Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

CTSS Project Delivery Process

The CTSS (Controlled Traffic Signal Systems) Project Delivery Process is designed to facilitate the design of CTSS Projects in a structured and efficient manner. This process is intended to guide designers through the design of a CTSS Project. The CTSS Project Delivery Process Flowchart illustrates the process for delivering CTSS Projects and can be found at the link below. Additional information can be found in Section C.2.7 of the Transportation Systems Management (TSM) Procedures Manual.

Figure 1: CTSS Project Delivery Process Flowchart

For a full size view of the above CTSS Project Delivery Process Flowchart, see the link below.

MANUAL REFERENCE:

CTSS Project Delivery Process Flowchart
CTSS Project Delivery Flowchart.pdf

The CTSS Project Delivery Schedule further illustrates the process in greater detail depicting the interaction timeline between associated tasks. The schedule template can be found in the link below.

MANUAL REFERENCE:

CTSS Project Delivery Process Schedule Template
CTSS Project Delivery Process Schedule Template MSP2007.mpp

The task descriptions in the following sections describe in detail the process tasks illustrated in the CTSS Project Delivery Process Flowchart and CTSS Schedule Template. This process defines the roles and responsibilities of MSE Staff, Designers, and Regional Electrical Operations staff involved in the design...
and construction of a CTSS Project and are broken into 11 sub-phases, with the following submittals, as follows:

1. **Project Assessment**
2. **Project Assignment**
3. **Project Screening**
   a. Draft Systems Engineering Documents
   b. Initial Screening Report
   c. Gap Analysis
   d. Data Collection Program
4. **Project Verification**
   a. Data Collection Report
   b. Field Conditions Memo
5. **Preliminary Engineering**
   a. Existing Conditions Model and Clearance Intervals
   b. Structural Calculations
   c. Subsurface Investigation Report
6. **Interim Design**
   a. Optimized Conditions
   b. Interim Design Plans and Specifications
   c. Engineer’s Estimate
   d. Finalize Environmental Documentation
7. **Final Design**
   a. Final Design Plans
   b. Final Systems Engineering Documents
      i. Concept of Operations
      ii. Systems Requirements
      iii. Verification Plan
      iv. Validation Plan
   c. Signal Timing Directives
   d. Construction Estimate
   e. Construction Schedule
   f. Special Provisions
   g. SESC Certification
   h. Final Service Request Approval Letter
8. **Plans, Specifications, and Estimate (PS&E)**
   a. PS&E Package
   b. PS&E Certification
9. **Bid Package Preparation**
   a. Advertising Authorization Package
10. **Post-Design**
    a. Contract Inquiry Responses
    b. Bid Analysis
11. **Construction** *(Construction Support Services Contract to be issued as a separate Task Order and is not part of this version of the Project Delivery Process)*

Section C.1, Design Overview, of the TSM Procedures Manual, summarizes the Submittal Process of NJDOT-MSE led projects. The CTSS Final Design Process is summarized below:

- Initiate Final Design
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

- Approved Environmental Document (if this document wasn’t completed in an earlier phase)
- Interim Design Submission (see link for ITS Design Submission checklists)
- Final Design Submission (see link for ITS Design Submission checklists)
- PS&E Submission (see link for ITS Design Submission checklists)
- PS&E Certified
- Authorization Request Date
- Receive Authorization to Advertise

The CTSS sub-phases and related tasks are summarized below in the CTSS Process Overview.

Figure 2: CTSS Process Overview

For a full size view of the above CTSS Process Overview, see the link below.

MANUAL REFERENCE: CTSS Process Overview
CTSS Process Overview.pdf

MANUAL REFERENCE: ITS Design Submission Checklists
ITS Design Submission Checklists.pdf

Certain CTSS Project Delivery tasks coincide with the Traffic Signal Optimization (TSO) Project Delivery Process (Section F of the TSM Manual) and are noted accordingly. The CTSS specific tasks are displayed in green and the TSO-related tasks are displayed in blue. Tasks that MSE staff engineers are responsible for are displayed in orange.

The Designer utilizes the Microsoft Project CTSS Project Delivery Process Schedule Template (unless directed otherwise by the Project Manager) to complete the man-hour estimate for each staff category for
the individual tasks in the Scope of Work as described in the Develop Task Order task in the Project Assignment sub-phase. Note that any durations provided in the template are for guidance only and the designer is to modify the durations as needed, commensurate with the Scope of Work for the applicable CTSS project. Not all tasks may be required for each specific corridor. The Designer shall use their judgement in determining which tasks are necessary. The Designer submits the completed template to MSE for their review during the Develop Task Order task.

The Designer utilizes the CTSS Scope of Work Assumptions Template to describe the assumptions/backup for the man-hour calculations (and any indirect costs) for each CTSS design task in the Scope of Work (i.e., number of meetings, number of staff at each meeting, hours per meeting, etc.) and submits this with the completed CTSS Project Delivery Process Schedule to MSE for their review during the Develop Task Order task.

**MANUAL REFERENCE:**

CTSS Scope of Work Assumptions Template

CTSS Scope of Work Assumptions Template.doc

### 1. Project Assignment

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Initiate Internal Coordination</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>MSE Staff Engineers</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Traffic Signal Optimization Section F.2.1, Planning Request Letter, Coordination / Conflict Spreadsheet, Traffic Signal Survey Spreadsheet</td>
</tr>
</tbody>
</table>

Stakeholders are identified by MSE staff engineers based on the location of the intersections within the corridor. Stakeholders other than NJDOT include, but are not limited to, the following:

- Contractors/Developers
- Municipality
- County
- Other External Agencies (e.g., FHWA, NJTA, PANYNJ, OIT, etc.)
- State of New Jersey DOT Information Technology
- MPO

Once the stakeholders are identified, MSE staff sends out a Planning Request Letter to other NJDOT Divisions (Roadway Maintenance Engineering and Operations, Access, Traffic Engineering, Regional Electrical Operations, Bureau of Transportation Data and Safety, and Capital Program Management). MSE staff should also use Capital Program Management's Project Reporting System (PRS), and Highway Access Permits System (HAPS) as resources for identifying current or upcoming projects within NJDOT to identify conflicts. MSE staff engineers will periodically coordinate with identified PM's of conflicting projects for schedule updates. A corridor field visit should be conducted by MSE staff during this time.

MSE will circulate an ITS Interference Checklist when a CTSS project is being proposed to identify potential conflicts from other disciplines to that installation. A sample ITS Design Interference Checklist can be found at the link below.

The Designer will not include man-hours related to this task. Refer to Traffic Signal Optimization Section F.2.1., Signal Optimization Project Delivery Process.
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

MANUAL REFERENCE: CTSS Sample Interference Checklist
CTSS Sample Interference Checklist.pdf

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Collect Internal Data</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>MSE Staff Engineers</td>
</tr>
</tbody>
</table>

The information contained in this spreadsheet serves to identify conflicts with other ongoing projects and validate the tier assignment.

The second part of this task involves the Data Gathering Analysis which includes a documentation of existing conditions and available resources. This task establishes the initial point of coordination between MSE staff and the Bureau of Permits, Electrical Maintenance and Claims (PEC). Throughout the CTSS and Traffic Signal Optimization Process, MSE and PEC will be required to coordinate at several different milestones in the process following this task. These subsequent points of coordination are described under the task description “Coordination with Bureau of PEC” under Scope Development.

During the Data Gathering Analysis task MSE will request confirmation from the PEC supervisors on the hardware and software information which includes the controller type, make and model, most current timing plan, detection devices, interconnect, software version, potential changes to phasing, and communication networks available both public (state, regional, and local) and private, for each intersection within the corridor under consideration. This information will be documented in a Traffic Signal Survey spreadsheet and will be valuable throughout the CTSS and Traffic Signal Optimization Process as coordination with Electrical Operations will continue through Design and Implementation. Any changes to the existing hardware/equipment or software will need to be documented and considered during the design of the project.

Michael Baker International
November 2015  5
Refer to Traffic Signal Optimization Section F.2.1., Signal Optimization Project Delivery Process.

For CTSS Projects, MSE Staff also gathers internal NJDOT existing data including but is not limited to the following information:

- Authorization Letter
- Constraints
- Latest Approved Traffic Signal Plans
- As-Builts
- Traffic Volumes
- Travel Times
- Traffic Models
- Existing Timing Directives
- Timing Plans
- Latest Approved Electrical Plans
- ITS Plans
- Base mapping from other projects (if available)

If Base Mapping is not available, MSE staff informs the Designer, who may be required to conduct supplemental survey, in accordance with the Conduct Supplemental Survey task. The Designer is to not include man-hours related to the Initiate Internal Coordination task.

Note: If the corridor was recently optimized, the MSE Project Manager may determine (on a case-by-case basis) that a new Optimized Timing Directive may not be required for the CTSS fallback mode.

Refer to Traffic Signal Optimization Section F.2.1, Planning Request Letter.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Tier Assignment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>MSE Staff Engineers</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Traffic Signal Optimization Section F.2.1</td>
</tr>
</tbody>
</table>

Prior to the inception of a CTSS project, MSE staff engineers identify the tier assignment depending on the level of treatment that a corridor requires. The following are the descriptions of each of the six (6) Tiers:

- T1 – Adaptive Signal Control Technology
- T2 – Responsive System, inbound and outbound timing plans
- T3 – Optimized with corridors that have communications, upgrading and optimizing time of day plans
- T4 – TOD plans with local communication
- T5 – Optimized with existing infrastructure
- T6 – Isolated intersection

Following the tier assignment, MSE staff will determine whether a corridor will be considered for a CTSS project. If the corridor is not selected, it will be logged into a corridor database for future consideration. If Tier 1 through 3 are assigned to a corridor, the project is recommended as a new CTSS project. If the corridor is assigned Tiers 4 through 5 the project will follow the Signal Optimization Process and coordination with conflicting projects will continue through the life of the project. If an intersection is assigned T6, the intersection may be improved through hardware or timings upgrades but the intersection will not be part of any coordinated system.

The Designer is to not include man-hours related to this task. Refer to Traffic Signal Optimization Section F.2.1., Signal Optimization Project Delivery Process.
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Preliminary CED Document</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>MSE Staff Engineers</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td></td>
</tr>
</tbody>
</table>

After a corridor is recommended for CTSS project, and prior to the Task Order being Developed, MSE staff will prepare a preliminary Categorical Exclusion Document (CED) document. The preliminary CED will be provided to Bureau of Environmental Program Resources for review and approval prior to the Task Order execution. MSE staff will provide the preliminary CED to the Designer for finalization during the Prepare CE/CCE Documentation task.

### 2. Project Assignment

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Develop Task Order</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>MSE Staff Engineers / Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>CTSS Project Delivery Process Flowchart, CTSS Project Delivery Process Schedule Template,</td>
</tr>
</tbody>
</table>

Following the tier assignment and recommendation of the corridor as a new CTSS project and the identification of a consultant for the corridor design, a Task Order is initiated and consultants are requested to develop a Scope of Work. All existing data that was gathered as part of the Collect Internal Data task is forwarded to the Designer at the execution of the task order.

The Designer reviews the information and conducts an initial field visit and preliminary assessment of the corridor to complete the Scope of Work and related documents, including the schedule and cost templates. The Designer utilizes the CTSS Scope of Work Assumptions Template to list the assumption/backup for the man-hour calculations for each CTSS design task in the Scope of Work. Refer to the Section C.2.7 CTSS of the TSM manual for further information.

MSE staff responds to written Requests for Information from the Designer to aid in the development of the Scope of Work during the Develop Task Order task.

After negotiation of the Task Order and Scope of Work, MSE staff completes the CTSS Task Order checklist and imitates the Task Order for the assigned Designer. After FHWA approval of the finalized Task Order the project may proceed to the Project Kick-off task.

Note: The Designer is to not include man-hours related to the activities that encompass the Develop Task Order task.

**MANUAL REFERENCE:**

- CTSS Project Delivery Process Flowchart
  - CTSS Process Delivery Flowchart.pdf

- CTSS Project Delivery Process Schedule Template
  - CTSS Project Delivery Process Schedule Template MSP2007.mpp

- CTSS Scope of Work Assumptions Template
  - CTSS Scope of Work Assumptions Template.pdf
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Hold Project Kick-off Meeting</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>MSE Staff / Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td></td>
</tr>
</tbody>
</table>

After the execution of the Scope of Work, the Project Kick-off is initiated. During the Project Kick-off meeting, the Scope, Project Schedule and deliverables are discussed. In addition to being a protocol meeting, it is a discussion of technical gaps.

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to the Hold Project Kick-off Meeting task and related activities.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Send External Stakeholder Contact Letter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td></td>
</tr>
</tbody>
</table>

The Designer prepares and transmits an External Stakeholders Contact Letter (Shotgun Letter).

The Designer should provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Notify NJDOT SME Units</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>MSE Staff Engineers</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td></td>
</tr>
</tbody>
</table>

After the Kick-off meeting, the Designer coordinates with the MSE Project Manager to notify, at a minimum, the following NJDOT Subject Matter Expert units of the project scope and preliminary schedule:

- Bureau of Environmental Program Resources
- Bureau of Traffic Engineering
- Bureau of ROW and Access Management
- Structures Unit
- Division of Mobility and Systems Engineering
- NJ Office of Information Technology
- Pavement Management (if in-pavement sensors are proposed)

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

3. Project Screening

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Develop Systems Engineering</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>FHWA’s Model Systems Engineering Documents (Model Documents) for Adaptive Signal Control Technology (ASCT)</td>
</tr>
</tbody>
</table>

The Designer coordinates with the MSE Project Manager to identify applicable project stakeholder and solicit information from the identified internal NJDOT units and external stakeholders. Refer to the Initiate Internal Coordination task. This request may include, but is not limited to, information such as:

- Available traffic studies
- Recently completed work orders or projects
- Any development plans within study limits
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

- Bicycle/pedestrian plans
- Station area access plans
- Township Master Plan
- Adjacent or concurrent studies or projects
- Crash Records
- Trails Plans
- Other relevant information

The Designer conducts Public Officials Engagement and Stakeholder Engagement Workshops and incorporates the information received in the development of the Concept of Operations. After initiating the Systems Engineering Stakeholder Engagement Workshops, the Designer shall complete the Concept of Operations in accordance with the FHWA’s Model Systems Engineering Documents for Adaptive Signal Control Technology. The Concept of Operations describes the needs and objectives of the CTSS system to determine what functions the proposed system must be capable of fulfilling. The Concept of Operations shall, at a minimum, include the Needs Statements and a Traceability Matrix.

Subsequent to completing the Concept of Operations, the Designer completes the Systems Engineering Documents including the Systems Requirements, Verification Plan, and Validation Plan in accordance with the FHWA’s Model Systems Engineering Documents for Adaptive Signal Control Technology. As part of the Project Screening Submission, the Designer submits the Draft Systems Engineering Documents.

Refer to Section A.5.2. The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task. The Designer should assume at a minimum one meeting for each municipality, public agency, and NJDOT SME unit.

<table>
<thead>
<tr>
<th>EXTERNAL REFERENCE:</th>
<th>FHWA’s Model Systems Engineering Documents (Model Documents) for Adaptive Signal Control Technology (ASCT)</th>
</tr>
</thead>
</table>

<table>
<thead>
<tr>
<th>MANUAL REFERENCE:</th>
<th>CTSS Systems Engineering Analysis Template</th>
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<tr>
<td></td>
<td>CTSS Systems Engineering Analysis Template.pdf</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Initiate Gap Assessment</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Gap Assessment for CTSS/Adaptive Projects</td>
</tr>
</tbody>
</table>

The Designer conducts an initial assessment of the project corridor to identify, document, and evaluate potential project issues and alternatives. This high level report includes and identifies ROW, utility, structural, environmental, and other potential constraints. During the development of the Initial Screening Report, the designer provides a summary of any identified constraints and assesses possible alternatives for the location/site. The designer submits the Initial Screening Report as a Project Screening Submission.

While the report is being reviewed by NJDOT, the designer conducts a detailed Gap Assessment to assess the design requirements for the CTSS corridor. The development of the Gap Analysis Assessment involves a more detailed definition, assessment, and comparison of the alternatives emerging from the Initial Screening Report. Final refinement, evaluation, and documentation of the rationale used to select the recommended alternatives, using the required template (Form # MSE 627-001). The designer is required to exercise engineering judgment where necessary to meet the intended goals and objectives. 

Michael Baker International
November 2015
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

outlined in the Gap Assessment procedures. The designer is also required to outline the progression of the field work to be performed and to coordinate with NJDOT’s Project Manager for consultation prior to the start of work.

The Physical Inventory Gap Analysis includes an inventory and visual inspection of the traffic signal infrastructure including traffic signals, signal poles, junction boxes, and signal controller cabinets. The Conduit Fill Gap Analysis includes an inventory and visual inspection of the traffic signal conduits, conductors, and cables. The Designer red-lines Traffic Signal and Electrical As-Built and verifies existing timing schedules to current field conditions, and also includes this information in the Data Collection Report as part of the Perform Data Collection task.

In conjunction with the activities performed as part of the Gap Assessment task, the Designer arranges field visits to verify and evaluate existing conditions or measurements obtained from plans or reports. Roadway features and infrastructure along the project corridor to be inventoried include Intelligent Transportation Systems (ITS), utilities, drainage, environmental, traffic signal infrastructure, etc. The designer assesses the communications infrastructure including ITS hubs, applicable Traffic Operation Centers, ITS cabinets, junction boxes, and conduit systems. The designer assesses ITS and CTSS (i.e., Image Detectors, Midblock detectors, fiber-optic communications, wireless communications, junction boxes, conduits, meter cabinets, and traffic signal infrastructure) device locations for structural, underground and overhead utility, right of way, and environmental constraints.

Follow State ITS Management (SITSM) procedures to schedule and perform field visits to Hub/TOC locations. Identify future projects which may have impacts at affected Hub/TOC locations. Refer to Section D. Construction, Working Drawings/Submittals in the TSM manual for the ITS Access Request Form and the Section D. Construction, Construction Issues in TSM manual for the Fiber Optic Markout Request Form.

The Designer reviews existing base maps to identify base mapping constraints. The designer prepares existing conduit fill and bandwidth calculations and documents the photo log. The Designer documents the field conditions and prepares and submits a Gap Analysis Report as a Project Screening Submission.

Refer to the Gap Assessment for CTSS/Adaptive Projects (Form # MSE 627-001) at the link below. A Sample Gap Analysis template is included at the link below. Refer to Section B.4. Gap Assessment. The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Develop Data Collection Program</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Traffic Signal Optimization Section F.2.2, Data Collection Report</td>
</tr>
</tbody>
</table>

The Designer will develop the Data Collection for the project as discussed under Signal Optimization Section F.3 – Data Collection. This process includes the development and approval of a Data Collection Program prior to initiating any type of data collection. The Data Collection Program will outline the Data to be collected, the process by which that data is to be collected and the location of the data collection points. The Data Collection Program is submitted to the NJDOT MSE for review and approval. Upon approval, the MSE Project Manager will provide the consultant with a signed copy of the Authorization Letter, a letter authorizing the consultant to initiate data collection on behalf of NJDOT. The sample Data

Michael Baker International
November 2015

10
Collection Program is discussed in greater detail under Section F.3.10 – Data Collection Deliverables and Processing.

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

### 4. Project Verification

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Base Maps</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Article 51 Standards and Procedures</td>
</tr>
</tbody>
</table>

The Designer develops base maps which depict in detail the required existing topography. The base maps also include the mainline and secondary road baselines (when deemed necessary by the MSE Project Manager), baseline information and existing right of way deed search results (when required). The details of this task are to be discussed with and approved by the MSE Project Manager. This data is to be provided in accordance with Article 51 Standards and Procedures and current NJDOT CADD Standards.

**NJDOT REFERENCE:** NJDOT Standard Terms & Conditions of Agreement: Article 51 CADD

http://www.state.nj.us/transportation/business/procurement/ProfServ/documents/StandardTermsConditions.pdf

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Conduct Supplemental Survey</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
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</tr>
</tbody>
</table>

The Designer conducts a supplemental survey for any proposed device and infrastructures locations not addressed in previous surveys or base mapping. Supplemental survey information may include additional topographic data, utility test pits, right of way stakeouts, soil borings and wetland delineation.

The limits of supplemental survey shall include, at a minimum:

- Electronic plan sheet base mapping developed in accordance with the standards set forth in the most current NJDOT CADD Standards Manual and Survey Manual.
- For midblock detection devices, provide the following information within the complete width of the ROW and 100 feet in both directions along the corridor:
  - Depiction of pavement edges, lane and shoulder lines, medians, channelizing islands and gores, barrier curb and guiderail, driveway openings, structure outlines, sign structures, and prominent above-ground features, right-of-way, utilities and drainage systems
- For underground conduits, provide the following information a minimum of 20 feet in all directions along the entire length of the proposed infrastructure:
  - Depiction of pavement edges, lane and shoulder lines, medians, channelizing islands and gores, barrier curb and guiderail, driveway openings, structure outlines, sign structures, and prominent above-ground features, right-of-way, utilities and drainage systems
- Critical planimetric and site-specific elevation data.
- Two inter-visible survey control points with ties at each proposed location.
- Survey controls tied to the NAD83 horizontal control datum and the NAVD88 vertical control datum.
The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to the Conduct Supplemental Survey task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Determine Location of Devices</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>CTSS Design Considerations, Section C.2.7</td>
</tr>
</tbody>
</table>

The Designer reviews locations previously assessed during the Initiate Gap Assessment task for proposed ITS and CTSS (i.e., Image Detectors, Midblock detectors, fiber-optic communications, wireless communications, junction boxes, conduits, meter cabinets, and traffic signal infrastructure) with regard to optimizing their usefulness while minimizing their impact on current field conditions. Attempts will be made to incorporate new devices into existing systems where possible. Preliminary device location considerations include, but are not limited to, line-of-sight, environmental impacts, right of way availability, etc. Refer to the CTSS Design Considerations in Section C.2.7 of the TSM manual for further guidance.

Designer arranges a field review with the TOC to engage in an on-site dialogue about the project, when necessary. Potential device location options are discussed, and alternatives are evaluated. Bucket-trucks may be used in the field to evaluate potential locations for line-of-sight.

Designer makes a preliminary identification of Power/Communications availability utilizing various methods including field visits or aerial imagery. Consideration is made regarding type of power/communication that will be required based on the device locations.

Maintain required safe distance away from any overhead power lines in accordance with OSHA and utility company and high voltage proximity requirements. Include analysis of construction/maintenance high voltage proximity.

During the Initiate Internal Coordination task, MSE will circulate an ITS Interference Checklist when a CTSS project is being proposed to identify potential conflicts from other disciplines to that installation, and the designer will need to include such considerations with various units in the design. Confirm potential interferences within the Traffic Signal Optimization unit of MSE as well as outside of TSM.

After completion of the Project Verification sub-phase tasks, the Designer submits a Field Conditions Memo, identifying changes and any new conflicts and gaps associated with the proposed location of devices and associated infrastructure, structures, utilities, and communications media subsequent to the submission of the Designer's Gap Assessment. The Designer will prepare and include the Fields Conditions Memo as an amendment to the Gap Assessment, following the same format and guidelines as the Gap Assessment for CTSS/Adaptive Projects (Latest version of Form # MSE 627-001) found at the link below.

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.
The Designer coordinates with NJDOT ROW and Access Management and MSE to obtain Right of Way (ROW) information for areas that include proposed Device Locations. The Designer utilizes private websites (such as state info services and ESRI), municipal GIS mapping, and tax maps. ROW information is analyzed to ensure proposed ITS and CTSS devices, associated infrastructure (conduits, junction boxes, cabinets), and area to access such devices and infrastructure during construction and maintenance activities are within NJDOT’s ROW. If ROW cannot be confirmed through the aforementioned means, the Designer conducts a Title Search to confirm the ROW.

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort for this task, including indicating where it is necessary to conduct title searches. The details of this task are to be coordinated with and approved by the MSE Project Manager.

The Designer determines the utility companies serving the area through a field survey. Using the NJDOT Utility Company Database, the Designer identifies the Regional utility owner contacts and sends the Utility Contact Letter to them. The intent of this letter is to establish the specific utility field contacts and determine utility conflicts.

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to the Determine Location of Devices task.

An Environmental Screening is performed to identify environmental concerns or “fatal flaws.” The MSE Project Manager requests an environmental screening by sending a memo to the Bureau of Environmental Program Resources (BEPR). The Environmental Screening Report (ESR) identifies and documents potential environmental issues that may include environmental constraints or sensitive areas, such as wetlands, parkland, cultural resources, hazardous waste, permits, air/noise, socio-economic, Environmental Justice, etc. If the ESR is prepared by the Designer, the Project Manager will request BEPR to review NJDEP Regulations. This is necessary to determine the applicability of wetlands, Cultural Resources, Storm Water Regulation, and Deforestation regulations, etc. to the study. MSE staff will share the preliminary CED with the Designer team when available.
The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Perform Data Collection</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/ Documents</td>
<td>Traffic Signal Optimization Section F.2.2, Data Collection Report</td>
</tr>
</tbody>
</table>

Upon receipt of the Authorization Letter authorizing the Designer to initiate data collection on behalf of NJDOT, the Designer will collect the data. After the data is collected, reduced, and analyzed the Consultant will prepare a Data Collection Report summarizing all data collection. As part of this activity, the Consultant will collect Traffic Counts, Speed and Travel Time Data, Roadway and Signal Equipment Inventory, Physical Characteristics, Field Observations including queues, and other roadway and signal characteristics as discussed under Section F.3.3 - Physical Inventories (PI), including red-lined Traffic Signal/Electrical As-Builts. Other data may be collected as agreed to by MSE and the Consultant. The sample Data Collection Report is discussed in greater detail under Section F.3.10 – Data Collection Deliverables and Processing. For CTSS projects the Designer will verify traffic signal timings and prepare red-line markups for any changes from the as-built plans.

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

5. Preliminary Engineering

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Structural Calculations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/ Documents</td>
<td>Traffic Signal Standards</td>
</tr>
<tr>
<td></td>
<td>Midblock Standards, which are typically modified traffic signal standards with System Detection device assemblies.</td>
</tr>
<tr>
<td></td>
<td>ITS Standards</td>
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</tbody>
</table>

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Conduct Subsurface Investigation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/ Documents</td>
<td></td>
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</tbody>
</table>

The Designer investigates information regarding underground utilities utilizing the Send Utility Contact Letter task and sub-surface utility engineering at the locations of proposed structures. The Designer develops and administers the service of a vendor to perform a subsurface exploration program, which consists of borings, in-situ testing, and test pits. The subsurface exploration program may also include geophysical and geologic surveys. The Designer identifies the need for subsurface exploration and in-situ testing to evaluate foundation support, settlement, slope stability and ground water conditions and determines the general geology of the project site, and verifies there are no underground utility conflicts with test pits.
The Designer determines the number, location and depth of borings, the depth and types of samples and the in-situ testing required for the geotechnical design of structure foundations and roadway design, utilizing the Bridges and Structures Design Manual.

The Designer prepares a boring and in-situ testing layout plan and submits to the MSE Project Manager and the Geotechnical Engineering Unit, when directed, for review and comment. The MSE Project Manager and Geotechnical Engineering Unit, if required, reviews the submission and provides comments to the Designer. The Designer updates the plans and resubmits to the MSE Project Manager/Geotechnical Engineering Unit for approval. The Designer then administers the service of a vendor to conduct the Subsurface Investigation and updates the project base mapping, as necessary.

The Designer submits a Subsurface Investigation Report as a Preliminary Engineering Submission.

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task. Test pits are conducted for locations of proposed pole and cabinet foundations and related infrastructure including, but not limited to, junction boxes and conduits.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Send Utility Verification Request Letter (Utility Letter 2)</th>
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<td>Responsible</td>
<td>Designer</td>
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<table>
<thead>
<tr>
<th>Task Name</th>
<th>Coordinate with Permitting Agencies</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
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</table>

The Designer conducts a preliminary investigation of the project area to determine potential electric and/or communications service delivery options. Determine which electric company provides power to the project area. Confirm appropriate electric service is available and can deliver electric power to the project area. Complete electric company’s service request process. Submit the Utility Verification Request Letter (Utility Letter 2) and submit two sets of the utility base plans to the utility company to confirm their existing facilities on the utility base plans. Obtain confirmation via fax/email/letter from the electric company that the request will be fulfilled and obtain a cost estimate for service. Provide the MSE Project Manager the Utility contact and cost estimate.

Leased line communications may only be used for Tier 3 CTSS systems. Determine which Communication Service company provides services to the project area. Confirm appropriate service is available and can be delivered to the project area. Complete Communication Service company’s service request process. Submit the Utility Verification Request Letter (Utility Letter 2) and submit two sets of the utility base plans to the utility company to confirm their existing facilities on the utility base plans. Obtain confirmation via fax/email/letter from the communication service company that the request will be fulfilled and obtain a cost estimate for service. Provide the MSE Project Manager the Utility contact and cost estimate.

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Coordinate with Permitting Agencies</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
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</table>

The Bureau of Environmental Program Resources (BEPR) begins consultation with permitting agencies, if the Environmental Screening indicates that major permitting agency coordination will be required to obtain the necessary permits. If significant impacts are anticipated in the study area such as wetlands, endangered species, historic structures, riparian, storm water, provide an Alternatives Matrix to the permitting agencies to present the study and range of alternatives being considered.

Permitting agencies may include:

- Highlands Council
- Pinelands Commission
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

- New Jersey Sports and Exposition Authority (Formerly New Jersey Meadowlands Commission)
- Delaware and Raritan Canal Commission
- State Historic Preservation Office
- Division of Land Use Regulation Program
- Army Corps of Engineers

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Coordinate With NJDOT SME Units</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
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<tr>
<td>Related Guidance/Documents</td>
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</tbody>
</table>

Coordinate with the following NJDOT Subject Matter Expert units to identify project constraints, fatal flaws and potential conflicts/risks:
- Bureau of Environmental Program Resources
- Bureau of Traffic Engineering
- Bureau of ROW and Access Management
- Structures Unit
- Division of Mobility and Systems Engineering
- NJ Office of Information Technology
- Systems Architecture Review (SAR) team
- Pavement Management (if in-pavement sensors are proposed)

Coordinate with the above NJDOT Subject Matter Expert units again during the Prepare Final Plans & Serf task during the Final Design sub-phase to review and confirm design updates.

The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task during both the Preliminary Engineering and Final Design sub-phases.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Perform Data Analysis and Develop Base Conditions Model</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Traffic Signal Optimization Section F.2.2</td>
</tr>
</tbody>
</table>

After approval of the Data Collection Report, the Designer will perform data analysis and develop the Existing Base Model with software such as HCS and/or Synchro after consultation and approval from the MSE Project Manager. The Base Model should only include geometric data and is to be submitted to MSE for approval. Once approved, the Designer will develop the Existing Conditions Model to replicate existing conditions during the system peak periods to be analyzed. The Existing Conditions Model includes the current geometric configuration, existing signal timing parameters (including existing clearance intervals, minimum times, etc.), and vehicular and pedestrian volumes. Submit the base model to MSE for review.

Refer to Traffic Signal Optimization Section F.2.1., Signal Optimization Project Delivery Process. The Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Calibration and Validation of Existing Conditions Model</th>
</tr>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Traffic Signal Optimization Section F.2.2</td>
</tr>
</tbody>
</table>

Following the development of the Existing Conditions Model, the Designer must calibrate and validate the model to actual field conditions and submit to MSE for approval before further analysis is conducted. In
addition to performing adjustments to the model parameters to better reflect nuances experienced in the field, this process serves as an opportunity to validate the accuracy of the model inputs. Model outputs should be compared against any available and comparable field data to determine the validity of the model results. Such data includes but is not limited to the following:

- Traffic volume served versus demand
- Travel times
- Delays
- Queues
- Lane utilization
- Capacity Analysis
- Existing clearance intervals

Refer to Signal Optimization Project Delivery Process Section F.4.7 – Calibration and Validation for further details. Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

6. Interim Design

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Preliminary Plans</th>
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<td>Responsible</td>
<td>Designer</td>
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</tbody>
</table>

The Designer prepares the plans. The plans shall be prepared in accordance with the NJDOT Sample Plans. Refer to the CTSS Sample Plans and Details. The plans may include:

- Key Sheet
- Plan Sheet Index
- Electrical Plans
- ITS Plans
- Traffic Signal Plans
- Utility Construction Staging Plans
- Estimate – Distribution of Quantities
- Electrical Details
- ITS Details
- Construction Plans
- Traffic Control (Maintenance of Traffic) and Staging Plans
- Environmental Plans
- Construction Details

The Designer prepares the Interim Submission package for MSE review. The package should include:

- Transmittal letter indicating the distribution of all submission deliverables
- Systems Engineering Review Form (SERF)
- Interim Plans
- Non-Standard Items & Proprietary Items
- Interim Design Submission Review Checklists (See Appendices H.9 and H.10)
- Draft Systems Engineering (ConOps, Systems Requirements) gathered

Perform and provide backup calculations including proposed conduit fill, bandwidth electrical, and structural analysis, guiderail calculations, etc. for ITS and Electrical Plans. An On-Board review (Project
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

Presentation) meeting will be held with the Designer and MSE and any required SMEs to review the Submission. After the review, the Designer prepares and submits Comment Response Summary resolving the comments from the On-board Interim Design Submission. The consultant will prepare a report/meeting minutes to include all the action items, comments, decisions and pending issues discussed at the review meeting.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Preliminary Specifications</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Standard &amp; Non-Standard Pay Item Instructions</td>
</tr>
</tbody>
</table>

The Designer prepares input for the Special Provisions using guidance provided by the latest Baseline Document Changes and Standard Specifications, as well as the CTSS Pay Items in Section C.2.7, of the TSM manual.

When it is not possible to specify a Standard Pay Item, a Non-Standard Pay Item may be used. Non-Standard Pay Items are items of work that are not included in the Standard or Supplemental Specifications, typically, because the Department has not developed an approved Standard Specification for the item. Non-Standard Pay Items differ from Standard Pay Items in the following manner:

1. Any revision to a Standard Pay Item will cause it to become a Non-Standard Pay Item because it is no longer consistent with the Department’s approved Standard Specification.
2. Proprietary items specifying an exclusive product or manufacturer required for an item of work. Proprietary items may be used in projects when the designer has provided justification for their use. The product must be in the best interest and/or health and safety of the public. If a proprietary item is used, which is not an approved Department standard, the designer shall provide at least three approved equals to be included in the specification. If the designer cannot provide three equals, documentation shall be provided, for approval, as to the reason or reasons why the product or manufacturer is necessary for the project. For Federally funded projects, proprietary items must be approved by FHWA and meet the requirements of 23 CFR Subpart D 635.411.
3. An experimental item of work for new materials or construction methods currently under review by the Department.

If the Designer needs to request Non-standard Pay Items they follow NJDOT’s Capital Project Procedures Standard & Non-Standard Pay Item Instructions to gain approval for Non-standard Pay Items to be incorporated into project. Incorporate Non-standard Pay Items into the Final Design Submission package. The System Requirements will be necessary for initiating the Specifications on CTSS devices.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

NJDOT REFERENCE: NJDOT’s Capital Project Procedures Standard & Non-Standard Pay Item Instructions

http://www.state.nj.us/transportation/eng/documents/miscref/payiteminstructions.shtm

Michael Baker International
November 2015
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare CE/CCE Documentation</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
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<tr>
<td>Related Guidance/Documents</td>
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</table>

Utilizing the technical environmental studies, cultural resource survey report and Section 4(f) evaluation, the Designer or Bureau of Environmental Program Resources (BEPR) assesses the project impacts and risks with respect to each environmental discipline (Noise, Air Quality, Ecology, Cultural Resources, Section 4(f), Hazardous Waste, Socio-economic and Environmental Justice). The Designer completes the Categorical Exclusion Document (CED).

The Designer submits the CED to BEPR for review and approval. Reference the Programmatic Agreement for Approval of Certain Categorical Exclusions between FHWA and NJDOT to determine if the project qualifies as a Categorical Exclusion or Certified Categorical Exclusion (CCE).

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Hold Public Officials Meeting #1</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
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<tr>
<td>Related Guidance/Documents</td>
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</table>

Designer will coordinate with the MSE Project Manager to hold public officials meetings. Public outreach will involve preparation of project display boards, in coordination with MSE Project Manager. Designer will attend Public outreach meetings, as necessary.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Develop No-Build and Optimized Model</th>
</tr>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Traffic Signal Optimization Section F.2.2</td>
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</tbody>
</table>

After Approval of the Existing Conditions Model, the Designer develops the No-Build Model. The No-Build Model includes updates to clearance calculations, pedestrian intervals, and link speeds according to NJDOT and MUTCD/HCM standards. Also, the Consultant applies annual growth rates from various sources, following discussions with the MSE Project Manager and technical lead on the project to capture the growth in traffic, even when no new development is being planned along the corridor. Finally, cycle lengths, phasing, and signal groupings are reviewed and modified if necessary for the Optimized Model. The No-Build model will be used to compare to the Optimized Model. After submittal and approval of the No-Build Model by MSE and the NJDOT Electrical Operations, the Designer will develop the CTSS fallback mode Optimized Model (if required).

Refer to Traffic Signal Optimization Section F.2.1., Signal Optimization Project Delivery Process.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

7. Final Design

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Resolve IDS Comments</th>
</tr>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
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<tr>
<td>Related Guidance/Documents</td>
<td>Quality Management Guideline</td>
</tr>
</tbody>
</table>
The Designer revises the plans and documents in accordance with the Comment Response Summary to resolve the comments from the On-board (Project Presentation) Interim Design Submission review meeting.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Conduct Constructability Review</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
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<tr>
<td>Related Guidance/Documents</td>
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</table>

The Designer performs a constructability review of the proposed project for construction and maintenance activities and any potential utilities (underground and overhead), environmental, and/or ROW conflicts.

The Designer coordinates with MSE and the necessary SMEs to conduct a constructability review meeting. The Regional Maintenance Engineer may perform a maintenance review to minimize long term maintenance costs. Traffic Operations may perform a review of the traffic impacts during construction. The desired result is to incorporate the potential comments from Construction Management, Traffic Operations and the Regional Maintenance Engineer to reduce the duration of construction and ensure the project can be constructed while maintaining public safety. In addition, this review helps to develop a reasonable construction cost estimate. Upon completion, Construction Management, Regional Maintenance and Traffic Operations forward comments to the MSE Project Manager for the Designer to incorporate into related plans, estimates, etc.

The Designer reviews the comments for any identified constructability or maintenance risks and prepares a Comment Response Summary for MSE (and applicable SME) review. After MSE (and applicable SMEs) approve the Comment Resolution, the Designer revises the Design documents in accordance with the Comment Response Summary.

As part of the Final Design Submission, the Designer submits a Constructability Review Report.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task and associated meetings.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Final Plans &amp; SERF</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Quality Management Guideline</td>
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</tbody>
</table>

The Designer revises the plans and documents in accordance with the Comment Response Summary to resolve the comments from the On-board (Project Presentation) Interim Design Submission review meeting.

If additional Intelligent Transportation Systems (ITS) facilities have been proposed since the latest Systems Engineering Review Form (SERF) revision, the Designer revises the SERF and obtains approval from Traffic Operations prior to submitting it to ITS Engineering. Upon approval from Traffic Operations, the Designer submits the revised SERF to MSE.

The Designer prepares the Final Design (FD) Submission package according to the Quality Management Guideline. The package should include:

- Transmittal letter indicating the distribution of all FD Submission deliverables
- Construction Job Number form (AC-1643)
- Designer FD Submission Certification
- Design Communications Report (DCR)
• Final Plans (prints only) with copies to the appropriate review units. Mylar sheets are to be held by the designer so that any necessary revisions can be made as required by the FD Review and Plans, Specifications and Estimate (PS&E) processing activities
• Traffic Signal Timing Directives (including CTSS fallback plans)
• Final Systems Engineering Documents as follows:
  o Concept of Operations
  o Systems Requirements
  o Verification Plan
  o Validation Plan
• Special Provisions - show all revisions required to the current Standard Input (SI)
• Construction Cost Estimate (Utilizing NJDOT bid price reports and Transport)
• Construction Schedule with narrative
• Bureau of Construction Management (CM) lane miles and bridge information
• FDS Design Submission Review Checklists (See Appendices H.8 and H.9)

The MSE Project Manager may hold a meeting with the Designer to discuss the requirements of the submission. The Project Manager and Program Manager will decide which functional SME units will be selected for the distribution of documents for review and comment. The Designer will coordinate with the MSE Project Manager to determine if the construction Cost Estimate and Schedule will be reviewed by Bureau of Construction Management. The Designer prepares and sends Construction Management lane miles and bridge information to the MSE Project Manager who forwards it to the Bureau of Construction Management.

A Final Design Submission On-Board (Project Presentation) Meeting will be held and the Designer will coordinate with the selected units that will review the submission. After the review, the Designer prepares and submits Comment Response Summary resolving the comments from the On-Board Final Design Submission. Once all comments are resolved, the Project Manager informs the Designer that the project can proceed to PS&E. The Designer updates the Design Communications Report to reflect any design decisions.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Develop Network Design</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
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<tr>
<td>Related Guidance/Documents</td>
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</table>

The Designer obtains the latest network diagram(s) for Hub/TOC equipment. Update the Network Diagram using Hub/TOC As-Builts and prior field visits as a reference. Use the Network Diagram and add proposed equipment and device locations to create the proposed Network Diagram and System Block Diagrams. Update Rack Layouts and Block Diagrams where appropriate to show proposed device locations and connections. Coordinate with and reserve IP addresses from NJ OIT. Coordinate with the System Architecture Review Team regarding server requirements and the completion of the SAR.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Final Specifications</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
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<tr>
<td>Related Guidance/Documents</td>
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</tbody>
</table>

The Designer develops input for the Special Provisions using guidance provided by the latest Baseline.
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

Document Changes and Standard Specifications and as prepared as part of the Prepare Preliminary Specifications task and revised subsequent to MSE comments.

The Designer incorporates the System Requirements, Verification Plan, and Validation Plan prepared as part of the Complete Systems Engineering Documents task into the Special Provisions.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Permits</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
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<tr>
<td>Related Guidance/Documents</td>
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</table>

The Designer and Bureau of Environmental Program Resources (BEPR) collect supporting information and prepare required plans, engineering analysis, and environmental reports according to the current standards of the applicable permitting agency. If permit applications are required for the project, the Designer submits a draft application to the MSE Project Manager and BEPR for review. The MSE Project Manager forwards the draft permit application to the Regional Maintenance Engineer for review and comment. Flood Hazard Area permit applications are submitted to the Hydrology and Hydraulics Unit. Army Corps permits may require Final Wetland Mitigation Plans be submitted as part of the permit application.

Note: All efforts should be made to avoid the need for permits, and devices should be relocated, if possible. Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare SESC Report and Plans</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
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<tr>
<td>Related Guidance/Documents</td>
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The Designer prepares the Soil Erosion and Sediment Control (SESC) Report, which identifies the areas requiring temporary and permanent erosion control and identifies the type of controls to be most effective. Within the SESC Report, the Designer includes field investigation notes, drainage survey, soil type identification, and soil loss and drainage erosion calculations. The Designer also recommends SESC controls or features.

The Designer also prepares the SESC Plans based on engineering/design need incorporating the controls and features identified in the SESC Report. Develop SESC specifications and prepare the engineering construction cost estimate. Submit the SESC Report and Plans to the Bureau of Environmental Program Resources for review and comment. Provide a copy of the certification to the Executive Secretary of the State Soil Conservation Committee and the Project Manager.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Develop Optimized Timing Directives</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
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</table>

The Designer will prepare timing directives and submit to MSE along with the Timing Directive Review – Quality Assurance Form for approval. As part of this task the Designer will prepare the necessary timing directives including Incident Management (IM) Plans, where required for all traffic signal optimization projects within the TOC corridors as agreed to with MSE. IM plans should be developed according to the Incident Management Timings Guidelines document.
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

Upon Approval of the optimized timing directives, the timing directives will be incorporated in the final design package.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

### MANUAL REFERENCE:
- **Timing Directive Review – Quality Assurance Form**

- **Incident Management Timings Guidelines**
  - MSE 617-001_Incident Management Timings Guideline.pdf

- **CTSS Sample Timing Directive**
  - CTSS Sample Timing Directive.docx

- **CTSS Sample Force Off Parameters for Midblock System Detectors**
  - CTSS Sample Force Off Parameters for Midblock System Detectors.pdf

### 8. Plans, Specifications, and Estimate (PS&E)

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare PS&amp;E Package</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
</tr>
<tr>
<td>Related Guidance/Documents</td>
<td>Quality Management Guideline</td>
</tr>
</tbody>
</table>

After resolution of the Final Design Submission Comment Response Summary, the Designer prepares and submits the Plans, Specifications and Estimate (PS&E) package to the Project Manager as per the Quality Management Guideline. In addition to the project plans, specifications and estimate, the PS&E package may include:

- Designer PS&E Certification
- Soil Boring Log
- Construction Schedule and Narrative
- Trainee Memo
- ESBE Goal Memo
- Approved Design Communications Report
- Quantity Calculations and Design Calculations
- PS&E Design Review and Submission Checklists (See the links below)

### NJDOT Review

The Project Manager, Bureau of Construction Management (CM) and appropriate Subject Matter Experts (SMEs) review the documents and provide comments. CM reviews and finalizes the construction cost estimate, construction schedule and the project’s Substantial and Final Completion dates. The Designer prepares and sends the Job Training Request on all federal projects to the Division of Civil Rights and Affirmative Action.

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November 2015
The Designer prepares and sends the request for Disadvantaged Business Enterprise (DBE) Goals (federal projects) or Women/Minority Business Enterprise (W/MBE) Goals (100% state projects) to the Division of Procurement. After completing their portion of the request, the Division of Procurement forwards the request to the Division of Civil Rights and Affirmative Action for final goal assignment. The Project Manager consolidates and reviews the comments to resolve any conflicting comments. The Project Manager prepares a comments package, highlighting the major issues and attaches all comments (memos and marked up plans). The Project Manager forwards the package to the Designer. The Designer documents any design decisions that result from the comments in the Design Communications Report.

FHWA Review
For Projects of Division Interest, (PoDI) the Project Manager submits the Design Submission to FHWA for review and comment. FHWA prepares a comments package (memos and marked up plans) and forwards the package to the Project Manager. The Project Manager reviews the FHWA comments package and incorporates the comments into the comments package.

The Designer makes any necessary revisions and changes based upon the above NJDOT and FHWA review comments.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Obtain Environmental Reevaluation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer/MSE</td>
</tr>
<tr>
<td>Related Guidance/Document</td>
<td></td>
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</tbody>
</table>

The Project Manager requests the Bureau Environmental Program Resources (BEPR) complete a Construction Environmental Reevaluation form and an Environmental Inventory Checklist. If the reevaluation indicates that there has been a significant change to environmental considerations, then supplemental environmental documentation may be required. BEPR submits the reevaluation form and the Environmental Inventory Checklist to FHWA for approval, if required.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.
9. Bid Package Preparation

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Advertising Authorization Package</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
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</tbody>
</table>

The Project Manager submits the AC-1643 Construction Job Number Form to the Bureau of Program Coordination for completion (construction job number, construction year and item funding). The Bureau of Program Coordination sends the completed AC-1643 Construction Job Number Form to the Project Manager.

The Project Manager submits the Plans, Specifications (Special Provisions) and Estimate (PS&E) package along with the AC-1643 Construction Job Number Form to Construction Management (CM). The PS&E package includes the Designer’s PS&E package along with:

- Utility Clearance Letter
- ROW Clearance Letter
- Environmental Reevaluations or valid environmental document (federally funded only)
- Soil Boring Logs
- Soil Erosion and Sediment Control Certifications
- Construction Environmental Authorization Checklist/Inventory
- Department Certification (federally funded only)
- Project Summary Information form (federally funded only)

CM reviews all documents for completeness and when acceptable, prepares the CM Certification, which officially certifies the PS&E package. At this time, CM also prepares a Construction Inspection Estimate to establish construction inspection funding. CM sends the CM Certification and the Construction Inspection Estimate to the Bureau of Program Coordination. The Bureau of Program Coordination requests funds for construction and construction inspection to advertise approximately seven (7) calendar days after the receipt of the CM Certification and Construction Inspection Estimate.

CM circulates the Key Sheet for signature with the CM Certification. For state and federal projects, the Director of Project Management and the State Transportation Engineer sign the key sheet. For projects that are sponsored by local or county governments, also obtain key map signatures from the sponsoring body.

CM reviews the Construction Cost Estimate submitted by the Designer and coordinates with the Office of Schedule and Budget Management and the Bureau of Program Coordination to generate the project’s Final Engineer’s Estimate and Proposal for bidding. Utilizing the Final Construction Schedule, CM updates the Substantial and Final Completion dates if necessary into the Special Provisions. CM verifies that the correct Equal Employment Opportunity (EEO) Special Provisions, Disadvantaged Business Enterprise (DBE) or Women/Minority Business Enterprise (W/MBE) Goals, Training Special Provisions, Environmental Hazards Abatement Specification and general Wage Rates, etc. are included within the Special Provisions.

For federally funded construction projects, CM compiles the advertising authorization package and submits to the Bureau of Program Coordination. The advertising authorization package includes the Construction Authorization Request, Construction Engineering Authorization Request and Construction Inspection Authorization Request. For state funded construction projects, an advertising authorization package is not needed.

Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.
The MSE Project Manager performs the steps necessary to close out the design project. If required, the MSE Project Manager will instruct the Designer to submit their Final Invoice for the design project. Upon payment of the final invoice, the MSE Project Manager will notify NJDOT accounting to close the job number.

10. Post-Design

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Conduct Final Design Closeout</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer / MSE</td>
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</tbody>
</table>

The Designer reviews contractor bid inquiries and provided consultation and prepares recommended responses to MSE. Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Respond to Contract Inquiries</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
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</table>

The Designer prepares bid addenda, if necessary, based on contractor bid inquiries. Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Prepare Bid Addenda</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
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</table>

The Designer will review and analyze the contractor bid submissions. Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Analyze Bids</th>
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<tr>
<td>Responsible</td>
<td>Designer</td>
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</table>

The Designer will coordinate with previously identified public officials for notification and attend meetings, if necessary, once the construction contract has been awarded to a contractor. Designer will provide assumptions/backup for the Scope of Work regarding the level of effort related to this task.

<table>
<thead>
<tr>
<th>Task Name</th>
<th>Hold Public Officials Meeting #2</th>
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<tbody>
<tr>
<td>Responsible</td>
<td>Designer</td>
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</table>

The Project Manager may request a proposal from the Designer, to provide construction support services (working drawing review, engineering assistance, preparation of as-built plans, etc. The Designer prepares and submits a proposal to the Project Manager, when requested. The Project Manager reviews and negotiates the proposal with the Designer in accordance with NJDOT Policy and Procedure #328. The Designer submits a final construction support services proposal for execution.
Appendix H.27 - CTSS Project Delivery Process
TSM Procedures and Standards Manual

The MSE Project Manager sends the Consultant Agreement Addendum (CAA) to the Designer. The Designer signs the CAA and sends two signed and sealed original copies back to the MSE Project Manager along with copies of the Corporate Resolution and Business Registration Certificates. The MSE Project Manager circulates the CAA and an AD-12 to NJDOT Management for signature and approval. The MSE Project Manager distributes the executed CAA to the appropriate parties. Once the CAA is fully executed, the MSE Project Manager issues a Notice to Proceed to the Designer for the construction support services.

11. Construction

The Construction Support Services Contract is typically issued as a separate Task Order. Reference the Execute Designer Addendum task above. Refer to the TSM Procedures Manual, Section D. Construction, for further guidance. Refer to the TSM Procedures Manual Appendix H.29 CTSS/Adaptive Testing Forms, for the CTSS/Adaptive testing forms and procedures.

MANUAL REFERENCE:
Appendix H.29 – CTSS/Adaptive Testing Forms
CTSS Adaptive Testing Forms.pdf

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November 2015
CTSS Project Delivery Process TSM Manual Reference Files:

- Appendix H.27 - CTSS Project Delivery Process
  - CTSS Gap Analysis Sample
  - CTSS Process Flowchart
  - CTSS Process Overview
  - CTSS Project Delivery Process Schedule Template MSP2007
  - CTSS Sample Force Off Parameters for Midblock System Detectors
  - CTSS Sample Interference Checklist
  - CTSS Sample Plans & Details
  - CTSS Sample Timing Directive
  - CTSS SOW Assumptions Template
  - CTSS Systems Engineering Analysis Template
  - Gap Assessment for CTSS Tier 1 (MSE 627-001)
  - ITS Design Review Checklists
  - ITS Design Submission Checklists

- Appendix H.28 – CTSS/Adaptive Testing Forms