment
- Implement the WAN networking equipment to address bandwidth enhancement needs.

4.16.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection

- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

4.16.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-103 Network Enhancements Part III													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	5265	2274	369	0	7,908	0	7,908
2 Pre-Design	0	0	5539	22156	2216	0	6718	4169	369	0	41,167	0	41,167
3 Final Design	0	0	9232	36927	2216	7385	8896	6443	739	0	71,837	0	71,837
4 Impl Construct	369269	66468	0	0	0	0	0	0	0	0	435,737	0	435,737
4 Impl other	0	0	3693	14771	15509	55390	7081	6519	1108	0	104,070	0	104,070
5 Close Out	0	0	0	0	2250	11251	4794	4670	1125	0	24,090	0	24,090
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	60191	60191
TOTALS:	369,269	66,468	18,463	73,854	22,191	74,026	32,754	24,074	3,710	0	684809	60191	745000

5. NEW PROJECTS - SUBPROJECT DEFINITIONS

5.1. New Projects

The New Projects are briefly listed here for your immediate reference. For each New Project, the subprojects associated with it are included.

Plant & Offsite Control Project

Subproject No. 10-107 – Operations Decision Support System, Part II
Subproject No. 10-108– Operations Decision Support System, Part III
Subproject No. 10-109– Brightwater Control – North Plant

Water Quality Management Project

- Subproject No. 30-101– LIMS Upgrade
- Subproject No. 30-103 – Water Quality Data Repository

Asset / Maintenance Management Project

- Subproject No. 40-101 – Asset Management System
- Subproject No. 40-102 – Maintenance Management System, Part I
- Subproject No. 40-103 – Maintenance Management System, Part II

Infrastructure Data Management Project

- Subproject No. 50-102 – Engineering Document Management, Part II
- Subproject No. 50-103 – Engineering Document Management, Part III
- Subproject No. 50-105– Infrastructure Data Management System - Part I
- Subproject No. 50-106– Infrastructure Data Management System - Part II
- Subproject No. 50-109– West Point Plant Facilities Data Repository

Computing Infrastructure Project

- Subproject No. 90-104 – Information Portal, Part I
- Subproject No. 90-105 – Information Portal, Part II
- Subproject No. 90-106 – Information Portal, Part III
- Subproject No. 90-108 – Integration Bus Part I
- Subproject No. 90-109 – Integration Bus Part II
- Subproject No. 90-110 – Mobile Connectivity, Part I
- Subproject No. 90-111 – Mobile Connectivity, Part II

Each Subproject is described in detail in the following Sections. Each Subproject description includes the following:

- Subproject overview
- Subproject identifier number
- Project association identifier
- Subproject sponsor (usually a Section Manager or Supervisor that is the primary beneficiary of the Subproject)
- Subproject justification

- Subproject objectives
- Description of the Subproject phases required in implementing it.

5.2. Subproject: Operations Decision Support System Subproject - Part II WTD Administration

This Subproject provides the tools needed to effectively plan, schedule, and manage plant and offsite facilities by providing the necessary operations decision support information in a timely manner. The information required for effective operations decision support is currently stored in a wide variety of disparate databases, which will be used to create a uniform common database of certified information which is readily available to users via web based tools.

This is Part II of the Operations Decision Support System (ODSS). Part II provides a centralized reporting system for the Predictive CSO derived data.

5.2.1. Subproject ID

423493-10-107

5.2.2. Project Association

Plant Control Project

5.2.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.2.4. Subproject Justification

The existing systems used for the planning, scheduling, and dispatching of plant and offsite facilities are outdated and fail to provide the necessary operations decision support information in a timely manner. The information required for effective operations decision support is currently stored in a wide variety of disparate databases, including some that are stand-alone on individual desktop workstations.

This Subproject addresses this need through the implementation of a standard set of computerized decision support software tools at each of the major facilities within the WTD.

The operations decision support tool set at each plant will include a set of standardized, web-based applications on the front-end, and a standard SQL-compliant database for storing relevant decision support data.

It is anticipated a core set of software tools for decision support will be utilized, not only to address the needs of operations but also the needs of asset management, water quality management, Subproject control and management, and Division productivity monitoring. On top of this core set of decision support software tools, applications designed to address the specific needs of operations will be developed and deployed.

5.2.5. Subproject Objectives

This Subproject will implement a standard set of computerized decision support software tools at each of the major facilities within the WTD. The operations decision support tools set at each plant will include a

set of standardized, web-based applications on the front-end, and a standard SQL-compliant database for storing relevant decision support data.

5.2.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.2.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-107 ODSS Part II													
Phase	Construct	Tax & Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
1 Plan	0	0	0	0	0	0	3021	963	143	0	4,127	0	4,127
2 Pre-Des	0	0	2147	15030	859	0	3855	1765	143	0	23,799	0	23,799
3 Final De	0	0	3579	25050	859	6442	5105	2728	286	0	44,048	0	44,048
4 Impl Co	143145	25766	0	0	0	0	0	0	0	0	168,911	0	168,911
4 Impl ot	0	0	1431	10020	6012	48311	4063	2760	429	0	73,028	0	73,028
5 Close O	0	0	0	0	867	9751	2733	1965	433	0	15,749	0	15,749
6 Land Ac	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Conting	0	0	0	0	0	0	0	0	0	0	0	25337	25337
TOTALS:	143,145	25,766	7,157	50,101	8,597	64,504	18,777	10,181	1,435	0	329663	25337	355000

5.3. Subproject: Operations Decision Support System Subproject - Part III WTD Administration

This Subproject provides the tools needed to effectively plan, schedule, and manage plant and offsite facilities by providing the necessary operations decision support information in a timely manner. The information required for effective operations decision support is currently stored in a wide variety of disparate databases, which will be used to create a uniform common database of certified information which is readily available to users via web based tools.

This is Part III of the Operations Decision Support System (ODSS). Part III provides the reporting and analytical applications capabilities in conjunction with the Division's new Plant and Offsite Control System(s).

5.3.1. Subproject ID

423493-10-108

5.3.2. Project Association

Plant Control Project

5.3.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.3.4. Subproject Justification

The existing systems used for the planning, scheduling, and dispatching of plant and offsite facilities are outdated and fail to provide the necessary operations decision support information in a timely manner. The information required for effective operations decision support is currently stored in a wide variety of disparate databases, including some that are stand-alone on individual desktop workstations.

It is anticipated a core set of software tools for decision support will be utilized, not only to address the needs of operations but also the needs of asset management, water quality management, Subproject control and management, and Division productivity monitoring. On top of this core set of decision support software tools, applications designed to address the specific needs of operations will be developed and deployed.

The applications, and the decision support tools on which they are based, will all be web-based and deployed via the Information Portal.

5.3.5. Subproject Objectives

This Subproject will implement a standard set of computerized decision support software tools at each of the major facilities within the WTD. The operations decision support tools set at each plant will include a set of standardized, web-based applications on the front-end, and a standard SQL-compliant database for storing relevant decision support data.

5.3.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.3.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

10-108 ODSS Part III													
Phase	Construct	Tax & Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
1 Plan	0	0	0	0	0	0	9574	3051	454	0	13,079	0	13,079
2 Pre-Des	0	0	6804	47631	2722	0	12215	5594	454	0	75,420	0	75,420
3 Final De	0	0	11341	79385	2722	20413	16177	8645	907	0	139,590	0	139,590
4 Impl Co	453629	81653	0	0	0	0	0	0	0	0	535,282	0	535,282
4 Impl oth	0	0	4536	31754	19052	153100	12876	8747	1361	0	231,426	0	231,426
5 Close O	0	0	0	0	2747	30901	8662	6227	1373	0	49,910	0	49,910
6 Land Ac	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Conting	0	0	0	0	0	0	0	0	0	0	0	80292	80292
TOTALS:	453,629	81,653	22,681	158,770	27,243	204,414	59,504	32,264	4,549	0	1044708	80292	1125000

5.4. Subproject: Brightwater Control System– North Plant

The I&C design will incorporate functions common to all three treatment plants. SCADA and plant control will use systems similar to the existing plants. The Subproject includes procurement of the operator workstation portion of the treatment plant control system that provides the operators with plant status and allows them to control and coordinate plant operations. The Subproject includes design and procurement of the operator workstations, the historical data system, equipment to interface to the existing field controllers, plant instrumentation, design and installation of the communication system that links the control system components, and the support computer structure (servers) to operate the control system. The new control system would come with new software to support the required functions.

5.4.1. Subproject ID

423493-10-109

5.4.2. Project Association

Plant Control Project

5.4.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.4.4. Subproject Justification

Major upgrades to the existing plant control systems at the West and South Plants will provide the basis for design of the Brightwater Treatment Plant control system. The I&C design needs to incorporate instrumentation and controls developed for the West and South Plant. Common I&C design will provide cost savings in the areas of training, FTE reduction based on more efficient maintenance, reduced spare parts inventory, common operating methodology, and a much higher level of interface between the South, West and Brightwater Treatment Plants.

The opportunity for limited staffing of the Brightwater Plant is possible by installing an advanced control system with high bandwidth, very reliable communications system to allow rapid, secure and reliable communications between South Plant, West Plant, and Brightwater. The resultant labor savings will more than offset the cost of this new system. It also affords WTD with the opportunity to create a backup control center within its service area from which to manage emergency events.

5.4.5. Subproject Objectives

The primary objective of this Subproject is to: 1) provide the plant control and collection SCADA for the new Brightwater Treatment Plant; 2.) provide high bandwidth, reliable communications between the Brightwater Plant, South Plant, and West Plant for emergency control and limited off hour control of Brightwater remotely.

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Specific elements of this Subproject are described in the next section on Subproject Phases / Tasks.

5.4.6. Overview of Subproject Phases

Note:

- 1. The Subproject phases and task descriptions are included in Subproject 10-101's Subproject phase/task descriptions*
- 2. Most of the tasks described in 10-101 are needed by this Subproject, however the few that aren't needed are so noted, along with those tasks that are different.*
- 3. This was done to reduce the repetition between Subprojects and make the descriptions more to the point, and reduce the total number of pages in the plan.*

Planning Phase

Subproject Planning: The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject. Procurement issues need to be addressed relative to this Subproject allowing for procurement of standard control equipment throughout WTD.

The funds for the Brightwater Control System Subproject and its communication system are assumed to be included in the RWSP budget for Brightwater. No additional funding is included herein.

Pre-Design Phase

The requirements and functional specifications for the Brightwater Plant Control System, 10-109, will be developed as part of this Subproject.

A standard design specification format needs to be established in 10-101 that will be used by all subsequent control system procurements over the next ten years. This Subproject, 10-109, will follow the standards established in 10-101.

The following tasks are required to complete the Pre-Design Phase as they apply to the Brightwater Control System Subproject; 10-109:

Gather Control System Data: Same task as used for 10-101, except apply it to the Brightwater Control System.

Establish Control System Requirements: Same task as used for 10-101, except apply it to the Brightwater Control System.

Perform Communications Study: Same task as used for 10-101, except apply it to the Brightwater Control System.

Analyze Technical Alternatives: Same task as used for 10-101, except apply it to the Brightwater Control System.

Develop Pre-Design Report: Same task as used for 10-101, except apply it to the Brightwater Control System.

Develop System Implementation Plan: Same task as used for 10-101, except apply it to the Brightwater Control System.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a new control system procurement.

Perform Site Investigations- Currently Monitored Sites: Same task as used for 10-101, except apply it to the Brightwater Control System, relative to initially planned sites since this is a new system.

Perform Site Investigations – Expansion Sites: Same task as used for 10-101, except apply it to the Brightwater Control System.

Develop Communications System Design: Same task as used for 10-101, except apply it to the Brightwater Control System.

Develop Control Room Design: Same task as used for 10-101, except apply it to the Brightwater Control System.

Develop System Configuration Requirements: Same task as used for 10-101, except apply it to the Brightwater Control System.

Report Definition: Same task as used for 10-101, except apply it to the South Plant Control System and East Collection System SCADA

Develop Detailed Design Specifications: Same task as used for 10-101, except apply it to the Brightwater Control System.

Develop Request For Proposal Documents (RFP): Same task as used for 10-101, except apply it to the Brightwater Control System.

Provide Procurement Services: Same task as used for 10-101, except apply it to the Brightwater Control System.

Implementation Construction Phase

This phase includes activities to administer the Brightwater Plant Control System as described below.

Construction Subproject Management: Same task as used for 10-101, except apply it to the Brightwater Control System.

Submittal Review: Same task as used for 10-101, except apply it to the Brightwater Control System.

Witness Communications System Testing: Same task as used for 10-101, except apply it to the Brightwater Control System.

Conduct Control System Site Visits and Testing: Same task as used for 10-101, except apply it to the Brightwater Control System.

Contract Closeout: Same task as used for 10-101, except apply it to the Brightwater Control System.

Implementation (Other) Phase

Implement New Work Processes: Same task as used for 10-101, except apply it to the Brightwater Control System.

Design and Implement System Maintenance Practices and Procedures: Same task as used for 10-101, except apply it to the Brightwater Control System.

Deployment and Training: Same task as used for 10-101, except apply it to the Brightwater Control System.

5.4.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

The RWSP Program funds this Subproject; therefore it is excluded from the cost estimates for the Computer System Planning Study Subprojects.

5.5. Subproject: Water Quality Data Repository

The Water Quality Data Repository will provide a centralized source of certified data on biological and chemical analyses completed by the Division's various process laboratories as well as by the Environmental Laboratory. Historical laboratory data from the Environmental Lab's LIMS, as well as historical data from the various plant process laboratories, will be stored within this data repository. A web-based analytical application will be deployed via the Information Portal so that this laboratory data can be accessed and utilized for decision-making purposes. The data repository will contain raw laboratory data, as well as derived (calculated, summarized, and/or consolidated) data. In many instances, end-users will be able to quickly access and use the stored data without having to perform further manipulation. Further, for end-users that do need to perform more additional data derivations, a web-based analytical application embedded within the Information Portal can be used or data can be automatically downloaded into spreadsheets.

It is expected that the same database and web technologies that were used to construct the Operations Decision Support System will be utilized for this Subproject as well, including the Information Portal technologies. The Information Portal will provide a report generation function that allows for a wide variety of water quality reports in pre-set and ad hoc formats to be created easily by end-users. With the Information Portal, end-users can essentially "surf" water quality databases and locate the specific data they need without having to use the typically cumbersome report generation tools or having to thoroughly understand how the water quality databases are structured. Of course, the accessibility to water quality databases and the ability to "surf" databases will be controlled by the Information Portal's security gating features.

5.5.1. Subproject ID

423493-30-103

5.5.2. Project Association

Water Quality Project

5.5.3. Subproject Sponsor(s)

Environmental Laboratory LIMS Director

5.5.4. Subproject Justification

This Subproject addresses the Division-wide need to capture and distribute the raw and derived data from laboratory analyses, including water quality information. Laboratory data is currently being generated by the Environmental Laboratory as well as by the process laboratories within each of the plants. This laboratory data has proven difficult to access by end-users both at the plants and throughout the rest of the Division. The current situation also demands considerable manual labor for data input, data formatting, and data calculations. The implementation of a Water Quality Data Repository will make it easier to access laboratory data and generate required reports for regulatory and other purposes. This will dramatically reduce the time and effort currently required to access laboratory information.

5.5.5. Subproject Objectives

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Specific elements of this Subproject include:

- Acquisition of all necessary hardware and network connectivity
- Acquisition of all necessary software for database management, web-based application management, and decision support applications
- The encoding of water quality metadata and reporting structures into database-driven, web-based applications
- Specification and acquisition of analytical and reporting applications for decision support
- Design and implementation of automated data processing software for certifying and publishing water quality data
- Migration of existing water quality reporting applications and informational data stores to the new system
- Redesign and implementation of work processes to maximize the effectiveness of the new system
- Design and implementation of applications and processes to provide for updating, backup, recovery, and fail-over
- Training for users and support personnel for software and the stored data

5.5.6. Overview of Subproject Phases

Planning Phase

Subproject Planning. A Subproject plan will be developed and reviewed with the Division to ensure it meshes with other Division Subprojects and activities. The Subproject will be linked to all other relevant program elements and managed within the program management structure. A Subproject team will be assembled and initiated in the program-standard procedures and practices for Subproject management and control.

Pre-Design Phase

Requirements & Functional Specification. The requirements and functional specifications for the Water Quality Data Repository will be developed. These specifications will provide standards, architecture, and component definitions for a Division-wide Water Quality Data Repository that will address a wide variety of water quality reporting and analysis requirements. During this step, the existing Laboratory Information Management System – LabVantage – will be analyzed to assist in the construction of data models for decision support and reporting.

Document Water Quality Rules and Data Derivations. Water Quality information – including relevant attributes, operations rules, and calculations used to derive data – will be formally specified in digital form. This effort captures all operations information and documents in both text and data model diagrams, creates a data dictionary, and provides a guide for navigating the system and its applications. For each major facility, a data model will be developed to document data definitions, derivation rules, calculations, and work process specifications that have been substantially validated by key personnel.

Final Design Phase

Select Core Application Software. Software solutions will be evaluated and selected for each of the core system application components. These software solutions will provide access to water quality data, transformation and transfer of water quality data into required data formats and structures, as well as

reporting and analytical solutions. It is expected that the selected software applications will be identical or very similar to those used for the Operations Decision Support System as well as for other information systems that will be constructed throughout the Division.

Select Database and Data Management Software. The Water Quality Data Repository will require a relational database system to store its data and data management software. During this phase, the relational database management engine and the data management software to be used in support of the Water Quality Data Repository will be selected. This task may be eliminated or downsized, since the Environmental Laboratory already utilizes Oracle. So, this task may be focused on simply validating the use of Oracle for this Subproject.

Select Hardware. During this step, the hardware will be evaluated and selected for the Water Quality Data Repository, including database server, application server, file server, and web server.

Detailed Implementation Planning. A detailed implementation plan will be developed for hardware and software implementation.

Implementation (Construction) Phase

Implement Hardware. This step implements and integrates all servers, including the servers for database management, applications processing and management, file services, and web services

Implement Networking. This step networks all relevant hardware servers.

Implement Data Extraction, Transformation, and Transfer Tools and Procedures. This step implements the tools and procedures for initial and on-going extraction, transformation, and transfer of data from the LabVantage LIMS and other water quality data sources.

Implement Database and Data Management. This step accomplishes the configuration of the relational database management system based on water quality data models and populates the data repository with actual water quality data.

Implement New Applications. This effort installs the new application software on the server hardware, links the applications to the database and data management system, and initiates testing process.

Configure New Applications. This effort configures the new applications to ensure that all relevant processing rules and data structures are utilized by the new applications.

Implementation (Other) Phase

Complete Application Acceptance Testing. During this step, a thorough acceptance testing process will be utilized.

Implement New Work Processes. This step implements the new work processes associated with the effective day-to-day use of the Water Quality Data Repository.

Design and Implement System Maintenance Practices and Procedures. In order for the Division to achieve its return on investment and to support productivity objectives, the Water Quality Data Repository needs to be kept current and must meet response and total in-service time objectives. For these purposes, this step establishes the practices and procedures for the effective, on-going maintenance of the Water Quality Data Repository. It establishes practices and procedures – including documentation

– for database backups, software updates, failover, recovery, access control, as well as for review and adjustment of work processes to effectively use the applications.

Deployment and Training. Potential users of the Water Quality Data Repository need to be trained in the tools used to access it, and also in the organization and content of the data repository. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for Water Quality Data Repository users. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training, which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

5.5.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

50-109 West Plant facilities Data Repository													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM		CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT		TOTAL with Contingency
	Construct	Conting			CM	Consult CM					PROJECT	Project Conting	
1 Plan	0	0	0	0	0	0	11382	4916	798	0	17,096	0	17,096
2 Pre-Design	0	0	11974	59871	4790	0	14522	9012	798	0	100,967	0	100,967
3 Final Design	0	0	19957	99784	4790	35922	19232	13928	1597	0	195,209	0	195,209
4 Impl Construct	798274	143689	0	0	0	0	0	0	0	0	941,963	0	941,963
4 Impl other	0	0	7983	39914	33528	269417	15307	14092	2395	0	382,635	0	382,635
5 Close Out	0	0	0	0	4837	54413	10305	10038	2418	0	82,011	0	82,011
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	-
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	130119	130,119
TOTALS:	798,274	143,689	39,914	199,569	47,944	359,753	70,748	51,986	8,006	0	1719881	130,119	1,850,000

5.6. Subproject: Asset Management System

The Division recognizes the significance of effective asset management. In the modern world of wastewater treatment and conveyance, effective asset management is essential to being a competitive wastewater utility. A competitive wastewater utility can be characterized as having utilized effective asset management to:

- Optimize asset life
- Reduce unnecessary maintenance
- Smooth year-to-year CIP spending
- Improve asset (and operations) reliability.

Effective asset management requires significant utilization of information technology. The thrust of this Subproject is to implement an Asset Management System that enables the Division to conduct effective asset management.

5.6.1. Subproject ID

423493-40-101

5.6.2. Project Association

Asset/Maintenance Management Project

5.6.3. Subproject Sponsor(s)

Asset Management Section Manager

5.6.4. Subproject Justification

In utilizing the Asset Management System to support effective asset management within the Division, there are a number of significant benefits:

- Increased asset life
- Reduced maintenance costs
- Scalable asset reliability
- Focused resources on critical assets
- Managed capital asset replacement schedule.

In addition to these business and operational benefits, the Asset Management System will enable the Division to become compliant with new, emerging regulations regarding the tracking and management of assets.

One set of new regulations are emerging from the Government Accounting Standards Board, or GASB, which establishes the Generally Accepted Accounting Principles (GAAP) for government agencies. In 1999, in response to pressure to drive government agencies to account for funds and assets in ways more consistent with GAAP, GASB issued Statement 34. GASB Statement No. 34, or simply GASB-34, is not mandatory as yet, but significant pressure from major government investors and the Federal government are likely to result in mandatory requirements before too long. In the meantime, GASB-34 compliance is a prerequisite to demonstrating GAAP compliance and a compliance implementation schedule is already public.

GASB Statement No. 34 establishes a new framework or “reporting model” for state and local government financial reports. It is generally acknowledged by government leaders and financial managers as the “biggest change in the history of public-sector accounting.” Of special significance to the Division, GASB-34 has become one of the primary justifications for implementing new and upgraded financial management, maintenance management, and asset management systems by state and local government agencies.

The new GASB-34 standard has come about in response to publicly expressed concerns about the inadequacy of public sector accountability. Accountability is the paramount objective of financial reporting for state and local governments. There are two separate and equally important aspects of accountability:

- *Fiscal accountability* requires that governments demonstrate compliance with public decisions concerning the raising and spending of public monies in the short term; and
- *Operational accountability* requires that a government demonstrate the extent to which it has met its operational objectives efficiently and effectively, using all resources available for that purpose, and whether it can continue to do so.

The traditional government accounting model, with its strong emphasis on legal compliance, continues to provide a high level of fiscal accountability. But, this traditional accounting model has provided little in the way of operational accountability and is considered woefully inadequate for this purpose.

GASB-34 directs governmental agencies to adopt a more “private sector-like” focus on accounting for assets. Specifically, GASB Statement No. 34 requires that all capital assets, including general infrastructure assets, be capitalized in the financial statements at their historical cost or estimated historical cost. This rule will apply retroactively to major general infrastructure assets that were acquired in fiscal years beginning after June 15, 1980 or that received major renovations, restorations, or improvements since that date.

Traditionally, state and local governments have not consistently depreciated capital assets. The move to a more “private sector-like” focus on all activities in government-wide financial statements will change traditional practice. Governments will be required under the new financial reporting model to report depreciation expense for all their capital assets, including general infrastructure assets, in the government-wide financial statements. Governments, however, can avoid this mandate if those assets (1) are managed using an asset management system, and (2) using the asset management system, the agency documents that its assets are being preserved at or above the condition level established and disclosed by the agency.

In addition to the new regulatory demands coming from the Governmental Accounting Standards Board, there are also new regulatory demands coming from the Environmental Protection Agency. The EPA issued new guidelines for improved asset management by wastewater agencies and intends to make these mandatory. These emerging regulations revolve around two principal elements:

- 1) First, the EPA, in association with environmental consulting firms and specialists, issued the conceptual design for a comprehensive Environmental Management System (EMS). As it envisions the role of the EMS in improved asset management in wastewater utilities, the EMS will serve as a repository of relevant data and reports about how general EPA regulatory compliance was achieved and whether or not the wastewater utilities can sustain its compliance. The EMS would need to be directly accessible by any external agency, including State and Federal environmental regulatory agencies. Technologically, the EMS is a data warehouse that automatically captures relevant data from information and controls systems within the utility, automatically organizes the data for

reporting, and automatically categorizes and then publishes the environmental data over the Internet via an Information Portal.

- 2) Somewhat later, the EPA has also issued guidelines for CMOM – Capacity, Management, Operation, and Maintenance – audits by state environmental agencies and by the EPA. These audits would in effect require wastewater utilities to prove that they are taking an optimized approach to the management of its assets and its operations. It is generally understood that CMOM audits would require wastewater utilities to have an integrated, utility-wide, set of applications and databases that provide even more data and automated reporting and publication than the original EMS concept did.

5.6.5. Subproject Objectives

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Some of the specific objectives of this Subproject include:

- Implement a Division-wide Asset Management System based on data management and Web publishing technologies consistent with GASB and EPA guidelines and modern asset management principles
- Implement Division-wide practices and processes for improved asset management, including asset condition evaluation and tracking
- Implement full life-cycle management policies and processes for Division assets
- Replace all existing, disparate systems currently being ineffectively utilized or underutilized for managing Division assets – including Facilities Asset Management Program systems such as Repair or Replacement Decision Development Software (R2D2), Facilities Information Retrieval System (FIRS), Facilities Inspection Tracking System (FITS), and others
- Deploy the Asset Management System via the Information Portal to make asset information readily accessible to everyone in the Division, as well as to external agencies.

5.6.6. Overview of Subproject Phases

Planning Phase

Subproject Planning. A Subproject plan will be developed and reviewed with the Division to ensure it meshes with other Division Subprojects and activities. The Subproject will be linked to all other relevant program elements and managed within the program management structure. A Subproject team will be assembled and initiated in the program-standard procedures and practices for Subproject management and control.

Pre-Design Phase

WTD Assessment. This step assesses WTD's current asset management practices, processes, and procedures for each of its major facilities. The applications, databases, and work processes associated with the current asset management systems being used within WTD – including MainSaver, R2D2, FIRS, and FITS among others – will be analyzed in depth. The findings from this step will be used in the design of improved asset management processes. The methods and tools used in this step should be standard for those used in professional business process analysis.

Ten-year Strategic Asset Management Planning. A facility master plan will be developed for each of WTD's facilities.

Final Design Phase

Design of WTD's Asset Hierarchy. A standardized functional grouping of WTD assets will be formulated. This design effort will provide guidelines for the detailed construction of WTD's Asset Hierarchy in the Implementation Phase below. Asset hierarchy levels will be consistent with "best practices" naming standards, including GIS industry-leading standards.

Establish Asset Condition Standards. Condition standards by asset classification (within the WTD Asset Hierarchy) will be established.

Requirements & Functional Specification. The requirements and functional specifications for the Asset Management System will be developed. These specifications will provide standards, architecture, and component definitions for a Division-wide Asset Management System.

Select Core Application Software. Software solutions will be evaluated and selected for each of the core system application components for the Asset Management System.

Select Hardware. During this step, the hardware will be evaluated and selected for the Asset Management System.

Detailed Implementation Planning. A detailed implementation plan will be developed for hardware and software implementation, as well as for the implementation of new asset management practices, processes, and procedures.

Implementation (Construction) Phase

Implement Hardware. The hardware required for the Asset Management System will be procured, implemented and configured.

Implement Software. The Asset Management System software will be procured, installed and configured. Staff training will be conducted, and staff will be supported as they start using the software.

Construct the WTD Asset Hierarchy. WTD assets and their attributes will be loaded into the Asset Management System.

Establish Asset Criticality. Using the Asset Management System, WTD assets will be assessed and asset criticality will be established for each of those assets. The following will be taken into consideration in establishing asset criticality: regulatory compliance, life and safety issues, asset cost, and asset importance to the operating environment.

Assign Level of Maintenance. Using the Asset Management System, the level of maintenance will be assigned for each WTD asset. In assigning level of maintenance, a number of maintenance strategies will be considered and the optimal mix of strategies established.

Evaluate Asset Condition. Based on the condition standards established for each asset classification (in the WTD Asset Hierarchy), the condition of each WTD asset will be evaluated and stored in the Asset Management System for later analysis and decision making.

Implementation (Other) Phase

Data Analysis Support. WTD staff will be supported in the use of the Asset Management System in the analysis of asset data for optimizing asset reliability and costs. Data analysis efforts include calculations of asset value, scheduling for CIP replacement, optimized maintenance versus asset cost, assigned maintenance strategy values, quantified maintenance costs, and overall condition rating of assets.

Implement New Work Processes. This step implements the new work processes associated with the effective day-to-day use of the Asset Management System. An asset accounting path will be designated at this time.

Design and Implement System Maintenance Practices and Procedures. The procedures will be established for the effective, on-going maintenance of the Asset Management System. It establishes practices and procedures – including documentation – for database backups, software updates, failover, recovery, access control, as well as for review and adjustment of work processes to effectively use the applications.

Deployment and Training. Potential users of the Asset Management System need to be trained in the tools used to access it, and also in the organization and content of the System’s database. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for Asset Management System users. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training, which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

5.6.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

40-101 Asset Mgt System													
Phase	Construct	Tax & Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
1 Plan	0	0	0	0	0	0	16798	5354	796	0	22,948	0	22,948
2 Pre-Design	0	0	11939	119388	6367	0	21432	9815	796	0	169,737	0	169,737
3 Final Design	0	0	19898	198980	6367	19898	28383	15169	1592	0	290,287	0	290,287
4 Impl Construct	795918	143265	0	0	0	0	0	0	0	0	939,184	0	939,184
4 Impl other	0	0	7959	79592	44571	149235	22591	15347	2388	0	321,683	0	321,683
5 Close Out	0	0	0	0	6446	30215	15246	10960	2417	0	65,285	0	65,285
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	140878	140878
TOTALS:	795,918	143,265	39,796	397,959	63,752	199,348	104,451	56,644	7,989	0	1809122	140878	1950000

5.7. Subproject: Maintenance Management System – Part I

This Subproject implements a Division-wide Computerized Maintenance Management System (CMMS) in support of the Division's Asset Management Program. It has yet to be decided if the Division's existing CMMS software will be re-implemented to better fit the Division's needs, or whether a completely new CMMS software package will be selected. Nevertheless, a thorough evaluation and selection process will be conducted to ensure the Division's future needs are fulfilled. The failure to do so will jeopardize the Division's efforts with regard to asset management. In the end, even if MainSaver is "re-selected", it will have the management support and focus to make it a far more successful implementation.

Maintenance needs to be viewed in the context of asset management. Maintenance is a key element in the overall life-cycle management of assets. In simple terms, maintenance keeps an asset performing to the standard that is required. Maintenance management deals with the planning, organizing, and controlling it takes to accomplish that. Maintenance management systems are needed to automate these processes and ensure reliability-cost optimization of maintenance.

It is critical for the WTD to implement effective maintenance processes within its overall asset management program. And the automation of maintenance management processes, using a maintenance management system, is essential for achieving asset management goals in an efficient and cost effective manner.

The Division needs to address a number of urgent matters with regard to its maintenance management system. First, the Division needs to establish consistent, Division-wide, maintenance and work management standards, procedures and work processes to guide the effective implementation of a CMMS. Second, the Division has new requirements from outside agencies to report on all maintenance activities as they relate to the condition of Division facilities and equipment. These needs are addressed by this Subproject, which consists of three distinct efforts delineated here as Part I, Part II.

- Part I establishes consistent, Division-wide standards, procedures and work processes for maintenance and work management. This step also evaluates the software required to support the newly established standards, procedures and work processes. During Part I, a web-based CMMS as well as various maintenance and work management applications will be deployed via the Information Portal.
- Part II implements automated, real-time, data-level integration of the CMMS to other information systems such as Finance, Human Resources, Inventory Control, Engineering Document Management, CAD/GIS, and the Operations Decision Support System.

5.7.1. Subproject ID

423493-40-102

5.7.2. Project Association

Asset/Maintenance Management Project

5.7.3. Subproject Sponsor(s)

Asset Management Section Manager

5.7.4. Subproject Justification

Maintenance management is an important element in effective asset management. The Division must develop sound maintenance management processes and automate those processes to achieve its objectives.

The Division's existing maintenance management system – MainSaver – cannot be considered as fully implemented and working at the level required to effectively and efficiently support Division maintenance management processes. From its inception, the implementation of MainSaver has not had the executive sponsorship, funding, or Subproject management commonly required to implement a complex and powerful set of applications that comprise a Computerized Maintenance Management System (CMMS). The implementation of a CMMS is not just a technical effort; in fact, it is largely a business-driven effort.

Some of the expected benefits of implementing effective maintenance management, including a Computerized Maintenance Management System are listed as follows:

- Improved cost control of maintenance labor and materials resources
- Improved productivity through documented maintenance procedures and more efficient use of staff
- Optimized maintenance throughout the Division
- Improved responsiveness to incidents
- Extend useful life of infrastructure assets.

5.7.5. Subproject Objectives

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. The Subproject will support the Division as it implements an Asset Management Program and addresses GASB-34 compliance.

This Subproject intends to improve the Division's current maintenance management efforts and to accomplish the following:

- Establish best practices and standards for maintenance management throughout the Division
- Design and implement the maintenance business processes that capture the best practices and standards
- Implementation of an enterprise-level CMMS – a CMMS configured consistent with the Division's overall asset management program, including the Division-wide Asset Hierarchy
- Full implementation of all required CMMS modules – including modules for work order management, maintenance scheduling (both reactive and preventive), purchasing management, inventory control, and others
- Implement a CMMS that is easy to use; implement a simple, web-based, interface that promotes the use of the system and eases the effort required to enter data (such as work orders)
- Implement a web-based CMMS that can be readily deployed via the Division's Information Portal to computers of all types and in all locations, including mobile computers that can be used throughout the plants and in the field
- Train all users in the effective use of the CMMS.

5.7.6. Overview of Subproject Phases

Planning Phase

Subproject Planning. A Subproject plan will be developed and reviewed with the Division to ensure it meshes with other Division Subprojects and activities. The Subproject will be linked to all other relevant program elements and managed within the program management structure. A Subproject team

will be assembled and initiated in the program-standard procedures and practices for Subproject management and control.

Pre-Design Phase

Ten-year Strategic Maintenance Management Planning. The business environment for maintenance will be documented, including intra- and inter-sectional workflow, business processes, functions, practices, staffing, and other key factors necessary for establishing business requirements for a new Computerized Maintenance Management System (CMMS). A plan for establishing a Division-wide maintenance management program will be delivered to management, including planning for integration and transition issues.

Division Best Practices. Utilizing best industry practices, and taking into consideration the specific needs and constraints of the WTD, the Maintenance Management Best Practices for the Division will be identified.

Implementation Preparation. The implementation of an enterprise-class CMMS requires approximately 18 months to complete. However, there are a number of activities that need to be initiated in advance of the start of implementation in order to achieve an 18-month implementation. These activities will be initiated with WTD staff at this time: collection and verification of asset-related data (in conjunction with the Asset Management System Subproject), initiation of staff training on Division Best Practices, and dealing with various technical transition decisions.

Final Design Phase

Design Maintenance Management Work Processes. The maintenance management workflow for each specific facility within the Division will be designed and documented in a web-based manual. This activity provides an excellent forum for staff to identify existing roadblocks inhibiting their performance. It also provides an opportunity to educate staff on the full capabilities and value of a CMMS. Finally, it specifies the work processes so that they can be communicated more fully to software vendors and new employees. The practices typical of professional business process analysis and design should be used in this step, ensuring that the newly designed processes can also be used in eBusiness processes (especially eProcurement).

Requirements & Functional Specification. The requirements and functional specifications for the Computerized Maintenance Management System will be established. These specifications will provide standards, architecture, and component definitions for a Division-wide Computerized Maintenance Management System. During this step, the existing MainSaver maintenance management system will be analyzed to determine necessary transition steps.

Select Core Application Software. Software solutions will be evaluated and selected for each of the core system application components.

Select Hardware. Computer hardware will be evaluated and selected for the Computerized Maintenance Management System, including database servers, application servers, file servers, and web servers.

Detailed Implementation Planning. A detailed implementation plan will be developed for hardware and software implementation, as well as for the implementation of new work processes.

Implementation (Construction) Phase

Procurement Support. Support will be provided to the Division during the procurement of all hardware and software components.

Implement Hardware. This step implements and integrates all servers, including database servers, application servers, file servers, and web servers.

Implement Networking. This step networks all relevant hardware servers.

Implement Data Collection and Data Conversion Tools and Procedures. This step implements the tools and procedures for initial and on-going data collection and data conversion. Relevant data from existing systems, including MainSaver, will be converted and transferred into the database of the new system. Data from manual, paper-intensive processes will also be converted as appropriate. Data from the Asset Management System, including the Asset Hierarchy, will also be loaded into the new CMMS.

Implement New CMMS Software. This effort installs the new CMMS application software on the server hardware, links the applications to the database and data management system, and initiates testing process.

Configure New CMMS Software. This effort configures the new CMMS software to ensure that relevant maintenance rules and asset data structures are correctly utilized by the new CMMS software.

Deploy CMMS Via Information Portal. The new CMMS software applications – such as work orders, purchasing, and others – will be deployed via the Information Portal to enable access via Web browsers on mobile computers in the field.

Complete Application Acceptance Testing. During this step, a thorough acceptance testing process will be utilized.

Deploy CMMS Auxiliary Applications. Various maintenance management applications, forms, and reports – not typically found in off-the-shelf CMMS software packages – will be configured within the Information Portal and deployed via the Information Portal.

Implement New Work Processes. This step implements the new work processes associated with the effective day-to-day use of the Computerized Maintenance Management System and the auxiliary applications.

Deployment and Training. Potential users of the Computerized Maintenance Management System need to be trained in the tools used to access it, and also in the organization and content of the System's database. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for Computerized Maintenance Management System users. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training, which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

Implementation (Other) Phase

Design and Implement System Maintenance Practices and Procedures. In order for the Division to achieve its return on investment and to support productivity objectives, Computerized Maintenance Management System databases and applications need to be kept current and must meet response and total in-service time objectives. For these purposes, this step establishes the practices and procedures for the effective, on-going maintenance of the Computerized Maintenance Management System. It establishes practices and procedures – including documentation – for database backups, software updates, failover, recovery, access control, as well as for review and adjustment of work processes to effectively use the applications.

5.7.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

40-102 Maint Mgt Sys Part I													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	17083	7378	1198	0	25,659	0	25,659
2 Pre-Design	0	0	17972	179716	9585	0	21796	13526	1198	0	243,792	0	243,792
3 Final Design	0	0	29953	299526	9585	59905	28864	20904	2396	0	451,133	0	451,133
4 Impl Construct	1198104	215659	0	0	0	0	0	0	0	0	1,413,763	0	1,413,763
4 Impl other	0	0	11981	119810	67094	449289	22974	21150	3594	0	695,892	0	695,892
5 Close Out	0	0	0	0	9671	90666	15453	15054	3627	0	134,470	0	134,470
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	195291	195291
TOTALS:	#####	215,659	59,905	599,052	95,935	599,860	106,170	78,011	12,013	0	2964709	195291	3160000

5.8. Subproject: Maintenance Management System Subproject - Part II

The Division's Maintenance Management needs are addressed by this Subproject, which consists of three distinct efforts delineated here as Part I, Part II, and Part III.

Part I establishes consistent, Division-wide standards, procedures and work processes for maintenance and work management. This step also evaluates the software required to support the newly established standards, procedures and work processes. It is assumed that the Division's existing Computerized Maintenance Management System (CMMS) software, Cayente's MainSaver, will be able to meet most of the software requirements and will not need to be replaced. During Part I, the CMMS will be web-enabled and various maintenance and work management applications will be deployed via the Information Portal.

Part II implements automated, real-time, data-level integration of the CMMS to other information systems such as Finance, Human Resources, Inventory Control, Engineering Document Management, CAD/GIS, and the Operations Decision Support System.

Part III automates the various workflow associated with the CMMS, especially those associated with integration of CMMS with other information systems, as well as with coordination, collaboration, review and approval, and document routing.

5.8.1. Subproject ID

423493-40-103

5.8.2. Project Association

Asset & Maintenance Management Project

5.8.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.8.4. Subproject Justification

The Division needs to address to urgent situations. First, the Division needs to establish consistent, Division-wide, maintenance and work management standards, procedures and work processes to lower overall maintenance costs and increase productivity. Second, the Division has new requirements from outside agencies to report on all maintenance activities as they relate to the condition of Division facilities and equipment. These needs are addressed by this Subproject, which consists of three distinct efforts delineated here as Part I, Part II, and Part III.

5.8.5. Subproject Objectives

The major Subproject milestones for Part I include:

- Establish consistent, Division-wide standards, procedures and work processes for maintenance and work management
- Fully implement a CMMS to support the standards, procedures and work processes established Division-wide
- Deploy various CMMS applications via the Information Portal

The major Subproject milestones for Part II include:

- Implement data integration adapters required to link the CMMS to other information systems

The major Subproject milestones for Part III include:

- Implement workflow automation for the CMMS and the other integrated information systems.

5.8.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.8.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

40-103 Maint Mgt Sys Part II													
Phase	Tax & Construct	Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
1 Plan	0	0	0	0	0	0	7137	3082	501	0	10,720	0	10,720
2 Pre-Design	0	0	7509	30034	4005	0	9106	5651	501	0	56,805	0	56,805
3 Final Design	0	0	12514	50057	4005	17520	12060	8734	1001	0	105,890	0	105,890
4 Impl Construct	500571	90103	0	0	0	0	0	0	0	0	590,674	0	590,674
4 Impl other	0	0	5006	20023	28032	131400	9598	8836	1502	0	204,397	0	204,397
5 Close Out	0	0	0	0	4050	26576	6471	6304	1519	0	44,919	0	44,919
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	81593	81593
TOTALS:	500,571	90,103	25,029	100,114	40,091	175,496	44,373	32,607	5,023	0	1013407	81593	1095000

5.9. Subproject: Engineering Document Management System - Part II

The Engineering Document Management System is to be implemented in four steps, referred to as Part I, Part II, Part III, and Part IV. These steps are described below.

Part I establishes engineering document standards and document identification labeling standards. It also moves existing CAD files to *.pdf* format for viewing by appropriate staff throughout the Division via the Information Portal.

Part II upgrades the Division's existing AutoCAD system to the newest web-enabled version to enable the viewing of dynamic CAD maps by appropriate staff throughout the Division via the Information Portal.

Part III implements a web-based application – to be deployed via the Information Portal – for the viewing and collaborative editing of CAD drawings

Part IV implements document version control – deployed via the Information Portal – and automates workflow associated with engineering document management.

5.9.1. Subproject ID

423493-50-102

5.9.2. Project Association

Infrastructure Data Management Project

5.9.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.9.4. Subproject Justification

This Subproject will provide the following benefits to the Division:

- Increases productivity; reduces paper; automates workflow; reduces time spent locating maps and documents associated with infrastructure assets
- Unifies all engineering document management efforts within the Division
- Improves support for changes to as-built drawings
- Facilitates collaborative efforts among engineering, plant, and planning staff
- Improves the speed and accuracy of infrastructure planning and change decisions.

5.9.5. Subproject Objectives

The objectives of this Subproject include:

- Establish standards for engineering documents and engineering document management
- Provide easy access to engineering documents regardless of document format
- Implement a Division-wide, web-enabled Engineering Document Management System having two major application components – a web-based visual data access; and document version control
- Provide web-enabled viewing and collaboration of drawings in 2D and 3D formats for both AutoCAD and InterGraph drawings

- Provide text searches on CAD drawings from the WTD Information Portal
- Provide queries based on drawing attributes in a CAD file via the WTD Information Portal.

5.9.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.9.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

50-102 Engineering Doc Mgt - Part II													
Phase	Tax & Other										TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Fixed Costs	Land ROW			
1 Plan	0	0	0	0	0	0	5276	1682	250	0	7,208	0	7,208
2 Pre-Design	0	0	3750	26250	1500	0	6732	3083	250	0	41,565	0	41,565
3 Final Design	0	0	6250	43750	1500	11250	8915	4764	500	0	76,930	0	76,930
4 Impl Construct	250000	45000	0	0	0	0	0	0	0	0	295,000	0	295,000
4 Impl other	0	0	2500	17500	10500	84375	7096	4821	750	0	127,541	0	127,541
5 Close Out	0	0	0	0	1514	17030	4774	3432	757	0	27,506	0	27,506
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	44250	44,250
TOTALS:	250,000	45,000	12,500	87,500	15,014	112,655	32,793	17,781	2,507	0	575,750	44,250	620,000

5.10. Subproject: Engineering Document Management System - Part III

The Engineering Document Management System is to be implemented in four steps, referred to as Part I, Part II, Part III, and Part IV. These steps are described below.

Part I establishes engineering document standards and document identification labeling standards. It also moves existing CAD files to *.pdf* format for viewing by appropriate staff throughout the Division via the Information Portal.

Part II upgrades the Division's existing AutoCAD system to the newest web-enabled version to enable the viewing of dynamic CAD maps by appropriate staff throughout the Division via the Information Portal.

Part III implements a web-based application – to be deployed via the Information Portal – for the viewing and collaborative editing of CAD drawings

Part IV implements document version control – deployed via the Information Portal – and automates workflow associated with engineering document management.

5.10.1. Subproject ID

423493-50-103

5.10.2. Project Association

Infrastructure Data Management Project

5.10.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.10.4. Subproject Justification

This Subproject will provide the following benefits to the Division:

- Increases productivity; reduces paper; automates workflow; reduces time spent locating maps and documents associated with infrastructure assets
- Unifies all engineering document management efforts within the Division
- Improves support for changes to as-built drawings
- Facilitates collaborative efforts among engineering, plant, and planning staff
- Improves the speed and accuracy of infrastructure planning and change decisions.

5.10.5. Subproject Objectives

The objectives of this Subproject include:

- Establish standards for engineering documents and engineering document management
- Provide easy access to engineering documents regardless of document format
- Implement a Division-wide, web-enabled Engineering Document Management System having two major application components – a web-based visual data access; and document version control
- Provide web-enabled viewing and collaboration of drawings in 2D and 3D formats for both AutoCAD and InterGraph drawings

- Provide text searches on CAD drawings from the WTD Information Portal
- Provide queries based on drawing attributes in a CAD file via the WTD Information Portal.

5.10.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

Computer Systems Planning Study

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.10.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

50-103 Engineering Doc Mgt - Part III													
Phase	Construct	Tax & Construct Conting	In-House Eng	In-House Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
1 Plan	0	0	0	0	0	0	8552	3693	600	0	12,845	0	12,845
2 Pre-Design	0	0	8997	62978	3599	0	10911	6771	600	0	93,856	0	93,856
3 Final Design	0	0	14995	104964	3599	26991	14450	10465	1200	0	176,663	0	176,663
4 Impl Construct	599793	107963	0	0	0	0	0	0	0	0	707,756	0	707,756
4 Impl other	0	0	5998	41986	25191	202430	11501	10588	1799	0	299,493	0	299,493
5 Close Out	0	0	0	0	3634	40884	7743	7542	1817	0	61,620	0	61,620
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	97766	97,766
TOTALS:	599,793	107,963	29,990	209,928	36,023	270,305	53,157	39,060	6,016	0	1352234	97,766	1,450,000

5.11. Subproject: Infrastructure Data Management System - Part I

The implementation of a GIS-centric Infrastructure Data Management System is to take place in four steps, referred to as Parts I, II, III, and IV. These steps are summarized below.

Part I implements the Wastewater Program GIS Database, including database design, data standards, and data conversion. The GIS Database is to be hosted by the GIS Team, which is a part of the IT group of the Department of Natural Resources (DNR).

Part II implements an initial series of priority GIS-enabled applications via the Information Portal. The applications implemented in this step will support asset and maintenance management.

Part III implements an additional series of GIS-enabled applications, making use of both the Information Portal and the Integration Bus. The applications implemented in this step require the data-level integration of GIS with such systems as PIMS, Repair/Replacement, Facility Inspection, and Inflow & Infiltration.

Part IV implements upgrade modeling applications – such as conveyance modeling – using both the Information Portal and the Integration Bus.

5.11.1. Subproject ID

423493-50-105

5.11.2. Project Association

Infrastructure Data Management Project

5.11.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.11.4. Subproject Justification

Data about the Division's infrastructure – its facilities and equipment – is critical for effective operations and maintenance. This Subproject implements a system for managing this critical infrastructure data in a GIS-centric technical platform. As is the case for the more effective wastewater utilities throughout the United States, it is essential that the Division make GIS the core technical platform for its infrastructure data management. The configuration and linkages of Division facilities can only be stored and utilized effectively with GIS technology.

5.11.5. Subproject Objectives

This Subproject addresses the Division-wide need to capture and distribute geographical information about:

- Division facilities and equipment, including plant and offsite
- Facilities and equipment of other agencies, such as water, transportation
- Industrial waste discharge.

This Subproject also addresses the Division-wide need for a GIS database to support conveyance modeling, industrial discharge modeling, and other modeling applications. For instance, conveyance

modeling requires location and configuration data regarding the Division's conveyance systems that must be captured, stored, and maintained in a GIS database.

5.11.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

- Construction Subproject Management
- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.11.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

50-105 Infrastructure Data Mgt Part I														
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM		Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT		TOTAL with Contingency
	Construct	Conting			CM	CM						Project	Conting	
1 Plan	0	0	0	0	0	0	0	11383	4916	798	0	17,098	0	17,098
2 Pre-Design	0	0	11975	107777	4790	0	0	14523	9013	798	0	148,876	0	148,876
3 Final Design	0	0	19959	179628	4790	27942	0	19233	13929	1597	0	267,078	0	267,078
4 Impl Construct	798345	143702	0	0	0	0	0	0	0	0	0	942,048	0	942,048
4 Impl other	0	0	7983	71851	33531	209566	15308	14093	2395	0	0	354,727	0	354,727
5 Close Out	0	0	0	0	4845	42396	0	10323	10056	2423	0	70,044	0	70,044
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0	-
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	0	130130	130,130
TOTALS:	798,345	143,702	39,917	359,255	47,956	279,904	70,771	52,007	8,011	0	1799870	130,130	1,930,000	

5.12. Subproject: Infrastructure Data Management System - Part II

The implementation of a GIS-centric Infrastructure Data Management System is to take place in four steps, referred to as Parts I, II, III, and IV. These steps are summarized below.

Part I implements the Wastewater Program GIS Database, including database design, data standards, and data conversion. The GIS Database is to be hosted by the GIS Team, which is a part of the IT group of the Department of Natural Resources (DNR).

Part II implements an initial series of priority GIS-enabled applications via the Information Portal. The applications implemented in this step will support asset and maintenance management.

Part III implements an additional series of GIS-enabled applications, making use of both the Information Portal and the Integration Bus. The applications implemented in this step require the data-level integration of GIS with such systems as PIMS, Repair/Replacement, Facility Inspection, and Inflow & Infiltration.

Part IV implements upgrade modeling applications – such as conveyance modeling – using both the Information Portal and the Integration Bus.

5.12.1. Subproject ID

423493-50-106

5.12.2. Project Association

Infrastructure Data Management Project

5.12.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.12.4. Subproject Justification

Data about the Division's infrastructure – its facilities and equipment – is critical for effective operations and maintenance. This Subproject implements a system for managing this critical infrastructure data in a GIS-centric technical platform. As is the case for the more effective wastewater utilities throughout the United States, it is essential that the Division make GIS the core technical platform for its infrastructure data management. The configuration and linkages of Division facilities can only be stored and utilized effectively with GIS technology.

5.12.5. Subproject Objectives

This Subproject addresses the Division-wide need to capture and distribute geographical information about:

- Division facilities and equipment, including plant and offsite
- Facilities and equipment of other agencies, such as water, transportation
- Industrial waste discharge.

This Subproject also addresses the Division-wide need for a GIS database to support conveyance modeling, industrial discharge modeling, and other modeling applications. For instance, conveyance modeling requires location and configuration data regarding the Division's conveyance systems that must be captured, stored, and maintained in a GIS database.

5.12.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- **Establish Subproject Mission**
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.12.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

50-106 Infrastructure Data Mgt Part II													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM		CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT		TOTAL with Contingency
	Construct	Conting			CM	Consult CM					Project	Conting	
1 Plan	0	0	0	0	0	0	7404	2360	351	0	10,114	0	10,114
2 Pre-Design	0	0	5262	47359	2105	0	9446	4326	351	0	68,849	0	68,849
3 Final Design	0	0	8770	78931	2105	12278	12510	6686	702	0	121,982	0	121,982
4 Impl Construct	350806	63145	0	0	0	0	0	0	0	0	413,952	0	413,952
4 Impl other	0	0	3508	31573	14734	92087	9957	6764	1052	0	159,675	0	159,675
5 Close Out	0	0	0	0	2127	18613	6709	4822	1064	0	33,335	0	33,335
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	-
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	62093	62,093
TOTALS:	350,806	63,145	17,540	157,863	21,071	122,978	46,026	24,958	3,519	0	807907	62,093	870,000

5.13. Subproject: West Point Plant Facilities Data Repository

This Subproject is to complete long overdue work on the completion of CAD drawings for the West Point Treatment Plan. It is assumed that much of the labor associated with completing these drawings can and will be outsourced.

The data contained in West Point Plant CAD databases are essential for the on-going operations management, as well as the asset and maintenance management of the West Point Plant. In addition, this data will prove highly valuable to the Division as a whole for planning and other business purposes.

5.13.1. Subproject ID

423493-50-109

5.13.2. Project Association

Infrastructure Data Management Project

5.13.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.13.4. Subproject Justification

This Subproject addresses the Division's need to have a complete set of CAD drawings for its West Point Treatment Plant facilities. The data contained within these CAD drawings is essential for the effective operations and maintenance of the West Point Treatment Plant. The database created by this Subproject will either feed or integrate with other Division information systems, including the Engineering Document Management System, the Infrastructure Data Management System, the Asset Management System, the Maintenance Management System and others.

5.13.5. Subproject Objectives

The objectives of this Subproject include:

- Evaluation and selection of CAD data conversion alternatives, including external data conversion specialty houses
- Conversion of existing CAD data, largely residing in the MicroStation CAD database, to AutoCAD and/or GIS formats
- Synchronization of West Point CAD data with the Asset Hierarchy standards established in the Asset Management System Subproject.

5.13.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition

- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- **Establish Subproject Mission**
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.13.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

50-109 West Plant facilities Data Repository													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	11407	4926	800	0	17,133	0	17,133
2 Pre-Design	0	0	12000	60000	4800	0	14553	9032	800	0	101,185	0	101,185
3 Final Design	0	0	20000	100000	4800	36000	19273	13958	1600	0	195,631	0	195,631
4 Impl Construct	800000	144000	0	0	0	0	0	0	0	0	944,000	0	944,000
4 Impl other	0	0	8000	40000	33600	270000	15340	14122	2400	0	383,462	0	383,462
5 Close Out	0	0	0	0	4847	54531	10327	10060	2424	0	82,189	0	82189
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	130400	130,400
TOTALS:	800,000	144,000	40,000	200,000	48,047	360,531	70,901	52,098	8,024	0	1723600	130,400	1,854,000

5.14. Subproject: Information Portal – Part I

This Subproject initiates the construction of the WTD Technology Architecture (described in Section 5.3) by implementing a Division-wide Information Portal. Later Subprojects in this Computing Infrastructure Project will implement additional components of the Technology Architecture, such as the Integration Bus (for data and workflow integration and automation) and the eBusiness Connector (for Internet-based eBusiness transactions).

As the Division continues to publish more and more information on its Intranet, and as a new set of web-based applications begin to be implemented within the Division, the need for an Information Portal becomes critical. Rigorous and authoritative surveys of both commercial and governmental organizations that have implemented information portals attest to the tremendous return on computing assets that can be attained. The Wastewater Treatment Division, as with many other governmental agencies, must commit significant funds to its computing capabilities in order to meet ever-more stringent regulatory and operational requirements in the face of dwindling labor resources. The productivity of its labor force must be maximized, and information portals are a proven technology for achieving significant productivity and efficiency gains.

The Division's Information Portal will enhance the value of new and existing information technology assets. And, equally significant, the Information Portal will place the Division on the path towards eBusiness. The Information Portal will provide a first and vital technical resource for eBusiness, including eCommerce (that is, the procurement of supplies and services via the Internet), eCollaboration (ubiquitous, location-independent communication and coordination among employees), and others.

A complete range of information and computing resources will be available via any computing platform to each and every employee within the Division, including:

- Documents such as spreadsheets, memos, contracts, work orders, Web pages, and email messages;
- Information and services from software applications such as asset management, maintenance management, biological and chemical analyses, human resources, finance, and others;
- eBusiness services being deployed to automate processes such as benefits administration, expense reporting, timekeeping, and procurement;
- Internet services such as wastewater regulatory updates, wastewater industry benchmarking, and other information hosted by other parties on the World Wide Web; and
- Division-wide Forums for employees, other agencies, and contractors to collaborate more effectively.

The Information Portal is to be implemented in three steps, referred to as Part I, Part II, and Part III. Part I accomplishes the following:

- Implements the core functional elements of the Information Portal
- Deploys an initial set of web-based applications and data via the Information Portal, which could include applications for capital improvement Subprojects reporting, asset management tracking, maintenance management, Balanced Scorecard, finance and payroll data from IBIS and PeopleSoft, and Division employee safety and training information.

Part II accomplishes the following:

- Implements more advanced functional elements of the Information Portal
- Expands deployment of CIP, asset, maintenance, Subproject management, finance, payroll, and Balanced Scorecard information

- Deploys new applications, such as WTD Employee Information System, Operations Decision Support System, Productivity Metrics, GIS maps, Budgeting Reporting & Information System, and others.

Part III accomplishes the following:

- Automates workflow for operations decision making and reporting, asset management, maintenance management, purchasing, human resources tracking, financial and cost analysis and reporting, and Subproject management

5.14.1. Subproject ID

423493-90-104

5.14.2. Project Association

Computing Infrastructure Project

5.14.3. Subproject Sponsor(s)

All Section Managers

5.14.4. Subproject Justification

A Wastewater Treatment Division Information Portal provides a standard user interface for accessing all databases and applications, dramatically reducing training, support and maintenance requirements for IT resources. The implementation of a Wastewater Treatment Division Information Portal provides both technical and business benefits. The technical benefits include an enhanced ability to manage documents, streamline information distribution, integrate applications, deliver IT services more cost-effectively, lower intranet administration, and reduce IT infrastructure costs. The business benefits include reducing the time spent searching for information, improving employee collaboration, lowering training costs, providing a unified view of business and operations, and providing both customers and employees with self-service applications. It also positions the Division for future eBusiness Projects that are becoming more and more critical to governmental agencies.

The Information Portal will improve management of the content – the information, facts, and documents – that are being published in ever-increasing volumes via the Division’s Intranet (Web site). Without the Information Portal, it is projected that the Division will either need to increase Web support staffing or lower expectations of what can be published via the Intranet. Furthermore, by providing standard authoring templates that automate formatting and information composition, the Information Portal enables consistent and automatic application of access control, version control and personalization. This ensures that published Division content on the Web has visual consistency, integrity, and audit ability.

5.14.5. Subproject Objectives

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management.

The major business objectives for this Subproject are:

- Implement the means of making the WTD Intranet the main channel for all communications among employees and between WTD staff and external agencies and contractors, replacing all existing Division Intranet and Web Site technologies and practices
- Provide the means of scaling up the capabilities of WTD Web publishing so that increasing volumes of data and documents can be shared on-line

- Provide the means of implementing and managing WTD standards for Web publishing
- Roll all current Intranet publishing efforts into the Information Portal – including newsletters, manuals, Standard Operating Procedures (SOPs), reports, issues logs, etc. – so that published information is managed to Division-wide standards for quality and format
- Implement the software tools required for easier and more efficient management of Web publishing and data sharing efforts Division-wide
- Provide for improved quality and rapidity of deploying new applications
- Reduce the need for employees to utilize information technology resources (either internal or external to the Division) in order to access applications and data, generate ad hoc reports, search databases, and filter information requests
- Eliminate computer platform differences – such as the differences between Apple Macintosh and Win/Tel PCs – so that users can be equally effective no matter what computer platform they must work with
- Provide links to other agency Web sites, including that of the Department of Natural Resources.

The major technical objectives for Information Portal, Part I include (refer to Technology Architecture, Section 5.3):

- Implement the system management capabilities of the Information Portal, including Report Scheduling and Alerting, Data and Document Search, Audit and Logging Services, Load Balancing Services, XML Services, Data Access Services, and Repository Management Services
- Implement Content Panes for WTD Intranet, State & Local Government Web Sites, News & Weather Feeds, and Subscription Services
- Implement Productivity Panes for Calendar, E-Mail, and Messaging
- Implement Application Panes for web-based applications, such as those for capital improvement Subprojects reporting, data graphing, data analysis, static viewing of Balanced Scorecard data, static viewing of GIS maps, asset management tracking, maintenance management, and viewing of historical data from IBIS and PeopleSoft
- Implement Personalization, including Page Builder, Content Filters, Alerts, Folders and Channels
- Implement E-Intelligence in conjunction with the implementation of the Operations Decision Support System (under the Plant Control Project)
- Implement Security, including Authentication and LDAP Directory Services.

5.14.6. Overview of Subproject Phases

Planning Phase

Subproject Planning. A Subproject plan will be developed and reviewed with the Division to ensure it meshes with other Division Subprojects and activities. The Subproject will be linked to all other relevant program elements and managed within the program management structure. A Subproject team will be assembled and initiated in the program-standard procedures and practices for Subproject management and control.

Pre-Design Phase

Requirements & Functional Specification. The requirements and functional specifications for the Information Portal will be elicited, analyzed, and documented. These specifications will provide standards, architecture, and component definitions for a Division-wide Information Portal. The specifications will include current and future requirements for integration with other web, application management, data integration middleware, and workflow automation middleware technologies.

Information Categorization. WTD business, asset, Subproject, and operations information will be organized to enable more efficient data and document access via the Web. In addition to making structured data in databases more widely sharable, this Division-wide information taxonomy will also provide a means of organizing unstructured data that is currently not in databases, as well as invaluable knowledge held by key staff that is presently not accessible.

User Personalization Templates. This step designs a set of user templates to guide end-users in the personalization of their portal interface to Division data and documents. These templates will ensure a consistent look and feel to all user interfaces, as well as consistent information accessibility and interpretation.

Final Design Phase

Select Core Application Software. Information Portal solutions will be evaluated and selected.

Select Database and Data Management Software. The Information Portal will require a database system to store its configurations and the Division's information taxonomy. This step will select the database management engine and the data management software to be used in support of the Information Portal. It is expected that this selection decision will be conducted in parallel with other database software selections made in other Program Projects so that a consistent WTD data management architecture emerges.

Select Hardware. During this step, the servers required to support a Division-wide deployment of the Information Portal will be evaluated and selected.

Detailed Implementation Planning. A detailed implementation plan will be developed for hardware and software implementation, as well as for the transition of all existing Division Intranet and Web Site applications.

Implementation (Construction) Phase

Procurement Support. Support will be provided to the Division during the procurement of all hardware and software components.

Implement Hardware. This step implements the Information Portal servers and connects them to relevant components of the Division's network.

Implement Information Management Procedures. This step implements the procedures for initial and on-going information capture, certification, categorization, and maintenance.

Implement Database and Data Management. This step accomplishes the configuration of the Information Portal's database management system based on the WTD information taxonomy.

Implement Information Portal Applications. This effort implements the initial set of applications to be deployed via the Information Portal, including the establishment of links to relevant data sources and applications. Existing Division Intranet and Web Site applications and pages will be migrated at this time.

Deploy Information Portal. This step loads any required Information Portal software onto end-user computers. It is assumed that all Division computers already have the Microsoft Internet Explorer web browser software loaded and ready to activate.

Implementation (Other) Phase

Complete Application Acceptance Testing. During this step, a thorough acceptance testing process will be utilized.

Design and Implement System Maintenance Practices and Procedures. This step establishes the practices and procedures for the effective, on-going maintenance of the Information Portal. It establishes practices and procedures – including documentation – for database backups, software updates, failover, recovery, access control, as well as for review and adjustment of work processes to effectively use the information and applications deployed via the Information Portal.

Deployment and Training. Potential users of the Information Portal will be trained in its use, as well as in how to personalize their interface to Division data and documents. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for Information Portal users. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training, which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

5.14.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-104 Information Portal Part I													
Phase	Tax & Construct	Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
1 Plan	0	0	0	0	0	0	6298	2007	298	0	8,603	0	8,603
2 Pre-Design	0	0	4476	31331	1790	0	8035	3680	298	0	49,610	0	49,610
3 Final Design	0	0	7460	52218	1790	13427	10641	5687	597	0	91,819	0	91,819
4 Impl Construct	298387	53710	0	0	0	0	0	0	0	0	352,097	0	352,097
4 Impl other	0	0	2984	20887	12532	100706	8469	5754	895	0	152,227	0	152,227
5 Close Out	0	0	0	0	1807	20326	5698	4096	903	0	32,830	0	32,830
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	52815	52815
TOTALS:	298,387	53,710	14,919	104,435	17,920	134,459	39,140	21,223	2,992	0	687185	52815	740000

5.15. Subproject: Information Portal - Part II

The major Subproject milestones for Part I include:

- Implement prototype web-based Information Portal applications for CIP Reporting, data graphing, data analysis, static viewing of Balanced Scorecard data, static viewing of GIS maps, and viewing of historical data from IBIS and PeopleSoft
- Links the Information Portal to the basic messaging capabilities of the Integration Bus

The major Subproject milestones for Part II include:

- Deploys applications for Asset Management, Maintenance Management, Subproject Management and Control, Operations Decision Support, and preliminary Budget Tracking via the Information Portal
- Links the Information Portal to the Data Integration capabilities of the Integration Bus

The major Subproject milestones for Part III include:

- Via the Information Portal, deploys applications for Engineering Document Management, Budget Reporting & Information, dynamic viewing of Balanced Scorecard information, dynamic viewing of GIS maps
- Links the Information Portal to the Workflow Automation capabilities of the Integration Bus

5.15.1. Subproject ID

423493-90-105

5.15.2. Project Association

Computing Infrastructure Project

5.15.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.15.4. Subproject Justification

A Wastewater Treatment Division Information Portal provides a standard user interface for accessing all databases and applications, dramatically reducing training, support and maintenance requirements for IT resources. The implementation of a Wastewater Treatment Division Information Portal provides both technical and business benefits.

The technical benefits include an enhanced ability to manage documents, streamline information distribution, integrate applications, deliver IT services more cost-effectively, lower intranet administration, and reduce IT infrastructure costs.

The business benefits include reducing the time spent searching for information, improving employee collaboration, lowering training costs, providing a unified view of business and operations, and providing both customers and employees with self-service applications.

5.15.5. Subproject Objectives

The major Subproject objectives for Part II include:

- Deployment of applications for Asset Management, Maintenance Management, Subproject Management and Control, Operations Decision Support, and preliminary Budget Tracking via the Information Portal
- Linking the Information Portal to the Data Integration capabilities of the Integration Bus.

5.15.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.15.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-105 Information Portal Part II													
Phase	Construct	Tax & Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
1 Plan	0	0	0	0	0	0	11413	4929	800	0	17,142	0	17,142
2 Pre-Design	0	0	12006	84043	4802	0	14561	9036	800	0	125,250	0	125,250
3 Final Design	0	0	20010	140072	4802	36019	19283	13965	1601	0	235,753	0	235,753
4 Impl Construct	800414	144074	0	0	0	0	0	0	0	0	944,488	0	944,488
4 Impl other	0	0	8004	56029	33617	270140	15348	14129	2401	0	399,669	0	399,669
5 Close Out	0	0	0	0	4850	54559	10333	10065	2425	0	82,231	0	82,231
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	130467	130467
TOTALS:	800,414	144,074	40,021	280,145	48,072	360,717	70,937	52,125	8,028	0	1804533	130467	1935000

5.16. Subproject: Information Portal - Part III

The major Subproject milestones for Part I include:

- Implement prototype web-based Information Portal applications for CIP Reporting, data graphing, data analysis, static viewing of Balanced Scorecard data, static viewing of GIS maps, and viewing of historical data from IBIS and PeopleSoft
- Links the Information Portal to the basic messaging capabilities of the Integration Bus.

The major Subproject milestones for Part II include:

- Deploys applications for Asset Management, Maintenance Management, Subproject Management and Control, Operations Decision Support, and preliminary Budget Tracking via the Information Portal
- Links the Information Portal to the Data Integration capabilities of the Integration Bus

The major Subproject milestones for Part III include:

- *Via the Information Portal, deploys applications for Engineering Document Management, Budget Reporting & Information, dynamic viewing of Balanced Scorecard information, dynamic viewing of GIS maps*
- *Links the Information Portal to the Workflow Automation capabilities of the Integration Bus*

5.16.1. Subproject ID

423493-90-106

5.16.2. Project Association

Computing Infrastructure Project

5.16.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.16.4. Subproject Justification

A Wastewater Treatment Division Information Portal provides a standard user interface for accessing all databases and applications, dramatically reducing training, support and maintenance requirements for IT resources. The implementation of a Wastewater Treatment Division Information Portal provides both technical and business benefits. The technical benefits include an enhanced ability to manage documents, streamline information distribution, integrate applications, deliver IT services more cost-effectively, lower intranet administration, and reduce IT infrastructure costs. The business benefits include reducing the time spent searching for information, improving employee collaboration, lowering training costs, providing a unified view of business and operations, and providing both customers and employees with self-service applications.

The Information Portal is to be implemented in three steps, referred to as Part I, Part II, and Part III. Part I accomplishes the following:

- Develops and implements the initial, prototype Information Portal
- Deploys an initial set of web-based applications and data, including the CIP Reporting & Information System, asset management, maintenance management, work management, static Balanced Scorecard, finance and payroll data from IBIS and PeopleSoft, and the WTD Employee Information System

Part II accomplishes the following:

- Expanded deployment of CIP, asset, maintenance, Subproject management, finance, payroll, and Balanced Scorecard information
- Deploys new applications, such as WTD Employee Information System, Operations Decision Support System, Productivity Metrics, GIS maps, Budgeting Reporting & Information System, and others

Part III accomplishes the following:

- Deploys applications for workflow automation of operations, asset, maintenance, and Subproject management processes

5.16.5. Subproject Objectives

Part III's Subproject objective includes the following:

- Deployment of applications for workflow automation of operations, asset, maintenance, and Subproject management processes.

5.16.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.16.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-106 Information Portal Part III													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	7107	3069	498	0	10,675	0	10,675
2 Pre-Design	0	0	7477	52337	2991	0	9068	5627	498	0	77,998	0	77,998
3 Final Design	0	0	12461	87229	2991	22430	12008	8697	997	0	146,813	0	146,813
4 Impl Construct	498449	89721	0	0	0	0	0	0	0	0	588,170	0	588,170
4 Impl other	0	0	4984	34891	20935	168226	9558	8799	1495	0	248,889	0	248,889
5 Close Out	0	0	0	0	3020	33976	6434	6268	1510	0	51,209	0	51,209
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	81247	81247
TOTALS:	498,449	89,721	24,922	174,457	29,936	224,633	44,175	32,460	4,999	0	1123753	81247	1205000

5.17. Subproject: Integration Bus - Part I

The Integration Bus is to be implemented in two steps, referred to as Part I and Part II.

Part I implements the data-level integration components of the Integration Bus, enabling priority applications within WTD to access WTD databases regardless of the data structure, data format, or database technology.

Part II implements the workflow automation components of the Integration Bus, enabling the automation of application-to-application links and reducing the reliance on human intervention to establish and maintain integrated applications.

5.17.1. Subproject ID

423493-90-108

5.17.2. Project Association

Computing Infrastructure Project

5.17.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.17.4. Subproject Justification

The Integration Bus extends the functionality and capabilities of the WTD Information Portal, resulting in further productivity and cost savings benefits. The technical benefits include an enhanced ability to manage documents, streamline information distribution, integrate applications, deliver IT services more cost-effectively, lower intranet administration, and reduce IT infrastructure costs. The business benefits include reducing the time spent searching for information, improving employee collaboration, lowering training costs, providing a unified view of business and operations, and providing both customers and employees with self-service applications.

5.17.5. Subproject Objectives

This Subproject implement's Part I, which will provide the data-level integration components of the Integration Bus, enabling priority applications within WTD to access WTD databases regardless of the data structure, data format, or database technology.

5.17.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition

- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- **Establish Subproject Mission**
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review

Computer Systems Planning Study

- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.17.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-108 Integration Bus Part I													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	10705	4623	751	0	16,079	0	16,079
2 Pre-Design	0	0	11262	78831	4505	0	13658	8476	751	0	117,482	0	117,482
3 Final Design	0	0	18769	131386	4505	33785	18087	13099	1502	0	221,133	0	221,133
4 Impl Construct	750776	135140	0	0	0	0	0	0	0	0	885,915	0	885,915
4 Impl other	0	0	7508	52554	31533	253387	14396	13253	2252	0	374,883	0	374,883
5 Close Out	0	0	0	0	4549	51175	9692	9441	2274	0	77,132	0	77,132
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	122376	122376
TOTALS:	750,776	135,140	37,539	262,771	45,091	338,347	66,538	48,892	7,530	0	1692624	122376	1815000

5.18. Subproject: Integration Bus - Part II

The Integration Bus is to be implemented in two steps, referred to as Part I and Part II.

Part I implements the data-level integration components of the Integration Bus, enabling priority applications within WTD to access WTD databases regardless of the data structure, data format, or database technology.

Part II implements the workflow automation components of the Integration Bus, enabling the automation of application-to-application links and reducing the reliance on human intervention to establish and maintain integrated applications.

5.18.1. Subproject ID

423493-90-109

5.18.2. Project Association

Computing Infrastructure Project

5.18.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.18.4. Subproject Justification

The Integration Bus extends the functionality and capabilities of the WTD Information Portal, resulting in further productivity and cost savings benefits. The technical benefits include an enhanced ability to manage documents, streamline information distribution, integrate applications, deliver IT services more cost-effectively, lower intranet administration, and reduce IT infrastructure costs. The business benefits include reducing the time spent searching for information, improving employee collaboration, lowering training costs, providing a unified view of business and operations, and providing both customers and employees with self-service applications.

5.18.5. Subproject Objectives

This Subproject implements Part II, which provides the workflow automation components of the Integration Bus, enabling the automation of application-to-application links and reducing the reliance on human intervention to establish and maintain integrated applications.

5.18.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition

- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- **Establish Subproject Mission**
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review

- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.18.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-109 Integration Bus Part II													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	10705	4623	751	0	16,079	0	16,079
2 Pre-Design	0	0	11262	78831	4505	0	13658	8476	751	0	117,482	0	117,482
3 Final Design	0	0	18769	131386	4505	33785	18087	13099	1502	0	221,133	0	221,133
4 Impl Construct	750776	135140	0	0	0	0	0	0	0	0	885,915	0	885,915
4 Impl other	0	0	7508	52554	31533	253387	14396	13253	2252	0	374,883	0	374,883
5 Close Out	0	0	0	0	4549	51175	9692	9441	2274	0	77,132	0	77,132
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	122376	122376
TOTALS:	750,776	135,140	37,539	262,771	45,091	338,347	66,538	48,892	7,530	0	1692624	122376	1815000

5.19. Subproject: Mobile Connectivity - Part I

Mobile Connectivity is to be implemented in three steps, referred to as Part I, Part II and Part III.

Part I implement's the mobile information distribution capabilities of the Information Portal, delineates WTD authorized wireless devices, and configures those mobile devices for access to the Information Portal.

Part II implements enhanced mobile information distribution capabilities, especially graphical information such as CAD and GIS; Part II also implements 3rd-Generation mobile devices within the WTD.

Part III extends the capabilities of the wireless devices available and distribute this capability WTD wide.

5.19.1. Subproject ID

423493-90-110

5.19.2. Project Association

Computing Infrastructure Project

5.19.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.19.4. Subproject Justification

Mobile networking and connectivity are rapidly becoming commonplace in utilities. The Division plans to improve field staff productivity by providing ready access to facilities and equipment information, including electronic Operations & Maintenance Manuals and electronic Work Order status information. In addition, CAD and GIS maps can be viewed by field staff. Other WTD staff, including Division management, also need to access a wide variety of information via mobile devices, thereby cutting down on the time and effort required to find information and access it when needed.

5.19.5. Subproject Objectives

Part I implements basic mobile information access via the WTD Information Portal.

5.19.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition

- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- **Establish Subproject Mission**
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Computer Systems Planning Study

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.19.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-110 Mobile Connectivity Part I													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	15012	4784	711	0	20,507	0	20,507
2 Pre-Design	0	0	10669	53345	4268	0	19153	8771	711	0	96,917	0	96,917
3 Final Design	0	0	17782	88908	4268	14225	25365	13555	1423	0	165,525	0	165,525
4 Impl Construct	711268	128028	0	0	0	0	0	0	0	0	839,296	0	839,296
4 Impl other	0	0	7113	35563	29873	106690	20188	13715	2134	0	215,276	0	215,276
5 Close Out	0	0	0	0	4327	21636	13647	9810	2164	0	51,584	0	51,584
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	125894	125894
TOTALS:	711,268	128,028	35,563	177,817	42,736	142,552	93,364	50,635	7,143	0	1389106	125894	1515000

5.20. Subproject: Mobile Connectivity - Part II

Mobile Connectivity is to be implemented in two steps, referred to as Part I, Part II and Part III.

Part I implements the mobile information distribution capabilities of the Information Portal, delineates WTD authorized wireless devices, and configures those mobile devices for access to the Information Portal.

Part II implements enhanced mobile information distribution capabilities, especially graphical information such as CAD and GIS; Part II also implements 3rd-Generation mobile devices within the WTD.

Part III extends the capabilities of the wireless devices available and distribute this capability WTD wide.

5.20.1. Subproject ID

423493-90-111

5.20.2. Project Association

Computing Infrastructure Project

5.20.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

5.20.4. Subproject Justification

Mobile networking and connectivity are rapidly becoming commonplace in utilities. The Division plans to improve field staff productivity by providing ready access to facilities and equipment information, including electronic Operations & Maintenance Manuals and electronic Work Order status information. In addition, CAD and GIS maps can be viewed by field staff. Other WTD staff, including Division management, also need to access a wide variety of information via mobile devices, thereby cutting down on the time and effort required to find information and access it when needed.

5.20.5. Subproject Objectives

Part II implements enhanced mobile information access via 3rd-Generation mobile devices.

5.20.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition

- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review

- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

5.20.7. Cost and Schedule

Refer to Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix for schedule information, and to the cost summary table for the cost by year. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-111 Mobile Connectivity Part II													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingency
	Construct	Conting											
1 Plan	0	0	0	0	0	0	19322	6158	915	0	26,395	0	26,395
2 Pre-Design	0	0	13732	68662	5493	0	24652	11289	915	0	124,744	0	124,744
3 Final Design	0	0	22887	114437	5493	18310	32647	17447	1831	0	213,053	0	213,053
4 Impl Construct	915493	164789	0	0	0	0	0	0	0	0	1,080,282	0	1,080,282
4 Impl other	0	0	9155	45775	38451	137324	25985	17653	2746	0	277,088	0	277,088
5 Close Out	0	0	0	0	5570	27849	17565	12627	2785	0	66396	0	66396
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	162042	162042
TOTALS:	915,493	164,789	45,775	228,873	55,006	183,483	120,172	65,174	9,193	0	1787958	162042	1950000

6. DEFERRED PROJECTS - SUBPROJECT DEFINITIONS

6.1. Deferred Projects

The Deferred Projects are briefly listed here for your immediate reference. For each Deferred Project, the subprojects associated with it are included.

Project Control Systems Project

- Subproject No. 20-103 – Project Management and Control Applications, Part II
- Subproject No. 20-104 – Project Management and Control Applications, Part III

Water Quality Management Project

- Subproject No. 30-102– PIMS Septage Bio-solids Integration

Asset / Maintenance Management Project

- Subproject No. 40-104 – Maintenance Management System, Part III

Infrastructure Data Management Project

- Subproject No. 50-104– Engineering Document Management, Part IV
- Subproject No. 50-107– Infrastructure Data Management System - Part III

Human Resources Project

- Subproject No. 60-101– WTD Employee Information System

Business Support Project

- Subproject No. 70-101– County Finance and HR Integration – Part I
- Subproject No. 70-102– County Finance and HR Integration – Part II

Productivity Metrics Project

- Subproject No. 80-101 – Budget Planning and Tracking System
- Subproject No. 80-102 – Productivity Metrics

Computing Infrastructure Project

- Subproject No. 90-107 – eBusiness
- Subproject No. 90-112 – Mobile Connectivity, Part III

Each Subproject is described in detail in the following Sections. Each Subproject description includes the following:

- Subproject overview
- Subproject identifier number
- Project association identifier
- Subproject sponsor (usually a Section Manager or Supervisor that is the primary beneficiary of the Subproject)
- Subproject justification

- Subproject objectives
- Description of the Subproject phases required in implementing it.

6.2. Subproject: Project Management and Control Applications – Part II

The Division is experiencing a rapidly expanding need for Project management and Project control applications to support its Capital Improvement Programs. The Division needs to take a series of steps to address this need and avoid an emergency situation. This Subproject implements, in three steps (Part I, Part II, and Part III), the applications that will be required to avoid an emergency situation. These applications include, but are not limited to, the following:

- Program & Project Identity and Characteristics
- Program & Project Budgeting
- Contract Administration
- Project Planning & Scheduling
- Project & Activity Cost Tracking
- Construction Management
- Program & Project Document/Records Control & Tracking
- Certification & Approval
- Permit Status
- Compliance Issues & Deadlines
- Required Actions & Improvements.

This is Part II of the Project Management and Applications Subproject, 20-103. It is the second step of this Subproject shown in the table below.

The sequence consist of:

Subproject Sequence	Result
1. 20-102- Part I	Part I establishes consistent, Division-wide standards, procedures and work processes for Project management and control. This step also evaluates and selects software to support the standards. And, finally, it implements at least some of the applications listed above.
2. 20-103 Part II	<i>Part II implements data-level integration of the Project Management & Control Applications to other information systems such as Finance, Human Resources, Inventory Control, Engineering Document Management, CAD/GIS, and others.</i>
3. 20-104 Part III	Part III automates many of the data-level integration links and some of the significant workflow(s) associated with the Project Management & Control Applications, especially those associated with coordination, collaboration, review and approval, and document routing.

6.2.1. Subproject ID

423493-20-103

6.2.2. Project Association

Project Control Project

6.2.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.2.4. Subproject Justification

The Division is experiencing a rapidly expanding need for Project management and Project control applications to support its Capital Improvement Programs. There exists over 14 different databases and a dozen or more applications that are currently used to track Projects, prepare invoices, plan for capital improvements, track transmittals, process change orders, schedule Projects, and more in the course of managing WTD capital Projects. Many of these databases have duplicate information in them that need to be reconciled before the information is actually usable. The WTD staff involved spends considerable time gathering the information they need to do their job, from the data needed, to the drawings and schedules used.

It's this problem that has created an information emergency within WTD which needs to be addressed quickly as WTD enters a period of increased Project workload and increased capital dollar expenditures over what is being experienced today. This Subproject will address these needs systematically; gradually improving the data accessibility, accuracy, and currency of certified information used daily to manage these Projects.

6.2.5. Subproject Objectives

The major Subproject objectives for Part II include:

- Implement data-level integration required to link the Project Management & Control Applications to other information systems

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. Specific elements of this Subproject are described in the next section on Subproject Phases / Tasks.

6.2.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and includes:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support

- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and steps.

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase as they apply to the Project Management and Control Applications – Part II Subproject; 20-103:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

Final Design Phase

The final design phase is very heavily influenced by the requirements and alternatives brought forward from the pre-design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation (Construction) Phase

This phase includes activities to administer the Project Management and Control Applications – Part II Subproject; 20-103:

- Construction Subproject Management
- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.2.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

20-103 PM & Control App Part II													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	3076	1329	216	0	4,621	0	4,621
2 Pre-Design	0	0	3236	22654	1294	0	3925	2436	216	0	33,761	0	33,761
3 Final Design	0	0	5394	37756	1294	7551	5198	3764	431	0	61,389	0	61,389
4 Impl Construct	215750	38835	0	0	0	0	0	0	0	0	254,585	0	254,585
4 Impl other	0	0	2157	15102	9061	56634	4137	3809	647	0	91,549	0	91,549
5 Close Out	0	0	0	0	1309	11457	2790	2718	655	0	18,929	0	18,929
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	35167	35167
TOTALS:	215,750	38,835	10,787	75,512	12,960	75,643	19,126	14,055	2,165	0	464833	35167	500000

6.3. Subproject: Project Management and Control Applications Part III

The Division is experiencing a rapidly expanding need for Project management and Project control applications to support its Capital Improvement Programs. The Division needs to take a series of steps to address this need and avoid an emergency situation. This Subproject implements, in three steps (Part I, Part II, and Part III), the applications that will be required to avoid an emergency situation. These applications include, but are not limited to, the following:

- Program & Project Identity and Characteristics
- Program & Project Budgeting
- Contract Administration
- Project Planning & Scheduling
- Project & Activity Cost Tracking
- Construction Management
- Program & Project Document/Records Control & Tracking
- Certification & Approval
- Permit Status
- Compliance Issues & Deadlines
- Required Actions & Improvements.

This is Part III of the Project Management and Applications Subproject; 20-104. It is the third step of this Subproject shown in the table below.

The sequence consist of:

Subproject-Sequence	Result
1. 20-102- Part I	Part I establishes consistent, Division-wide standards, procedures and work processes for Project management and control. This step also evaluates and selects software to support the standards. And, finally, it implements at least some of the applications listed above.
2. 20-103 Part II	Part II implements automated, real-time, data-level integration of the Project Management & Control Applications to other information systems such as Finance, Human Resources, Inventory Control, Engineering Document Management, CAD/GIS, and others.
3. 20-104 Part III	<i>Part III automates the workflow(s) associated with the Project Management & Control Applications, especially those associated with coordination, collaboration, review and approval, and document routing.</i>

6.3.1. Subproject ID

423493-20-104

6.3.2. Project Association

Project Control Project

6.3.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.3.4. Subproject Justification

The Division is experiencing a rapidly expanding need for Project management and Project control applications to support its Capital Improvement Programs. There exists over 14 different databases and a dozen or more applications that are currently used to track Projects, prepare invoices, plan for capital improvements, track transmittals, process change orders, schedule Projects, and more in the course of managing WTD capital Projects. Many of these databases have duplicate information in them that need to be reconciled before the information is actually usable. The WTD staff involved spends considerable time gathering the information they need to do their job, from the data needed, to the drawings and schedules used.

It is this problem that has created an information emergency within WTD, and needs to be addressed quickly as WTD enters a period of increased Project workload and increased capital dollar expenditures over what is being experienced today. This Subproject will address these needs systematically; gradually improving the data accessibility, accuracy, and currency of certified information used daily to manage these Projects.

6.3.5. Subproject Objectives

The major Subproject objectives for Part III include:

- Implement workflow automation for the Project Management & Control Applications

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management.

6.3.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control

- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.3.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

20-104 PM & Control App Part III													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	965	417	68	0	1,450	0	1,450
2 Pre-Design	0	0	1016	4063	406	0	1232	764	68	0	7,549	0	7,549
3 Final Design	0	0	1693	6771	406	1693	1631	1181	135	0	13,512	0	13,512
4 Impl Construct	67715	12189	0	0	0	0	0	0	0	0	79,903	0	79,903
4 Impl other	0	0	677	2709	2844	12696	1298	1195	203	0	21,623	0	21,623
5 Close Out	0	0	0	0	412	2575	878	855	206	0	4,925	0	4,925
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	11037	11037
TOTALS:	67,715	12,189	3,386	13,543	4,069	16,964	6,005	4,413	680	0	128,963	11,037	140,000

6.4. Subproject: PIMS - Septage Biosolids Integration

The Subproject will make use of both the Information Portal and the Integration Bus to (a) integrate LIMS, PIMS, Septage, Biosolids, and GIS; and (b) publish data from these applications for use by other Division staff and outside agencies.

6.4.1. Subproject ID

423493-30-102

6.4.2. Project Association

Water Quality Project

6.4.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.4.4. Subproject Justification

PIMS, Septage, and Biosolids applications are critical to the Division for revenue-generation and, more importantly, for regulatory reasons. It is essential that information be shared among these applications and with GIS and the Environmental Lab's LIMS. This application-to-application integration meets the Division's regulatory reporting needs and increases productivity.

6.4.5. Subproject Objectives

The Subproject objectives include:

- New PIMS, Septage, and Biosolids applications that are web-based, making them easier to maintain, readily deployable via the Information Portal, and easier to use
- New PIMS, Septage, and Biosolids applications will readily integrate with the new Environmental Labs' LIMS, thereby taking advantage of the new features and capabilities of that newly enhanced system.

6.4.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories

Computer Systems Planning Study

- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes

- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.4.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

30-102 PIMS - Septage-Biosolids Integration													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	8555	3695	600	0	12,850	0	12,850
2 Pre-Design	0	0	9000	63000	3600	0	10915	6774	600	0	93,889	0	93,889
3 Final Design	0	0	15000	105000	3600	21000	14455	10468	1200	0	170,723	0	170,723
4 Impl Construct	600000	108000	0	0	0	0	0	0	0	0	708,000	0	708,000
4 Impl other	0	0	6000	42000	25200	157500	11505	10592	1800	0	254,597	0	254,597
5 Close Out	0	0	0	0	3642	31863	7758	7558	1821	0	52,642	0	52,642
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	-
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	97800	97,800
TOTALS:	600,000	108,000	30,000	210,000	36,042	210,363	53,188	39,086	6,021	0	1,292,700	97,800	1,390,500

6.5. Subproject: Maintenance Management Part III

Part I establishes consistent, Division-wide standards, procedures and work processes for maintenance and work management. This step also evaluates the software required to support the newly established standards, procedures and work processes. It is assumed that the Division's existing Computerized Maintenance Management System (CMMS) software, Cayente's MainSaver, will be able to meet most of the software requirements and will not need to be replaced. During Part I, the CMMS will be web-enabled and various maintenance and work management applications will be deployed via the Information Portal.

Part II implements automated, real-time, data-level integration of the CMMS to other information systems such as Finance, Human Resources, Inventory Control, Engineering Document Management, CAD/GIS, and the Operations Decision Support System.

Part III automates the various workflow associated with the CMMS, especially those associated with integration of CMMS with other information systems, as well as with coordination, collaboration, review and approval, and document routing.

6.5.1. Subproject ID

423493-40-104

6.5.2. Project Association

Asset & Maintenance Management Project

6.5.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.5.4. Subproject Justification

The Division needs to address to urgent situations. First, the Division needs to establish consistent, Division-wide, maintenance and work management standards, procedures and work processes to lower overall maintenance costs and increase productivity. Second, the Division has new requirements from outside agencies to report on all maintenance activities as they relate to the condition of Division facilities and equipment. These needs are addressed by this Subproject, which consists of three distinct efforts delineated here as Part I, Part II, and Part III.

6.5.5. Subproject Objectives

The major Subproject objectives for Part I include:

- Establish consistent, Division-wide standards, procedures and work processes for maintenance and work management
- Fully implement a CMMS to support the standards, procedures and work processes established Division-wide
- Deploy various CMMS applications via the Information Portal.

The major Subproject milestones for Part II include:

- Implement data integration adapters required to link the CMMS to other information systems
- The major Subproject milestones for Part III include:
- Implement workflow automation for the CMMS and the other information systems integrated with it

6.5.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

Computer Systems Planning Study

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.5.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

40-104 Maint Mgt Sys Part III													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	14258	6158	1000	0	21,416	0	21,416
2 Pre-Design	0	0	15000	60000	8000	0	18192	11289	1000	0	113,481	0	113,481
3 Final Design	0	0	25000	100000	8000	35000	24092	17447	2000	0	211,539	0	211,539
4 Impl Construct	1000000	180000	0	0	0	0	0	0	0	0	1,180,000	0	1,180,000
4 Impl other	0	0	10000	40000	56000	262500	19175	17653	3000	0	408,328	0	408,328
5 Close Out	0	0	0	0	8090	53092	12927	12593	3034	0	89,736	0	89,736
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	163000	163000
TOTALS:	1,000,000	180,000	50,000	200,000	80,090	350,592	88,644	65,140	10,034	0	2024500	163000	2187500

6.6. Subproject: Engineering Document Management System - Part IV

The Engineering Document Management System is to be implemented in four steps, referred to as Part I, Part II, Part III, and Part IV. These steps are described below.

Part I establishes engineering document standards and document identification labeling standards. It also moves existing CAD files to *.pdf* format for viewing by appropriate staff throughout the Division via the Information Portal.

Part II upgrades the Division's existing AutoCAD system to the newest web-enabled version to enable the viewing of dynamic CAD maps by appropriate staff throughout the Division via the Information Portal.

Part III implements a web-based application – to be deployed via the Information Portal – for the viewing and collaborative editing of CAD drawings

Part IV implements document version control – deployed via the Information Portal – and automates workflow associated with engineering document management.

6.6.1. Subproject ID

423493-50-104

6.6.2. Project Association

Infrastructure Data Management Project

6.6.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.6.4. Subproject Justification

This Subproject will provide the following benefits to the Division:

- Increases productivity; reduces paper; automates workflow; reduces time spent locating maps and documents associated with infrastructure assets
- Unifies all engineering document management efforts within the Division
- Improves support for changes to as-built drawings
- Facilitates collaborative efforts among engineering, plant, and planning staff
- Improves the speed and accuracy of infrastructure planning and change decisions.

6.6.5. Subproject Objectives

The objectives of this Subproject include:

- Establish standards for engineering documents and engineering document management
- Provide easy access to engineering documents regardless of document format
- Implement a Division-wide, web-enabled Engineering Document Management System having two major application components – a web-based visual data access; and document version control
- Provide web-enabled viewing and collaboration of drawings in 2D and 3D formats for both AutoCAD and InterGraph drawings

- Provide text searches on CAD drawings from the WTD Information Portal.
- Provide queries based on drawing attributes in a CAD file via the WTD Information Portal.

6.6.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.6.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

50-104 Engineering Doc Mgt - Part IV													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	8552	3693	600	0	12,845	0	12,845
2 Pre-Design	0	0	8997	62978	3599	0	10911	6771	600	0	93,856	0	93,856
3 Final Design	0	0	14995	104964	3599	26991	14450	10465	1200	0	176,663	0	176,663
4 Impl Construct	599793	107963	0	0	0	0	0	0	0	0	707,756	0	707,756
4 Impl other	0	0	5998	41986	25191	202430	11501	10588	1799	0	299,493	0	299,493
5 Close Out	0	0	0	0	3634	40884	7743	7542	1817	0	61,620	0	61,620
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	97766	97,766
TOTALS:	599,793	107,963	29,990	209,928	36,023	270,305	53,157	39,060	6,016	0	1352234	97,766	1,450,000

6.7. Subproject: Infrastructure Data Management System - Part III

The implementation of a GIS-centric Infrastructure Data Management System is to take place in four steps, referred to as Parts I, II, III, and IV. These steps are summarized below.

Part I implements the Wastewater Program GIS Database, including database design, data standards, and data conversion. The GIS Database is to be hosted by the GIS Team, which is a part of the IT group of the Department of Natural Resources (DNR).

Part II implements an initial series of priority GIS-enabled applications via the Information Portal. The applications implemented in this step will support asset and maintenance management.

Part III implements an additional series of GIS-enabled applications, making use of both the Information Portal and the Integration Bus. The applications implemented in this step require the data-level integration of GIS with such systems as PIMS, Repair/Replacement, Facility Inspection, and Inflow & Infiltration.

Part IV implements upgrade modeling applications – such as conveyance modeling – using both the Information Portal and the Integration Bus.

6.7.1. Subproject ID

423493-50-107

6.7.2. Project Association

Infrastructure Data Management Project

6.7.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.7.4. Subproject Justification

Data about the Division's infrastructure – its facilities and equipment – is critical for effective operations and maintenance. This Subproject implements a system for managing this critical infrastructure data in a GIS-centric technical platform. As is the case for the more effective wastewater utilities throughout the United States, it is essential that the Division make GIS the core technical platform for its infrastructure data management. The configuration and linkages of Division facilities can only be stored and utilized effectively with GIS technology.

6.7.5. Subproject Objectives

This Subproject addresses the Division-wide need to capture and distribute geographical information about:

- Division facilities and equipment, including plant and offsite
- Facilities and equipment of other agencies, such as water, transportation
- Industrial waste discharge.

This Subproject also addresses the Division-wide need for a GIS database to support conveyance modeling, industrial discharge modeling, and other modeling applications. For instance, conveyance modeling requires location and configuration data regarding the Division's conveyance systems that must be captured, stored, and maintained in a GIS database.

6.7.6. Overview of Subproject Phases Subproject

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.7.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

50-107 Infrastructure Data Mgt Part III													
Phase	Construct	Tax & Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
1 Plan	0	0	0	0	0	0	14258	6158	1000	0	21,416	0	21,416
2 Pre-Design	0	0	15000	90000	6000	0	18192	11289	1000	0	141,481	0	141,481
3 Final Design	0	0	25000	150000	6000	30000	24092	17447	2000	0	254,539	0	254,539
4 Impl Construct	1000000	180000	0	0	0	0	0	0	0	0	1,180,000	0	1,180,000
4 Impl other	0	0	10000	60000	42000	225000	19175	17653	3000	0	376,828	0	376,828
5 Close Out	0	0	0	0	6076	45568	12945	12610	3038	0	80,236	0	80,236
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	163000	163,000
TOTALS:	1,000,000	180,000	50,000	300,000	60,076	300,568	88,661	65,157	10,038	0	2054500	163,000	2,217,500

6.8. Subproject: Infrastructure Data Management System - Part IV

The implementation of a GIS-centric Infrastructure Data Management System is to take place in four steps, referred to as Parts I, II, III, and IV. These steps are summarized below.

Part I implements the Wastewater Program GIS Database, including database design, data standards, and data conversion. The GIS Database is to be hosted by the GIS Team, which is a part of the IT group of the Department of Natural Resources (DNR).

Part II implements an initial series of priority GIS-enabled applications via the Information Portal. The applications implemented in this step will support asset and maintenance management.

Part III implements an additional series of GIS-enabled applications, making use of both the Information Portal and the Integration Bus. The applications implemented in this step require the data-level integration of GIS with such systems as PIMS, Repair/Replacement, Facility Inspection, and Inflow & Infiltration.

Part IV implements upgrade modeling applications – such as conveyance modeling – using both the Information Portal and the Integration Bus.

6.8.1. Subproject ID

423493-50-108

6.8.2. Project Association

Infrastructure Data Management Project

6.8.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.8.4. Subproject Justification

Data about the Division's infrastructure – its facilities and equipment – is critical for effective operations and maintenance. This Subproject implements a system for managing this critical infrastructure data in a GIS-centric technical platform. As is the case for the more effective wastewater utilities throughout the United States, it is essential that the Division make GIS the core technical platform for its infrastructure data management. The configuration and linkages of Division facilities can only be stored and utilized effectively with GIS technology.

6.8.5. Subproject Objectives

This Subproject addresses the Division-wide need to capture and distribute geographical information about:

- Division facilities and equipment, including plant and offsite
- Facilities and equipment of other agencies, such as water, transportation
- Industrial waste discharge.

This Subproject also addresses the Division-wide need for a GIS database to support conveyance modeling, industrial discharge modeling, and other modeling applications. For instance, conveyance

modeling requires location and configuration data regarding the Division's conveyance systems that must be captured, stored, and maintained in a GIS database.

6.8.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.8.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

50-108 Infrastructure Data Mgt Part IV													
Phase	Construct	Tax & Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
1 Plan	0	0	0	0	0	0	15796	5034	748	0	21,579	0	21,579
2 Pre-Design	0	0	11226	56132	4491	0	20154	9229	748	0	101,981	0	101,981
3 Final Design	0	0	18711	93554	4491	22453	26690	14264	1497	0	181,658	0	181,658
4 Impl Construct	748430	134717	0	0	0	0	0	0	0	0	883,148	0	883,148
4 Impl other	0	0	7484	37422	31434	168397	21243	14431	2245	0	282,656	0	282,656
5 Close Out	0	0	0	0	4542	34069	14326	10298	2271	0	65,506	0	65,506
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	132472	132,472
TOTALS:	748,430	134,717	37,422	187,108	44,958	224,918	98,208	53,256	7,510	0	1536528	132,472	1,669,000

6.9. Subproject: WTD Employee Information System

This Subproject is focused on web-enabling the WTD Employee Information System in-order to make it more easily available to supervisors, managers, and personnel. It also addresses current access problems and will improve system response times accordingly.

6.9.1. Subproject ID

423493-60-101

6.9.2. Project Association

Human Resources Project

6.9.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.9.4. Subproject Justification

This Subproject web-enables the existing WTD Employee Information System (WEIS). This will provide easier access to employee safety and training information by various groups throughout the WTD. It will also allow WTD employees to support the updating of their own records.

6.9.5. Subproject Objectives

6.9.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be

integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- **Establish Subproject Mission**
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.9.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

60-101 Employee Information System													
Phase	Tax &		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	8442	2691	400	0	11,533	0	11,533
2 Pre-Design	0	0	6000	42000	2400	0	10771	4933	400	0	66,504	0	66,504
3 Final Design	0	0	10000	70000	2400	18000	14264	7623	800	0	123,088	0	123,088
4 Impl Construct	400000	72000	0	0	0	0	0	0	0	0	472,000	0	472,000
4 Impl other	0	0	4000	28000	16800	135000	11353	7713	1200	0	204,066	0	204,066
5 Close Out	0	0	0	0	2422	27248	7638	5491	1211	0	44,010	0	44,010
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	-
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	70800	70,800
TOTALS:	400,000	72,000	20,000	140,000	24,022	180,248	52,469	28,450	4,011	0	921,200	70,800	992,000

6.10. Subproject: County Finance and HR Integration – Part I

Information provided by the County's Finance and HR systems is essential to the effectiveness of Division operations. There are a number of Division information systems that need to be integrated with the County's Finance and HR system, including Maintenance Management, Asset Management, Subproject Management & Control, and others. The utilization of the Integration Bus and the Information Portal will enable integration that will enhance the value of the County systems by providing expanded access to the County Finance and HR systems.

The integration of County Finance & HR systems with Division information systems is to be implemented in two steps, referred to as Part I and Part II. Part I implements data-level integration via the Integration Bus and the Information Portal. Part II implements workflow automation via the Integration Bus and the Information Portal.

6.10.1. Subproject ID

423493-70-101

6.10.2. Project Association

Business Management Support Project

6.10.3. Subproject Sponsor(s)

Finance and Administration Section Manager

6.10.4. Subproject Justification

Tighter, real-time integration with these County systems offers significant advantages to both the Division and to the County Finance Department, including:

- Improved reliability and efficiency
- Increased data integrity
- Streamlined financial and HR business processes
- Increased productivity
- Improves decision processes
- Risk reduction through timely data accessibility
- More efficient use of staff time
- Better support for County-wide eBusiness Projects.

6.10.5. Subproject Objectives

Integration with County Finance & HR systems is to be implemented in two steps: Part I, which implements data-level integration; and Part II, which implements workflow automation.

6.10.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors

Computer Systems Planning Study

- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.10.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

70-101 County Finance & HR Integration - Part I													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	8442	2691	400	0	11,533	0	11,533
2 Pre-Design	0	0	6000	42000	2400	0	10771	4933	400	0	66,504	0	66,504
3 Final Design	0	0	10000	70000	2400	18000	14264	7623	800	0	123,088	0	123,088
4 Impl Construct	400000	72000	0	0	0	0	0	0	0	0	472,000	0	472,000
4 Impl other	0	0	4000	28000	16800	135000	11353	7713	1200	0	204,066	0	204,066
5 Close Out	0	0	0	0	2422	27248	7638	5491	1211	0	44,010	0	44,010
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	-
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	70800	70,800
TOTALS:	400,000	72,000	20,000	140,000	24,022	180,248	52,469	28,450	4,011	0	921,200	70,800	992,000

6.11. Subproject: County Finance and HR Integration – Part II

Information provided by the County's Finance and HR systems is essential to the effectiveness of Division operations. There are a number of Division information systems that need to be integrated with the County's Finance and HR system, including Maintenance Management, Asset Management, Subproject Management & Control, and others. The utilization of the Integration Bus and the Information Portal will enable integration that will enhance the value of the County systems by providing expanded access to the County Finance and HR systems.

The integration of County Finance & HR systems with Division information systems is to be implemented in two steps, referred to as Part I and Part II. Part I implements data-level integration via the Integration Bus and the Information Portal. Part II implements workflow automation via the Integration Bus and the Information Portal.

6.11.1. Subproject ID

423493-70-102

6.11.2. Project Association

Business Management Support Project

6.11.3. Subproject Sponsor(s)

Finance and Administration Section Manager

6.11.4. Subproject Justification

Tighter, real-time integration with these County systems offers significant advantages to both the Division and to the County Finance Department, including:

- Improved reliability and efficiency
- Increased data integrity
- Streamlined financial and HR business processes
- Increased productivity
- Improves decision processes
- Risk reduction through timely data accessibility
- More efficient use of staff time
- Better support for County-wide eBusiness Projects.

6.11.5. Subproject Objectives

Integration with County Finance & HR systems is to be implemented in two steps: Part I, which implements data-level integration; and Part II, which implements workflow automation.

6.11.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors

- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.11.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

70-102 County Finance & HR Integration - Part II													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Contingen
	Construct	Conting											
1 Plan	0	0	0	0	0	0	14258	6158	1000	0	21,416	0	21,416
2 Pre-Design	0	0	15000	105000	6000	0	18192	11289	1000	0	156,481	0	156,481
3 Final Design	0	0	25000	175000	6000	45000	24092	17447	2000	0	294,539	0	294,539
4 Impl Construct	1000000	180000	0	0	0	0	0	0	0	0	1,180,000	0	1,180,000
4 Impl other	0	0	10000	70000	42000	337500	19175	17653	3000	0	499,328	0	499,328
5 Close Out	0	0	0	0	6059	68163	12909	12575	3029	0	102,736	0	102,736
6 Land Acq	0	0	0	0	0	0	0	0	0	0	-	0	-
7 Contingency	0	0	0	0	0	0	0	0	0	0	-	163000	163,000
TOTALS:	1,000,000	180,000	50,000	350,000	60,059	450,663	88,626	65,122	10,029	-	2,254,500	163,000	2,417,500

6.12. Subproject: Budget Planning & Tracking System

This Subproject implements a Division-wide system to provide information and coordination support for WTD business unit budgeting and budget tracking processes. Budgeting process status updates, budgeting analyses, and actual-to-budget tracking via the WTD Information Portal is included.

6.12.1. Subproject ID

423493-80-101

6.12.2. Project Association

Productivity Project

6.12.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.12.4. Subproject Justification

Currently it is difficult to obtain timely and accurate data from which to track approved budgets, and to plan and create new budgets. The current process and tools are full of potential pitfalls that impact WTD financial planning and tracking heavily. The amount of redundant data used in performing these job functions is extensive, which leads to uncertainty on the part of the users, and requires extra time analyzing the information, in-order to arrive at accurate financial projections and reports.

6.12.5. Subproject Objectives

The major Subproject objectives are:

- Improve budgeting analysis, planning, and tracking work processes
- Define budget support requirements, including data capture and assembly, data staging, data aggregation and analytical applications
- Implement Budgeting Data Warehouse, integrating relevant data used for budgeting and budget tracking
- Deploy web-based analytical applications via the WTD Information Portal
- Implement mobile connectivity via Information Portal with WTD authorized wireless devices
- Automate budgeting workflow.

6.12.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition

- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection.
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review

- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.12.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

80-101 Budget Planning & Tracking System Cost By Phase													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	7841	3387	550	0	11,778	0	11,778
2 Pre-Design	0	0	8249	57744	3300	0	10004	6209	550	0	86,056	0	86,056
3 Final Design	0	0	13749	96241	3300	19248	13249	9595	1100	0	156,481	0	156,481
4 Impl Construct	549946	98990	0	0	0	0	0	0	0	0	648,936	0	648,936
4 Impl other	0	0	5499	38496	23098	144361	10545	9708	1650	0	233,357	0	233,357
5 Close Out	0	0	0	0	3338	29205	7111	6927	1669	0	48,250	0	48,250
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	-
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	89641	89,641
TOTALS:	549,946	98,990	27,497	192,481	33,035	192,814	48,751	35,825	5,518	0	1,184,859	89,641	1,274,500

6.13. Subproject: Productivity Metrics

This Subproject implements a Productivity Metrics Reporting & Information System to support the management of WTD and its Productivity Project. By embedding this executive reporting system within the WTD Information Portal, relevant productivity data can be assembled from a variety of data sources throughout the Division and other agencies and presented to Division management in highly visual formats to support business decisions. In this way, the status and progress towards Productivity Project goals and objectives can be viewed and assessed quickly and easily. Relevant business data will be rolled up into a dynamic Balanced Scorecard presentation that provides Division management with the up-to-the-minute status of the Division. Benchmarking data can be readily shared via the Information Portal as well.

6.13.1. Subproject ID

423493-80-102

6.13.2. Project Association

Productivity Metrics Project

6.13.3. Subproject Sponsor(s)

Manager's Office

6.13.4. Subproject Justification

This Subproject will provide the following benefits to the Division:

- Provides ability for Division Management Team to monitor progress towards Ten-year Strategic objectives
- Provides high degree of accessibility to relevant productivity metrics data by the Division Management Team
- Provides Division Management Team with easy-to-use decision support and reporting tools either on desktop or mobile computers
- Provides the capability for maintaining and updating a Division Balanced Scorecard without labor-intensive and paper-intensive efforts

6.13.5. Subproject Objectives

This Subproject will include all necessary information technology implementation elements, including requirements, analysis and design, testing, deployment, and configuration and change management. The major Subproject components include:

- Web-enabling all Section Business Plans and publishing them via the Information Portal in a highly searchable format
- Improve work processes associated with planning and measuring progress of the Productivity Project
- Implement and deploy productivity reporting applications, including the Balanced Scorecard application, via the Information Portal.

6.13.6. Overview of Subproject Phases

Planning Phase

Subproject Planning. A Subproject plan will be developed and reviewed with the Division to ensure it meshes with other Division Subprojects and activities. The Subproject will be linked to all other relevant program elements and managed within the program management structure. A Subproject team will be assembled and initiated in the program-standard procedures and practices for Subproject management and control.

Pre-Design Phase

Requirements & Functional Specification. The requirements and functional specifications for Balanced Scorecard and other productivity metrics applications will be elicited, analyzed, and documented. These specifications will provide standards, architecture, and component definitions for Division-wide productivity metrics applications that can be configured to meet the specific needs of the Division and each of its Sections.

Final Design Phase

Select Core Application Software. Balanced Scorecard and other productivity metrics solutions will be evaluated and selected. These software solutions will provide Division managers with easy-to-use tools for accessing and analyzing relevant business and productivity data. It is expected that the additional software applications, implemented for the Operations Decision Support System and the Water Quality Data Repository, would also be re-usable for this Subproject as well and provide valuable functionality for reporting and analytical purposes.

Select Hardware. During this step, the hardware will be evaluated and selected for the Balanced Scorecard and other productivity metrics solutions.

Detailed Implementation Planning. A detailed implementation plan will be developed for hardware and software implementation.

Implementation (Construction) Phase

Implement Hardware. This step implements and integrates the server hardware that supports the Balanced Scorecard and other productivity metrics software.

Implement Networking. This step networks all relevant hardware servers.

Implement Data Collection and Data Conversion Tools and Procedures. This step implements the tools and work processes for initial and on-going collection and conversion of productivity measurement data. Relevant data from existing systems being used to collect productivity data will be converted and transferred into the database of the new system.

Implement Database and Data Management. This step accomplishes the configuration of the relational database management system based on Division business and productivity measurement data models and populates the databases with actual data.

Implement New Applications. This effort installs the new application software on the server hardware, links the applications to the database and data management system, and initiates testing process.

Configure New Applications. This effort configures the new applications to ensure that all relevant business rules and data structures – including Balanced Scorecard roll-up rules – are utilized by the new applications.

Implementation (Other) Phase

Complete Application Acceptance Testing. During this step, a thorough acceptance testing process will be utilized.

Implement New Work Processes. This step implements the new work processes associated with the effective day-to-day use of the Balanced Scorecard and other productivity metrics applications.

Design and Implement System Maintenance Practices and Procedures. In order for the Division to achieve its return on investment and to support productivity objectives, Balanced Scorecard databases and applications need to be kept current and must meet response and total in-service time objectives. For these purposes, this step establishes the practices and procedures for the effective, on-going maintenance of the Balanced Scorecard and other productivity metrics applications and databases. It establishes practices and procedures – including documentation – for database backups, software updates, failover, recovery, access control, as well as for review and adjustment of work processes to effectively use the applications.

Deployment and Training. Potential users of the Balanced Scorecard and other productivity metrics applications need to be trained in the tools used to access it, and also in the organization and content of the System’s database. This step identifies the different classes of users, defines a training program and conducts the training sessions. This step also creates the user and design documentation, and defines and institutes necessary support for Balanced Scorecard users. This step instigates three levels of training for Division staff: (a) Level One Training, via typical vendor course offerings; (b) Level Two Training, which provides coaching for users; and (c) Level Three Training, which supports the adjustment of work processes as users become proficient in the use of the applications.

6.13.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

80-102 Productivity Metrics and Information System													
Phase	Construct	Tax & Construct Conting	In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
1 Plan	0	0	0	0	0	0	7129	3079	500	0	10,708	0	10,708
2 Pre-Design	0	0	7500	75000	3000	0	9096	5645	500	0	100,741	0	100,741
3 Final Design	0	0	12500	125000	3000	12500	12046	8724	1000	0	174,770	0	174,770
4 Impl Construct	500000	90000	0	0	0	0	0	0	0	0	590,000	0	590,000
4 Impl other	0	0	5000	50000	21000	93750	9588	8826	1500	0	189,664	0	189,664
5 Close Out	0	0	0	0	3042	19011	6481	6313	1521	0	36,368	0	36,368
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	81500	81,500
TOTALS:	500,000	90,000	25,000	250,000	30,042	125,261	44,339	32,587	5,021	0	1,102,250	81,500	1,183,750

6.14. Subproject: e-Business: e-Commerce / e-Procurement Subproject

This Subproject implements e-Commerce and e-Procurement for the WTD, enabling WTD staff to procure basic or indirect supplies over secure Internet links from their desktop Information Portals.

6.14.1. Subproject ID

423493-90-107

6.14.2. Project Association

Computing Infrastructure Project

6.14.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.14.4. Subproject Justification

This Subproject implements eCommerce and eProcurement for the WTD, enabling WTD staff to procure basic or indirect supplies over secure Internet links from their desktop Information Portals. The demands on governmental agencies to participate in eCommerce are increasing. Over the next 5-8 years, suppliers will continue to move quickly towards eCommerce, offering faster and lower cost procurement opportunities. The demands from communities and citizens to access government services over the Internet are also expected to grow rapidly in the next 5-8 years. This Subproject responds to these needs and will allow WTD to keep up with the present and position themselves for the future.

6.14.5. Subproject Objectives

The primary objectives for this Subproject include:

- Redesign internal business processes for eProcurement
- Evaluation and selection of eCommerce suppliers
- Implementation of an eBusiness Connection capability, using the Integration Bus and the Information Portal to deliver eBusiness to desktops in a seamless manner.

6.14.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition
- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application

development; transition, including data conversion; integration with other information systems and/or database repositories

- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.14.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-107 e-Business												
Phase	Tax & Construct		In-House Eng	In-House		CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting		Consult Eng	CM							
1 Plan	0	0	0	0	0	14258	6158	1000	0	21,416	0	21,416
2 Pre-Design	0	0	15000	105000	6000	18192	11289	1000	0	156,481	0	156,481
3 Final Design	0	0	25000	175000	6000	35000	24092	17447	2000	284,539	0	284,539
4 Impl Construct	1000000	180000	0	0	0	0	0	0	0	1,180,000	0	1,180,000
4 Impl other	0	0	10000	70000	42000	262500	19175	17653	3000	424,328	0	424,328
5 Close Out	0	0	0	0	6069	53105	12931	12596	3035	87736	0	87736
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	163000	163000
TOTALS:	1,000,000	180,000	50,000	350,000	60,069	350,605	88,647	65,144	10,035	2154500	163000	2317500

6.15. Subproject: Mobile Connectivity - Part III

Mobile Connectivity is to be implemented in two steps, referred to as Part I, Part II and Part III.

Part I implements the mobile information distribution capabilities of the Information Portal, delineates WTD authorized wireless devices, and configures those mobile devices for access to the Information Portal.

Part II implements enhanced mobile information distribution capabilities, especially graphical information such as CAD and GIS; Part II also implements 3rd-Generation mobile devices within the WTD.

Part III extends the capabilities of the wireless devices available and distribute this capability WTD wide.

6.15.1. Subproject ID

423493-90-112

6.15.2. Project Association

Computing Infrastructure Project

6.15.3. Subproject Sponsor(s)

Major Capital Improvements Section Manager

6.15.4. Subproject Justification

Mobile networking and connectivity are rapidly becoming commonplace in utilities. The Division plans to improve field staff productivity by providing ready access to facilities and equipment information, including electronic Operations & Maintenance Manuals and electronic Work Order status information. In addition, CAD and GIS maps can be viewed by field staff. Other WTD staff, including Division management, also need to access a wide variety of information via mobile devices, thereby cutting down on the time and effort required to find information and access it when needed.

6.15.5. Subproject Objectives

Part III extends the capabilities of the wireless devices available and distributes this capability WTD wide.

6.15.6. Overview of Subproject Phases

The activities within this Subproject are standard for web-based information systems implementation and include:

- Subproject Management – management of all Subproject tasks; management of vendors and subcontractors
- Establish Subproject Mission, including team and objectives for the Subproject – Workflow and Data Analysis of existing systems used for operations decision support in order to determine the functionality that needs to be retained and what needs to be improved or replaced; Formulation of desired Workflow and Data Architecture to meet future needs
- Requirements – detailed requirements definition

- Analysis & Design – design of complete solution, including identification of solution software components; software components alternatives analysis; software evaluation & selection
- Implementation – implementation, transition, and integration planning; software component procurement; software component installation; software component integration; application development; transition, including data conversion; integration with other information systems and/or database repositories
- Test – software component testing; software installation testing; software component integration testing; acceptance testing
- Deployment – application deployment via Information Portal; end-user training; end-user support
- Configuration & Change Management – tracking, prioritizing, scheduling, and executing software and application configuration; documenting changes and version control
- Environmental Audit – review of factors external to the Subproject that might impact the achievement of the Subproject objectives, including organizational changes, changes to systems that need to be integrated with the solution implemented by this Subproject, and changes in business or operations objectives.

This work is allocated to the following Subproject phases and tasks:

Planning Phase

The Computer System Planning Study will serve as this Subprojects initial plan. It needs to be acted upon by assigning a Subproject team to be responsible for the Subproject.

Pre-Design Phase

The following tasks are required to complete the Pre-Design Phase:

- Subproject Management
- Establish Subproject Mission
- Gather System Data
- Establish System Requirements
- Analyze Technical Alternatives
- Develop Pre-Design Report
- Develop System Implementation Plan.

System Design Phase

The system design phase is very heavily influenced by the requirements and alternatives brought forward from the preliminary design phase. The tasks listed below represent the typical tasks included in a system replacement Subproject:

- Develop System Configuration Requirements
- Report Definition
- Develop Detailed Design Specifications
- Develop Request For Proposal Documents (RFP)
- Provide Procurement Services.

Implementation Construction Phase

This phase includes activities to administer the Subproject:

Computer Systems Planning Study

Construction Subproject Management

- Submittal Review
- Conduct System Site Testing
- Contract Closeout.

Implementation (Other) Phase

- Implement New Work Processes
- Design and Implement System Maintenance Practices and Procedure
- Deployment and Training.

6.15.7. Cost and Schedule

This Subproject is a deferred project and has not been included in Figure F-5: WTD Master Plan Implementation Road Map in Section 3 of this Appendix. Refer to the cost summary table in this subsection for the estimated cost of this Subproject by phase and cost category.

90-112 Mobile Connectivity Part III													
Phase	Tax & Construct		In-House Eng	Consult Eng	In-House CM	Consult CM	CIP Labor	Other Labor	Other Fixed Costs	Land ROW	TOTAL PROJECT	Project Conting	TOTAL with Conting
	Construct	Conting											
1 Plan	0	0	0	0	0	0	19817	6316	939	0	27,072	0	27,072
2 Pre-Design	0	0	14085	70423	5634	0	25284	11579	939	0	127,943	0	127,943
3 Final Design	0	0	23474	117371	5634	18779	33485	17895	1878	0	218,515	0	218,515
4 Impl Construct	938967	169014	0	0	0	0	0	0	0	0	1,107,981	0	1,107,981
4 Impl other	0	0	9390	46948	39437	140845	26651	18105	2817	0	284,193	0	284,193
5 Close Out	0	0	0	0	5713	28563	18016	12950	2856	0	68,098	0	68,098
6 Land Acq	0	0	0	0	0	0	0	0	0	0	0	0	0
7 Contingency	0	0	0	0	0	0	0	0	0	0	0	166197	166,197
TOTALS:	938,967	169,014	46,948	234,742	56,417	188,187	123,253	66,845	9,429	0	1833803	166197	2000000