CONSTRUCTION CONTRACT TIME DETERMINATION (CTD)

GUIDELINES FOR DESIGNERS/PLANNERS

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1 CONTRACT TIME DETERMINATION GUIDLINE SUMMARY

The development of a Contract Time Determination Schedule has many important considerations beyond just generating a suitable contract duration.

The CTD is used to:

- *Improve the accuracy of bid price projections.*
- *Adequately plan for the interactions of third-party utilities (that have often caused claims/delays in the past).*
- *Establish reasonable Contract Milestones*
- *Better plan the sequencing and traffic considerations.*
- *Properly plan for the many various types of restrictions associated with construction operations.*
- *Properly communicate vital work restrictions to formulate the contractors bid price.*
- *Can be used to perform a more thorough review of the Contractor's Baseline Schedule submission.*
- *Can help MassDOT plan its own forces, priorities, and improve programmatic cash demand projections.*
- *To help MassDOT Construction adjust to changes during construction*
- *Can be used to prepare proactive recovery /acceleration plans during changes/delays during construction.*
- *Can be used to help defend against unwarranted/justified time extension requests from the contractor.*
- *Improve the ability to evaluate the Designer's ability to prepare well planned construction documents.*
- *While developing the CTD, the Scheduler of Record should identify potential constructability concerns, such as access and/or utility constraints. These concerns should be identified in the Narrative, as well as the assumptions that were made in the development of the schedule so that they can be resolved prior to bidding the work.*

In an effort to help the Designers provide consistent and accurate contract durations and milestones, MassDOT has created this tool kit for the designers use to develop a Contract Time Determination deliverable. In general, this guideline that follows is required for most site specific Design-Bid-Build (DBB) projects and all Design-Build (DB) projects. – CTD submissions for DBB Projects are required at the 75% Design Submission, 100% Submission, and updated as required by the MassDOT, as part of the PS&E submission. Note - A *simplified/conceptual CTD* may be requested at the 25% DBB submission and is explained in ***Attachment F***.

For Design-Build projects, the CTD is required at the 25% submission and is to be updated as required by the MassDOT Project Manager prior to RFP Advertisement. See Designer Work-Hour Form and Project Manager for variations of when one is required.

CTD Tool-Kit Summary:

- ✓ Guideline for a Contract Time Determination (CTD) schedule development (below)
- ✓ CTD Schedule template for Primavera or "shell project" (.xer) – (https://www.mass.gov/info-details/massdot-highway-contractors-schedule-toolkit#primavera-software-downloads-)
- ✓ Sample of the Limitations of Operations (Special Provision 8.03) that the Designer will be responsible to prepare and update (below + Attachment D)
- ✓ Sample Limitations of Operations, Access Restraints, and Milestones (below + Attachments B & C)
- ✓ Sample construction work 'calendar' restrictions (below and Attachment A)
- ✓ Sample CTD narrative (Attachment G)
- ✓ Sample CTD (at 25%) – simple / conceptual (Attachment F)
- ✓ Sample CTD (at 75% or 100%) – detailed (Attachment I)

- ✓ Sample Design-Build CTD with Procurement steps (Attachment J)
- ✓ MassDOT CTD Checklist (Attachment H)

Related Tools Summary:

- ✓ Incentive/Disincentive Procedure, checklist and example (Attachment E)
- ✓ Bottom-up (production based) Construction Cost Estimate (linked to A Guide to Estimating Highway Projects Designer Tool-Kit)

1.1 GUIDANCE DISCLAIMER

The intent of the Contract Time Determination (CTD) toolkit is to assist designers when creating a construction Contract Time Determination Schedule; primarily eliminating a need to create standardized coding, reporting, formatting and to assist in the general schedule set up. The activity coding listed in this CTD toolkit is based on current requirements and is subject to change. The Designer/Scheduler is advised to check the MassDOT website, for updated templates, prior to starting each required CTD deliverable.

The CTD Toolkit is being provided for informational purposes and is available for use as a schedule development guideline only. The CTD Toolkit may not reflect specific project requirements and it is not guaranteed to be free from errors or inconsistencies. MassDOT makes no representations or warranties of any kind, express or implied, about the accuracy, reliability, or completeness with respect to the toolkit or any of the information, services, or related content contained therein for any purpose.

Note - It is the Designer's responsibility to ensure that the CTD schedule reflects the project scope, planned sequence of work, in accordance with the latest contract requirements, and that the design provided is buildable within the specified contract duration.

1.2 GENERAL

Contract Time Determination (CTD) is a procedure for determining the planned duration of construction contracts for placement in bid documents and documenting all time related aspects of the project planning that must be communicated to the bidders as an important basis. A major requirement of the CTD planning is to first start with an experienced construction planner/scheduler (5+ years in construction planning/scheduling), working with the Designer Project Manager/team, in the development of all aspects of sequencing, planning, and constructability.

This CTD deliverable will be evaluated, by MassDOT, as an important component of the Designer's overall design performance rating at the outcome of construction. In general, the CTD schedule must be performed in a way that:

- ✓ allows the contractor sufficient time to complete the project,
- ✓ is to be based upon at least one reasonable/constructible solution,
- ✓ minimizes any inconvenience to the traveling public,
- ✓ utilizes any valuable information that has been developed in the planning of the engineer's estimate (if applicable),

- ✓ takes into account all known limitations of construction operations that the contractor will need to be made aware as part of the bid documents (as prepared by the Designer with the MassDOT Standards as only the starting basis of specific project requirements),
- ✓ considers/conveys any unusual circumstances (specific location), that impact the time related aspects of the construction.

As part of the Contract Time Determination, the Designer will also:

- ✓ evaluate any special situations that might affect the duration of the project, such as unique site conditions, sensitive abutters, time of year restrictions (such as Cape Cod traffic restrictions and environmental restrictions for in-water work), other construction projects being performed in the area, either public or private, current detours, material restrictions (such as HMA paving, waterproofing, and curing), along with upcoming local public events,
- ✓ consider contractor *means and methods,* for key items of work, for at least one constructible plan,
- ✓ utilized the latest available Plans Specifications and Estimate,
- ✓ utilize the experience and professional judgment of the construction planner/scheduler (note: this CTD deliverable is a Designer responsibility – not exclusively a sub-consultants),
- ✓ check with the MassDOT PM to see if contractor incentives/disincentives will be offered,
- ✓ utilize the latest Project Utility Coordination form (PUC),
- ✓ develop a draft/proposed "Limitations of Operations" Section to define the specific Time related requirements that the contractors will need to work with (including any special restrictions like working within or around an active railroad) – See ***Attachment D*** for example of Limitations of Operations

For best results, the CTD is to be prepared using the ***Critical Path Method (CPM)*** scheduling technique to properly evaluate the reasonableness and accuracy of the overall construction plan.

1.3 SUMMARY OF IMPORTANT WORK-HOUR RESTRICTION CONSIDERATIONS

In some cases (when the roadway or bridge construction will not impede the traveling public greatly), the CTD will be based on the contractor working a normal 8-hour per day, 5-day work week (Monday thru Friday), and will contain provisions for a winter shut-down for any weather dependent work. However, many of MassDOT projects now are being planned to progress work in the winter and may require heat/weather protection and extended/accelerated shifts to minimize the impact to the public. Therefore, an alternative CTD may be planned to evaluate these production hour considerations. In these cases, two separate CTDs are to be prepared and presented to MassDOT for consideration (as negotiated in the updated Work Hour forms for the Designer) – or the MassDOT PM may direct the Designer to prepare only the accelerated version. In which case, concurrence must be obtained by the PM and the Special Provision must stipulate what the resulting work-hour/shift expectations are of the Contractor (as a basis of the bid price).

In cases where this MassDOT concurrence has been obtained, the working hours must be clearly stated in the Special Provision for ***8.06 Limitations of Operations*** and/or ***8.03 Prosecution of Work***:

SUBSECTION 8.03 Prosecution of Work

"Add/Amend the following at the end of the Section:

{This should be ahead of the Contractual and Interim Milestones}

The Contractor is hereby notified that winter work is expected for this project and has been taken into account in setting the completion date for the contract. Items of work that are expected to continue through the winter include, but are not limited to, the following: ***{Designer to insert specific work elements, e.g. closure pours; setting and grouting of precast elements; setting of prefabricated elements: etc.}***. If the work to be performed during the winter includes concrete or mortar, the relevant provisions of Section 901.72 shall be followed. Any costs, either direct costs or resulting from inefficiencies, related to continuing work in the winter shall be included in the contractor's bid and shall not be cause for a claim for a time extension or additional compensation

SUBSECTION 8.10 Determination and Extension of Contract Time for Completion

Add/Amend the following at the end of the Sections 8.10.B.4 and 8.10.C.5:

No additional time will be added to the Completion Date for work that is expected to be performed between Dec. 1 and Mar.15. Refer to Subsection 8.03 for work that is expected to be performed during this time period."

Other, non-weather related situations, requiring similar Special Provisions, include restrictions during peak hours on heavily traveled highways, night paving operations, and special requirements by sensitive abutters, railroads and/or other agencies. Typical examples of situations requiring special consideration include restrictions during peak hours on heavily travelled highways, night paving operations, and special requirements by sensitive abutters, specific temperature or moisture limits for specific materials/applications, railroads and/or other agencies. Typical examples of other working hours include night work, additional shifts per workday, extended shifts, and/or extended workweeks.

Note – If modified 8.03 is approved by MassDOT (as detailed above) and/or work is expected to be planned on during non-standard 40 hour work weeks, the Designer should be certain to eliminate/modify Subsection 7.09 accordingly.

SUBSECTION 7.09 Public Safety and Convenience.
(page 27) Add the following paragraph above the 2nd paragraph from the bottom:

Work is restricted to a normal 8-hour day, 5-day week, with the Prime Contractor and all Subcontractors working on the same shift. No work shall be done on Saturdays, Sundays, holidays, or the day before or after a holiday without prior approval of the Engineer.

See ***Attachment A*** for additional 'calendar' work restriction considerations.

1.4 CTD DEVELOPMENT PROCESS – GUIDELINE FOR DESIGN TEAM

The general procedure to develop a computerized Contract Time Determination Schedule is as following:

1. ***Designer's Project Manager*** **-** Initiate start of the CTD evaluation. Gather/transmit all relevant/ latest set plans and specs, any pertinent information and meet with the Designer's Construction Planner/Scheduler to review key project considerations, approach, and the CTD deliverable time table.
2. ***Designer's Construction Planner/Scheduler*** - Attend meetings related to planning, staging, constructability and or options to be evaluated.
3. ***Designer's Project Manager*** - Seek guidance/concurrence from the MassDOT PM regarding the plan to evaluate and obtain unusual site considerations (as developed by the Designer's team) – including the utility site evaluation meeting as part of Engineering Directive E-07-002.
4. ***Designer's Project Manager*** -Request the latest Project Utility Coordination (PUC) Form from the MassDOT District Utility Constructability Engineer (if applicable).
5. ***Designer's Project Manager*** **-** Seek confirmation, from the MassDOT PM, that contractor incentives/disincentives will (or will not) be offered (requiring special language and evaluations related to contract time). See I/D procedure and check-list.
6. ***Designer's Construction Planner/Scheduler*** -Perform a thorough review of the plans and specifications and utility considerations (PUC) with special emphasis on staging and maintenance of traffic, sequencing, and constructability, to gain an overall understanding of the key time related aspects of the project.
    1. Attend site meeting to evaluate utilities considerations, construction staging considerations, and other applicable work restrictions.
    2. Refine any required construction sequences.
    3. Review the Specifications and Special Provisions and take note of any time related, or sequence related items.
    4. Review the Cost Estimate for applicable quantities, shift premiums, and/or production rates for key items of work are noted for time related considerations. And, ensure that the cost estimate has been updated to reflect the latest plans, specifications, and requirements.
    5. Outline any other time related project issues or needs that will be part of the CTD narrative and Special Provisions to alert contractors.
7. ***Designer's Construction Planner/Scheduler*** -Create the CTD Schedule for the entire project and prepare graphic to present logic, sequence, durations, work-hour restrictions, etc.
8. ***Designer's Construction Planner/Scheduler*** -Develop a narrative (similar to a Contractor Baseline – as shown on the MassDOT Web-site Construction Contractor Tool-Kit --- MassDOT Highway contractor's schedule toolkit | Mass.gov) to adequately describe the basis of the schedule.
9. ***Designer's Construction Planner/Scheduler*** - Generate/record any comments or suggestions related to concerns or opportunities related to constructability, sequencing of the work, quantities, specifications, estimates, permits, Right of Way, Maintenance of Traffic, and/or any other assumptions used to make the Determination, and any other information that is deemed necessary to justify the duration. Include comments in the Narrative and transmit comments to Designer Project Manager.
10. ***Designer's Construction Planner/Scheduler & Designer's PM*** - Present to key members of the design team for concurrence to the basis and assumptions.
11. ***Designer's Construction Planner/Scheduler & Designer's PM*** **-** Check to make sure that the overall schedule appears to be reasonable, there are no obvious errors or mistakes in logic, (i.e., paving not being

performed in the middle of January), and that the Project Duration and Construction Contract Completion Date also appear to be reasonable

12. ***Designer's Construction Planner/Scheduler & Designer's PM -*** Modify the CTD and the Narrative accordingly.
13. ***Designer's Construction Planner/Scheduler & Designer's PM -*** Develop a draft Special Provision for all time related restrictions/considerations, access restraints and milestones that must be conveyed to the bidders.
14. ***Designer's Construction Planner/Scheduler -*** Finalize the deliverable package and obtain the Designer Project Manager signature (review)/ concurrence.
15. ***Designer Project Manager*** – Transmit to the MassDOT Project Manager and schedule a meeting to review (as desired by MassDOT PM).
16. ***Designer Project Manager*** –Offer to schedule a meeting with the MassDOT Project Manager to present the CTD, Narrative, and Special Provisions to the MassDOT.
17. ***MassDOT Project Manager*** – Distributes to MassDOT reviewers.
18. ***Designer's Construction Planner/Scheduler & Designer PM -*** Modify and update accordingly (with comments incorporated or responded to from MassDOT reviewers)
19. ***Designer's Construction Planner/Scheduler & Designer PM -*** Check to make sure that the overall schedule appears to be reasonable, there are no obvious errors or mistakes in logic, (i.e., paving not being performed in the middle of January), and that the Project Duration and Construction Contract Completion Date also appear to be reasonable

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20. *REPEAT FOR NEXT SUBMISSION PHASE*

    Designer's Construction Planner/Scheduler & Designer PM - Update CTD, Narrative, and Special Provisions as part of the next Design Phase Submission accordingly – with particular attention on changes, issues that were added (like a new utility on the PUC form), and/or design development that impacts the planned approach and special considerations that the contractor/bidders should be aware of.

1.5 CTD ORGANIZATION GUIDE – FOR DESIGNER'S PLANNER/SCHEDULER

The process for developing the Schedule and determining the Project Duration is as follows:

1. **Create a Work Breakdown Structure (WBS)** for the Project: Create a sequence of operations by breaking the project down into phase or time-related groups of operations that are compatible with the designer's suggested method of construction contained in the documents. For a CTD, the WBS should at a minimum, break down the work into the levels of detail shown on the sequencing steps within the staging plans. It should also correlate to the Engineer's Estimate for separate types of work and types operations. In most cases the WBS will have one of the following formats:

WBS Code	WBS Name
CSTv2.0	CSTv2.0
CSTv2.0.Mil	Milestones
CSTv2.0.Mil.Gene	General
CSTv2.0.Mil.Dura	Durations
CSTv2.0.Wid	Project Wide
CSTv2.0.Pre	Preconstruction
CSTv2.0.Pre.Prm	Permitting
CSTv2.0.Pre.Pro	Submittals & Procurements
CSTv2.0.Pre.Pro.8.01	Subsection 8.01: Subcontractor Approvals
CSTv2.0.Pre.Pro.8.01.SitePro	Licensed Site Professional
CSTv2.0.Pre.Pro.8.01.StrucClean	Structure Cleaning Subcontractor
CSTv2.0.Pre.Pro.8.01.Elec	Electrical Subcontractor
CSTv2.0.Pre.Pro.8.01.BrdDemo	Bridge Demolition Subcontractor
CSTv2.0.Pre.Pro.100	Item 100: Schedule of Operations
CSTv2.0.Pre.Pro.114.1	Item 114.1: Demolition of Superstructure
CSTv2.0.Pre.Pro.119.5	Item 119.5: Construction Noise Control
CSTv2.0.Pre.Pro.149.2	Item 149.2: Public Outreach
CSTv2.0.Pre.Pro.180.01	Item 180.01: Environmental Health & Safety Program
CSTv2.0.Pre.Pro.220	Items 220.x: Drainage Structures
CSTv2.0.Pre.Pro.701.47	Item 701.47: Winter Concrete Plan
CSTv2.0.Pre.Pro.701.61	Item 701.61: Contractor Quality Control Plan
CSTv2.0.Pre.Pro.756	Item 756: Stormwater Water Protection Plan
CSTv2.0.Pre.Pro.850	Items 850.x: Traffic Control for Construction and Maint Operations
CSTv2.0.Pre.Pro.991.1	Item 991.1: Control of Water
CSTv2.0.Pre.Pro.995.01	Item 995.01: Bridge
CSTv2.0.Pre.Pro.995.01.SEP	Steel Erection Procedure
CSTv2.0.Pre.Pro.995.01.901	SubItem 901: 4000 PSI 1.5 in., 565 Cement Concrete
CSTv2.0.Pre.Pro.995.01.960.01	SubItem 960.01: Structural Steel - Coated Steel
CSTv2.0.Pre.Pro.995.01.975.1	SubItem 975.1: Metal Bridge Railing (3 Rail), Steel (Type S3-TL4)
CSTv2.0.Pre.Pro.995.01.PD	Precast Decks
CSTv2.0.Pre.Pro.TPD	Temporary Pavement Design
CSTv2.0.Uti	Utility
CSTv2.0.Uti.URP	Utility Relocation & Coordination Plan
CSTv2.0.Uti.Not	Utility Notifications & Meetings
CSTv2.0.Uti.Rel	Utility Relocation
CSTv2.0.Uti.Rel.1	Utility 1 PUC Tasks

WBS Code	WBS Name
CSTv2.0.Uti.Rel.2	Utility 2 PUC Tasks
CSTv2.0.Uti.Rel.3	Utility 3 PUC Tasks
CSTv2.0.Uti.Rel.4	Utility 4 PUC Tasks
CSTv2.0.Uti.SCONN	Utility Service Connections
CSTv2.0.Con	Construction
CSTv2.0.Con.Gene	General
CSTv2.0.Con.Mobi	Start-up
CSTv2.0.Con.Ph1	Stage 1
CSTv2.0.Con.Ph1.StpA	Step A
CSTv2.0.Con.Ph1.StpB	Step B
CSTv2.0.Con.Ph1.StpC	Step C
CSTv2.0.Con.Ph1.StpD	Step D
CSTv2.0.Con.Ph2	Stage 2
CSTv2.0.Con.Ph2.StpA	Step A
CSTv2.0.Con.Ph2.StpB	Step B
CSTv2.0.Con.Ph2.StpC	Step C
CSTv2.0.Con.Ph2.StpD	Step D
CSTv2.0.Con.Ph3	Stage 3
CSTv2.0.Con.Ph3.StpA	Step A
CSTv2.0.Con.Ph3.StpB	Step B
CSTv2.0.Con.Ph3.StpC	Step C
CSTv2.0.Con.Ph3.StpD	Step D
CSTv2.0.Con.Ph4	Stage 4
CSTv2.0.Con.Ph4.StpA	Step A
CSTv2.0.Con.Ph4.StpB	Step B
CSTv2.0.Con.Ph4.StpC	Step C
CSTv2.0.Con.Ph4.StpD	Step D
CSTv2.0.Con.Ph5	Stage 5
CSTv2.0.Con.Ph5.StpA	Step A
CSTv2.0.Con.Ph5.StpB	Step B
CSTv2.0.Con.Ph5.StpC	Step C
CSTv2.0.Con.Ph5.StpD	Step D
CSTv2.0.Clo	Close-Out
CSTv2.0.Pla	Placeholder
CSTv2.0.Deleted	Deleted Activities

Activity Codes: Activity codes should be assigned to activities in order to be able to sort them other than by the Work Breakdown Structure (WBS) code. And the Activity codes should be assigned at the Project Level (within Primavera).

2. **Assign Durations:** In general, CTD activities should planned in a manner that allows for activity durations to be no less than 3 days and no greater than 30 days, to ensure that proper logic, sequencing and critical paths, are developed and maintained as the CTD is finalized. Once the individual activities are identified, the Planner/Scheduler is to determine the duration of each activity based with some of the following considerations:

- If applicable (i.e. a *Bottom Up Estimate* – or production based estimate has been provided), the Planner/Scheduler should review the crew basis and/or production rates used in the Engineer's Estimate). https://www.mass.gov/doc/controls-guidelines-production-based-construction-cost-estimate-bottom-up/download A Guide to Estimating Highway Projects
- Estimated quantities contained in the Engineer's Estimate
- Comparison of critical operations of recently completed similar projects
- The Design Team's professional judgment and experience
- Construction Estimating Guides and Published Documents (i.e. RS Means etc.) and/or any other data, information that help determine the time required to complete various activities.
- A normal, eight (8) hour per day, five (5)-day work week, unless there are special considerations to justify other working hours – see Special Provision 8.03 and other sections related to extended shift basis.
- Submittal review time should not be less than 30 days.
- For planning purposes, it is advisable to also generate revise and resubmit activities for submittals on the critical path. This consists of one 10 day activity to 'Revise & Resubmit Submittal – by Contractor' and another 20 day activity to "Re-Review and approve – by MassDOT."
- For complicated submittals, 60 days can be used, but the extended review time should be noted in the Special Provisions.
- Long lead items should be identified and the time assumed should be used. It should be noted in the narrative if the lead time came from a vendor, or if it is based upon the Designer's judgment.

3. **Assign Work Calendars:** For each activity, either select an existing calendar, one that matches all the required non-work days in the project, or, if an existing one does not match the project's requirements, create and use a new, project-specific calendar. The new work calendars should be created to match any contract requirements and what has been delineated as the basis of work in the requirements, estimate, and schedule. Operations may be limited by seasonal weather restrictions, seasonal water access restrictions (i.e. fish migration), landscaping restrictions etc. See section on Calendars elsewhere.

4. **Determine Logic Relationships between activities:** The Planner/Scheduler is to identify and apply logic between the activities in the schedule to represent the intent of the staging plans, required work sequences and any assumptions that the Engineer has made in the basis of Estimate. The Planner/Scheduler is to be sure to include activities for early post NTP activities such as office trailer set-up, preconstruction meeting, and early submittals whose approval is required prior to start of work. Ensure that each activity, excluding NTP and Field Completion, has at least one predecessor and one successor and there are no '*open ends.*'

5. **Apply Access Restraints and Milestones.** The CTD is also used to adequately plan for significant changes during the design and procurement phases to best anticipate consequential impacts related to possible calendar/work restriction impacts. A project with two seasons may turn into three construction seasons if the bid opening slips just a few weeks. The Planner/Scheduler is to prepare the CTD with consideration to the advertising date and bid opening date. A constraint is to be assigned to the anticipated NTP date, and for any other required Milestones or Access Restraints. Add project events such as the Advertising Date, the Bid Opening Date, the Award Date, the NTP Date (based on the CTD Guidance Grid below), and the Pre-Construction meeting, which should be scheduled within 30 days of NTP issuance. The Scheduler

Planner should also be certain to add activities (calculated from NTP) for the Full Beneficial Use milestone, Substantial Completion milestone, and the Field Completion milestones. Constraints should only be used to hold contractual dates, such as Access Restraints and Milestones. See Access Restraints and Milestone in ***Attachment C&D*** below.

CTD Guidance

Project Criteria	Advertisement to NTP Duration
Design-Build Projects (RFP to NTP)	180-220 Days
Office Estimate >$15M or Municipal Design	120 Days
Office Estimate <$15M and MassDOT Design	90 Days

6. **Consider key Resources/Restrictions.** As part of the CTD basis, the major resources that make up the bulk of the work should be considered in the evaluations critical activities in the schedule, for example placement and movement of heavy equipment to and around the site.

7. **Calculate and Review the Schedule**. After logic has been applied, the Planner/Scheduler should calculate the schedule and review the Critical Path. Critical Path Method (CPM) calculations result in start times, finish times and float calculations of the activities. A resulting Bar Chart should be developed to show work will be performed and the duration of each activity, and will be a representation of the entire project. Once the Schedule is calculated, a more accurate check can be made to make sure that the overall schedule appears to be reasonable, there are no obvious errors or mistakes in logic (i.e. paving not being performed in the middle of January), and that the Project Duration and Construction Contract Completion Date also appear to be reasonable. Special care should be taken regarding the final dates calculated for the finish Milestones, especially consider what the results would be if project advertisement or Notice-to-Proceed issuance were to be delayed by, 30 days or 60 days for example, and the logical effect on the Milestone dates. Does it push past another winter season? Does final landscaping fall into a restricted planting season? Special care should also be taken on the closeout of the Project, and whether Punchlist Items generated after declaration of Substantial Completion can be performed in that time period, or may slip to the following spring construction season. A grid, similar to the one shown here, should be included in the Narrative showing the effects of various procurement durations in relation to advertisement.

[PROJECT NAME]		NTP ADV + 90days		NTP ADV + 120days		NTP ADV + 150days		NTP ADV + 180days	
Milestone	Milestone Description	Date	Days from NTP	Date	Days from NTP	Date	Days from NTP	Date	Days from NTP
ADV	Advertisement	10/28/2024		10/28/2024		10/28/2024		10/28/2024	
NTP	Notice to Proceed	1/26/2025		2/25/2025		3/27/2025		4/26/2025	
MS03	Full Beneficial Use	6/11/2028	1,232	8/14/2028	1,266	10/6/2028	1,289	10/6/2028	1,259
MS02	Substantial Completion	7/8/2028	1,259	9/14/2028	1,297	11/3/2028	1,317	11/3/2028	1,287
MS01	Contractor Field Completion	8/22/2028	1,304	10/29/2028	1,342	12/18/2028	1,362	12/18/2028	1,332

8. Once the Project Schedule is Calculated and Reviewed, a written Narrative is required for all CTDs. See example CTD narrative in ***Attachment G***.

9. Review/complete the Contract Time Determination Checklist – See Section ***Attachment H*** below.

10. Prepare a Determination Memo providing the project duration and file the Determination documentation in the appropriate contract file. Based on the calculated schedule, an interoffice Memorandum should be prepared by the Designer that contains the information listed below:

    - Project Duration
    - Construction Contract Completion Date
    - If one-hundred and twenty (120) calendar Days were not used, list the estimated number of days assumed to elapse between the Advertisement Date and NTP, as the basis for the Construction Contract Time Determination. If the Advertisement Date is delayed by more than thirty (30) Calendar Days, an updated Construction Time Determination will be required
    - Contractor prequalification type obtained from MassDOT's Definitions of Classes of Work

1.6 OTHER IMPORTANT FACTORS

There are many factors which must be considered while preparing the CTD Schedule. It will be the Designer's responsibility to determine which factors apply and are most relevant to the specific project. Listed below are typical factors which must be given consideration.

1. **Utilities:** Planning and coordination with third party utilities is very important in avoiding delays. MassDOT has a new section 8.14 Utility Coordination Specification for contractors to utilize for Utility Coordination. The Planner/Scheduler should review this specification, insert activities for pre-con and utility coordination meetings to occur with 30-days NTP issuance, and should be certain that a PUC form has been provided by the District Utility/Constructability Engineer (DUCE). This PUC form depicts the planned duration and sequence as a result of MassDOT/Designer planning during design. This PUC form also serves as one of the most important baseline schedule basis documents prior to bid and into construction. Careful consideration must be given to which utilities have to be relocated and the sequence of those relocations. Often the contractor has to do certain enabling work before a utility is able to relocate, which may result in delay to the contractor if this work is not included in the Project Schedule. All necessary utility force accounts and/or other agreements must either be in place prior to the creation of the Project Schedule or sufficient time, as determined by either the PM or the DUCE, must be allowed in the schedule for their formulation.

2. **Seasonal Limitations:** Seasonal limitations for landscaping work (seeding, planting trees, shrubs, and ground cover) must be considered and scheduled so that, for example, the Contract Completion Date does not occur in March (see Winter Work), thereby allowing no time for the Contractor to do this work, which, typically, occurs at the end of a project. There may be other restrictions for various reasons as well, such as; paving and striping that need similar consideration in their scheduling. These restrictions must appear in the Special Provisions. See example 8.03 for expectation for working through winter on most MassDOT projects with significant user volume – ***Attachment A, B, and C.***

3. **Maintenance of Traffic (MOT):** The sequence of operations may be directly affected by the traffic pattern unique to a project. When detours are involved, their complexity and availability require careful study. Frequently, time restrictions are placed on the contractor in the specifications to keep off the traveled way during heavy commuting hours and the Traffic Management Plan (TMP) contained in the Contract drawings often dictates the number of phases in a project. Each CTD should contain the shortest practical duration of traffic interruptions during project construction. Therefore, MOT requirements must be carefully considered during the development of the CTD.

4. **Curing Time:** The effect on the Project Schedule of concrete curing time, waiting periods between successive paving courses or between concrete placement operations, as well as specified embankment settlement periods, must be considered.

5. **Winter Work:** Construction projects shall not be scheduled to automatically include a December 1 to March 15 shutdown period, because there are many work activities that can proceed during this time. Different calendars need to be used to properly account for certain activities non-work periods and to help monitor changes/impacts as the project evolves. See ***Attachment A, B, and C.***

6. **Adjacent Contracts:** Conflicting operations of adjacent projects, both public and private, must be considered. Coordination of two or more construction projects in the same area can have an effect on the Project Schedule. Any restrictions assumed in the schedule must be clearly described in the Special Provisions of all affected contracts.

7. **Submittal Review Periods:** Review time for demolition procedures, shop drawings, erection procedures, and other submittals must be taken into account. Typically, these reviews are scheduled at one Calendar Month per submittal. Utilities and railroads will require more time and should be scheduled for a minimum of sixty (60) Calendar Days. As a rule of thumb, periods of between thirty (30) and sixty (60) Calendar Days prior to the start of construction should be included in the schedule for this work. For larger contracts, major submittals should be shown as occurring within the contract period, but at a reasonable amount of time before work starts.

8. **Fabrication Time:** Time for fabrication of structural steel, precast concrete units, traffic signal equipment, and other items must be taken into account. This work must be given careful consideration in the Project Schedule. Project Schedules typically require that orders be placed soon after Contract Award, but fabrication time must follow shop drawing approval in the schedule.

9. **Railroads:** All Railroads have strict rules for working along and over their Right-of-Way. Most of them require that no construction operations progress when there is any potential of fouling the track. Coordination with railroads is very important and the specific rules of working along specific rail road sites needs to be clearly communicated to the bidders and documented with the rail road. Careful consideration must be given to the sequence of the work required with regard to the railroad's allowable track fouling time windows. Often the contractor has to perform certain work before the railroad work, which may result in delay to the contractor if this work is not included in the Project Schedule. All necessary railroad force accounts and/or other agreements must either be in place prior to the finalization of the CTD, as determined by either the PM or the DUCE, and must be explained in the Special Provisions. See ***Attachment D.***

10. **Permits:** Certain permits may be required. The time required to obtain such permits will vary depending on the nature of the permit and the authority granting the permit. Sufficient time, as determined by either the PM or the DUCE and included in the Special Provisions, should be allotted for this process, although in many instances it will coincide with other operations that can be performed. Any impacts to the Project Schedule must be determined and quantified in the schedule.

11. **ROW:** Right-of-Way (ROW) must be established, if required, by the PM. The time needed to obtain such ROW will vary depending on the nature of the land-taking, easement, and/or right(s)-of-entry involved and the individual landowner(s) of the property in question. If not already completed by the time of the Determination request, the PM should determine and provide to the DUCE the amount of time that should be allotted for this process, although in many instances it will coincide with other operations that can be performed. Requirements for the Contractor to obtain ROW or the expected times for MassDOT to do so must be clearly defined in the Special Provisions.

12. **Night Work:** Certain projects such as resurfacing of heavily traveled highways have provisions for night work only. Contract provisions may restrict the contractor to less than a full eight (8) hours of work per night. With the use of temporary lighting set-ups, traffic operating under revised and/or temporary traffic control devices and lane restrictions, and other restrictions peculiar to night work, production rates are generally less than daytime operations and must be given careful consideration in determining project durations.

13. **Punchlist/Close-Out:** The CTD should detail the post-Substantial Completion declaration project close-out phase, including scheduling and performing a Substantial Completion walk-through and generation of punchlist items by MassDOT (21 days) , contractor resolution of punchlist items (30 days per 722.61.B.18), and receipt of all Material Certifications, prior to Contractor Field Completion.

The previous information is intended as guidance only. Each project is different and contains its own unique set of circumstances that may not be covered by this information. Care should be exercised in the creation of the Project Schedule to ensure that each project's unique requirements and schedule impacts are captured

2 TOOLKIT COMPONENTS

2.1 SCHEDULE FILE

This schedule templates (Design-Bid-Build & Design-Build) were created in Primavera P6 release 20 and were designed to aid the Designer prepare a Contract Time Determination Schedule to determine the project's duration. The templates include standard resources IDs, project and activity codes, WBS organization, work calendars, and standard layouts. In order to use the templates, the Designer will need to save the .xer file to the scheduler's local drive, open Primavera and import the file.

MassDOT Highway contractor's schedule toolkit | Mass.gov

2.2 PRIMAVERA SCHEDULE SETTINGS

The template has been developed using the following schedule calculation settings.

Scheduling Method = Retained Logic
This is the normal method for predicting status with out-of sequence progress.

Schedule Method = Contiguous Activities
This is also the standard setting in Primavera and is intended for use on non-interruptible activities.

Total Float Calculations = Uses finish dates to calculate Total Float
Standardizing this setting across all ABP projects will provide consistency to our reporting.

2.3 CALENDARS

Calendars Provided --- See *Attachment A*
Work calendars should adhere to the project Specifications. The template has been developed with several Calendars that comply with the specifications and correctly describe the work restrictions.
Please ensure that each activity in the schedule is assigned to a calendar that is appropriate for the work type.

Calendars should be maintained at the Project Level *(on the Primavera setting – i.e. not global)*

2.4 MASS DOT STANDARD MILESTONES – CSD-084

Standard Contract Milestones
MassDOT uses the following Contract Milestones for all site-specific Highway and Roadway Bridge Projects (including Design Build). These Milestones are subject to change in 2014 – therefore, the Designer is advised to check the MassDOT web-site before starting each CTD.

The Designer is instructed to use these definitions or as modified by MassDOT standards for contract Milestones.

MS#3 – FULL BENEFICIAL USE – The majority of contract Work has been completed and the asset(s) has been opened for full multi-modal transportation use, except for limited contract work items that do not materially impair or hinder the intended public use of the transportation facility. All anticipated lane takings have been completed, except for minor, short term work items.

MS#2 – SUBSTANTIAL COMPLETION – A walkthrough of the entire contract Work has been performed by the Resident Engineer. A Punch List has been generated and the Work required by contract, including paper work, has been completed, except for work having a contract price of less than one percent of the adjusted total contract price, including overruns underruns and all contract amendments. All material submittals have been received by the District Materials Lab.

MS#1 – CONTRACT FIELD COMPLETION - All physical contract Work is complete including the punchlist. The Contractor has fully de-mobilized from the field operations.

The milestones listed below should adhere to the following naming convention. These milestones have been created within the CTD template MassDOT Highway contractor's schedule toolkit | Mass.gov .

Milestone

Milestone Identifier	Milestone Activity Description	Example
NTP	Notice to Proceed	NTP – Notice to Proceed
AR01	Access restraint for start of demolition to allow for utility relocations	AR01 – Access Restraint #1 (Aerial Utilities) or AR02 – Access Restraint #2 (In Bridge Utilities)
MS03	Full Beneficial Use	MS03 – Full Beneficial Use
MS02	Substantial Completion	MS02 – Substantial Completion
MS01	Contractor Field Completion	MS01– Contractor Field Completion
MSXX	Other Interim Milestones as defined by need (such as significant phasing and incentives)	MSXX – Phase 2 Completion

There should be no successor activities to Final Completion Milestones. If the Project asks for contractual completion dates for each, then the activities should be assigned a "finish on or before" constraint of the contract date.

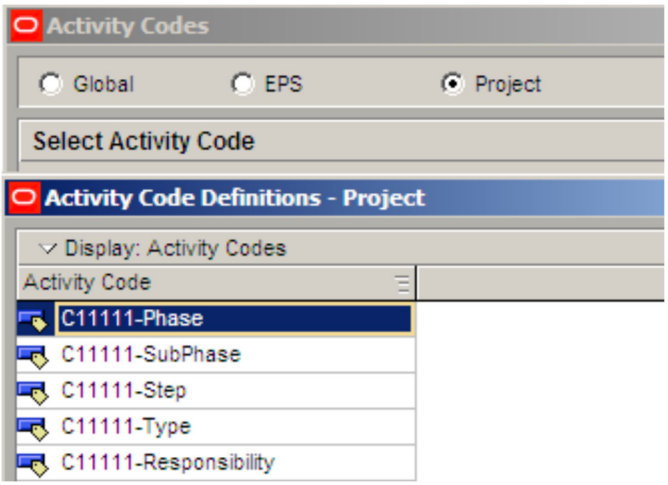
2.5 ACTIVITY CODES AND SETTINGS

Activity Codes

Activity codes can be assigned to activities in order to be able to sort them other than by the Work Breakdown Structure (WBS) code. See CTD Tool Kit.

Listed below are some suggested activity code fields.

The activity codes should be maintained at the Project Level.



Additional activity code (or WBS coding) may be added and utilized at the contractor's discretion.

WBS Structure

The WBS structure shown below was created within the project to allow for additional means to organize the CTD schedule. Additional WBS detail may be added and utilized at the Designer's discretion. See CTD Tool-Kit

2.6 NARRATIVE

Once the schedule is calculated and reviewed a written Narrative is required for all CTDs.
The narrative should expand upon what is contained in the Basis of Estimate and explain all elements of the schedule, any assumptions made by the Designer and with special attention to the critical path, and near critical paths. See Attachment below example CTD Narrative.

The narrative should expand upon what is contained in the Basis of Estimate (if applicable) and explain all elements of the schedule, with special attention to the critical path, and near critical paths. The narrative should include the following.

- Discuss the Designer's site management plan (i.e. lay down, staging, traffic, parking etc.)
- Describe the Designer's overall planned approach and the resulting description of the critical path.
- Describe the basis of any and all significant resource issues.
- Identify any significant risks that MassDOT Construction should be made aware of.
- Provide a summary of the basis and assumptions for critical activity durations and logic.
- Confirm that a complete PUC form was provided to the Scheduler and used as the basis.
    - Note even if there are no utilities impacts, a signed PUC form is required stating N/A
- Summarize all of the Access Restraints and Milestones.
- Confirm compliance with winter weather requirements and other work-restrictions.
- Explanation of the use of Calendars.
- Explain how limitations of operations were incorporated into the Schedule – and provide draft language for the Special Provisions (as required).

- Explain any work that must take place outside of normal work hours.
- Explain any schedule compression/acceleration that was used to achieve any required dates.
- Identify any constructability considerations that the Design team should address.
- Explain any options that were considered
- Identify any other important time related considerations
- If this CTD is an update of a previous submission, confirm review comments have been addressed and describe all significant changes that have been included.

*See **Attachment G for Example Narrative***