



MnDOT Project Management  
Office Presents:

# Schedule Float

**Presenter: Jonathan McNatty, PSP**  
Senior Schedule Consultant  
DRMcNatty & Associates, Inc.

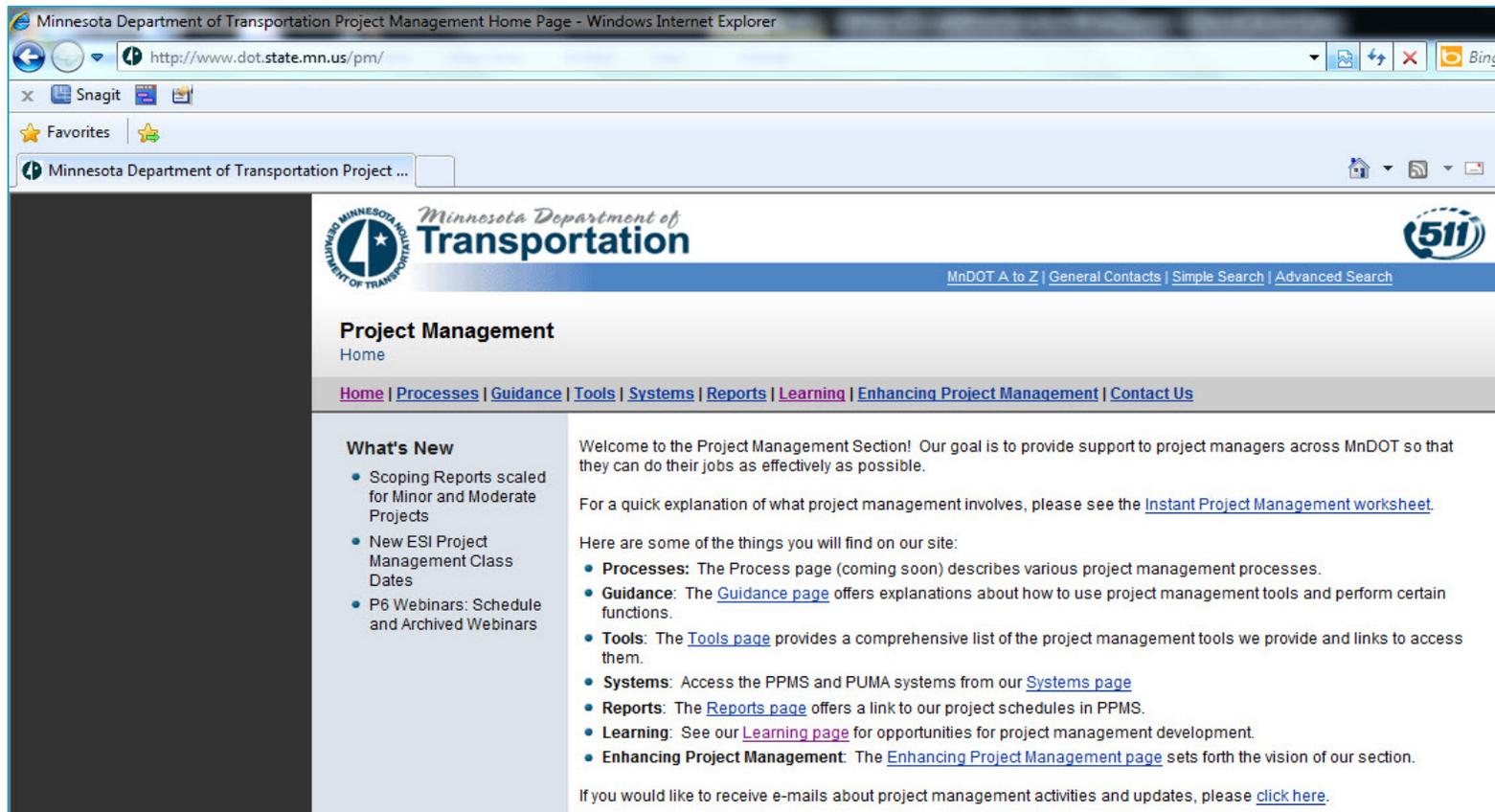
# Housekeeping Items

- ❖ Lines will be muted during the webinar
- ❖ Questions can be submitted thru the GoToWebinar Questions box on right of your screen and posted on website within 5 days
- ❖ Questions will be made available “Live” for the next webinar, can download pdf on how to submit live questions for next weeks webinar on the MnDOT Website this Friday
- ❖ Webinar slides available in pdf on MnDOT website within 5 days
- ❖ Webinar is being recorded and will be available on the MnDOT website within 5 days
- ❖ <http://www.dot.state.mn.us/pm/>



# MnDOT Webinars

❖ <http://www.dot.state.mn.us/pm/>



The screenshot shows a Windows Internet Explorer browser window displaying the Minnesota Department of Transportation Project Management Home Page. The address bar shows the URL <http://www.dot.state.mn.us/pm/>. The page features the MnDOT logo and navigation links for "MnDOT A to Z", "General Contacts", "Simple Search", and "Advanced Search". The main content area is titled "Project Management Home" and includes a "What's New" section with three bullet points: "Scoping Reports scaled for Minor and Moderate Projects", "New ESI Project Management Class Dates", and "P6 Webinars: Schedule and Archived Webinars". The main text welcomes visitors to the Project Management Section and provides a list of resources: "Processes", "Guidance", "Tools", "Systems", "Reports", "Learning", and "Enhancing Project Management". A link to "Instant Project Management worksheet" is also provided. At the bottom, there is a link to "click here" for e-mail updates.

Minnesota Department of Transportation Project Management Home Page - Windows Internet Explorer

<http://www.dot.state.mn.us/pm/>

Minnesota Department of Transportation

MnDOT A to Z | [General Contacts](#) | [Simple Search](#) | [Advanced Search](#)

## Project Management

Home

[Home](#) | [Processes](#) | [Guidance](#) | [Tools](#) | [Systems](#) | [Reports](#) | [Learning](#) | [Enhancing Project Management](#) | [Contact Us](#)

### What's New

- Scoping Reports scaled for Minor and Moderate Projects
- New ESI Project Management Class Dates
- P6 Webinars: Schedule and Archived Webinars

Welcome to the Project Management Section! Our goal is to provide support to project managers across MnDOT so that they can do their jobs as effectively as possible.

For a quick explanation of what project management involves, please see the [Instant Project Management worksheet](#).

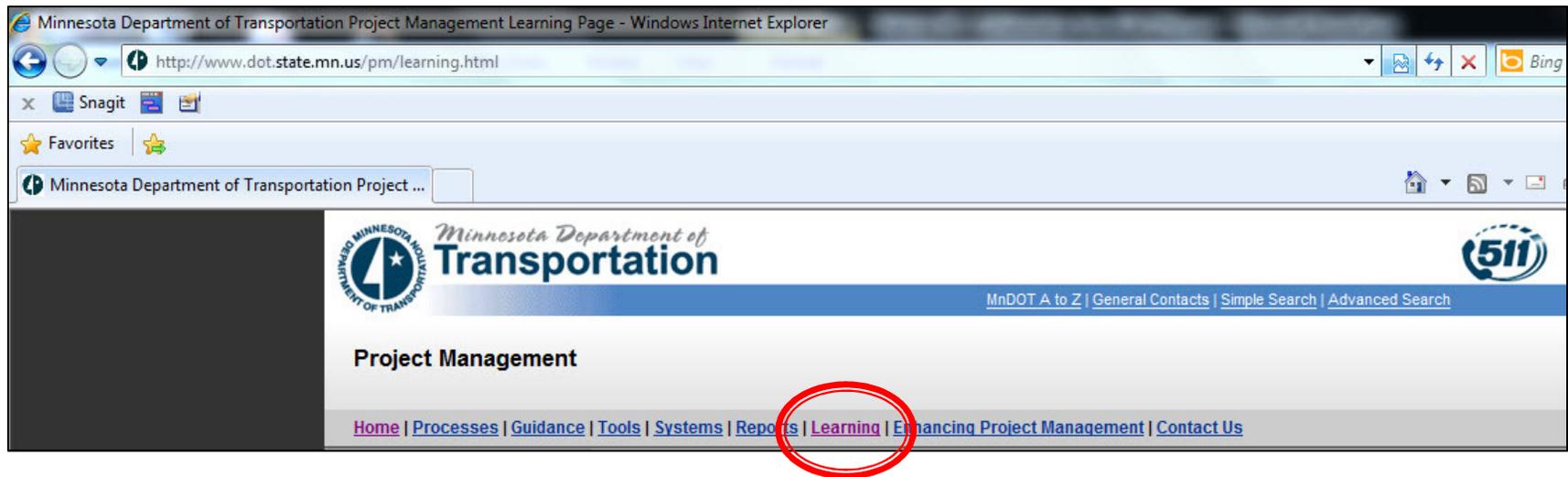
Here are some of the things you will find on our site:

- **Processes:** The Process page (coming soon) describes various project management processes.
- **Guidance:** The [Guidance page](#) offers explanations about how to use project management tools and perform certain functions.
- **Tools:** The [Tools page](#) provides a comprehensive list of the project management tools we provide and links to access them.
- **Systems:** Access the PPMS and PUMA systems from our [Systems page](#)
- **Reports:** The [Reports page](#) offers a link to our project schedules in PPMS.
- **Learning:** See our [Learning page](#) for opportunities for project management development.
- **Enhancing Project Management:** The [Enhancing Project Management page](#) sets forth the vision of our section.

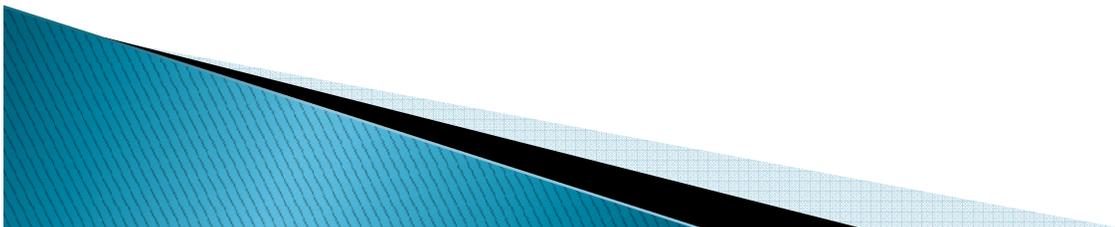
If you would like to receive e-mails about project management activities and updates, please [click here](#).

# MnDOT Webinars

❖ <http://www.dot.state.mn.us/pm/learning.html>



❖ Click on the “Learning” link



# MnDOT Webinars

**Primavera P6 Webinars:** Each webinar will start at 1:00 p.m. and last 1/2 hour. Click the links below to register for a session. After each webinar, a recording will be made available from this page.

To request ASL or a foreign language interpreter or other reasonable accommodations for the live webinars, call Janet Miller at 651-336-4720 or 1-800-657-3774 (Greater Minnesota). You may send an email to [janet.rae.miller@state.mn.us](mailto:janet.rae.miller@state.mn.us) (please request at least one week in advance).

**The Future of MnDOT Project Controls**

March 13, 2013

- [View this Presentation](#) (13:51, WMV 17 MB)
- [View Slides](#) (PDF 2MB)

**Primavera P6 in the Project Management Process**

March 20, 2013

- [View this Presentation](#) (28:39, WMV 40 MB)
- [View Slides](#) (PDF 8MB)
- [View Q&A](#) (PDF 17KB)
- [View Script \(Word 23KB\)](#)

**Collaborative Scheduling using the CPM Method**

March 27, 2013

- [View this Presentation](#) (32:57, WMV 34MB)
- [View Slides](#) (PDF 15MB)
- [View Script](#) (Word 5MB)

**Work Breakdown Structures**

April 3, 2013

- [View this Presentation](#) (31:11, WMV 23MB)
- [View Slides](#) (PDF 10 MB)

**Scheduling Float**

April 10, 2013

[Reserve your Webinar seat now](#)

**Schedule Baselines**

April 17, 2013

[Reserve your Webinar seat now](#)

**Schedule Updates**

April 24, 2013

[Reserve your Webinar seat now](#)

**Project Reporting**

May 1, 2013

[Reserve your Webinar seat now](#)

**Impact Schedules**

May 8, 2013

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**MnDOT use of Calendars in Primavera P6**

May 15, 2013

[Reserve your Webinar seat now](#)

**Roles and Resource Management**

May 22, 2013

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**Risk Management**

May 29, 2013

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**Views and Layouts for Program Management**

June 5, 2013

[Reserve your Webinar seat now](#)

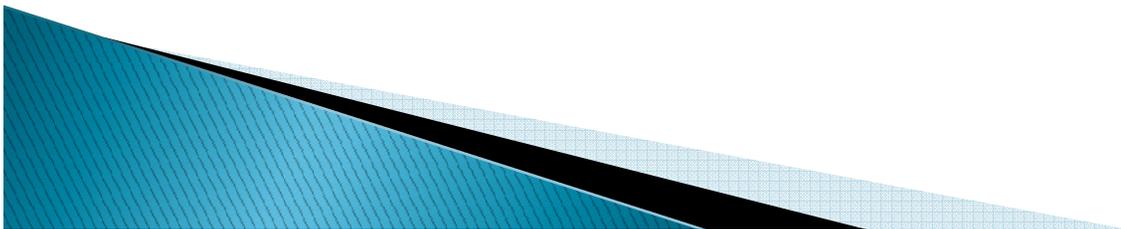
**Dashboards and Reporting for Program Management**

June 12, 2013

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# Introduction to Webinar

Learn that Total Float is the amount of time that a task or activity in a schedule can be delayed without causing a delay to subsequent activities and the project completion date.



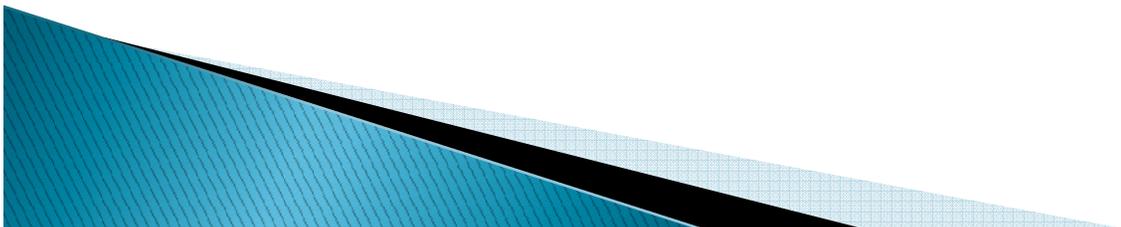
# What is Schedule Float

## Total Float

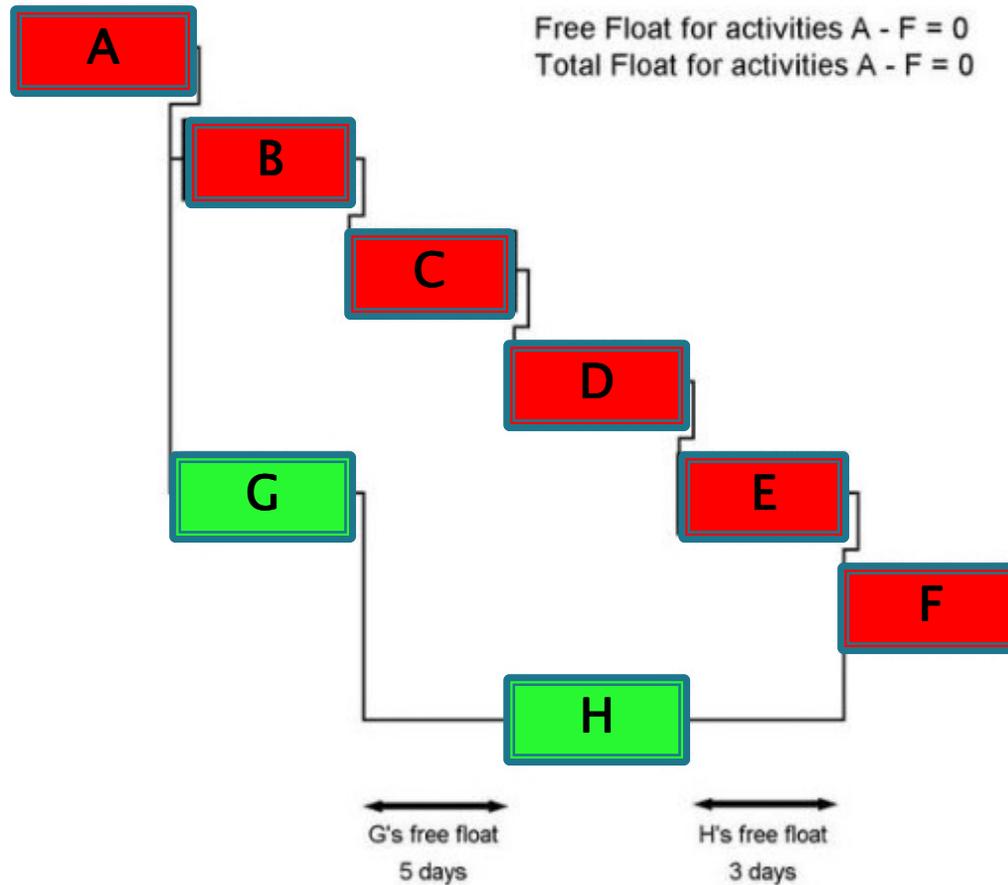
The total number of days that the start or finish of an activity can be delayed without affecting the project finish date.

## Free Float

The time by which an activity can be delayed without delaying the early start of its successor activity



# Total Float and Free Float

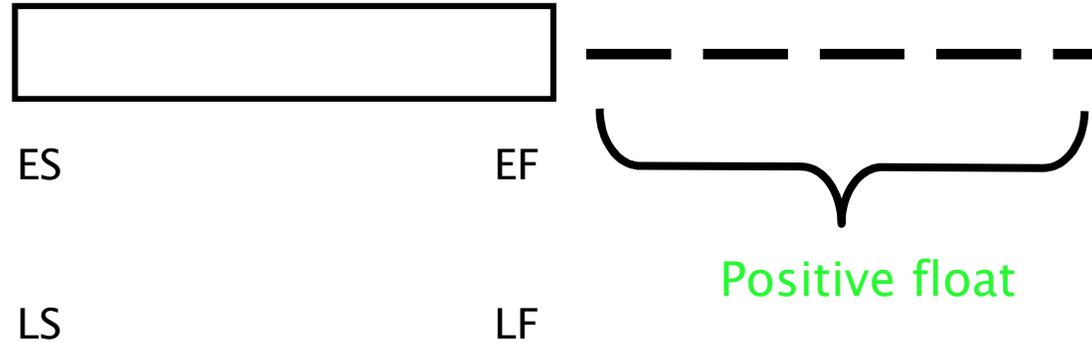


G's Free Float = 5 days  
G's Total Float = 8 days

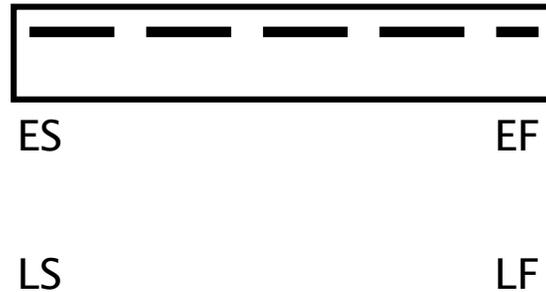
H's Free Float = 3 days  
H's Total Float = 3 days

# Total Float

Positive float

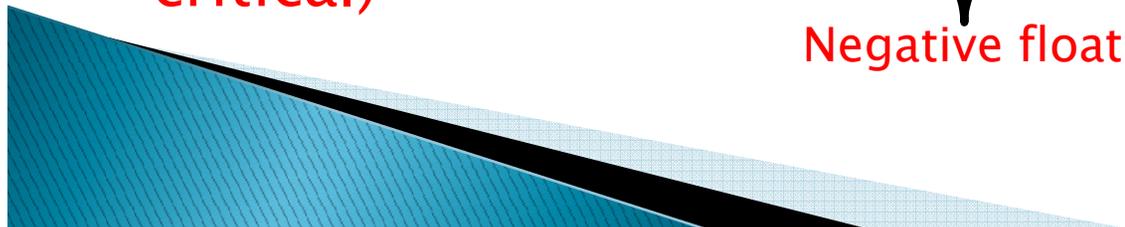
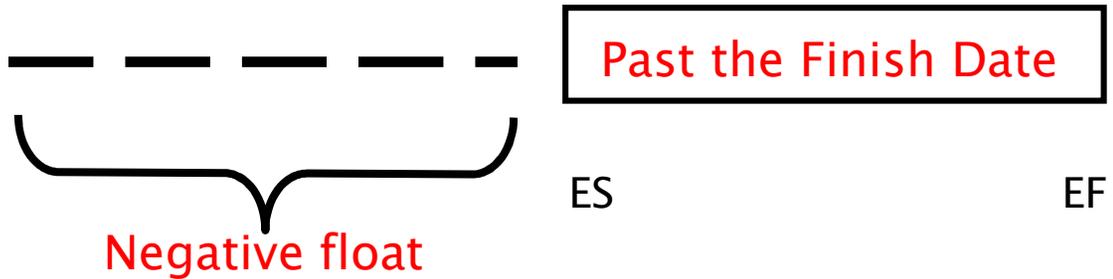


Zero float  
(critical)



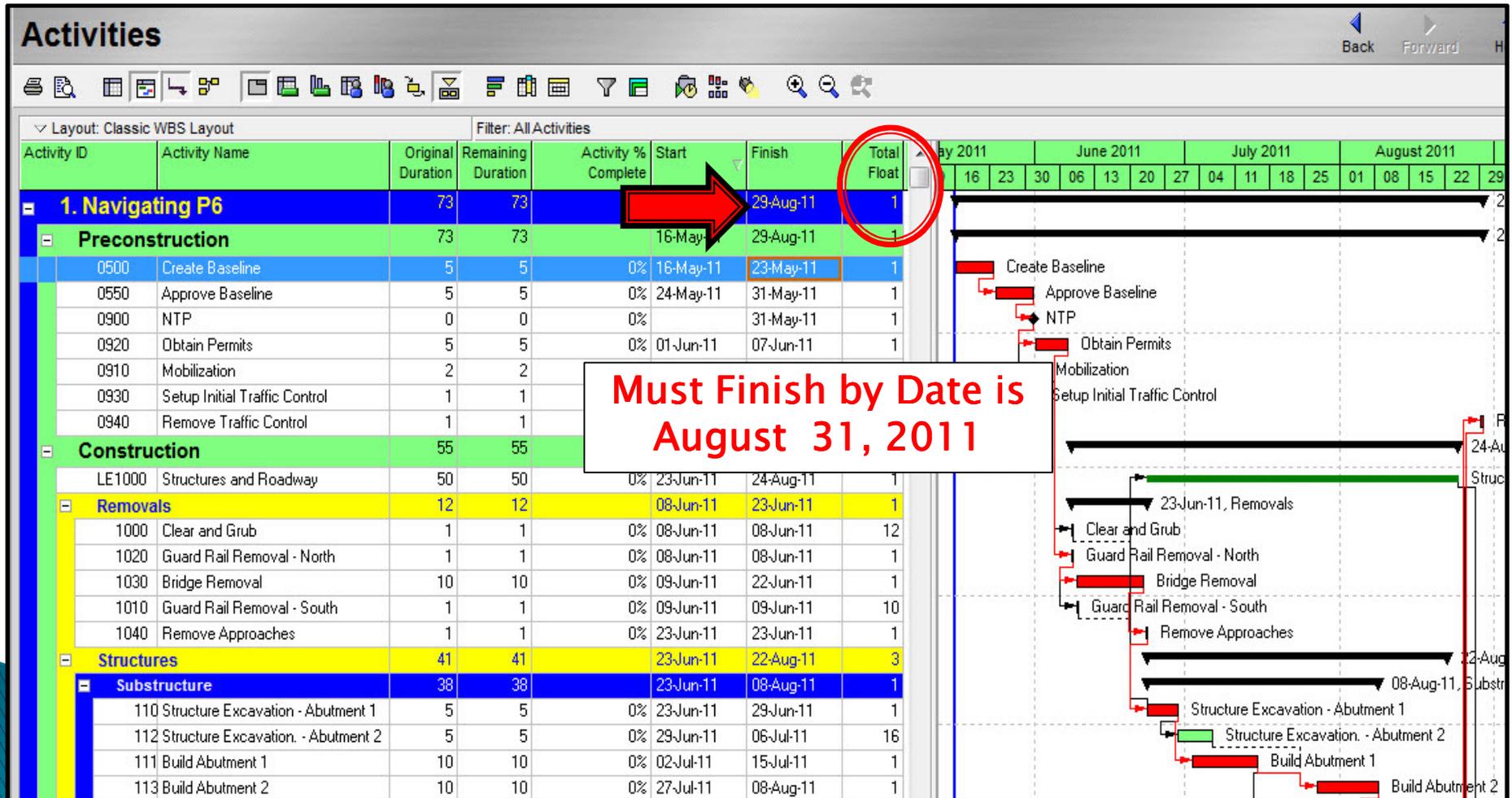
0 Total Float

Negative Float  
(extremely  
critical)



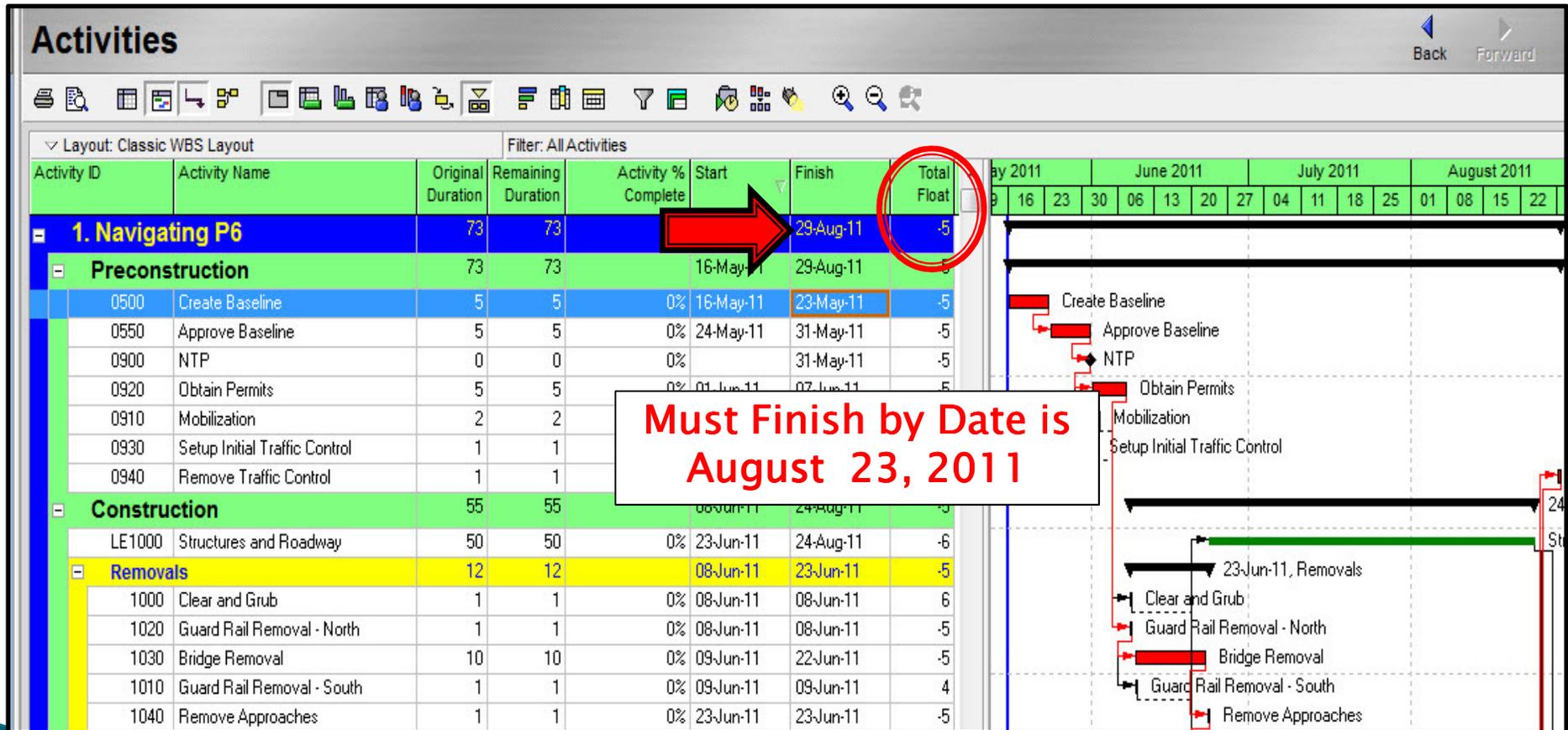
# Positive Float Schedule

- ❖ Finish of Schedule is before the Must Finish Date of Project



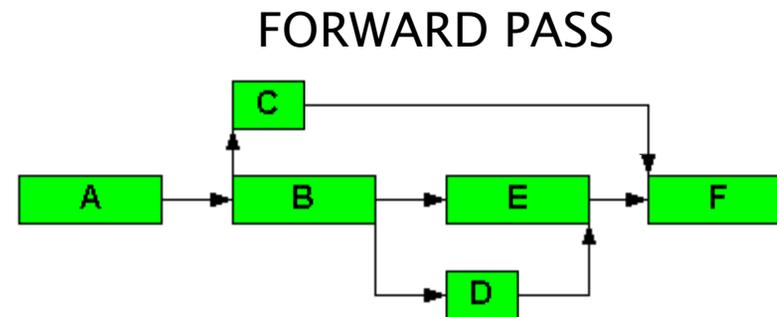
# Negative Float Schedule

- ❖ Finish of Schedule is after the Must Finish Date of Project

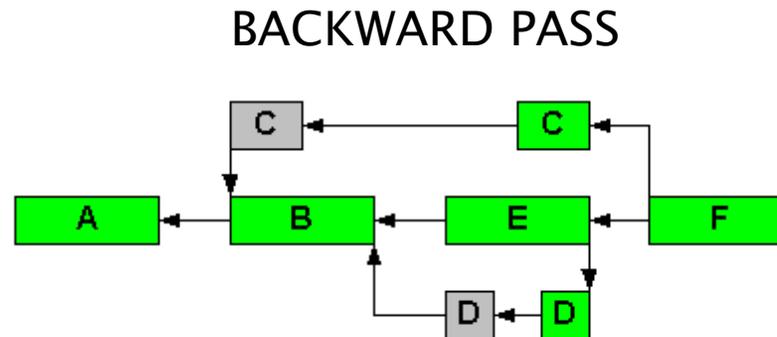


# Calculating the Schedule Dates

- ❖ CPM Calculations determine the Start & Finish dates
- ❖ Forward Pass
  - Calculates the Activities Early Dates



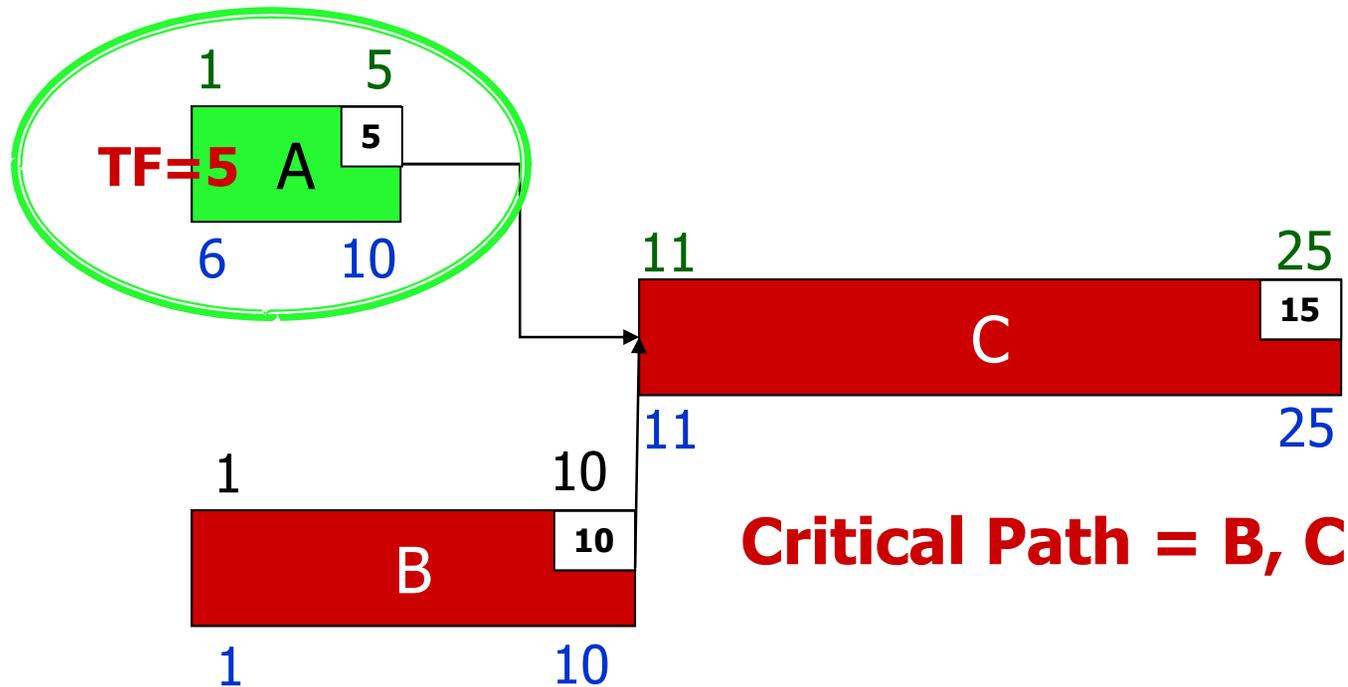
- ❖ Backward Pass
  - Calculates the Activities Late Dates



# Positive Total Float

$$(TF = LF - EF)$$

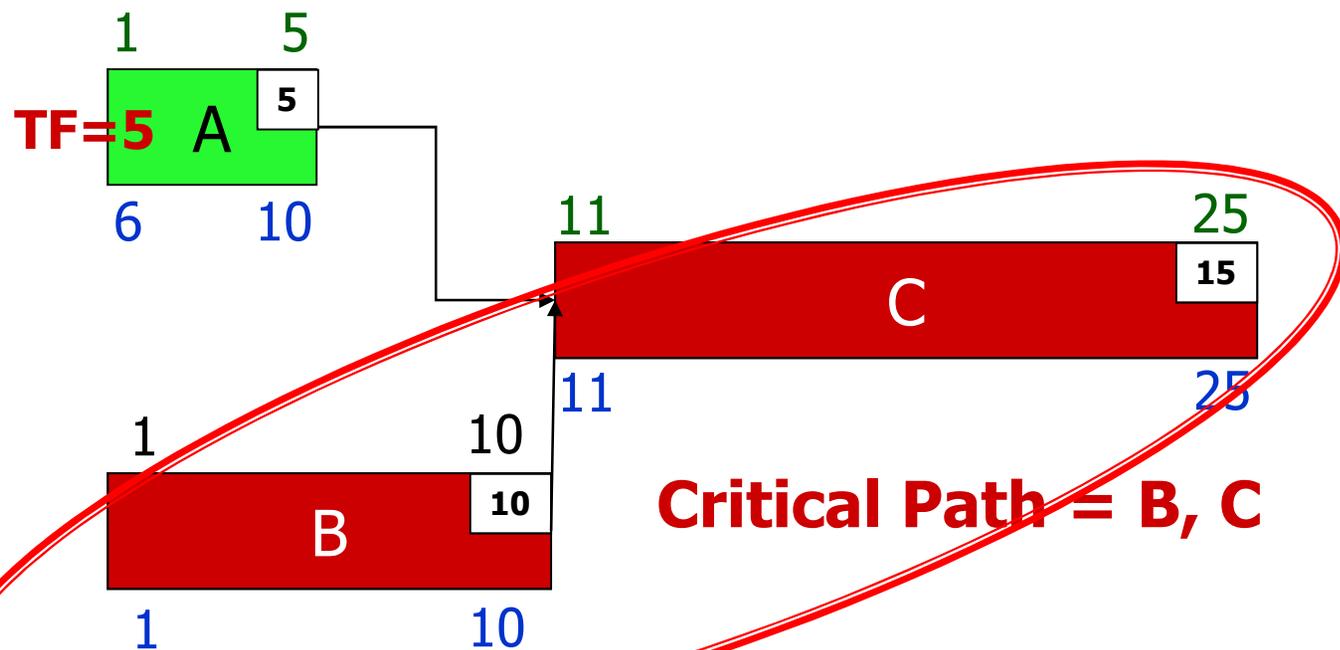
- Difference between the Late and Early Dates



# Zero Total Float

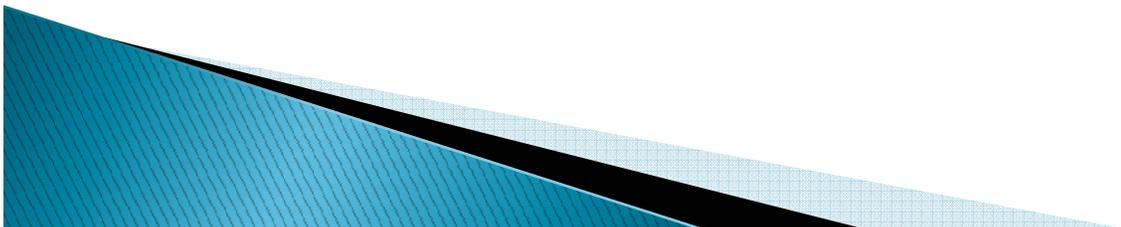
$$(TF = LF - EF)$$

- Difference between the Late and Early Dates



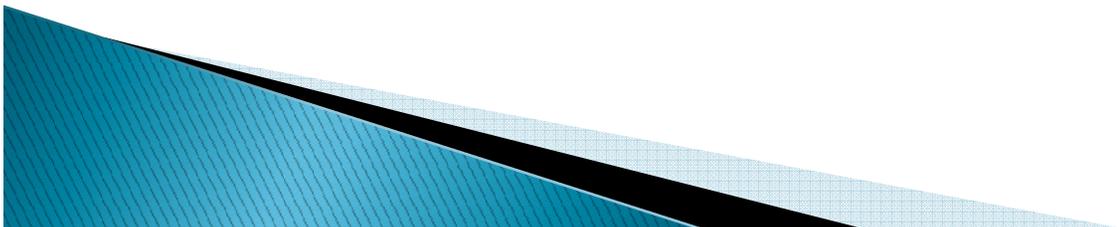
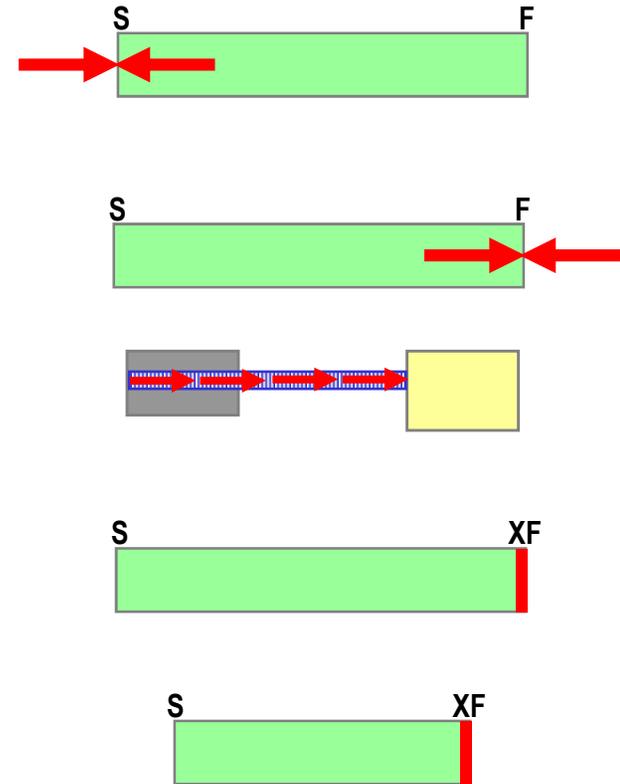
# Constraints

- ◆ Constraints are imposed restrictions used to reflect project requirements that cannot be built into the logic.
- ◆ More accurately reflects the real-world aspects of the project
- ◆ Provide added control to the project
- ◆ Impose a restriction on the entire project or an individual activity



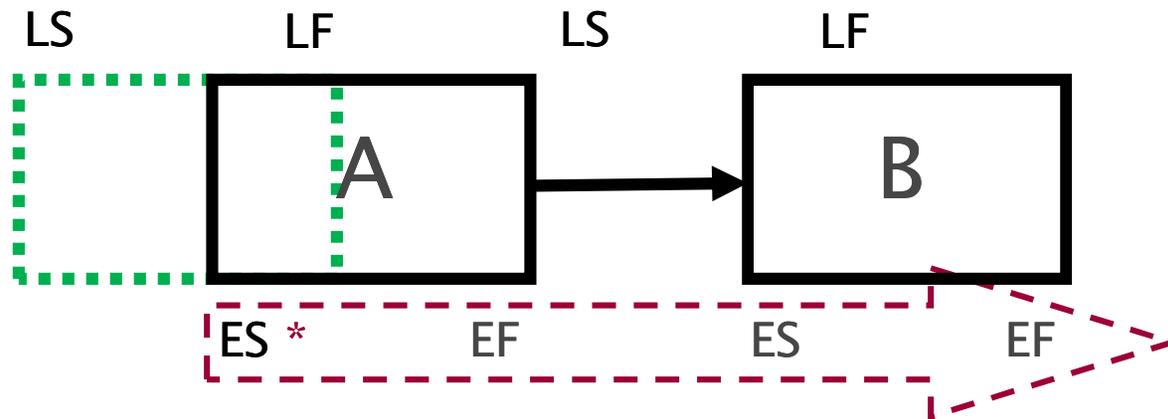
# Constraints

- ▶ Override relationships
- ▶ Can distort the schedule dates, float and critical path
- ▶ Start constraints
- ▶ Finish constraint



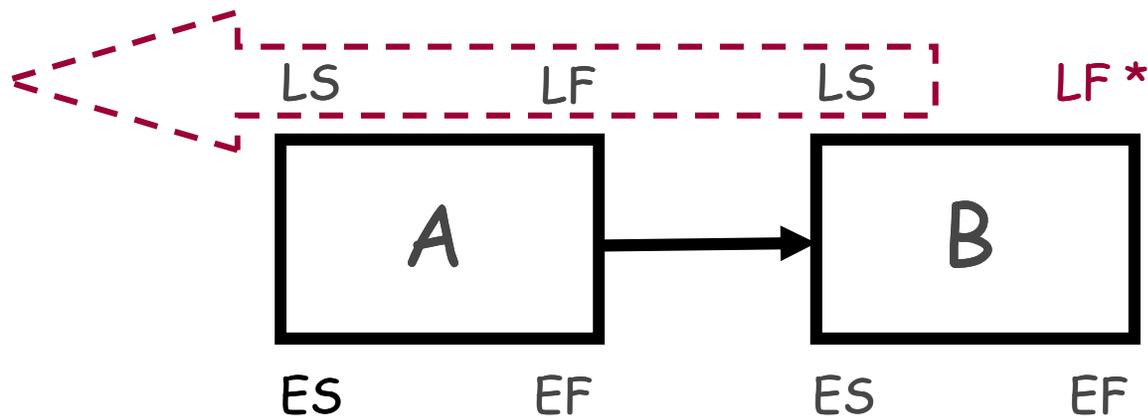
# Start On or After

- Used to set the earliest date an activity can begin.
- Forces the activity to start no earlier than the constraint date
- Pushes the early start to the constraint date
- Affects the early dates of its successors



# Finish On or Before

- Used to set intermediate completion points
- Forces the activity to finish no later than the constraint date
- Pulls the late finish date to the constraint date
- Affects the late dates of its predecessors



# Constraints

Layout: Classic WBS Layout Filter: All Activities

Activity ID	Activity Name	Original Duration	Remaining Duration	Activity % Complete	Start	Finish
130	Excavate Roadway North	5	5	0%	18-Jul-11	22-Jul-11
131	Install Approach - North	5	5	0%	20-Jul-11	26-Jul-11
132	Curb and Gutter - North	3	3	0%	27-Jul-11	29-Jul-11
133	Pave - North	3	3	0%	01-Aug-11	03-Aug-11
<b>Roadway - South</b>		<b>12</b>	<b>12</b>		<b>09-Aug-11</b>	<b>24-Aug-11</b>
140	Excavate Roadway South	5	5	0%	09-Aug-11	15-Aug-11
141	Install Approach - South	5	5	0%	11-Aug-11	17-Aug-11
142	Curb and Gutter - South	2	2	0%	18-Aug-11	19-Aug-11
143	Pave - South	3	3	0%	22-Aug-11	24-Aug-11
<b>Post Substantial Completion</b>		<b>3</b>	<b>3</b>		<b>24-Aug-11</b>	<b>29-Aug-11</b>
1500	Substantial Completion	0	0	0%		24-Aug-11*
1510	Striping and Signing	2	2	0%	25-Aug-11	26-Aug-11
1520	Install Guardrail	2	2	0%	25-Aug-11	26-Aug-11

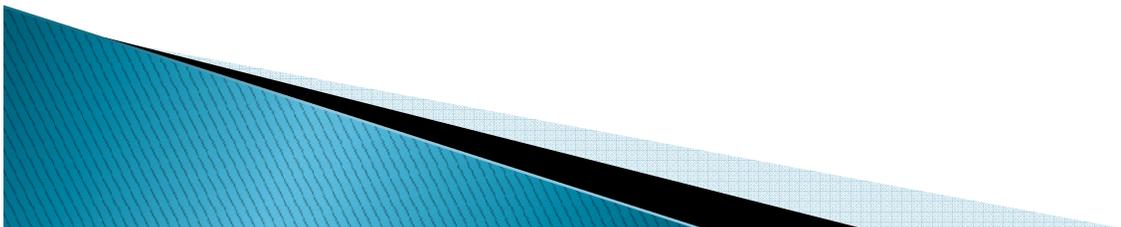
August 2011 Gantt Chart: Shows activity bars for August 2011. A red arrow points to the 'Substantial Completion' bar, which is circled in red and labeled '24-Aug-11\*'. The chart also shows bars for 'Excavate Roadway South', 'Install Approach - South', 'Curb and Gutter - South', and 'Pave - South'.

Activity Details for 1500 Substantial Completion:

- Duration: Original 0, Actual 0, Remaining 0, At Complete 0
- Status:  Started,  Finished, Exp Finish: [Empty]
- Constraints: Primary: Finish On or Before, Date: 26-Aug-11

# Constraints – Must Finish By

- ▶ Project Level Constraint for the entire project
- ▶ Will determine “Negative Total Float” on entire project
- ▶ If there is no Must Finish By Constraint at the project level the schedule will not show “Negative Total Float”
- ▶ Most commonly this is the Contractual Finish Date for the project



# Constraints – Must Finish By

**Projects** ← **Must be in the Projects Screen**

Layout: Projects

Project ID	Project Name	Total Activities	May 2011				June 2011				July 2011				August 2011				September 2011	
			02	09	16	23	30	06	13	20	27	04	11	18	25	01	08	15	22	29
CPM102	Critical Path Management 102 Training	33	6-May-11																	29-Aug-11
CPM102-01	1. Navigating P6	33	6-May-11																	29-Aug-11
CPM102-02	2. Creating a Project and WBS From a Template	0																		
CPM102-03	3. Creating Project Calendars	0																		
CPM102-04	4. Adding Activities	0																		
CPM102-07	7. Adding Constraints	0																		
CPM102-08	8. Understanding Float	0																		
CPM102-09	9. Adding and Assigning Activity Codes	0																		
CPM102-10	10. Layouts and Filters	0																		
CPM102-11	11. Assigning a Baseline	0																		
CPM102-12	12. Updating and Printing	0																		
CPM102C	Copy of CPM 102 Projects																			

← **Highlight the Project**

Select the "Dates" tab

Enter "Must Finish By" Date

**Schedule Dates**

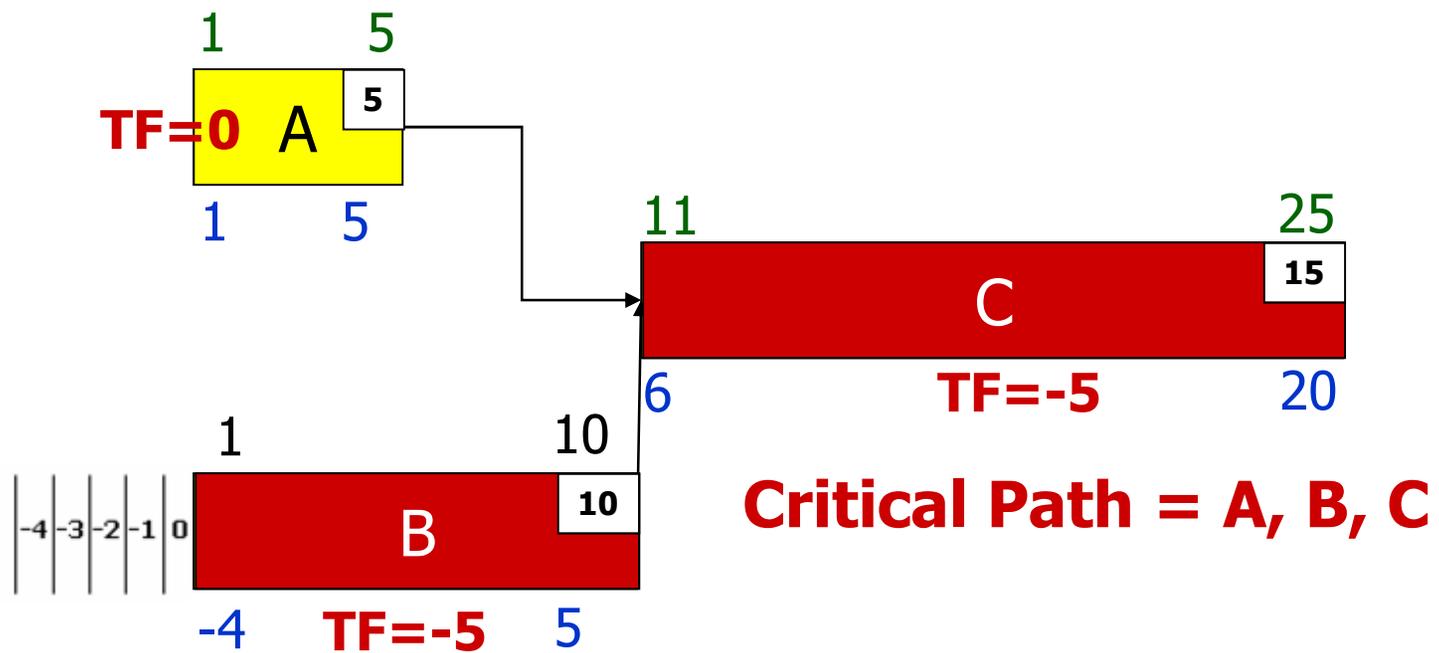
Planned Start	Must Finish By
02-May-11	29-Aug-11
Data Date	Finish
16-May-11	29-Aug-11

**Anticipated Dates**

Anticipated Start
Anticipated Finish

# Negative Total Float

- ▶ Caused by a constraint





# Questions or Comments

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**Peter Harff**

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MnDOT Project Management Office  
507-514-1095

<http://www.dot.state.mn.us/pm>

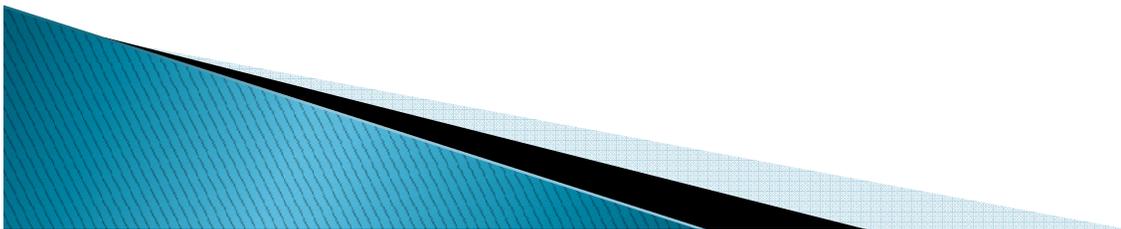
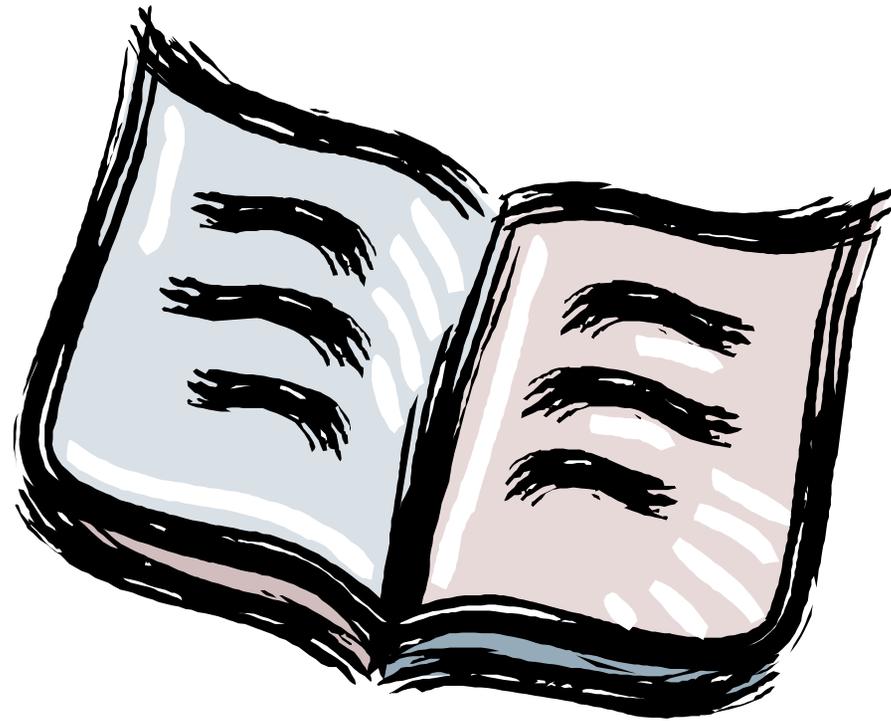
**Next Webinar: Wednesday, April 17, 2013**

**Time: 1:00 p.m.**

**Topic: Schedule Baselines**

**Presenter: Jonathan McNatty  
DRMcNatty & Associates, Inc.**

# Glossary of CPM Terms



# Glossary of CPM Terms

**Activity** - An individual work task that is the basic component of a project.

**Activity Codes** - Values assigned to project activities to organize them into manageable groups for updating, analyzing, reporting, plotting, and summarizing.

**Actual Cost** - The cost incurred to date for a resource or activity.

**Actual Dates** - Start (AS) and Finish (AF) dates that you record for an activity that has progress or is complete.

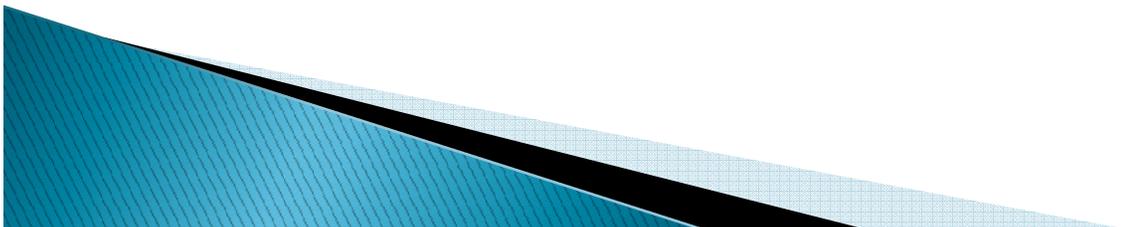
**Actual Quantity** - The amount of a resource used to date.

**Backward Pass** - The calculation of a network's late dates.

**Bar Chart** - The graphical display of activities according to time. Relationships between activities are not shown. A bar chart is also called a Gantt Chart.

**Baseline Schedule** - The original planned schedule for a project.

**Budget** - The estimate of the total units or costs required by a resource or cost account for an activity.



# Glossary of CPM Terms

**Calendar** - The workdays and holidays defined for a project that determine when an activity can be scheduled.

**Completion** - The date on which a project is to be finished.

**Constraint** - A restriction imposed on the start or finish of an activity.

**Critical Activity** - An activity that has the least amount of total float.

**Critical Path** - The series of activities in a project that will take the longest to complete.

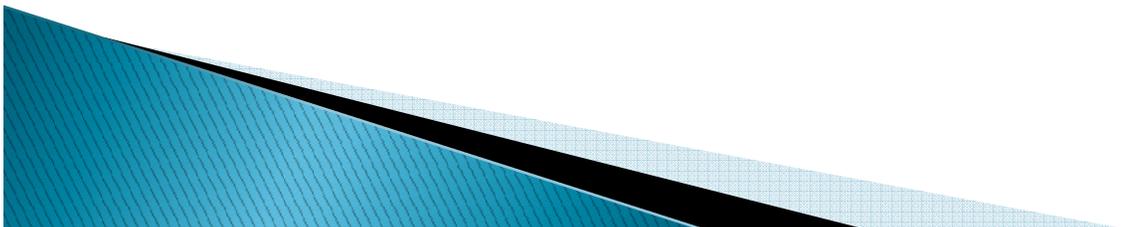
**Critical Path Method (CPM)** - The calculation of the earliest and latest start and finish dates of activities based on their duration and relationships to other activities.

**Data Date** - The date used as the starting point for schedule calculations.

**Driving** - A predecessor/successor relationship in which the predecessor

**Relationship** - Determines the successor's early dates.

**Duration** - The amount of time (in workdays) needed to complete an activity.



# Glossary of CPM Terms

**Early Start (ES)** - The earliest date when an activity can begin after its predecessors have been completed.

**Earned Value** - The value of work performed rather than actual work performed.

**Exception** - A day when work must occur that was originally designated as a nonworkday.

**Finish to Finish** - A type of relationship in which a successor activity finish depends on its **(FF)** predecessor activity's finish.

**Finish-to Start** - A type of relationship in which a successor activity can begin only when its **(FS)** predecessor activity finishes.

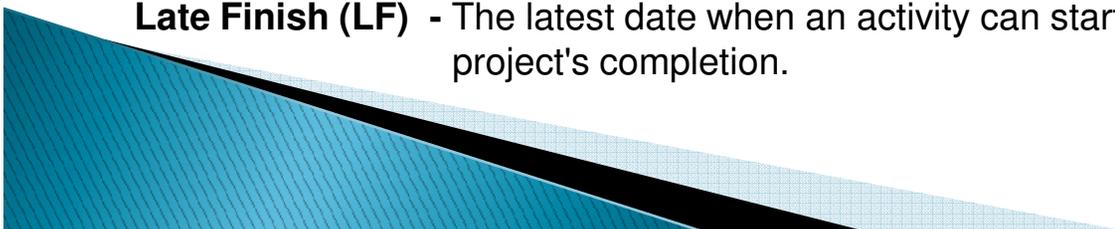
**Float** - The amount of time that the start or finish of an activity can be delayed without affecting the project finish date.

**Forward Pass** - The calculation of the network's early dates.

**Free Float** - The amount of time that an activity's early start can be delayed without delaying the early start of a successor activity.

**Lag** - An offset or delay from an activity to its successor.

**Late Finish (LF)** - The latest date when an activity can start without delaying the project's completion.



# Glossary of CPM Terms

**Late Start (LS)** - The latest date when an activity can start without delaying the project's completion.

**Loop** - Circular logic within a network.

**Milestone** - An activity that represents a significant point in time, that has no duration.

**Negative Float** - The total number of days that the start or finish of an activity exceeds the time allowed. Negative float indicates a delay in the schedule.

**Negative Lag** - An offset or lead time from an activity to its successor in which the successor's start date is earlier than the predecessor's start date.

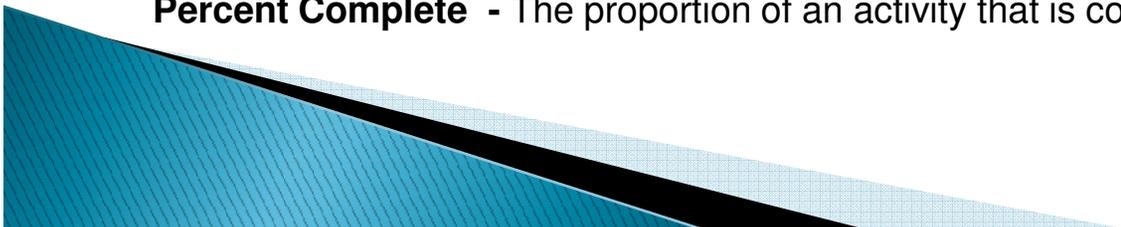
**Network** - The series of activities required to complete a project.

**Nonworkperiod** - A period of time when work may not occur.

**Open End** - An activity that has no successor or predecessor relationships to other activities in the network.

**Out-of-Sequence Progress** - Work completed for an activity before it is logically scheduled to occur.

**Percent Complete** - The proportion of an activity that is complete.



# Glossary of CPM Terms

**Performance Measurement** - The comparison of the current plan to a target plan to assess whether it is progressing as intended.

**Planning Unit** - The increment of time used to schedule a project. The planning unit can be in hours, days, weeks, or months.

**Predecessor** - An activity that must logically occur before another activity.

**Progress** - The completion of work.

**Resources** - The people, materials, equipment or services required to complete a project.

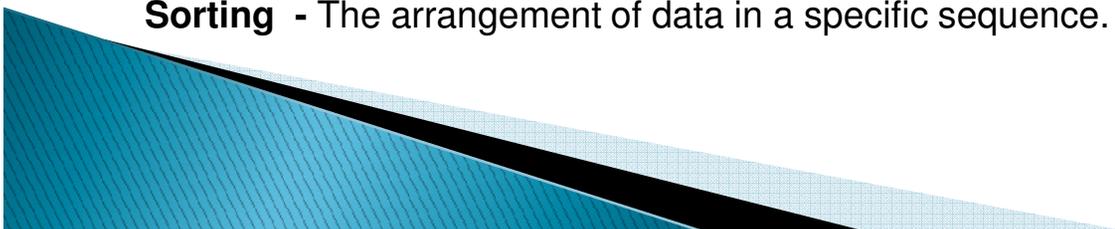
**Schedule** - A list of the activities needed to complete a project, along with their start and finish dates.

**Schedule Calculation** - The calculation of early and late dates for each activity in the project.

**Slack** - See Float.

**Slippage** - Lateness determined by measuring the target finish of an activity from its actual or current early finish.

**Sorting** - The arrangement of data in a specific sequence.



# Glossary of CPM Terms

**Start-to Start** - A type of relationship in which a successor's start depends on the start of **(SS)** its predecessor.

**Status** - The process of updating a project by indicating progress at regular intervals.

**Successor** - An activity that must logically occur after another activity.

**Target** - A project plan that can be compared to the current schedule to measure progress.

**Task** - A unit of work. Also called an activity.

**Total Float (TF)** - The total number of days that the start or finish of an activity can be delayed without affecting the project finish date. Float can be negative, zero, or positive.

**Updating** - The process of recording progress in a project at regular intervals.

**Variance** - The difference between the current and target schedule dates.

**Work Breakdown Structure (WBS)** - The graphical depiction of the hierarchy of work needed to complete a project.

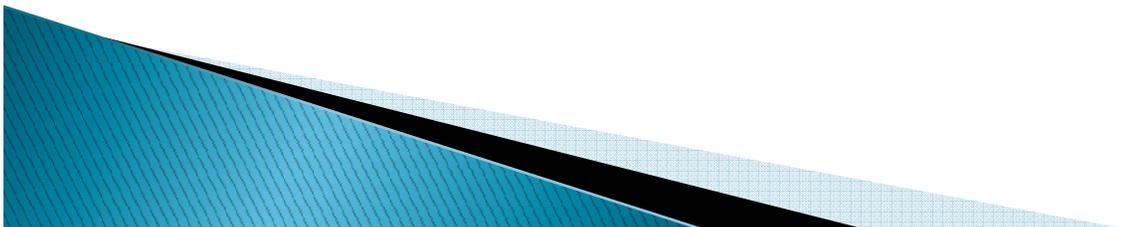
**Workday** - Any day of the week when work can be scheduled.



# MnDOT Goals Going Forward

## Projects in Construction Phase

- ❖ Contractor's Build Their Schedule in our Network 1/1/13
- ❖ Piloting Providing BIM Models and CTD Schedules to Contractors 3/1/13
- ❖ Select "Unit Rate" project– Resource and Cost Loaded 3/1/13
- ❖ Role and Resource Loaded of CE&I staff 6/1/14



# MnDOT Goals Going Forward

## Projects in Scoping and Design Phase

- ❖ “Active Projects” Role and Resource Loaded 6/30/13
- ❖ All planned projects Role loaded by June 30, 2014
- ❖ Taxpayer Transportation Accountability Act

