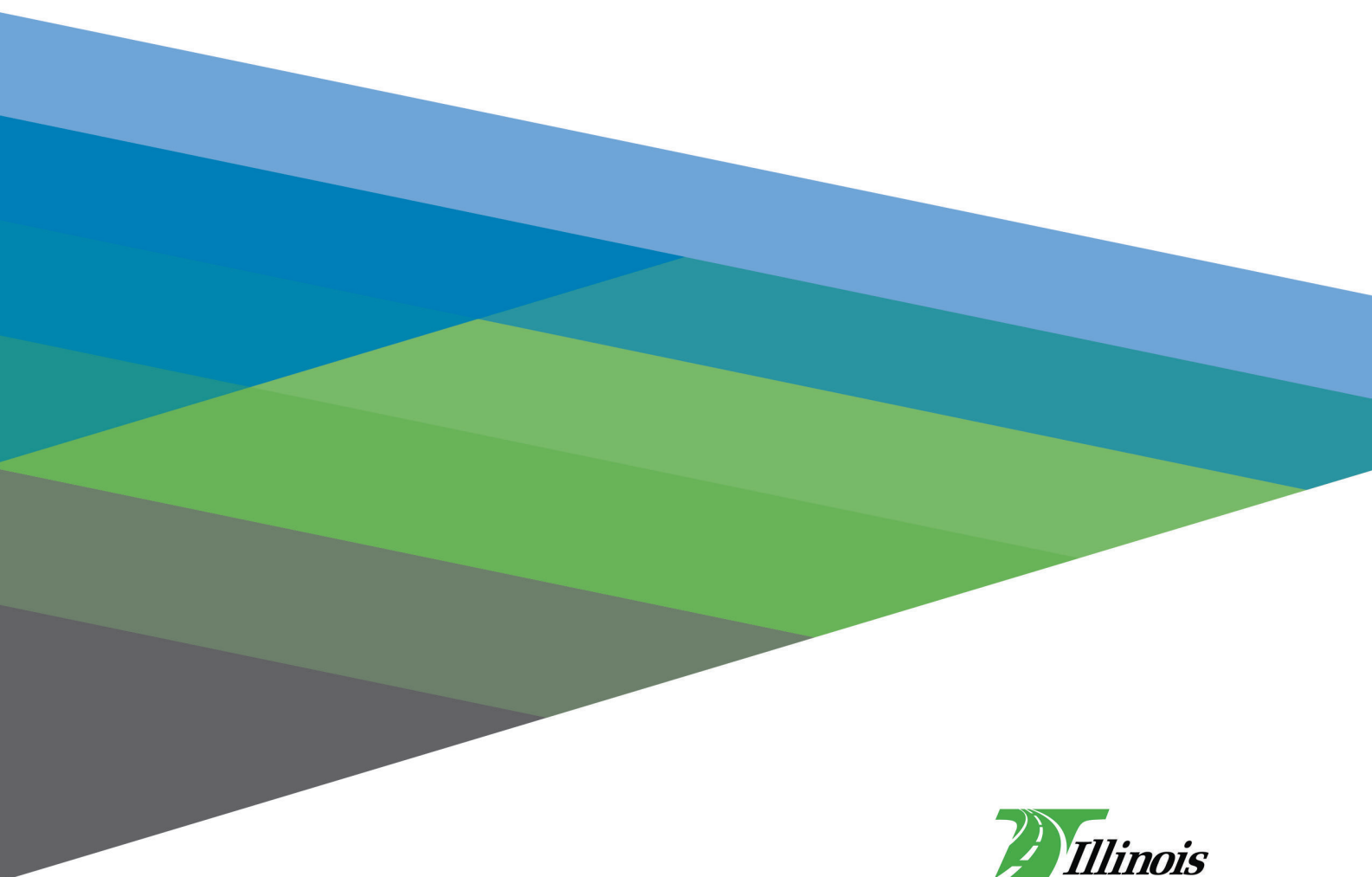
November 2022

Design Section Engineer's Manual

ILLINOIS STATE TOLL HIGHWAY AUTHORITY



Illinois Tollway

INTRODUCTION

Design Section Engineer's Manual

The Design Section Engineer's Manual provides guidance for Design Consultant Services on the minimum requirements for completion of design and contract documents. The manual's content provides a detailed listing of criteria, guidelines, policies deliverables and procedures to ensure Design Section Engineers remain in compliance in the execution of their duties. The manual's content provides consistency between the Design Section Engineer and the Illinois Tollway's administrative policies with the benefit of uniform expectations of practices and procedures.

The Design Section Engineer's Manual dated November 2022 replaces the March 2021 version.

Major Revision Highlights

Section 1.0 Introduction

Article 1.2 - Updated Definitions Guide Special Provisions, Illinois Tollway Supplemental Specifications and Working Drawings.

Article 1.3 - Added abbreviation for ESA, updated Guide Special Provisions example.

Section 4.0 Design Phase Project Deliverables

Article 4.2.2 - Updated language for discussion of comment disagreements during milestone reviews

Article 4.3.1 - Updated list and language of requirements for Master Plan Preparations

Article 4.3.1.1 - Updated list and language of requirements for Master Plan Submittal Requirements

Article 4.4.4.3 - Updated entire list and language of minimum design requirements for Drainage

Article 4.4.4.5 - Updated the language of structural requirements for the designer

Article 4.4.4.5.1 - Updated list and language of minimum design requirements for Bridges

Article 4.4.4.5.2 - Updated list and language of minimum design requirements for Bridges Culverts

Article 4.4.4.5.3 - Added a requirement for a feasibility study to be submitted prior to TS&L plans for retaining walls

Article 4.4.4.6 - Added new 3D requirements

Article 4.4.4.7 - Updated language that explains when Geotechnical Design Memorandums and Reports should be revised and resubmitted.

Article 4.4.4.8 - Updated language to clarify what should be indicated in the pavement marking discussion. Added requirement to identify if geometric or roadway conditions warrant sign lighting.

Article 4.4.4.10 - Updated requirements items for Roadway Safety. Added requirement to present level 3 analysis for TS&L study.

Article 4.4.4.17 - Updated language and added requirements for Erosion Control and Landscape.

Article 4.4.4.18 - Updated language to clarify the technical requirements of the ITS Deployment Guide. Updated memorandum list summary. Updated project level roll plot requirements.

Article 4.4.6.1 - Updated language to provide disposition of comments and summary prior to review meetings.

Article 4.4.6.2 - Updated language to add GEC staff as part of the ITS Design Workshop.

Article 4.5.4.5 - Updated language to request preliminary barrier warrant analysis report in DMR submittal.

Article 4.5.5 - Updated list of preliminary design phase requirements for Drainage.

Article 4.5.7 - Updated language to follow section 6.0 to fulfill requirements for preliminary plan submittal.

Article 4.5.9 - Updated to reflect only pavement marking requirements.

Article 4.5.10 - Updated requirements to add station and legend for all proposed signs. Updated various items in the list of requirements.

Article 4.5.11 - Added photometric calculations for temporary lighting layouts as a requirement.

Article 4.5.16 - Added Environmental Site Assessment (ESA)

Article 4.5.17 - Updated list of preliminary design phase requirements for Erosion Control and Landscape.

Article 4.5.18 - Updated list and language of preliminary design phase requirements for ITS elements

Article 4.5.27 - Added new 3D requirements

Article 4.5.28 - Updated language that explains when Geotechnical Design Memorandums and Reports should be revised and resubmitted.

Article 4.6.13 - Updated list of requirements for Pre-Final Design Phase (95%) for existing and proposed drainage plans.

Article 4.6.15 - Added requirement to coordinate grading for H1 level pads around proposed light poles for grading plans

Article 4.6.16 - Updated requirement for Pre-Final Barrier Warrant Analysis with DMR submittal.

Article 4.6.18 - Updated requirements for Pre-final plans for erosion control and landscape

Article 4.6.20 - Updated requirements for Pre-final plans for pavement marking plans and instructed to reference proposed sign locations in grayscale.

Article 4.6.21 - Updated requirements for Pre-final plans for signing plans requirements and instructed to reference proposed pavement markings in grayscale.

Article 4.6.22 - Updated requirements for Pre-final plans for roadway lighting plans.

Article 4.6.24 - Updated language to reference Article 6.11 of Structure Design Manual for Pre-Final Plan submittal requirements

Article 4.6.28 - Updated language to require that plans reflect requested changes during 60% design meeting.

Article 4.6.30 - Updated language to require that cross sections show cut along culvert crossings and other unique locations.

Article 4.6.31 - Added new 3D requirements

Article 4.6.32 - Updated requirement that geotechnical design memorandum shall be submitted to Roadway and/or Structure Geotechnical reports as necessary.

Article 4.7 - Added requirement for lane profile smoothness ProVAL reports.

Article 4.7.1 - Added new 3D requirements

Article 4.8.2 - Added new 3D engineering model files as part of contract documents

Section 5.0 Submittal Formats and Standards

Article 5.2.2 - Updated order of drawings to include ITS removal and installation, communication plan and calculations. Renamed Earthwork Schedule of Quantities and added Environmental Soil Classification Plans.

Section 10.0 Design Resources and Guidelines

Article 10.1.3 - Updated titles to Erosion Control and Landscape Manual and Intelligent Transportation Systems (ITS) Manual.

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SECTION 1.0 INTRODUCTION

1.1 Purpose and Use of the Design Section Engineer's Manual

It shall be understood that this Design Section Engineer's Manual (Manual) shall be contractually a part of and directly pursuant to the Proposal and Agreement for Design Section Engineering Services. This Manual replaces the March 2021 Design Section Engineer's Manual. Each Design Section Engineer (DSE) shall furnish services assigned to him/her per Agreement with the Illinois Tollway and in accordance with this Manual. Such services shall be performed under the direct administration of the Illinois 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 may comply with the Illinois 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.

1.2 Terms and Definitions

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

3-D Engineered Model: A digital representation of any three-dimensional engineered object.

Addendum: Written interpretation or modification of any of the Contract Documents which shall be 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.

Base Sheets and Guide Special Provisions: A document provided to the DSE by the Illinois Tollway that contains pertinent information for facilities, materials and/or systems that the DSE may incorporate into the design. Guide documents such as the 100 series special provisions may be used as base documents when allowed by the Illinois Tollway. Base Sheets shall be modified and completed by the DSE to be specific for the Contract.

Chief Engineering Officer: The individual responsible for the Engineering Division of the Illinois Tollway.

Chief Planning Officer: The individual responsible for the Planning and Programming Division of the Illinois Tollway.

Conceptual Design: An initial stage of design work, which develops the nature of the required

improvement(s), demonstrates the intent of the proposed design and verifies compliance with established parameters and design criteria. The Conceptual Design shall include description of alternatives considered in reaching the reported conclusions.

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. The reviewer should have construction or construction management experience and be independent of the individuals participating in the design.

Construction Manager (CM): The Engineer or firm of engineers and their duly authorized employees, agents and representatives retained by the Illinois Tollway to observe The Work to determine whether or not it is being performed and constructed in compliance with the Contract.

Construction Section: Any one of the numerous divisions into which construction of the roadway, facilities and appurtenances of the Illinois Toll Highway may be divided for the purpose of awarding Contracts.

Consultant Quality Program (CQP): A program developed and proposed by the Design Section Engineer (DSE) and approved by the Chief Engineering Officer that describes the process by which the DSE shall endeavor to ensure that only quality work is submitted to the Illinois Tollway during the course of the project. The program is to be written following the Illinois Tollway's GUIDELINES FOR DESIGN SECTION ENGINEER'S QUALITY PROGRAM available on the WBPM system.

Consulting Engineer: The Engineer or firm of Engineers retained by the Illinois Tollway for the purpose of carrying out the duties imposed on the Consulting Engineer pursuant to the terms and conditions of the contract between the Consulting Engineer and the Illinois Tollway and any Trust Indenture and any additional requirements, entered into, by, or on behalf of the Illinois Tollway. Also referred to as the General Engineering Consultant (GEC).

Contract (Construction Contract): The written agreement executed between the Illinois Tollway and the successful Bidder 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 the Contractor is bound to perform The Work and to furnish labor, equipment and materials and by which the Illinois Tollway is obligated to compensate the Contractor therefore at the established rate or price. The Contract includes the Advertisement to Bidders, Instructions to Bidders, the Proposal, Bonds, the Standard Specifications, the Illinois Tollway Supplemental Specifications, the Contract Plans, the Special Provisions and all Addenda and any Extra Work Order, Change Order or Supplemental Agreements after execution of the Agreement.

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.

Contractor: The individual, partnership, firm or corporation, or any combination thereof, who has entered into the Construction Contract.

Corridor Construction Manager (CCM): The Engineer or firm of Engineers contracted by the Illinois Tollway to act as the duly authorized agent of the Chief Engineering Officer to manage other Construction Managers (CMs) in accordance with the scope of their particular duties delegated to them by the terms of their Agreement.

Deputy Chief of Program Control/System Integrity: The individual engineer responsible for the Design Division of the Illinois Tollway under supervision of the Chief Engineering Officer.

Deputy Chief of Program Implementation: The individual engineers responsible for implementation of final design and construction programs under supervision of the Chief Engineering Officer.

Deputy Program Manager: An individual Engineer responsible for a corridor within the Illinois Tollway system under supervision of the Deputy Chief of Program Implementation.

Designer (Designer of Record): The person (or consultant team) responsible for performing a design task for an Illinois Tollway project. Although this is typically the Design Section Engineer (DSE), it may also include a person (or consultant team) hired by a Contractor to perform design as part of a Value Engineering Proposal or part of a Performance Based Design.

Design Corridor Manager (DCM): The Engineer or the firm of Engineers contracted by the Illinois Tollway to act as the duly authorized agent of the Chief Engineering Officer to manage other DSEs, in accordance with the scope of the particular duties delegated to them by the terms of their Agreement.

Design Section: Any one of the numerous divisions into which design of the roadway, facilities and appurtenances of the Illinois Tollway may be divided for the purposes of design.

Design Section Engineer (DSE): The Engineer or firm of Engineers and their duly authorized employees, agents and representatives retained by the Illinois Tollway to prepare the Contract Plans for a Design Section.

Design Upon Request (DUR): The Engineer or firm of Engineers and their duly authorized employees, agents and representatives retained by the Illinois Tollway to prepare the Contract Plans for multiple small projects or tasks. Each task is scoped separately and contains an upper limit of compensation.

DSE Project Manager: A member of the DSE's staff responsible for all activities of all design disciplines and who serves as the interface with the Illinois Tollway Project Manager.

Design Review and Collaboration Platform (DRCP): Software used to electronically review, comment, and dispose of comments using a live interface that allows for a more efficient and completely paperless review process.

Environmental Lead: The staff member from the DSE charged with coordinating the DSE team's 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 Illinois Tollway projects. This person is also responsible for ensuring that the DSE performs the proper studies to determine whether a project meets Illinois Tollway, State and Federal environmental policies.

Environmental Upon Request (EUR): Contract used to develop studies, data and resources to be used in planning, design, construction, maintenance and operations and other such services on a broad range of projects.

Errors and Omissions:

- **Error:** A failure to provide professional services in accordance with the Contract.
- **Omission:** 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 Illinois Tollway and/or the Consulting Engineer.

Final Check: The procedure adopted by the Illinois 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 Illinois Tollway as Contract Documents.

Geotechnical Engineer: The Engineer or firm of Engineers contracted by the Illinois Tollway or the DSE to perform work in the field of Soil Mechanics and Foundation Engineering for the Design Section and/or Construction Section.

Illinois Tollway: The Illinois State Toll Highway Authority.

Illinois Tollway INVEST Program: Processes and tools adopted by the Illinois Tollway to incorporate sustainability into project design and construction as well as System-Wide Planning and Operations and Maintenance activities. The program is based upon implementation of the Federal Highway Administration (FHWA) INVEST Tool.

Illinois Tollway Project Manager (PM): The representative of the Illinois Tollway that the Chief Engineering Officer assigned to be the technical and administrative liaison between the Illinois Tollway and its various contractors, DSEs, program manager, consulting engineers and CMs.

Illinois Tollway Supplemental Specifications: The Illinois Tollway Supplemental Specifications to the Illinois Department of Transportation Standard Specifications for Road and Bridge Construction adopted January 1, 2022.

Master Planning: A stage of design development sometimes performed under a separate Agreement, which is reached prior to the start of the Conceptual Design. 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 Design submittal.

Owner's Representative (OR): The Engineer or firm of Engineers contracted by the Illinois Tollway to act as the duly authorized agent of the Chief Engineering Officer in accordance with the scope of the particular duties delegated to them by the terms of their Agreement towards the management of a specific construction contract.

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. This design submittal shall be a biddable set of construction documents.

Preliminary Design: Drawings, sketches and work sheets prepared by the DSE, which demonstrates the general intended content of the Contract Plans. The Preliminary Design 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 Illinois 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 DSE's staff responsible for the design of a singular discipline identified within the Contract Documents.

Project Principal: A member of the DSE's staff responsible for the performance of all services required of the DSE by the Agreement and who has the full authority to obligate the Design Section Engineer in administrative, contractual and legal matters.

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 Illinois Tollway.

Record Plans: Contract Plans which have been marked, to show changes or alterations to the work which were incorporated during the course of construction.

Risk Based Cost Estimating and Management: Qualitative and or quantitative risk assessment process utilized to develop mitigation strategies to manage schedule and budget during planning and design.

Scope of Services: A description of the professional design services, that is jointly agreed upon and is provided by the DSE 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 CM and DSE as necessary to illustrate material or equipment to be incorporated in a portion of the work. Working Drawings are signed and sealed by a PE/SE and the contractor will assume liability.

- **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 specific to the Work included in the Construction Contract.

Standard Drawings: The Illinois 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 Illinois Tollway prior to advertising.

Standard Specifications: The most recent edition of IDOT's "Standard Specifications for Road and Bridge Construction".

Substantial Completion: The point in the progress when a portion of the Work, or in the case of beneficial occupancy, a designated portion thereof, has been completely performed in accordance with the Contract Documents so the Illinois Tollway may occupy or utilize that portion of the Work for its intended purpose.

Supplemental Specifications: Additions and revisions to the Standard Specifications published by IDOT that are adopted subsequent to issuance of the Standard Specifications for Road and Bridge Construction.

Survey Upon Request (SUR): The Surveyor or firm of surveyors and their duly authorized employees, agents and representatives retained by the Illinois 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 shall become a contractual obligation.

Traffic Engineer: The Engineer or firm of engineers retained by the Illinois 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 Illinois Tollway and any Trust Indenture entered into, by, or on behalf of the Illinois Tollway.

Utility: The privately, publicly or cooperatively owned lines, facilities and systems for transporting persons or property, for producing, transmitting, or distributing communications, cable television, power, electricity, light, heat, gas, oil, crude products, water, steam, or waste water. 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 facilitated process that actively helps stakeholders work together to achieve a shared understanding of project purpose and to ensure the customer receives best value in fulfilling that purpose.

Web-Based Program Management (WBPM) System: Software database tool used to reduce coordination errors and improve productivity through automation of previously paper-based processes. The database is administered via a website on the Internet, allowing controlled access to the documentation processes. The WBPM system is utilized as a communication, collaboration, and coordination tool, as well as a document management solution, for various project activities during planning, design and construction phases. The WBPM system allows Illinois Tollway authorized users with various roles to collaborate on various types of projects. The WBPM system is the official repository of the Project records.

Work:

Work shall mean the furnishing of all labor, material, tools, equipment, and other incidentals necessary or convenient to the successful completion of the project and carrying out of all duties and obligations imposed by the contract. Work may also be used in context to describe, in whole or in part, the completed facilities to be constructed, altered or removed, as detailed in the Contract. The Engineer will have exclusive authority to determine the intent and meaning of the usage of this term whenever it appears in the Contract.

NOTE:

This manual follows the traditional definitions for **shall, should** and **may**. **Shall** is used to mean something that is required or mandatory, while **should** is used to mean something that is recommended, but not mandatory and **may** is used to mean something that is optional and carries no requirement or recommendation.

1.3 Abbreviations & Acronyms

- AAF Advertisement Authorization Form
- AASHTO American Association of State Highway and Transportation Officials
- AMG Automated Machine Guidance
- ANSI/IESNA RP8 American National Standards Institute/ Illuminating Engineering Society of North America
- BDE Bureau of Design and Environment
- CCTV Closed Circuit Television
- CDB Illinois Capital Development Board
- CE Consulting Engineer
- CM Construction Manager
- CORS Continuously Operating Reference Stations
- CQP Consultant Quality Plan
- CPM Critical Path Method
- CRP Congestion-Relief Plan
- CSI Construction Specification Institute
- DBE Disadvantaged Business Enterprise
- DCM Design Corridor Manager
- DMS Dynamic Message Sign
- DRCP Design Review and Collaboration Platform
- DSE Design Section Engineer
- DTM Digital Terrain Model
- DUR Design Upon Request
- ECP Earned Credit Program
- EEO Equal Employment Opportunity
- ESA Environmental Site Assessment
- ESIS Environmental Studies Inventory Sheet
- EVA Existing Vegetative Assessment
- FEIN Federal Employer Identification Number
- GBSP Guide Bridge Special Provisions
- GEC General Engineering Consultant to the Illinois Tollway
- GSR General Service Representative
- GUR Geotechnical Upon Request
- HRS Highway Route Surveys
- HWL High Water Elevation
- IDHR Illinois Department of Human Resources
- IDOT Illinois Department of Transportation
- IFB Invitation for Bids
- INVEST Infrastructure Voluntary Evaluation Sustainability Tool
- IOD Issues and Opportunities Diagram
- ITS Intelligent Transportation System
- LRFD Load and Resistance Factor Design
- MOT Maintenance of Traffic
- MPR Master Plan Report
- MVDS Microwave Vehicle Detection System
- MUTCD Manual on Uniform Traffic Control Devices for Streets and Highways
- NCR Non-conformance Report
- NOI Notice of Interference
- NTP Notice to Proceed
- NWO Notice of Work Order
- PC Point of Curvature

- PCMS Portable Changeable Message Signs
- PIN Property Identification Number
- PM Project Manager
- PMO Program Management Office
- POA Plats of Acquisition
- POH Plats of Highway
- PSB Professional Services Bulletin
- PT Point of Tangency
- PVI Point of Vertical Intersection
- QA Quality Assurance
- QC Quality Control
- RFI Request for Information
- RFP Request for Proposal
- RFQ Request for Qualifications
- RWIS Road Weather Information System
- SOI Statement of Interest
- SUE Subsurface Utility Engineering
- SUR Survey Upon Request
- SWZ Smart Work Zones
- TCB Temporary Concrete Barrier
- TIN Triangulated Irregular Network
- TOC Traffic Operations Center
- TEC Traffic Engineer Consultant to the Illinois Tollway
- TS&L Type, Size and Location Study
- UAS Unmanned Aircraft System
- USGS United States Geological Survey
- VOSB Veteran Owned Small Business
- VWIM Virtual Weigh-in-Motion
- WIM Weigh-in-Motion
- WBPM Web-Based Program Management
- WZSL Work Zone Speed Limits

SECTION 2.0 ADMINISTRATIVE POLICIES, PRACTICES AND PROCEDURES

2.1 Introduction

This section includes detailed instruction regarding the day-to-day administrative conduct of a Project.

2.2 Project Management Procedures

The Illinois Tollway has developed a series of Project Management Procedures for the management of each project. These procedures shall be obtained from the Illinois Tollway Project Manager (PM). Procedures were developed to establish a uniform method to ensure consistency in the performance of assigned duties across the Program. The 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. The DSE shall be required to follow these procedures. The procedures are supported by the automation of Illinois Tollway processes in the WBPM system; work instructions provide users guidance as to how the Illinois Tollway expects the processes to be completed.

Similarly, the DSE Manual specifies the duties, roles and responsibilities of the DSE and provides information relative to the Illinois Tollway's role in the DSE services. The Illinois Tollway assigns a PM to each DSE contract. Typical roles of the Illinois Tollway PM include such things as:

- 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 Illinois Tollway have been documented on the monthly progress and staffing reports.
- Prepare DSE performance evaluations.

2.3 Design Consultants Services

The design consultant 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/Reports Services (Planning/Engineering)
- Engineering/Architectural Design Services
- DSE Project Management Services
- Consultant Upon Request Services
    - Design Upon Request (DUR)
    - Geotechnical Upon Request (GUR)
    - Survey Upon Request (SUR)
    - Environmental Upon Request (EUR)
- Design Corridor Management (DCM) Services

All of the services above may be required to implement Risk Management. This is at the discretion of the Illinois Tollway and in coordination with the GEC.

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 Illinois 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 Illinois Tollway. Assigned tasks may include management services on an as-needed basis or the management of multiple designated DSE and CM contracts of a specific section of the Illinois Tollway or large programs with similar needs.

2.3.4 Design Upon Request (DUR) Services

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

The DSE is responsible for delivering Engineering services as described within each Task Order of the DUR contract. The general process of this service is:

- A request for task order and associated scope is provided to the DSE.
- 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 by the Chief Engineering Officer once agreement is reached on a task order between the Illinois Tollway and DSE.

2.3.5 Design Corridor Management (DCM) Services

Design Corridor Management services generally include the overall design management of an Illinois Tollway Corridor improvement. Overall, the assignment includes providing design consistency across the corridor. The assignment includes such responsibilities as plan reviews, tracking of permit, utility, land acquisition, railroad status, development of corridor standards and specifications, coordination of maintenance of traffic, corridor environmental management and permit coordination, coordination with resource and regulatory agencies and recommending corridor wide Best Management Practices (BMPs).

The overall scope of DCM services shall be provided through the project scoping meetings.

2.4 Design Section Engineering Selection

Professional services contracts are solicited and awarded in accordance with the Architecture, Engineering and Land Surveying Qualifications Based Selection Act (30ILCS535). Professional Service Bulletins (PSB) are issued on a periodic basis. A PSB is the official notice of needed professional services for the Illinois Tollway as authorized by Section 15-1 of the Illinois Procurement Code 30 ILCS 500/15-1. It is posted on the Illinois Tollway's website to solicit potential consultants and consists of planning design and/or construction management items. PSB items for Consultant Upon Request services shall specify general contract scope, schedule and upper limit of compensation.

2.5 Design Section Project Management and Administration

2.5.1 Project Directory

DSE shall keep current the Project Directories that were submitted as part of the Statement of Interest in the PSB 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:

- Illinois Tollway Project Manager
- Key Illinois Tollway staff members
- DSE Project Manager
- DSE Key staff members

- DSE sub-consultants and their key personnel

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

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

2.5.1.3 Pre-qualifications

The PSB identifies the pre-qualifications required by the Illinois Tollway for the DSE project and DSE staff. The Illinois Tollway must approve all changes of DSE Key staff members 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 business days prior to the meeting. The DSE should prepare the meeting agendas and minutes in accordance with Illinois Tollway Procedure P1040, via the WBPM system and distribute them to all attendees.

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 checklists for further development of information relating to further definition of scope of services and facilities or other requirements needed to prepare for project alignment (team building). 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
- Illinois 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

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

- Project Manager (Illinois Tollway)
- Consulting Engineer
- Deputy Chief Program Control/System Integrity (If needed)
- Deputy Program Manager (If needed)
- DSE key staff including design leads by discipline
- Illinois Tollway Traffic Operations Manager
- Sub-consultant key personnel

2.5.3 Communications and Reports

2.5.3.1 Project Communications: A communications distribution list 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 and Illinois Tollway PM shall utilize the WBPM 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.

2.5.3.2 Progress Reports: The DSE is required to submit a progress report detailing the labor hours expended on specific project functions. The report compares the expended labor hours with those scheduled in Exhibit A of the DSE's Proposal. Unless otherwise stated in the Scope of Services (or work, as defined in Exhibit "F" of the agreement), or as directed by the Illinois Tollway, the report shall be submitted monthly. For DUR contracts the progress report shall compare expended labor hours with scheduled labor hours for each assigned task.

Progress reports for DUR contracts shall contain a narrative section that details the progress of each assigned task. Multiple tasks, if applicable, shall be included on one invoice. Also, the DSE shall enter the invoice amounts into the DUR Task Tracking Log. The DSE shall also report the invoiced to date amount per task on the DUR Tracking Log. The DSE is expected to maintain supporting documentation/records of the invoiced amounts per task, which may be requested by the Illinois Tollway PM for review.

2.5.3.3 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 shall 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.

2.5.3.4 Monthly Narrative: 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 shall be included with the Invoice.

2.5.3.5 DSE Employee Rate Listing: The direct salary rate allowable for any individual for invoicing purposes shall be the rate listed on the most recently approved Payroll Rate Form. 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 Payroll Rate Form along with an updated Certified Payroll. The Certified Payroll shall match the employee rates listed on the Payroll Rate Form. 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 must be approved by the Illinois Tollway Chief Engineering Officer prior to using the increased rate on invoices.

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

2.5.3.6 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 shall then submit a report of this evaluation to the Illinois Tollway PM. If the Illinois 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.

2.5.4 Invoicing

Invoices shall be submitted per the terms set forth by the Agreement and per any documentation and process requirements related to the contract type. For Direct Labor Multiplier (DLM) contracts, instructions and requirements for the preparation and submittal of consultant invoices is available under the CONSULTANT FORMS section of the Illinois Tollway's website; *Monthly Progress Report Package and Invoice Package for Construction Managers and Design Section Engineers (current version)*. For other consultant contract types, invoice instructions and requirements that are not available on the website will be provided by the Illinois Tollway.

The DSE is responsible to manage to the amounts in the Contract. A request letter and a reallocation process are required to be completed anytime the DSE desires to reallocate the amounts in the Contract without raising the upper limit of compensation. The DSE shall submit a written request to the Illinois Tollway for reallocation of funds using the Illinois Tollway's Reallocation Form (current version) available on the Illinois Tollway's website.

Should the DSE require additional funding in excess of the total upper limit of compensation, the DSE shall request a supplement from the Illinois Tollway prior to expending any funds in excess

of the total estimated fee (see Article 2.5.5). Use of a contingency amount (if applicable) shall be approved by the Illinois Tollway prior to its use. The request should be submitted for approval by the Chief Engineering Officer through the Illinois Tollway PM, utilizing the WBPM system. Invoice amounts exceeding the total estimated fee shall only be processed to the approved total estimated fee.

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 current sub-consultant's terms within the Contract's total estimated fee, the DSE shall submit a reallocation request as discussed above. Further documentation and explanation from the DSE shall be required when a DBE sub-consultant is involved in the reallocation. Should the DSE require the assistance of a sub-consultant not listed, the DSE shall provide an explanation and obtain documented permission prior to using the sub-consultant on the Contract. Should the DSE require the sub-consultant to perform services that may cause the sub-consultant to exceed its upper limit of compensation, the DSE shall obtain prior written permission from the Illinois Tollway. Failure to follow this guideline shall result in rejection of such expenses.

Payments may be tracked online on the State of Illinois Comptroller's website using the DSE company's FEIN number and the Illinois Tollway's agency code.

2.5.5 Supplements to Agreements

2.5.5.1 Changes in Scope of Services: During the Contract, 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.

A change in scope shall 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 Illinois Tollway Board's schedule. 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 Illinois Tollway.

2.5.5.2 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 may have on the project schedule, the construction costs and the total change to estimated design fee including man-hours per individual, DBE utilization and all associated direct costs.
- All requests for extension of time and claims for extra compensation received from the DSE shall be reviewed by the Illinois Tollway PM and reviewed and approved by the Chief Engineering Officer. The DSE shall submit to the Illinois Tollway all pertinent facts regarding each request or claim, together with recommendations. The Illinois Tollway's response to the request shall be transmitted through the Illinois Tollway PM to the DSE.

2.5.5.3 Contract Schedule: The DSE shall examine the nature and magnitude of the changes proposed in each Change in Scope of Services and determine if accomplishment of any of the changed work may:

- Impact the design milestone submittal schedule
- Impact the Bid letting schedule
- Revise the construction contract schedule

The DSE analysis of the impact of the changes on the Schedule shall be attached as a part of the supporting documentation to the Changes in Scope of Services.

2.5.6 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.

2.5.7 Project Closeout

The project closeout includes the administrative and procedural requirements for Contract closeout, including, but not limited to, completion of physical work, submission of records, completion of the Documentation Matrix for Design, closeout meeting and financial Contract closeout. The Illinois Tollway's 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.

For DUR contracts, task closeout letters are required for each approved task order. These close out letters are typically initiated by the DSE, but may be requested or initiated by the Illinois Tollway PM. The letter is the official notice from the Illinois Tollway that the task is complete and invoicing may no longer be accepted. Any unused funds may be reallocated to other tasks within that design contract.

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

2.6 Design Upon Request (DUR) Services

DUR Services are those identified in Article 2.3.4. A task order needed for design services may be identified by the Illinois Tollway Engineering Department (or other Illinois Tollway Department). When assigning the task order, the Engineering Department may review all available DUR Contracts to determine where the services shall be assigned. Factors include, but are not limited

to: scope of work, geographic location, DUR remaining fee and prequalification's identified in the DUR PSB. One or more tasks are scoped and presented to the DSE through a memorandum from the Illinois Tollway PM, indicating the nature and scope of the task. The DUR consultant shall then submit the scope, budget and schedule required to complete each assigned task. The scope, budget and schedule shall be approved by the Illinois Tollway and a NTP issued before work begins.

2.6.1 Scope of Services

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

2.7 DSE Survey Upon Request (SUR) Services

SUR Services encompass a wide range of project activities. SUR Contracts are established to provide the Illinois Tollway flexibility in developing survey services on multiple projects.

2.7.1 Scope of Services

The scope of the SUR Contract may require surveying of lands to determine the Illinois 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 Illinois 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. All right-of-way related deliverables shall be in accordance with the IDOT 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, cost control and comprehensive program controls as required by the Illinois Tollway. Assigned tasks may include management services on an as-needed basis or the management of multiple designated DSE contracts of specific sections of the Illinois 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
- Progress Reporting

- Project Risk Register (if required)

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 DSE Performance Evaluation

It is the policy of the Illinois Tollway to evaluate the performance of the DSE at established intervals during the course of a project. Evaluations shall, at a minimum, be conducted once a year (Annual) and following the award of the construction contract (Final). If a DSE is involved in more than one project, the DSE performance shall be separately evaluated for each project.

SECTION 3.0 WEB-BASED PROGRAM MANAGEMENT

3.1 Web-Based Program Management System Introduction

The Illinois Tollway has implemented the Web-Based Program Management (WBPM) system 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

DSEs shall be required to use this system for all official project communications and interactions.

The software is accessed via the Internet and there is no licensing cost to Consultants or Contractors. In addition, the Illinois Tollway may provide training at no cost to the DSE on the system. Project team members shall complete training prior to gaining access to their project websites.

The DSE shall be solely responsible for:

- Establishing and furnishing high-speed Internet connectivity to access their project site(s) and
- Furnishing all hardware and software required to establish and maintain access to the project site(s), 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 WBPM system.

SECTION 4.0 DESIGN PHASE PROJECT DELIVERABLES

4.1 General Project Delivery Requirements

All work developed by the DSE shall be submitted at various milestones, as described in this and other Illinois Tollway manuals, for review and written acceptance by the Illinois 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 Illinois Tollway are being followed and that further work may proceed. Corrections of subsequently discovered errors shall be done at no additional cost to the Illinois Tollway.

The Illinois Tollway's design review period for most projects may be 10 working days. The DSE shall consult with the Illinois Tollway PM prior to establishing or modifying any project review completion schedule.

- Large design projects or multiple concurrent project reviews may require more than 10 working days review time. The DSE shall coordinate with the Illinois Tollway PM to establish a proper review period.
- Accelerated review periods require prior approval from the Illinois Tollway PM. The minimum design review period is 5 working days.
- DSE dispositions to previous review comments shall accompany each subsequent submittal.

If the Illinois 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 Illinois 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 Manager (CM) shall, if required, be reviewed for acceptability by the DSE.

4.2 Phases of the Project

Illinois Tollway projects are planned, designed and constructed through a phased project management process. This Article describes the various 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 Articles:

- Master Planning or Pre-Conceptual Phase
- Conceptual Design Phase (30%)
- Preliminary Design Phase (60%)
- Pre-Final Design Phase (95% - biddable documents)

- Final Check Design Phase (100%)
- Contract Advertisement Phase
- Addendum Phase
- Bid Support Phase
- Construction Support Phase

4.2.1 Design Milestone Submittal

The DSE shall provide a design milestone submittal schedule at NTP and any changes to this schedule must be submitted to and approved by the Illinois Tollway PM. At the completion of each phase of design, prior to advertisement, the DSE shall submit all Contract Documents to the Illinois Tollway for review using the WBPM system. Each submittal consists of an electronic WBPM process. The DSE shall coordinate with the Illinois Tollway PM to determine if paper copies are needed for outside agency reviews. No paper copies of the documents are required for the Design Milestone Submittal. The review and disposal of review comments shall be completed electronically using the Design Review and Collaboration Platform (DRCP). The schedule of the design review and disposition process is outlined below and additional information regarding the paperless review process can be found under Project 16 on the WBPM system.

1. DSE shall submit the documents for review using the WBPM process.

2. Illinois Tollway shall create a paperless review session on the DRCP.

3. Illinois Tollway shall provide the paperless review session information and schedule within the WBPM process, provide review comments within the DRCP session and complete their review per schedule.

4. DSE shall join the DRCP session provided and dispose of comments within the DRCP session. This may occur as soon as comments are populated within the DRCP session. Disposal of comments prior to the review deadline is at the DSE's risk as comments are not considered final until the review deadline.

5. DSE shall provide draft dispositions to all comments within the DRCP review session at least one full working day prior to the design review meeting.

6. DSE shall upload all reviewed documents to the WBPM process after all comments have been given final dispositions within the DRCP review session. The final documents uploaded to the WBPM system shall include all the comments with the dispositions provided by the DSE.

Further direction regarding the paperless review and disposal of review comments can be found under Project 16 on the WBPM system.

4.2.2 Design Milestone Review Meetings

After review of each submittal is completed, a formal review meeting is held between the DSE, Illinois Tollway and Illinois Tollway reviewers. The DSE shall provide draft dispositions to all comments within the DRCP review session at least one full working day prior to the review meeting. During the review meeting, the DSE shall present the draft disposition of all comments. At that time the DSE shall prepare follow-up questions and clarification resulting from the submittal review. When the DSE disagrees partially or fully with a comment provided by an Illinois Tollway reviewer, the disagreement shall be discussed during the design review meeting and resolved prior to the next design submittal. The DSE shall ensure all necessary personnel (including sub-consultants) attend to adequately address all comments during the review meeting. All questions, unresolved matters and incomplete or missing portions of the submittal have to be satisfactorily answered, resolved, completed or submitted by the DSE prior to the Illinois Tollway's acceptance of the submittal. All review meetings should have an option of virtual attendance. For smaller or limited discipline contracts, these virtual reviews can be set up as one meeting with all disciplines. For larger contracts, multiple concurrent discipline meetings can be set up to allow for smaller discipline groups with more discussion time related to the discipline topics. These meetings should start with an introduction session followed by breakout sessions concurrently. Coordinate with the Illinois Tollway PM regarding possible review meetings with outside agencies and stakeholders.

4.3 Master Planning Phase

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

In general, Master Planning scope requirements follow those of the typical Conceptual Design 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 Planning activities are project specific, the requirements of this phase shall be detailed in the Scope of Services for a particular Design Section. The Master Planning Report shall identify alternatives for all identified issues and project aspects that shall be covered with expanded detail in the Conceptual Design.

The DSE shall prepare a report with supplemental pre-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 alternative shall also be demonstrated.

An Illinois Tollway PM will be assigned as the technical and administrative liaison to the DSE work.

4.3.1 Master Plan Preparation Requirements

Master Planning includes, but is not limited to:

- Site visits and interviews with competent persons having knowledge of project parameters
- Preparation of pre-conceptual sketches/drawings for reference
- Preparation of calculation required to meet various Codes
- Preparation of budget estimates and schedules suitable for the purposes of planning and financial analysis
- Development of the Preliminary Scope of Work, which describes Sponsor/User/Maintainer functional requirements
- Performance of analyses (e.g., Alternatives Analysis, Cost-Benefit Analysis of different alternatives in the design, Operating Budget Impact Analysis) required to support the decision-making process
- Clarification of the project's scope of work
- Determination of spatial assignments necessary to meet functional and support requirements
- Maintenance of Traffic alternatives
- Evaluate right-of-way needs based on alternatives
- Investigate utility and stormwater management impacts
- Incorporation of Illinois Tollway INVEST Manual Initiatives
- Constructability review (if applicable)
- Determination of area(s) requiring a Design Deviation
- Identification of current and proposed ITS elements, including identification or source of power feed and fiber connection to a splicing handhole or plaza or other type of Illinois Tollway building, and also identify the maintenance strategies during construction
- Exploration of innovative contracting methods, design ideas and construction approaches
- 3-D engineered model representative of earthwork calculations and mass haul diagram
- 3-D engineering model for ITS Camera Field-of-View identifying possible viewing obstruction like static signs, overpass and others
- Community and Governmental Outreach (as applicable)

- Development of initial project Risk Register to carry through the entire project (if required)

- If applicable, Geotechnical Desk Study Report in accordance with the Geotechnical Manual for major highways and/or major river or highway bridges to assist in development of the Master Plan.

- If applicable, identify changes to existing IGAs or the need for new IGAs in support of accomplishing the Project (e.g. local agencies or communities requesting new assets or equipment to be provided as part of the project, maintenance of local abutting roadways and bridges, right-of-way requirements for building IGA related assets, etc.). Development of scope and estimated costs for the preparation of an LOU or MOU from the Illinois Tollway to the entity regarding general responsibilities to be addressed in a future IGA.

4.3.1.1 Master Plan Submittal Requirements

A complete Project Master Plan consists of:

- Executive Summary of project Scope of Work and analyses performed
- Preliminary Scope of Work, to include pre-conceptual designs suitable for the purposes of planning and financial analysis
- Project Analyses, as required
- Risk Register (if required)
- Budget Estimate
- Preliminary Project Schedule
- Project Coordination
- Pre-Conceptual Drawings
- Bridge Condition Reports (in accordance with the Structure Design Manual)
- Drainage Reports (in accordance with the Drainage Design Manual)
- Existing Vegetation Assessment (as required, in accordance with the Erosion Control and Landscape Manual)
- Environmental Surveys (in accordance with the Environmental Studies Manual)
- ITS device deployment and connectivity to the Illinois Tollway communication network.
- ITS Functionality Plan (in accordance with the ITS Deployment Guide)
- Tolling System Evaluation
- Roadway Operations and Level-of-Service Evaluation
- Supporting documents such as worksheets, reports, etc.
- Project Master Plan Sign-off Sheet

4.3.1.2 Master Plan Milestone Submittals

The scope of a Master Plan widely varies from one project to the next. The DSE shall discuss with the Illinois Tollway PM the number of milestone submittals which shall be required for each Master Plan. Large or complex Master Plans may require multiple milestone submittals. At a minimum, a Draft and Final Submittal shall be required for all Master Plans.

4.3.2 Master Plan Guidance

4.3.2.1 Executive Summary

The Executive Summary provides a brief summary of the project's Preliminary Scope of Work, Budget Estimate, Project Coordination and Project Analysis. It shall provide information sufficient enough to enable executive readers (i.e. Illinois Tollway Department Heads, the Illinois Tollway Executive Director and Board members) to judge a project's value in relation to Illinois Tollway strategies.

The Executive Summary shall include the following:

Section A. Project Identification

- Project Title
- Project Number
- Design Cost: Design cost line item from Budget Estimate
- Design Start: Design start date from preliminary schedule
- Construction Cost: Construction cost line item from Budget Estimate
- Construction Start: Construction start date, from preliminary schedule
- Right of Way Cost: From Budget Estimate
- Utility Relocation Costs: From Budget Estimate
- Total Cost: Total cost from Budget Estimate
- Sponsor Department
- Date Prepared

Section B. Description of Recommended Work and Major Project Elements

1. Purpose/Objective of Project: Describe the Project Sponsor's purpose and objective for proposing the project. Include a discussion of how the project shall meet departmental and/or the Illinois Tollway goals.
2. Location and Limits: Identify the project's geographical location, limits or boundaries.

3. Description of Proposed Work/Major Project Elements: Identify all of the major elements of the proposed capital improvement, including the impacts on existing conditions

4. Project Risk (if required): Executive Summary shall include an overview of project risks including identification of any design deviations required.

5. Operating Budget Impact: If required by the Sponsor department or Chief Financial Officer, a discussion of the impact to the maintenance and operating budget of the capital improvement shall be included.

6. Cost Benefit Analysis (if applicable): Indicate findings of cost benefit analysis performed for the project or any alternative examined.

7. Alternatives: A summary discussion of alternatives and of any analyses performed or budget estimates prepared for all identified alternatives and provide the designers recommended alternative.

8. Project Coordination: A summary of public outreach, agency coordination and data gathering conducted to date.

4.3.2.2 Preliminary Scope of Work

The Preliminary Scope of Work is to be developed in sufficient detail to provide a concise definition of all the major work items to be included in the project. This document shall provide a sound basis for project planning, evaluation and a budget estimate. A clear understanding of the project scope early on reduces the need for scope changes later in the project.

This Preliminary Scope of Work shall serve as the starting point for the Pre-Conceptual Design Phase should the project be approved.

A complete Preliminary Scope of Work contains the following elements:

Introduction

This section should include:

- Statement of Project Purpose/Objective - a detailed explanation of the Sponsor's purpose and objective for proposing the project
- Justification - a discussion of how the project relates to departmental and/or the Illinois Tollway goals
- Overview of scope of work document

Project Description

This section should identify all of the major elements of the proposed capital improvement, including the impacts on existing conditions. Items to be included in this section are:

- Description of items/facilities to be developed/changed

- Description of conditions
- Discussion of major physical improvements proposed
- Discussion of significant construction phasing considerations both internal and external to the proposed project

Design Objectives by Discipline

This section is the core of the Preliminary Scope of Work document. It identifies all items of work for the proposed project. Each task listing should provide sufficient information to identify the extent and quantity of the item discussed. Special materials, standards, codes, or construction techniques required should be specified by task item. The breakout of tasks in this section shall provide sufficient detail for pre-design cost estimates. Sections to be developed shall be determined by the Chief Planning Officer and Project Master Plan Manager.

Pre-Conceptual Drawings

This section should identify the project's physical location, limits or boundaries. Pre-Conceptual drawings, illustrations and maps may be included. Generally, two types of drawings shall be included: 1) a location map which identifies the project's general location with respect to the Illinois Tollway system and 2) drawings which provide appropriately detailed layouts of proposed improvements and delineates all adjacent sites/uses.

Attach drawings, sketches or any other graphic material that may assist with understanding the project or developing quantities for cost estimates.

4.3.2.3 Budget Estimate

The Project Master Plan's Budget Estimate Summary Sheet is a non-binding cost estimate that represents the first attempt to assign a meaningful cost to a proposed project. The Budget Estimate is used to support both preliminary scope development and project justification and analysis and to assist with planning purposes. A sufficiently detailed and supported Master Plan Budget Estimate is the first step in reducing the chances of unanticipated expenses and cost overruns. Additional information on cost estimating is available in the Cost Estimating Procedure.

The Budget Estimate Summary Sheet (F2010.03) is to be completed as follows:

Section A. Contact Information

Sponsor Department: Enter the name of the department sponsoring the project.

Sponsor Representative: Enter the name, telephone, fax and email number of the departmental representative for the project.

Section B. Project Identification

Project Title: Project Title assigned in the Project Proposal Stage.

Prepared by: Name of Project Estimator and/or other individual(s) participating in developing the estimate.

Project Number:

Date: Enter the date the Budget Estimate Summary Sheet was completed.

Section C. Budget Estimate

a. Project Cost Summary

b. Illinois Tollway location

c. Type of work to be done

d. Improvement type

e. Limits of construction (Milepost start-finish)

f. Length of construction (miles)

g. Project Cost Estimate

Section D. Major Construction Cost Components

The Chief Planning Officer and the Project Master Plan Manager shall determine the major work items that make up the project costs and shall add them in given lines as necessary. Examples include but are not limited to Railroad Requirements, Right of Way and Utility Relocations.

4.3.2.4 Preliminary Project Schedule

The preliminary schedule should provide schedule information sufficient for the purposes of planning and budgeting. Design consultants or in-house design forces and construction contractors may be required to submit design and construction schedules, as needed.

This section of the Project Master Plan should provide:

- Breakdown of the project into phases, i.e. Conceptual Design, Preliminary Design, Pre-Final Design, Final Design, Advertisement, Bidding, Construction and Contract Closeout.
- Estimate of the duration of each phase in months.
- Summary of the work associated with each phase.

4.3.2.5 Project Analyses

Potential projects undergo justification and analysis as part of the master planning process. Project Analysis helps to support the decision to proceed with a project and ensure that limited Illinois Tollway funds are used to meet the Illinois Tollway strategic goals in the most appropriate and cost-effective way.

There are generally two types of formal project analysis. The Project Master Plan includes the following analyses:

- Cost-Benefit analysis (if required)
- Alternatives analysis
- Quantitative Risk Analysis (if required)

Cost-Benefit Analysis

The need for a Cost-Benefit Analysis is determined by the Illinois Tollway Finance Department or Capital Program Project Controls group on a case-by-case basis for any project.

The basis of this analysis is the present value of the costs and benefits expected to accrue over a project's useful life. After this is derived, net present value and Cost-Benefit ratios are calculated. Three types of data are required: costs, direct financial benefits and other quantifiable benefits. Dollar values are to be stated in current-year dollars.

Program Controls establishes the format for and provides guidance in the completion of Cost-Benefit analyses.

Alternatives Analysis

An Alternatives Analysis involves investigation of various feasible alternatives to a potential project. Alternatives analyses are generally only required for major projects with significant alternatives. The purpose of the alternatives analysis is to assist in identifying cost-effective means of meeting the Illinois Tollway's stated goals for investment. The determination for the need and format for an alternatives analysis is determined by the Chief Planning Officer.

Quantitative Risk Analysis

Quantitative Risk Analysis identifies the areas of the project budget and schedule that are subject to uncertainty and examines the required amount of extra time and schedule that should be budgeted based on probability of occurrence and likely impacts. The goal is to ensure that risks are identified, tracked and mitigated wherever possible. The DSE shall work in conjunction with the GEC Risk Manager to develop the risk model and conduct quantitative analysis. The GEC will provide risk simulation services on behalf of the Illinois Tollway. The determination of need for Quantitative Risk Analysis will be made by the Illinois Tollway.

4.3.2.6 Project Review and Approval

- The Chief Planning Officer and Project Master Plan Manager determine appropriate Customer and project reviewers.
- The draft project Master Plan is reviewed and comments collected.
- Comments are submitted to the Master Plan Manager.
- The Master Plan is subsequently updated and a formal presentation made.

- The Project Master Plan Sign-off Sheet is then circulated to obtain required signatures.

4.3.2.7 Project Sign-off Sheet

For the Project Master Plan to be considered complete, the Project Master Plan Sign-Off Sheet, at a minimum, shall bear the signatures of the following individuals:

- Project Master Plan Manager
- Chief Financial Officer
- DPM, Project Controls
- DPM (If assigned)
- Chief Planning Officer
- Deputy Chief Program Controls/System Integrity
- Deputy Chief Project Implementation
- Program Manager
- Maintenance Manager
- End User (Maintenance, Business Systems, Operations and/or IT)
- Chief Operating Officer
- Chief Engineering Officer

4.3.2.8 Capital Project Acceptance

Once all required reviewers have reviewed the Project Master Plan and signed the ISO form, the Project Master Plan may be considered for inclusion in the design phase.

4.4 Conceptual Design Phase (30%)

Conceptual Design is the initial design stage of a Project. The Scope of Work first developed in the Master Plan serves as the basis for the project design. The objective of this design phase is to prepare a report which presents information about each aspect of the project with sufficient detail to allow the Illinois Tollway to approve the recommended scope and design direction for each project aspect prior to moving to the next milestone submittal. This design phase requires all of the activities necessary to produce a conceptual design to meet the overall milestone objective.

During this phase of design, the DSE prepares concept design studies, in report format, which present proposed design options and recommendations consisting of detailed project descriptions supported by engineering drawings and details, calculations, estimated costs and schedules, potential design deviations, right-of-way and utility impacts and other pertinent information required to summarize the character of the project in accordance with the contract scope of work. Ultimately sufficient information and detail shall be provided to allow the Illinois Tollway to review

and recommend acceptance of the Conceptual Design.

The concept documents should be sufficient for review with the appropriate authorities and for initiating public consultation, as required. The submittal shall identify which components, including utilities, ITS elements 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:

- Analyzing and furthering the level of design and detail developed in the Master Planning Phase (Article 4.3). If a Master Plan was not completed, but many activities are required which are commonly found in the Master Plan, a Pre-Concept Submittal may be required.
- Presentation of design options with recommendations for each aspect of the project.
- Coordination with Illinois Tollway Traffic Operations to determine ITS scope and maintenance concept during construction. Traffic Operations may provide available guidance and typical details based on current deployment and integration standards at the Illinois Tollway.
- Exploration of innovative contracting methods, design ideas and construction approaches.
- Furthering the Risk Register (if required)
- Determination of anticipated right-of-way needs.
- Community and Governmental Outreach (as applicable). Where an IGA was identified during the Master Plan Phase, define scope and estimated costs and initiate tracking via the IGA process in the WBPM system.

4.4.2 Concept Design Report

The DSE shall prepare a report with sufficient corroborating conceptual design information to support the overall recommendations. The information shall include items such as plans, sketches, details, calculations, estimates, schedules and recommendations for review. Certain elements of design may require an in-depth analysis and evaluation of possible alternatives. The cost-effectiveness of the recommended alternatives shall be demonstrated through quantities and cost comparison of alternatives.

4.4.3 Schematic Submittals

Separate submittals outside of and in advance of, the Conceptual Design submittal may be required depending upon the scope of the project. The requirement for each of these elements shall be discussed with the Illinois Tollway Project Manager to determine whether they are required.

4.4.3.1 Maintenance of Traffic

This separate 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 transitions and crossovers and other pertinent information which the DSE deems necessary to present the recommended MOT to the Illinois Tollway. This is generally presented at a meeting with applicable Illinois Tollway personnel. The objective of the MOT plans shall be:

- Reduction of interference with Illinois Tollway traffic and operations.
- Efficient movement of traffic through the work zones.
- Maintaining a reasonable level of traffic operations for the motoring public, the workers and the work zone.
- See Roadway Traffic Control and Communications Manual for further information, policies and guidance.

4.4.3.2 Signing

This separate submittal shall show existing, proposed and both overhead and ground mounted signs, with message, type of support and approximate location, on a large-scale aerial. This is generally presented at a meeting with applicable Illinois Tollway personnel. The objective of the schematic signing submittal shall be:

- Identification of signing requirements for the Illinois Tollway's Sign Shop to begin material procurement.
- Discussion of signing needs, challenges of the project, and coordination with adjacent project signing along the corridor.
- Using the existing sign condition survey, the DSE should indicate whether existing signs are to remain in place, or are to be relocated, removed or replaced.
- See Signage Guidelines and related manuals for further information and guidance.

4.4.4 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 acceptance from the Illinois Tollway for all Conceptual Designs prior to continuing with detailed design. Typical minimum design requirements for various project components are as follows:

4.4.4.1 Roadway Design

- Provide statement of existing pavement, roadside conditions, scope requirements and applicability at specific locations within the Design Section.
- Provide a summary of the design criteria being followed.

- Show typical sections of the existing and proposed roadway.
- Show layout of horizontal geometry with basic alignment information including curve data, superelevation rate and design speed.
- Contact Tollway Materials regarding proposed pavement design.
- DSE shall verify any alignments and ties that may be provided to them.
- Show layout of vertical geometry, with basic profile information including design speed. Indicate approximate location and size of bridges, major culverts and cross roads.
- Determine anticipated right-of-way requirements; coordinate with the Illinois Tollway Land Acquisition Unit and certify acquisition lists.
- Provide 3-D engineered models representative of critical cross sections in which additional right-of-way or retaining walls may be required.
- Consider earthwork balance by stage of construction and for the contract(s). At a minimum, this needs to consider environmental, profile, cross section and slope criteria.
- Provide color photo documentation of typical and special conditions addressed in the report.

4.4.4.2 Interchanges

- Show existing and projected traffic demand.
- Provide conceptual layouts and capacity analyses of possible alternatives.
- Prepare preliminary layouts (including right-of-way limits) and recommendations of the alternatives. Provide estimated costs for each alternative.
- For ramps involving toll collection facilities, provide graphical criteria to determine toll plaza location and minimum ramp geometrics. Identify utilities including but not limited to gas, electric, telephone, fire protection water, domestic potable water and sanitary sewer service locations.
- Provide Intersection Design Studies (where the Illinois Tollway ramps intersect with State, Federal, County, Municipal, or Township routes) which show:
    - Traffic data
    - Intersection geometrics including baseline stationing
    - Turning radii and edges of pavement
    - Pavement widths
    - Islands, turning lanes and tapers

- Signalized intersection analysis

- Statement that the alternatives are in compliance with the Illinois Tollway's interchange policy requirements.

4.4.4.3 Drainage

- Define the drainage areas, limits and composition of watersheds and sub-watersheds of drainage facilities affecting the immediate project area on a digital base map. Watersheds of 20 acres or greater may be outlined on USGS maps.

- Locate and identify all pertinent drainage structures such as existing culverts, storm sewers, inlets, catch basins and utilities such as fiber optic cable, water, gas, telephone, electric, etc.

- Existing information shown should include type, size, condition, end treatment and rim and invert elevations. Show this information on a base plan showing existing topography.

- Identify existing flow direction and drainage patterns.

- Prepare an Existing Drainage Plan to illustrate the current drainage features of the project.

- Identify and document drainage concerns throughout the project limits.

- Show base floodplains and regulatory floodways and elevations based on the most recent FEMA maps or IDNR-OWR regulatory floodway map.

- Show culvert locations and preliminary sizing information.

- Identify stream crossings where detailed hydrologic and hydraulic studies shall be performed. Prepare a Waterway Information Table (WIT) for each bridge and/or culvert. Evaluate scour at bridges.

- Provide statements of Illinois Tollway and applicable local and other regulatory agency design criteria, assumptions, methods of analysis and justification for non-compliance of design criteria.

- Evaluate existing outlets where runoff exits the Illinois Tollway right-of-way.

- Evaluate detention requirements; develop a concept plan for providing the required storage volumes; and determine if a closed or open storage facility is required.

- Identify the need for additional right-of-way and easement requirements; tabulate the right-of-way and easement requirements and include stations and offsets; and prepare a memorandum to the Illinois Tollway Project Manager summarizing the right-of-way and easement requirements.

- Perform a qualitative evaluation of drainage alternatives consistent with the design criteria.

- Prepare a Proposed Drainage Plan fully describing the proposed drainage concept. Indicate any proposed changes to flow patterns and identify maintenance, replacement, extension and/or construction of storm sewers, crossroad and appurtenant culverts and special drainage structures. Identify potential utility conflicts.

- Evaluate encroachments on base floodplains and regulatory floodways and identify relevant IDNR-OWR permit requirements and local ordinances. Identify location of proposed compensatory storage.

- Coordinate with local and other agencies and distribute the Existing and Proposed Drainage Plans for review; document all relevant comments, concerns and drainage issues.

- Prepare a Concept Drainage Report (CDR) describing the nature of the existing drainage system, proposed modifications, alternatives and recommendations. All supporting calculations shall be approved by an Illinois Professional Engineer prior to submittal to the Illinois Tollway for review.

- See the Illinois Tollway's Drainage Design Manual for additional requirements and guidance.

4.4.4.4 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 considering positive protection and the drop-off policy requirements.

- 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.

- Follow the Work Zone Speed Limit process outlined in the Roadway Traffic Control and Communications Manual which includes submittal of the applicable Work Zone Speed Limit Form for each stage of construction.

- Prepare recommendations for any required temporary off-Illinois Tollway detours, ramp closures, or winter shutdowns or slowdowns.

- Prepare recommendations for crossovers.

- Provide stage duration and overall project 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.

- Identification of the need for implementing a Smart Workzone for major construction projects, when required. The Smart Workzone shall be developed in coordination with the ITS Unit.

- See Roadway Traffic Control and Communications Manual for further information, policies and guidance.

4.4.4.5 Structural

Provide 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 structure and areas of defects.

The designer shall review the previous pertinent correspondence, Inspection Reports, Hydraulic Report, Structure Geotechnical Report (SGR) and the Bridge Condition Report (BCR). For rehabilitation projects, outdated surveys or data, erroneous information, or defects identified in the BCR and/or wall inspection reports, shall be field verified and any new defects included in the prefinal plan submittal. The codes which were in effect at the time the structure was designed should be reviewed for updates. The designer should advise the Tollway of any new work which may be needed to bring the structure up to current code requirements so the Tollway can determine if the new work should be included with the rehabilitation work.

4.4.4.5.1 Bridges

- Bridge Condition Reports or Abbreviated Bridge Condition Reports are required during the Master Planning or Pre-Conceptual Phase for each bridge to be rehabilitated, reconstructed or replaced.

- When applicable, Structure Hydraulic, Hydrology Reports and Scour Analysis are required during the Master Planning or Pre-Conceptual Phase for each bridge and bridge culvert.

- Bridge Type study that includes Accelerated Bridge Construction Decision Matrix Tool and Bridge Life Cycle Comparison Tool submittals during the Master Planning or Pre-Conceptual Phase are to include a detailed explanation of the recommended alternative and the reasoning for including and discarding alternatives. This shall be included for all new, reconstructed and replacement bridges per Article 3.2 of the Structure Design Manual.

- Provide TS&L drawings for each structure to be constructed, replaced (including superstructure replacement) or widened. The TS&L drawing shall be developed in accordance with Section 3.0 of the Structure Design Manual. A Structure Report is require to be submitted with TS&L when Illinois Tollway is planning to construct, reconstruct, widen or extend a structure that is jointly maintained by Illinois Tollway, IDOT or local agency.

- Structure plans shall be sent from the Illinois Tollway to the District and IDOT Bridge Office for review when mainline bridges crosses over State Routes. Similarly, the

structure plans must be forwarded for review through the Illinois Tollway for crossings over other agency roadways. For roadways crossing railroad right of way, structure plans must be submitted to the Railroad through the Illinois Tollway at milestones prescribed by the Railroad.

- Indicate the location of the proposed longitudinal construction joint and temporary concrete barriers (TCB), if required, due to staged construction. TCB placement should take into account barrier deflection and pinning requirements.

- Fire protection per Structure Design Manual shall be provided as per SDM 5.10 and .

4.4.4.5.2 Bridge Culverts

- Bridge Condition Reports or Abbreviated Bridge Condition Reports are required during the Master Planning or Pre-Conceptual Phase for each bridge culvert to be rehabilitated, reconstructed or replaced.

- For bridge culverts over waterways, a type study shall be performed in accordance with the Illinois Tollway Drainage Design Manual.

- Bridge Culvert TS&L drawings shall also be in accordance with Section 21.0 of the Structure Design Manual.

4.4.4.5.3 Retaining Walls

- Prior to TS&L plans, a wall feasibility study shall be submitted per Article 22.2 of the Structure Design Manual.

- Determine whether constructing a retaining wall or acquiring additional right-of-way is a more cost-effective solution. Consider life cycle cost in this determination (i.e. maintenance cost).

- Provide a recommendation on the use of performance based retaining wall specification considering permits, utility conflicts, MOT staging, right-of-way, Contractor accessibility, schedule, soil conditions, earthwork and backfill material. The cost/benefit of a performance based retaining wall versus a designed wall shall be considered in the recommendation.

- Assumptions as to the proposed wall type used for earthwork calculations shall be clearly indicated on the plans. The DSE shall coordinate these assumptions with adjacent contracts through their Illinois Tollway PM and the corridor DCM (if applicable).

- Include consideration as to the time of year in which the proposed retaining wall construction may occur in the schedule, earthwork, backfill material, winter protection, or other constructability issues which may impact the cost or type of wall.

- Provide adequate time in the construction progress schedule for the Contractor's design of the Performance Based Retaining Walls, including time for review and approval of shop drawings.

- Provide TS&L drawings of each proposed or modified retaining wall. Indicate elevations of finish grades on both sides of the wall. Include typical sections and drainage details.

- Provide boring data and locations as required by the Illinois Tollway Geotechnical Manual.

4.4.4.5.4 Noise Abatement Walls, Sign Structures and Information Gantries

- Structure Geotechnical Reports are required in accordance with the Structure Design Manual during the Master Planning or Pre-Concept Phase for each structure to be constructed or replaced.

4.4.4.6 3D Requirements

- The DSE is responsible to provide a 2D seed and container file, using geocoordinate system as identified in the current Illinois Tollway Computer Aided Design and Drafting (CADD) Standards Manual and contain the following file for each model approach as part of the deliverables for the project milestone:

  For Full Models as Legal Document (MALD) or Hybrid Approach projects provide the following .dtm files:

  1. Existing ground surface
  2. Proposed surface

  .dgn files:

  1. Alignments
  2. Profiles
  3. Existing 2d linework
  4. Proposed 2d linework (examples is the EOP, back of Curb linework file, ditch flowline)
  5. MOT linework
  6. Master Container Files containing files. May include but not limited to:
     a. Earthwork & Environmental
     b. Stormwater Drainage
     c. Utilities/Lighting/ITS
     d. Signage
     e. Pavement Design & Geometrics

f. MOT

g. Bridge Structure Categories

h. Retaining Walls

i. Noise Abatement Walls (NAW)

j. Temporary Structures

Further details for guidelines for project delivery using model as a legal document are found in the BIM Implementation Manual.

4.4.4.7 Geotechnical Reports

Provide, where applicable, Roadway Geotechnical Reports for all roadway and pavement design, including embankments, slope cuts and widening in accordance with the Illinois Tollway Geotechnical Manual. Provide, where applicable, Structure Geotechnical Reports for all structures that require TS&L plans in accordance with the Illinois Tollway Geotechnical Manual. See the Illinois Tollway Geotechnical Manual for further information, policies and guidance.

4.4.4.8 Pavement Marking and Signing

- Discuss the overall scope of work related to pavement markings and signing for the project. The scope shall be in conformance with the latest edition of the Illinois Tollway Roadway Signing and Pavement Marking Guidelines.
- Pavement marking discussion should indicate those markings that may be impacted by the project, type of proposed markings, and determination of whether to include plowable raised pavement lane markers.
- The signing discussion should be in addition to the Signing Schematic submittal when required as part of Article 4.4.3.2.
- 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 if geometric or other roadway conditions warrant sign lighting.

4.4.4.9 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.
- Submittal requirements shall be in accordance with the Illinois Tollway's latest Guidelines for Roadway Illumination.

4.4.4.10 Roadside Safety

- Provide statement of need for roadside barrier rehabilitation, upgrading and modernization.
- Schedule a barrier warrant analysis Concept Meeting with the GEC team as soon as the roadway design elements have been determined.
- Prepare a Location Plan (aerial or topographic mapping at an appropriate scale) to be discussed as part of the barrier warrant analysis Concept meeting. Prepare exhibits for any unique conditions or displaying any potentially complex barrier warrant analyses.
- Present the Level 3 Analysis as required for the TS&L study and as described in the Structure Design Manual.

4.4.4.11 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.
- Provide borings and Geotechnical Report in accordance with the Illinois Tollway Geotechnical Manual.

4.4.4.12 Electrical (Buildings)

Design analysis:

- Exterior electrical conditions and characteristics
- Extent of exterior work
- Extent of interior work
- Description of lighting system(s)
    - Room name and number
    - Lighting intensity
    - Type of fixture
- Type of wiring system

- Special items of design; stand-by power, temp power
- Definition of any hazardous areas
- Basic characteristics of panelboards, protective devices, switchgear, motor control centers or other major equipment
- Short circuit and voltage drop calculations
- Electrical metering
- Lighting protection
- Grounding system
- Description of additions or alterations to the existing system(s)
- Description of electronic systems
    - Telecommunications/data
    - Fire detection and alarm
    - Special grounding
    - Public address
    - Security
    - Access control
- Communications layout
- Outline specifications
- Drawings:
    - Existing and new primary lines
    - Removals and relocations
    - Electrical characteristics
    - New construction and location of transformers
    - Secondary service
    - Exterior electronic system(s)
    - Typical lighting and receptacle layout

- Main electrical service
- Major pieces of electrical equipment
- Proposed riser diagram with sizes
- Sample panelboard, switchboard, motor control and fixture schedules
- Interior electronic system(s)

4.4.4.13 Mechanical (Buildings)

- Design analysis
  - List of references
  - Purpose of the work
  - Design conditions
  - Building characteristics
  - Basic building calculations
  - Proposed sequence of controls
  - Requirements for utilities
  - Required demolition
  - Outline specifications
- Preliminary design calculations and checking of adequate space for installation and maintenance
- Simple geometric layout with approximately correct dimensions
- Piping layouts as necessary
- Simplified schematic diagrams, system flow diagrams, and layouts
- Plans and sections to properly show pertinent information
- Single line layouts with preliminary sizing
- Preliminary capacities of major equipment

4.4.4.14 Utility Interferences & Utility Services

- Provide a list of anticipated new utilities and services (gas, electrical, etc.).

- Identify locations of potential interferences and an assessment of their project costs and schedule impacts.

4.4.4.15 Sustainability

- Refer to the Illinois Tollway INVEST Manual for detailed information and guidance.
- Coordinate with Illinois Tollway INVEST Team and hold a Conceptual Planning Sustainability Workshop to identify sustainable solutions that should be included in the project.
- Submit the Project INVEST Scorecard.

4.4.4.16 Environmental Studies

- Conduct field reconnaissance and submit Environmental Studies Inventory Sheet (ESIS) Part I prior to the concept submittal, utilizing the WBPM Process.
- Submit Phase I Environmental Site Assessment or Transaction Screen.
- See Environmental Studies Manual for detailed information and guidance.

4.4.4.17 Erosion Control and Landscape

- Perform field reconnaissance and submit Environmental Studies Inventory Sheet (ESIS) Part 1
- Prepare a Memorandum of Findings documenting a No Impact Determination, if appropriate.
- Conduct a Soil Erosion/Sediment Control Project Site Evaluation to understand existing conditions, potential impacts and key issues affecting erosion and sediment control concept design. Prepare and submit a Landscape, Erosion and Sediment Control Technical Memorandum including all necessary exhibits.
- Initiate Erosion Control Governmental and Regulatory Agency Coordination
- Conduct a Landscape Site Analysis including, but not limited to, an Existing Vegetative Assessment (EVA) and development of an Issues and Opportunities Diagram (IOD).
- If tree removals are identified in the ESIS Part I or are determined likely during the EVA, a Tree Survey per Appendix 10 of the Erosion Control and Landscape Manual shall be provided.
- Provide Erosion and Sediment Control Overview drawings.
- Begin regulatory agency coordination related to the National Historic Preservation Act and Endangered Species Act if an ILR10 permit is required.
- Support the Illinois Tollway with coordination with local stakeholders.

- Submit copies of the completed Erosion and Sediment Control Technical Review Checklist and Landscape Design Submittal Checklist.

- See Erosion Control and Landscape Manual and Environmental Studies Manual for detailed information.

4.4.4.18 Intelligent Transportation System (ITS)

This stage concludes with an approved concept plan and memorandum that shall be utilized to progress to the detailed design. Refer to the ITS Deployment Manual for technical requirements on what type of ITS devices and design considerations to successfully integrate the new ITS devices into the Illinois Tollway ITS network. The ITS Deployment Manual also emphasis the need to connect new ITS devices to power and fiber optic communication network depending on the type of ITS devices. The ITS Deployment Manual gives design guidelines to the DSE in order to facilitate the ITS device integration to the Illinois Tollway Traffic Operation Center.

- Provide a memorandum that summarizes decisions with the ITS Unit and includes:
    - Identification of any deviations from the Master Planning (pre-concept) design information provided by the Illinois Tollway and any deviation from the ITS Deployment Manual and ITS Labeling Guide.
    - Identification of the need for any inter-department and/or interagency coordination.
    - A preliminary schedule of the ITS work in respect to the overall project schedule.
    - Identification of the need for barrier warrant analysis.
    - Identification of how all existing devices and infrastructure (power and communications) may be utilized, upgraded, relocated and/or removed within the project.
    - Identify for each ITS devise where to connect to a splicing Fiber Optic handhole or plaza
    - Identification of existing fiber facilities and anticipated impact during construction within the project limits.
    - Identification of temporary ITS elements, if required.
    - Provided camera coverage with identification of every element that might obstruct the field-of-view of each new CCTV to be installed as part of the ITS contract
    - Identification of all proposed ITS devices (types and quantities) and rationale for locations within the defined project limits. Rational for proposed locations shall comply with the design guidelines of the ITS Deployment Manual
    - Identification of how new devices and infrastructure (power and

communications) may be deployed within the project.

- Identification of recommendations regarding maintenance of existing ITS devices/sites that might be affected by the ITS construction within limits of contract
- Identification of anticipated cost with contingencies for the proposed ITS work.

- The DSE and their QA representative shall complete and sign the Design checklist, found in the ITS Deployment Manual.
- Provide a project level roll plot (or sheets for individual sites) of the roadway plan and profile illustrating all existing and proposed relocated or new ITS devices/sites, utilizing the appropriate symbology. The project plans shall also address the removal of existing ITS device/site when applicable in the scope of the design contract. Refer to the ITS Deployment Manual for device placement criteria and type of ITS devices to use based on site conditions. Demonstrate visibility and occlusions of all ITS elements. Confirm the proposed site locations of new ITS devices can be accessible by the ITS maintenance crew and their equipment to adequately service each of the new ITS device/sites proposed by the DSE. The exhibits should include overhead obstructions such as bridges, sign structures, ditches, noise walls, underground utilities and overhead utilities.
- Any ITS design shall be reviewed by Illinois Tollway ITS staff and the GEC in a "Design Review" format. The Illinois Tollway ITS Design Review shall include the following:
  - DSE prepares agenda
  - DSE prepares the design documentation as required at each stage of the design process (30%, 60%, 95% and 100%) for project covering ITS scope as New ITS Capital Projects and also ITS Systemwide devise replacement.
  - DSE to provide cost estimate at each steam of the design milestone (30% to 100%)
  - DSE to provide schedule to complete review, hold meeting and address disposition
  - DSE prepares the disposition of comments received from the Illinois Tollway and GEC as part of the design review and meeting minutes
  - Illinois Tollway reviews post meeting documents and gives DSE final comments

4.4.4.19 Design Schedule and Cost Estimate Review

The DSE shall prepare and submit as part of the conceptual design effort a parametric cost estimate in accordance with Section 8.0 (utilizing the WBPM Process) and a conceptual milestone schedule. 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 Illinois Tollway, IDOT, government agencies and the general public. Exhibits shall be developed by the

DSE as needed to support communications with the project stakeholders. Schedules prepared by the DSE shall be in a format that is acceptable to the Illinois Tollway. On projects with a budget over $25M, the DSE may be requested to complete the schedule utilizing software by Primavera or Microsoft Project. If required, DSE shall conduct a Risk workshop with key stakeholders in conjunction with the GEC Risk Manager.

4.4.5 Minimum Submittal Requirements

The Conceptual Design submittal requires the review and written acceptance by the Illinois Tollway PM prior to proceeding with the detailed design.

The Conceptual Design submittal shall include all necessary supporting data, back-up information and drawings in order for the Illinois Tollway PM to provide acceptance. As part of the Conceptual Design 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. The submittal shall be uploaded onto the WBPM system and hard copies submitted as required by the scope of work or Illinois Tollway PM.

In presenting the Conceptual Design, the DSE shall provide:

- All assumptions and criteria
- Recommended design approach
- Identified and anticipated design deviations
- Analytical methods used Conceptual details
- Criteria, details or issues that may significantly affect the design
- Construction Cost Estimate
- Constructability Review
- Risk Register (if required)
- Conceptual Design Phase (30%) Submittal Checklist

When the Conceptual Design 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 Conceptual Design Report.

4.4.6 Conceptual Design Review

The Design shall be reviewed by the Illinois Tollway Design Review Team. The purpose of the Conceptual Design Review is to establish agreement between the Illinois Tollway and the DSE on all concepts of the intended design. The DSE shall obtain written approval from the Illinois Tollway prior to proceeding with the Preliminary Design Phase. Additional features or minor

revisions to the Conceptual Design, 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 Conceptual Design, the Illinois Tollway does not agree with the DSE's 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 shall be considered within the scope of design services and no separate or additional compensation shall be allowed.

4.4.6.1 Documentation of Review and Review Comments

The Illinois Tollway PM is the primary contact with the DSE and shall:

- Transmit design documents to the design review team in accordance with Procedure P4000
- Collect review comments
- Transmit comments to DSE

The DSE shall:

- Review the comments
- Provide a disposition of comments and summary of required design changes in the next design phase to the Illinois Tollway PM prior of the design review meeting
- Incorporate comments in the next submittal

4.4.6.2 Conceptual Design Review Meetings

A project meeting shall be conducted between the DSE and the Illinois Tollway PM to ensure that all comments are incorporated into the next submittal; this includes, but is not limited to:

- ROW Acquisition requirements, which shall be certified by the DSE and coordinated with the Land Acquisition Unit, Illinois Tollway PM and DCM.
- Permitting issues, which shall be identified and coordinated.
- Potential utility conflicts, which shall be identified and coordinated.

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

- Acceptance of the Conceptual Design indicates that the DSE is generally in compliance with the scope of services of the project. However, the Illinois Tollway reserves the right to modify an approved Conceptual Design at any time, in which case the modification may be considered outside the original scope.

- In the event that the Conceptual Design 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.

- Acceptance of the Conceptual Design by the Illinois 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.

When the project contains ITS, the DSE shall coordinate an ITS Design Workshop to be held at the Illinois Tollway with ITS staff and the GEC.

- Provide printed roll plots or project plans of proposed devices for Illinois Tollway, GEC, ITS Maintenance and ITS Operations staff review at least ten (10) working days prior to the Design Workshop.

4.5 Preliminary Design Phase (60%)

The objectives of the Preliminary Design Phase are to incorporate comments from the Conceptual Design 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.

4.5.1 Preliminary Plans and Special Provisions

Preliminary Design, Special Provisions, a list of pay items and a quantity estimate are developed following the approval of the Conceptual Design. 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 cross roads, utilities and railroads shall be contacted by the DSE. All regulatory agency coordination shall be through the Illinois Tollway PM. The DSE shall 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 Illinois Tollway PM.

4.5.2 General Notes, Jurisdictions and Commitments

4.5.2.1 General Notes

Notes should be limited to those items of information which warrant special attention.

- The Illinois Tollway maintains a list of standard general notes that are included in most Contracts. This list is available through the Illinois Tollway WBPM system. The DSE shall review the provided list and include the applicable items. Additional general notes may be required as determined by the DSE.

- All incidental work developed by the DSE, not previously identified as being incidental to pay items, shall NOT be itemized in the General Notes. Incidental work to standard pay item shall be listed in S.P. 110. All other incidental work shall be covered in the special provisions.

Information contained in the Standard and Supplemental Specifications or Special Provisions shall NOT be repeated as General Notes.

4.5.2.2 Project Jurisdictions

A table shall be added to the General Notes sheet listing the jurisdiction of all cross roads, ramps, waterways and railroads crossed by the Contract. The jurisdiction limits shall also be shown on the plans. For example, when a ramp changes from Illinois Tollway to IDOT jurisdiction that should be reflected on the Roadway Plans.

4.5.2.3 Project Commitments

Commitments made during the Master Plan and Design phases shall be listed on the General Notes sheet under a "Project Commitments" heading. The DSE is responsible to list all commitments made to local agencies, permitting agencies and other stakeholders. The purpose is to identify this information to the Contractor and the CM for the successful implementation of the Contract. The commitments shall be clearly identified and the pertinent schedule, payment and coordination requirements specified in the Contract.

4.5.3 Summary of Quantities

The drawings shall be set up in a columnar format with column headings for: SPECIAL PROVISION (S.P.), ITEM NUMBER, DESCRIPTION, UNIT, QUANTITY and RECORD QUANTITY.

- 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 schedule of prices (P-Pages) of the Proposal portion of the Contract Documents. A Special Provision is required for each pay item, unless the Standard Specifications or the Illinois Tollway Supplemental Specifications cover the work item. The Special Provision item shall be indicated with an asterisk (*) placed next to the item in the S.P. column.

- The numbering of the pay items shall conform to the IDOT Coded Pay Item List and Illinois Tollway maintained pay item list. A listing of available pay item numbers is available on the WBPM system.

    - If an appropriate item cannot be found on the IDOT Coded Pay Item List or the list of Illinois Tollway maintained coded pay item list, the DSE shall propose a special provision for Illinois Tollway review and request an item number from the GEC.

- IDOT numbers shall be listed first in numerical order including the X and Z numbers followed by the Illinois Tollway numbers also in numerical order.

- All anticipated pay items and quantities should be listed.

- Negative and Incentive Pay Items shall not be inserted in the summary of quantity drawing. They shall only appear on the Schedule of Prices (P-Pages).

- Quantities in the Summary of Quantities shall be rounded off according to the IDOT

BDE Manual.

4.5.4 Roadway Geometry

4.5.4.1 Typical Sections

Provide existing and proposed 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, removals (pavement, surface, topsoil), embankment zones and limits of excavating.
- Provide a legend that labels all existing and proposed components. The legend shall only include items within the Contract Plans.
- Proposed information shall agree with the Contract pay items.
- Include pavement mix table. Contact Illinois Tollway Materials regarding pavement design on Tollway jurisdictional routes. For local agency jurisdiction, coordinate pavement design with local agency when applicable.
- The legend shall appear on every sheet.

4.5.4.2 Horizontal Alignment

Existing and proposed horizontal alignment laid out accurately on a base drawing which shows:

- Existing topographic survey. DSE shall verify the accuracy of any survey and alignments and ties that may be provided to them.
- Preliminary contract limits, improvement limits (when different from Contract limits), right-of-way lines and easement lines.
- Curve data including stations of Point of Curvature (P.C.) and Point of Tangency (P.T.), superelevation rates and limits, and design speed.
- Stations of horizontal tie points.
- Stationing and dimensions of proposed improvements.
- Labeling of all cross roads, railroads and waterways. The labels shall include the jurisdiction information for each.

4.5.4.3 Vertical Alignment

Profiles shall be developed along the horizontal alignment(s). The profiles shall include bridge decks and approaches and show:

- Profile grades at 50-foot intervals (ramp profiles should follow the baseline).
- Vertical curve data including length of curve, offset to external tangent, "K" factor, gradients, beginning and ending stations, design speed and point of vertical intersection (PVI).
- Location of critical clearance points, existing pavements, underground structures and utilities.
- Superelevation design limits shall be shown in the top portion of the profile grid. See Illinois Tollway Base Sheets for example.

DSE shall analyze the pavement for smoothness and submit ProVal reports according to the Illinois Tollway Roadway Design Criteria. This documentation shall clearly show how the stationing within ProVal relates to the proposed alignment stationing.

4.5.4.4 Existing and Proposed Cross Sections

The cross sections shall show:

- Proposed roadway template.
- Slopes with corresponding slope values.
- Preferred ditch sections, where required.
- Preliminary existing and proposed right-of-way and easement lines.
- Existing ground line to at least 50' beyond the anticipated right-of-way, which shall indicate limits of construction.

4.5.4.5 Roadside Safety

Roadside safety shall be considered for all major elements of design. Overall submittal requirements shall be in accordance with the current Illinois Tollway Traffic Barrier Guidelines.

Prepare and submit the Preliminary Barrier Warrant Analysis report with the DMR submittal.

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4.5.5 Drainage

- Obtain supplemental surveys and perform a field visit noting any discrepancies or deficiencies as early as possible in the design process.
- Develop proposed drainage plan sheets including a layout of the proposed storm

sewer system, drainage structures and culverts. Provide structure and pipe call outs on these sheets or separate drainage schedules.

- Provide a uniform legend as needed and a key map on all plan sheets.
- Develop proposed drainage profile sheets showing a layout of the proposed storm sewer and ditch profiles. All existing utility and culvert crossings shall be shown on these sheets.
- Show storm sewer rims and inverts and paved ditch grades to the nearest 0.01'. Show non-paved ditch grades to the nearest 0.1'.
- Provide drainage structure schedules including the pay item; drainage structure, headwall and frame and grate type; and station, offset, rim elevation and invert. Include the height of monolithic reinforced concrete above pipe penetration holes > 15" and the total structure height. For all circular structures, fill out the size determination and percent inside perimeter removal spreadsheets available in the WBPM system.
- Provide storm sewer schedules including the pay item, class, type, material, size, length, structure to structure notation and trench backfill quantity.
- Coordinate proposed end treatment of culverts and other exposed pipes with the barrier warrant analysis. Additional consideration is required to determine if any roadside safety obstacles may be eliminated.
- Develop a temporary drainage system for each MOT stage. The designer has the option of showing the sequencing of drainage work on a separate set of drainage plans instead of or in addition to the MOT sheets.
- Complete all removal items and call outs in separate drainage removal sheets or include information on the roadway/drainage removal drawings.
- Incorporate an addendum to the CDR indicating any significant modifications to the proposed drainage plan.
- See the Illinois Tollway's Drainage Design Manual for additional requirements and guidance.

4.5.6 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. Overhead signs shall be shown for all stages with lane shifts or long term closures, including any signs that need to be covered or modified to match the current stage.
- Provide a description of major work activities and traffic control for each stage.
- Indicate nature and location of work in critical areas, such as at toll plazas, on or near structures, etc.

- Follow the Work Zone Speed Limit process outlined in the Roadway Traffic Control and Communications Manual which includes submittal of the applicable Work Zone Speed Limit Form for each stage of construction.

- Determine any required temporary off-Illinois 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 state and local jurisdictions, including police, fire, 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.

- Determine any required mainline and ramp temporary lane closures and provide the allowable lane closure hours.

- Provide a list of the WZSL for each stage of construction.

- If complex MOT staging is required for the project it is beneficial to provide strip map exhibits showing every stage. Coordinate with the Illinois Tollway PM and GEC to determine if strip maps should be provided.

- See Roadway Traffic Control and Communications Manual for further information, policies and guidance.

4.5.7 Structural

Develop and organize Preliminary Plans for each structure in accordance Section 6.0 of the Structure Design Manual. Requirements for the preliminary plan submittal are outlined in Article 6.10 of the Structure Design Manual.

4.5.8 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.

4.5.8.1 Utilities

Show utilities for Illinois 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.

4.5.8.2 Site Plans

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

4.5.9 Pavement Markings

Provide recommendations for station location, legend, and type of pavement marking material(s).

- Show proposed pavement markings including plowable raised pavement lane markers, if applicable.

4.5.10 Signing

Provide recommendations for station location and legend for all proposed signs (including non-guide signs). Consider topographic features which influence sign type and location such as contours, existing or proposed utilities, drainage systems, roadway lighting, noise abatement walls and retaining wall systems. In addition:

- Include preliminary sign elevation details for overhead mounted or breakaway steel mounted signs.
- Provide drawings of panel configuration, legend format and size calculations for review by the Illinois Tollway's sign shop. All new signs shall be vertically sized in even 12" increments and horizontally in increments of 6" as indicated in the Illinois Tollway's latest Roadway Signing and Pavement Marking Guidelines.
- Provide preliminary staking of sign location in the field to enable field checks.
- Verify need for sign lighting, identify electrical service locations, and provide preliminary location of power conduit runs for illuminated signs, if applicable.
- Provide list of sign locations requiring coordination with other agencies (bridge mount signs) and utilities (new power service connections).
- Analyze existing structures to be reused and determine the impact the new sign(s) may have on the structure.
- See the Illinois Tollway's latest Roadway Signing and Pavement Marking Guidelines for additional information and guidance.

4.5.11 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 and dimensioned.
- Voltage drop calculations for each lighting circuit shall be provided.
- Copies of correspondence with utilities for new or relocated points of service shall be included.
- All details and standards shall be identified.
- Temporary lighting requirements shall be identified.
- Photometric calculations for temporary lighting layouts.
- Existing lighting equipment shall be shown on plans and all demolition and removal work shall be identified.
- Submittal requirements shall be in accordance with the Illinois Tollway's latest Guidelines for Roadway Illumination.

4.5.12 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 plans.

4.5.13 Electrical (Buildings)

- Address all comments received during the concept submittal phase
- Exterior electrical distribution system analysis
    - Calculations
    - Characteristics
    - Transformers
    - Standards of design
    - Exterior lighting

  - Specifications
- Interior electrical distribution system analysis
  - Characteristics
  - Description of lighting system(s)
    - Room name and number
    - Lighting intensity
    - Type of fixture
- Type of wiring system
- Special items of design
  - Stand-by power load study and generator sizing
  - Toll equipment layout and wiring diagrams
  - Temp power for continual service
- Definition of any hazardous areas
- Lightning protection
- Grounding system
- Panelboards, protective devices, switchgear, motor control centers or other major equipment with short circuit and voltage drop calculations
- Electrical metering
- Drawings:
  - Removals
  - Legend
  - Exterior electrical including poles and components, transformers, manholes
  - Interior electrical including riser diagrams, panelboards, motor control center, switchgear equipment or other major equipment
  - Branch circuits, lighting fixtures, switches, receptacles
  - Fixture schedule
  - Electronic systems including exterior plans, removals riser diagrams,

locations of devices, telephone details

- Specifications

4.5.14 Mechanical and Plumbing (Buildings)

- Address all comments received during the concept submittal phase
- Detailed heating and cooling load calculations, plumbing calculations, equipment sizing, etc.
- Equipment selection
- Major changes from concept submittal
- Specifications
- Duct work and piping layouts
- Temperature control schematics
- Layout and details of all HVAC and plumbing systems
- Double line layouts in congested areas
- Equipment laid out to scale with maintenance clearings shown
- Plumbing riser diagrams
- Preliminary equipment schedules

4.5.15 Sustainability

- Refer to the Illinois Tollway INVEST Manual for detailed information and guidance.
- Incorporate sustainable solutions identified at the Conceptual Design Phase into the Contract Documents.

4.5.16 Environmental

- Submit the ESIS Part II typically prior to, but no later than, the 60% submittal. Include any special environmental studies, reports, investigations or other information needed resulting from the ESIS Part I evaluation.
- Based on the findings of the Phase I Environmental Site Assessment (ESA) or Transaction Screen, locations of planned earth excavation and volume of excavated soil expected, a sampling plan shall be prepared and submitted as part of the 60% design submittal.
- Initiate agency coordination through the Illinois Tollway Environmental Unit if required.

- See the Illinois Tollway's latest Environmental Studies Manual for detailed information.

4.5.17 Erosion Control and Landscape

- Erosion and Sediment Control items shall be reviewed and updated to address Concept submittal comments and furtherance of design.
- Submit ESIS Part II.
- Update Soil Erosion/Sediment Control Project Site Evaluation, and Landscape, Erosion and Sediment Control Technical Memorandum including exhibits.
- Provide Erosion Control overview plans, notes, and schedules.
- Show tree removals on the removal plans.
- Provide permanent landscape plans (may include Tree Preservation depending on project scale.
- Submit Contract Special Provisions
- Prepare and submit preliminary Erosion and Sediment Control Plans, Permanent Landscape Plans, Contract Special Provisions. Include Stormwater Pollution Prevention Plan if required.
- Continue to support stakeholders and perform regulatory agency coordination as appropriate.
- Submit copies of the completed Erosion and Sediment Control Technical Review Checklist and Landscape Design Submittal Checklist.
- See the Illinois Tollway's latest Erosion Control and Landscape Manual and Environmental Studies Manual for detailed information and Submittal Checklist.
- All landscape plans shall identify land use adjacent to the right-of-way, provide contour lines, construction limits, locations of utilities, guard rails, fencing, gates, retaining walls and any environmentally sensitive areas. Plans shall also include any landscape notes or other special notes and details not identified in the Standard Drawings.

4.5.18 Intelligent Transportation System (ITS) Elements

The majority of the detailed design development for ITS projects and improvement elements occurs within the Preliminary design phase. This is necessary to provide the Illinois Tollway sufficient opportunity to address concerns and corrections prior to submission of the (biddable) Pre-Final plans

The ITS Deployment Guide outlines of the design submittal requirements for the ITS elements and provides more detailed design requirements and approach considerations.

List the record drawings and/or documentation reviewed during design development.

Coordinate with adjacent Contract DSE throughout the ITS design process.

Fiber optic communications shall be reviewed with the Fiber Optic and Utilities Manager and the GEC Fiber Optic Management Group.

Internet based reconnaissance is not a substitute for field surveys, but may be used to augment information. Prior to the creation of the plan set, the following field work should be completed by the DSE:

- Complete a field review with the Illinois Tollway ITS and Operations Manager, and ITS GEC staff, identifying all ITS device locations and where each ITS device will be connected to fiver optic splicing handhole or plaza. Field review of proposed locations where new ITS devices will be installed. Identify terrain constraints such as deep slopes and drainage in close proximity of an ITS pole/enclosure.
- When required by the Illinois Tollway, perform a bucket truck survey to confirm the cameras field-of-view are clear of visual obstructions or use of drone with Tollway filing. Submit pictures to the Illinois Tollway.
- Visit all facilities where interior components are to be installed or new ITS devices to be connected to communication network in existing buildings as part of an ITS project.
- Verify the location of fiber optic communications, handholes and identify the closest splice points in the field. This information shall be provided in Existing Conditions plan sheets.
- All field work shall be well documented, with corresponding pictures and made available on the WBPM system.

As part of the design review of the 60% pre-final plans, the DSE shall present maintenance accessibility for all ITS devices/sites covered in the contract. Develop an ITS plan set that includes the following in compliance with the 60% Design Checklist as detailed in the ITS Deployment Manual. Drawings shall correspond to the same scale and orientation as the roadway plans.

- An index of drawings, list of standards and general notes specific to the ITS drawings.
- ITS construction schedule detailing submittals and reviews, material procurement, infrastructure and device installation, integration into TIMS, testing, burn-in period, walkthroughs and final acceptance. Identify all ITS work with respect to roadway work, including any ITS work needed in advance of proposed roadway work and ITS infrastructure required (power and communication)
- Identify all constraints related to ITS work and define the interim milestones needed for ITS elements.

- Summary of quantities.
- ITS Overview Sheet that provides an ITS element overview map, ITS Device Summary table and ITS Bill of Materials chart. Existing device references shall include Illinois Tollway designated asset IDs (to be obtained from the Illinois Tollway ITS Unit). The ITS Device Summary table shall include existing devices (with disposition – such as removal, relocation, or to remain) and proposed elements, including GPS coordinates and station.
- System Block Diagram (single-line device wiring diagrams) that illustrates how all existing and proposed devices shall be powered and communicate back to the TOC.
- ITS Removal Plans.
- Temporary ITS Plan sheets.
- Proposed ITS Plan sheets.
- Schedule of labels for the ITS cabinet and external ITS devices, adhering to the ITS Labeling Guideline.
- Detail sheets. All ITS Base Sheets are located on the Illinois Tollway's website. The DSE shall review and modify the ITS Base Sheets to suit project specific requirements if needed. It is important that the DSE remove all Notes addressed to the DSE in the project plans.
- Proposed communication infrastructure schematics.
- Provide fiber assignments for every fiber connection to ITS devices in conjunction with information received from the Illinois Tollway fiber maintenance contractor.
- Provide GPS coordinates for each ITS site location in GIS format using Tollway surveying standards.
- DMS boring logs in accordance with the Geotechnical Manual.
- Include cross section drawings at all ITS element sites.

Provide the following special provisions within this submission:

- Include all appropriate Illinois Tollway specifications and ITS special provisions required.
- The DSE shall review and modify Illinois Tollway special provisions to suit project specific requirements without modifying the Material Checklist as part of the ITS Special Provision. By doing so the DSE must remove the name of the Illinois Tollway and revision or issue date shown on the Illinois Tollway ITS Special Provisions title block except for special provisions with text to be modified by the DSE.

- Identify all schedule constraints related to ITS work and define the interim milestones needed for ITS elements.
- The DSE shall review the need for and include, liquidated damages criteria as appropriate, for the project (e.g. maintenance impact for missing an interim project milestone for constructing, relocating and maintaining an ITS device).
- Include in the special provisions a submittal Material Check List to be utilized during the construction phase for verifying all items required and completeness of submittals. Any submittal checklist included in Illinois Tollway special provisions shall be used as is and not modified unless approved by the GEC/Illinois Tollwayto suit the project specific requirements. Include in the special provisions a site test plan/checklist to be utilized during the construction phase for verifying ITS device functionality in the field prior to network/system integration. Any test plan/checklist included in Illinois Tollway special provisions shall be used as is and not modified unless approved by the GEC/Illinois Tollway to suit the project specific requirements. The DSE shall review and modify guide special provisions to suit project specific requirements.

Provide the following calculations within this submission:

- All voltage drop calculations
- All wire size calculations
- Conduit size calculations, where conduit sizes exceed standard sizing shown on the base sheet guide drawings
- All required structural and foundation calculations

Provide construction cost estimate that includes the break-down of each pay item, unit, quantity and total price.

The DSE and their QA representative shall complete and sign the Design checklist, found in the ITS Deployment Guide.

4.5.19 Utilities and Other Agencies

The DSE shall prepare a written report on utility interferences and involvement with other agencies and shall follow the guidelines in Section 6.0, Coordination Requirements.

- Provide "Utility Final" Plans for distribution to utilities companies.
- 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 name and telephone number, date, nature of interference and outcome with each utility company or agency.
- Provide evaluation of each conflict with the proposed improvement including utility

comments, construction interference or any involvement requiring relocation, protection or precautionary procedures for each alternate.

- Recommend a course of action and a timetable to coordinate the design of the relocation of each utility conflict with the design work by the DSE.
- Complete "Notification of Interference" (NOI) forms 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.).
- Prepare the Utility Relocation Matrix for inclusion in the Contract Plans.
- Utilize the Utility NOI process via the WBPM system.

4.5.20 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 may have an effect on the construction sequence, staging or schedule.
- Incorporate general notes or details in the plans in order to coordinate the design work with that of adjacent DSE efforts in progress or under construction.
    - Adjacent project coordination is critical for projects with ITS. Power and fiber communications cross project limits. Conduit pull box locations shall be agreed upon at project limits.

4.5.21 Permits, Agreements and Utility Work Orders

The DSE shall determine the need for easements, agreements and/or construction permits from governing/governmental agencies, railroads and utilities. The DSE shall prepare a written report on utility interferences and involvement with other agencies. Further detailed discussion regarding requirements is presented in Section 6.0, Coordination Requirements.

4.5.22 Construction Quantity Estimate

Quantity calculations are an important part of the overall design and should be completed throughout the design process. They shall be performed on calculation sheets organized in a logical manner. Although the Illinois Tollway does not maintain quantity calculation worksheets, a sample is provided through the WBPM system. The DSE is free to use their own format for

quantity calculations as long as they are prepared in a spreadsheet format or similar acceptable to the Illinois Tollway, are organized in numeric order by pay item number as they appear in the Summary of Quantities and provide sufficient information so that they may be back checked from the hard copy. Each worksheet shall be in a separate tab and include the following:

- DSE Firm Name, Contract Number, Pay Item Number, Pay Item Name, Drawing Number, Stationing, Calculation Formula.
- All supporting mathematical steps required to perform the quantity take-offs.
- Appropriate locations in the Contract Drawings where that element of work is to be found, noting the sheet number and station to station limits.

If calculations are performed electronically or are computer generated it is the DSE's sole responsibility to verify them for accuracy.

The Preliminary Submittal shall include a listing of the identified and/or anticipated pay items to be used. Quantity calculations are not required to be submitted at this milestone unless specifically requested.

4.5.23 Construction Cost Estimate

Submit the estimated Engineer's cost estimate including backup calculations for lump sum items (See Section 8).

4.5.24 Suggested Progress Schedule for Construction Activities

The schedule shall be in a format acceptable to the Illinois Tollway consisting of a Critical Path Method (CPM) Chart. On projects with a budget over $10M, the DSE shall complete the schedule utilizing Primavera P6 software or as agreed upon with the Illinois Tollway PM. The schedule shall identify the major controlling items of work, their sequence of construction and duration of major construction. Holiday periods shall be shown on the schedule. Only Maintenance of Traffic and Erosion Control shall be shown continuous through the project duration including the holiday periods. Schedule shall clearly delineate winter work. Time required between fabrication and delivery of precast elements per the Structure Design Manual shall be shown on the schedule. Consideration shall also be given to other materials that could have long lead times. Show estimated notice to proceed and final completion date, substantial completion date(s) and any interim completion dates, if required. A schedule narrative should be provided that describes the critical path and identifies any major assumptions, risks, opportunities and critical resources.

The Illinois Tollway maintains several standard progress schedule notes that are included in most contracts. These notes are available through the Illinois Tollway WBPM system.

4.5.25 Special Provisions

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

The Special Provisions shall be listed in numerical order of the pay item.

- An index of Special Provisions is required with page number reference.
- The pages of Special Provisions should be numbered beginning with Page J-1 on the page containing S.P. 101. Each new Special Provision shall begin on a new page after the 100 series Special Provisions.
- Special Provisions shall be arranged to match the respective order of pay items per Article 4.5.3. after the 100 series. The special provision could be a Tollway Standard special provision or an individual special provision written be the DSE. Special provisions order is as listed below.
    - IDOT pay items (numbers)
    - IDOT pay items (X)
    - IDOT pay items (Z)
    - Illinois Tollway alphanumeric number beginning with JA
    - Illinois Tollway alphanumeric number beginning with JI
    - Illinois Tollway alphanumeric number beginning with JS
    - Illinois Tollway alphanumeric number beginning with JT
    - Other special provisions which apply to the project but do not have a Pay item listed at the bottom shall be placed at the end in the following order;
    - Tollway standard special provision
    - All IDOT recurring special provisions
    - All IDOT Bureau of Design and Environment (DBE) special provision
    - All IDOT Guide Bridge Special Provisions (GBSP)
    - All IDOT District 1 or District 2 Special provisions
    - All Local/ Federal Agency Special provisions.
- A listing of project warranties shall be included in the Special Provisions.

4.5.26 Railroad

- The Illinois Tollway requires that the Railroads invoice the Contractors for all costs for which the Contractor may be reimbursed by the Illinois Tollway using a railroad flagging cost allowance line item in the construction contract. The DSE's duty is to estimate and provide an adequate amount of money in the flagging allowance pay item. The DSE estimates the flagging allowance pay item by contacting the Railroad(s) about daily flagger charges. Inquiries shall at a minimum include the following:
    - May a right-of-entry agreement be required for design and/or construction

services?

- What type of work or property access may trigger the need for a flagger?
- Does flagging include travel time, overtime, meals and/or Union requirements?
- In what timeframe should the Contractor expect to receive invoices?
- When should the final invoice be received in relation to the end of the Railroad flagging need?

- The DSE shall submit a preliminary Railroad flagging cost estimate along with the 60% submittal. The estimate shall be based on the documented contacts the DSE has had with Railroad(s), the preliminary construction schedule, anticipated Contractor access requirements, minutes of meetings held with the Illinois Tollway PM and the requirements of any agreements in place.
- The DSE provides the Railroad(s) a detailed construction schedule to include:
  - Description of construction scope (and/or submittal of plans)
  - Property access requirements
- The DSE estimate shall be revised based on the Railroad estimate, the DSE's engineering judgment and contingencies and any meetings with the PM.
- The DSE shall be familiar with Railroad Protective Liability insurance requirements.
- Upon coordination with the Railroad(s) the DSE shall determine if an Agreement may be required between the Illinois Tollway and Railroad(s), if an Agreement is required the DSE shall be responsible for coordinating the Agreement with the Illinois Tollway.

4.5.27 3D Requirements

The Preliminary 3-D engineered models shall at a minimum include:

- Existing ground, stripped surface, proposed sub-grade, proposed pavement layered section and finished grade.
- The DSE is responsible to provide a 2D seed and container file, using geocoordinate system as identified in the current Illinois Tollway Computer Aided Design and Drafting (CADD) Standards Manual and contain the following file for each model approach as part of the deliverables for the project milestone:
- For Full Models as Legal Document (MALD) or Hybrid Approach projects provide the following .dtm files:
  1. Existing ground surface
  2. Proposed surface

3. Stripped surface
4. Top of Clay (otherwise known as bottom of subgrade or hold down surface)

.dgn files:

5. Alignments
6. Profiles
7. Existing 2d linework
8. Proposed 2d linework (examples is the EOP, back of Curb linework file, ditch flowline)
9. MOT linework
10. Master Container File containing files. May include but not limited to:
    a. Earthwork & Environmental
    b. Stormwater Drainage
    c. Utilities/Lighting/ITS
    d. Signage
    e. Pavement Design & Geometrics
    f. MOT modeled per stage
    g. Bridge Structure Categories
    h. Retaining Walls
    i. Noise Abatement Walls (NAW)
    j. Temporary Structures

Further details for guidelines for project delivery using model as a legal document are found in the BIM Implementation Manual.

4.5.28 Geotechnical Reports

Geotechnical Design Memorandum shall be submitted for revisions to Roadway Geotechnical Reports and/or Structure Geotechnical Reports as necessary due to major TS&L changes (redesign); ground improvement design; refinement of foundation type size and/or stability and settlement evaluations based on additional or advanced in-situ and laboratory testing. All Geotechnical Reports shall be in accordance with the Illinois Tollway Geotechnical Manual. See the Illinois Tollway Geotechnical Manual for further information, policies and guidance.

4.5.29 Minimum Submittal Requirements

The Preliminary Engineering Design Package shall at a minimum include:

- Plan drawings (11"x17" PDF files), Special Provisions (8.5"x11" PDF files) and CADD files shall be uploaded onto the WBPM system and additional hard copies submitted as required by the Scope of Work or Illinois Tollway PM. Staple or bind and number all hard copy submittals for ease of reference.
- Drawings shall be transmitted to each utility and other agency affected by the project. Size and number of copies to be coordinated with the recipient and Illinois Tollway PM.
- The design package shall 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
    - CADD Standards Manual
- Disposition of all comments received from the previous submittal in a format approved by the Illinois Tollway. This includes the reviewed documents uploaded by the DSE in accordance with Article 4.2.1. Hard copy comments received shall be returned with the submittal and addressed to the applicable reviewer.
- 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
- Design deviation documentation in accordance with Article 10.1.5
- Constructability Review
- Risk Register (if required)
- Preliminary Design Phase (60%) Submittal Checklist

- Other reports and calculations required as presented in this, or referenced, articles.

4.5.30 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 accepted Conceptual Design 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 accepted, should be presented. The extent of involvement with utilities and other agencies should be defined in this submittal, including permit and right-of-way requirements and other impacts on construction cost and construction schedule. If it is determined that a formal review meeting is needed, the DSE shall provide a draft disposition of all comments at least one working day prior to the meeting.

Written acceptance of the Preliminary Design Plans shall be provided by the Illinois Tollway PM. In the event the Preliminary Design Plan submittal is unacceptable, a resubmittal of one or more portions of the plans may be requested.

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

Improvements of roadways and facilities not under Illinois Tollway jurisdiction require review and written acceptance/approval by the Agency or Agencies having jurisdiction thereof. The DSE shall coordinate with the IGA Manager and Local Agency to further refine the scope and cost participation estimates developed during Concept Design. Continue tracking via the IGA process in the WBPM system.

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

- Value Management
- Risk Workshop (if required)
- ITS Design Workshop to be held at the Illinois Tollway with ITS staff
    - Provide printed set of plans for Illinois Tollway and ITS staff ten (10) working days prior to the ITS Design Workshop

4.6 Pre-Final Design Phase (95%)

The objectives of the Pre-Final Phase are to incorporate comments from the Preliminary Design 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 presentation of a biddable set of design documents for review.

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, calculation of quantities and Engineer's Estimate.

4.6.2 General Notes, Jurisdictions and Commitments

General Notes, Project Jurisdictions and Project Commitments should be reviewed and updated to address Preliminary Plan comments and furtherance of design. General notes shall be prepared in accordance to Article 4.5.2. In new construction contracts, a jurisdictional limits plan sheet shall be provided, delineating between Illinois Tollway, IDOT and local agency jurisdictions.

4.6.3 Suggested Progress Schedule for Construction Activities

The schedule shall be in accordance with the Preliminary Plan submittal requirements and be updated to include Preliminary Plan comments and/or changes to the sequence and duration of construction activities.

4.6.4 Summary of Quantities

Summary of Quantities should be reviewed and updated to address Preliminary Plan comments and furtherance of design. Summary of quantities shall be prepared in accordance to Article 4.5.3.

4.6.5 Schedule of Quantities

Schedules are generally required for paving, drainage improvements, earthwork, guardrail, signing and lighting where large quantities of these items are included in the work. Schedules may also be utilized to reduce clutter on the plan drawings. Each 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 should be constructed.

An Earthwork Schedule is always required when earthwork is part of the Contract. The earthwork schedule should be in a consistent format and include volume information for topsoil, excavation, embankment, soil classification type, unsuitable materials, rock and other pertinent information. A sample earthwork schedule is provided as an Illinois Tollway Base Sheet. All earthwork quantities shall be summarized by stage of construction by applicable pay items. The Contract shall consider balance of earthwork by stage of construction and for the overall project as part of the overall design. This shall at a minimum include environmental, profile, cross section and slope considerations.

4.6.6 Alignment and Ties

Prepare a scale drawing showing existing and/or proposed centerlines, base lines and survey lines required to establish stationing. Ties shall 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 superelevation 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. Reference benchmarks to the Illinois Tollway's survey control network (CORS).

- Provide a uniform legend as needed and a key map on all plan sheets.

4.6.7 Typical Sections

Typical Sections should be reviewed and updated to address Preliminary Plan comments and furtherance of design. Typical sections shall be prepared in accordance to Article 4.5.4.1.

4.6.8 Construction Details

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

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

- Illinois Tollway Standards and/or IDOT highway or bridge standards that require modification shall be included as construction details in the Contract Plans.

- Nomenclature and titles of details shall conform to the pay items.

- Limit notes to information not included in the Special Provisions or Standard Specifications.

4.6.9 Maintenance of Traffic (MOT) Plans

Maintenance of Traffic typical sections and plans shall be provided for each construction stage shown in the Suggested Progress Schedule for Construction Activities. The plan shall define the work areas and provide sufficient area to accomplish the work intended with minimal traffic interference. The DSE shall follow the Work Zone Speed Limit process outlined in the Roadway Traffic Control and Communications Manual which includes submittal of the applicable Work Zone Speed Limit Form for each stage of construction.

- Schematic drawings may only be submitted with the approval of the Illinois Tollway PM 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 MOT series. Further refine the 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, supplemental traffic control devices and MOT enforcement pull out areas. Provide typical sections and geometrics for all situations where lane configuration is altered. Overhead signs shall be shown for all stages with lane shifts or long term closures, including any signs that need to be covered or modified to match the current stage.

- Requirements for the protection of cross-traffic or utilities shall be established in cooperation with the appropriate maintaining agency.

- Extend MOT plans beyond the construction limits to show the exact MOT that may be required for the project including entrance and exit tapers and advance signing.

- If complex MOT staging is required for the project it is beneficial to provide strip map exhibits showing every stage. Coordinate with the Illinois Tollway PM and GEC to determine if strip maps should be provided.

- Provide a uniform legend and a key map on all plan sheets.

- Provide all details and plans related to proposed detours.

- See Roadway Traffic Control and Communications Manual for further information, policies and guidance.

4.6.10 Existing and Proposed 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.

- Include on roadway plans all existing topography, utilities and drainage structures, existing and proposed pavement, shoulder, barrier wall, guardrail, gutter 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 all removal items and associated limits on separate removal 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.

- Label all cross roads, railroads and waterways. The labels shall include the jurisdiction information for each.

- 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.

- Items measured by feet 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.

- 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.

- Provide a uniform legend and key map on all plan sheets.

- Beneficial to show mile marker locations at ¼ mile intervals.

4.6.11 Roadway Profiles Plans

Show existing and proposed roadway profiles for the entire contract limits. 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, pavement crown, or a ramp baseline.

- Vertical curve data shall include length of curve, offset to external tangent, "K" factor, gradients, beginning and ending stations and elevations, design speed and point of vertical intersection (VPI).

- 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'. Show profiles continuously across structures.

- Show existing profile and gradient for a minimum of 200' beyond the limits of improvement.

- Show superelevation design limits in the top portion of the profile grid. See Illinois Tollway Base Sheets for example.

DSE shall analyze the pavement for smoothness and submit ProVal reports according to the Illinois Tollway Roadway Design Criteria. This documentation shall clearly show how the stationing within ProVal relates to the proposed alignment stationing.

4.6.12 Utilities, Utility Matrix and Plans

The DSE shall prepare a written report on utility interferences and involvement with other agencies and shall follow the guidelines in Section 6.0.

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

- Provide all utility permit, job and relocation numbers on plans.

- Provide a uniform legend as needed and a key map on all plan sheets.

4.6.13 Existing and Proposed Drainage Plans

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

- Complete proposed drainage plan sheets at this stage. Include storm sewers, culverts, detention basins, ditch checks, control structure outlets, articulated concrete block revetment systems, etc. All existing storm sewers and drainage structures to be removed or abandoned under proposed conditions shall be turned off on these sheets.

- 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 pipe underdrains in separate sheets or include in the proposed drainage plans. Provide call outs and schedules.

- Complete proposed drainage profile sheets at this stage. 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.

- Complete all drainage schedules at this stage. This includes the drainage structure, storm sewer, removal items, drainage structure adjustment / reconstruction, pipe cleaning and pipe underdrain schedules.

- Provide all drainage details including special drainage structures for larger sewer connections, outlet control structures, concrete collars, detention basin and proposed ditch grading plan, storage pipe connections, culvert extensions, slope drains, articulated concrete block revetment systems, etc.

- Complete temporary drainage plans and details.

- Show and label all existing and proposed stormwater detention locations within contract limits.

- For stormwater detention, show design detention volume (both required and provided), water quality volume, maximum release rate, overflow route, normal water elevation and 100-year high water elevation, overflow elevation, bottom elevation, top of berm elevation and drawdown time (where applicable) on the plans.

- Show and label all existing and proposed compensatory storage basin locations within contract limits. Provide a grading plan and show floodplain and floodway volumes (both required and provided) for NWL to 10-year water surface elevations and 10-year to 100-year water surface elevations.

- Provide general drainage notes.

- Provide a Draft Final Drainage Report (FDR) including a narrative and all supporting calculations for inlet and scupper spacing, storm sewer design, culvert design, ditch capacity and velocity analyses, stormwater detention storage, allowable release rate requirements, compensatory storage design, bridge scour, etc.

- See the Illinois Tollway's Drainage Design Manual for additional requirements and guidance.

4.6.14 Pavement Joints and Elevations Plans

Drawings shall correspond to the same or larger scale and orientation as the roadway plans. Include on drawings pavement joints, 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 25-foot intervals for existing pavement to be overlaid, proposed top of concrete pavement, longitudinal joint lines, edge of gutter, barrier bases, trench drains 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.

- Provide a uniform legend as needed and a key map on all plan sheets.

4.6.15 Grading Plans

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

- A grading plan shall be required near interchanges, retaining walls, bridge/culvert crossings or any other area locations where the cross sections do not provide sufficient grading detail in order to construct.

- 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).

- Provide a uniform legend as needed and a key map on all plan sheets.

- Coordinate grading for H1 level pads around proposed light poles

4.6.16 Roadside Safety

Roadside safety shall be considered for all elements of design. Analyses for roadside barriers shall have been completed. Overall submittal requirements shall be in accordance with the Illinois Tollway Traffic Barrier Guidelines.

Prepare and submit the Pre-Final Barrier Warrant Analysis report and complete BWA check sheet with the DMR submittal.

4.6.17 Sustainability

- Refer to the Illinois Tollway INVEST Manual for detailed information and guidance.

- Hold a 95% Sustainability Mini-Workshop to confirm sustainable solutions are included in the Contract Documents and to complete a design-level INVEST evaluation.

- Submit the updated Project INVEST Scorecard.

4.6.18 Environmental

- Re-submit ESIS Part II (utilizing the WBPM Process) with the 95% submittal confirming information submitted at the 60% submittal or updating with new information. Include any special environmental studies not identified as required at the 60% submittal.
- At the 95% design submittal, the DSE shall include a copy of the Phase II ESA, the LPC-662 and/or LPC-663 form with supporting information.
- Include an Environmental Soil Classification Plan and include an earthwork schedule showing waste disposal type, reuse options and construction worker precaution areas.
- See the Illinois Tollway's Environmental Studies Manual for detailed information and guidance.

4.6.19 Erosion Control and Landscape

- Erosion and Sediment Control items shall be reviewed and updated to address Concept submittal comments and furtherance of design.
- Provide Erosion and Sediment Control Project Site Analysis.
- Provide Erosion and Sediment Control Technical Memorandum.
- Provide Erosion Control Overview Plans, Notes, Schedules, and Construction Sequence.
- Provide detailed design sheets using Tollway base sheets as appropriate.
- Provide a uniform legend as needed and a key map on all plan sheets.
- Drawings should match scale and orientation of roadway plans.
- Prepare and submit Pre-Final Erosion and Sediment Control Plans, Contract Special Provisions and Stormwater Pollution Prevention Plan.
- Continue to support stakeholder and perform regulatory agency coordination as appropriate.
- Submit copies of the completed Erosion and Sediment Control Technical Review Checklist and Landscape Design Submittal Checklist.
- See Erosion Control and Landscape Manual and Environmental Studies Manual for detailed information.
- Drawings shall correspond to the same scale and orientation as the roadway plans. Show all proposed landscape tree, shrub, vine, plug, or other new vegetation related items and clearly label or provide identification key for each item, botanical name and common varietals name, size and quantities.

- Identify seed class references with associated erosion blankets and/or mulch types, sod areas, ditch treatment and indicate reduced mow zones in accordance with current Illinois Tollway mowing policy and criteria.

- Identify all existing vegetation and indicate areas to be preserved and protected, removed or relocated and/or maintenance treatments needed. This should include any impacts to adjacent properties. Provide treatment for all off site, transplanted material and/or borrow site locations.

- All landscape plans shall identify land use adjacent to the right-of-way, provide contour lines, construction limits, locations of utilities, guard rails, fencing, gates, retaining walls and any environmentally sensitive areas. Plans shall also include any landscape notes or other special notes and details not identified in the Standard Drawings.

- See Erosion Control and Landscape Manual for detailed landscape submittal information and submittal checklists.

- Provide a uniform legend as needed and a key map on all plan sheets.

4.6.20 Pavement Marking Plans

Drawings shall correspond to the same scale and orientation as the roadway plans and should reference the proposed sign locations in grayscale.

- Drawings covering the entire contract limits shall be provided, including details for gore striping, lane designations, tapers, lane drops, etc.

- List the size, type (epoxy, paint, multi-polymer, etc.) and spacing of each pavement marking.

- Show plowable raised pavement lane markers, if applicable.

- Show overhead signs that are directly related to the proposed pavement markings in grayscale.

- Provide a uniform legend as needed and a key map on all plan sheets.

4.6.21 Signing Plans

Drawings shall correspond to the same scale and orientation as the roadway plans and should reference the proposed pavement markings in grayscale.

- Prepare site plans showing the location of all proposed overhead truss, cantilever, bridge-mounted and ground-mounted signs by station and offset.

- Show on the site plans proposed sign location by station and offset, electrical service (if applicable) 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 and label the proposed work for 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 plans.
- 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 as well as locations and elevations of foundations, posts, sign supports and lighting supports, if applicable. Refer to Traffic Barrier Guidelines when establishing elevation and offsets.
- 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. Sign identification shall be in accordance with the Illinois Tollway's Signage Guidelines.
- Provide overhead sign lighting data, if applicable.
- Provide a uniform legend as needed and a key map on all plan sheets.

4.6.22 Roadway Lighting Plans

The roadway lighting plans shall be prepared according to Article 4.5.11 and the Guidelines for Roadway Illumination. 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.
- Provide a uniform legend as needed and a key map on all plan sheets.
- Confirm electric service availability at proposed locations.

4.6.23 Traffic Signal Plans

Prepare plans in accordance with the Local Agency's requirements. Traffic signal plans require

review and written acceptance/approval by the agency that shall operate and maintain the traffic signal.

4.6.24 Structural Plans

Requirements for Pre-Final Plan Submittal shall be as outlined in Article 6.11 of the Structure Design Manual.

4.6.25 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.

4.6.26 Electrical Plans

- Address all comments received during the preliminary submittal phase

- Short circuit analysis

- Identify roadway lighting controllers for which the contractor will have to assume maintenance and identify the limits of roadway lighting that is fed from those controllers. Provide a single line diagram for each controller.

- Drawings:

    - Details

    - Check for discrepancies

        - Verify compatibility

        - Panelboards, motor control centers, switchboard and switchgear schedules, home runs, floor plans

        - Power riser or one-line diagram

        - Legends and symbols

        - Fixture types

        - Compliance with design analysis and criteria

        - Circuitry
        - Definition of hazardous areas
        - Power for electronic systems
        - Proper receptacles for intended equipment
    - Specifications

4.6.27 Mechanical Plans

- Address all comments received during the preliminary submittal phase
- Flow diagrams for balancing purposes
- Major changes from preliminary submittal
- Completed specifications
- Final plans
    - Sections and details
    - Legends, and schedules
    - Piping schematics
    - Complete narratives, notes, and title blocks
    - Temperature control plans
        - Schematics and diagrams
        - Layouts and legends
        - Narrative and sequence of operations
        - Compatibility requirements with any existing system(s)
- Coordination with other disciplines, space requirements, foundations, supports, duct and pipe routing, electrical service

4.6.28 Intelligent Transportation System (ITS) Plans

Drawings shall correspond to the same scale and orientation as the roadway plans and shall reflect all the requested changes and agreed comments as discussed during the 60% design documentation review meeting

Submittal documents shall include updated plans with cross sections of all ITS devices/sites, special provisions, schedule and estimate based on comments from the previous submission

and any modifications discussed during the Preliminary Submittal review meeting. Refer to the 95% checklist in the ITS Deployment Guide for criteria and deliverables.

4.6.29 Boring Logs

Soil boring locations shall be shown on the applicable plan sheets. Boring logs for structural and roadway borings shall be reproduced directly from the Geotechnical Report. These shall include a legend for symbols and contain the name of the Geotechnical Engineer.

- Use boring numbers, U.S.G.S. elevation, project elevation (if different), station and offset from centerline or baseline location and description to determine the disposition of materials as described in the Geotechnical Report recommendation.

4.6.30 Cross Sections

Cross sections shall be plotted on an acceptable grid.

- Existing ground shall be shown in dashed lines.
- Cross sections shall be provided at a minimum of 50-foot increments. Greater frequency is required to show sections cut along culvert crossings, structures, overhead sign foundations, among other unique locations.
- 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.
- The horizontal and vertical scales shall be in accordance with Article 5.2.5.
- 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), pipe underdrains, trench drains, drainage pipes, retaining walls, noise walls, barrier wall, guardrail, culverts, gutters and any other critical feature.
- Show existing and proposed right-of-way limits, easements and all utilities.
- Show waste disposal type, reuse options and construction worker precaution areas per the Environmental Studies Manual.

4.6.31 3D Engineered Models

For all new roadway, reconstruction, or capacity improvement projects, the DSE shall deliver 3-D design files to the Illinois Tollway. The 3-D files shall include the following data and be provided in the appropriate format, in accordance with the CADD Standards Manual and Article 5.2.6:

- Existing, stripped surface, sub-grade and proposed final grade data: breaklines at various levels of vertical and horizontal data provided at a maximum spacing of 25'.
- Structures and foundation data: all exterior limits of structures and foundations, for subsurface clash detection and vertical clearance determination.
- Utility data: all existing and proposed utility conduits, 12 inches in size or greater.

For Full Models as Legal Document (MALD) or Hybrid Approach projects provide the following .dtm files:

1. Existing ground surface
2. Proposed surface
3. Stripped surface
4. Top of Clay (otherwise known as bottom of subgrade or hold down surface)

.dgn files:

5. Alignments
6. Profiles
7. Existing 2d linework
8. Proposed 2d linework (examples is the EOP, back of Curb linework file, ditch flowline)
9. MOT linework
10. Master Container File containing files. May include but not limited to:
    a. Earthwork & Environmental
    b. Stormwater Drainage
    c. Utilities/Lighting/ITS
    d. Signage
    e. Pavement Design & Geometrics
    f. MOT
    g. Bridge Structure Categories
    h. Retaining Walls
    i. Noise Abatement Walls (NAW)

j. Temporary Structures

The 3-D models provided shall be described in the Special Provisions, as outlined in the current Illinois Tollway "100 Series", found on the WBPM system.

Further details for guidelines for project delivery using model as a legal document are found in the BIM Implementation Manual.

4.6.32 Geotechnical Reports

Geotechnical Design Memorandum shall be submitted for revisions to Roadway Geotechnical Reports and/or Structure Geotechnical Reports as necessary due to major TS&L changes (redesign); ground improvement design; refinement of foundation type size and/or stability and settlement evaluations based on additional or advanced in-situ and laboratory testing. All Geotechnical Reports shall be in accordance with the Illinois Tollway Geotechnical Manual. See the Illinois Tollway Geotechnical Manual for further information, policies and guidance.

4.6.33 Special Provisions

The Special Provisions shall be prepared according to Article 4.5.25.

4.6.34 Schedule of Prices

Submit the Proposal schedule of prices pages (P-Pages) to be included in the Contract Requirements book. These pages shall list pay items in sequential order with titles identical to those of the text of the Special Provisions and Standard Specifications pay items. The first page shall be numbered P-5. The DSE shall provide a larger bottom margin on each page that may account for two additional pay items. This is required in order to avoid spill over due to adding pay items in the event of an addendum.

4.6.35 Railroad

The DSE shall submit to the Railroad final construction plans, construction schedule and details of how the Illinois Tollway has requested to be invoiced. The DSE shall provide a report of the Railroad flagging plan and include copies of any agreement, detailed calculations, estimates, related specifications, pay items, method of payment and invoicing details to the Illinois Tollway PM with the Pre-Final plan submittal.

4.6.36 Design Calculations

The DSE is solely responsible for maintaining all necessary design calculations for their individual projects. Specific design calculations that are required are presented throughout the Illinois Tollway's Manuals and shall be addressed accordingly. Calculations should be presented in an orderly format, be initialed on each calculation by the individual that performed the calculation and the individual that reviewed the calculation and include a signed and sealed cover page(s) that includes at a minimum the DSE firm name, design and construction contract numbers, construction contract summary and the calculation discipline.

4.6.37 Minimum Submittal Requirements

The Pre-Final Engineering Design Package shall at a minimum include:

- Plan drawings (11"x17" PDF files), Special Provisions (8.5"x11" PDF files), CADD files, and suggested progress schedule electronic file shall be uploaded onto the WBPM system and additional numbers of hard copies shall be submitted as required at the direction of the Illinois Tollway PM. Bind and number all hard copy submittals for easy reference.
- A narrative progress and status report on all matters related to:
    - Utility relocation work orders
    - Utility Agreements
    - Request for Utility Services
    - Regulatory Agency Permits
    - Inter-Agency Agreements
    - Land Acquisition
    - Easements
    - Design Deviations
    - Railroad insurance, entry permits and flagging costs
    - Other agency coordination or involvement
    - Barrier Warrant Analysis
    - Environmental Issues
    - ITS Elements (Including communications and power feeds)
- A chronological summary of all contacts with utility companies or agencies.
- Constructability Review
- The design package shall 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 preliminary design package
    - Illinois Tollway CADD Standards Manual
- Disposition of all comments received from the previous submittal in a format approved by the Illinois Tollway. This includes the reviewed documents uploaded by the DSE in accordance with Article 4.2.1. Hard copy comments received shall be returned with the submittal and addressed to the applicable reviewer. An electronic copy of quantity calculations meeting the requirements of Article 4.5.22 shall accompany the Pre-Final Submittal. The submittal shall either be a PDF or a copy of the spreadsheet file.
- Pre-Final engineer's estimate and construction schedule in accordance with Section 4.5.24, including but not limited to:
    - Constructability
    - Phasing

  - Site constraints and right-of-way needs
  - Procurement Strategy
  - Utility Relocation Identification
  - Environmental Considerations
- Design deviation documentation in accordance with Article 10.1.5.
- Risk Register (if required).
- Pre-Final Design Phase (95%) Submittal Checklist
- Calculation of all applicable Contract Liquidated Damage amounts. These are calculated following the latest version of the Calculating Liquidated Damages Procedure.
- Other reports and calculations required as presented in this, or referenced, sections.
- Copy of all soil reports.
- Continue to coordinate with the IGA Manager and Local Agency to document any cost participation and maintenance requirements and finalize scope and estimated costs.

4.6.38 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 Illinois Tollway format and practice.
- Verify that all work items are identified, properly detailed and clearly specified.
- Verify that the design has been adequately completed.
- Hold an ITS Design Workshop at the Illinois Tollway with ITS staff.
- If required, hold a Risk Workshop to review the Risk Register with Illinois Tollway PM and GEC Risk Manager.
- Hold a progress schedule review workshop with Illinois Tollway PM and PMO.

After review of the Pre-Final Submittal, a formal review meeting is held with the DSE. The DSE shall provide a draft disposition of all comments at least one working day prior to the meeting. During the review meeting, all DSE 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 Illinois Tollway's written acceptance of this submittal. Once the submittal is accepted, no further changes in design details are expected and the DSE may proceed with completion of Final Plans. Acceptance of the Pre-Final Plans and Special Provisions shall be provided by the Illinois Tollway PM.

The responsibility for checking quantities and design calculations rests solely with the DSE.

Corrections shall appear within the Final Plans. Pre-Final Plans shall represent the completed product submitted by the DSE. In the event that the Pre-Final Plans are found to be unacceptable, due to not meeting the minimum set forth in Article 4.6, a Nonconformance Report shall be documented and a re-submittal may be required. Acceptance of Pre-Final Submittal may be given contingent upon the demonstration of satisfactory resolution.

4.7 Final 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 verify that the Bid documents are complete and coordinated. The Final design review package consists of:

- Drawings and Specifications required for advertisement, bid and construction of a Project.
- Final suggested progress schedule for construction activities including detailed schedule electronic file in accordance with Section 4.5.24.
- Final Engineer's estimate.
- Disposition of Pre-Final plan review comments. This includes the reviewed documents uploaded by the DSE in accordance with Article 4.2.1.
- List of required standard drawings.
- List of required warranties included in the Special Provisions.
- All final quantity and design calculations.
- Final 3-D engineered models.
- Final Bridge Superstructure Rating Form for each bridge as well as load rating model(s).
- Final Barrier Warrant Analysis report signed and sealed by a Professional Engineer of Illinois and a completed BWA check sheet. If a Barrier Warrant Analysis is not required due to the project scope of work, this shall be documented in the WBPM system.
- Final design calculations indexed and stamped by a Professional and/or Structural Engineer registered in Illinois.
- Lane Profile Smoothness ProVAL reports.
- Risk Register (if required).
- Final Design Phase (100%) Submittal Checklist
- Approved project design deviations.
- If applicable, final IGA scope of work and cost estimate.

4.7.1 3D Requirements

For all new roadway, reconstruction, or capacity improvement projects, the DSE shall deliver electronic data files to the Illinois Tollway. The electronic data files shall include the following data and be provided in the appropriate format, in accordance with the CADD Standards Manual and Article 5.2.6:

- Existing, stripped surface, sub-grade and proposed final grade data: breaklines at various levels of vertical and horizontal data provided at a maximum spacing of 25'.
- Structures and foundation data: all exterior limits of structures and foundations, for subsurface clash detection and vertical clearance determination.
- Utility data: all existing and proposed utility conduits, 12 inches in size or greater.
- The DSE is responsible to provide a 2D seed and container file, using geocoordinate system as identified in the current Illinois Tollway Computer Aided Design and Drafting (CADD) Standards Manual and contain the following file for each model approach as part of the deliverables for the project milestone:

  For projects using Full Models as Legal Document (MALD) Approach provide the following as:

  .dtm & .xml files

  1. Surfaces
     - Existing ground Surface
     - Proposed surface
     - Stripped surface
     - Top of Clay (otherwise known as bottom of subgrade or hold down surface)
  2. Alignments
  3. Profiles

  .dgn files

  1. Existing 2d linework
  2. Proposed 2d linework (examples is the EOP, back of Curb linework file, ditch flowline)
  3. MOT linework
  4. Master Container File containing files
     - Earthwork & Environmental

- Stormwater Drainage
- Utilities/Lighting/ITS
- Signage
- Pavement Design & Geometrics
- MOT
- Bridge Structure Categories
- Retaining Walls
- Noise Abatement Walls (NAW)
- Temporary Structures
- Culverts

Further details for guidelines for project delivery using model as a legal document are found in the BIM Implementation Manual.

The 3-D models provided shall be described in the Special Provisions, as outlined in the current Illinois Tollway "100 Series", found on the WBPM system.

4.7.2 Final Check

The Final Check meeting generally takes place at the DSE's office. Exception may be granted by the Illinois Tollway PM, in which may relocate the final check meeting to the Illinois Tollway office. All final checks should have a virtual meeting as outlined in section 4.2.2. Any comments shall be addressed immediately, and any revisions needed shall be incorporated into the construction documents.

- The Illinois Tollway PM ensures that the DSE is prepared for the final check. The Final design review package shall be uploaded onto the WBPM system at least one full working day in advance of the Final Check. The package may then be put into review which provides the design review team with an opportunity to review the documents in advance of the meeting. This schedule shall be coordinated with the Illinois Tollway PM and shall adhere to the guidance provided in Section 4.8.1.

- Reviewers shall provide comments during the final check meeting using the DRCP session. If a reviewer does not have the resources available to comment in the DRCP session, they shall provide comments during the final check meeting or through the WBPM system the same day. The DSE shall scan any paper comments submitted during the meeting and upload to the WBPM system.

- The DSE prepares meeting minutes of the Final Check and uploads them onto the WBPM system. The minutes should document discussions at the meeting, as well as reference the location of the dispositions to all comments.

4.8 Advertisement Phase

Following the Final Check, the Contract Plans are ready to be advertised for sealed bids. At this point the DSE is responsible to provide the Illinois Tollway with the necessary documentation and information to advertise the Contract (advertisement package). The documents shall be submitted to the Illinois Tollway PM as shown in Article 4.8.1 using the proper WBPM process and the actual schedule shall be coordinated with the Illinois Tollway PM. The advertisement package generally consists of the following documents:

Electronic Files (posted to the WBPM system, prior to date of Advertisement)

- Final Plan Drawings – 1 copy (11"x17" PDF)
- Contract Specifications - 1 copy (PDF)
- Schedule of Prices (P-Pages) - 1 copy (MS Excel), 1 copy (PDF)
- Engineer's Estimate – 1 copy (MS Excel), 1 copy (PDF)
- All required data to be posted to the online plan room, i.e. geotechnical reports
- All CADD, GEOPAK and 2-D and 3-D Engineered Model files of the Advertisement Plans

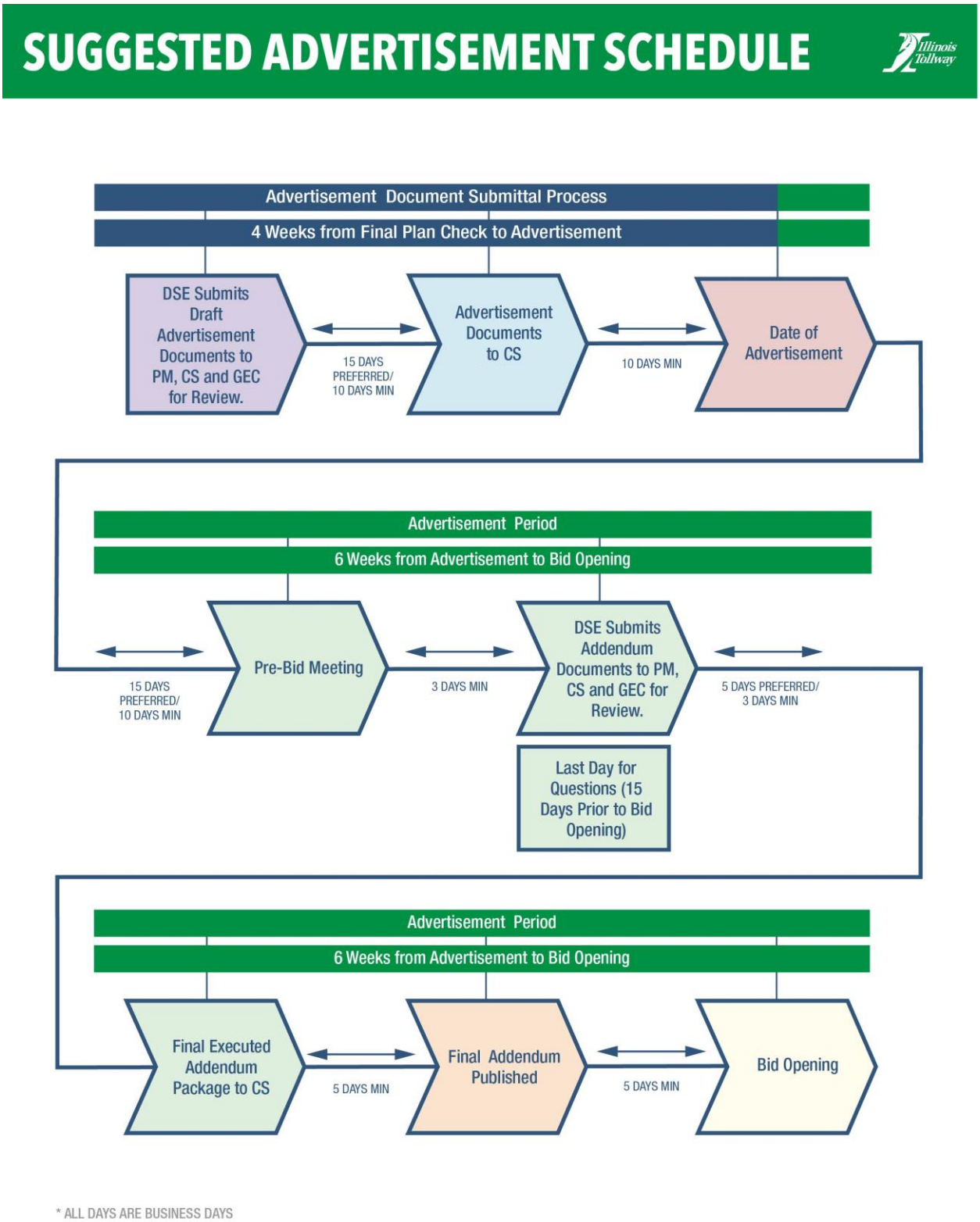
The advertisement package shall be routed at the Illinois Tollway for a cursory review of the documents per the ACDR process. The Illinois Tollway PM, Contract Services and Illinois Tollway reviewers conduct the final cursory review of the Plans, Special Provisions, P-Pages content, latest Engineer's Estimate and general formatting of the advertisement package. Illinois Tollway reviewers shall conduct this review electronically using the DRCP allowing the reviewers to comment and the DSE to dispose of comments without having to transfer hard copies of plans. The DSE shall be prepared and available to make any changes that may be required as a result of this cursory review.

When preparing the advertisement package, the DSE shall work with the Illinois Tollway PM to establish the need and schedule for an optional pre-bid meeting and also the schedule for the last day to receive questions from perspective bidders. It is important that both items are scheduled to allow time for the issuance of an addendum if questions arise which require changes to the advertised documents. These dates are provided in the A-1 Page by the Illinois Tollway.

Once the review is completed, the final revised advertisement package shall be uploaded by the DSE to the WBPM system and named accordingly under the design contract's project folder. Once uploaded, the documents are submitted by the Illinois Tollway's Contract Services group through the Illinois Tollway's vendor for Online Plan Sales for distribution to perspective bidders.

Once the Contract is bid and awarded, the as-bid documents are placed on the WBPM system by the Illinois Tollway, under the Construction Contract project folder. The DSE is responsible for uploading the issued for construction: PDF sheets and Volumes, CADD, GEOPAK and 3-D Engineered Model files into the WBPM system construction project folder.

4.8.1 Suggested Advertisement Schedule



4.8.2 Contract Documents

The DSE prepares the following sections of the Contract Documents. These sections detail the construction work and the contract dates for the work. All but the Plan Drawings are contained within the Contract Requirements Volume II.

- P-Pages (which lists the Contract Pay Items of the Proposal, starting on page P-5)
- J-pages (Special Provisions)
- IDOT BDE and GBSP special provisions
- Plan Drawings
- 3D Engineered model files (refer to LOD Scoping Document for Project Management in BIM Implementation Manual)

Contract Services prepares the following sections of the Contract Documents. These sections administer the work and all are contained within Volume I of the Contract Requirements.

- A-1 (Advertisement for Bids)
- CL-pages (Construction Bid Check List)
- I-pages (Instruction and Information to Bidders)
- Prevailing Wages
- P-pages (Proposal, pages other than those with the contract pay items)
- Bid Bond
- N-pages (Financial Disclosures and Certifications)
- PA-1 (Responsible Bidder Affidavit)
- R-1, R-2 (Bidder Preferences)
- R3 (Bidder List of Individual Contracts)
- R4 (Affidavit)
- S-7 (Current Contractual Obligations)
- DBE-pages (Disadvantaged Business Enterprise Participation and Utilization Plan)
- EEO-pages (Equal Employment Opportunity Program)
- VOSB-pages (Veteran Owned Small Business Participation and Utilization Plan)
- BCP (Bid Credit Incentive Program)

- TC (Illinois Tollway Standard Business Terms and Conditions)
- T-pages (Contract Bond Agreement)
- U-pages (Performance Bond)
- V-pages (Payment Bond)
- I-Pages (Insurance)

4.8.2.1 Advertise Contract Documents

The Online Plan Room (http://www.illinoistollwaybidding.com/) is the Illinois Tollway's mechanism for advertising and distributing construction Contract Documents and Standard Specifications to prospective Illinois Tollway bidders. The Illinois Tollway PM shall provide one hard copy of the complete Advertisement Package to the DSE upon advertisement. Illinois Tollway Contract Services will file the Advertisement Package under the Construction Contract in the WBPM system.

4.8.3 Advertisement Authorization

Approval to advertise the Contract Documents is done through the execution of the Advertisement Authorization Form (AAF) and the WBPM process. The Illinois Tollway shall NOT advertise the Contract without approval of this document by all signature authorities.

The DSE should request the latest version of the AAF form from the Illinois Tollway PM. The AAF is completed by the DSE and submitted to the Illinois Tollway PM a minimum of five weeks prior to the Advertisement for Sealed Bids date. This is a critical step in the process and requires the attention of the DSE so that the process is not delayed. The AAF provides the Illinois Tollway with a summary of the key elements of the project including Engineer's Estimate relative to project budget, status of all permits, status of utilities including relocation and new services and status of land acquisition including right-of-way, temporary and permanent easements, any right-of-entry agreements required for the Project and required DBE and ECP amounts.

The DSE is responsible to complete the appropriate forms to obtain the DBE, EEO, VOSB and ECP amounts for the Contract. The latest forms shall be requested from the Illinois Tollway PM and shall be submitted to the Illinois Tollway PM to be included with the AAF for processing.

4.9 Addendum Phase

4.9.1 Addendum Overview

An addendum is the formal notification procedure used by the Illinois Tollway to inform potential bidders (Plan Holders) of changes to an advertised contract before the bid opening. Addenda are prepared by the Illinois Tollway PM through the use of the DSE and issued to Plan Holders through the Illinois Tollway's Contract Services Department (Contract Services). The contents of addenda are determined by the Illinois Tollway PM and reviewed by the Deputy Program Manager, Program Manager and Deputy Chief of Program Implementation and ultimately approved by the Chief Engineering Officer.

In general, addenda should be limited to those revisions needed to eliminate substantial out-of-scope work during the construction phase, or to clarify the Plans and Specifications to eliminate change orders in the field. Every effort should be made by the DSE to prepare an accurate and complete set of Contract Documents prior to Advertisement.

The release of an addendum by the Illinois Tollway changes the Plan Holder's basis for developing the bid. If the addendum also changes the bid opening date, it may influence the Plan Holder's schedule for developing a bid, decrease the number of potential bidders and adversely impact the Illinois Tollway's credibility. Still, postponing a bid opening date should always be considered as part of evaluating addendum contents prior to release.

4.9.2 Scheduling an Addendum Release Date

The release date is when the addendum is issued to the Plan Holders. This date is determined by the Illinois Tollway PM and the DSE and coordinated with Contract Services.

The Illinois Tollway PM and the DSE need to estimate the time required by Plan Holders to review and distribute an addendum that also allows adequate time to develop a bid amount. When an addendum is released, each prime Contractor of the Plan Holders shall copy and transmit the addendum to all of their potential subcontractors, fabricators, suppliers, engineers and other businesses from whom bids are being solicited. The addenda shall be copied and transmitted through multiple layers of the bid, creating the potential that some subcontractors may not receive the addendum or may receive it too late to compile a competitive bid.

The guideline is to allow two weeks between the release of an addendum and the bid opening date, depending on the size and complexity of the addendum. Smaller addenda that include only minor plan or specification changes, answers to Plan Holder questions or minutes to the pre-bid meeting may be released with less than two weeks prior to the bid opening. Under no circumstances shall an addendum be released less than five business days prior to the bid opening. Please refer to Article 4.8.1 for the suggested schedule.

Time to prepare and issue an addendum may vary considerably depending on:

- The extent of changes by addendum,
- The time needed by the Illinois Tollway to review the addendum package prepared by the DSE and
- The number of other contracts under review by the Illinois Tollway.

It is critical to coordinate the addendum release with Contract Services as early as possible in order to set a truly achievable date.

4.9.3 Subject Contents of an Addendum

Illinois Tollway Directed Changes: The DSE shall prepare an addendum on the following subjects, as directed by the Illinois Tollway;

- Change in bid opening date. The bid opening date may be revised for a variety of reasons such as:

- To allow the bidders additional time to review addendum items.
- To eliminate concurrent bid openings between Illinois Tollway projects or with outside agencies projects.

- Revision to Illinois Tollway special provisions, including updates to Disadvantaged Business Enterprise Participation (DBE), Veteran Owned Small Business Participation (VOSB), Equal Employment Opportunity Program (EEO), Earned Credit Program (ECP) and other 100 series special provisions. These are typically provided to the Illinois Tollway PM and incorporated into the addendum by the DSE.
- Issuance of the minutes of any pre-bid meeting(s).
- Answers to Plan Holder questions.

Designer Requested Changes: The DSE shall prepare an addendum on the following subjects, as recommended by the DSE and agreed to by the PM. The DSE should base their recommendations on the need to eliminate substantial out-of-scope work during the construction phase and to avoid significant impacts to the basis for the bid, as discussed in the Addendum Overview (Article 4.9.1):

- Inaccuracies or omissions in the Contract quantities.
- Inconsistencies or omissions in the Contract Plans and/or Specifications.
- A revision resulting from an Inquiry from a Plan Holder. Plan Holders may submit questions or comments (Inquiries) to the Illinois Tollway as directed in the Advertisement for Sealed Bids (A-1 page) of Contract Requirements. The DSE reviews the Inquiries from Plan Holders and provides a response for each to the Illinois Tollway. Responses to Plan Holders must be submitted as part of an addendum.

4.9.4 Addendum Review and Routing prior to Release

The DSE completes the documents of the addendum package following the Addendum Guidelines available in the WBPM system and provides them to the Illinois Tollway PM. The DSE transmittal letter to the Illinois Tollway PM needs to disclose that the DSE has thoroughly reviewed the contents and format of the addendum package and that they are in compliance with Illinois Tollway standards. Reviews of the addendum package may be conducted by the Illinois Tollway prior to release. The DSE shall plan to submit the entire addendum package to the Illinois Tollway PM in accordance with Article 4.9.2 using the proper WBPM process. The addendum package shall be submitted approximately ten business days prior to the anticipated release date, or as discussed with the Illinois Tollway PM. The DSE shall be prepared to quickly update the addendum as needed during the reviews. Any time added to address comments may adversely impact the ability to release the addendum.

4.9.4.1 Addendum Review and Routing by the Illinois Tollway PM

The Illinois Tollway PM conducts the initial review of the addendum package. The DSE updates the addendum package as needed to address comments by the Illinois Tollway. The review is complete after the DSE has addressed all comments.

After the review, the Illinois Tollway PM initials the memorandum for Addendum Release Approval and routes one set of the entire addendum package for signatures by (in the following order):

- Deputy Program Manager
- Program Manager
- Deputy Chief Program Control/System Integrity
- Chief Engineering Officer

The signatures are needed prior to submitting the addendum for release. The Illinois Tollway PM and DSE should be prepared to verbally describe and summarize the need and contents of the addendum as part of securing the signatures.

4.9.4.2 Addendum Review and Routing by Contract Services

Prior to issuing the addendum to Plan Holders, the Illinois Tollway conducts final review of P-Page content, submittal of revised Engineer's Estimate and general formatting of the addendum. Similar to the Illinois Tollway PM review, the DSE should be prepared to address comments as soon as they are received.

P-Page review

- Conducted by Illinois Tollway Contract Services.
- Early submittal of the P-Page changes is highly recommended (P-Page revisions shall be sent to the Illinois Tollway PM, as soon as they are completed and before submitting the addendum package to the Illinois Tollway PM).

Format review

- Starts after the P-Page review is completed and accepted by Illinois Tollway.
- One copy of the complete addendum is routed for internal Illinois Tollway review. This review may take up to two days, which reinforces the need for early coordination of an anticipated addendum with Contract Services.

NOTE: No changes to the addendum are allowed after the addendum package is reviewed by the Illinois Tollway. If changes are made, an additional review may be required. Availability of reviewers and the workload within the Illinois Tollway may impact the processing time for addendums.

4.9.5 Transmitting an Addendum to Plan Holders

Addenda are released to Plan Holders through the Illinois Tollway's vendor for Online Plan Sales (Vendor). All coordination with the Vendor occurs through Contract Services. The DSE or Illinois Tollway PM should not contact the Vendor directly without prior approval from Contract Services.

An addendum may be issued with up to two paper sizes. The pages for the Addendum Summary and Contract Requirements are typically issued on 8 ½" x 11" sized paper. Plan Drawings are typically issued on 11" x 17" sized paper. The Vendor tracks receipt of the addendum from Contract Services, date of issue on the addendum, proof of transmittal to all Plan Holders and the date of the transmittal.

At this point the DSE shall upload the addendum documents to the WBPM system to document the changes to the advertisement package. The addenda in combination with the advertisement package shall then document the Bid Documents within the WBPM system for the Contract design.

4.9.6 Addendum Document Requirements

When submitting the addendum documents to the Illinois Tollway PM, the following are general guidelines for what needs to be submitted and the overall format:

- Draft Addendum Release Approval memorandum – 1 electronic copy that may be edited by the Illinois Tollway PM
- Addendum document – 1 electronic copy (8.5"x11" and 11"x17" of plans) uploaded to the WBPM system
- P-Pages – 1 electronic copy uploaded to the WBPM system. All P-Pages must be included with the addendum regardless of the number of pay item changes

4.9.7 Final Engineer's Estimate

A Final Engineer's Estimate shall be submitted to the Illinois Tollway PM for review and formatting by the program controls team at least five business days prior to the bid opening. The Final Engineer's Estimate should list all unit prices rounded to two decimal places, all quantities rounded to the P-Page displayed value and all pay item numbers and descriptions in the order matching the P-Pages as issued in the Bid Documents.

4.10 Bid Support Phase

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

- Participate and assist the Illinois Tollway in pre-bid meeting(s)
- Bid document preparation support
- Pre-construction bid meeting support
- Assist in preparing responses to bid document questions
- Assist in preparing bid document addendums (when required)
- Construction Bid review support (when required)
- Analysis of Contractor bids. This includes evaluating all of the bidders average, low bidder and comparison with the engineers estimate. The low bidders submitted prices

shall be evaluated for variances above or below the average unit price with descriptions to why these variances occurred.

- Recommendation to accept/reject contractor's bid
- Electronic file delivery to successful bidder
- Submittal of Addenda drawings (only issued to the successful bidder), shall be provided prior to the pre-construction meeting.
- Where applicable, update the IGA cost estimate to reflect as-bid costs and submit to the Illinois Tollway PM for Agency coordination.

4.11 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. During construction, the DSE may be under a separate Contract with the CM or may have hours in the DSE Contract for construction support phase:

- The DSE shall coordinate with the Illinois Tollway PM to determine if a meeting is needed and schedule said meeting to transition the project from the DSE to the CM.
- The DSE shall submit a separate listing of those pay items or component parts of pay items which may 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.
- The DSE shall 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 CM may include the Illinois Tollway Design PM and DSE for review of proposed Contract changes and construction revisions. The DSE shall promptly review such changes and provide a recommendation to the CM.
- The DSE may be requested to provide shop drawing reviews of Contractor's submitted performance based retaining walls to ensure they are in conformance with the Plans and Specifications.
- The DSE may be requested to evaluate a Contractor's request to substitute material or equipment. The DSE shall work with the CM to resolve the issue in an expeditious and timely manner.
- Proposed Contract changes (field changes, value engineering proposal or performance base design) may affect the Final Barrier Warrant Analysis. The DSE should follow and be familiar with the requirements of the amendment process outlined in the Illinois Tollway's Traffic Barrier Guidelines.
- The DSE shall prepare and submit the ILR10 permit Notice of Intent (NOI) and attend the Erosion Control Pre-Construction Meeting.

4.12 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 Illinois Tollway and the DSE. The DSE is required to complete the Documentation Matrix for Design, which is available on the WBPM system under Project 16.

4.12.1 Final Negotiations and Financial Close-Out

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

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

Prior to these negotiations, the Illinois Tollway PM should ensure that all outstanding office-executed engineering changes have been finalized, including incorporation into Contract amendments.

4.12.2 Notice of Project Completion

Notice of project completion shall be issued by the Illinois Tollway only after all project close-out activities are complete. A project notice of completion letter shall be issued by the Illinois 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 including a complete submittal of CADD files uploaded to the WBPM system, taking precautions to maintain the data links, within the CADD files and file folder structure in accordance the DSE Consultant's Quality Plan and Computer Aided Design and Drafting Standards Manual.
- A letter from the DSE stating that they have completed their services and there shall be no further invoicing.

SECTION 5.0 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 may 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 shall be the responsibility of the DSE to correct the inconsistencies so the submitted material complies with the guidelines at no additional cost to the Illinois Tollway. DSE Contract folders shall be established and maintained in conformance with the Illinois Tollway's WBPM system.

5.2 Preparation of Drawings

In order to ensure uniformity in the work of DSE firms, the Illinois Tollway may provide sample plans from previous Contracts. However, each DSE shall 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 Illinois Tollway.

5.2.1 Size and Scale of Drawings

- All Contract Plans shall be prepared in accordance with the CADD Standards Manual.
- Further information regarding drawing scales is presented in Article 5.2.5.
- All other drawings shall be to a scale selected by the DSE and coordinated with the Illinois Tollway PM to most clearly portray the information.

The 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 volumes. This division is mandatory when the total number of drawings (including Standard Drawings) exceeds 250.

- Each volume shall have a Title Sheet and Index of Drawings 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 section.

- Each drawing, except for the Illinois Tollway Standard Drawings and IDOT Highway Standards, shall be numbered.

- Title & Signature Sheet
- Index of Drawings and List of Standards
- General Notes
- Suggested Progress Schedule
- Summary of Quantities
- Earthwork Schedule of Quantities
- Schedule(s) of Quantities
- Alignment & Ties
- Typical Sections
- Maintenance of Traffic
- Existing Roadway & Removal Plans
- Proposed Roadway Plans
- Roadway Profiles
- Roadway Details
- Utility Matrix & Plans
- Existing Drainage & Removals
- Proposed Drainage Plans
- Drainage Profiles
- Drainage Details
- Pavement Jointing and Elevation Plans
- Grading Plans
- Environmental Soil Classification Plans
- Landscape and Fencing Plans
- Erosion Control Plans
- Pavement Marking Plans
- Signing Plans & Details
- ITS removal and installation plans with cross section of each ITS sites
- ITS communication plan
- ITS calculations required by the Code and Illinois Tollway ITS requirements
- Roadway Lighting Plans
- Structure Plans
- Structural Details
- Boring Logs Sheets
- Architectural Plans
- Facility Electrical Plans
- Mechanical Plans
- Cross Sections

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
- Illinois 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 cross roads 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 Illinois 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 number of professional seals required exceeds the space limitations on the Title Sheet a separate drawing may be added for the seals.
- 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 Illinois Tollway Standards

Illinois Tollway Standard Drawings used within the Contract shall be listed in numerical order by standard number and revision number with exact title as shown on each drawing. Illinois Tollway Standard Drawings listed in the Index of Drawings by the DSE shall be added by the Illinois Tollway's printer to the Contract Documents. When Standard Drawings are referenced throughout the Contract Plans the references should not include the revision number of Standard, the revision number should only be listed in the Index of Drawings.

5.2.4.2 IDOT Highway Standards

IDOT highway or bridge standard drawings with latest revisions shall be listed as part of the Index, following the Illinois Tollway Standard Drawings. IDOT Highway Standards listed by the DSE shall be added by the Illinois Tollway's printer as full standard size plans to the Contract

Documents. Full standard size plans of IDOT District specific standard drawings shall be provided by the DSE as project details and included in the Contract Plans.

5.2.4.3 General Notes and Project Commitments

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 Illinois Tollway PM for approval at the time of the Preliminary Design submittal.

5.2.4.4 Drawings

Drawings are numbered and referred to as "Drawings". Sheet numbers are shown in the lower right corner immediately above the title box. All scales referenced in this section are for full sized sheets (22" x 34") unless otherwise noted.

5.2.5 Drawing Scale

5.2.5.1 Roadway Plans

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

5.2.5.2 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'.

5.2.5.3 Typical Sections

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

5.2.5.4 Drainage and Utilities

- 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'.
- Use 1" = 20' for plazas and other facilities.

5.2.5.5 Landscape and Temporary/Permanent Erosion Control Plans

- Use same scale and orientation as the roadway plans.

5.2.5.6 Maintenance of Traffic Plans

- Use a scale of 1" = 50' for the full length of the project.
- Use 1" = 50' for site plans for each overhead sign truss, cantilever and bridge mount location.

5.2.5.7 Roadway Lighting

- Use 1" = 50' for proposed roadway lighting plans.

5.2.5.8 Intersection plans

- Use 1" = 20'.

5.2.5.9 Cross Sections

- Typically use a scale of 1" = 10' horizontal and 1" = 5'.
- Special circumstances such as median closure work may require consideration of a vertical scale of 1" = 2'.

5.2.6 3-D Engineered Models

All 3-D Engineered Models shall be delivered in native CADD format as well as breaklines and surface files in the following formats below and in accordance with the CADD Standards Manual.

- All CADD Models (2-D and 3-D) shall be provided in their native CADD formats.
- Breakline files shall be provided as a LandXML file.
- Surface files shall be provided as a LandXML file.

5.3 Quantity Calculations

Quantity calculations for every pay item shall be transmitted to the Illinois Tollway in the format of an excel file and pdf.

SECTION 6.0 COORDINATION REQUIREMENTS

The Illinois Tollway is required to comply with internal regulations and directives, as well as state and federal government policies, including the Toll Highway Act (605 ILCS 10/). The role of the DSE shall be to coordinate with all necessary Illinois Tollway Departments to ensure the project design meets these regulations, directives and policies. Regular coordination meetings may be required with the Illinois Tollway PM and the following Illinois Tollway Departments: Maintenance, Traffic Operations, Business Systems, IT, Planning, Environmental, Land Acquisition, Utilities, Communications, PMO, GEC and others. This Section provides the DSE additional coordination guidance which are required to complete most Illinois Tollway design projects.

6.1 End User Coordination

The Illinois Tollway PM and DSE shall be in regular coordination with the appropriate Illinois Tollway Departments which shall act as the end user, upon completion of the project. These Illinois Tollway departments include: Maintenance, Traffic Operations, Business Systems, IT and State Police.

6.2 Permitting

The DSE is responsible for coordinating and obtaining all permits necessary for construction prior to advertisement. Common permitting agencies necessitating approval for Illinois Tollway Projects include, but are not limited to:

- Illinois State Historic Preservation Office (SHPO)
- National Pollutant Discharge Elimination System (NPDES)
- Clean Construction Demolition Debris (CCDD)
- U.S. Fish and Wildlife Service (USFW)
- U.S. Army Corps of Engineers (ACOE)
- Illinois Environmental Protection Agency (IEPA)
- Illinois Department of Natural Resources (IDNR)
- Illinois Department of Transportation (IDOT)
- Municipal / County DOT
- Railroad Coordination / Permitting

6.3 Land Acquisition

As part of its capital planning process, the Illinois Tollway often seeks to acquire real estate needed for various public purposes, including the construction or expansion of the Illinois Tollway system. The Illinois Tollway has adopted policies that provide fair and equitable procedures for the acquisition process.

When the DSE identifies properties requiring acquisition for Illinois Tollway purposes, the DSE shall engage the Illinois Tollway Land Acquisition Unit and initiate the Plat of Acquisition (POA)

process, utilizing the WBPM system. Once the DSE submits the necessary documentation, the average acquisition timeline requires 18 months to obtain the property for Illinois Tollway purposes. This timeline is the same regardless of type of acquisition (fee simple, permanent easement, temporary easement, or access control).

Preliminary right-of-way needs are to be identified in the Concept Studies for the Project. These needs are to include the County Property Identification Number (PIN) so that title commitment letters may be ordered. Preliminary POA's shall be submitted no later than the Preliminary Plans submittal or no later than 90 days after receipt of the title commitments and the POA's shall show the final land acquisition needs based on the DSE's design. Submittal of signed POA's for use by the Illinois Tollway's designated appraiser is to occur within 30 days after receipt of comments on the preliminary POA's.

For additional information regarding Land Acquisition including: fact sheets, frequently asked questions, average timelines and relocation program summary; please reference the Illinois Tollway website.

6.4 Utility Coordination

Utility relocation guidelines are designed to provide the DSE direction related to the relocation of utilities on Illinois Tollway improvement projects. Utility Plan sample contract drawings may be found in the Drainage Design Manual, Appendix I. For additional information regarding Utility Policy, Standard Matrix, Relocation Flowchart or required forms please reference the Illinois Tollway Website.

6.4.1 Illinois Tollway Furnished Items

The Illinois Tollway PM may provide the DSE with the following:

- A list of known utilities within the project area.

6.4.2 Required DSE Utility Relocation Services

- The DSE shall identify, coordinate and resolve through the Illinois Tollway PM, all utility conflicts within the project limits. Part of this process includes adjusting the design to avoid utility conflicts when feasible and when in the best interest of the Illinois Tollway.

- The DSE shall coordinate and resolve through the Illinois Tollway Fiber Optic Maintenance and Management PM all conflicts that involve Illinois Tollway Fiber Optic and Illinois Tollway facilities (Gas, Water, Sewer, Communications and Electric).

- The DSE shall obtain and keep record of all atlas files collected from the utility companies. These records shall be documented on the WPBM system.

- The DSE shall make known, verify and include on the design plans all existing utilities and known interferences associated with the improvement(s).

- The DSE shall conduct field surveys to verify information received from the utility companies is accurate and complete.

- The DSE shall review and coordinate all utility relocation plans prepared by others for

conflicts between the design plans and the relocation plans of other utilities.

- The DSE shall identify utility conflicts which require an extended period for relocation or purchase of materials and determine the effect of the 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 Illinois Tollway, unless otherwise directed by the Illinois Tollway or the municipality.

- The DSE shall prepare an estimate of cost for all relocation of utilities in the design section

- The DSE shall attend regular meetings with the Illinois Tollway's Utility Personnel.

- The DSE shall include in the Contract Documents all information provided by a Utility relating to existing or relocated facilities.

- All work orders shall be provided to the Illinois Tollway PM to be uploaded in the Online Plan Room. The DSE shall provide executed utility work orders with the CM.

- The DSE shall prepare and maintain documentation for each relocation and incorporate into the Utility Matrix within the plans.

- The DSE shall coordinate and prepare (if needed) any necessary documentation of forms required by any permitting agency.

- The DSE shall coordinate with the utilities the points of service required by the design and coordinate all required documentation to ensure a timely completion of the work.

- DSE shall identify and coordinate with other utility customers whose services will be impacted by relocations and Illinois Tollway construction.

- The DSE is responsible to identify the need for utility agreements and/or property rights to perform the utility relocation work.

- In some instances the DSE may be asked to apply for and pay any fees for new utility service on behalf of the Illinois Tollway. The Illinois Tollway shall execute all service agreements as the Owner. All documentation for new service billing should be sent to "Illinois Tollway" to the attention of "Chief of Operations". No other names for the Illinois Tollway are acceptable and new service applications that do not follow this procedure shall not be presented to the Chief Engineering Officer for execution.

- The DSE shall establish a general service representative (GSR) and an account number.

- The DSE shall create a load letter for each new electrical service requested and forward it to the DCM for review. The DSE shall send the load letter to the electrical utility no later than 16 weeks prior to advertisement date. After the load letter is submitted, a field meeting should be scheduled by the GSR to produce a preliminary plan showing proposed utility service.

- The naming/addressing convention for all services should read as follows: Corridor Facility MP Direction, City (e.g. I90 IPDC MP 23.9 WB, Belvidere, IL).

6.4.3 Utility Relocation Process

The DSE is required to provide a weekly Design Utility Report to the Illinois Tollway that summarizes all utilities within the project limits. In particular, the report provides weekly status on resolving the potential utility conflicts. This report is a means to assist the DSE in fulfilling their requirements for coordinating utility relocations. Reference the WBPM system for a Design Utility Report template.

Step 1 - The DSE shall contact each utility company to start the process of conflict identification. If the utility does not respond, the facility should be considered "in conflict" unless the utility company determines otherwise.

Step 2 - 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 shall fill out a Notice of Interference (NOI) Form for all utilities within the project limits as determined by their preliminary findings. The DSE then sends the Plan Sheets (strip maps) along with the NOIs to the proper department at the utility companies for mark-up and comments. For areas that may require more detail, the DSE shall engage the services of a SUE consultant, if such services are not available through the Illinois Tollway.

Step 3 - The DSE shall obtain the marked up Preliminary Plans from the utility companies and transfer the existing facility information and locations to the plans. The DSE shall keep copies of all NOIs submitted to the Utility. The Utility confirmation of conflict/no-conflict and the DSE response correspondence of concurrence with the Utility findings are to be uploaded to the WBPM system before closing out any NOI.

The DSE shall identify, depict and label the existing utility company facilities on the plans. Included in the depiction and labeling the DSE is required to provide the Utility Job Number for all utilities. This Utility Job number may be a Relocation number (e.g. NW 1959-16) or Permit number (e.g. N07 Comed-105).

DSE shall submit the NOI forms that they and the Utility have determined to be in potential conflict with the Illinois Tollway for further processing. Only the NOIs that have been determined to be a potential conflict shall be submitted to the Illinois Tollway for processing. This should be done utilizing the WBPM system.

Step 3A - The Illinois Tollway Utility Group shall review the Notice of Interference Forms and assign Utility Conflict numbers.

The Illinois Tollway may determine utility reimbursement status.

The Illinois Tollway shall determine the need for utility agreements

The Illinois Tollway Utility Group shall execute the Notice of Interference Forms and return the forms to the DSE. The DSE shall send the completed forms to the respective utility companies.

Step 4 - Prior to the Preliminary Plan Submittal, the DSE meets with the Illinois Tollway to discuss expectations for utility coordination.

Step 5 - The DSE initiates the following activities:

- Review right-of-way requirements for the project.
- Checks right-of-way availability for relocating utilities.
- Checks and verifies prior rights of utility within any proposed ROW acquisition.
- Advises utilities of any right-of-way takes.
- Identifies the need for any utility company relocation agreements.
- Notice of Work Order (NWO) for all utilities determined to be in conflict will be submitted to and distributed by the Illinois Tollway. A template of the NWO is in Project 16 on the WBPM system.

Step 6 - Preliminary Plan Submittal (60% design complete) - the DSE shows the following information on the submitted plan set:

- Existing utilities
- Utility job numbers shall be shown on plans (as described in Step 3). The DSE shall submit the number of sets of the Preliminary Plans to each utility company as required by each utility company. The plans shall be noted as "Utility Final".

Step 6A - 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 6B - DSE and Illinois Tollway actions (60% design complete) The DSE, Utility and Illinois 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 with consideration for extreme weather impacts.
- Consideration of utility, state, municipal and other agency moratoriums.
- Advanced scheduling of utility services disruptions/shutdowns.
- Temporary facility needs.

Step 7 - Pre-Final Plan Submittal (95% design complete)

The DSE shall submit the following documentation to the Illinois Tollway:

- Review of Utility Work Orders submitted by the utility company.
- Provide one set of the utility plans.
- Review of the cost estimates for utility relocations including right-of-way related efforts.
- Process the Order for Utility Work so that the information is available to the perspective bidders by the time of advertisement of the plans.

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

- Finalize right-of-way availability for relocation.
- Utility materials status.
- Seasonal constraints resolved.
- Temporary facilities identified.
- Shutdown and/or disruption of service scheduled.

6.4.4 Documentation

- Utility relocation documentation, including the NOI, NWO, DUR and Work Order reviews, are performed by the DSE. The Utility is responsible for the creation of the Work Order and any A28s, if required. The Illinois Tollway will process all documentation and create the NTP once the Work Order is approved and bid documents or letter of preferred contractor are received from the Utility.
- Notice of Interference is prepared by the DSE. The Order for Utility Work is prepared by the Utility Company. The Notice to Proceed is prepared by the Illinois Tollway.
- Coordination of utility relocation plans and documents with design plans and documents is the responsibility of the DSE.
- The DSE shall provide work orders to the CM through the construction contract in the WBPM system in order to be coordinated with the contract work.
- The DSE shall identify and make known all interferences between the proposed construction and all utility facilities. The DSE shall coordinate all necessary documentation and forward it to the Illinois Tollway for processing.
- Utility relocation plans and cost estimates prepared by others shall be reviewed by the DSE to verify the relocations shall not interfere with the proposed improvements. Review of estimates may only be for order of magnitude and reasonableness. Additionally, the Illinois Tollway reserves the right to make recommendations as well as the right of approval.
- Agreements for utility service.

6.5 Unmanned Aircraft System (UAS) Coordination

- Unmanned Aircraft System (UAS) usage shall comply with Article 107.40 of the Illinois Tollway Supplemental Specifications.

SECTION 7.0 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 DSE Consultant's Quality Plan
- Value Management
- Constructability review

7.2 DSE Quality Program

The DSE is responsible for developing their Quality Plan for design activities following the Guidelines for Design Section Engineer's Quality Program located on the WBPM system. The DSE and the Illinois Tollway shall continually monitor the Quality Plan for effectiveness.

7.3 Value Management

The DSE may be required to perform a Value Management Study if directed by the Illinois Tollway.

7.4 Constructability Review

The purpose of Constructability Review is to ensure that the project may be built as designed, with the objective of ensuring that the number of potential change orders and extra work orders is minimized and the probability of delays and disputes is reduced. Constructability Reviews shall be conducted, by a member of the DSE team with previous construction experience, and submitted with the 30%, 60% and 95% submittals. The Illinois Tollway may waive the requirement for these reviews at their discretion on projects considered less complex.

SECTION 8.0 PROJECT BUDGET AND COST ESTIMATES

8.1 Design Section Engineer Responsibilities

This Section provides guidance for the DSE development of cost estimates required at the various phases of a project. The DSE is responsible for providing a design for the Project which has an estimated construction cost equal to or less than the Illinois Tollway's construction budget for the Contract ("design to construction budget").

8.1.1 Milestone Estimate Submittals

The DSE is responsible for developing a cost estimate for each milestone submittal. The Illinois Tollway may provide the DSE with a review of each submittal. Any reviews provided do not in any way relieve the DSE of their responsibility for accuracy and completeness of their estimates. Each milestone submittal should include a summary of previous milestone submittal cost estimate amounts with a brief description of significant changes since the last submittal.

8.1.1.1 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.

8.1.1.2 Conceptual Estimate:

The estimate prepared by the DSE relative to Contract item quantities and costs when the Plans and Specifications reach 30% completion. The Illinois Tollway shall perform a review of the conceptual Cost Estimate and provide the DSE with comments. The comments shall require disposition from the DSE prior to submission of the Preliminary Cost Estimate.

8.1.1.3 Preliminary Estimate:

The estimate prepared by the DSE relative to contract item quantities and costs when the Plans and Specifications reach 60% completion. The Illinois Tollway shall perform a review of the Preliminary Cost Estimate and provide the DSE with comments. The comments shall require disposition from the DSE prior to submission of the Pre-Final Cost Estimate.

8.1.1.4 Pre-Final Estimate:

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

8.1.1.5 Final 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 Illinois Tollway may review the Engineers Cost Estimate and provide the DSE with comments. The comments shall require disposition from the DSE prior to bid.

8.1.2 Basis of Cost Estimate Development

The guiding principles to cost estimate development include:

- All cost estimates developed by the DSE are prepared to ensure the application of the "design-to construction budget" concept.
- The DSE is required to provide Contract item quantities for the purpose of preparing estimates.
- The DSE shall provide a detailed breakdown of lump sum pay items based on the Construction Specification Institute (CSI) specification sections.
- 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.
- Identification and information used to prepare the cost estimate shall include, but is not limited to, the following:
    - Type of estimate and milestone submittal.
    - Estimates shall be prepared in the standard Schedule of Prices format and contain the information prescribed by the Illinois Tollway.
    - Historical cost information from the Illinois Tollway and other related agencies.
    - Escalation factors used, including percentages and dates for escalation periods and source of escalation factors.
    - Total regional construction volume, labor and material availability, overall industry workload and industry overhead 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 and other design assumptions.
    - If labor hours are restricted or if the project requires the use of overtime to meet schedule demands based upon productivity rates, the DSE shall provide

the factors used for labor adjustments needed for Illinois Tollway work and account for premium time in the estimate.

- Evaluation of site conditions for determination of impact on costs.
- Dates for scheduled Contract Award, Substantial Completion and Construction Duration.
- Exclusions for work or services provided by others within the project and/or project items.
- 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.
- Utility service relocation efforts by others

8.1.3 Design Contingency

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**
Master Plan Estimate	25%
Conceptual Estimate (30%)	20%
Preliminary Estimate (60%)	10%
Pre-Final Estimate (95%)	5%
Engineer's Estimate (100%)	0%

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 Illinois Tollway by the DSE.

8.1.4 Analysis of Construction Bids

The purpose of analyzing construction bids is to evaluate the consistency of the Bid Estimate, to determine that line item costs are reasonable 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 relative to those of all other bidders.
    - Low bidder's unit price variance with average unit prices.

The DSE shall prepare a letter to the Illinois Tollway PM summarizing the analysis findings and providing a recommendation to the Chief Engineering Officer of whether to award to the low bidder, disqualify the low bidder and award to the second bidder, or re-bid the Contract. An overall rationale should be provided with the recommendation.

8.2 Illinois Tollway Responsibilities

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

8.2.1 Illinois Tollway Project Manager (PM)

The Illinois Tollway PM shall be responsible for coordinating the efforts of the DSE and the Illinois Tollway's Estimating Group on all matters regarding budget and estimates. Estimates shall be done in accordance with Illinois Tollway Procedure P4110.

8.2.2 Illinois Tollway Estimating Group

- The 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 Estimating Group shall review cost estimates prepared by the DSE for 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.

SECTION 9.0 DSE 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.
- Document whether the DSE's actual and planned progress are reasonable and in compliance with the Contract Documents.

9.2 Illinois Tollway PM Responsibilities

On a monthly basis the DSE provides the Illinois Tollway PM with a monthly schedule and a report containing:

- Executive summary.
- Schedule narrative.
- Work progress.
- Comparison of project planned cash flow with actual.
- An in-depth schedule analysis including critical path and comparison against the Baseline Schedule or Approved Revised Schedule.

The Illinois Tollway PM shall 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. Identified potential schedule issues shall be discussed with the DSE and depending on the nature and magnitude the Illinois Tollway PM may request a recovery Schedule.

9.3 DSE Responsibilities

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 Illinois Tollway PM.
- 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 coordination, conflict identification, 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.
- Illinois 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 shall be required to update this schedule periodically as agreed to with the Illinois Tollway PM. Changes to the design schedule shall be approved in advance by the Illinois Tollway PM.

SECTION 10.0 DESIGN RESOURCES AND GUIDELINES

This Section lists the primary standards, criteria, resources and guidelines used in the design of Illinois 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 Improvement Record and iPlans

- The Illinois Tollway Improvement Record document which provides a graphical presentation of historical contracts that have been performed throughout the Illinois Tollway System is, available at www.illinoisvirtualtollway.com. Also available at the Illinois Virtual Tollway website is access to iPlans. Current vendors with the Illinois Tollway are able to request a login through the iPlans system which shall allow them access to record plans for their design section.

10.1.2 Specifications and Standards

- IDOT Standard Specifications, Supplemental Specifications and Recurring Special Provisions, available at IDOT website under Doing Business.
- IDOT Highway Standard Drawings, available at IDOT website under Doing Business.
- Illinois Tollway Supplemental Specifications to IDOT Standard Specifications, available at the Illinois Tollway website under Doing Business.
- Illinois Tollway Standard Drawings and Standard Base Sheets, available at the Illinois Tollway website under Doing Business.
- Illinois Tollway Special Provisions which are found on the Illinois Tollway's WBPM system.

10.1.3 Illinois Tollway 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 Illinois Tollway. The current editions of the following manuals are available at the Illinois Tollway website under Doing Business:

- Computer Aided Design and Drafting (CADD) Standards Manual
- Construction Manager's Manual
- Contractor's Quality Program Manual
- Drainage Design Manual
- Environmental Studies Manual

- Erosion Control and Landscape Manual
- Geotechnical Manual
- Guidelines for Roadway Illumination
- INVEST Project Development Manual
- Intelligent Transportation Systems (ITS) Manual
- Quality Standards for Work Zone Traffic Control Devices
- Roadway Design Criteria
- Roadway Signing and Pavement Marking Guidelines
- Roadway Traffic Control and Communications Manual
- Structure Design Manual
- Traffic Barrier Guidelines
- Illinois Tollway AADT Lane Closure Guide
- Illinois Tollway Lane Closure Reference Guide
- Traffic Generator and Info Sign Policy

10.1.4 Policies and Guidelines

- See the Illinois Tollway's website for current Design and Construction Bulletins.

10.1.5 Design Deviation

In any instance where Illinois Tollway policies, standards, or criteria established within the aforementioned documents or other Illinois Tollway materials cannot be met for specific reasons or are inadequate to fulfill the scope of services requirements, the DSE shall complete the "Illinois Tollway-Request for Design Deviation to Criteria" (Design Deviation) process and submit it to the Illinois Tollway, via the WBPM system. No further work shall be expended on the subject under question until the Design Deviation is approved by the Chief Engineering Officer.

Design Deviations shall be submitted as early as possible in the design process. They are submitted as a separate document and thus are not linked to a WBPM design milestone submittal process. The DSE shall submit a Design Deviation tracking report at each design milestone starting at the Conceptual Design Phase through Advertisement Phase or until all Design Deviations have been approved or resolved. This report shall include all project Design Deviations, including any previous deviations, with numbers, descriptions and statuses. When a major Design Deviation has been identified, which may impact roadway geometry, or any other project critical element, the DSE may request a meeting from the Illinois Tollway PM to discuss the item with Illinois Tollway and GEC staff. During design milestone review meetings, the DSE shall be prepared to discuss in detail any potential Design Deviations that are identified during

the design process. If a Design Deviation has been approved during Master Plan or Conceptual phases but the proposed design in latter phases further deviates from what was previously approved, a new Design Deviation may have to submitted. Coordinate with the Illinois Tollway PM and GEC regarding whether or not a new Design Deviation is required.

Documentation of previous Design Deviations within the project limits may or may not be available. For all projects, the DSE shall identify all instances where the existing facility does not meet current criteria. For Rehabilitation projects, the DSE shall revisit existing deviations and use engineering judgment to evaluate whether redesign is warranted in order to eliminate the nonconformity. If the nonconformity is to remain, the DSE shall complete the above described Design Deviation process, regardless of whether a previous deviation was documented. For reconstruction projects, the DSE shall design the facility with the disposition to meet all applicable criteria as is reasonable.

The first priority of the designer is to meet all applicable design criteria. Design Deviation is considered a last resort when all other possibilities have been exhausted.

The burden of proof is on the designer to demonstrate the following conditions have been met:

- Evaluate and present the implications of meeting the policy, standard, or criteria thereby indicating that no reasonable alternatives exist which comply with Illinois Tollway policy, standard, or criteria.
- The potential impacts of the proposed Design Deviation have been mitigated to the maximum extent possible. Mitigation includes minimization of the magnitude and extent of the deviation, as well as applying countermeasures to reduce the impacts of the deviation.
- Sufficient supporting documentation has been provided which evaluates overall risk through considering the impacts to public safety, operation of the facility, compatibility with adjacent sections of roadway and whether the deviation is permanent or temporary. Note that a Design Deviation is a stand-alone document that shall be entered into the project record. All supporting documentation shall be provided as one document, to scale, attached to the Design Deviation process.

When completing the Design Deviation process, none of the following may be the sole justification for the deviation:

- Cost and/or Schedule impacts.
- The DSE scope and/or prequalifications.
- The proposed condition was in a previously accepted Master Plan or Concept Report.

When design deviates from multiple criteria at a single location, separate Design Deviations shall be completed for each criterion being deviated from. If a single criterion is deviated from in multiple locations under similar circumstances (e.g. reduced shoulder width at numerous bridge crossings due to the same restriction), these may be grouped together in a single Design Deviation at the DSE's discretion. Design Deviations common to a corridor may be submitted jointly by the DCM or independently by individual DSE.

The Illinois Tollway has no hierarchy for design criteria that may be deviated from. If evaluating trade-offs between designs deviating from different criteria, the Engineer shall use judgment to determine the alternative which provides the greatest safety benefit.

Further information and guidance is provided within the Design Deviation process instruction document found on the WBPM system (Project 0016 - Documents - User Manual).

SECTION 11.0 RELATED REFERENCES

Where the Illinois Tollway supplied guidelines and design criteria do not address specific design issues which may arise during design development, the DSE is then directed to 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.
    - Illinois Supplement to the National Manual on Uniform Traffic Control Devices
- American Association of State Highway and Transportation Officials (AASHTO):
    - Roadside Design Guide
    - Publication entitled "An Informational Guide for Roadway Lighting"
    - Publication entitled "A Policy on Geometric Design of Highways and Streets"
    - Standard Specifications for Highway Bridges
    - LRFD Bridge Design Specification
    - A Guide for Transportation Landscape and Environmental Design
- Manual on Uniform Traffic Control Devices
- American National Standard Practice for Roadway Lighting, ANSI/IESNA RP8
- Illinois Urban Manual
- Other design, construction and operating practices accepted by the Illinois 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 Illinois 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 protecting the interests of the Illinois 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 shall be accomplished by the DSE as an initial activity of the project.

SECTION 12.0 CHANGE MANAGEMENT

Identifying, communicating and managing changes to the project cost and/or schedule are the responsibility of all members of the project team, including the Illinois 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 Illinois Tollway and DSE management team the opportunity to minimize or mitigate impacts of the potential change. The vehicle used for managing change issues is the Staff Summary Sheet process.