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**Work Package** - A deliverable at the lowest level of the work breakdown structure. A work package contains activities.

## **2.0 Scheduling Software**

The New Jersey Department of Transportation, Capital Program Management has adopted the use of Primavera software in XER format as the standard format for progress schedules. This software and format will be updated as newer versions become available. At Final Design, the Designer will develop a construction schedule for the proposed project. See Appendix A for an example of a Primavera Schedule view.

The Contractor will submit a preliminary and baseline construction schedule and submit bi-monthly schedule updates. All construction schedules will conform to the requirements of this manual.

## **3.0 Standard Practices**

In developing a schedule, three basic items make CPM scheduling work:

- Clearly defined activities
- Realistic duration's
- Good logic

Other good practices include:

- Negative lags and negative floats will not be permitted.
- Do not use a Finish to Start relationship with a lag. An activity must be added to represent the lag time.
- A project has one beginning and one end. All activities have a predecessor and successor except the project's start and finish milestones. No "Open Ends" will be permitted.
- Durations of work activities do not exceed the update cycle. The Department requires the update cycle to be prepared bi-monthly.
- "Suspension of Dates" will not be permitted. An activity must be added.
- If an activity has a Start-to-Start relationship - it is to be closed with a Finish-to-Finish or Finish-to-Start relationship. (No open ends)
- The completion date of the CPM schedule is the completion date in Subsection 108.10 of the project's Special Provisions, which is to be input as a Finish Milestone with a Late Finish Constraint. All intermediate milestones (Interim Completion Dates) required in the Contract are to be shown in proper logical sequence and input as either the "Start-no-Earlier-Than" or "Finish-no-Later-Than" date. Mandatory Finish and Mandatory Starts are not to be used.
- When updating, all "Out of Sequence" activities are to be corrected to reflect the current construction operations.
- Original durations will not be changed from the approved Baseline Schedule.

## **4.0 Standard Coding**

As a means of monitoring progress schedules, the Department has developed with the Consultant and Construction industries common coding structure and procedures to be utilized from design through construction. The Designer and Contractor is required to utilize the Primavera template project containing the latest standard coding provided from the Department's web site. Details regarding template usage are provided in Appendix C.

### 4.3 AREP Project Area

Values of YYYY will be the name of the project and the last two places are user defined.

Value	Used Defined
YYYYA1	Area 1 (Description to be defined by user)
YYYYA2	Area 2 (Description to be defined by user)
YYYYA3	Area 3 (Description to be defined by user)
YYYYA4	Area 4 (Description to be defined by user)
YYYYA5	Area 5 (Description to be defined by user)
YYYYA6	Area 6 (Description to be defined by user)
YYYYA7	Area 7 (Description to be defined by user)
YYYYA8	Area 8 (Description to be defined by user)
YYYYA9	Area 9 (Description to be defined by user)
YYYYB1	Area 10 (Description to be defined by user)

### 5.0 Standard Factors

Designers will take into account the following factors when preparing a Construction Schedule:

- Determine the optimum time to advertise a project, so as to minimize the impacts of seasonal restrictions and thus reduce the overall length of a project's duration. When possible, schedule the advertisement of a project to allow construction to be completed in a single construction season.
- Seasonal limitations on work such as concrete construction, HMA paving (especially if restricted to night hours), HMA availability, curb, traffic stripes, landscaping and bridge painting.
- Work requiring temperature above 50 degrees F is to be scheduled between May 1 and September 30.
- Work requiring temperature above 60 degrees F is to be scheduled between June 1 and September 15.
- Utility relocation's. Treat each utility separately - work on the same pole line must be treated sequentially, not concurrently.
- No natural gas service interruptions during the winter months (Normally from October 1 to April 1). Confirm dates with Capital Program Support.
- No water service interruptions during the summer months (Normally from April 1 to September 30). Confirm dates with Capital Program Support.
- No electrical services interruptions during the summer months. Normally from June 1 through Sept 30 should not be considered for electric outages. This is not only for transmission lines but also distribution lines.
- Special interruptions of utility services. Utility company customers may restrict when services can be interrupted. This is particularly true with manufacturing customers, and financial service customers.
- Railroad access restrictions. This should account for how often the RR will likely grant a track outage or other access in a given week, and also for the impacts on contractor productivity.
- Right-of-way availability (each parcel treated separately). Construction easement restrictions.
- Work hour restrictions due to staging and traffic volumes. Marine, bridge openings, or railroad traffic.
- Staged construction.
- Allowable lane closures along shore routes. These may not be closed from

## 7.6 Table A

### Production Rates For Roadway Items

ITEM	Type 1 Construction	Type 2 Reconstruction	Type 3 Widening	Type 4 Resurfacing	Type 5 Intersections
Mobilization	10 Days*	10 Days*	5 Days	2 Days	2 Days
Clearing Site	4 Acres	4 Acres	4 Acres	N/A	N/A
Stripping	2 Acres	2 Acres	1 Acres		
Demolition of Buildings	1 Unit	1 Unit	1 Unit	N/A	N/A
Pest Control	10 Days	10 Days	10 Days	N/A	N/A
Asbestos Clean-up Resident and Small Commercial	4 Days	4 Days	4 Days	N/A	N/A
Large Commercial	10 Days	10 Days	10 Days		
Pavement Removal	N/A	2250 SY	2250 SY	2500 SY	300 SY
Roadway Excavation	3000 CY	1000 CY	1000 CY	N/A	N/A
Embankment	1500 CY	350 CY	350 CY	N/A	N/A
Drainage Pipe Includes 1 Structure 36 inches and Smaller	300 LF	150 LF	150 LF	N/A	150 LF
Larger than 36 inches	100 LF	60 LF	60 LF	N/A	60 LF
Reset Castings	N/A	5 Units	5 Units	5 Units	5 Units
Extension Frames, Rings and Grates	N/A	12 Units	12 Units	12 Units	12 Units
Subbase	350 CY	250 CY	150 CY	N/A	50 CY
Aggregate Base Course	350 CY	250 CY	150 CY	N/A	50 CY
HMA	1500 TONS	1000 TONS	750 TONS	1300 TONS	250 TONS
Concrete Base or Surface Course	2500 SY	1000 SY	750 SY	N/A	225 SY

Note: Production Rates are based on 8-hour working day per crew.

TYPE 1 = New construction, additions or major reconstruction of divided or undivided highways.

TYPE 2 = Reconstruction or upgrading existing highways.

TYPE 3 = Widening (less than one lane) and resurfacing existing highways.

TYPE 4 = Resurfacing existing highways with bituminous concrete.

TYPE 5 = Minor construction or reconstruction of street or highway intersections.

\* = Use 20 days when \$50 million or higher.

## Appendix E

### Concrete Curing Time

	Form Removal	Form Removal with Strength *	Cold Weather Curing **	Subsequent Forming ***	Subsequent Pours/Loading
Barrier Curb	Concrete holds shape	NA	5 DAYS at 60 °F	NA	NA
Piles	24 HOURS***	NA	5 DAYS at 60 °F	24 HOURS	3 DAYS Minimum or Forming Requirement if >
Footing	24 HOURS***	NA	5 DAYS at 60 °F	24 HOURS	3 DAYS Minimum or Forming Requirement if >
Abutment Wall	24 HOURS***	NA	5 DAYS at 60 °F	24 HOURS	3 DAYS Minimum or Forming Requirement if >
Cast in Place Retaining Wa	24 HOURS***	NA	5 DAYS at 60 °F	24 HOURS	3 DAYS Minimum or Forming Requirement if >
Wing Walls	14 DAYS	3 DAYS 3000 PSI	5 DAYS at 60 °F	Required Form Removal of Previous Pour	Subsequent Forming Requirement
Battered Columns	14 DAYS	3 DAYS 4000 PSI	5 DAYS at 60 °F	Required Form Removal of Previous Pour	Subsequent Forming Requirement
Pier Caps	14 DAYS	3 DAYS 4000 PSI	5 DAYS at 60 °F	Required Form Removal of Previous Pour	Subsequent Forming Requirement
Arches	14 DAYS	7 DAYS 4000 PSI	7 DAYS at 60 °F	Required Form Removal of Previous Pour	Subsequent Forming Requirement
Culverts	14 DAYS	7 DAYS 4000 PSI	7 DAYS at 60 °F	Required Form Removal of Previous Pour	Subsequent Forming Requirement
Approach Slab	14 DAYS	7 DAYS 4000 PSI	7 DAYS at 60 °F	14 DAYS + 4000 PSI 80000 pound Maximum	Subsequent Forming Requirement
Deck	14 DAYS	NA	7 DAYS at 60 °F	14 DAYS + 4000 PSI 80000 pound Maximum	Subsequent Forming Requirement
Bridge Sidewalk	24 HOURS	NA	5 DAYS at 60 °F	NA	Subsequent Forming Requirement
Bridge Parapet and Barrier	Concrete holds shape	NA	5 DAYS at 60 °F	NA	Subsequent Forming Requirement
ALL ELSE	24 HOURS	NA	5 DAYS at 60 °F	Required Form Removal of Previous Pour	3 DAYS Minimum or Forming Requirement if >
* When using protective measures for cold weather concreting, as specified in 504.03.02.C.1, do not remove the forms until the protective measures are removed regardless of concrete cylinder strength.					
** If the temperature of the concrete falls below 60 °F within 5 days after placing, maintain the protective measures in place for an additional 5 days.					
*** If >20% flyash 3 days					