



THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY

Design Section Engineer's Manual



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SECTION 1 INTRODUCTION

- 1.1 Purpose and Use of the Design Section Engineering Manual
- 1.2 Terms and Definitions
- 1.3 Acronyms

SECTION 2 ADMINISTRATIVE POLICIES, PRACTICES, AND PROCEDURES

- 2.1 Introduction
- 2.2 Tollway Project Management Services
 - 2.2.1 Purpose of Program Management Procedures
 - 2.2.2 Role of the Tollway's Project Manager
- 2.3 Design Section Engineering Services
 - 2.3.1 Studies/Reports Services (Planning/Engineering)
 - 2.3.2 Engineering/Architectural design Services
 - 2.3.3 DSE Project management Services
 - 2.3.4 Design Upon Request Services
 - 2.3.5 Non-Engineering Professional Services
- 2.4 Design Section Engineering Selection
 - 2.4.1 Professional Services Bulletin
 - 2.4.2 Statement of Interest
 - 2.4.3 Request for Qualifications
- 2.5 Design Section Project Management and Administration
 - 2.5.1 Project Directory
 - 2.5.2 Project Meetings
 - 2.5.3 Meeting Minutes
 - 2.5.4 Communications and Reports
 - 2.5.5 Invoicing
 - 2.5.6 Supplements to Contracts
 - 2.5.7 Submittals
 - 2.5.8 DSE Performance Evaluation
 - 2.5.9 Project Closeout
- 2.6 DSE - Consultant Upon Request Services
 - 2.6.1 Scope of Services
 - 2.6.2 Project Administration
- 2.7 DSE – Survey Upon Request Services (SUR)
 - 2.7.1 Plat review and Approval Process
- 2.8 DSE – Program/Project Management Upon Request Services
 - 2.8.1 Project Administration
- 2.9 Appendix
 - P1010 Deviating From Procedures
 - P1040 Meeting Minutes
 - P1050 Uniform Filing System
 - P1080 Staff Summary Sheet Procedure
 - P3030 Evaluation of Consultant Performance

- P4000 Design Management Procedure
- Sample Contract Bid Preparation
- Sample Contract
- Sample Professional Services Bulletin
- Monthly Progress Report Templates
 - Cover letter
 - Progress Report
 - Manpower Utilization
 - Monthly Narrative

SECTION 3 WEB BASED MANAGEMENT SYSTEM

- 3.1 Web Based Management System Introduction
- 3.2 DSE Requirements
- 3.3 Appendix

SECTION 4 DESIGN PHASE PROJECT DELIVERABLES

- 4.1 General Project delivery Requirements
 - 4.1.1 Submittal Requirements
- 4.2 Phases of the Project
- 4.3 Planning/Studies Project Development Phase
 - 4.3.1 Master Planning (Pre-Concept) Reports
- 4.4 Concept Design Phase (30%)
 - 4.4.1 Conceptual Design
 - 4.4.2 Concept Design Report
 - 4.4.3 Schematic Maintenance of Traffic
 - 4.4.4 Minimum Submittal Requirement
 - 4.4.5 Minimum Design Requirement
 - 4.4.6 Documentation of Review and Review Comments
- 4.5 Preliminary Engineering Phase (60%)
 - 4.5.1 Preliminary Plans and Special Provisions
 - 4.5.2 Minimum Submittal Requirements
 - 4.5.3 Roadway Geometry
 - 4.5.4 Drainage
 - 4.5.5 Maintenance of Traffic
 - 4.5.6 Structural Type, Size and Location Drawings
 - 4.5.7 Toll Plazas
 - 4.5.8 Signing
 - 4.5.9 Roadway Lighting
 - 4.5.10 Architectural (buildings)
 - 4.5.11 Electrical (buildings)
 - 4.5.12 Mechanical (buildings)
 - 4.5.13 Landscaping and Permanent Erosion Control
 - 4.5.14 Temporary Erosion Control

- 4.5.15 Utilities and Other Agencies
- 4.5.16 Guardrail Modernization
- 4.5.17 Preliminary Construction Quantity Estimate
- 4.5.18 Preliminary Construction Schedule and Time Estimates
- 4.5.19 Subsurface Report
- 4.5.20 Preliminary Special Provisions
- 4.5.21 Preliminary Plan Review
- 4.6 Pre-Final Design Phase (95%)
 - 4.6.1 Pre-final plans and Special Provisions
 - 4.6.2 General Notes
 - 4.6.3 Progress Schedule for Construction Activities
 - 4.6.4 Schedule of Quantities
 - 4.6.5 Alignment and Ties
 - 4.6.6 Typical Sections
 - 4.6.7 Construction Details
 - 4.6.8 Maintenance of Traffic Staging Plans
 - 4.6.9 Roadway Plans
 - 4.6.10 Roadway Profiles
 - 4.6.11 Drainage Plans
 - 4.6.12 Pavement Joints and Elevations
 - 4.6.13 Pavement Marking Plans
 - 4.6.14 Grading Plans
 - 4.6.15 Landscaping and Permanent Erosion Control Plans
 - 4.6.16 Temporary Erosion Control Plans
 - 4.6.17 Signing Plans
 - 4.6.18 Roadway Lighting Plans
 - 4.6.19 Traffic Signal plans
 - 4.6.20 Structural Plans
 - 4.6.21 Building Plans
 - 4.6.22 Electrical Drawings
 - 4.6.23 Soil Boring Logs
 - 4.6.24 Cross Sections
 - 4.6.25 Special Provisions
 - 4.6.26 Design Computations
 - 4.6.27 Minimum Submittal Requirements
- 4.7 Pre-Final Design Review
- 4.8 Final check Design Phase (100%)
 - 4.8.1 Final Check
 - 4.8.2 Phase Reviews
 - 4.8.3 Approval of Construction Documents
- 4.9 Bid Support Phase
- 4.10 Construction Support Phase
- 4.11 Project Close-Out Support
 - 4.11.1 Final Negotiations and Financial Close-Out
 - 4.11.2 Notice of Contract Completion

4.12 Appendix

- P1080 Staff Summary Sheet Procedure
- P2010 Capital Project Planning Procedure
- P4020 Value Management
- P4100 Constructability Reviews

SECTION 5 SUBMITTAL FORMATS AND STANDARDS

5.1 Submittal Requirements

5.2 Preparation of Drawings

- 5.2.1 Size and Scale of Drawings
- 5.2.2 Arrangement and Content of Drawings
- 5.2.3 Title Sheet
- 5.2.4 Index of Drawings
- 5.2.4 Drawing Scale

5.3 Appendix

SECTION 6 UTILITY RELOCATION GUIDELINES

6.1 Tollway Furnished Items

6.2 Required DSE Utility Relocation Services

6.3 Utility Relocation Process

6.4 Documentation

6.5 Appendix

SECTION 7 QUALITY MANAGEMENT

7.1 Quality Assurance Overview

7.2 Tollway Project Management Services

- 7.2.1 Tollway Project Manager Quality Assurance Functions

7.3 Design Section Engineer Quality Plan

- 7.3.1 DSE Quality Program
- 7.3.2 Submittal of Quality Program
- 7.3.3 Acceptance of the DSE Quality Program
- 7.3.4 Proposed Changes to the DSE Quality Program

7.4 Elements of the Design Engineer's Quality Program

- 7.4.1 Quality Control/Quality Assurance
- 7.4.2 DSE Management Responsibility
- 7.4.3 Documented Quality System
- 7.4.4 Design Control
- 7.4.5 Document Control
- 7.4.6 Sub-Consultant Evaluation and Procurement Control
- 7.4.7 Handling, Storage and Control of Materials and Equipment
- 7.4.8 Control of Special Provisions

- 7.4.9 Inspection and Testing Status and Plans
- 7.4.10 Control of Measuring and Testing Equipment
- 7.4.11 Inspection and Test Status
- 7.4.12 Identification and Control of Non-Conforming Conditions
- 7.4.13 Corrective Action
- 7.4.14 Documentation by Quality Records
- 7.4.15 DSE Review/Internal Audits
- 7.4.16 Certification and Training
- 7.5 Value Management
 - 7.5.1 Value Management Project Organization
 - 7.5.2 Number and Purpose of Value Management Studies
 - 7.5.3 Study Plan
- 7.6 Constructability Review
 - 7.6.1 Constructability Review Team Members
 - 7.6.2 Constructability Reviews
- 7.7 Appendix
 - P3090 Errors and Omissions Procedures
 - P4020 Value Management
 - P4100 Constructability Reviews
 - P4010 Acquisition of Permits Procedure
 - P6000 Evaluation of Consultants' and Contractors' Quality Programs Procedure
 - P6010 Quality Training Procedure (Internal to Tollway only)
 - P6040 Quality Assurance Audit Procedure
 - P6060 Document Control Procedure for Quality Manual and Program Procedures Manuals Procedure (Internal to Tollway only)
 - P6110 Management Review of Quality Management System Procedure (Internal to Tollway only)

SECTION 8 PROJECT BUDGETS AND ESTIMATES

- 8.1 Tollway Project Management Services
- 8.2 Project Budgets and Estimates
 - 8.2.1 Design Section Engineer
 - 8.2.2 DSE Cost Estimates
 - 8.2.3 Summary of Quantities
 - 8.2.4 Basis of Estimate
 - 8.2.5 DSE Design
 - 8.2.6 Contingency (developed by Tollway)
- 8.3 Analysis of Construction Bids
 - 8.3.1 Estimate Format
- 8.4 Appendix
 - P4110 Cost Estimating Procedure
 - P7010 Project Status Reporting Procedure
 - P7030 Exception Reporting

- P7040 Measurement Analysis and Improvement Procedure
- P7050 Customer Satisfaction Procedure
- P7060 Lessons Learned Procedure
- P7110 Scheduling Control Procedure

SECTION 9 SCHEDULES

- 9.1 Overview
- 9.2 Tollway Project Management Services
- 9.3 Project Schedules
 - 9.3.1 Submittal Requirements
 - 9.3.2 Construction Schedules Prepared by DSE
 - 9.3.3 Schedule Format
- 9.4 Appendix
 - P7110 Scheduling Control Procedure

SECTION 10 TECHNICAL GUIDELINES AND DESIGN CRITERIA

- 10.1 Design Data for Design Section Engineers
 - 10.1.1 Specifications, Standards, and Improvements Record
 - 10.1.2 Manuals and Criteria
 - 10.1.3 Policies and Guidelines
 - 10.1.4 Design Bulletins
 - 10.1.5 Deviation
- 10.2 Appendix

SECTION 11 RELATED REFERENCES

- 11.1 Design Criteria
- 11.2 Other criteria
- 11.3 Appendix

SECTION 12 CHANGE MANAGEMENT

- 12.1 Change Process
- 12.2 Appendix

SECTION 1.0 INTRODUCTION

1.1 PURPOSE and USE of the DESIGN SECTION ENGINEERING MANUAL

It shall be understood that this Manual shall be contractually a part of and directly pursuant to the Proposal and Agreement for Design Section Engineering Services. This Manual replaces the September 8, 1998, Design Services Manual. Each Design Section Engineer (DSE) shall furnish services assigned to him/her per Agreement with the Illinois Tollway and in accordance with the Sections of this Design Section Engineering Manual. Such services shall be performed under the direct administration of the Tollway.

The Illinois Tollway retains consulting firms to provide planning, design, and management services. This Manual provides sufficient information about the applicable administrative policies and practices, design guidelines, and performance criteria so that the DSE can comply with the Tollway's requirements in the execution of their assignments with minimum supervision and review.

The Manual also provides a description of the requirements for the administration and management of DSE services. Detailed guidelines, criteria, policies, practices, procedures and requirements particular to the Illinois Tollway are contained in subsequent sections and appendices.

1.2 TERMS and DEFINITIONS

This Section contains definitions of frequently used terms as well as definitions with special or specific meanings as it applies to Illinois Tollway work. Other Sections define infrequently used or technical terms particular to that Section. Whenever in this Manual the following proper nouns are used, their intent and meaning, both the singular and plural thereof, shall be as follows:

- **Addendum:** Written interpretation or modification of any of the Contract Documents which will be mailed or delivered to prospective Bidders prior to the opening of bids.
- **Agreement:** The legal written instrument or negotiated Contract defining the obligations and considerations of the signatory parties including, but not limited to the performance of the Services, furnishing of labor and materials, and basis of payment. The term "Agreement" includes all Supplemental Agreements.
- **Chief Engineer:** The person designated by the Tollway for the position of Chief Engineer.
- **Constructability Review:** An independent structured review of current project design documentation with the objective of ensuring that the number of potential change orders is minimized and the probability of delays and disputes is reduced. The review also addresses sequencing, utility relocations, coordination of owner furnished items, staging, access and impact on adjacent neighborhood issues, schedule and funding, coordination with other projects, impact on traffic and toll operations, which directly or indirectly impact the design documents under review.
- **Construction Section:** Any portion of, or an entire Design Section, between designated limits, for which separate construction plans are to be prepared.
- **Construction Manager (CM):** The Engineer or firm of engineers and their duly authorized employees, agents and representatives engaged by the Tollway to observe The Work to determine whether or not it is being performed and constructed in compliance with the Contract for Construction.
- **Consultant Quality Plan (CQP):** A plan following the Tollway guidelines developed and proposed by the Design Section Engineer that describes the process by which it will endeavor to ensure that only quality work is submitted to the Tollway during the course of the project.
- **Contract:** The written agreement executed between the Tollway and the successful Respondent and any supplemental agreements duly executed, establishing the terms and conditions for the performance and construction of The Work and the furnishing of labor, materials and equipment by which Contractor is bound to perform The Work and to furnish labor, equipment and materials, and by which the Tollway is obligated to compensate the Contractor therefore at the established rate or price. The contract

also includes the Advertisement to Bidders, Instructions to Bidders, the Proposal, the Standard Specifications, Bonds, the Drawings, the Special Provisions, the Plans, the Specifications and all Addenda and any Extra Work Order, Change Order or Supplemental Agreement after execution of the Agreement.

- **Contractor:** The individual, partnership, firm or corporation, or any combination thereof, who has entered into the Contract.
- **Contract Documents:** All the documents mentioned under the definition of “Contract”.
- **Contract Plans:** The term commonly used to designate the “drawings” incorporated into the Contract Documents. They are the design drawings, special provisions and contract requirements, which have had all addendum items incorporated.
- **Design Concept:** An initial stage of design work, which develops the identified nature of the required improvement(s), demonstrates the intent of the proposed design and verifies compliance with established parameters and design criteria. The Design Concept must include description of alternatives considered in reaching the reported conclusions.
- **Deputy Program Manager Project Management:** The individual engineer responsible for the Construction Division of the Tollway under supervision of the Chief Engineer.
- **Deputy Program Manager Design Management:** The individual engineer responsible for the Design Division of the Tollway under supervision of the Chief Engineer.
- **Deputy Program Manager Project Development:** The individual engineer responsible for the Planning and Programming Division of the Tollway under supervision of the Chief Engineer.
- **Design Section:** A geographic location or area between designated termini or limits for which the Professional Services specified in the Agreement are to be performed by the DSE.
- **Design Section Engineer (DSE):** The Engineer or firm of Engineers and their duly authorized employees, agents and representatives engaged by the Tollway to prepare the Plans and Special Provisions for a Design Section.
- **Design Upon Request (DUR):** The Engineer or firm of Engineers and their duly authorized employees, agents and representatives engaged by the Tollway to prepare the Plans and Special Provisions for multiple small projects.

- **Environmental Lead:** The staff member from the DSE charged with coordinating the DSE teams' environmental studies. This individual shall meet the IDOT Prequalification Guidelines for Environmental Studies.
- **Environmental Planner:** The person on the staff of the Illinois Tollway responsible for coordinating environmental issues and permits for the Tollway projects. This person is also responsible for ensuring that the DSE performs the proper studies to determine whether a project meets the Tollway's, state, and federal environmental policies.
- **Errors and Omissions:**
 1. **Error:** A failure to provide professional services in accordance with the contract.
 2. **Omissions:** A failure to indicate on drawings, specifications or other products of professional services the requirement for a feature, system or equipment which is necessary to complete the function of a project.
- **Field Check:** A review meeting at the proposed Project site for the purpose of performing a comparison of the DSE design with field conditions including topography, utilities, drainage structures, buildings, and other items. Representatives may accompany the DSE from the Tollway and/or the Consulting Engineer.
- **Final Check:** The procedure adopted by the Tollway by which the final drawings, special provisions, supporting calculations and other documents are inspected and reviewed to determine their acceptability as Contract Documents.
- **Final Design:** Drawings, Special Provisions, and supporting calculations which are deemed by the Design Section Engineer to be complete and correct in all respects, including corrections and revisions resulting from the review of Pre-Final Drawings, but which have not been subjected to a Final Check nor accepted by the Tollway as Contract Documents.
- **General Consultant Engineer:** The Engineer or firm of Engineers retained by the Tollway for the purpose of carrying out the duties imposed on the General Consulting Engineer pursuant to the terms and conditions of any trust indenture, and any additional requirements, entered into, by, or on behalf of the Tollway.
- **Geotechnical Engineer:** The Engineer or firm of Engineers contracted by the Tollway or the DSE to perform work in the field of Soil Mechanics and Foundation Engineering for the Design Section.
- **Guide Drawings and Guide Special Provisions:** A document provided to the DSE by the Tollway that contains pertinent information for facilities, materials, and/or systems that the DSE is to incorporate into the design. Guide documents may be used as base documents when allowed by the Tollway. They shall be modified and completed by the DSE to be specific for the Contract.

- **Master Planning (Pre-Concept) Design:** A stage of design development sometimes performed under a separate Agreement, which is reached prior to the start of the Design Concept. The Master Planning Design efforts typically include the development and analysis of major alternative designs and the development of concept budget and schedule. Only selected projects include a Master Planning (Pre-concept) Design submittal.
- **Pre-Final Design:** A complete set of checked plans, accompanied with special provisions and calculations, which includes all anticipated drawings and contains complete design computations and pay item quantity documentation.
- **Preliminary Design:** Drawings, sketches and work sheets prepared by the Design Section Engineer, which demonstrates the general, intended content of the Contract Plans. The Preliminary Plan submittal includes draft special provisions, structural/mechanical and electrical calculations preliminary quantity calculations and updated budget and schedule.
- **Program Manager:** The Engineer or firm of Engineers retained by the Tollway for the purposes of carrying out the duties imposed on the Program Manager, pursuant to the terms and conditions of an authorized Program Management Contract. Also known as the Program Management Office (PMO)
- **Project:** The proposed development that is the subject of the Services stipulated in the Agreement. It may be comprised of one or more Design or Construction Sections.
- **Project Engineer:** A member of the Design Section Engineer's staff responsible for the design of a singular discipline identified within the Contract Documents.
- **(DSE) Project Manager:** A member of the Design Section Engineer's staff responsible for all activities of all design disciplines and who serves as the interface with the Tollway Project Manager.
- **(Tollway) Project Manager:** The representative of the Tollway Chief Engineer assigned to be the technical and administrative liaison between the Tollway and its various contractors and DSE.
- **Project Principal:** A member of the Design Section Engineer's staff responsible for the performance of all services required of the Design Section Engineer by the Agreement and who has the full authority to obligate the Design Section Engineer in administrative, contractual and legal matters.
- **Proposer or Respondent:** The individual, partnership, firm, or corporation, or any combination thereof that has been pre-qualified by the Tollway to submit statement of interest and enter into a Contract for Design Services.

- **Public Agency:** Any public body whether local, state or federal, charged by law with the responsibility of administering and/or controlling public facilities which may be affected by the construction or reconstruction of the roadway, facilities and appurtenances of the Toll Highway.
- **Record Plans:** Contract Plans which have been marked, to show changes or alterations to the work which were incorporated during the course of construction.
- **Scope of Services:** A description of the professional design services, that is jointly agreed upon, and is provided by the Design Section Engineer and which is included in the Agreement.
- **Services:** Professional services provided by a DSE or on their behalf in the performance of studies, surveys, assessments, evaluations, consultations, inspections, scheduling, sequencing, or training; and/or
 - The preparation of reports, opinions, recommendations, permit applications, maps, drawings, designs, specifications, manuals, instructions, computer programs for designated systems, or review of construction change orders; or
 - The sampling, testing, monitoring, or Quality Control necessary to perform any of the Services listed above.
- **Shop Drawings or Working Drawings:** Drawings, diagrams, illustrations, schedules and other data which are specifically prepared by or for the Contractor to illustrate some portion of the work, together with all illustrations, brochures, standards, schedules, performance charts, instructions, diagrams, and other manufacturers' literature; all as approved and accepted by the Contractor and submitted to the Design Section Engineer to illustrate material or equipment to be incorporated in a portion of the work.
 - **Brochure:** A pamphlet or booklet containing descriptive and technical data to help facilitate the acceptability of a product or service.
 - **Sample:** A representative part or a single item from a larger whole presented for inspection or to show evidence of the quality of, and compliance with, contract requirements.
- **Special Provisions:** Special clauses, directions, and requirements supplemental to the Standard Specifications, setting forth requirements peculiar to the Work included in the Contract and Bid Documents.
- **Supplemental Specifications:** Revisions or additions to the Standard Specifications issued by the Tollway.
- **Standard Drawings:** The Tollway's standard details for items such as drainage appurtenances, signs, pavement, guardrail, etc., listed by the Design Section Engineer in the Index of Drawings in the Contract Plans and inserted into the Contract Plans by the Tollway prior to advertising.

- **Standard Specifications:** The most recent edition of the Illinois State Toll Highway Authority's book "Standard Specifications".
- **Survey Upon Request:** The Surveyor or firm of surveyors and their duly authorized employees, agents and representatives engaged by the Tollway to prepare Composite Plats of Highways (POH), Plats of Acquisition (POA), Highway route surveys (HRS) or other Plats of survey and/or Land Survey services.
- **Task Order:** A specific detailed scope of work issued to the DSE under a DUR that will become a contractual obligation.
- **Tollway:** The Illinois State Toll Highway Authority.
- **Traffic Engineer:** The Engineer or firm of engineers retained by the Tollway for the purpose of carrying out the duties imposed on the Traffic Engineer pursuant to the terms and conditions of the contract between the Traffic Engineer and the Tollway and any trust indenture entered into, by, or on behalf of the Tollway.
- **Utility:** The privately, publicly or cooperatively owned lines, facilities and systems for transporting persons or property, for producing, transmitting or distributing communications, electric power, light, heat, gas, oil, crude products, water, steam, waste, sewerage, storm water not connected with highway drainage, and other similar commodities, including publicly owned fire and police signal systems and street lighting systems or any part thereof which directly or indirectly serve the public. The term "utility" shall also mean the utility company, inclusive of any wholly owned or controlled subsidiary.
- **Value Management:** A function-oriented, systematic, team approach to achieve best value for the customer.
- **Value Management Study:** A Value Management Study is a facilitated process that actively helps stakeholders work together to achieve a shared understanding of project purpose and to insure the customer receives best value in fulfilling that purpose.
- **Work:** The improvement described in the Bid Documents and Contract Documents including all authorized Change Orders, Extra Work Orders and Supplemental Agreements.

CONSTRUCTION TERMS AND DEFINITION

- **Beneficial Occupancy:** The stage in the progress of the work of the Contractor when the Tollway may accept a part of the work, when, in the opinion of the Tollway, it is deemed to be in their best interest to occupy or accept for use such a part, provided that all critical system safety elements have been completed.

- **Change Order (CO):** A written directive authorizing changes for pay items previously established in the contract, to be performed by a construction contractor, which affect contract price and/or schedule. A Change Order may include future work to be performed or work performed in accordance with previously authorized Memos, or work otherwise performed at the direction of the Illinois Tollway.
- **Contract Closeout:** The final stage of contract administration during which the Tollway verifies that the construction contractor has completed all provisions in the applicable construction, including the submittal of all record documents, and that all financial aspects of a contract are settled.
- **Extra Work Order (EWO):** A written directive, for items not established in the contract at the time of bid, authorizing changes in the work to be performed by the contractor.
- **Final Acceptance:** The stage in the progress of the work when all required construction work, including all items on all punch lists have been completed to the satisfaction of the Tollway and in accordance with the requirements of the contract. The “Notice of Final Acceptance” is certification to the Contractor that all physical work is complete.
- **Monitoring Verification:** An unplanned (reactive) verification in which a problem/concern is uncovered or raised and leads to investigation.
- **Objective Evidence:** Information that is detectable by the five senses and would be the same, regardless of the observer.
- **Scheduled Verification:** A planned verification in which all requirements on a pre-prepared checklist are reviewed for conformance.
- **Substantial Completion:** The stage in the progress when the work, or in the case of beneficial occupancy a designated portion thereof, is sufficiently complete in accordance with the contract documents so the Tollway can occupy or utilize the work for its intended purpose. The notice of substantial completion is an indication that all physical work has been completed, except for those minor defects or deficiencies on the punch list.
- **Submittal Package:** A submittal package is made up of all related submittal information, generally organized to provide a complete description of elements for use in a specific component or work. An index is provided to identify the information.

1.3 ACRONYMS

- CDB Illinois Capital Development Board
- CM Construction Manager
- CQP Consultant Quality Plan
- CRP Congestion Relief Plan
- DSE Design Section Engineer
- DUR Design Upon Request
- HRS Highway Route Surveys
- IDHR Illinois Department of Human Resources
- IDOT Illinois Department of Transportation
- IFB Invitation for Bids
- MOT Maintenance of Traffic
- NTP Notice to Proceed
- PMO Program Management Office
- POA Plats of Acquisition
- POH Plats of Highway
- PSB Professional Services Bulletin
- RFI Request for Information
- RFP Request for Proposal
- RFQ Request for Qualifications
- SOI Statement of Interest

SECTION 2

ADMINISTRATIVE POLICIES, PRACTICES, AND PROCEDURES

2.1 INTRODUCTION

This Section includes detailed instruction regarding the day-to-day administrative conduct of a Project. The principal topics in this section include:

- Tollway Program Management Services
- Design Section Engineering Services
- DSE Selection
- Project Meetings
- Meeting Minutes
- Communications and Reports
- Invoice Payment
- Amendments to Contract
- Submittals
- Performance Evaluation
- Project Close-out

2.2 TOLLWAY PROGRAM MANAGEMENT SERVICES

The Design Section Engineering Firms are advised that the Tollway has retained a Program Manager and a General Consulting Engineer to develop, implement and maintain the Tollway's Program Management Policies and Procedures. The Purpose and Goals of the Program Management Team is to:

- Evaluate DSE progress and performance in a manner that is fair and unbiased (refer to P3030, Consultant Evaluation Procedure)
- Provide feedback to the DSE to influence their ability to meet the contractual requirements (refer to P4000, Design Management Procedure).
- Identify and implement improvements beyond the stated contractual requirements, at minimal or no cost to the public.
- Contribute to positive perceptions of the Program.
- Communicate proactively and timely with DSE, and
- Increase DSE understanding of the Tollway's Project Quality Management vision.

2.2.1 Purpose of Program Management Procedures

The purpose of the Tollway's Program Management Procedures is to communicate job duties, roles, and responsibilities to individuals and consultants working directly with the Tollway's Department of Engineering to successfully complete the Congestion Relief plan as part of the congestion Relief Plan Management Team. Procedures are developed to establish a uniform method to ensure consistency in the performance of assigned duties across the CRP. The Program Management Procedures specify the mandatory work

processes to be completed, the methods and manner to be utilized in their completion, and any required review and approval processes associated with each.

Similarly, the Design Section Engineers Manual specifies the duties, roles, and responsibilities of the Design Section Engineers.

The Program Management Procedures referenced herein are for communication and informational purposes.

2.2.2 Role of the Tollway's Project Manager

In accordance with Tollway Procedures the Tollway's project manager will be involved with the project from conception through construction completion. They will:

- Prepare the estimate of work hours required for design services based on historical data from similar work, present the scope of services to the DSE at the proposal meeting, and perform the final adjustment to the scope of services during the proposal review and negotiation phase.
- Monitor the DSE Progress and work with the DSE to ensure schedule and budget compliance.
- Conduct office visits to obtain "first hand" information on the DSE activities, staffing, and compliance with the scope of services, work progress, project status with respect to schedule and budget and general project management.
- Review on a monthly basis the DSE submitted invoices and verify that the work hours charged to the Tollway have been documented on the monthly progress and staffing reports.
- Prepare bi-annual DSE performance evaluations.

2.3 DESIGN SECTION ENGINEERING SERVICES

The Design Section Engineer provides the comprehensive consulting, design, engineering, and construction related services required for the development of the design of a Construction Section. These services include, but are not limited to:

- Studies/Report Services
- Engineering/Architectural Services
- Upon Request Services
- Project Management.

2.3.1 Studies/Reports Services (Planning/Engineering)

The Illinois Tollway may retain a DSE to perform studies to investigate, define, or quantify a specific issue identified by the Tollway. Usually studies are a pre-design and a pre-construction planning activity with a relatively broad scope of work.

2.3.2 Engineering/Architectural Design Services

The Illinois Tollway retains engineering and architectural firms to provide DSE services necessary for the design of a Construction Section. The extent and type of services to be performed by the DSE is set forth in the Scope of Services contained in the Agreement.

2.3.3 DSE Project Management Services

Project Management Services include, but are not limited to, project management, design management, cost control, and comprehensive program controls as required by the Tollway. Assigned tasks may include management services on an as-needed basis or the management of multiple designated DSE and CM contracts of specific section of the Tollway or large programs with similar needs.

2.3.4 Design Upon Request (DUR) Services

Design upon request contracts provide the Illinois Tollway flexibility in developing design services on multiple small projects. In general, Design Upon Request Services follow the typical design phases and procedures.

The Tollway Project Manager is responsible for developing and managing the DUR contract and developing each Task Order assigned to the contract. The DSE is responsible for delivering Engineering services as described within each Task Order of DUR contract.

- The DSE develops a proposal to include schedule and budget for performing work described in the Task Order.
- Written Notice to Proceed (NTP) is issued once agreement is reached on a task order between the Illinois Tollway and DSE.
- Each deliverable is reviewed per Tollway Procedure P 4000, Design Management.
- The DSE is evaluated at the end of each task order.

2.3.5 Non-engineering Professional Services

Consulting firms may also be requested to perform various non-engineering professional services. The Illinois Tollway solicits DSEs for non-engineering professional services by using a Request for Qualification ("RFQ") that is similar to the Professional Services Bulletin (PSB) procedure. The Tollway Purchasing Department advertises the RFQ invitation and receives the responses from the pre-qualified firms. Questions from prospective consultants are addressed and, if necessary, addendums are issued. Requests for Proposals ("RFP") and Invitation for Bids ("IFB") are also used to solicit proposals for services other than engineering and architectural professional services. The DSE selection, in these cases, may be based on qualifications and/or price.

2.4 DESIGN SECTION ENGINEERING (DSE) SELECTION

DSE firms are selected by the Illinois Tollway to provide design services for projects contained in the annual Capital Improvement Program. The Illinois Tollway solicits professional engineering services by issuing a Professional Services Bulletin ("PSB"). The PSB is a published invitation soliciting Statements of Interest ("SOI") from engineering and architectural firms to provide professional design services ("DSE"). Questions from prospective DSEs are addressed and, if necessary, addendums are issued.

The Illinois Tollway Engineering Contract Services Department posts the PSB invitation and manages the receipt of the SOI. Engineering and architectural firms respond to the PSB with a SOI that includes the requested information about the firms. All Professional Services contracts are solicited and awarded in accordance with the Architectural, Engineering and Land surveying Qualifications Based Selection Act (“30ILCS535”).

2.4.1 Professional Service Bulletin (PSB)

The Illinois Tollway solicits professional services by issuing a PSB. The PSB is a published invitation soliciting Statements of Interest (SOI) from engineering and architectural firms to provide Design Section Engineering services. DSE selection is based upon qualifications.

2.4.1.1 For each Project in the Professional Services Bulletin the Tollway develops the design schedule, construction schedule, the description of the project and the following information and instructions:

- Electronic Submittal Instructions
- Notice of Electronic Signatures
- Signature Certification for Electronic Submittals
- Statement of Interest
- Certification by Principal of Submitting Firm
- Notice: (Project and Scope of Services Description)
- Disadvantaged Business Enterprise (DBE) Participation
- Allowable Direct Costs
- Required Exhibits and Certifications
- Proposed Staff
- Location Design/Environmental Questionnaire
- Instructions for completing Exhibit C
- Current Obligations
- Availability of Key and Support Personnel
- Disclosure Certification Forms
- Notice to Out of State Companies
- Hard Copy Submittal Instructions.

2.4.1.2 The project description in the Professional Services Bulletin includes, but is not limited to:

- Location of work area
- Description of required services
- Qualifications required of the successful bidder
- Qualifications of individuals required to complete the work
- Required submittal information.

2.4.1.3 Questions from prospective DSEs are addressed and, if necessary, addendums are issued.

2.4.1.4 In order to be considered the DSE firms must be pre-qualified by the Illinois Department of Transportation (IDOT) and/or pre-qualified by the Illinois capital development Board (CBD) in specific categories identified in the Professional Services Bulletin, pre-qualified by the Illinois Department of Human Resources (IDHR), and meet any additional requirement noted in the Professional Services Bulletin in order to be considered.

2.4.1.5 The Illinois Tollway Engineering Contract Services Department is responsible for the posting of the PSB invitation and the receipt of the Statements of Interest.

2.4.1.6 A committee consisting of representatives from the Tollway, IDOT, and the Illinois Society of Professional Engineers reviews the Statement of Interest and evaluates each firm on qualifications using the technical guidelines and the criteria contained in the PSB. The selection committee's choice is based solely upon these qualifications. The three most qualified firms are ranked in order.

2.4.1.7 The Tollway Engineering department conducts contract negotiations with the top ranked firm. If contract negotiations are unsuccessful with the top firm the Tollway will then enter into negotiations with the second ranked, and proceed to third ranked firm if necessary. The project will be re-advertised if no successful negotiations are achieved.

2.4.2 Statement of Interest (SOI)

When responding to the Professional Services Bulletin engineering and architectural firms submit a SOI that includes information organized as follows:

- **Section 1.** Executive Summary (no longer than 6 pages)
 - Name of firm, address, telephone number, and contact person
 - List all sub DSE, the work they will provide on the project and a contact person for each. Identify DBE.
 - Name of Project Manager
 - Name of Project Engineer
 - Project Understanding
 - Project Approach
 - Statement that firm will meet or exceed the Disadvantaged Business Enterprise (DBE) goal for the Item.
- **Section 2.** Organization Chart
 - Includes names and titles for all Key and Support Personnel
- **Section 3.** Personnel
 - A list of the Key Proposed Staff members and their functions on the project
- **Section 4.** Availability of Key and Support Personnel
 - Firms must show the percentage of time that the identified Key and Support Personnel will be available to work on the project described in each Item.
- **Section 5.** Relevant Project Experience

- **Section 6.** Locations of where the actual Design Studies and Environmental Reports (if required) are to be performed.
- **Section 7.** Current Obligations of Work
- **Section 8.** Certification by Principal of Submitting Firm

NOTE: The Tollway may at its discretion amend the above as required

2.4.3 Request for Qualifications

For non-engineering professional services, the Illinois Tollway solicits professional services using a Request for Qualifications (RFQ) procedure. This is similar to the PSB procedure. The Illinois Tollway advertises the RFQ invitation and receives the responses from pre-qualified consulting firms.

2.4.3.1 Request for Qualifications (RFQ), Request for Proposal (RFP) or Invitation For Bid (IFB) Solicitations

- The Tollway Project Manager prepares the solicitations' scope of work and level of effort. The request is reviewed and approved by:
 - Responsible Deputy Program Manager
 - Program Manager
 - Chief Engineer

2.4.3.2 The Tollway's Engineering Contract Services issues the RFQ, RFP or IFB package containing the following:

- **Scope of work**
- **Level of effort**
- **Memo:** A Memo outlining the project name, anticipated contract award date and approval for advertisement based on the approved Master Program Schedule.
- **Project Justification**
- **Submittal Contents:** This section of the RFQ/RFP document identifies all documents and information to be submitted by DSE upon which the evaluation is to be based.
- **Evaluation Criteria:** This section of the RFQ/RFP document identifies in descending order the importance of each item being evaluated. This section must be consistent in order with the Evaluation Criteria Weights. Each Evaluation Criteria item must reference the related item in the Submittal Contents section.
- **Committee Evaluation Guidelines:** This document describes how each Evaluation Criteria item is to be evaluated by the Evaluation Committee. This section must be consistent with the Evaluation Criteria section of the RFQ/RFP.
- **Evaluation Criteria Weights:** This document must be consistent with the items identified in the Evaluation Criteria section of the RFQ/RFP. The Evaluation Criteria Weights are to be used for listing the order of the items in the Evaluation Criteria section of the RFQ/RFP. These weights are to transform the raw scores into final scores.

2.4.3.3 A committee structure is used to review the RFQ responses for technical content and the firm's qualification using the guidelines and the criteria contained in the RFQ. The committee's final recommendations are made to the appropriate committees of the Board of Directors for their approval.

2.4.3.4 Request for Proposal (RFP) and Invitation for Bids (IFB) are also used to solicit proposals for services other than engineering and architectural services. The DSE selection, in these cases, may be based on both qualification and price.

2.5 DESIGN SECTION PROJECT MANAGEMENT AND ADMINISTRATION

2.5.1 Project Directory

DSE will keep current the Project Directories that were submitted as part of the Statement of Interest describing their project staff and sub-consultant organization with reporting relationships, functional responsibilities, job descriptions, and technical qualification.

2.5.1.1 Project Directory includes the following information:

- Tollway Project Manager
- Key Tollway staff members
- DSE Project Manager
- DSE Key staff members
- DSE sub-consultants and their key personnel.

2.5.1.2 Unless otherwise directed by the Tollway the DSE will, at a minimum, staff each project with a Project Manager, Project Engineer, Quality representative and an Environmental Lead to ensure compliance with all applicable regulatory requirements.

2.5.1.3 The Project Directory will also contain means of contact with the key members of the DSE design staff by including:

- Fax Number
- Phone number
- Mailing address
- E-mail addresses
- Mobile phone number

2.5.1.4 The Professional Service Bulletin identifies the pre-qualifications required by the Tollway for the DSE project and DSE staff. The Illinois Tollway must approve all changes of Key DSE or their sub-consultant technical staff members.

2.5.2 Project Meetings

All project meetings are scheduled in advance with a prepared agenda distributed to each attendee three days prior to the meeting. The Tollway uses a uniform method for preparing and distributing meeting agendas and minutes (Refer to P1040 Meeting

Agendas and Minutes Procedure). At a minimum, the meeting agenda includes the following:

- Meeting Purpose
- Meeting Date
- Meeting Time
- Meeting Chairperson
- Location
- To (Invitees)
- List of topics to be discussed

2.5.2.1 Project Kick-Off Meeting: The purpose of the project kick-off meeting is to communicate and discuss with the project team such items as contractual details, contracted scope of work, business and execution strategies, and project initiation details. Also intended is distribution of reminders and checklist for further development of information relating to further definition of scope of service and facilities or other requirements needed to prepare for project alignment (team building).

The following people shall be required to attend the project kick-off meeting:

Key Attendees

Tollway Team

- Deputy Program Manager for Design
- Deputy Corridor Program Manager
- Project Manager
- Project controls representative

DSE Team

- DSE key staff personnel including design leads by discipline
- Sub-consultant key personnel
- Project controls key staff

Topics to be covered in the kick-off meeting include but are not limited to:

- Introductions
- Roles and Responsibilities of key personnel assignments
- Scope of Work, schedule and budget review
- Tollway and DSE interfaces
- Establish reporting requirements
- Team rosters with names, addresses, email addresses, and telephone numbers
- Establish approval procedures
- Specifications checklist
- Contract specific issues
- Contract administrative issues (travel, expenses, meals, etc.)
- Consultant Quality Plan submittal

2.5.3 Meeting Minutes

Meeting minutes are prepared by the DSE using the Meeting Minutes Form for each meeting and are distributed to all attendees. The DSE may use their own form for Meeting Minutes, so long that it contains the required information in the proscribed format. Meeting minutes include the basic project identification, attendee sign-in sheet, the agenda items, new action items as well as the status of action items from previous meetings.

Instructions for the format, content, approval, and sign-in sheet and distribution requirements of project meeting agenda and meeting minutes as well as related forms are contained in Tollway Procedure P 1040.

2.5.4 Communications and Reports

2.5.4.1 Project Communications: A communications distribution is defined at the beginning of the project and establishes the proper distribution of project correspondence and documents on a need-to-know basis.

The DSE shall use the Illinois Tollway Uniform Filing System to enable the efficient method of control, identification, storage, protection, retrieval, retention, and disposition of records. Included are the formats and forms that permit the consistent identification of hard copy and electronic documents, files, and folders including:

- File Naming Conventions
- Design Folder Structure
- Construction Folder Structure
- Administration Folder Structure

NOTE: The Tollway is currently developing a web based management system that will modify the communication and reporting protocols.

Records are identified in accordance with the established File Naming Convention and are contained in files in three major categories:

- Design Project-Specific Records
- Construction Project Specific Records
- Administrative Records

2.5.4.2 Progress Reports: The DSE is required to submit a progress report detailing the labor hours expended on specific project functions. The report compares the estimated labor hours with those scheduled, expended and anticipated. Unless otherwise stated in the Scope of Services (or work, as defined in Exhibit "F" of the agreement), or as directed by the Tollway, the report must be submitted monthly.

Completed progress reports are required prior to the processing of invoices. The progress report must be received by the Tollway no later than the 20th day of the

month covered by the report. The dates covered by the monthly reports shall coincide exactly with the dates covered by the monthly invoice. Progress reports are submitted directly to the Tollway Project Manager.

2.5.4.3 Staffing Reports: With each Progress Report, the DSE shall submit a staffing report listing the names of the individuals performing work on the project. The number of hours worked by each individual in the period matching the progress report shall be shown along with the total for the month. The total for the month must equal the total number of labor hours invoiced for the month. The report shall also report the total hours worked on the project by each individual.

2.5.4.4 Monthly Narrative: The DSE will be required to submit a monthly narrative, prepared by the DSE Project Manager. The narrative shall include a dated listing of all meetings, submittals, telephone conversations, requests for data, receipt of material; work accomplished during the reporting period; work expected to be accomplished in the upcoming month and all other milestones of importance during the project.

The monthly narrative is submitted directly to the Tollway Project Manager as part of the Progress Report. The narrative should be brief. It should not repeat minutes of the meetings, attendance lists, content of conversations, etc., but should inform the reader of the key activities during the reporting period and note pertinent documents, narratives or correspondence.

2.5.4.5 DSE Employee Rate Listing: The direct salary rate allowable for any individual for invoicing purposes will be the rate listed on the most recently approved "Work Force and Rate Listing". When new or additional staff is required or when the individual labor rates change (annual salary increases) from the rates negotiated in the proposal, the DSE shall submit a revised Work force and Rate Listing along with an updated Certified Payroll. The Certified Payroll must match the employee rates listed on the work force and Rate Listing. Also:

- Total annual salary rate increases should not exceed 3% per year, and
- Individual salary increases of 7% or more require a written request by the DSE that is approved by the Tollway's Chief Engineer prior to using the increased rate on invoices.

Promotions resulting in salary increases will only be permitted if the promotion occurs on this project. Employees promoted within the company will not be entitled to a rate increase on this project beyond the rate appropriate for the services being performed by the employee. Any increase will be at the effective date of annual increases.

2.5.4.6 Project Status Evaluations: When the compensation due the DSE approaches fifty percent of the total estimated fee, it shall be the DSE's responsibility to review and evaluate the work accomplished to date, the work

remaining and the project schedule. The DSE will then submit a written report of this evaluation to the Project Manager. If the Tollway deems that the progress is unsatisfactory, the DSE may be required to repeat the review and evaluation process prior to the time that the compensation due approaches seventy and ninety percent of the total estimated fee.

2.5.5 Invoicing

Invoices are submitted monthly for the previous month's Engineering Services to the nearest end of the week that conforms to the respective Monthly Staffing Reports. All invoices submitted to the Tollway for Engineering Services must include the required supporting documentation. All invoices must be submitted on applicable Tollway forms (which will be provided to the DSE by the Tollway's Project Manager at the start of the contract). The invoice for payment form includes:

- Invoice Routing sheet
- Period covered
- Type of work (Engineering Services)
- Tollway project number
- Sequential invoice number
- DSE job number
- Invoice summary sheet for:
 - Prime consultant, and
 - Sub-consultants
- Direct labor summary sheet
- Direct costs summary sheet
- Services by Others summary sheet
- Man-hours to date
- Total invoice amount
- Signature by an authorized company signatory
- One set of supporting documentation.

Should the billable amounts exceed the applicable line item within the Agreement, but not cause an increase in the total estimated fee, the DSE must make a written request to the Tollway for adjustments to line items in the agreement, prior to invoicing for such expenses. The DSE will manage the current upper limit of compensation for total direct costs. Should the DSE require additional funding in excess of the total estimated fee, the DSE must make a written request to the Authority prior to expending any funds in excess of the total estimated fee. Use of a contingency amount (if applicable) must be approved by the Tollway prior to its use. Invoice amounts exceeding the total estimated fee will not be processed without prior written approval.

Payments may be tracked on the internet at www.comptroller.state.il.us. You will need to know your FEIN number and use the Authority's agency code of 557. Reimbursement of expenses related to the use of sub-consultants is limited to those included in the proposal. Should circumstances require a revision to a sub-

consultant's terms, the DSE must secure written approval from the Tollway. Should the DSE require the assistance of a sub-consultant not listed, the DSE must provide written explanation and obtain written permission prior to using the sub-consultant's services. Should the DSE require the sub-consultant to perform services that would cause the sub-consultant to exceed its upper limit of compensation, the DSE must obtain prior written permission from the Tollway. Failure to follow this guideline will result in rejection of such expenses.

2.5.5.1 "Cost Times Multiplier" Agreements

Invoices are submitted to the Tollway monthly. The dates covered by each invoice shall coincide exactly with the corresponding progress report(s). All payroll documentation relating to the project must be made available for audit by the Tollway. All outside direct costs shall be documented with receipts and/or invoices from suppliers, outside service providers or sub-consultants. In-house direct costs chargeable to the project and provided for in the Agreement shall be supported with internal accounting documentation showing the type, quantity and unit cost of the in-house produced items.

2.5.5.2 "Lump Sum" Agreements

Invoices are submitted monthly to the Tollway. The dates covered by each invoice shall coincide exactly with the corresponding progress report(s). Invoices must be accompanied by a computer-generated labor-charge printout. Signed time sheets or initialing of time by project staff is not required. All payroll documentation relating to the project must be available for audit by the Tollway. Sample invoice forms will be provided to the DSE by the Tollway Project Manager at the beginning of the project.

2.5.6 Supplements to Contract

2.5.6.1 Changes in Scope of Services: During the Master Planning, Concept, Preliminary, Pre-Final or Final design preparation, items of work may develop or be identified as being outside the original or amended Scope of Services. Such items shall be identified and have a separate time-estimate prepared to cover the anticipated man-hours.

Whenever possible, any change in scope should be identified and negotiated before any of the out of scope work is undertaken. The time from identifying a change, through drafting a scope and estimated level of effort, negotiating the change, preparing the supplement, board approval, and execution of the Change in Scope of Services is dependent upon the Tollway Board's schedule. When the schedule for the project requires that the DSE proceed with the work prior to the execution of the Change in Scope of Services, the Tollway may direct the performance of the work immediately following conclusion of the negotiations. The DSE shall submit a request in writing for approval and recognition of the item as being beyond the original or amended Scope of Services. Work may not proceed on out-of-scope items without written approval from the Tollway.

2.5.6.2 Supplement Scope of Services: The request to supplement the Scope of Services shall include the following information:

- A definition of the revision to the Scope of Services;
- Documentation of the facts leading to the revision to the scope;
- An evaluation of the impact the revision will have on the project schedule, the construction costs and the total change to estimated design fee including man-hours per individual and all associated direct costs.

2.5.6.3 Contract Time: The DSE shall examine the nature and magnitude of the changes proposed in each Change in Scope of Services and determines if accomplishment of any of the changed work will:

- Extend the Contract time beyond the then current Contract Completion Date as described in the Standard Specifications; or
- Result in a delay as described in the Standard Specifications.

The DSE analysis of the impact of the changes on the Contract time shall be attached as a part of the supporting documentation to the Changes in Scope of Services. All requests for extension of time and claims for extra compensation received from the DSE shall be reviewed by the Tollway's Project Manager and reviewed and approved by the Chief Engineer. The DSE shall submit to the Tollway all pertinent facts regarding each request or claim, together with recommendations. The Tollway's response to the request will be transmitted through the Tollway Project Manager to the DSE.

2.5.7 Submittals

All work developed by the DSE shall be submitted at various intervals as described in **SECTION 4 "Design Phase Project Deliverables"** of this manual.

2.5.8 DSE Performance Evaluation

It is the policy of the Illinois Tollway to evaluate the performance of DSE at established intervals during the course of a project. Evaluations shall be made on a project by project basis. If a DSE is involved in more than one project, the DSE performance shall be separately evaluated for each project. This evaluation is completed primarily by the Tollway Project Manager, who may consult with various other members of the Tollway staff on specific issues. The Tollway will conduct a formal evaluation of the DSE's performance on each project in accordance with the Tollway procedure P3030 (Consultant Performance Evaluation Design contract Administration).

2.5.8.1 Schedule of Evaluations: Evaluation intervals and target dates are established based on the nature of the assignment, the scope of services, and the term of the contract.

- For design projects, evaluations are conducted at the end of the Master Plan Development phase; at 60 % completion of the Construction Document Preparation Phase (or other milestone defined by the Project Manager); and following Final Acceptance Construction Contract Closeout.

- For all other non-design DSE assignments, an evaluation is held at completion of the assignment, but prior to the DSE final payment. The maximum interval between evaluations for all DSE will not exceed six months. Additional evaluations may be made if deemed appropriate. The Project Manager evaluates the DSE performance at the established intervals.

2.5.8.2 Evaluators: The Tollway's Project Manager or other designated evaluator shall assess the DSE performance, including:

- Organization and staffing of the project, and the procedures used for assigning, supervising, and checking work.
- Coordination of sub-consultants
- Conformance to design schedule and submittal of design packages
- Design within construction budget
- Approach to the storage of design records
- Quality of reproductions
- Adequacy of supervision
- Relative physical location of the different technical disciplines (structural, architectural, mechanical, electrical, etc.) and the method of communication (viewed in relation to ease of coordination)
- Adherence to quality requirements (to be discussed with the QA department)
- Assess the current stage of the project and an approximate percentage completion
- Examine time records and correspondence files, calculations, drawings, and studies in sufficient detail to make an evaluation of progress beyond the last progress milestone submission
- Check for conformance to previous comments
- Check for adherence to the scope of work.

2.5.8.3 Evaluation Documentation:

- If the answer to all evaluation questions is either excellent, above average, or average the Tollway Project Manager will send the evaluation to the DSE for signature. The DSE Principal-in-Charge shall sign and return the signed evaluation to the Tollway's project manager.
- If there is a below average or unacceptable evaluation, the Project Manager will meet with the DSE Principal-in-Charge to review the evaluation. All identified deficiencies shall have a corrective action plan developed and documented. At the conclusion of the meeting, the DSE Principal-in-Charge shall sign and date the evaluation. Deficiencies considered to be materially significant or of a long-term nature shall be further documented in writing to the DSE Principal-in-Charge. All unacceptable and below-average ratings require a written response by the DSE, identifying a Corrective Action Plan which must be submitted.

2.5.9 Project Closeout

The project close out includes the administrative and procedural requirements for contract closeout, including, but not limited to, completion of physical work, submission of records, closeout meeting and financial contract closeout.

- Tollway policies provide for the orderly and controlled closeout of all DSE contracts to ensure that all work specified has been completed in accordance with the contract, that all record documents have been received, and that all financial aspects of the contract are settled.

Final payment will be released upon completion of all contract requirements, including resolution of all open technical matters.

2.6 DSE CONSULTANT UPON REQUEST (DUR) SERVICES

Consultant Upon Request Services encompasses a wide range of project activities. Design Upon Request (DUR) contracts are established to provide the Tollway flexibility in developing design services on multiple small projects.

2.6.1 Scope of Services

The scope of DUR contracts may include, but not limited to Task Order (individual tasks which will become contracts), investigations, studies, design preparation, and construction support services.

2.6.2 Project Administration

As with other types of design projects, the Tollway Project Manager is the primary point of contact with the DSE. The Tollway Project Manager is responsible for managing DUR contracts and developing each Task Order assigned to the contract. All communication with the Tollway and third parties, such as regulatory agencies, shall be coordinated through the Tollway Project Manager. Administration of DUR projects utilizes the standardized procedures, modes of communication, and formats for the day-to-day management of the project. The previously described policies, practices, procedures and their application remain applicable.

2.7 DSE SURVEY UPON REQUEST (SUR) SERVICES

The Survey Upon Request services are a special type of DSE contract. The scope of these services typically require surveying of lands to determine the Tollway's existing rights-of-way and to further prepare Plats of Acquisition (POA) for additional rights-of-way, a composite Plat of Highways (POH) to document the Tollway's existing property boundaries, a highway route survey (HRS) which is a plat of highways prepared to delineate a proposed route/improvement and the new ROW boundaries or any other Plats or survey and/or Land Survey services. These assignments are often issued directly under a "SURVEY UPON REQUEST (SUR) SERVICES" Contract, but may also be included as a task under a more comprehensive DUR or specific project DSE Contract.

In any case, the breadth of ROW survey and final deliverable packaging will be negotiated, established and documented in advance of the Notice to Proceed.

2.7.1 Plat Review and Approval Process

Step -1 When plats are involved, prior to the initial submission of each Plats of Acquisition (POAs), Plat of Highways (POH) or a highway route Survey (HRS), the Originating Surveyor shall comply with the requirements set forth in checklist (F3110.01) and check off the “COMPLETED” column on the appropriate line items based on the definitions provided below, and enter the date adjacent to the Originating surveyor check box on Page #1. The checklist (F3110.01) shall be submitted to the Tollway’s Project Manager along with all other preliminary deliverables (parcel plat/plat of highways) in the original Excel format for the Tollway’s review.

Step – 2 The Tollway reviewer will review the surveyor’s preliminary deliverables utilizing the checklist (F3110.01) by checking off the “CHECKED” column on the appropriate items. Lastly, the Tollway’s reviewer will enter the date adjacent to the Independent Review check box on Page 1 and include any supplemental data as required.

Step – 3 The Tollway will then return the completed checklist in original Excel format to the surveyor, and may include a separate written analysis to supplement the review of more complex plats.

Step- 4 The Surveyor shall then comply with all the comments revealed in the review checklist and/or the supplemental analysis.

Step – 5 The Surveyor then prepares the final deliverables, including written responses to all comments listed within the checklist and notes as to any items that have not been incorporated into the final deliverables. The Surveyor shall then sign the checklist attesting that all review comments have been satisfactorily resolved or otherwise noted herein and submit the final deliverables in accordance with the formatting set up in the NTP.

The following definitions are provided to assist the DSE in assigning development status to their deliverables.

- **COMPLETED:** indicates that the Surveyor (consultant) was adequately compliant with their submittal.
- **CHECKED** indicates that the provided submittal was reviewed relevant to the line item.
- **N/A** indicates the line item is not applicable to this type of submittal.
- **NONE** indicates item listed does not appear to exist or affect the subject location
- The following nomenclature is used to define deliverables;
 - C = Composite Plat of Highways (POH) (existing right-of-ways)
 - P = Plat of Acquisition (POA)
 - H = Highway Route surveys (HRS)

- HRS, a.k.a. POH of proposed route/improvement

All right-of-way related deliverables shall be in accordance with the Illinois Department of Transportation Land Acquisition Manual, and applicable Exhibits.

2.8 DSE PROGRAM/PROJECT MANAGEMENT SERVICES

Program/Project Management Services include, but are not limited to, program management, project management, design management, construction management oversight, cost control, and comprehensive program controls as required by the Tollway. Assigned tasks may include management services on an as-needed basis or the management of multiple designated DSE and CM contracts of specific section of the Tollway or large programs with similar needs.

2.8.1 Project Administration

DSE projects use standardized procedures and formats for the day-to-day administration and management of their projects. The project requirements, criteria, procedures, formats, and their reporting requirements are defined. The Program/Project Manager's primary task is to manage the principal project phase milestones and ensure their accurate execution and reporting including the following:

- Project Scopes
- Project budgets
- Project Schedules, and
- Progress Reporting

The project organization and communications are coordinated at the project kick-off meeting and should follow established procedures and formats for DSE projects.

2.9 APPENDIX

2.9.1

The procedures identified below are the operating procedures used by the Tollway project managers to ensure design contract compliance. They are included for reference only:

- P1010 Deviating From Procedures
- P1040 Meeting Minutes
- P1050 Uniform Filing System
- P1080 Staff Summary Sheet Procedure
- P3000 Request for Qualification and Request for Proposal Procedure
- P3030 Consultant Performance Evaluation Design Contract Administration.
- P3110 Consultant Upon Request Procedure
- F3110.01 Survey Checklist
- P4000 Design Management Procedure
- Illinois Land Acquisition Manual, and applicable Exhibits

2.9.2

The following documents and templates may be obtained by the DSE from the Tollway at project initiation

- Revised Proposal for Design Section Engineers
- Instructions to complete the Proposed exhibits
 - Exhibit B
 - Exhibit D
 - Exhibit H
- Revised Invoice forms
- Description of the:
 - Proposal and Exhibit Packet What to include in the resubmittal of the Proposal and Exhibits
 - Invoice forms Packet
 - Monthly Progress Report
- F3110.01 survey checklist

SECTION 3

WEB BASED MANAGEMENT SYSTEM

3.1 WEB -BASED MANAGEMENT SYSTEM INTRODUCTION

The Tollway is implementing a Web-Based Project Management System (Meridian Systems-R Proliance-R) for all official project communications. This system provides all project team members the following:

- Simplification of communications
- Automated tracking of time-sensitive information
- Automated reporting
- Common document storage and management Audit trail of information
- Secure, real-time 24/7 access and exchange of information

3.2 DSE REQUIREMENTS

All DSE shall be required to use this system for all official project communications and interactions including:

- Correspondence
- Meetings
- Design Management
- RFIs
- Submittals
- Schedule submittals
- Nonconformance reporting
- Resident Engineer's Daily Diary
- Daily Activity Reports
- Punch lists
- Budget and Cost management
- Reporting

The software is accessed via the Internet and there is no licensing cost to consultants or contractors. In addition, the Tollway will provide training at no cost to the DSE on the system and all project team members must complete training prior to gaining access to their project websites.

The DSE will be solely responsible for:

- Establishing and furnishing high-speed Internet connectivity to access their project websites, and
- Furnishing all hardware and software required to establish and maintain access to the project websites, including the provision of any small or large format scanning hardware, plotter devices, printers, or means of obtaining scanned or plotted documents from a printing/plotting service, to support the electronic submittal review process via the websites

3.3 APPENDIX

The procedures identified below are the operating procedures that may be used by the DSE to ensure design contract compliance.

- Requirements for design Management
- Requirements for Document Management and Construction Processes
- Web-Based Project Management System User Manual

SECTION 4

DESIGN PHASE PROJECT DELIVERABLES

4.1 GENERAL PROJECT DELIVERY REQUIREMENTS

4.1.1 Submittal Requirements

All work developed by the DSE shall be submitted at various intervals as described in this manual for review and acceptance by the Tollway. Such acceptance, when it is granted, does not relieve the DSE of the responsibility for the correctness and accuracy of the work. Such review and acceptance, is intended to verify that the requirements of the Tollway are being followed and that further work may proceed. Corrections of subsequently discovered errors shall be done at no additional cost to the Tollway.

If the Tollway finds it advantageous to divide the project into more than one contract, and/or include part of the work in contract documents prepared by others, or to include designs and plans prepared by others in the contract documents prepared by the DSE, the DSE shall do so and shall assist the Tollway in coordinating the preparation of such contract documents.

In addition, DSE services may be required for the review of submittals and for response to inquiries concerning the design and plan interpretation during construction. Shop drawings and other submittals developed by the Contractor, and supplied through the Construction Section Engineer (CM), shall if required, be reviewed for acceptability by the DSE.

4.1.1.1 Calculation Submittals: Calculations and analysis shall be performed on calculation sheets properly labeled and organized in an orderly and logical manner. Calculations sheets shall identify the Tollway contract number; the name of the DSE firm, the date the work was performed and includes identification of the originator and checker.

- All calculation submittals shall be marked to indicate the appropriate design phase.
- All submittals shall include a cover sheet with the full name of those who initial the sheets
- Specialized calculations (lighting, drainage, etc.) shall include references to design guidelines or manuals for verification. Final calculation submittals shall be neatly bound, indexed and stamped by a Professional and/or structural Engineer registered in Illinois.

4.1.1.2 Miscellaneous Items: As part of the design process, the DSE shall:

- Check with manufacturers on availability and delivery time of specified products and materials
- Make recommendations for changes in the specifications, standards or typical details when they are advisable

- Make changes in the progress schedule when the anticipated delivery times will have an effect on the construction sequence, staging or schedule
- Incorporate general notes or details in the plans in order to coordinate their design work with that of adjacent DSE efforts in progress or under construction.

4.1.1.3 Permits, Agreements and Utility Work Orders: The DSE shall:

- Determine the need for easements, agreements, and/or construction permits from governing/governmental agencies and utilities

Further detailed discussion regarding requirements for utilities, railroad and right-of-way is presented in **SECTION 6 “Utility Relocation”**

4.1.1.4 Other Services: It shall be the responsibility of the DSE to perform all other required services as provided in the Scope of Services contained in the agreement including, but not limited to, the following:

- Prepare an Agenda, when required
- Participate and assist the Tollway in pre-bidding conferences and analyze construction bids, as required
- Provide quantity calculations

4.2 PHASES OF THE PROJECT

Tollway projects are planned, designed, and constructed through a phased project management process. This Section describes the various design phases of the project and the required program and technical submittal content for each phase. The formats for the various submittals are described in subsequent sections:

- Studies/Reports (Master Planning/Pre-Concept Reports)
- Conceptual Design Phase (30%)
- Preliminary Engineering Phase (60%)
- Pre-final Design Phase (95%)
- Final Check Design Phase (100%)
- Bid Support Phase
- Construction Support Phase
- Upon Request Services
- Program / Project Management.

4.3 PLANNING/STUDIES PROJECT DEVELOPMENT PHASE

4.3.1 Master Planning (Pre-Concept) Reports

On certain projects, the Tollway may require the development of a Master Planning Report prior to releasing the project for work on the Conceptual Design. On such projects, the Master Plans (Pre-Concept) Report may be the subject of a separate agreement, or it may be an initial activity separately identified, but part of a DSE Agreement.

The Master Planning Pre-Concept Report develops and analyzes multiple feasible alternative designs for implementing the improvement. This analysis will include the early investigation and study of one or more major topics that have been identified as major factors in the design, costs and/or schedule of the project. Examples of such topics of concern include toll plaza location studies, interchange configuration studies, major bridge type studies, evaluation of potential environmental impacts, major utility interferences, etc. Generally, early resolution of these issues is necessary to meet the project schedule requirements.

In general, Master Plan scope requirements follow those of the typical Design Concept with heavier emphasis placed on the identification and evaluation of larger scale alternatives, especially in the critical-issue areas. Because the nature and extent of Master Plan activities are project specific, the requirements of this phase will be detailed in the Scope of Services for a particular Design Section. The Master Plan Report must identify alternatives for all identified issues and project aspects that will be covered with expanded detail in the Design Concept.

A Project Manager from the Tollway Engineering Department will be assigned as the technical and administrative liaison to the DSE work. General procedures and administration of the DSE for this phase of design development follow the P2010 "Capital Project Master Planning" Procedure.

4.4 CONCEPTUAL DESIGN PHASE (30%)

Conceptual Design is the initial design stage of a capital project. The Scope of Work first developed in the Project Master Plan serves as the basis for the project design. This design phase includes all of the activities necessary to produce a conceptual design.

During this phase of design, the DSE prepares concept design studies of proposed design options consisting of engineering drawings, a project description, and calculations required to summarize the character of the project in accordance with the contract scope of work. Identified deviations to contract scope of work and the budget estimate are reviewed and clarified. The concept documents are sufficient for review with the appropriate authorities and for initiating public consultation, as required. The submittal shall identify which components, including utilities, or construction disciplines are interdependent and assess the impacts of design decisions on these items.

4.4.1 Conceptual Design

Conceptual Design includes, but is not limited to:

- Clarification of the project's scope of work
- Determining spatial assignments necessary to meet functional and support requirements
- Conceptual designs
- Agreement on technical solutions to design problems
- Constructability review (if applicable)

- Exploration of innovative contracting methods, design ideas, and construction approaches
- Community and Governmental Outreach (as applicable)

4.4.2 Concept Design Report

The DSE shall prepare a report with corroborating conceptual design plans for review. The report may include sketches, drawings or calculations. Certain elements of design may require an in-depth analysis and evaluation of possible alternatives. The cost-effectiveness of the recommended alternate must also be demonstrated.

4.4.3 Schematic Maintenance of Traffic

The submittal shall include a schematic Maintenance of Traffic (MOT) plan that identifies the major stages of construction, the number and width of lanes to be provided, location of cross-over, and other pertinent information which the DSE deems necessary. The objective of the MOT plans shall be:

- Reduction of interference with Tollway traffic and operations
- Efficient movement of traffic through the work zones
- Maintenance of a reasonable level of safety for the motoring public, the workers, and the work zone.

4.4.4 Minimum Submittal Requirement

The Design Concept submittal requires the review and written approval by the Tollway Project Manager prior to proceeding with the detailed design.

4.4.4.1 The Design Concept submittal shall include all supporting data, back-up information and drawings. As part of the Design Concept submittal the DSE shall include plan drawings showing the location and limits of problem areas (such as areas requiring grading, etc.), typical sections of existing conditions and recommended treatments, and color photos showing existing conditions.

4.4.4.2 In presenting the Design Concept, the DSE shall provide:

- All assumptions and criteria
- Recommended design approach
- Analytical methods used
- Conceptual details
- Criteria, details or issues that could significantly affect the design

4.4.4.3 When the Design Concept is preceded by a Master Planning Pre-Concept Report, a summary of the conclusions and approved recommendations, as well as responses to previous review comments shall be included in the Design Concept Report.

4.4.5 Minimum Design Requirements

The DSE shall comply with the requirements that apply to each project, as described in the Scope of Services. Meeting minimum submittal requirements does not relieve the DSE from the responsibility of obtaining written approval from the Tollway for all

Design Concepts prior to continuing with detailed design. Typical minimum design requirements for various project components are as follows:

4.4.5.1 Geometric Design

- Provide a statement of design criteria.
- Show typical sections.
- Show layout of horizontal geometry with basic alignment information.
- Show layout of vertical geometry, with basic profile information. Indicate approximate location and size of bridges, major culverts and cross roads.
- Determine preliminary right-of-way requirements.
- Provide critical cross sections (work sheet), when additional right-of-way, or retaining walls are required.
- Provide quantities and cost comparisons for presented alternatives.

4.4.5.2 Interchanges

- Show existing and projected traffic demand.
- Provide conceptual layouts and capacity analysis of possible alternatives.
- Prepare preliminary layouts (including right-of-way limits) and recommendations of the most cost-effective alternative.
- Provide quantities and cost estimates for each alternative.
- For ramps involving toll collection facilities, provide graphical criteria to determine toll plaza location and minimum ramp geometrics. Identify gas, electric, telephone, fire protection water, domestic potable water, and sanitary sewer service locations.
- Provide Intersection Design Studies (where the Tollway ramps intersect with State, Federal, County, Municipal, or Township routes) which shows:
 - Traffic data
 - Intersection geometrics including:
 - baseline stationing
 - Turning radii and edges of pavement geometrics
 - Pavement widths
 - Island, turning lanes and tapers
 - Signalized intersection analysis
- Compliance with the Tollway's interchange policy requirements.

4.4.5.3 Drainage

- Provide statements of design criteria, assumptions, and methods of analysis.
- Identify need for specific types of facilities including detention, retention, etc., and calculate preliminary volumes.
- Provide conceptual layout of proposed drainage system, and the contributing drainage areas of each system.
- Show culvert locations and preliminary size.
- Identify stream crossings where detailed hydraulic study will be performed.

- Show floodplain limits and elevations based on USGS, FEMA and/or local agency records.
- Identify the need for additional right-of-way, if applicable.

4.4.5.4 Maintenance of Traffic

- Identify work zones, major or critical work activities and the number of lanes open to traffic during each major stage of construction for the full length of the project.
- Prepare recommendations for any required temporary off-Tollway detours, ramp closures, or winter shutdowns, or slowdowns.
- Prepare recommendations for crossovers.
- Provide typical roadway sections, sections at bridge structures and other critical locations showing actual work zone limits for each stage and position of temporary or channelized traffic lanes relative to normal lanes, and existing and proposed lane widths.
- Provide estimation of stage duration.
- Coordinate stages within adjacent projects as applicable. Include coordination with other agency projects.
- If two or more alternate MOT paths are possible, provide analyses of the features of each with a recommendation of the best alternate.
- Additional signage or modifications to existing signage.

4.4.5.5 Structural

Provide brief written proposed design procedures, including constructability, concerning each item in the scope of work, which are anticipated to significantly affect the final design. Condition reports shall include color photos depicting an overall view of the substructure and areas of defects.

4.4.5.5.1 Bridges

- Prepare a "Bridge Condition Report" for each existing structure in the Design Section that will be affected by the proposed improvement.
- Determine the affected structures in the Design Section that will require widening, replacement or rehabilitation based on condition, and/or vertical and horizontal clearances required.
- Develop a typical proposed cross-section for each structure to be improved, showing the cross slope and construction of the superstructure, including approximate super structure depth, and resulting approximate vertical clearances. Indicate the location of the proposed longitudinal construction joint and moveable barriers, if required, due to staged construction.
- Include an estimate of cost for each structure. Investigate and discuss alternative types of construction and span arrangements for each structure to be rehabilitated, widened or replaced. Develop and compare estimates of cost for each alternative, and include a recommendation of the best alternative.

- Investigate and discuss alternative types of construction and span arrangements for new structures.
- Develop and compare estimates of cost for each alternative and prepare recommendations for each new structure.
- Develop a general plan and elevation sketch of each structural element being designed, modified or rehabilitated, showing proposed approximate span lengths; minimum vertical and horizontal clearances; and construction of super and substructure.

4.4.5.5.2 Box Culverts

- Report on the condition of each existing box culvert in the Design Section that will be affected by the proposed improvement.
- Determine which of the existing box culverts in the Design Section will need to be extended, repaired or replaced based on their condition and/or hydraulic capacity.
- Develop sketches showing a cross section, general plan, longitudinal section and proposed end treatments for each box culvert to be constructed, extended, repaired or replaced.
- Investigate and discuss alternative types of construction for replacing existing culverts or constructing new ones. Develop and compare estimates of cost and impacts upon traffic and construction for each alternative. Recommend the most cost effective alternative for each location.

4.4.5.5.3 Retaining Walls

- Identify, by station and offset, the location of each proposed retaining wall in the Design Section. Document all conflicts with utilities.
- Investigate and discuss alternative types of construction for the proposed retaining walls or the proposed modification or rehabilitation of existing retaining walls. Develop and compare estimates of cost for each alternative. Recommend cost effective alternates for each location.
- Determine whether constructing a retaining wall or acquiring additional right-of-way is a more cost-effective solution.
- Develop drawings showing a general plan and elevation of each proposed or modified retaining wall. Indicate elevations of finish grades on both sides of the wall. Include typical sections and drainage details.
- Define DSE design responsibility for each retaining wall, specifically for those structures supporting noise abatement walls.

4.4.5.6 Signing

- Show existing and proposed signs, with message, type of support, and approximate location, on a large-scale aerial. Show the layout of all signs

in an interchange approach sequence, including those located at previous exit locations, whether or not they are to be modified by the project.

- Identify new electrical service locations.
- Using a modified copy of the existing sign condition survey, the DSE should indicate whether existing signs are to remain in place, to be relocated, to be removed or to be replaced.

4.4.5.7 Roadway Lighting

- Show proposed layout of light standards on roadway plans.
- Recommend spacing and distribution type for all light standards.
- Provide computer generated photometric calculations for plaza approaches and departures, underpasses, all gore areas and mainline configurations not covered by the standard spacing.
- Show proposed locations of control consoles and electric services.
- Provide statement addressing interface with existing systems.
- Provide statement concerning need for temporary lighting.

4.4.5.8 Roadway Rehabilitation

- Provide statement of scope requirements and applicability at specific locations within the Design Section.
- Provide statement of existing pavement and roadside conditions including drainage facilities.
- Draw typical section of existing and proposed roadway.
- Provide color photo documentation of typical and special conditions addressed in the report.
- Provide statement of need for guardrail rehabilitation, upgrading/modernization.

4.4.5.9 Guardrail Modernization

- Provide statement of design criteria, assumptions and methods that are to be used for traffic barrier warrant analyses and for determination of cost-effectiveness of possible alternatives.
- Provide three examples of barrier warrant analyses performed for actual locations of the project. At a minimum, one level 2 and one level 3 analysis should be included when appropriate.

4.4.5.10 Architectural (Buildings)

- Provide schematic building layout, building orientation and topographic site plan, renderings, sketches as required with descriptions of principal architectural features, materials and structural elements.

4.4.5.11 Electrical (Buildings)

- Provide statement of design criteria, assumptions and method of analysis.
- Provide concept sketch one-line diagram; including service entrance, stand-by power and panel boards with estimated capacities.

- Provide load study, including both estimated connected load and estimated demand load.
- Develop indoor lighting concepts, indicating type of lighting and room lighting levels.
- Where applicable, propose method for keeping existing facilities operational during construction.

4.4.5.12 Mechanical (Buildings)

- Provide statement of existing problems and/or conditions.
- Provide statement of existing and proposed sequence of operation.
- Provide schematic diagram for the proposed system and at least one alternative, illustrating and noting the following:
 - Location of major equipment components of each system.
 - Description of each system's operating modes and types of controls.
 - List of pros and cons of each system.

4.4.5.13 Utility Interferences & Utility Services

- Provide a list of anticipated utilities and services (gas, electrical, etc.)
- Identify locations of interferences and an assessment of their project costs and schedule impact.

4.4.5.14 Environmental Studies

- Refer to Design Concept requirements in the Environmental Manual.

4.4.5.15 Landscaping and Erosion Control

- Identify existing vegetation, landscape conditions, environmental factors and potential disturbances.
- Briefly state goals, objectives and recommendations of anticipated proposed landscaping.
- Identify key issues, commitments, special requirements related to landscape or erosion control issues.

4.4.5.16 Design Concept Review

The Design shall be reviewed by the Tollway Design Review Team. The purpose of the Design Concept Review is to establish agreement between the Tollway and the DSE on all concepts of the intended design. The DSE must obtain written approval from the Tollway prior to proceeding with the preparation of Preliminary Design work. Additional features or minor revisions to the Design Concept, which may arise during the course of the design may be presented at any time prior to the next regularly scheduled submittal.

It is the responsibility of the DSE to identify all principal concepts to be reviewed. If, at any time after the approval of the Design Concept, the Tollway does not agree with the DSE design of a certain component, and such design had not been submitted for prior review and approval, re-design of such component shall be

accomplished by the DSE. All such changes will be considered within the scope of design services and no separate or additional compensation will be allowed.

4.4.5.17 Design Schedule and Cost Estimate Review

The DSE shall prepare and submit as part of the conceptual design review effort a parametric cost estimate and conceptual milestone schedule.

4.4.6 Documentation of Review and Review Comments

4.4.6.1 The Tollway Project Manager is the primary contact with the DSE and shall:

- Transmit design documents to the design review team in accordance with F4000.01 "Design Review List".
- Collect review comments, consolidate in a log
- Issue consolidated log of review comments to DSE
- Resolve comment issues
- Return the comments and responses to the Design Review Team and/or verify inclusion in the next submittal package.

4.4.6.2 The DSE Project Manager shall:

- Review the comments
- Respond in writing to the Tollway Project Manager on every item on the Design Review Comment log.
- Incorporate agreed to comments in the next submittal.

4.4.6.3 A project meeting will be conducted between the DSE and the Tollway Project Manager to ensure all agreed comments are incorporated into review and next submittal; this includes, but is not limited to:

- Acquisition requirements, which shall be determined and coordinated
- Permitting issues, which shall be identified and coordinated
- Potential utility conflicts, which will be identified and coordinated.

4.4.6.4 Following the Design Concept review, a meeting will be held to clarify all comments, questions or issues contained in the formal review presented to the DSE. The DSE will respond to questions concerning the features of the design.

- Acceptance of the Design Concept indicates that the DSE is generally in compliance with the scope of services of the project. However, the Tollway reserves the right to modify an approved Design Concept at any time, in which case the modification would be considered outside the original scope.
- In the event that the Design Concept is not acceptable, a re-submittal may be requested of certain portions, or an approval may be given contingent upon the satisfactory resolution of all review comments.
- Approval of the Design Concept by the Tollway does not relieve the DSE of the responsibility to provide a sound, coordinated, cost-effective, practical and safe design in the ensuing preparation of contract documents.

4.5 PRELIMINARY ENGINEERING PHASE (60%)

4.5.1 Preliminary Plans and Special Provisions

Preliminary Design, Special Provisions and a list of pay items and a quantity estimate are developed following the approval of the Design Concept. The preliminary design elements include sufficient information to allow a review of the presented design. During this stage of design, all agencies having jurisdiction over crossroads, and railroads shall be contacted by the DSE. All regulatory agency coordination will be through the Tollway Project Manager. The DSE will attend meetings with agencies and prepare application materials. Requirements for detours, alternate routes or protection of cross traffic or utilities shall be established by the DSE in cooperation with the appropriate agency. Specific railroad insurance and other requirements shall be obtained by the DSE. All contacts shall be in writing, properly documented, and copied to the Tollway Project Manager.

4.5.2 Minimum Submittal Requirements

The Preliminary engineering Design Package shall include:

- Full size set of drawings which shall be sent to each utility or agency affected by the project.
- The design package must be consistent with:
 - Illinois Tollway design criteria and maintenance guidelines
 - Cost and scheduling constraints
 - Illinois Tollway and industry technical standards
 - Federal, state and utility codes, regulations, and/or requirements
 - The reviewed 30% design package
- All previously reviewed design packages containing comments made by the Tollway and written responses to the review comments must be included with this submittal.
- Staple or bind and number all drawings for easy reference.
- Provide a preliminary Index of Drawings including Tollway Standard Drawings that are to be used.
- Preliminary engineer's cost estimate and construction schedule, including but not limited to:
 - Constructability
 - Phasing
 - Site constraints and Right-of-Way needs
 - Procurement Strategy
 - Utility Relocation Identification
 - Environmental Considerations

4.5.3 Roadway Geometry

Typical Sections, showing existing conditions and proposed improvements on the same section.

4.5.3.1 Horizontal Alignment: Existing and proposed, laid out accurately on a base drawing which shows:

- Existing topographic survey
- Preliminary contract limits, improvement limits (when different from contract limits), right-of-way lines and temporary construction easement requirements.
- Curve data including: station of Point of Curvature (P.C.) and Point of Tangency (P.T.) and horizontal tie points and limits
- Super elevation rates and limits
- Stationing and dimensions of proposed improvement.

4.5.3.2 Vertical Alignment: Including bridge decks and approaches which show:

- Profile grades (ramp profiles should follow the baseline)
- Length of vertical curves and vertical offset at Point of Vertical Intersection (PVI)
- Location of critical clearance points, existing pavements, underground structures and utilities.

4.5.3.3 Existing and Proposed Cross Sections: Which show:

- Proposed roadway template
- Side slopes and back slopes with corresponding slope values
- Preferred ditch sections, where required
- Preliminary right-of-way line
- Existing ground line to at least 50' beyond the anticipated right-of-way, which shall indicate limits of construction

4.5.3.4 Preliminary Traffic Barrier Warrant Analysis: Where obstructions or right of way constraints are involved the DSE shall make an analysis of the cost-effectiveness of traffic barriers vs. flatter slopes or removal of hazards.

4.5.4 Drainage

- Define the drainage areas, limits and composition of watersheds and sub-watersheds of drainage facilities affecting the immediate project area on an ortho digital mapping base map. Watersheds of 20 acres or greater may be outlined on USGS maps.
- Locate and identify existing culverts, storm sewers, inlets, catch basins, all pertinent drainage structures, and utilities such as fiber optics cable, water, gas, telephone, electric, etc.
- Information shown should include type, size, condition, end treatment and rim and inverts elevations. Show this information on a base plan drawing showing existing topography.
- Identify existing flow direction and drainage patterns.
- Indicate any proposed changes to flow patterns or modifications to watershed size or composition as a result of the project.
- Define the contributing drainage area considered, the design frequency, and runoff rates.

- Identify proposed method of handling drainage changes and detention requirements, e.g. enclosed pipe vs. open ditch; inlet vs. shoulder runoff; culvert extension, etc.
- Show floodplain contours for all stream crossings and bodies of water.
- Show on preliminary drainage plans proposed drainage structure type, location and inverts; storm sewer preliminary size and flow direction; ditch location and flow direction
- The DSE shall prepare a brief written report on the nature of the existing drainage system, proposed modifications, alternatives, and recommendations. A preliminary cost estimate is required for each alternative. This estimate shall be based on preliminary sizing of the facilities supported with calculations per previously approved Drainage Criteria.
- As a minimum, the Preliminary Plan submittal shall include 60% drainage plans showing proposed culverts, storm sewers, and proposed drainage structure type.

4.5.5 Maintenance of Traffic

- Maintenance of Traffic drawings shall include traffic flow patterns and number of lanes for each stage for the full length of the project, lane widths, lane taper and shift lengths, proposed construction signing, proposed temporary guide signs and disposition of existing guide signs, temporary striping and striping removal. Indicate nature and location of work in critical areas, such as at toll plazas, on or near structures, etc.
- Determine any required temporary off-Tollway alternate access route for ramp and/or road closures, including the estimated duration of each closure, and the local jurisdiction of roads affected by the detour.
- Ensure that the detour plans have been reviewed and accepted by local jurisdictions, including police, emergency, school districts, etc.
- Show approximate location and geometrics for any required crossovers.
- Provide typical sections at mainline bridge structures, ramps and any other locations showing actual work zone limits and driving lanes for each stage. Include pertinent features such as cold joint locations, temporary striping and barrier locations.
- Describe coordination of stages between adjacent projects as applicable.
- Provide a signing plan indicating alternate access routes when interchange ramp closures are required. Show size, color and placement of alternate route signs.

4.5.6 Structural Type, Size and Location (TSL) Drawings

4.5.6.1 Bridges New: Provide the following drawings for each structure to be constructed, replaced or widened. The applicable portions of the IDOT "Checklist for Preparation of TS&L Plans" shall be used as a guide.

- Provide plan and elevation views of the structure and all existing aerial or underground utilities; location map; bench mark description; design criteria, waterway information table, if required

- This sheet will become a “General Plan and Elevation” sheet in the pre-final plan set
- Include a typical cross-section through the structure (looking-up-station)
- Show the center pier in elevation
- Include end elevation or section through the pier showing the configuration of the crash wall
- Include cross sections through the abutment showing the abutment type
- Show expansion joint and backfill requirements
- Show slope wall details and other details required for the structure
- On additional drawings, if applicable, show all stages of construction including existing and proposed cross-sections, abutments, piers, and any other structural details unique or of significance to the project.

4.5.6.2 Bridges Rehabilitation Only: Provide a general plan for existing bridges which are included in the project primarily for rehabilitation.

- Include a list of the rehabilitation work items to be performed on these bridges.
- Provide appropriate cross sections, details and views to depict significant design features that characterize the rehabilitation.

4.5.6.3 Box Culverts: Provide drawings for each box culvert to be constructed, replaced or extended. The applicable portions of the IDOT “Checklist for Preparation of TS&L Plans” shall be used as a guide when developing the following drawing:

- Provide a plan view, typical cross-section, a longitudinal section, end walls, location map, bench mark description, design criteria, and a waterway information table. This sheet will become a “General Plan and Elevation” sheet in the Pre-Final plan set. Show on plan view all existing and proposed utilities, roadway lighting, signing, guardrails and drainage systems which may interfere with the box culvert.

4.5.6.4 Retaining Walls: Provide the following drawings for each required retaining wall:

- Plan and elevation views (showing stations and offsets along the wall baseline relative to the roadway centerline, or ramp baseline)
- Location map
- Bench Mark description
- Typical Cross-Sections
- Utility conflict plans and details
- Drainage structures
- Noise abatement walls
- Wall mounted sign structures
- Light poles, and
- Design criteria.

4.5.7 Toll Plazas

Show site plan and elevation view of the area along with the size and locations of tunnels, lanes, islands, canopies and other structural items, buildings, parking lots and driveways.

4.5.7.1 Utilities: Show utilities for Tollway infrastructure and other agencies. Include other sections and details to fully show the extent of the work to be done. Elevation views shall contain reference to a datum elevation. Include the elevations of potential utility relocations, the timetable and impact to project schedule.

4.5.7.2 Site Plans: Toll plaza site plans shall show station and a tie of transverse dimensions to the project center line or base line.

4.5.8 Signing

Provide recommendations of station, location and legend for all proposed signs (including non-guide signs). Take into account topographic features which influence sign location such as existing or proposed utilities, drainage systems, and roadway lighting. In addition:

- Show proposed pavement markings. When signing is part of a roadway improvement, include preliminary elevations
- Provide 8 1/2" by 11" drawings of panel configuration, legend format and size calculations for review by the Tollway's sign shop. All new signs shall be sized in one-foot increments in both dimensions
- Provide preliminary staking of sign location in the field to enable field checks
- Provide preliminary location of power conduit runs for illuminated signs
- Provide list of sign locations requiring coordination with other agencies (bridge mount signs) and utilities (new power service connections)
- Analyze existing structures and determine the affect the new sign will have on the structure.

4.5.9 Roadway Lighting - Mainline, Ramp and Underpass

- All conduit and cable shall be sized and labeled.
- All overhead sign trusses and overhead power lines shall be shown.
- Lighting standards, controllers conduit casings and junction boxes shall be shown and stationed or dimensioned
- Voltage drop calculations for each pair of lighting circuits shall be provided
- Copies of correspondence with utilities for new or relocated points of service shall be included
- All details and standards identified
- Generator loading calculations shall be provided
- Temporary lighting requirements shall be identified, and
- All demolition and removals work identified.

4.5.10 Architectural (Buildings)

- Provide floor and roof plans.

- Provide exterior elevations. Include a reference to a datum elevation
- Provide typical full height wall sections for each elevation
- Provide door and room finish schedules
- Provide Special Provision with identification of items to be furnished and installed as equipment/furnishings other than items/material “built-in”
- Provide foundation and structural plan.

4.5.11 Electrical (Buildings)

- Provide layout and electrical one-line diagram denoting service entrance, stand-by power, panel boards, transfer switches, feeder sizes, circuit breaker ratings and preliminary load calculations.
- Provide load study and stand-by generator sizing calculations
- Provide panel layout diagrams with indication of power sources, feeder capacity (main), branch circuit assignments, loads and interruption ratings and ampere rating
- Provide lighting calculations with room lighting levels and type of fixtures used. Include catalog cuts which describe lamp and photometric data
- List major equipment to be used. Include descriptive catalog cuts
- Define requirements for new electric service
- Provide generator loading calculations
- Provide comparative cost analyses that were used to develop recommendations
- List variances and/or clarification to the Scope of Services
- Provide specifications of items to be furnished and installed

4.5.12 Mechanical (Buildings)

- Develop schematic diagrams, including a minimum of two alternate concepts, each illustrating and noting the following:
 - Location and listing of the major equipment, including manufacturers’ brochures indicating model numbers, intended to be designed into each concept
 - Location and list of auxiliary equipment
 - Description of each concept’s operating modes outlining its compatibility with the function of the facility
 - list the pros and cons of one concepts presented
 - Preliminary engineering calculations supporting each concept
 - Cost analysis of each system that includes first costs, owning and operating costs and its cost-effectiveness
 - Outline of maintenance requirements, procedures and their resultant impact upon operating personnel
 - Provide specifications of items to be furnished and installed.

4.5.13 Landscaping and Permanent Erosion Control

Identify proposed plant groupings, landscape items, and treatment of existing landscape material.

- Provide preliminary landscape material list outlining any special maintenance requirements and special provisions.

4.5.14 Temporary Erosion Control

Identify drainage areas, proposed temporary erosion control methods and devices; and locate environmentally sensitive areas and resources requiring protection.

4.5.15 Utilities and Other Agencies

The DSE shall prepare a written report on utility interferences and involvement with other agencies.

- List each utility or facility indicating its location and description, and whether the information is from field surveys, field checks or record plans
- Provide contact, date, nature, and outcome with each utility company or agency
- Provide evaluation of each conflict with the proposed improvement and utility comments, construction interference or any involvement requiring relocation, protection or precautionary procedures for each alternate
- Recommend a course of action and a time table to coordinate the design of the relocation of each utility conflict with the design work by the DSE
- Complete "Notification of Interference" forms (to be supplied by Tollway) for all anticipated utility interferences
- Show all existing utility conflicts and utility conflict numbers on the Preliminary Plans. This information shall be shown on all applicable plans, (roadway, grading, drainage, lighting, cross sections, structures, etc.) The DSE shall include the anticipated utilities timetable for facility relocation and any lead time required by the Utilities.

4.5.16 Guardrail Modernization

- Provide statement of design criteria, assumptions and methods of analysis
- Provide topographic plan showing the clear zone limits throughout the project area as well as the existing features and the recommended treatment
- Provide layouts identifying the type and limits of obstacles or hazards with dimensions and stationing from survey notes or from contour grading plan
- Provide cross-sections along the area of the analysis
- Furnish calculations for clear zone width and barrier needs
- Provide cost-effective/ life cycle cost analyses and recommendations of possible alternatives
- Provide preliminary cost estimates of recommended alternatives
- Based on the results of the warrant analyses, the DSE shall prepare a plan in worksheet form showing the recommended design to protect, eliminate or reduce the hazards, including station locations. After submittal of the preliminary plans if requested, field checks of all proposed barrier warrant locations shall be scheduled and conducted by the DSE.

4.5.17 Preliminary Construction Quantity Estimate

Submit the estimated quantities and copies of their backup calculations for review.

4.3.18 Preliminary Construction Schedule and Time Estimate

The Program Schedule shall consist of a line diagram showing the following:

- Sequence of construction for major controlling items including major utilities
- Duration of major controlling items
- Total construction period
- Tentative starting and completion dates.

4.5.19 Subsurface Report

Provide, where applicable, subsurface investigation and foundation reports for all structures and embankments, including embankment widening.

4.5.20 Preliminary Special Provisions

Submit a draft of a Special Provision for each identifiable or anticipated pay item unless the item is specifically covered by a pay item in the Standard Specifications. The Special Provisions shall be complete in content, titled to coincide with the appropriate pay item and correctly cross-referenced.

4.5.21 Preliminary Plan Review

The purpose of the Preliminary Design plan review is to verify that the DSE is proceeding with detailed design in accordance with the approved concepts and design criteria and that all major parts or disciplines of the design are coordinated with each other. At this review, conceptual design of all non-standard items or details, if not already approved, should be presented. The extent of involvement with utilities and other agencies should be defined in this presentation, including permits and right-of-way requirements and other impacts on construction cost and construction schedule.

4.5.21.1 Acceptance and approval of the Preliminary Design Plans will be in writing in accordance with F4000.01 "Design Review list". In the event the Preliminary Design plan submittal is unacceptable, a resubmittal of one or more portions of the plans may be requested.

4.5.21.2 Approval may be given contingent upon the satisfactory resolution of all review comments received, or the Tollway may request that the affected drawings be resubmitted for further review.

4.3.21.3 Improvements of roadways and facilities not under Tollway jurisdiction require review and written acceptance/approval by the Agency or Agencies having jurisdiction thereof.

4.5.21.4 For major projects, additional reviews may be performed at the conclusion of the Preliminary Design Phase and may include the following:

- Constructability Review (P 4100)
- Value Management (P 4020)

4.6 PRE-FINAL DESIGN PHASE (95%)

The objectives of the Pre-final Phase are to incorporate comments from the Preliminary Plan Phase, and refine and detail the size and character of the entire project to include final architectural and engineering systems, materials and finishes. This design phase concludes with the review of design documents.

4.6.1 Pre-final Plans and Special Provisions

Upon review and acceptance of the DSE preliminary plans and recommendations, the DSE shall proceed with detailed design and preparation of Pre-Final contract plans, Special Provisions and estimate of quantities.

4.6.2 General Notes

Notes should be limited to those items of information, which warrant special attention. A listing of all items containing incidental construction, to standard pay items initiated by the DSE, together with the drawing number on which this work is shown, shall be included in the General Notes.

- All incidental items developed by the DSE, not previously identified as being incidental to pay items, shall be itemized in the General Notes
- It is not advisable to repeat information contained in the Standard Specifications or Special Provisions. Exceptions include the following topics:
 - General Safety Provisions
 - Fluorescent vests and hard hats
 - Field Conditions related to lump sum items
 - Underground utilities
 - Plan scale
 - Contractor storage yard
 - Restricted areas
 - Permits
 - Special security information.

4.6.3 Progress Schedule for Construction Activities

The schedule shall consist of either a bar graph, C.P.M. or simple construction list. The schedule shall identify the major controlling items of work, their sequence of construction and duration of construction. Holiday periods shall be shown on the schedule. Only Maintenance of Traffic and pay item 628 shall be shown continuous through the holiday periods.

- Show tentative starting and completion dates and any interim completion dates, if required

4.6.4 Schedule of Quantities

The schedule shall be in a columnar format with columns identified by item number description, unit, quantity, record quantity, and rows identified by station at which the item will be constructed. Schedules are generally required for drainage work, guardrail, signing and lighting work where large quantities of these items are included in the work. Schedules may also be utilized to reduce clutter on the plan drawings.

4.6.4.1 Summary of Quantities

- A special provision is required for each pay item, unless the standard specifications cover the work item and a standard pay item is already listed in the standard specifications.
- Unless otherwise designated by the Tollway, the numbering of the pay items must conform to the item number listed in the Standard specifications.
- All pay items and quantities that are anticipated should be listed, and all quantities shown are expected to be final.

4.6.5 Alignment and Ties

Prepare a scale drawing showing existing and/or proposed centerlines, base lines and survey lines required to establish stationing. Ties must be to points outside the limits of the work.

- All curve data for existing and/or proposed curves shall be listed. The curve data shall include super elevation rates and design speed
- Include ties for all center-lines and “off-line” control points to enable the re-establishment of all centerlines, base lines and survey lines
- List and show benchmarks. The title shall reflect the presence of the benchmarks. Reference benchmarks to the Tollway’s survey control network
- All State Plane or Project coordinates for alignment shall be pre-approved by the Tollway’s surveyor and shall be listed along with notation of their origin.

4.6.6 Typical Sections

Provide sections for typical and special situations or configurations. Identify the section with appropriate ramp or mainline designation and station intervals. Face section in the direction of increasing stations.

- Draw sections to a minimum of five feet beyond the right-of-way line or easement. Draw half-sections from centerline to a minimum of five feet beyond the right-of-way line or easement
- Clearly label the base line, survey line or centerline and profile grade line
- List existing and proposed cross-slopes and embankment slopes. Provide dimensions and distances for all components of the section, including typical drainage and under drain items, topsoil removal, embankment zones and limits of excavating
- Provide a legend that labels all existing and proposed components
- Proposed information must agree with the contract pay items.
- The legend should appear on every sheet

4.6.7 Construction Details

Provide a detail for each pay item or assembly not covered by a Standard Drawing. Show details to sufficient scale and with sufficient dimensions and notes to present a clear indication of the item to be constructed.

- Group roadway, drainage, electrical and structural details by description and place after the applicable discipline in the plans

- IDOT highway or bridge standards, or portions thereof may be reproduced as a construction detail. However, if an I.D.O.T. standard Maintenance of Traffic detail is used, it may be referenced by number and incorporated by Special Provision into the Contract Documents without reproducing the entire drawing
- Nomenclature and titles of details shall conform to the pay items
- Limit notes to information not included in the Special Provisions or Standard Specifications.

4.6.8 Maintenance of Traffic Staging Plans

Maintenance of Traffic (M.O.T.) typical sections and plans shall be provided for each construction stage shown in the Progress Schedule. The plan shall define the work areas and provide sufficient area to accomplish the work intended with minimal traffic interference. The number of lanes of traffic to be maintained on the mainline shall be as specified. The Project Manager will verify the minimum number of lanes to remain open in each direction at toll plazas.

- Schematic drawings may only be submitted when the following conditions prevail: typical sections are shown detailing lane widths and work areas, the signing required conforms with the typical lane closure standard drawings, cross-overs are not required, and existing ramp terminals are not re-aligned
- Provide a legend and appropriate general notes on the first drawing of the M.O.T. series. Include a description of major work activities and traffic control for each stage
- Prepare detailed scale drawings defining the placement of lane lines, edge lines, signs, barricades, pre-cast barrier wall, flaggers and supplemental traffic control devices. Provide typical sections and geometrics for all situations where lane configuration is altered
- Requirements for the protection of cross-traffic or utilities shall be established in cooperation with the appropriate maintaining agency
- Extend M.O.T. plans beyond the construction limits to show the exact M.O.T. that will be required for the project.

4.6.9 Roadway Plans

The plan coverage should begin and end approximately 200' beyond the proposed construction limits by stationing. Lateral coverage should be shown from right-of-way to right-of-way for rehabilitation work, but shall extend approximately 50' beyond the proposed right-of-way for new construction. Show all existing topographic features within these limits.

- The Tollway's Standard Mapping Symbols (CADD) should be used. If the DSE must use any other symbols not included in the Standard, a supplemental/ symbol legend shall be provided
- Include on roadway plans all existing topography, utilities and drainage structures, existing and proposed pavement, shoulder, guardrail, curbing and fencing items. Show proposed drainage, lighting, grading, intersection details, erosion control, landscaping, signals, pavement joints and elevations on separate drawings. Show sign trusses and major drainage structures and culverts in outline on the roadway plans

- Show and label on roadway plans all major geometric control points (P.I., P.C., P.T., gores, baselines, etc.) with centerline or baseline stations and offsets. Label ramp baseline points with both ramp baseline and mainline centerline stations and offsets. Show State Plane Coordinates on the alignment and tie plan
- Show soil boring locations and identification marks on the roadway plans
- Stationing, dimensioning or cross-hatching is preferable to shading as a method of highlighting specific areas. If shading is used, it shall not be heavier than 15% and all dimensions must be highlighted by bold fonts
- Items measured by lineal foot shall be labeled by footage or stationing interval. Square yardage and tonnage items shall be labeled by stationing interval, with thickness or depth listed or a clear reference to typical section noted
- Draw existing underground and overhead utility lines and appurtenances based on the owner's data and verified by field survey or inspection. Conflicts shall be clearly labeled and referenced to appropriate cross-sections where a utility relocation may be demonstrated
- Show proposed utility relocations performed by others
- Show environmental resources subject to regulatory requirements on the plans in outline form (e.g., wetlands)
- Show existing and proposed right-of-way and easement limits.

4.6.10 Roadway Profiles

Show existing and proposed roadway profiles for the entire contract limits. In general, show the profile together with the roadway plan on plan and profile sheets. Exceptions must be approved in advance. When combined plan and profile sheets are used, the upper half of the sheet shall show the roadway plan and the bottom half the roadway profile.

- Roadway profiles may be developed along an edge of pavement, a profile grade line, the crown of pavement or a ramp baseline
- Vertical curve data shall include length of curve, offset to external tangent, "K" factor, gradients, beginning and ending stations and point of vertical intersection
- Indicate existing and proposed elevations corresponding to the proposed roadway profile shown at 50-foot intervals. Shorter intervals may be necessary on ramps or vertical curves. Show proposed and existing pavement elevations to the nearest 0.01'
- Show proposed and existing elevations of non-paved surfaces to the nearest 0.1'. With a bolder font indicate the proposed elevation below the existing. Show profiles continuously across structures.
- Show existing profile and gradient for a minimum of 200' beyond the limits of improvement.

4.6.11 Drainage Plans

Drawings shall correspond to the scale and orientation presented on the roadway plans.

- Show profiles at the flow line or invert for ditches, storm sewers and any other bodies of water with moving water. Show existing and proposed ponds at the flow line or invert

- Show proposed drainage structures by symbol with supporting notation defining station, offset, structure type, size, frame or grate type and inverts
- Show proposed storm sewers by symbol and general orientation with supporting notation defining length, type, class, inverts and station of ends of pipe on non-perpendicular runs
- Coordinate proposed end treatment of culverts and other exposed pipes with the barrier warrant analysis
- Show storm sewer and structure rims and inverts and paved ditch grades to the nearest 0.01'. Show non-paved ditch grades to the nearest 0.1'
- For detention ponds, show design volume, maximum release rate, two year high water elevation, and 100 year high water elevation on the plans.

4.6.12 Pavement Joints and Elevations

Drawings shall correspond to the same or larger scale and orientation as the roadway plans. Include on drawings existing pavement joints, proposed transverse contraction joints, sawed longitudinal joints, edges of pavement, pavement widening tie bars, centerlines, stationing and dimensions.

- Indicate elevations to the nearest 0.01' at 50-foot intervals for existing pavement to be overlaid, proposed top of new concrete pavement, gutter lines, barrier bases, slotted grates, and controlling elevations for pavement gore areas parking lots and driveways. Pavement elevations are normally given at the edges of pavement
- For projects involving the construction or modification of an intersection or interchange, provide a larger scale intersection detail (1" = 20' scale recommended) drawing showing pavement joints, controlling elevations, stationing of curb transitions and islands.

4.6.13 Pavement Marking Plans

Drawings shall correspond to the same scale and orientation as the roadway plans and may be combined with signing plans (4.6.17).

- Drawings covering the entire contract limits are not needed if all proposed pavement marking can be shown with a typical section as in the case of mainline or ramp striping. As a minimum, however, provide details for gore striping, lane designations, tapers, lane drops or other specific striping that vary from the typical section
- List the size, type (thermoplastic, epoxy , paint, etc.) and spacing of each pavement marking
- Show overhead signs directly related to the pavement striping.

4.6.14 Grading Plans

Drawings shall correspond to the same scale and orientation as the roadway plans.

- A grading plan will be required when a project involves new ramps or mainline construction on embankment which must be contoured to meet existing earth grading or drainage patterns
- Contours and elevations shall be at convenient intervals from one foot to five feet
- Clearly show storm water detention areas and note the 100 year high water elevation (HWL).

4.6.15 Landscaping and Permanent Erosion Control Plans

Drawings shall correspond to the same scale and orientation as the roadway plans. Show all proposed landscaping items and clearly label by proper botanical name and common varieties name, size and quantities.

- Include a Bill of Materials on the drawings
- Provide separate drawings showing all landscaping items, quantities and pay items and the drawings so that they may be used as a separate set of Contract Plans
- Identify seed classes with associated erosion blankets and mulch types, sodded areas, ditch treatment and indicate reduced mow zones in accordance with current mowing policy and criteria
- Identify all existing vegetation, and indicate areas to be preserved and protected or relocated
- Plans shall provide locations for all transplanted material and shall indicate borrow sites locations
- Identify adjacent and potential land use, contour lines, structures, construction limits, utilities, guard rail, fencing, walls, environmentally sensitive areas, special notes and details not identified in the standard drawings.

4.6.16 Temporary Erosion Control Plans

Drawings shall correspond to the same scale and orientation as the roadway plans.

- Show on plans requirements, devices and limits of disturbance for temporary erosion control during construction for each stage of the work, separate from Landscaping/ Permanent Erosion Control Plans. Provide staged plans with construction sequence for erosion control construction activities on each sheet, in addition to tables identifying device locations
- Provide a separate cover sheet to include an index of sheets, related notes, special requirements, NPDES and EIS summary of commitments, prioritization for protection of areas, sequencing activities, runoff calculations, legend, and details for non-standard devices
- Provide plans showing drainage limits and composition of watershed and sub-watersheds of drainage facilities affecting the immediate project area
- Each sediment trap/ basin shall be scaled to actual size on the drawings and indicate identification number, drainage area, storage required, storage provided, bottom elevation, crest elevation, clean out elevation, size, and side slope ratio
- Indicate direction of ditch flow. Show and identify all drainage structures with a structure number. Outlet locations for each structure shall indicate two year storm peak flow rates in c.f.s., design peak flow rates in c.f.s., two year velocities in f.p.s., and design velocity in f.p.s. or drainage ways.

4.6.17 Signing Plans

For contracts containing pavement marking plans, show signing on the same plan as the pavement markings. Drawings shall correspond to the same scale and orientation as the roadway plans.

- Prepare site plans for each overhead sign truss, cantilever and bridge mount location.
- Show on the site plans proposed sign location by station and offset, electrical service and roadside barrier protection. When the signing work is part of a general roadway construction or rehabilitation project, the signing site plan requirement is usually satisfied by including the appropriate sign location information in the roadway plans
- Show the location of all proposed overhead, cantilever, bridge-mounted and ground-mounted signs by station and offset
- Show and label the disposition of all existing signs
- Provide structural and construction details not covered by Standard Drawings
- Detail conduit and wiring for electrical needs. For projects containing general roadway lighting plans, this information is typically shown on lighting plans, and is cross-referenced on the signing plan. Provide an elevation view of each overhead sign installation showing a true existing or proposed ground and pavement cross section, indication of critical pavement and ground elevations, location of sign panels with dimensions and elevations relative to traffic lanes and supports, and location and elevations of foundations, posts, sign supports and lighting supports. Also, provide details of necessary modifications to drainage or other underground facilities due to pier or footing construction
- Show information for ground mount signs in tabular form using a typical elevation view as a key. Include panel dimensions, post support type and size, lengths and locations, foundation elevations and type, and other information defining the sign installation
- Provide overhead sign lighting data.

4.6.18 Roadway Lighting Plans

Drawings shall correspond to the same scale and orientation as the Roadway Plans.

- Show by symbol and stationing the location of all existing and proposed light standards, roadway lighting control consoles, utility entry to the right-of-way, junction boxes, service connections, sign and underpass lighting
- Provide construction details not covered by Standard Drawings
- Indicate conduit and wiring for existing, temporary and proposed lighting
- Provide a descriptive symbol list.

4.6.19 Traffic Signal Plans

Prepare plans based on the approved Intersection Design Study following IDOT format. Traffic signal plans require review and written acceptance/approval by the agency that will operate and maintain the traffic signal.

- Show on plans the location of all utilities which may be affected by the installation of traffic signal foundation or appurtenances

- Indicate by size, type, length, station and offset traffic signal equipment or signal heads to be relocated, abandoned, removed or installed. Include sequence of operation of temporary and permanent signals
- Include sufficient legends, cable plan, sequence of operations, schedules and schematics to install the proposed signalization to the satisfaction of the maintaining agency
- Show structural or construction details not included as Standard Drawings or as part of IDOT standard details on detail drawings.

4.6.20 Structural Plans

Develop and organize Pre-final Plans for each structure in accordance with the Bridge Design Criteria.

4.6.21 Building Plans

Provide a site plan showing the relationship between a proposed building and the surrounding site. Indicate the grades to be set, with reference to a datum elevation, existing or new utilities, appurtenances to be constructed such as sidewalk, curbing and parking lots, and the proposed storm sewer and sewerage systems.

- The use of lump sum items shall be augmented by the inclusion of a Bill of Materials or other tabulation of measurable items. Items of work for which a Standard Specification exists shall be measured and constructed in full conformance with that Standard Specification
- Provide drawings for each discipline required by the scope of work.

4.6.22 Electrical Drawings

Should include:

- Completed electrical one-line diagram denoting all panel boards, service entrance, emergency power, etc. All equipment and feeders should be sized. Provide conduit and cable schedule as required
- Lighting plans depicting all fixtures located to scale, circuit designation and fixture designation
- Completed lighting schedule
- Power plans depicting all equipment with feeders depicted as “home-runs” all receptacles with circuit designations and all power panels and controllers
- Heating/cooling load calculations
- Panel board schedules which should be fully phase-balanced if 3-phase and load balanced if single phase
- Electrical installation details as required:
 - Toll equipment layouts for islands and tunnels
 - Toll equipment wiring diagrams
- Mechanical drawings:
 - Piping and flow diagrams for each system showing major and auxiliary equipment items
 - Operating parameters of equipment (can be shown on Equipment Schedules)
 - Power wiring diagrams and electrical data where required

- Temperature and control schematic diagrams
- Legends, explanatory notes, symbol list and equipment schedules
- Architectural modification, if required, for installation of equipment
- Special Provisions
- Special provisions detailing technical specifications of items to be furnished and installed.

4.6.23 Soil Boring Logs

Soil Boring logs for structural and roadway borings shall be reproduced directly from the soil boring report. These shall include a legend for symbols and contain the name of the Soils Engineer.

- Use boring numbers, U.S.G.S. elevation, station and offset from centerline or baseline location and description to determine the disposition of materials as described in the soil boring report recommendation.

4.6.24 Cross Sections

Cross sections shall be plotted on an acceptable grid to an appropriate scale.

- Existing ground shall be shown in dashed lines
- Cross sections shall be arranged in order of increasing stationing with the lesser station at the bottom of the drawings.
- The cross sections are to be drawn with the viewer facing in the direction of increasing stationing
- The cross sections shall begin and end at least two full stations in advance of and beyond the project limits respectively
- Cross sections shall be drawn with the 10 and 5 foot datum matching the prominent grid lines
- Show and label the limits of excavation, proposed cut and fill. Show the major components of both the existing and proposed pavement and shoulder structure, including overlay, pavement, sub-base(s), under drains, slotted drains and curbs or gutters
- Horizontal and Vertical scales shall be chosen to permit adequate detailing of all components of the section
- Show existing and proposed right-of-way limits and utilities

4.6.25 Special Provisions

The Special Provisions shall be numbered and titled to correspond exactly with the pay item.

- The pages of Special Provisions should be numbered beginning with Page J-1 on the page containing S.P. 101. Beginning with the 200 series, each new Special Provision shall begin on a new page
- A Special Provision is required whenever a Standard Specification section or sub-section is modified or when the item is otherwise not covered in the Standard Specifications. In general, when modifying a Standard Specification section, use the same section number and modify it with an alphabetic letter after the number using up to a maximum of eight characters; if more characters are required, use a

different number in the same principle series for the work in question (e.g. roadway lighting in the 900 series)

- The Tollway Project Manager will provide the DSE with the necessary Specification modification form to be used by the DSE for changes or additions to the Tollway Standard Specifications.
- Submit a draft of the Proposal pages (P-Pages) to be included in the Contract Requirements book. This draft will list pay items in sequential order with titles identical to those of the text of the Special Provisions and Standard Specification pay items. The first page will be numbered P-2.

4.6.26 Design Computations

Submit calculations for structural design, drainage (including detention, ditch and storm sewer sizing, outlet locations for each structure shall indicate two year storm peak flow rates in c.f.s., peak flow rates in c.f.s., two year velocities in f.p.s., and design velocity in f.p.s. or drainage ways), design of non-standard lighting, voltage drops, electrical loads, barrier warrant analysis (for guardrail, drainage and signing improvements), heating, cooling or other mechanical improvements, and for all other disciplines requiring calculations to substantiate a design.

- The barrier warrant analysis shall indicate the location, type, length and dimensions of all proposed or recommended treatments for barriers including:
 - Types of guardrail terminal end sections required
 - Types of concrete barrier wall end treatments necessary, with plans of proposed configuration drawn to an appropriate scale;
 - Type of headwall or end treatment required
 - Preliminary cross-sections showing proposed flattening of side slopes, side slope transition to meet the existing slope with quantities shown on supporting cross-section sheets.

4.6.27 Minimum Submittal Requirements

The DSE shall submit complete sets of prints of the pre-final drawings and Special Provisions directly to the Tollway. The number of sets shall be as stipulated in the Agreement. Supporting calculations or analyses shall also be submitted. Marked-up sets of previously reviewed materials with written responses to all review comments shall be included as a part of the submittal.

- The DSE shall provide copies of all soil reports
- A chronological summary of all contacts with utility companies or agencies
- The DSE will provide a construction cost estimate, final quantities, and schedule
- Copies of current quantity calculations for all identified or anticipated pay items and a computer file, in a spreadsheet format acceptable to the Tollway, of the summary of quantities shall accompany the pre-final submittal
- The pre-final submittal shall include a narrative progress and status report on all matters related to:
 - Permits and agreements
 - Right-of-way requirements
 - Railroad insurance and entry permits

- Construction easements
- Other agency coordination or involvement
- Utility relocation
- Environmental Issues

4.7 PRE-FINAL DESIGN REVIEW

The purpose of the Pre-Final Plans and Special Provisions review is to:

- Verify that the Contract Documents are being prepared in accordance with current Tollway format and practice
- Verify that all work items are identified, properly detailed and clearly specified
- Verify that the design has been adequately completed, and
- As part of the Pre-Final Design review effort a drawing field review is conducted.

After review of the pre-final submittal, a formal review meeting is held with the DSE. During the review meeting, all comments and questions resulting from the review are addressed. All questions, unresolved matters, incomplete or missing portions of the submittal have to be satisfactorily answered, resolved, completed or submitted by the DSE prior to the Tollway's acceptance and approval of this submittal. Once the submittal is accepted, no further changes in design details will be expected, and the DSE can proceed with completion of Final Plans. Acceptance of the Pre-Final Plans and Special Provisions is in writing.

The responsibility for checking quantities and design calculations rests solely with the DSE. Corrections must appear within the first addendum issued, if not corrected prior to bidding. In the event that the Pre-Final Plans are not accepted or approved, a re-submittal may be requested, or approval may be given contingent upon the demonstration of satisfactory resolution of the comments prior to the final check. Pre-Final Plans should represent the completed product submitted by the DSE.

4.8 FINAL CHECK DESIGN PHASE (100%)

At the conclusion of this phase, the project design documentation is complete. The objective of issuing a package of information at this stage is to ensure that the Bid documents are complete and coordinated. Final design review package consists of:

- Drawings and specifications required for advertisement, bid, award, and construction of a capital project
- Final construction schedule (duration)
- Final construction estimate.

4.8.1 Final Check

The Final Check takes place at the DSE office. Any comments shall be addressed immediately and any revisions needed shall be incorporated into the construction documents. Final contract bidding documents will be completed at this check.

- The Tollway Project Manager ensures that the DSE is prepared for the final check
- The Tollway Design Team leaves with the final documents.

4.8.2 Phase Reviews

The Tollway's design review period for most projects will be 10 working days. Consult with the Tollway Project Manager prior to establishing or modifying any project review completion schedule.

- Large design projects may require more than 10 days review time. The DSE will coordinate with the Tollway Project Manager to establish a proper review period
- Accelerated review periods require prior approval from the Tollway Project Manager. The minimum design review period is 5 working days
- DSE Project Managers will provide to the Tollway Project Manager copies of the index of drawings, table of content for reports, and list of items to be submitted for guidance on the number of required copies for review
- DSE responses to previous review comments must accompany each submittal.

4.8.3 Approval of Construction Documents

Construction Documents (Bid design documents) are approved by the Chief Engineer for Issue.

4.9 BID SUPPORT PHASE

The Tollway and DSE Project Managers will develop and agree upon the project specific tasks and deliverables that the DSE will be required to provide during the Bid Support Phase, which may include but are not limited to:

- Bid document preparation support
- Pre-construction bid meeting support
- Assist in preparing responses to bid document questions
- Assist in preparing bid document addendums
- Construction Bid review support
- Analysis of contractor bids

4.10 CONSTRUCTION SUPPORT PHASE

Services extending into the construction phase of the project are required for the review of shop drawings and for responses to inquiries concerning the design and plan interpretation during construction.

- The DSE shall submit a separate listing of those pay items or component parts of pay items which will require shop drawings. This submittal may be made with the Final Plans, but is required at least one week prior to the pre-construction meeting
- During construction, the DSE shall under a separate contract with the CM be available to answer questions concerning the design. Such questions may include those relating to design intent, interpretation of plan information, clarification of special provisions, or other design related issues. In all cases, the DSE shall respond promptly

- The DSE will be required to conform to the applicable requirements for reviewing and approving working drawings as specified in Sub-Section 105.2.3 of the Standard Specifications when performing this task.
- The DSE is responsible for evaluating a Contractor's request to substitute material or equipment. They are responsible for initial evaluation of a substitution request and the impacts it will have on the project function. They will work with the CM to resolve the issue in an expeditious and timely manner.

4.11 PROJECT CLOSE-OUT SUPPORT

Project close-out is the sequence of activities required to complete all remaining project financial matters, satisfy all outstanding contractual requirements, transfer or dispose of project records, and document the project history. It is the formal, planned termination of a contractual relationship between the Tollway and the DSE.

4.11.1 Final Negotiations and Financial Close-Out

Final negotiations of outstanding financial items between the Tollway and the DSE include the following:

- Reaching agreement on remaining issues or problem areas
- Making final billing rate adjustments
- Settling on any fee adjustments.

Prior to these negotiations, the Tollway Project Manager shall ensure that all outstanding office-executed engineering changes have been finalized, including incorporation into contract amendments.

4.11.2 Notice of Contract Completion

Notice of contract completion will be issued by the Tollway only after all project close-out activities are complete. A contract notice of completion letter must be issued by the Tollway when the DSE has fulfilled all contractual obligations. Key reminders and activities that should occur prior to issuing the notice of completion letter are:

- Transference of all property (project deliverables) and Project Records
- Storage of retainable records
- Potential litigation records and files
- Handling of "Vital records" (contract documents, supplements etc.).

4.12 APPENDIX

4.12.1

- The procedures identified below are the operating procedures used by the Tollway's project managers to ensure design contract compliance. They are included for reference only:
 - P4020 Value Management
 - P4020 Value Management Procedure
 - P4100 Constructability Reviews
 - P5000 Pre-construction meetings Procedure

- P5030 Submittals Procedures
- P5040 Review & Approval of Material or Equipment Substitution Procedure.

4.12.2

The following document(s) may be obtained by the DSE from the Tollway at project initiation.

- Specification Modification Approval Form (2 pages).

SECTION 5

SUBMITTAL FORMATS AND STANDARDS

5.1 SUBMITTAL REQUIREMENTS

As part of the guidelines and requirements established in this manual, electronic submittal of design information, studies and plans will be required throughout all phases of a project. In addition to consultants contracted by the Illinois Tollway, outside agencies or their representatives requesting permits to construct facilities within Illinois Tollway rights-of-way shall be required to submit materials that follow the guidelines and requirements of this manual in the format specified below.

All work, electronic or hard copy, not complying with the guidelines and requirements described in this manual shall be rejected. It will be the responsibility of the DSE to correct the inconsistencies so the submitted material complies with the guidelines at no additional cost to the Tollway. DSE contract folders shall be established and maintained in conformance with the Tollway's uniform filing system as defined in Procedure P1050.

5.2 PREPARATION OF DRAWINGS

In order to ensure uniformity in the work of DSE firms, the Tollway may provide sample plans from previous contracts. However, each DSE must exercise judgment in the preparation of neat, accurate and comprehensive plans. The following instructions are for the guidance of the DSE in the preparation of such plans and are intended to describe the plan format acceptable to the Tollway.

5.2.1 Size and Scale of Drawings.

- All Contract Plans shall be 24" x 36" (outside dimensions) with margin and title block conforming to the Tollway's Standard Drawings
- Plan and profile sheets shall be to a scale of 1"=50' horizontal
- Cross sections shall be to a scale of 1"=10' horizontal and 1"=5' vertical except for median closure work which shall be 1"=2' vertical
- Intersection details shall be to a 1"=20' horizontal scale
- All other drawings shall be to a scale selected by the DSE to most clearly portray the information.

The Pre-Final Plans shall reflect the completed work. All drawings shall be dated, numbered and initialed by the preparer and the checker.

5.2.2 Arrangement and Content of Drawings

For contracts involving roadway, structural and other work, the plans may be divided into two or more parts. This division is mandatory when the total number of drawings exceeds 200.

- All parts must have a Title Sheet, an Index Sheet and Summary of Quantity sheet(s), common to the whole set duplicated for ease of identification

- Drawings prepared by the DSE shall be arranged in the following sequence and shall be prepared in accordance with the guidelines for each drawing
- Each drawing, except for the Standard Drawings, shall be numbered.

5.2.3 Title Sheet

Drawings shall have bold block lettering centered in the upper third of the sheet identifying:

- THE ILLINOIS STATE TOLL HIGHWAY AUTHORITY
- Contract title as listed in the Scope of Services
- Tollway Segment and Milepost location
- Contract number
- Volume number (if applicable)
- A map of the Construction section shall be centered in the lower two-thirds of the sheet. The map shall be of sufficient scale to identify the contract limits by station and to identify adjacent local crossroads and access points to the construction area
- A location map of the region shall be centered on the left third of the sheet. The map shall be of sufficient scale to identify the contract location with respect to the overall Tollway system and shall identify major arterial routes and municipalities
- The lower right corner is reserved for the DSE to sign and date the drawings. One or more professional seals, as applicable to the work included, shall be applied in the lower right corner.

When the contract plans are compiled in two or more volumes all volumes shall be listed at the top left corner with a short list of major sections contained in each volume. Also, the current volume shall be highlighted or boxed.

5.2.4 Index of Drawings

The drawing number and any supplemental numbering system (sheet numbers) shall be listed. Drawing titles shall be listed and shall match the exact drawing title as shown on the individual drawing.

5.2.4.1 Tollway Standard Drawings used within the contract shall be listed in numerical order by drawing number with exact title as shown on each drawing. A second column will also include the Standard Number. The Standard Drawings do not receive drawing set numbers.

5.2.4.2 IDOT highway or bridge standard drawings with latest revisions are to be listed as part of the Index, following the ISTHA Standard Drawings by the DSE. I.D.O.T. Standard Drawings shall be provided by the Tollway's printer as full standard size plans. Full standard size plans of I.D.O.T. District specific standard drawings shall be provided by the DSE.

5.2.4.3 On small contracts the General Notes may be combined with the Index, and in some cases, both the Index and General Notes may be combined with the Summary of Quantities. The DSE shall propose any such combination to the Project Manager for approval at the time of the Preliminary Design submittal.

5.2.4.4 Drawings are numbered and referred to as “Drawings”. Sheet numbers are supplemental and are to be limited to isolated disciplines involving cross-reference to sheets within a closed subset (i.e. control building drawings, structural drawings, and electrical drawings). Sheet numbers are shown in the lower right corner immediately above the title box.

5.2.5 Drawing Scale

5.2.5.1 Roadway Geometry

- Horizontal alignment - existing and proposed use 1"=50' base drawing
- Vertical Alignment use 1"=50' Horizontal and 1"=5' Vertical
- Cross Sections use 1"=10' Horizontal and 1"=5' Vertical
- For median closure projects use 1"=2' Vertical.

5.2.5.2 Roadway Plans

- Acceptable scale range is 1" = 20' through 1" = 50'
- For most projects use 1" = 50'.

5.2.5.3 Roadway Profiles

- For existing and proposed roadway profiles use 1"= 5' Vertical scale
- Existing and proposed elevations corresponding to the proposed roadway profile shown shall be given at 50-foot intervals
- Shorter intervals may be necessary on ramps or vertical curves
- Proposed and existing pavement elevations shall be shown to the nearest 0.01'
- Proposed and existing elevations of non-paved surfaces shall be shown to the nearest 0.1'.

5.2.5.4 Typical Sections

- Typically use vertical scale of 1"=5'
- Use minimum, 1"=2' vertical scale for typical details.

5.2.5.5 Drainage

- For conceptual layout of proposed drainage system and the contributing drainage areas of each system use 1" = 200' scale
- For identification of existing flow direction and drainage patterns use 1"=50'
- Show storm sewer and structure rims and inverts to the nearest 0.01'
- Show ditch grades to the nearest 0.1'
- Landscaping and Permanent Erosion Control Plans shall use the same scale and orientation as the roadway plans
- Use 1"=20' for plazas and other facilities.

5.2.5.6 Temporary Erosion Control Plans

- Use 1"=200' scale plans (minimum).

5.2.5.7 Maintenance of Traffic Signing and Pavement Delineation Plans

- Use a scale of 1"=50' for the full length of the project
- Use 1" = 200' scale for location striping plans when separate site plans are provided or when signing is shown on the roadway plans
- Use 1"= 50' for site plans for each overhead sign truss, cantilever and bridge mount location.

5.2.5.8 Roadway Lighting

- Use for proposed layout of light standards 1"=50' scale roadway plans.

5.2.5.9 Intersection plans

- Use 1"=20'.

5.2.5.10 I.D.O.T Format

Use 1"= 20' scale for plans following I.D.O.T format.

5.3 APPENDIX

5.3.1

The following document(s) may be obtained by the DSE from the Tollway at project initiation.

- P1050 Uniform Filing System Procedure
- Computer Aided Plan Preparations (ICAPP), November 2002

SECTION 6

UTILITY RELOCATION

Utility relocation guidelines are designed to provide the DSE direction related to the relocation of utilities on Tollway improvement projects.

6.1 TOLLWAY FURNISHED ITEMS

The Tollway will provide the DSE with the following:

- A list of Permits and all information on known utilities, relocated utilities, permitted utilities and utility contacts
 - Standard forms
 - Utility Agreements.

6.2 REQUIRED DSE UTILITY RELOCATION SERVICES

- The DSE shall identify, coordinate and resolve through the Tollway all utility conflicts within the project limits
- The DSE shall make known, verify and include on the design plans all existing utility interferences associated with the improvement(s)
- The DSE shall conduct field investigations to ensure information received from the utility companies is accurate and complete
- The DSE shall review all utility relocation plans prepared by others for conflicts between the design plans as well as the relocation plans of other utilities
- The DSE shall identify those conflicts which require an extended period for relocation or purchase of materials when such extended period may adversely affect project schedule
- Existing Municipal utilities within the design section which are to be relocated shall be designed by the DSE in accordance with the requirements of the municipality, law and the Tollway, unless otherwise directed by the Tollway.
- The DSE shall prepare cost estimates for all relocation of utilities in the design section
- The DSE shall make themselves available for periodic meetings with the Tollway's Utility Personnel
- The DSE shall include in the construction documents all information provided by a Utility relating to existing or relocated facilities
- The DSE shall prepare and maintain separate files for all utility work
- The DSE shall prepare any necessary documentation of forms required by any permitting agency
- The DSE shall make known to the utilities the points of service required by the design and coordinate all required documentation to ensure a timely completion of the work
- The DSE is responsible to identify the need for utility agreements and/or property rights to perform the utility relocation work
- The DSE shall apply for utility service on behalf of the Tollway. The Tollway will execute all service agreements as the owner.

6.3 UTILITY RELOCATION PROCESS

Step - 1 The Tollway provides the DSE a listing of Permits and relocations within the project area.

Step – 2 Pre- Preliminary Plan Submittal (Pre 60% design complete)

The DSE meets with the Tollway to discuss expectations for utility coordination.

Step - 3 The DSE assembles a list of known utilities within the project area and creates a set of preliminary utility plan sheets (strip maps). The DSE then sends the strip maps to the utility companies for mark-up and comment.

- This effort includes utility contact identification, and
- Establishes the need for utility agreements.

Step – 4 Preliminary Plan Submittal

The DSE meets with the Tollway to discuss expectations for utility coordination.

Step – 5 The Tollway then initiates the follow efforts:

- Start an in-house file for each utility
- Determines reimbursable status
- Assigns conflict numbers
- Approves Notice of Interference.

Step – 6 The DSE initiates the following activities:

- Checks right-of-way requirements
- Checks and verifies prior rights of utility on take
- Advises utilities of any right-of-way takes
- Checks and coordinates utility right-of-way needs.

Step – 7 Preliminary plan Submittal (60% design complete)

The DSE shows the following information of the submitted plan set:

- Existing utilities
- Utility conflict numbers.

The DSE shall submit 3 sets of the preliminary plans to each utility company.

Step – 7A Utility Company Actions (60% design complete)

- The utility company confirms the locations shown, and right-of-way takes shown on the submitted plan sets
- The utility company begins relocation design efforts.

Step -7B DSE and Tollway actions (60% design complete)

The DSE and Tollway discuss the progress of utility coordination efforts to identify and resolve critical elements including:

- Advance material needs and purchasing status
- Seasonal impacts on utility relocations
- Advanced scheduling of utility services disruptions/shutdowns

- Temporary facilities needs.

Step -8 Pre-Final Design (95% design complete)

The DSE shall submit the following documentation to the Tollway:

- 3 sets of the Utility Work Orders submitted to them by the utility company.
- 3 sets of the utility plans, and
- 3 sets of the detailed cost estimates for all utility including right-of-way related efforts

The DSE will at this time meet with the Tollway to ensure that the utility companies have received the following information:

- Right-of-way availability for relocation
- Utility materials status
- Seasonal constraints resolved
- Temporary facilities identified
- Shutdown and/or disruption of service scheduled
- Cost estimates for utility relocation and services to be included in the resolution awarding and the construction contract.

6.4 DOCUMENTATION

- All utility relocation documentation shall be prepared by the DSE and proposed by the Tollway
- Coordination of utility relocation plans and documents with design plans and documents is the responsibility of the DSE
- Utility relocation details for construction shall be incorporated into the permanent records by the DSE
- The DSE shall identify and make known all interferences between the proposed construction and all utility facilities. The DSE shall complete all necessary documentation, and forward it to the Tollway for processing
- Utility relocation plans and cost estimates prepared by others shall be reviewed by the DSE. Additionally, the Tollway reserves the right to make recommendations as well as the right of approval
- Agreements for utility service

6.5 APPENDIX

SECTION – 7

QUALITY ASSURANCE

7.1 QUALITY ASSURANCE OVERVIEW

Quality Assurance is an ongoing effort and includes multiple components. In this section the principal elements are described for the following:

- The Tollway Project Manager Quality Assurance functions
- The DSE consultant's quality plan
- Value Management
- Constructability review

7.2 TOLLWAY PROJECT MANAGEMENT SERVICES

The purpose of the Tollway's Design Quality Assurance program is to:

- Ensure that the DSE is delivering the work in accordance with the requirements defined by the Contract.
- Facilitate continuous improvement by the DSE
- Document the means for planning, executing, and recording verifications.
- Facilitate consistency and effectiveness in verifications.
- Provide data that facilitates decision-making by project stakeholders.
- Communicate to all project team members and other interested parties the methodology of the verification process.
- Foster positive perception of the verification program.

7.2.1 Tollway Project Manager Quality Assurance Functions

The Tollway Project Manager Quality Assurance functions are described below and include, but are not limited to the following:

- The Tollway Project Manager will collect through design submittals, reviews, coordination meetings, audits and other means objective evidence to ascertain whether the requirements have been complied with
- Upon identification of a non-fulfillment of a specified requirement, the Project Manager or assigned Verifier liaises with the DSEs to apprise them of a possible problem; and to allow them to provide additional objective evidence or clarification; to attempt to obtain concurrence or agreement; and to advise them that the formal report will be forwarded to the DSE following review and approval by the Project Manager and the Deputy Program Manager for Design.
- The Tollway Project Manager will review the DSEs proposed disposition and provide recommendations to the Tollway Project Manager on accepting or rejecting resolutions to contractual quality issues.
- The Tollway Project Manager provides the DSE with the formal response, with justification, and decides on actions to be taken to resolve outstanding quality issues.
- The Tollway Project Manager summarizes the results of verifications on a monthly basis and identifies trends and opportunities for improvement.

- The Tollway Project Manager and DSE use the results of the monthly performance summaries, ongoing verifications, and other project knowledge to re-evaluate and modify verifications planned.
- The Tollway Project Manager or the designated Verifier does not direct the DSE. They may offer suggestions to the DSE on remedies, but stress that it is up to the DSE to propose a resolution that is satisfactory to the Tollway Project Manager

7.3 DSE QUALITY PLAN

This Section contains the current requirements for the Quality Program manual submitted by Design Section Engineers (DSE). The DSE is responsible for developing their Quality Plan (DSE QUALITY PROGRAM) for engineering and design activities. The DSE and the Tollway will continually monitor the quality plan for effectiveness. After the Tollway's review, the DSE will be required to address any concerns or findings. The Tollway may suspend work until corrective action is taken.

7.3.1 DSE Quality Program

The DSE shall use an ongoing, effective Quality Program to manage and document engineering and design work. In the DSE QUALITY PROGRAM the DSE shall describe and communicate throughout its organization the policies, plans, and procedures to ensure quality in the preparation of specifications, drawings and documents.

7.3.1.1 The functions and activities for the project should reflect the organizational and management structure of the DSE. The choice of quality elements within the program may vary depending on the complexity of the project. A less extensive program may be implemented for simpler projects. The DSE is fully responsible for ensuring conformance to all of the original quality requirements. The level of effort in addressing individual efforts should meet the complexity of the project.

7.3.1.2 Achieving quality extends to all levels within the design effort, including DSE, sub-consultants, management, engineering and support levels.

7.3.2 Submittal of Quality Program

After receiving the notice to proceed, the DSE shall supply their DSE Quality Program signed by an appropriate officer, to the Tollway Project Manager within 14 days of the date of the agreement. The DSE Quality Program shall include a written endorsement by the DSE Quality Representative.

7.3.2.1 If the DSE Quality Program is not sent within 14 days, or the plan is not accepted by the Tollway, work may be suspended until the DSE provides an acceptable plan addressing quality assurance and quality control requirements. Delays in developing and implementing a Tollway-approved DSE Quality Program may result in sanctions against the DSE.

7.3.3 Acceptance of the DSE Quality Program

The Tollway will accept the DSE Quality Program based on satisfactory review of the DSE Quality Program and work performance. As the work progresses, the design DSE may be required to revise the DSE QUALITY PROGRAM for consistency. Any revisions will be subject to the Tollway's approval.

7.3.4 Proposed Changes to DSE Quality Program

The DSE shall notify the Tollway in writing with any proposed changes to the DSE Quality Program.

7.4 ELEMENTS OF THE DSE QUALITY PROGRAM

The DSE Quality Program should address the following quality components under these guidelines:

- Management responsibility
- Documented quality system
- Design Document Control
- Sub-consultant evaluation and procurement control
- Handling, storage, and control of materials and equipment
- Control of special processes
- Control of measuring and testing equipment
- Inspection and Test Status
- Identification and control of nonconforming conditions
- Corrective action
- Documentation by quality records
- DSE performance review
- Certification and training.

7.4.1 Quality Control/Quality Assurance

The DSE Quality Program shall consist of both a Quality Control procedure, and an independent Quality Assurance procedure and team.

7.4.1.1 The DSE Quality Control team may be comprised of independent technically competent project development team members who are able to:

- Perform complete checks of all calculations, plans, special provisions, and estimates
- Evaluate engineering practice conformance with contract and project criteria and overall completeness for implementation in the field.

7.4.1.2 The DSE Quality Assurance team will be comprised and staffed by an independent team of qualified design personnel who will:

- Audit design packages and release for construction plans for conformance with the Quality Program
- Audit and certify all design packages for release for construction for compliance with the Quality Program

- Ensure appropriate design reviews have occurred for all design deliverables.

7.4.2 DSE Management Responsibility

The DSE Quality Program shall declare and document the commitment to quality held by the DSE Executive Management and shall contain an organizational chart illustrating the lines of authority, including executive management, project management and quality functions.

7.4.2.1 The DSE shall also assign a Quality Representative who will oversee a staff that will perform quality control and quality assurance activities to ensure contract compliance. Quality personnel will do their work independently, have the necessary authority to perform their roles effectively, and will not have direct responsibility for the work being performed.

7.4.2.2 Management will review the DSE Quality Program for effectiveness and suitability. The reviews will be documented and recorded.

7.4.3 Documented Quality System

The DSE shall develop, implement and maintain a documented quality system to identify engineering and design activities, such as, management commitment, design concept reviews, calculation checks, design checklists, control of subcontractors, nonconforming product, corrective actions, and internal audits, that must be done to ensure that all necessary requirements are completed. The documented quality system shall include policies and procedures for a management level commitment to quality and a statement of corporate quality. The system shall also detail policies and procedures that are required to achieve satisfactory design and engineering while improving quality.

7.4.3.1 The documented quality system shall follow a specified format and show revision levels, approval dates and signatures. The format for documented procedures shall include purpose, scope, references, definitions, responsibilities, procedures, attachments and provisions.

7.4.3.2 The quality system shall use a uniform procedure numbering system, establish quality records to be maintained and a site where they will be held, establish systems for control of procedures, and ensure procedures contain acceptance criteria. It also shall establish requirements for procedures, provide a tool for quick change, identify procedures for controlled documents and establish a periodic procedures review process.

7.4.4 Design Control

The DSE shall create a procedure to establish design interfaces, perform design reviews, control design changes and ensure that design criteria and standards are understood. The DSE shall maintain the design records to confirm design acceptability.

7.4.4.1 The designer also shall document design input requirements, which shall include design basis, design criteria, regulatory requirements, codes, and standards, reliability of data, environmental data and software utilized.

7.4.4.2 Design output shall be documented and includes calculations and analyses. In the end, design output shall meet standards and criteria requirements, comply with regulatory requirements, and identify generally accepted engineering practices.

7.4.4.3 The design review shall look at constructability, operability and maintainability, and shall be administered by qualified people who were not connected to the original design.

7.4.4.4 Reviews of design data shall be conducted regularly through different efforts. Reviews must be conducted before submittals. Reviews can be conducted in several forms, including initiation by project management, organized according to engineering discipline, with review performed by a senior staff member with extensive construction background, and value engineering reviews.

The DSE shall maintain design control using procedures for the review of all changes and modifications in drawings, specifications and referenced documents.

7.4.4.5 The control process program should include the following provisions:

- Drawings should be numbered
- Specifications should follow a standard format
- Complete drawing lists should be established
- Changes made should be done according to procedures
- Changes should be reviewed and approved as original documents
- Permanent files should be maintained of all documents
- Control should include documentation of completed improvements by providing as-built drawings following construction completion.

7.4.4.6 The DSE will establish an independent design Quality Assurance team, separate of their quality control efforts, staffed by qualified professional engineers and designers who will review all design documentation for contractual compliance with the DSE quality plan prior to submitting them to the Tollway for review.

7.4.5 Document Control

The DSE shall develop procedures for managing submittals by sub-consultants. By creating this document control, the procedures will define the responsibility and authority for documents affecting the quality of work.

7.4.5.1 The document control system will ensure that the latest approved specifications are available to begin the design effort. Also, any changes to documents should be made in records that will be reviewed by appropriate personnel.

7.4.5.2 Documents that require control include drawings, specifications, inspection procedures, test procedures, special work instructions, operational procedures and quality assurance program and procedures.

7.4.5.3 The DSE shall create a design document index which lists every document for the project and contains the latest revisions.

7.4.6 Sub-Consultant Evaluation and Procurement Control

Any services provided by sub-consultants shall comply with all quality requirements established for the DSE. Quality plans submitted by sub-consultants shall be reviewed by the DSE to make sure the plans comply with the guidelines. Sub-consultants should be evaluated based on several factors, which include technical competence, past performance history, familiarity with guidelines and applicable codes. Procurement documents should be approved by designated personnel.

7.4.7 Handling, Storage, and Control of Materials and Equipment

The DSE shall make sure that requirements for product identification and traceability are included in documents to prevent the use of incorrect or defective items. Contract documents shall require measures to ensure proper handling and storage of material and equipment by contractors.

7.4.8 Control of Special Processes

Requirements for process control and procedures shall be included in contracts and reference appropriate standards. Special processes include welding, non-destructive testing and heat treating.

7.4.8.1 Workers performing the special processes, and inspectors overseeing the work, must be certified and qualified.

7.4.8.2 By controlling special processes, the DSE will require that personnel performing the work are qualified and certified. Other guidelines include requiring special processes to be appropriately defined, inspectors to have proper certification, the work to be identified and performed in proper sequence, and using documented procedures for the work.

7.4.8.3 Where appropriate, the DSE shall ensure that the requirements for contractors to implement controls for calibration and maintenance, as well as the requirements for inspection and test status of work during construction are included in contract documents.

7.4.9 Inspection and Testing Status and Plans

The DSE shall ensure that applicable testing and inspection requirements are included in contract documents. Specifications shall indicate the inspections and tests required, the standards to be achieved and acceptance criteria.

7.4.10 Control of Measuring and Testing Equipment

The DSE shall ensure that requirements for contractors to implement controls for calibration and maintenance of inspection, measuring and testing equipment are included in contract documents.

7.4.11 Inspection and Test Status

The DSE shall ensure that contract documents include requirements for contractors to identify the inspection and test status of work during construction and installation.

7.4.12 Identification and Control of Nonconforming Conditions

The DSE shall create procedures for identifying and correcting non-conforming items. In the procedures, the DSE shall document the instances and monitor their status by maintaining logs. Non-conforming design items shall be identified and segregated.

7.4.12.1 The DSE Quality Program shall contain provisions to notify those responsible for activities affected by the non-conforming work. The personnel in charge of reviewing the non-conforming work shall be identified and shall have demonstrated competence in the area of interest.

7.4.12.2 The disposition of non-conforming items should be documented and evaluated to ensure the validity of the design by using the same input documents that were used in the original. Design documents shall be revised to reflect all changes resulting from the resolution of the non-conformances.

7.4.13 Corrective Action

The DSE shall investigate any action that is nonconforming and take appropriate corrective action to prevent recurrence. The DSE shall develop a procedure to take corrective actions for analyzing processes to detect and eliminate potential causes, initiate preventive actions to deal with problems, ensuring effectiveness of corrective actions and recording changes in procedures. The DSE shall investigate the reason behind the non-conformance and prevent the action from repeating. A corrective action plan shall be documented for the following:

- Analyzing processes to eliminate potential causes of non-conformances
- Create preventive actions to a level that corresponds with the risks encountered
- Ensure implementation of corrective actions
- Record changes in procedures that are a result of corrective actions.

7.4.14 Documentation by Quality Records

The DSE Quality Program shall contain provisions that identify quality records to be maintained and retention time. The DSE shall develop a procedure for control of quality records. This procedure shall contain responsibility for production, collection, indexing, filing, storage, maintenance, and disposition of quality records.

The quality records should be stored in a suitable environment, to prevent damage, ensure legibility, prevent unauthorized access, and should include:

- Inspection reports

- Qualification records for personnel, processes and equipment
- Calibration records, non-conformance and corrective action reports
- Drawings, procedures and the DSE Quality Program
- Design input, output and verification
- Certification and training records
- Sub-consultant evaluations and quality records.

7.4.15 DSE Review / Internal Audit

The DSE shall develop procedures for audit activities, which should be conducted by qualified quality personnel. An internal audit process should be established to verify compliance with the DSE Quality Program. The DSE also shall create a system of external audits to verify compliance by sub-consultants with DSE Quality Program. Audit results should be given to personnel overseeing the area being audited. Management shall take timely corrective action on the deficiencies.

7.4.16 Certification and Training

The DSE shall provide training and certification programs for personnel affecting quality and maintain records. Personnel shall have demonstrated competence and understanding of the project requirements. The DSE shall review credentials of active personnel to make sure that education experience and technical qualification are maintained.

7.4.16.1 The DSE shall develop a procedure to establish requirements for training, including the DSE Quality Program and related procedures. Training should be conducted by knowledgeable instructors.

7.5 VALUE MANAGEMENT

The Value Management Program is applicable to all design projects with a project budget of \$50 million or more and other projects as designated.

- A Value Management study relies on the insight, knowledge, and experience of a multi-discipline team following the step-by-step Value Management Job Plan under the guidance of Certified Value Specialist
- Before design, the Value Management study will verify project purpose, propose design directions to accomplish the purpose, and review the budget for adequacy to carry out the project.
- During design, the Value Management study will thoroughly audit the project by comparing its purposes (functions), the cost to achieve them and their acceptance by the stakeholder. Imbalances will be corrected by recommending appropriate design and/or program changes.
- A VM study may be performed, at the discretion of the Chief Engineer or the Program Manager, on criteria and guidelines for each program or system (including, roadway, bridges, toll plazas, etc.).

7.5.1 Value Management Project Organization

7.5.1.1 Tollway Project Manager:

- The Tollway Project Manager coordinates with the Certified Value Specialist to assist in VM study scheduling, availability of documents and other information, team member selection and coordination with the DSE
- When the final report is received the Tollway Project Manager ensures that the VE team's recommendations are reviewed and, those that are adopted by the Tollway are implemented.

7.5.1.2 Certified Value Specialist (CVS):

- An external Certified Value Specialist (CVS) will be retained to facilitate the value study.
- The CVS along with the Tollway Project Manager schedules the VM session, including the oral and written presentation of the Value Study Team's results
- The CVS:
 - Establishes a standardized format for reports
 - Facilitates the Value study
 - Tracks and reports the results of Value studies
 - The CVS will plan and schedule all aspects of the study including identifying resources required, study organization, required data, execution (the workshop) and the presentation of the team's recommendations
 - The CVS will prepare the report summarizing the team's recommendation and expected benefits.

7.5.1.3 Value Management Study Team

Value Management Studies are performed by a multi-disciplinary team.

- The Value Study Team will be selected from the project stakeholders including the DSE and Illinois Tollway operations and maintenance personnel.
- The Tollway Project Manager may be a member of the team
- All team members will be approved by the Tollway Program Manager

7.5.2 Number and Purpose of Value Management Studies

Unless otherwise noted, all selected projects shall have at least two formal Value Management studies.

7.5.2.1 Conceptual Design (30%) Value Management Study

- The objective of this Value study is to create among the stakeholders a shared understanding of project purpose and how to achieve it
- It will be conducted over a five-day period to verify project purpose, propose design directions to accomplish the purpose, to identify and reduce constraints, and to review the budget.

7.5.2.2 Preliminary Engineering (60%) Value Management Study

- The objective of this Value study is to ensure total project value
- This study will thoroughly review the entire design by examining the relationship between project purpose (functions), the cost to achieve them, and the acceptance of their performance by the stakeholders
- The Value Study Team will recommend design and/or scope changes as deemed necessary to ensure total project value.

7.5.2.3 Pre-Final (95%-optional) Value Management Study: If necessary, a third Value Management study may be carried out at the conclusion of the 95% pre-final design phase to focus specifically on portions of the project, which display excessive cost, poor stakeholder acceptance or those factors, which demonstrate poor value.

7.5.3 Presentation of Study Results

- At the conclusion of each study a conference will be held in which the Value Study Team and other relevant project stakeholders will participate to approve, reject or set aside for further study the recommendations of the Value Study Team.
 - Recommendations set aside for further study will be assigned to specific project stakeholders for review along with a date by which the review must be completed and their recommended approval or rejection made.
- Following the conference the CVS shall prepare and submit a written report to the Tollway. The report shall contain:
 - An Executive Summary reviewing the significant features of the project
 - The study goals and objectives
 - A tabular summary of the results
 - A presentation of the individual Value Team recommendations, and
 - A disposition of the recommendations as decided upon at the Decision Conference will be included in the report.
- The Tollway Project Manager will coordinate incorporation of the accepted recommendations into the design.

7.6 CONSTRUCTABILITY REVIEW

The purpose of Constructability Review is to ensure that the project can be built as designed, within budget and schedule, and meet the project goals. Constructability Reviews will be conducted throughout the design development process in accordance with P4100 "Constructability Review Procedure". The Constructability Review will be conducted concurrently with the established design review schedule. Evaluate whether or not the results of design and development will fulfill project goals and scope of work.

7.6.1 Constructability Review Team Members

The Constructability Review Team Members are selected for their experience in construction, and work in the field with construction documentation and include DSE, Tollway and additional personnel as required.

7.6.1.1 The Constructability Reviews may include, but are not limited to such factors as construction methods, job phasing, materials, and use of Illinois Tollway provided services, lane closures, utility relocation, public access and conflicts.

7.6.1.2 The Tollway Project Manager may arrange for in-house staff to perform the review, even if no Constructability Review guidelines are stipulated within the DSE/CM contract.

7.6.2 Constructability Reviews

Constructability reviews are conducted on projects with construction costs exceeding \$50 million. At the Illinois Tollway's discretion, a constructability review on projects less than \$50 million may be required.

7.6.2.1 Changes in design will be undertaken in order to facilitate necessary phasing, to ensure compatibility of materials and system applications, and to ensure that what has been designed may be constructed with minimal difficulty and cost. A list of long-lead time material items shall be identified by the review team, to secure procurement in sufficient time for installation.

7.6.2.2 The Tollway Project Manager will arrange for the Review Team to visit the project site and surrounding area to verify existing facilities and conditions.

7.6.2.3 The Review Team uses the Constructability Review Checklist as a guideline to perform the review and to document review comments.

7.6.2.4 The Review Team transmits the completed checklists to the Project Manager.

7.6.2.5 The Review Team members shall perform the following:

- Complete a Constructability Review Checklist
- Submit the Constructability Review Checklist to the Tollway Project Manager for review and comment.

7.6.2.6 The Tollway Project Manager and/or DSE shall evaluate and prepare the Constructability Review Report and resolve any conflicts.

7.6.2.7 Upon completion of the Constructability Review Report, the Tollway Project Manager distributes the report to the DSE and appropriate Tollway departments.

7.6.2.8 Upon Tollway review and approval, the Tollway Project Manager directs the DSE to make the agreed upon changes.

7.7 APPENDIX

7.7.1

The procedures identified below are the operating procedures used by the Tollway's project managers to ensure design contract compliance. They are included for reference only:

- P4020 Value Management
- P4100 Constructability Reviews
- P4010 Acquisition of Permits Procedure
- P6000 Evaluation of Consultants' and Contractors' Quality Programs
- P6010 Quality Training Procedure
- P6040 Quality Assurance Audit Procedure
- P6060 Document Control Procedure for Quality Manual and Program Procedures Manuals Procedure

SECTION 8

PROJECT BUDGETS and ESTIMATES

8.1 TOLLWAY PROJECT MANAGER SERVICES

The Tollway's role regarding Project Budgets and Estimates is as follows:

- The Tollway's Estimating Group shall develop all project related budget estimates using all available parametric cost data, using scale up or down factors that are appropriately escalated for market conditions (e.g. total regional construction volume, contractor workload, labor and/or material cost inflation, etc.).
- The Tollway Project Manager is responsible for coordinating the efforts of the DSE and the Tollway's Estimating Group on all matters regarding budget and estimates.

8.2 PROJECT BUDGETS AND ESTIMATES

This Section provides guidance for the development and preparation of budgets and estimates required at the various phases of a project. The guiding principles to budget and cost estimate development include:

- All cost estimates developed by the DSE are designed to insure the application of the "design-to construction budget" concept
- The DSE is required to provide contract item quantities for the purpose of preparing estimates as outlined in the DSE quantity calculation manual
- The DSE will provide a detailed breakdown of lump sum pay items based on the Construction Specification Institute (CSI) specification sections
- The Tollway Engineering Department will review the DSE estimates with respect to unit prices, pay items, etc.
- The Tollway's review of the DSE estimates does not relieve the DSE of the responsibility for the accuracy and completeness of their cost and quantity estimates.

8.2.1 Design Section Engineer

The DSE is responsible for developing the following cost estimates:

8.2.1.1 Master Plan Estimate: A level-of-effort conceptual cost estimate based on the approved master plans and documents. It is an estimate prepared without detailed plans and specifications. A conceptual plan is used for quantity take off and development of a conceptual quantity take off and cost estimate.

8.2.1.2 Preliminary Estimates: These estimates are prepared at both 30% and 60% design completion, and are prepared by the DSE to contract item quantities and costs when the plans and specifications reach 30% to 60% completion. The Tollway shall perform a review of the Preliminary Cost Estimate and provide the DSE with comments. The comments will require disposition from the DSE prior to submission of the Pre-Final cost estimate.

8.2.1.3 Pre-Final Estimate: A DSE cost estimate prepared using the data developed on 95% complete plans and specifications. The Tollway will review the Pre-Final Cost Estimate and provide the DSE with comments. The comments will require disposition from the DSE prior to submission of the Engineer's Estimate.

8.2.1.4 Engineer's Estimate The cost estimate prepared from the set of contract documents (i.e. plans, specifications, addendum, etc.) sent to bidders. Final contract quantities are provided by the DSE. The Tollway may review the Engineers Cost Estimate and provide the DSE with comments. The comments will require disposition from the DSE prior to bid.

8.2.2 DSE Cost Estimates

For each estimate, the following items shall be readily identifiable:

- Estimator's name and affiliation
- Date of cost estimate preparation
- Project Manager's name and affiliation
- Project Description
- Numbered sheets and total number of pages
- Verification of content and arithmetic check, and date of check
- Design phase, i.e., budget, conceptual, preliminary, pre-final, final, engineer's estimate
- Item number of specification or drawings, if applicable
- Quantity of estimated item
- Unit(s) of measure
- Unit price(s) of material per unit
- Cost estimates for unit price contracts or contracts with unit price content shall be structured in the same format as the Bid Proposal, if possible.
- As applicable, cost estimates shall include all costs developed, coded in accordance with the agreed format
- For Lump Sum items the DSE shall provide a breakdown for the work using CSI/Tollway pay item quantity breakdowns with units/unit price extensions with a total for lump sum item.
- Determination of escalation factors used in the development of the estimate along with a complete written analysis and supporting documentation.

8.2.3 Summary of Quantities

The drawings shall be set up in a columnar format with column headings for: ITEM NO., DESCRIPTION, UNIT, QUANTITY, and RECORD QUANTITY.

8.2.3.1 The item number, description and unit shall match exactly each item in the Special Provisions or Standard Specifications and also be so stated in the P-pages of the Proposal portion of the Contract Documents. A Special Provision is required for each pay item, unless the Standard Specifications cover the work item and a standard pay item is already listed in the Standard Specifications. The

Special Provision item should be indicated with an asterisk (*) placed next to the item, outside the table.

8.2.3.2 The numbering of the pay items must conform to the Item Numbers listed in the Standard Specifications. For work not covered by the Standard Specifications and unless otherwise directed, the DSE may number the items in a logical order of his choice. However, the following general groups shall be used:

- Items 201 - 299 Earthwork
- Items 301 - 399 Bases and Sub-bases
- Items 401 - 499 Plaza and Roadway Pavement
- Items 501 - 599 Structural
- Items 601 - 699 Drainage, Erosion Control and Landscape
- Items 701 - 799 Roadway Safety
- Items 801 - 899 Signing and Pavement Marking
- Items 901 - 999 Roadway Lighting, Lighting and Electrical
- Items 1000-1099 Construction Traffic Management and Project Control
- Item 1300 Mobilization
- Items 1301-1379 Building and Specialty Construction (as required)
- Item 1380 Integrated Radio Tower System
- Item 1501 Contract Specified Force Account Items
- Item 1502 Partnering
- Items 1300010 - 1316999 <C.S.I. Format>

8.2.3.3 All pay items and quantities that are anticipated should be listed. Item 1300 MOBILIZATION shall always be the very last pay item listed in the summary of quantities, following section 1300000 items, item 1501 and any non-ISTHA pay item numbers. All quantities shown are expected to be final.

8.2.3.4 Negative or Penalty items and Incentive Pay Items will not be inserted in the summary of quantity drawing. They will only appear on the P-Pages.

8.2.3.5 Quantities in the summary of Quantities should be rounded off to not less than whole units, except for Acres, which can be rounded off to one tenth of an acre. Quantity units shall be in accordance with the DSE quantity calculation Manual.

8.2.3.6 Schedule of Quantities: The schedule shall be in a columnar format with columns identified by Item No. and Description and rows identified by station at which the item will be constructed. Schedules are generally required for drainage work, guardrail, signing, reinforcing steel, structural steel, and earthworks, concrete and lighting work where large quantities of these items are included in the work. Schedules may also be utilized to reduce clutter on the plan drawings.

8.2.3.7 Construction Cost: The construction cost estimate shall identify the following factors or items:

- Basis of quantity development, and allowances made to quantities, if any, and what items
- Drawings used for the quantity take-off or bill of materials
- Dates for scheduled Contract Award, Substantial Completion and Construction Duration
- Escalation factors used, including percentages and dates for escalation periods, and source of escalation factors
- Source cost data, e.g., previous project data, Contractor's unit costs, estimating publications, estimator's judgments
- Allowance made to estimated costs for incomplete design, assumptions and items applied
- If labor hours are restricted or if the project requires the use of overtime to meet schedule demands, the DSE shall provide the factors used for labor adjustments needed for Illinois Tollway work
- Productivity factors used for direct labor costs
- Site surveys conducted by the DSE, including a description of site conditions and impact on costs, if any.

8.2.3.8 The DSE shall develop take-offs for each category of work for each detailed line item in accordance with the agreed coding convention, accounting for material unit costs derived from various sources, including vendor quotes, previous contracts with proper escalation applied, estimating manuals and departmental standards. Factors to be considered in the development of unit cost estimates include, but are not limited to:

- Total regional construction volume
- Contractor workload
- Labor and material availability
- Labor and material cost escalation
- Material cost inflation
- Changes in contractor insurance rates
- Premium time requirements
- Spot overtime requirements
- Other factors that might affect historical costs.

8.2.3.9 The Cost Estimator shall develop material and labor unit prices to satisfy unit price costing of items as required by the Contract Specifications. The Cost Estimator should make adjustments for market conditions based on the determination of labor availability in the Chicago area. In accordance with the construction schedule, the Estimator shall determine escalation requirements using indices of material prices and labor rates based on crafts labor agreements.

8.2.4 Basis of Cost Estimate

Identification of the information used to prepare the cost estimate shall include, but is not be limited to, the following:

- Reference and scope

- Type of estimate
- Phase
- Source of quantity take-off
- Drawing schedules issued and maintained for each project, which list the drawings applicable to the project, and their issue or scheduled issue date.
- Exclusions such as Illinois Tollway labor, financial charges, legal Project contract drawings
- Project contract documents, including specifications
- Commercial catalogs, which provide information on material items identified in specifications and/or on contract drawings
- Support documents such as soil reports, traffic studies, and planning reports
- Details supporting calculations used in developing quantities, which are prepared, reviewed and documented by Estimators
- Start, award date and substantial completion date
- Escalation index and date
- Information expenses, land purchases, permit, outside consultants etc.
- Utility service relocation efforts
- Assumed Contractor hours of work (standard, premium or overtime)

8.2.5 DSE Design

The Tollway shall review cost estimates prepared by the DSE for capital construction projects. The review objective is to ensure that projects are designed to budget.

- Estimates submitted as part of design milestone submissions shall be reviewed for completeness to determine and control design variance from budgets
- The DSE shall assist the Tollway Project Manager in managing designs that are found to have cost estimates that exceed allowable variances, as defined herein.
- Estimates shall be prepared in the standard format and contain the information prescribed by the Tollway
- The DSE is responsible to provide updated cost estimates whenever changes in the design scope (quantities) or unit prices impact overall cost of the project more than 2% from the latest cost estimate submitted. This may require the DSE to prepare and provide additional cost estimates other than previously identified in this document.

8.2.6 Contingency (developed by the Tollway)

The Tollway Cost Estimator shall assign a construction cost estimating contingency to the overall project. The Tollway Cost Estimator shall determine the magnitude of the contingency based on factors such as the percentage of the project's design completion at the time of the estimate, market conditions, project budget, budget construction estimate, the project location and complexity, etc.

8.2.4.1 Unless otherwise noted the DSE shall use the table below as a guideline to applying contingency for major cost accounts and the overall project at various stages of design.

Design Stage	Contingency
Budget Conceptual Estimate	15%
Preliminary / Pre-final Estimate	10%
Engineer's Estimate (100%)	5%

Note: The Table above is to be used as a guideline, and estimating judgment should be used when including these factors in an estimate submittal. Additionally, all supporting documentation used in the development or adoption of contingency factors shall be submitted to the Tollway by the DSE.

8.3 ANALYSIS OF CONSTRUCTION BIDS

The purpose of analyzing construction bids is to evaluate the consistency of the Bid Estimate. Bids shall be analyzed overall as well as by item, both to determine that line item costs are suitable and to check for unbalanced bids.

- For unit price contracts, item-by-item comparisons shall be made between:
 - The variance of each Contractor's bid price and the Engineer's Estimate and contributory item total amount
 - Low bidder's bid prices and those of all other bidders
 - Low bidder's unit price variance with average unit prices.

If the low bid and the Engineer's Estimate fall within a target range and there are no major discrepancies in the prices for various items, the bid shall be considered acceptable.

In situations where differences between the two lowest bidders and Engineer's Estimate cannot be explained to the satisfaction of the Illinois Tollway, the possibility of a re-bid should be considered. The Chief Engineer shall issue the recommendation for re-bid to Illinois Tollway Purchasing.

To obtain more acceptable bid results, the Illinois Tollway may elect to clarify the contract documents, correct quantities in the specifications, seek out additional Contractors to enhance competitive bidding, combine the contract with another contract, split the contract, etc.

8.3.1 Estimate Format

The objective of standardizing cost estimate formats is to ensure that all cost estimates accurately, completely and uniformly reflect the estimated cost of the project during the various phases. Standardized formats facilitate reviews and analyses. Estimates prepared by consultants shall be prepared in a format that is acceptable to the Tollway.

- Consultant design estimates shall be submitted in the format and with the level of detail most appropriate to the design phase. Estimate elements shall be identified and coded in accordance with Illinois Tollway standard pay items, CSI convention or any combination of these, as agreed upon.

8.4. APPENDIX

8.4.1

The procedures identified below are the operating procedures used by the Tollway's project managers to ensure design contract compliance. They are included for reference only:

- P4110 Cost Estimating Procedure
- P7010 Project Status Reporting System Procedure
- P7030 Exception Reporting
- P7040 Measurement Analysis and Improvement Procedure
- P7050 Customer Satisfaction Procedure
- P7060 Lessons Learned Procedure
- P7110 Scheduling Control Procedure

SECTION 9 SCHEDULES

9.1 OVERVIEW

The purpose of a Scheduling System is to:

- Determine whether the DSE is on track to meet or exceed project milestones
- Determine the appropriate timeframe for construction
- Prevent or mitigate against schedule creep, and
- Document whether the DSE actual and planned progress are reasonable and in compliance with the contract documents.

9.2 TOLLWAY PROJECT MANAGER SERVICES

- On a monthly basis the DSE provides the project manager with a monthly schedule and a report containing:
 - executive summary
 - schedule narrative
 - work progressed
 - comparison of project cash flow with actual, and
 - an in-depth schedule analysis including critical path and comparison against the Baseline Schedule or Approved Revised Schedule.
- The Tollway Project Manager will review the above report and the monthly schedule to verify start and end dates, concentrating on near critical path activities; identify areas of potential schedule creep or other deviations.
- The Tollway Project Manager discusses identified potential schedule issues with the DSE and may request a recovery Schedule.

9.3 SCHEDULES

9.3.1 Submittal Requirements

Within two weeks after the issuance of the Notice to Proceed, the DSE shall provide a design schedule inclusive of the following items:

- Design Milestones in accordance with the contract provisions or as agreed with the Tollway Project Manager
- Activities required to meet the requirements of the interim milestones including but not limited to the following:
 - Real Estate requirements, including the development of plats and legal descriptions
 - Utility Services and Conflicts, including the development of utility work orders;
 - Completion of MOT plans (including required exhibits to demonstrate the traffic flow during each phase of the project)
 - Completion of estimates
 - Tollway and other Stakeholder reviews

- Coordination with outside agencies including the development and execution of required agreements
 - Environmental Permitting and associated activities
 - Traffic Studies
 - Stakeholder meetings, as appropriate
 - Other activities necessary to complete the design in accordance with the final deliverable date.
- The DSE will be required to update this schedule periodically as agreed to with the Tollway Project Manager. Changes to the design schedule must be approved in advance by the Tollway Project Manager.

9.3.2 Construction Schedules Prepared by the DSE

With each Design Deliverable (Conceptual, Preliminary, Pre-Final and Final), the DSE will be required to submit a construction schedule indicating the sequence of activities required to complete the Construction Phase of the project in accordance with the prescribed construction duration. The Construction schedule shall be to a level of detail commensurate with the level of design and shall be used as a tool during the development of the DSE Milestone Estimate. The schedule shall be accompanied by supporting drawings and/or narrative describing the anticipated approach to the work, days and hours of work, MOT provisions, and other required data necessary to support any required outreach with project stakeholders, including the Tollway, IDOT, government agencies and the general public. Exhibits will be developed by the DSE as needed to support communications with the project stakeholders.

9.3.3 Schedule Format

Schedules prepared by the DSE shall be in a format that is acceptable to the Tollway. On projects with a budget over \$25M, the DSE may be requested to complete the schedule utilizing software by Primavera.

9.4 APPENDIX

9.4.1

The procedures identified below are the operating procedures used by the Tollway's project managers to ensure design contract compliance. They are included for reference only:

- P7110 Scheduling Control Procedure

SECTION 10

TECHNICAL GUIDELINES AND DESIGN CRITERIA

This Section lists the primary standards, criteria, and guidelines used in the design of Tollway projects. The DSE is instructed to use the latest edition of all technical guidelines and design criteria.

10.1 DESIGN DATA FOR DESIGN SECTION ENGINEERS

10.1.1 Specifications, Standards, and Improvement Record

- Standard Specifications
- Supplement to Standard Specifications
- Standard Drawings and Guide Drawings
- ISTHA Improvement Record

10.1.2 Manuals and Criteria

The term "Current Edition" is defined as the edition in effect at the time the contract is signed by both the DSE and Tollway.

- Illinois State Toll Highway Authority – Bridge Design Criteria, current edition
- Illinois State Toll Highway Authority – Drainage Design Criteria, current edition
- Illinois State Toll Highway Authority – Geotechnical Engineer's Manual, current edition
- Illinois State Toll Highway Authority – Traffic Barrier Guidelines, current edition
- Illinois State Toll Highway Authority – Roadway Design Criteria, current edition
- Illinois State Toll Highway Authority – Erosion and Sediment Control, Landscape Design Criteria, current edition
- Illinois State Toll Highway Authority – Environmental Studies Manual, current edition
- Illinois State Toll Highway Authority – Computer Aided Plan Preparations (ICAPP) Procedures and Policies, current edition
- Illinois State Toll Highway Authority – Sign Design Guideline, current edition
- Illinois State Toll Highway Authority – Roadway Traffic Control and Communications Guidelines, current edition
- Illinois State Toll Highway Authority – Quality Standard for Work Zone Traffic Control Devices, current edition
- Illinois State Toll Highway Authority – Construction Manager's Manual, current edition
- Illinois State Toll Highway Authority – Construction Section Engineer's Manual, current edition
- Illinois State Toll Highway Authority – Guidelines for Roadway Illumination, current edition
- Illinois State Toll Highway Authority – Supplement to Bridge Design Criteria, Guidelines for Bridge Condition Reports, current edition
- Illinois State Toll Highway Authority – Supplement to Bridge Design Criteria, Guidelines for Bridge Life Cycle Cost Analysis, current edition

10.1.3 Policies and Guidelines

- Guidelines for Utility Relocation Design.
- Guidelines for Bridge Condition Reports – Memo
- Guidelines for Roadway Illumination
- Guidelines for Life Cycle Cost Analysis for Bridge Components.

10.1.4 Design Bulletins

- Guide Drawings for Electrical Systems at New Unattended Ramp Plazas
- Revised and New Guide Drawings for Electrical Systems at New Attended Ramp Plaza
- Revised and New Toll Plaza Structural Guide Drawings
- Ramp Plaza Guide Electrical Special Provisions and Revised Guide Drawings for New Unattended Ramp Toll Plazas.
- Ramp Plaza Guide Electrical Special Provisions S.P. 907E, Cable Duct and S.P. 909G Wire and Cable for New Unattended Ramp Toll Plaza Construction.
- Steel Plate Beam Guardrail Block-Outs.
- Coordination and Communication Plan
- Cost Analyses
- Design Criteria for Removal and Replacement of Trees
- Revisions to Maintenance of Traffic Standards.

10.1.5 Deviation

In any instance where the professional judgment of the DSE indicates that the criteria established within the aforementioned documents are inadequate to fulfill the scope of services requirements, then the DSE shall complete an “ISTHA-Request for Design Deviation” form included in the appendix and submit the form to the Tollway Project Manager. No further work shall be expended on the subject under question until the form is returned to the DSE.

SECTION 11

RELATED REFERENCES

Where Tollway supplied guidelines and design criteria do not address specific design issues which may arise during design development, the DSE work is then directed use appropriate and current design criteria established by AASHTO, IDOT or other applicable agencies as listed below:

11.1 DESIGN CRITERIA

- Illinois Department of Transportation (IDOT):
 - Current manuals, Standards, Criteria and Specifications. Including IDOT District #1 criteria, standards and policies
- American Association of State Highway and Transportation Officials (AASHTO):
 - Roadside Design Guide, current edition.
 - Publication entitled “An Informational Guide for Roadway Lighting”, latest edition
 - Publication entitled “A Policy on Geometric Design of Highways and Streets”, latest edition.
 - Standard Specifications for Highway Bridges, current edition
 - A Guide for Transportation Landscape and Environmental Design, current edition
- Manual on Uniform Traffic Control Devices (IDOT Version).
- American National Standard Practice for Roadway Lighting, ANSI/IESNA RP-8, latest edition.
- Design Bulletins which the Tollway has issued or may issue as the need arises
- Other design, construction and operating practices accepted by the Tollway at the time the design work is being performed

11.2 OTHER CRITERIA

Other design, construction and operating practices accepted by the Illinois Tollway at the time the design work is being performed.

- Where the Design Section includes work on facilities owned by agencies other than the Tollway, design for those facilities shall be in accordance with the requirements of that agency. The DSE shall conduct and coordinate this work to ensure the approval of the owning-agency, while deferring to the interests of the Tollway.
- The establishment of project design criteria and/or the resolution of any conflicts that exist in the standards and criteria used on the project must be accomplished by the DSE as an initial activity of the project.

SECTION 12

CHANGE MANAGEMENT

Identifying, communicating and managing changes to the project control base are the responsibility of all members of the project team, including the Tollway, DSE, vendors, and sub-consultants. This requirement is communicated to the project team at the start of the project and is continuously reinforced throughout the project development efforts.

12.1 CHANGE PROCESS

The change management process provides project management with early warning of conditions that might affect the project cost and/or schedule. This process allows both the Tollway and DSE management team the opportunity to minimize or negate impacts of the potential change. The vehicle used for managing change issues is the Tollway's **P1080 "Staff Summary Sheet Procedure"**. Matters for which the Staff Summary Sheet process may be used include, but are not limited to:

- Actions requiring the Executive Director's approval
- Request to amend/deviate from approved operating budget and/or plan
- Recommendations to change Congestion-Relief Plan Budget or Program that requires the Executive Director's and Board approval
- Recommendation (proposal) to change established procedures (excluding internal departmental procedures)
- Procurement of any consultant contract
- Procurement requiring approvals higher than the chief of the Department
- Congestion-Relief Plan construction contract
- Customer and Executive Director approval for projects not developing a project master plan.

12.2 APPENDIX

12.2.1

The procedures identified below are the operating procedures that shall be used by both the Tollway Project Manager and the DSE to ensure design contract compliance.

- P1080 Staff Summary Sheet Procedure