# Primavera P6 Introductory Course

**Prepared for the**



**Prepare and Presented by**



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## Accessing the MnDOT P6 Database

There are two ways to get into MnDOT's P6 database. P6 can be accessed by either going through Webportal using a web browser or the Citrix shortcut icon listed on your computer's desktop taskbar.
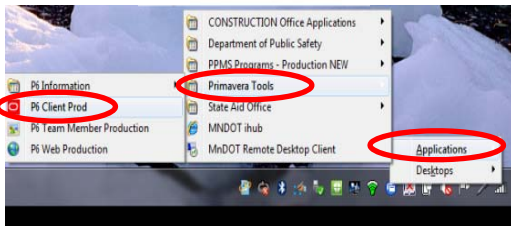
**Accessing P6 Using Citrix Icon**

Before the start of this class, IT should have assigned the Citrix icon onto your computer. If you do not see the Citrix icon, do not worry; P6 can be accessed in the second option (discussed below). If you do see the Citrix icon, place your mouse over it and left click; select Applications, then Primavera Tools, and then click on P6 Client Production. Once you have clicked on P6 Client Production, the P6 Login Window will pop up. Enter your credentials, which will be the same as your MnDOT AD credentials and click OK.

Citrix Shortcut icon

P6 Client

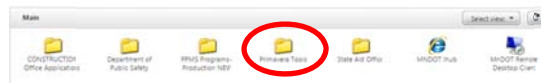P6 Client Production Login Window

**Accessing P6 Using Webportal**

It is possible to log in to Citrix using your internet browser, preferably using Internet Explorer when on the MnDOT network. If you are on the MnDOT network, in the internet browser field, type in "Webportal" or the direct address http://webportal.dot.state.mn.us/ and click enter. This will bring you to the Citrix Webportal log in page. Click Log On and enter your credentials as they would be to log into the MnDOT network.

Once logged in, click on the Primavera Tools folder, and then click on P6 Client Production. The P6 Client Production window will pop and the log in process will be the same as described above; enter your AD credentials and log into P6.

Webportal Login
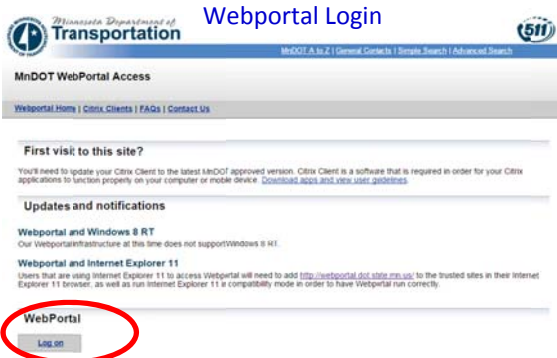
Primavera Tools Folder

P6 Client Production

## EPS (Enterprise Project Structure)

### EPS or Projects Window

The EPS is the hierarchical structure of MnDOT's database of project schedules.  The layout below is an example of how the information can be displayed.  The colored tiers are different layers of the EPS.  The white tier is the schedules.  To open a project schedule click on the desired schedule, then right click and chose Open Project.
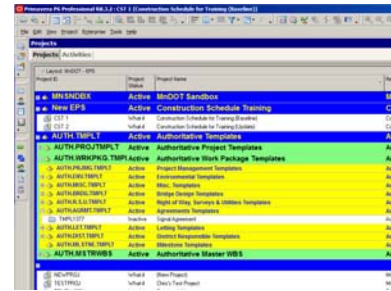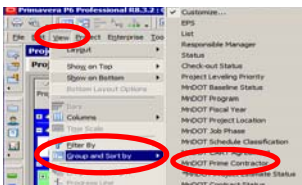
### Sandbox

A sandbox is an area within the EPS that the user can place copies of schedules to evaluate with abilities or to store copies of previous updates, etc.  A sandbox can be created for individuals, offices or even projects.  A user must be assigned access to a sandbox if they need to do more than read a schedule.  Access is gained through Central Office.  More discussion is contained later herein.
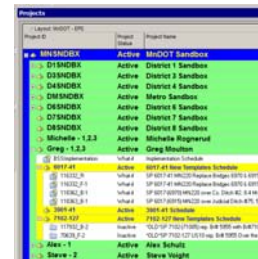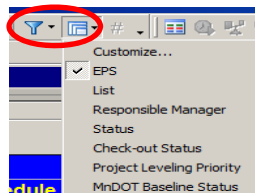
### EPS Layouts

Layouts can be viewed, filtered and grouped by many different categories.  Three ways to organize the EPS is to click by expressive choices or by shortcuts.  The expressive choice would be to click View then Group and Sort and then make your choice.  The shortcut will take you directly to the last pop-up of the expressive method; simply click the desired icon or drawdown triangle.

| Expressive Command | Filter/Organize Icons | t | Layout Drawdown Shortcut |
|---|---|---|---|
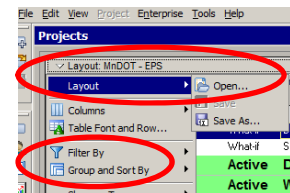
### Creating the EPS and Subsequent Tiers

A user's sandbox can get cluttered as they create and copy schedules over time.  In order to manage their P6 environment a user can have EPS tiers added to their sandbox.  However, only Central Office personnel can add a tier to the EPS; to do so contact the Shared Service Center.

## How to Work within the EPS

### Navigating within the EPS

The EPS is where you can <u>find project information</u> such as the start date, data date, must finish by date and projected finish date all on one screen. Other information includes the default settings and critical definition choice. All this information is located within the Project Detail Window. If you don't see a "Detail Window" at the bottom of the screen, then place your cursor in the center of the EPS; right click and select Project Details. Once you do the Project Details Window will appear.

Right Click Project Details
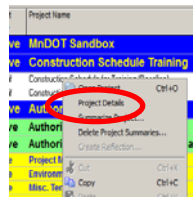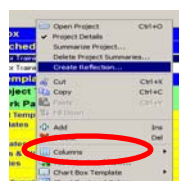


Project Details Window
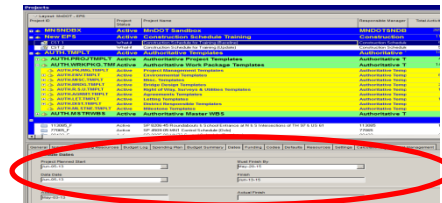


### Adding or Removing Columns

The user can also <u>add and remove columns</u> that are, or are not, displayed within the EPS. Place your cursor in the middle of the EPS and right click and select Columns then select Customize. There is also a shortcut icon. Use the directional arrows to add, remove and place the columns.

Columns Icon



Right Click Columns



Columns Window
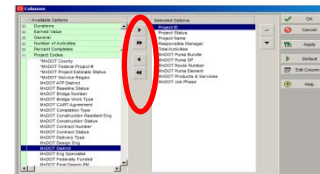


### Applying Filters

The user can <u>filter projects</u> on a multitude of choices, for example you can filter by MnDOT Prime Contractor or by District. To do so place your cursor in the middle of the EPS and right click and select Filter By then make your choice. There is also a Shortcut icon. The user can customize a filter or select from a set of Default or Global filters. Filters have three categories; Default, Global and User Defined. This section only addresses how to get to the point of being able to filter. The actual filtering discussion will take place later herein.

Filter Icon



Right Click Filter By
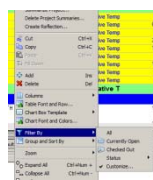


Filter Window

## Contractor Schedules (Read only)

A MnDOT user typically only has an ability to read a contractor schedule which is known as "Read-Only" access.  The user cannot calculate or modify the schedule if the contractor is assigned as the Responsible Manager.   The user can review the schedule and revise layouts to suit their needs.  To open a contractor schedule the user will need to be assigned access by Central Office to do so.  Access can be granted using the schedule access form located on iHUB.

## Contractor Schedules (Evaluate with Abilities)

To evaluate with abilities is to be able to calculate, alter or modify a schedule and to perform techniques like a What-If Analysis.   This bullet only addresses how to get to the point of being able to evaluate with abilities.  The actual evaluation discussion will take place in the second day of this course.

- To evaluate with abilities the user will need to make a copy, not a reflection, of the schedule to be reviewed and place that copy in the user's sandbox*. It is very important not to create a reflection; a reflection can be very detrimental to the contractors live schedule*.

- Another option would be to export the schedule and then import it into a stand-alone version of P6.  Exporting will be discussed later herein.

- If you do a what-if analysis you need to do so from a copied schedule.  If you don't want the contractor to see the analysis then the user **must** change the copied schedule's Responsible Manager code and the MnDOT Prime Contractor project code.  After you have copied the schedule to evaluate follow these steps:

    1. **Changing the MnDOT Prime Contractor Code** - When in the EPS make sure the bottom of the screen displays the project details.  Select the copied schedule and click on the Codes tab within the Project Detail Window.   The user should see three columns titled Project Code, Code Value and Code Description.  The MnDOT Prime Contractor Code needs to be changed to NA for Non Applicable.

        MnDOT Prime Contractor Code

    2. **Changing the Responsible Manager Code** - The schedule must be opened to make this change.  Once open make sure you are in the EPS (Projects) and not the activities.   If you are in the global EPS layout you will see a column titled Responsible Manager.  Double click on the Responsible Manager cell of the copied schedule and a window will pop-up.  Scroll down this window and select the appropriate choice.

        Responsible Mangers Location

    3. **Change the Schedule Status to "What-if" –** Status is found in Project Details of EPS.

## Creating a Project Library

### P6 Enterprise via a Sandbox

The current contractor practice within the MnDOT P6 Enterprise is for contractors to create their schedule and have it be the only active version that can be fully accessible on MnDOT's P6 Enterprise. Each subsequent schedule is saved as a baseline within the active schedule so that historical data can be viewed and digested. This is not an optimal means to review a past schedule in an impact, delay or claim situation. It is suggested that you push to have a Project Sandbox created for the user to be able to store a copy, not a reflection, of each update so that a fully accessible version is available. If you do you should slightly alter the name of each copied version to identify the update number, for example add BL08 (Nov 14) to the title description. Also remember to change the Responsible Manager and Contractor Code as discussed earlier herein.

Example of a Project Library

| | | |
|---|---|---|
| ⊞◇ | Misc | Misc Projects |
| ⊞◇ | 0306-46 | TH 10 - Project Controls |
| ⊞◇ | 0980-139 | TH 35 - Project Controls |
| ⊞◇ | 8204-55 | TH 36 - Project Controls |
| ⊞◇ | 3905-09 | Baudette |
| ⊟◇ | 2706-226 | TH7 / Louisiana |
| 📁 | T9N468 | SP 2706-226TH 7 and Louisiana Ave (Accepted Baseline) |
| 📁 | 69820_C-3 | SP 2706-226 TH 7 and Louisiana Ave (BL01 R2) |
| 📁 | 69820_C-7 | SP 2706-226 TH 7 and Louisiana Ave (BL02 R1) |
| 📁 | 69820_C-11 | SP 2706-226 TH 7 and Louisiana Ave (BL03 R1) |
| 📁 | 69820_C-14 | SP 2706-226 TH 7 and Louisiana Ave (BL04 R1) |
| 📁 | 69820_C-1 | SP 2706-226 TH 7 and Louisiana Ave (BL05 R2) |
| 📁 | 69820_C | SP 2706-226 TH 7 and Louisiana Ave (BL06 R3) |
| 📁 | 69820_C-12 | SP 2706-226 TH 7 and Louisiana Ave (BL07 R2) |
| 📁 | 69820_C-6 | SP 2706-226 TH 7 and Louisiana Ave (BL08 R1) |
| 📁 | 69820_C-17 | SP 2706-226 TH 7 and Louisiana Ave (BL09 R2) |

### P6 Standalone

The contractors typically will export the update schedule as a .xer file and include it with the submittal package. If they do this and the user cannot maintain a sandbox library on the P6 Enterprise then the user can import the .xer file into the P6 standalone, if they have access to one, and maintain a library. If the .xer file submitted by the contractor is in a version that does not match the user's P6 standalone then the user can go into the P6 Enterprise and export the schedule in the version that does match their needs. Exporting and importing will be discussed later herein.

### Windows Explorer

If neither of the above are options then it is highly recommended that the user create a project file in Windows to store all the contractor submitted .xer files. It is further suggested that a MnDOT user export a version of each update to be stored directly from P6 Enterprise to the MnDOT server so that a file exist that has never left the MnDOT network. Although the rule is that importing into the P6 Enterprise is not allowed having a .xer file that never left the MnDOT network may make it easier, and less fearful for IT, to allow the .xer file to be imported back into the P6 Enterprise should an impact or a claim arise.

# Work Breakdown Structure (WBS)

### WBS Explained

The WBS is a hierarchy of Work that typically defines a project's properties in an organized structure. This structure is broken down into tiers and sub-tiers that shape the approach to accomplishing the projects goals. In design it typically will be tiered by functional groups or deliverables. In construction it is typically tiered to reflect the phasing/staging and roadway alignments of the project.
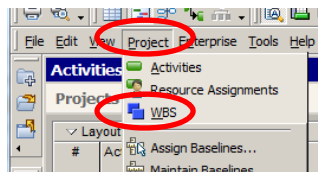
Example of WBS Tiers



### WBS Window

In order to view the WBS the project you want to view must be opened. You can use the WBS Window to create, view and edit an opened project's WBS. You can group, sort, customize columns and open and save WBS layouts. There are two ways to display the WBS Window; click by expressive choices or by short cut. The expressive choice would be to click Project then WBS. The Shortcut, on the left side of your screen, will take you directly to the last pop-up of the expressive method; simply click the desired icon.

WBS Icon

Expressive Command

WBS Window



The user can also modify the WBS Window by adding or removing columns. Just follow the same steps discussed in the **How to Work within the EPS** section. Adding tiers will be covered in the **Creating a Schedule** section later herein.

### WBS Code Structure

The WBS code structure consists of multiple alphanumeric or just numeric digits that represent each tier/layer of the WBS discussed and displayed above. Each tier is separated by a decimal point. The first tier represents the project itself. Each tier thereafter is separated by the decimal. The user can change the code value for each digit by clicking on the level to be changed and changing the code value within the WBS code cell or the detail windows code cell.

WBS Code

## Copying WBS Structure and Activities within and between Schedules

If the user has a section of the schedule that is representative of another section to be created the easiest and quickest way to create the next section is to copy and paste the existing section from within the WBS Window. Doing so will bring in all codes, activities and logic.  To do this follow these steps:

1. Click on the WBS tier you wish to copy.  If there are sub-tiers to the tier you are copying the sub-tiers and contents will be copied as well.  Once on the selected tier place your cursor over the selection, right click then click Copy.

2. Click on the tier you want the copied tier(s) placed. Once on the selected tier place your cursor over the selection, right click then click Paste.  Three windows will pop-up with check box choices.  Check or un-check the choices you want or don't want.  Reference the **Copy Files** section of this class, later herein, for more information on Window No. 2.  The three windows are as follows:

First Pop Up Window
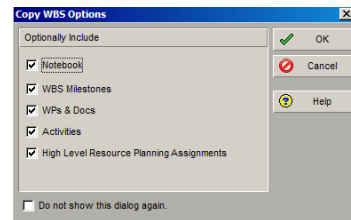


Second Pop Up Window
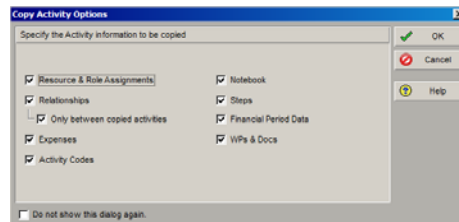


Third Pop Up Window
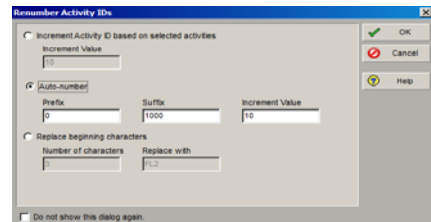


## Moving WBS Tiers within the WBS

The user can move the WBS tiers by selecting the tier to move and using the block arrows located within the tool bar on the right side of the screen.  The choices are up, down, left or right.  If the selected tier has sub-tiers then those sub-tiers will move with the selected tier. The WBS code values will change automatically as you move from tier to tier.  If the WBS code value is not what the user desires then the value can be changed as described earlier herein.  It is a good practice to make sure the tiers numerical values match the numerical placement.  For example, a tier code of 8 can be placed before a 4.  Misplaced tier values can misplace the desired location within reports or exported files.

WBS Block Arrows
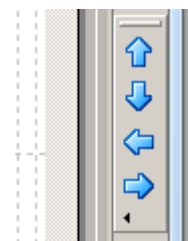
## Importing / Exporting Files

### Importing Files

MnDOT policy does not permit any user to import files into the MnDOT P6 Enterprise system.  Users who have access to a stand-alone P6 system they can import there.  The main concern with doing so is to make sure the .xer file to be imported was exported in a version that the P6 stand-alone will support; the file must be the same version, or older.  To import on a P6 stand-alone follow these steps:

1. Click the expressive File command and then click Import.  The Import Format Window will pop up.  Select the type of file being imported and then click Next.

   Import Format (1)

2. The Import Type Window will pop up, select type and then click Next.  Project is the more likely choice you will use.

   Import Type (2)

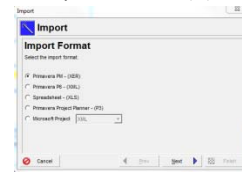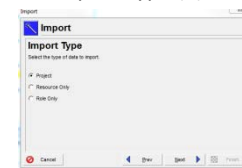3. The File Name Window will pop up.  Click on the drawdown box and you will be placed into Windows Explorer.  Chase down through Explorer the location of your.xer file a click on the desired file.  You will be taken back to the file name window, click Next.

   File Name (3)
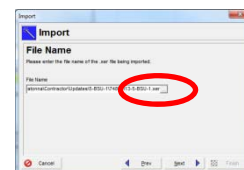
4. The Import Project Options Window will pop up.  You should see the file you selected from Windows Explore except that it will be referred to as the Project ID.  Make sure the check box is checked.  The Import To cell should be empty.  Click the drawdown box in this cell and the EPS will pop up.  Double click on the EPS node you wish the file to be placed and then click Next.

   Insert Project Option (4a)          EPS Tiers (4b)
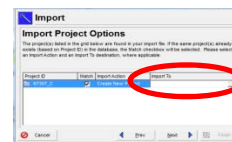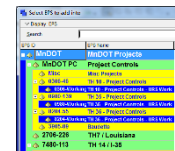
5. The Update Project Options Window will pop up with default configurations already in the Layout Name cell.  Just click Next.

   Update Project Options (5)
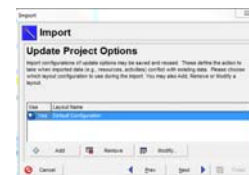
6. The Finish Window will pop up, click Finish.

   Finish (6)
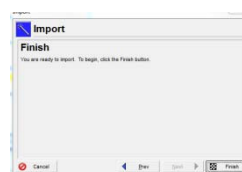
## Exporting Files

In order to export a project schedule the schedule must be opened.   The user can export the project schedule in the following formats:

- Primavera PM – (XER)
- Primavera Contractor – (XER)
- Primavera P6 – (XML)
- Spreadsheet – (XLS)
- Primavera Project Planner – (P3)
- Microsoft Project (XML 2002/3, XML 2007, XML 2010 or MPX)
- UN/CEFACT (XML)

MnDOT's P6 Enterprise will not allow an exportation of Primavera Project Planner (P3).  A standalone version of P6 will as long as the machine that the standalone version is on has a copy of P3 or was upgraded from P3.  However, P3 will not operate on any machine using Windows 7 or newer unless P3 is put on the machine via a vertical machine running under an older version of Windows.

Today's course will only discuss exporting a Primavera PM – (XER) file.

1. With the schedule opened click File then click Export.

   File – Export (1)
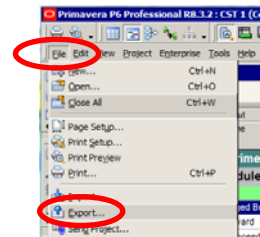
   

2. The Export Format Window will pop up for the user to choose the type of format to export.  For our demonstration purposes click the Primavera PM – (XER).  If you need to export an older version then click on the drawdown arrow in the cell to the right of the selected choice.  When you have selected the appropriate choice, click the Next button.

   Export Format (2)
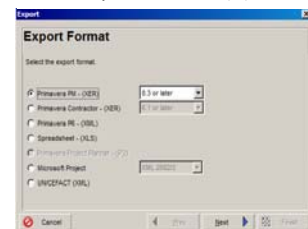
   

3. The Export Type Window will then pop up; choose Project then click the Next button.

   Export Type (3)
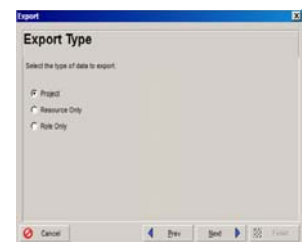
4. The <u>Projects To Export Window</u> will pop up. If only one schedule is opened then there will be only one choice. If multiple schedules are open then multiple schedules will appear. Choose the one(s) you want to export by clicking on the check box next to each name. Make sure the schedule you want to export is the only schedule with the export box checked, and then click the Next button.

Projects to Export (4)
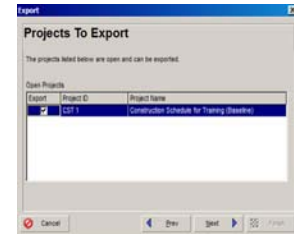
5. The <u>File Name Window</u> will pop up. A file path may already be shown in the file name cell. This cell is where you tell the program where to save the export file and what name to give. Click on the drawdown box within the cell and the Save File Window will pop up (not shown). Make sure you tell it where you want to send it and name it. Be careful because the previous file name you exported will automatically appear and you will want to change it. Once change click Save. This step will take you back to the File Name Window; click Finish.

File Name (5)

6. The <u>Export Result Window</u> will pop up. It you successfully exported the file it will tell you; click Close.

Export Result (6)
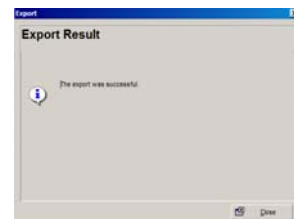
## Copy and Paste Files

### Step 1

To copy an existing schedule you need to be in Projects and the EPS page.  Find the file you want to copy and click on the title.  Place your cursor over the file, right click then click Copy.  *Although user restrictions more than likely would prevent such, do not create a reflection schedule.  If the user were to create such and commit the changes it would alter the active schedule which would be extremely detrimental if it were an active contractor schedule.*
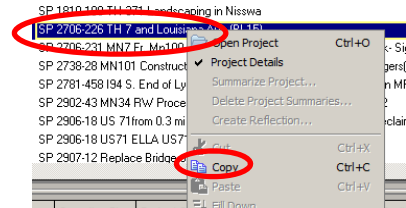
### Step 2

To paste the copied file scroll to the EPS location / tier where you want the copied file to be placed, say your sandbox.  The sandbox in this example is Construction Schedule Training.  Then click on the EPS tier band, right click, click Paste.

Step 2 - Paste
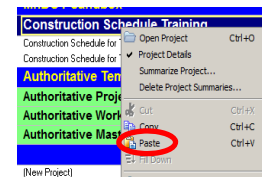
### Step 3

The Copy Projects Options Window will pop up.   Typically all the check boxes will be already checked as a default.  Review your choices to confirm the appropriate items will be copied.  If you are not sure then check them all.  The Baseline check box will be the one that may need more attention or thought.  If the schedule you are copying has previous versions saved within it as baseline then you may want to check this box.  If you do select this option the Copy Baselines Window will pop up.  If you don't check the box it will not pop up.

Step 3 – Copy Paste Options
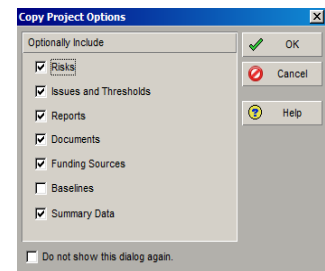
### Step 4

If checked the Copy Baseline Window will show all the previous versions that are saved within the schedule you are copying.  An active schedule can have saved copies in excess than what can be copied; you will be only allowed to copy three saved baselines.  If this is the case check the three or less you want to bring in with your copied schedule and click OK.

Step 4 – Copy Baseline

### Step 5

The next window to pop up will be the Copy WBS Options.  All the check boxes will be checked by default.  It is recommended to leave them all checked and click OK.

Step 5 – Copy WBS Options
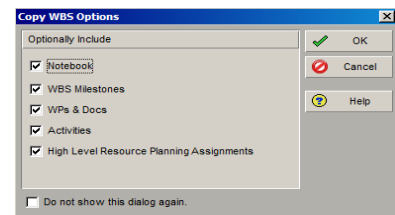
### Step 6

The Copy Activity Options Window will pop-up. All the check boxes will be populated by default. Most should be self-explanatory and should be left checked. The two that may need some explanation are the "Only between copied activities" and the "Steps" check boxes. Sometimes schedules have logical links with other schedules. This is not typical with the MnDOT construction projects but is with the MnDOT pre-construction schedules. If the schedule being copied has links with other schedules and the user wants those links to be maintained, then uncheck this box. But if both linked schedules are being copied at the same time it should be ok if this box were checked.

It is a good practice to always have the Steps box checked. Steps are a breakdown of an activity into multiple feats (steps). For example, constructing a pier is done in three steps, footer, pier and cap. An activity might simply state Construct Pier but might be broken down in steps within the activity within the schedule. This is not a common practice with MnDOT Contractors but has been introduced in MnDOT's pre-construction design schedules.

Step 6 – Copy Activity Options
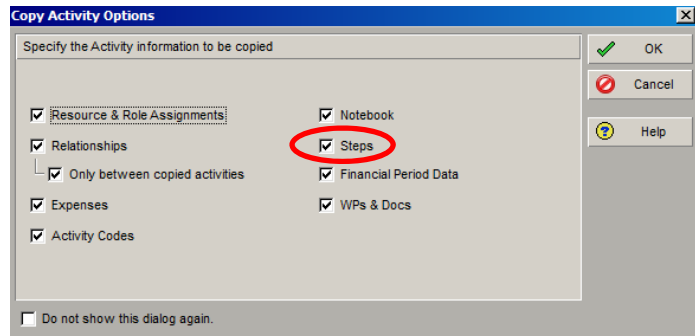


### Step 7 - Responsible Manager Code

It is very important that when a user copies a schedule that once copied the user change the Responsible Manger code. To do this the schedule must be opened. This was discussed in the **How to Work within the EPS** portion of this class. It can also be done in the WBS Window.

When in the WBS add the Responsible Manager column into the data table area. Within the column double click on the parent (top) tier and the Select Responsible Manager Window will pop up. Scroll to find the users OBS name and double click. A query window will pop up asking if you want assign this new manager to all the WBS elements of the schedule, click Yes.

Step 7 – WBS Responsible Manager
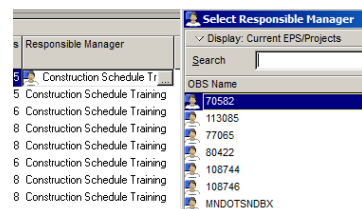


Step 7b – WBS Assign Query



### Step 8 - MnDOT Prime Contractor Code

It is very important that when a user copies a schedule that once copied the user change the MnDOT Prime Contractor code. To do this the schedule must be opened. This was discussed in the **How to Work within the EPS** portion of this class.

## User Preferences

### Time Units

The typical MnDOT schedule usually is displayed in whole days.  P6 schedules and the calendars within are based on hours.  This can and more than likely will visually affect the display, not the accuracy, of numeric val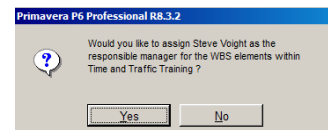ues such as remaining durations and float.   There are a number of factions that will cause a remaining duration and/or float to go from a whole value to a fractional value.  If any one faction occurs then the numbers will be calculated to decimals.  This can sometimes make the reading of float displayed as a whole number hard to follow through a schedule.  If a float value is fractioned and displayed as a whole number the display will be rounded up or down while the true value remains intact.  This can make a displayed zero float appear as critical yet the activity bar displayed as green versus red.  Another example is if a filter of all critical activities were run any activity displayed as zero but truly valued at .49 will not be included in the filter when the user is expecting it to be included.

### How to Display Time Units

Time units can be displayed down to two decimal points.  To do so click on the expressive Edit command and then click User Preferences or use the Shortcut Icon.  If you do not initially see user preference then click on the double down arrow to expand the window.

The User Preference Window will pop up; click the Time Unit tab.  Under the Duration Format section of this window change the decimal value from zero to two by clicking on the decimal draw down arrow.  This can also be done for units of time.

| User Preference Icon | Expressive Command | Time Unit Tab |
|---|---|---|
|  |  |  |
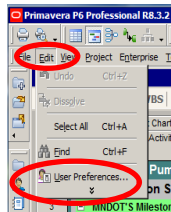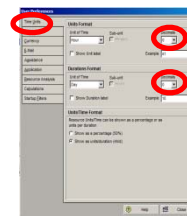
### Dates

Since P6 is based on hours differing clock settings between calendars is one of two main culprits of fractured values.  This can cause a finish-to-start relationship to finish and start on the same day.  How dates appear can help expose why float may be fractioned or why finishes and starts occur on the same day.  Dates can be displayed in a multitude of ways including the time of day.   To change how dates are displayed find your way to the user preference window as described above and click on the Dates tab.

Dates Tab
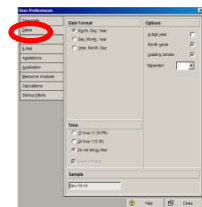


### Currency

The currency tab within user preferences will turn on or off decimal values and the dollar sign.  Using the currency tab will follow the same guidance as listed above.  Select the appropriate settings and click Close.

## Baselines

**Baseline**s

There are two functions, each with multiple steps, to working with a baseline.

- o   Function 1 – Maintain Baseline
- o   Function 2 – Assign Baseline

### Function 1 (Maintain Baselines)

Once a schedule has been accepted as the baseline a copy of that accepted schedule needs to be saved as a baseline within the accepted schedule before any changes are made to the accepted schedule.  The first thing to do is to export an xer file as discussed earlier and make a copy of the schedule  to be kept in the project library.

To save and/or convert a schedule within a schedule, whether a baseline or update, and regardless of the acceptability, follow these steps:

1.  Click on the expressive Project command and select Maintain Baselines or use the Shortcut maintain baseline Icon.

    Step F1 (1) - Expressive Command

    Icon

2.  The Maintain Baseline Window will pop up, click Add.
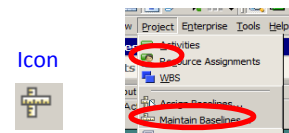
    Step F1 (2) – Maintain Baseline
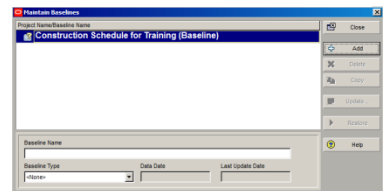
3.  The Add New Baseline Window will pop up. This is where the user needs to be careful with their decision.  There will be two choices, save or convert.  If the user choses save there is no repercussion. However, if the choice is to convert there is a repercussion.  ***When a schedule is tagged to be converted the conversion process will remove the tagged schedule from the EPS.  So before you convert make a copy of the schedule to be converted as instructed earlier herein and then select the copied version for conversion.***

    Step F1 (3) – Add New Baseline
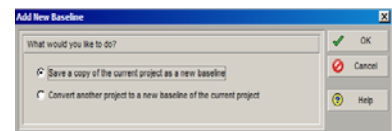
4.  If you choose convert then the Select Project Window will pop up. The user will see the entire EPS to which they have access.  Scroll through the EPS until you see the copied project to be converted; double click on that project and it will start the conversion process.

    Step F1 (4) – Select Project to Convert
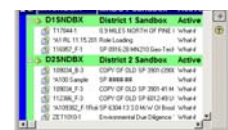
### Function 2 (Assign Baselines)

Saving and/or converting a schedule to a baseline (Function 1) does not make it accessible as a baseline. The user needs to assign the file to be viewed as the baseline. There are three baseline "slots" that the user can assign within the active schedule for comparison; the Primary, Secondary and Tertiary. Typically MnDOT construction only uses one, the Primary. To assign follow these steps:

1. To assign a primary baseline the active schedule needs to be opened. To assign the baseline click on the expressive Project command and then click Assign Baselines. Or use the Assign Baseline Shortcut icon.

Step F2 (1) - Expressive Command
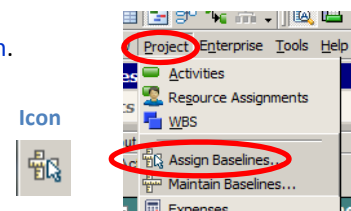
**Icon**

2. The Assign Baseline Window will pop up. There are two cells that need to be populated. Click on the Project Baseline draw down arrow and then click on the desired schedule. Populate the Primary cell under the User Baseline section of the window. Click on the Primary drawn down arrow and click on the desired schedule. Click OK.

Step F2 (2) – Assign Baseline
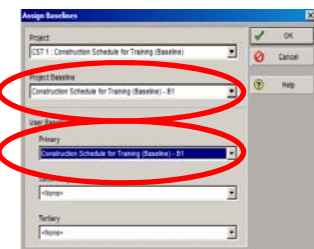
### Display Baseline Data in Gantt Area

The user can read the baseline data in the Gantt area, the data area or by creating a customized report. In order to see a comparison bar in the Gantt area the user needs to add the baseline bar as a selected bar for viewing *or* open a pre-set layout. There are three ways to add a bar; expressive command and two Shortcuts. The expressive command is to click View, and then click Bars. The first Shortcut is to click the Bar icon located in the top tool bar and the other Shortcut is to place your cursor within the Gantt area and right click, then click Bars.

| Bars Icon | Expressive Command | Gantt Area Short Cut |
|---|---|---|
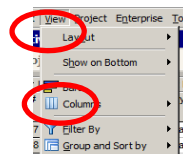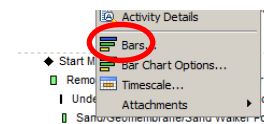
After clicking one of the above the Bars Window will pop up. Click on the Primary Baseline check box, and then click OK. If you want to view all three baselines then click Secondary Baseline and Tertiary Baseline check boxes.

Bars Window
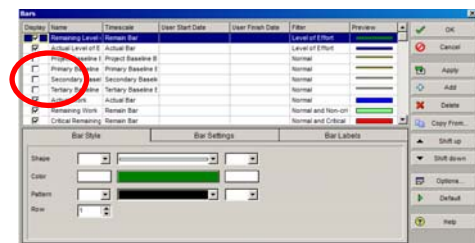
### Display Baseline Data in the Data Table

In order to see baseline information in the <u>data area</u> the user needs to add the appropriate columns to open a preset layout with such information. There are three ways to add columns; expressive command and two Shortcuts. The expressive command is to click View, and then Columns. The first Shortcut is to click the Column icon located in the top tool bar and the other Shortcut is to place your cursor within the data area and right click, then click Columns.

Columns Icon          Expressive Command          Data Area Short Cut
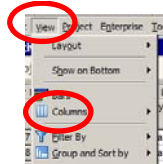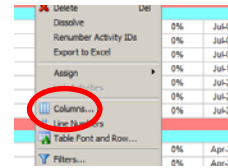
Baseline columns can be added by expanding any of the available choices to open the available data. Look for a BL, BL1, BL2 or BL3 designation. Click on the desired choice and then click the right arrow in the middle to move it into the Selected Options inner window. The BL designation is for Baseline Information, the BL1 is for Primary Baseline information, BL2 is for Secondary Baseline information and BL3 is for the Tertiary Baseline information. The different designations will only appear if the appropriate type of baseline has been assigned as discussed earlier.

Columns Window

URS
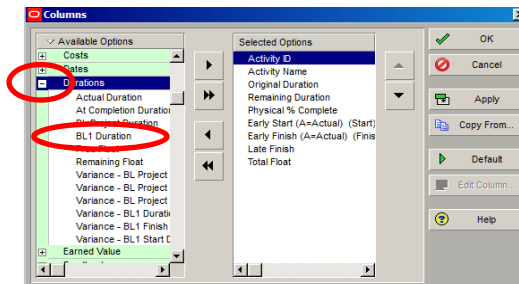
## Calendars

### P6 Enterprise

There are three types of calendars within P6; Global, Resource and Project.  The resource calendar is rarely used on MNDOT projects.  There are a number of detriments for a contractor using a global calendar, for example, if a change is made to the calendar by someone other than the contractor their project(s) will unknowingly be affected.  Therefore, it is highly recommended that all contractor schedules use the project calendars.  This is also recommended for time and traffic schedules.  The MnDOT w/Standard Holidays is the default calendar.  This means that for every added activity this default calendar will automatically be assigned to the activity.  The default for a project can be revised from within the EPS Projects Window located on the defaults tab in the Details Window.  For instructions on how to do so please refer back to the **How to Work within the EPS** section, navigating, of this tutorial.

### Access Calendars

To access the calendars click on the expressive Enterprise command and then click Calendars.   The Calendar Window will pop up which is where the user will find the three types of calendars.  The global calendars will contain pre-defined MnDOT calendars.  The project calendars will contain project specific calendars.
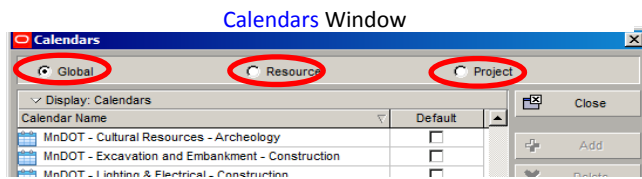
Calendars Window

Expressive Command
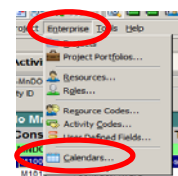


### Add Calendars

When a schedule is first created there are no project calendars to select, follow these steps to add:

1. Click Add.  The Select Calendar To Copy From Window will pop up (below).  The listing of calendars within this window is the global calendars.  Find the calendar that best fits the type of calendar needing to be created and double click on it.

2. The chosen calendar will be added to the project calendar with a name of "New Calendar" (bottom middle).   Change the name to a description of your choice.

3. Then make sure this new calendar is still selected and click Modify (bottom right).

Step 1 Select Calendar to Copy    Step 2 – Change Name    Step 3 - Modify
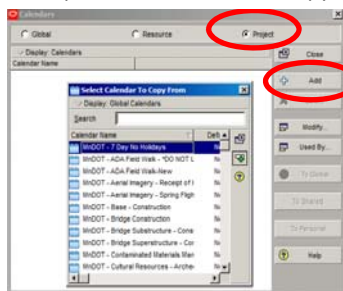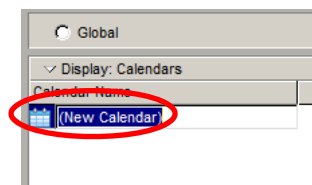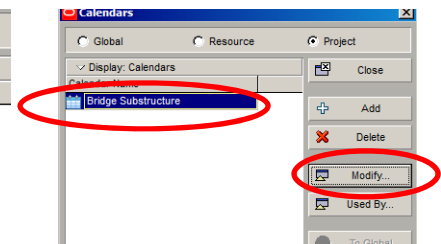
## Modify a Project Calendar

After clicking modify in the above step the new calendar will appear.  The user should see the days of the calendar.  Depending on the calendar that was copied some days will be shaded and some won't.  The shaded days are non-workdays which typically represent Sundays, Saturdays, holidays and weather contingency.   To change a non-workday to a workday or visa-versa simply double click on the day to be revised.  A revised non-workday will turn white which simply indicates that it was revised from a non-workday to a workday.  It is also referred to as an exception, as in an exception was made for this day.  If the user wishes to avoid the indication of an exception then they should consider copying a seven day or five day calendar and then adding their own non-workdays or select the exception and click the standard button.  Doing so can be tidiest over a multi-year project because it will have to be done for every month for every added calendar.

Modify Window
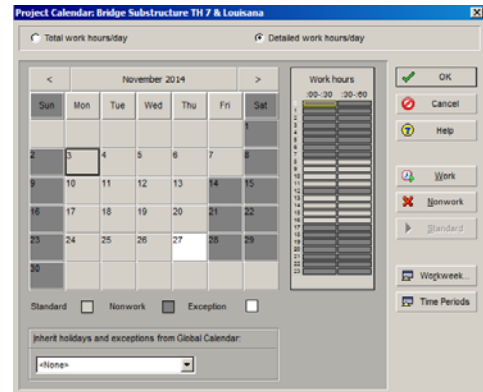


## Viewing Adjusting Working Hours (Clock Times)

Each calendar functions by the hour and not the day.  It is not uncommon for the designated working hours within a calendar and between calendars to be missed matched, particularly in contractor schedules.  This is one cause of float fracturing discussed earlier in the **User Preferences** section.  It is also a cause for activities with a finish-to-start relationship between them to finish and start on the same day.  What typically happens is one calendar may end its day at 4 PM while another ends at 5 PM.  This can also occur on a daily basis.  It is recommended that each day, of each calendar is set to work the same designated hours.  Some may say they are planning to work a ten hour shift versus an eight hour shift.  If this is the case it is recommended to have an eight hour and a ten hour calendar and should be discussed between the parties.  A Time and Traffic schedule may want to consider calendars with differing shifts.  If not already viewable click the Detailed Work Hours/Day found at the top of each calendar.  Scheduled hours to work are not shaded.  To change the hours double click on the 30 minute interval box that you would like to change.

Detailed Work Hours
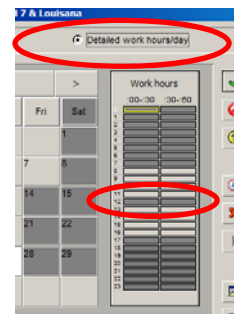


## Weather Contingency

The most common way, and now sometimes specified way, to include weather contingency within the schedule is within the calendars as non-workdays.  Some contractors have pushed for all of the Saturdays on a six-day calendar to be non-workdays representing the weather contingency.  If this is the case it is recommended that not every Saturday be designated as a non-workday.  The non-workdays in this case should be spread over the week with some, but not all, being allowed to fall on a Saturday.  Some specifications now prohibit a Saturday to be designated as a weather contingency day; so check the specs.

## Customizing Views

### Columns


Edit Columns

For instruction on how to add and/or remove columns in the data table area of your view please refer to the **How to Work within the EPS** (Navigating) and **Baselines** (How to Read) sections of this tutorial. The title, width and data position of a column can be edited. Open the column window and click Edit Column; the Edit Column Window will pop up. Make your edits and click OK.

### Bars


Bars Window
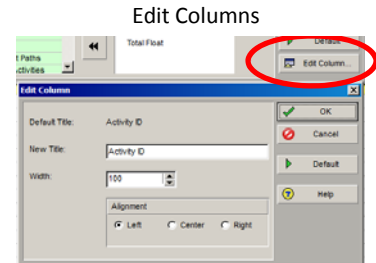
For instruction on how access the Bar Window please refer to the **Baselines** (How to Read) sections of this tutorial. With the Bar Window opened the user can select the bars to appear in the Gantt area by clicking the display check box in the first column of the Bar Window. To revise the bar style, setting or label click on the appropriate tab within the Bar Window. The user can also create a bar by clicking the Add button.
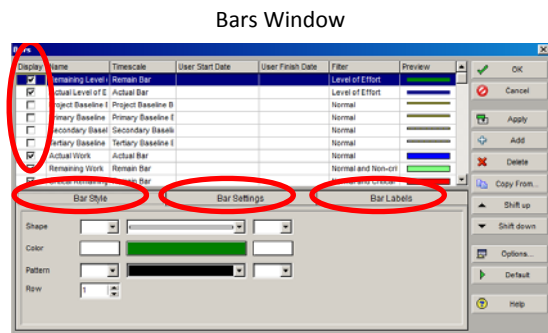
### Time Scale

There are three ways to access the time scale to modify; expressive command and two Shortcuts. The expressive command is to click View, and then Time Scale. The first Shortcut is to click the Time Scale icon located in the top tool bar and the other Shortcut is to place your cursor within the Gantt area and right click, then click Time Scale.

Timescale Icon     Expressive Command     Gantt Area Short Cut
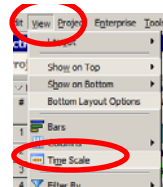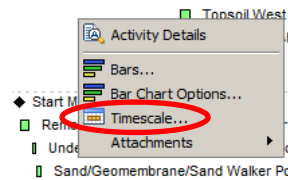


After clicking one of the above the Timescale Window will pop up which will permit the user to edit the header and scale appearance. Ordinal dates can be shown for time and traffic to depict the number of months if a start date is not known.

Timescale Window

To stretch or shrink the time scale hover your cursor over the time scale until it changes to a magnifying glass, hold down the left mouse button and drag; right to zoom in and left to zoom out.

Adjusting Zoom
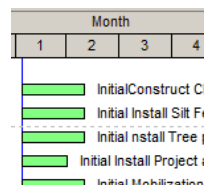
## Activity Details

### Activity Details

Offers the most activity based information within a window that is organized by tabs. If the Activity Detail Window is not displayed there are three ways to do so; expressive command and two shortcuts. The expressive command is to click View, and then click Show on Bottom, and then click Details. The first shortcut is to click the Detail icon located in the top tool bar and the other shortcut is to place your cursor within the Data Table area and right click, then click Details.

Activity Details Icon          Expressive Command          Data Table Area Shortcut
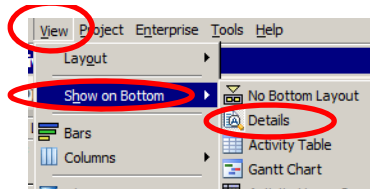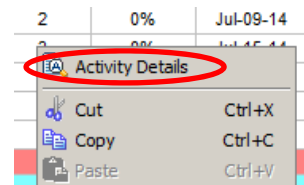
The Activity Detail Window can be customized to show 14 different tabs. Place your cursor in the tab area, right click and then select Customize Activity Details. Some of the tabs include, but are not limited to, General, Status and Relationships. To add or remove from view select the tab description and move between Available Tabs and Displayed Tabs. To view an activity's data within the Activity Detail Window the subject activity needs to be selected within the Data Table area. The commonly used tabs are general, status and relationships. Below is a view of the Status and Relationship tabs.

Customize Activity Details
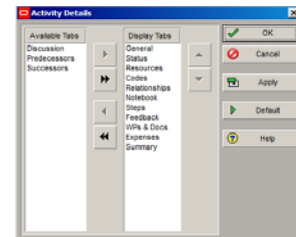
Status Tab
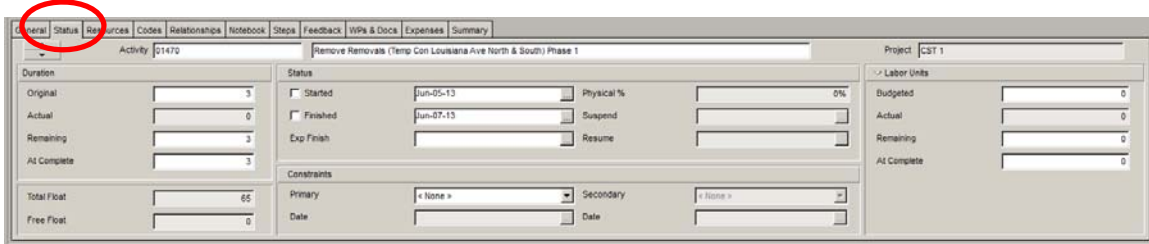
Relationships Tab
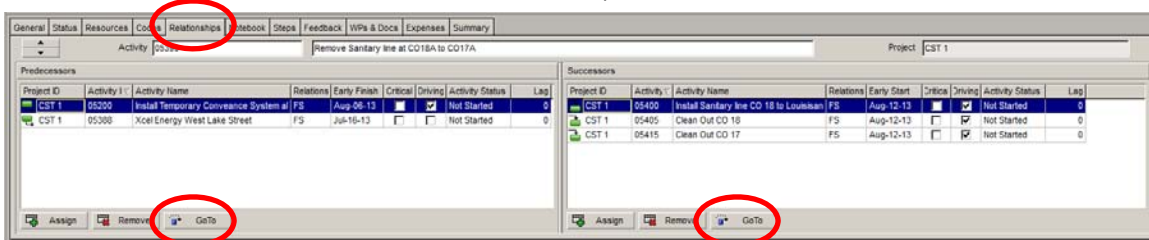
To move from one relationship to the next click on the desired activity and click the Go To button. Assigning and removing relationships will be discussed later herein.

## Scheduling (Calculate)

### How to Schedule (Calculate) the Project
The user must have access rights to schedule the project.  If the user is a non-contractor entity and their access rights are restricted they more than likely will not be permitted to schedule a contractor's active schedule.  To be able to schedule the project for an in-depth review make a copy of the schedule and place it in your sandbox.  The ways to calculate the schedule include expressive command and Shortcuts.

Schedule Icon

Keyboard Shortcut

**F9**

Expressive Command
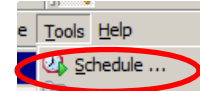
The Schedule Window will pop up.  If the user wants to view the schedule log report the Log to File check box at the bottom of the Schedule Window needs to be checked.  Some of the information this log will provide includes:

Schedule Window

- Scheduling Settings
- Statistics
- Missing Predecessors and Successors
- Out-of-Sequence Activities
- Actual Dates Greater than Data Date
- Critical Activities
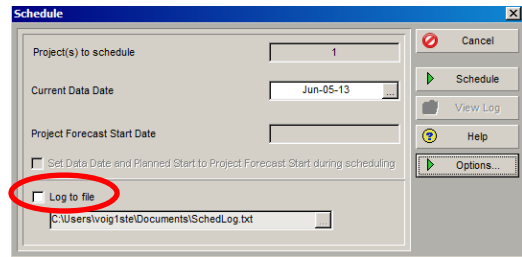
### Calculation Types
There are three calculation types, retained logic, progress override and actual dates.  The two commonly used types are retained logic and progress override.  Some specifications will specify which calculation is to be used.  To verify the calculation in use press F9 and the Schedule Window will pop up, and then click Options and the Schedule Options Window will pop up.

Schedule Options
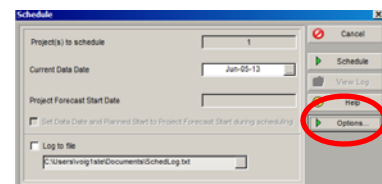
The difference between the two types is that progress override will ignore preceding logic associated with predecessors that are not complete.  Retained logic will ensure that remaining durations of incomplete activities are included in the calculation of any downstream succeeding activities even when completed activities lie between them.

Schedule Options – Calculation Types

### Critical Definition
There are two areas to define criticality; the EPS setting tab or the Schedule Options Window.  You can define it to a value or by longest path.  The definition will affect the bar in the Gantt which can be defined to mislead in a PDF setting if not looked at closely.

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Primavera P6 Introductory Course
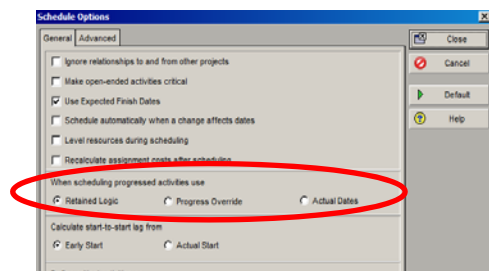
## Filtering

### Global and Default Filters

There are three categories of filtering, default, global and user defined.  The default and global filters are pre-set to singular type of conditions.  The user can choose more than one filter at a time.  For example if the user wants to filter out all not started activities and in progress activities then simply check the appropriate filter check boxes.   The one catch with selecting more than one filter is a choice to be made at the top of the Filter Window.  The choice is to show all selected filters or any selected filter.   The pre-set filters cannot be modified in their current category but can be copied and pasted into the user-defined category and modified therein.

The ways to open the Filter Window include expressive command and Shortcuts.  The expressive command is to click View, and then click Filter By.  The first Shortcut is to click the Filter icon located in the top tool bar and the other Shortcut is to place your cursor within the Data Table area and right click, then click Filters.
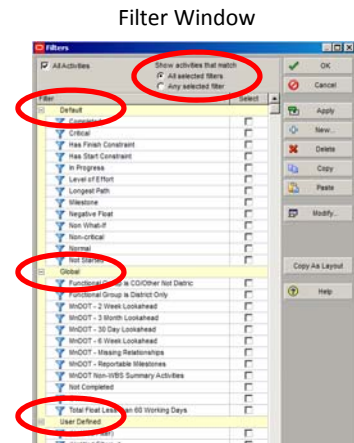
Filters Icon

Expressive Command
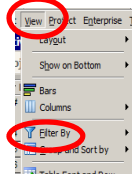
Data Table Shortcut
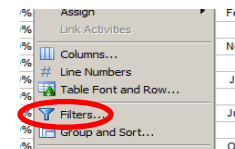
### User-Defined Filters

With the filter window opened the user can create a filter by clicking the New button.  Another Filter window will pop up with a default title of (Untitled Filter) for the filter you are creating.  Take the following steps to create your filter:

- Name: Select the default name in the filter name cell and type the desired description.
- Parameter: Chose "All of the Following" or "Any of the Following".  This can make a difference in the output.
- Parameter: Click the drawdown arrow, scroll to find item to filter and select.
- Is: Click the drawdown arrow and select equation.
- Values: Enter a value.  If it is a range then enter the low value in the Value cell and the high value in the High Value cell.
- Parameter:  If multiple parameters are needed then click the Add button and repeat above steps.

Filter Window

Filter Window – Click New
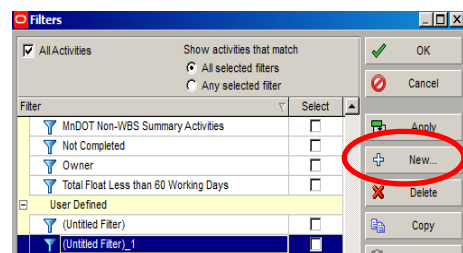
Filter Window – Create/Modify
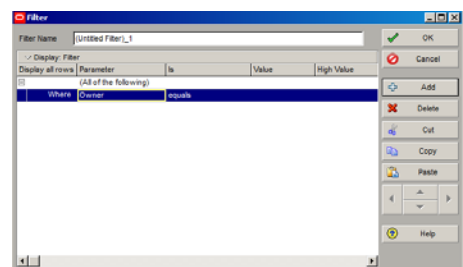
## Grouping and Sorting

### Grouping and Sorting

This is the function that organizes your display to reflect the WBS, which is the most common display. The ways to open the Group and Sort Window include expressive command and Shortcuts.  The expressive command is to click View, and then click Group and Sort by.  The first Shortcut is to click the Grouping icon located in the top tool bar and the other Shortcut is to place your cursor within the Data Table area and right click, then click Group and Sort.

Group/Sort Icon          Expressive Command          Data Table Shortcut
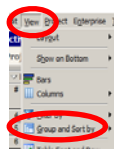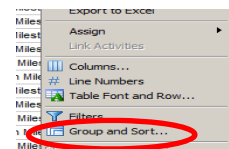
The Group and Sort Window is where totals within the WBS bands can be turned on or off by checking or unchecking the Show Group Totals check box in the upper left hand corner. The middle section of this window is where to find the grouping function.  Click on the Group By cell and choices will appear.  Scroll down to find the desired item to group by, say the WBS, and double click.  Another nice function is Hide if Empty.  Many times the screen will display WBS bands with no activities.  If you don't want to see the empty bands check the Hide if Empty check box.  To sort the data click on the Sort button and the Sort Window will open.

Grouping and Sorting Window
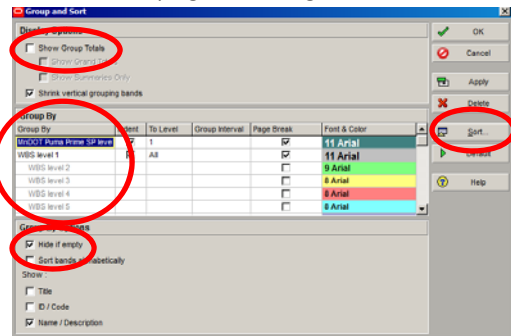
## Reports

### Reports

MnDOT has created some useful reports with just a few clicks of the mouse.  The Activity Logic report lists all activities sorted by Activity ID and another logic report is grouped by WBS.  These are very useful reports for reviewing logic.  In order to run a report the project must be opened.  To generate a report the expressive command is to click Tools, and then click Reports and Reports again. The Shortcut is to click the Report icon located in the left side tool bar.

Expressive Command
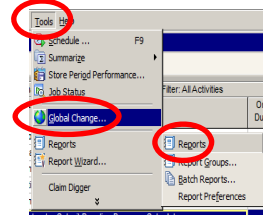
Reports Icon

The user is now in the report section of P6.  Find and click on the desired report.  Then right click, and then click Run and then click Report.  The Run Report Window will pop up; click OK.

Select Report, Run, Report
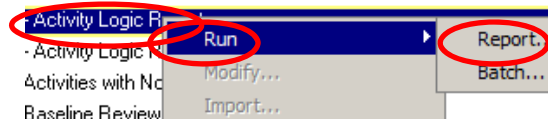
## Creating a Schedule

### Create a Time and Traffic Schedule

There are many steps to creating a schedule. They all don't have to be in a rigid order but some steps can save time and work if certain steps are done before others.

### Step 1 (Mandatory)

To create a schedule the user needs to contact the MnDOT SSC (Shared Service Center) and request them to add a "schedule Shell" within the EPS. Make sure you inform the SSC that this is for a contract time determination schedule. The SSC P6 Admin Team will create the schedule shell to ensure that administrative protocols are followed. The shell is an empty schedule for the user to build their schedule. Certain project information will need to be provided to the SSC: as to what information ask the SSC. The SSC is in the process of preparing a procedures document for this step.

### Step 2 – EPS Review

While in the EPS click on the schedule and review the Project Details General and Dates tabs. The date tab is where you can adjust the Project Planned Start date.

> It is suggested that you leave the must finish by date blank at this time. Doing so will allow for an easier compression of the schedule later in the process if so needed. It will eliminate the likelihood of negative float associated with multiple critical paths. It will be easier to compress one longest path versus multiple critical paths.

### Step 3 – Create Project Calendars

The P6 Enterprise currently contains global construction calendars that could be used to add the project calendars but is not recommended at this time. *Caution* **– The existing global construction calendars as of November 2014 show signs of incompleteness so make sure you review for appropriate construction holidays.** Do not include all MnDOT holidays because not all MnDOT holidays are observed by contractors. Additionally, it is good practice to extend all contractor holidays at least one year beyond the anticipated finish.

Each calendar, except a seven day, will need to include weather contingency. It is recommended that the weather contingency matches what the contractor will be required to use. *Caution* **- The existing global calendars as of November 2014 show signs of incompleteness so make sure to review.** It is also good practice to extend all contingencies at least one year beyond the anticipated finish.

It is recommended that the following calendars be added to the schedule. The calendars should be based on an eight hour day so make sure each calendars clock has the same start and finish time.

- Five Workday
- Six Workday
- Seven Calendar Day
- Seasonal (restricted by winter)
- Weekend
- Any specialties with date restrictions (Overlay, Paving, etc.)

If activity durations are to be resource driven within the schedule then ten hour days or greater calendars could be added to the schedule.  However, this step is recommended to occur only after a compression need arises.  Schedule compression will be a separate step discussed later herein.

**Step 4 – Defaults**

Now that the project calendars are created the user needs to go back to the EPS, select the schedule and click on the Default tab. One of the default settings is the calendar that new activities will be assigned.  The default calendar cell is located on the right of the project detail window; click on the calendar cell drawdown box.

EPS Project Details - Default Tab
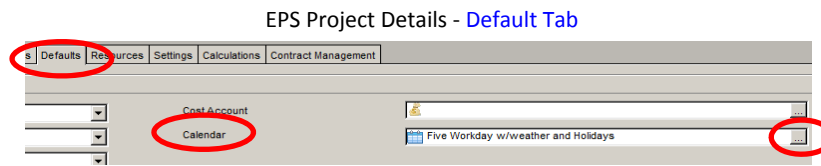


Select Default
Project Calendar



The Select Default Project Calendar Window will pop up.  The user may need to change the displayed choice from global to project.  To do so, click the triangle in the upper left corner and the choices will appear; click on Project Calendars. The listing of all project calendars will appear.  It is recommended that the default be set to the Project Five Workday Calendar.  Double click on the chosen calendar.
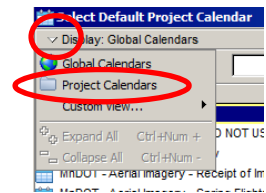
**Step 5 – Create the WBS**

A good WBS is one of the most efficient ways to organize and work within the schedule.  The Staging/Traffic Controls Plans are a good source to base the WBS.  So with the schedule open go to the WBS page.

There will already be a tier already in the WBS.  This top tier represents the schedule itself and can only have tiers placed thereunder.   To add the next tier place your cursor within the data table area and right click and then click Add or use the Shortcut Icon on the right side of the screen.

The WBS name will default to "(New WBS)" which the user will need to revise to the desired description, for example "Project Milestones".  The first sub-tier is typically used for Project Milestones.

As subsequent tiers are added they can be moved up, down, left or right.  When two or more sub-tiers are present the directional block arrows on the right side of the screen become usable.

The WBS code will automatically be created.  When tiers are moved the WBS code is automatically changed.  If the tiers are moved the user may need to manually adjust the WBS Code.  To do so double click on the respective tier's code and revise.  This can also be done in the General tab of the WBS Detail Window at the bottom of the screen.

The WBS could be created to its fullest platform during this step or as you add activities.  It is more of a preference but creating the WBS as you add activities does have a few advantages which are discussed in Step 8.

### Step 6 – Adding Activities Codes

Activity codes can be a useful tool but is not an absolute necessity.  Codes will let the user filter specific aspects of the schedule but can become a maintenance burden if too elaborate.  A code dictionary will need to be created.  To create the dictionary click the expressive Enterprise command and then click Activities Codes.   A message will pop up telling the user that no codes have been defined and to press the modify button to add project activity codes, click OK.
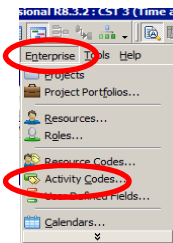
After you click OK the Activity Codes Window will pop up which is where you will see the modify button.  The user needs to make sure that Project is selected in the top row of the window and then press Modify.  Once modify is clicked the Activity Codes Definition – Project Window will pop up; click Add and a new code will appear for which the description will need to be revised.
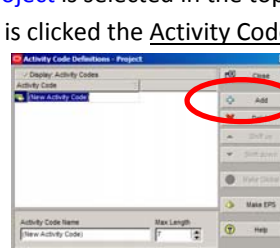
Activity Codes Definition Window
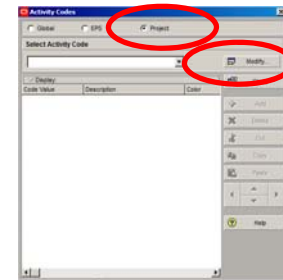
Activity Codes Window

### Step 7 – Adding Activities

One of the more important aspects of an activity is to have an accurate original duration.  Depending on the stage of design the contract drawings may have quantities that an activity's duration can be determined by dividing quantity over a production rate.  Unfortunately the drawings never provide quantities based on specific areas during specific stages.  So the user will more than likely need to calculate quantities for individual activities; the most time consuming part of creating a schedule.

To add an activity place your cursor over the WBS tier for it to reside in; right click and click Add.  An activity will appear with a default Activity ID.  The new activity will have a default original duration of five days and a description that will need to be revised, for example "Removals Stage 1 Mainline".  The original duration can be changed as you add the activity or after.  It is a matter of preference but changing the activity name can be done from a column within the data table area or from within the activity details window's status tab.

To add the next activity just right click and then click Add.  The same process will occur as it did for the first activity, name this one "Grading Stage 1 Mainline".  Repeat this process until you have created a string of activities (otherwise known as a fragnet) which in this case represents the work flow from removals to traffic markings.

Added Activities Prior to Adding Logic

| | | | | |
|---|---|---|---|---|
| **Project Milestones** | | | | |
| A1000 | Start Construction | 0 | Nov-12-14 | |
| A1010 | Finish Construction | 0 | | Nov-10-14 |
| **Stage 1 Mainline** | | | | |
| A1020 | Removals Stage 1 Mainline | 3 | Nov-12-14 | Nov-14-14 |
| A1030 | Grading Stage 1 Mainline | 10 | Nov-12-14 | Nov-25-14 |
| A1040 | Select Granular Stage 1 Mainline | 2 | Nov-12-14 | Nov-13-14 |
| A1050 | Class 5 Stage 1 Mainline | 2 | Nov-12-14 | Nov-13-14 |
| A1060 | Curb and Gutter Stage 1 Mainline | 5 | Nov-11-14 | Nov-18-14 |
| A1070 | Pave Non-Wear Course Stage 1 Mainline | 1 | Nov-12-14 | Nov-12-14 |
| A1080 | Pave Wear Course Stage 1 Mainline | 1 | Nov-12-14 | Nov-12-14 |
| A1090 | Traffic Markings Stage 1 Mainline | 3 | Nov-12-14 | Nov-14-14 |

### Step 8 – Adding Logic

The activities need to have logic added for which there are a number of ways; this tutorial will cover two.  One is from within the activity detail window at the bottom of the screen and the other from within the Gantt area.

Activity Detail Window – To assign and remove logic have the relationship tab open.  There will be a predecessor side and a successor side.  Each side has an assign and remove button.  Click the predecessor assign button and the Assign Predecessor Window will pop up.  Find the activity to be the predecessor and double click.  Follow the same process for successors.  To remove logic make sure the tie to be removed is selected and click the remove button.

Relationship Tab
Predecessor Side
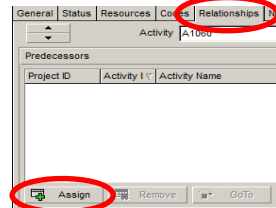
Assign Predecessor
Window
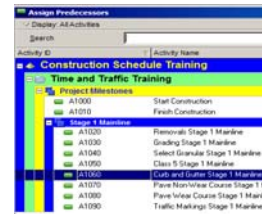


Gantt Area - The user can add a logic tie by floating their cursor within the Gantt area on either end of an activity and when the cursor changes to a single headed crooked arrow press the left mouse button, drag and release at the either end of the activity to be tied too.  **Caution – do not click the mouse on a double-ended arrow.  Doing so will change the activity's duration.**  To see the logic displayed in the Gantt area click on the logic Shortcut Icon.

Logic
Icon

Activities with Logic



It is suggested that the schedule be calculated as fragnets are added.  This can help to avoid missing logic.

If activity codes are to be used it is recommended they be added as the activities are added or at the end of creating a fragnet.  This way if the fragnet is to be copied into another WBS the codes will be copied therewith.  To assign activity codes open the code tab within the activity detail window.  It also is based on an assign and remove button process as discussed in assigning logic.

**Step 9 – Copy Activities (optional)**
After creating a roadway or bridge fragnet the user can copy a fragnet versus re-creating from scratch.  For example, a roadway will have grading, Class 5, curb, paving and traffic markings constructed in that order.  Instead of re-creating a fragnet for the same type of work the user can copy such fragnet and adjust as needed.  Typical adjustments include original durations and phasing logic.  We will discuss two ways; from within the activities screen and from within the WBS screen.

Activities Screen – If the WBS is created to its fullest platform then copying activities or a fragnet of activates from within the activities screen is the way to precede.  Follow these steps:

- From within the data table area select the activities to be copied
- Within the data table area right click,  then click Copy
- Click on the WBS tier that the activities are to be placed.  If the WBS tier is not displayed check the "hide if empty" function in the "Grouping and Sorting" window discussed earlier herein.

- Click Paste and the Copy Activity Option Window will pop up. By default all check boxes should be checked. It is suggested to leave them checked unless there is an item that is not wanted to be copied. Click OK.
- The Renumber Activity IDs Window will pop up. It is suggested to have the first (top) choice selected with an increment of ten. Click OK and the activities will be placed into the selected WBS tier. All that remains to be done is to revise descriptions, durations and outlying relationships.

Activity Options Window
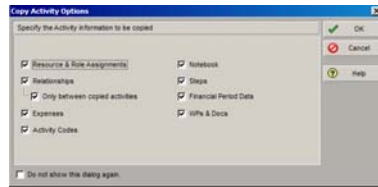
Renumber Activity ID Window
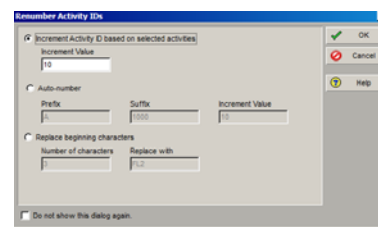
WBS Screen – If the WBS is being created as the schedule is being built then copying activities from within the WBS screen can save time and work. For example, if there is a Stage 1 tier with two sub-tiers and the Stage 1 tier is copied and pasted to become the Stage 2 tier then all sub-tiers, activities and logic including logic between copied tiers will remain intact. Follow these steps:

- From within the WBS data table area select the parent tier to be copied (Figure WBS 1)
- Still from within the WBS data table area right click, click Copy
- Select the parent tier of the tier copied, right click and then click Paste (Figure WBS 2)
- The Copy WBS Options Window will pop up with all check boxes checked by default, click OK (Figure WBS 3)
- The Copy Activity Options Window will pop up, click OK. This is the same window discussed in the Activities Screen discussion above.
- The Renumber Activity IDs Window will pop up, click OK. This is the same window discussed in the Activities Screen discussion above.
- The new tier will appear with a hyphenated number in the description. Revise the description to read as Stage 2
- Move the Stage 2 tier below the Stage 1 tier using the directional block arrows on the right side of the screen as they become usable.
- Make all necessary logic ties between stages and any other needs.

Figure WBS 1

Figure WBS 2

Figure WBS 3

### Step 10 – Constraints

Constraints are a good tool for interim contractual milestone dates to be met.  It is recommended that the Start On, Finish On, Mandatory Start, and Mandatory Finish type constraint not be used.  To add a constraint select the appropriate activity, usually a milestone type activity, and select the Status tab within the Activity Details Window.  The constraints assignments are in the lower middle of the Status tab window.

### Step 11 – Check for Missing Logic

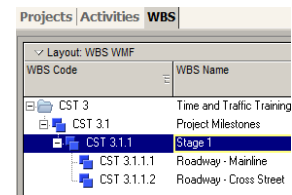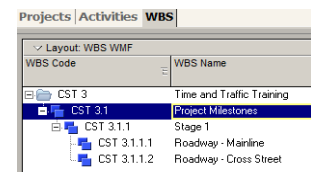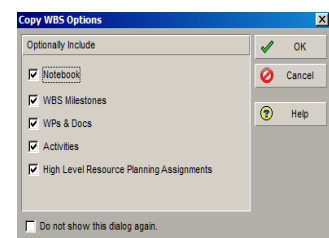There are a number of ways to check for missing logic; columns in the data table area, the schedule log report, or viewing the activity detail relationship tab.  The eye pleasing way is by columns.

If the schedule log report is the choice then the user will need to calculate the schedule prior to reviewing to ensure that the latest data is being viewed.  Refer to the Scheduling (Calculate) section discussed earlier herein for access instruction.

Using Logic Columns



### Step 12 – Schedule Compression

If the overall duration of the schedule is excessive or ends at the beginning of the construction season the schedule may need to be compressed.   The approach of this tutorial placed all activities on the five day workweek calendar working an eight hour day.  There are ways to compress the schedule without *arbitrarily* doubling up on resources, working days in excess of eight hours or working a six-day week.

Step 12.1 (Run Longest Path) - Compressing the schedule should be done by compressing the longest path.  The first step is to run the longest path filter available within the default filter selections.

Step 12.2 (Adding Crews) - The approach to the schedule was based on one crew.  The least costly compression is to add crews to the longest path.  The feasibility depends on the size and confines of the project.  As for an example to adding a crew; if the longest path contained a ten day drainage activity and the work area confines allowed room for another crew then the user could copy the ten day drainage activity, revise the description to highlight Crew 1 and 2, revise each duration from ten to five and assign the same logic as the original ten day activity; thus five days removed from the longest path.  Recalculate the schedule and rerun the longest path filter.  Repeat this method but do not throw crews at a schedule without consideration of availability and feasibility.  Keep the number of crews to a minimum.

Step 12.3 (Extended Workweek) - The next compression method is placing longest path activities on a six day workweek.  This does not necessarily mean all the longest path activities need to be placed on a six day week but only those that will get you to an acceptable project finish.  To revise an activity's calendar select the activity to be revised and open the General tab in the Activity Detail Window.   The activity calendar cell is located in the right side of the window.  Click the drawdown box and double click on the six day calendar.  Recalculate the schedule as a calendar change is made and re-run the longest path filter to see how far it was compressed.  If not enough then place more longest path activities on the six day work week.

General Tab in Activity Detail Window
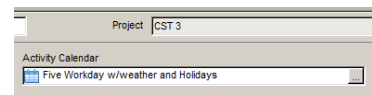
Step 12.4 (Extended Days) - If the entire longest path was placed on a six day calendar and the overall duration is still excessive then the user may think about revising durations to reflect a ten hour work day. If the schedule is resource driven the user could create ten hour day calendars and revise the new longest path activities to the new ten hour day calendars, be they five and/or six workdays.  But resource driven durations were not discussed herein so inliue thereof  the user could revise the activity original duration to be based on a ten hour day.  For example, if an activity was to work five-eight hour days its original duration would be revised to four-ten hour days; one day removed from the longest path.  Since this is a manual change it is suggested that a note of the change be recorded within the Notebook tab of the Activity Detailes Window.

## Reviewing Contractor Baseline Schedules

### Baselines

There is no magical order to reviewing a baseline schedule. However, a top down review can save the reviewer time. A top down approach consist of reviewing the hard set requirements before reviewing the details. Another time saver is to provide a complete review with every response. The more information provided typically results with fewer reiterations. The reviewer needs to be aware of any time limits for providing a response to the contractor. The following steps are a suggestive top down approach:

### Step 1 – Contractual Dates

If it is a calendar day project then make sure the number of days matches the number per Contract. If it is a date certain contract then make sure the last day in the schedule does not exceed that specified for both early and late finish dates. Also review all interim contractual milestone dates and closures for inclusion.

Many MnDOT contracts have a Substantial Completion requirement followed by a Final Completion requirement. Most contractors make use of date constraints to lock these dates into the schedule. Constraints are also used for interim contractual milestone dates. However, they are not always used correctly.

Another means to lock in the latest date allowed per contract, say Final Completion, is the use of the Must Finish By date located within the EPS Project Detail Window under the dates tab.

Constraints should not be allowed to be used on any activity that is not a specified date within the contract. Also, for logic reasons, the following constraints should not be used:

Default Constraint Filters

- Start On
- Finish On
- Mandatory Start
- Mandatory Finish
- As Late As Possible
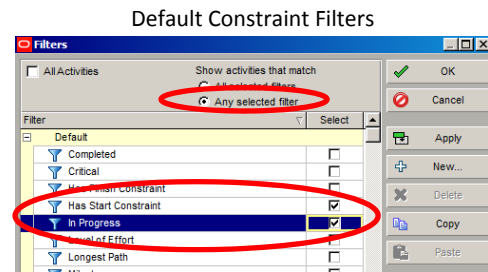


An effective way to expose constraints within the schedule is to run a filter. P6 has two default constraint filters; "Has Finish Constraint" and "Has Start Constraint". Open the filter function and check the check box for both. Make sure no other filters are selected. Also check the "Any Selected Filter" at the top of the filter window; then click OK.

For contractual reasons when a constraint or must finish by date is used it should be the exact date specified within the contract, not the day after.

### Step 2 – Review Calendars (Workdays, Holidays and Weather Contingency)

Except for a seven day calendar all project calendars should include the appropriate workdays, contractor holidays and weather contingency. If the specifications identify specific calendars then each one should be included within the schedule. The specifications will specify a minimum number of days, or a percentage of days, that are to be included as weather contingency days.

The following suggestions should be considered when reviewing holidays and weather contingency:

- Holidays should not be counted as a day of weather contingency
- Saturdays on a five-day workweek calendar should not be considered as weather contingency
- Weather contingency needs to meet the minimum required
- Weather contingency should not exceed a factor of two above the specified minimum
- The selected non-workdays representing weather contingency should be consistent month-to-month and between all calendars.
- Contingency and holidays should be included for one year after substantial completion
- Weekend calendars should not include weather contingency



Weekend – No Contingency       Five-Day w/Weather Contingency       Six-Day w/Weather Contingency
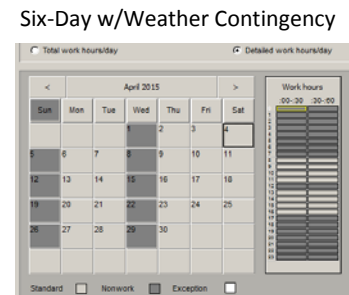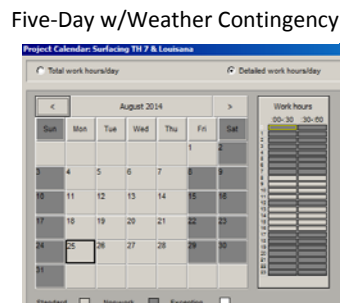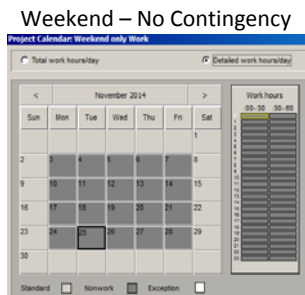
### Step 3 – Review the WBS

The WBS will typically mirror the traffic control plans and/or Specification S-1806.  Compare the WBS to the documents to ensure that all phases and alignments are accounted for.  Phases are almost always segregated by the WBS.  Some contractors are still creating a "WBS" via activity codes.  This is a past practice from Primavera's P3 application and is not recommended.

Some roadway alignments may be combined based on how they will be constructed.  If combined make sure each is clearly identified within the WBS description.  Another typical WBS segregation is roadway versus bridges.  This can make for a clean visual of the Work.

Some contractors like to use milestone type activities for the start and finish of a WBS section.  They have a propensity to tie all incoming logic to the start milestone and all out-going logic to the finish milestones.

Another propensity is to tie all WBS Staging, via the milestones, to top level Staging Milestones; as in Finish Stage 1 as a predecessor to Start Stage 2.  The reviewer should push for the removal of these milestones.  If not removed the reviewer needs to ensure that if a Stage 1 WBS work area does not need to be completed before starting Stage 2 then this type of WBS logic should be removed.  Even after their removal the reviewer needs to confirm that this logic mind-set still does not exist.



Milestones within a WBS

### Step 4 – Review Schedule's Content and Level of Detail

Content - It is not hard for items like utility relocations, lighting and TMS to be left out of a schedule.  These are tangible parts of the project and consume time that needs to be accounted for before succeeding work commences. The specifications and drawing indexes, as well as quantity tabulations, make for a nice check list.

Detail - All work items should be accounted for within the schedule.  Specification Sections 1803 and 1806 need to be compared to the schedule's contents.  The specification may dictate a level of detail.  The level of detail is a balancing act; too little will make reviewing impacts difficult; too much can make schedule maintenance difficult.  The following are examples of detail issues:

- Duration limitations – limiting durations to no less than five days does not bode well for weekend work.  It also causes float sequestration.  MnDOT specifications sometimes have limited durations to no less than five days unless otherwise authorized by the Engineer.  It is recommended that the Engineer allow for durations less than five days.

- Excessive Steps – Combing work components can eliminate excessive detail.  For example, it is not recommended that there be an activity for Form Concrete Footing, one for Install Reinforcement in Footing, one for Pour Footing, one for Cure and one for Strip Footing.  It is recommended that an activity be created for FRP Footing followed by an activity to Cure and Strip Footing.  FRP is an industry acronym for Form, Reinforce and Pour.

- Insufficient Steps – An activity title Bridge Substructure is insufficient detail.  It can make tracking progress difficult and make for reviewing impacts challenging.

### Step 5 – Review Activity Calendar Assignments

All activities need to be reviewed for proper calendar assignments.  It is not the reviewer's position to say that an activity should be on a five-day versus a six-day calendar but the reviewer should makes sure that a grading activity was not inadvertently assigned to a bridge calendar.  The reviewer should also look for activities on a global calendar and confirm if that is the correct intent.  The use of global calendars on a construction project level is not recommended.  An easy and eye-pleasing way to review calendar assignments is to add a column to the data table area.

Added Column to Display Calendar Assignments



### Step 6 – Review Float

The specifications typically dictate levels of critical and near critical float.  If the critical and near critical float is excessive then that is a clear indication that logic ties exist where they shouldn't. The most common are logic ties between different stages where the staging does not restrict the finish of an area but the logic dictates such.

If there is a high level of float then the work more than likely has not been sequenced in consideration of resources.  For example, seven bridges all starting and finishing on the same day.

A highly linear schedule will have a higher critical and near critical base; for example a ten mile mill and overlay should be given consideration regarding float.

P6 can organize float by values which will permit the reviewer to view the float in a numeric order; say zero to 100.  Or the reviewer can copy all activities and paste them into Excel for analysis.  If a schedule has a high amount of milestone type activities it is recommended that they are not included within the analysis of float because they do not account for tangible work.

To organize by float open the Group and Sort Window, change the Group By cell to "none".  Click sort and the Sort Window will pop up, drawdown the Field Name, select Total Float and then click OK and OK again.
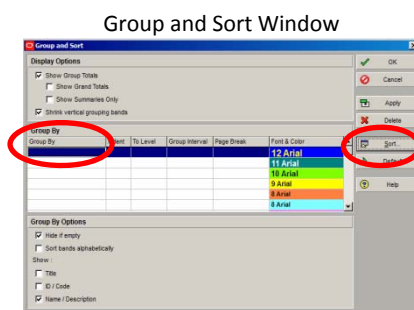
| Group and Sort Window | Sort Window with Field Name Opened |
|---|---|
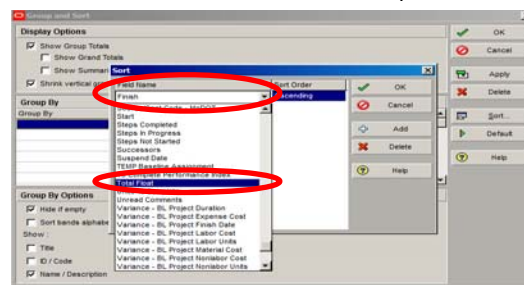


## Step 7 – Review Logic

The logic for all activities should be reviewed.  Look for the following when reviewing logic:

- Look for activities with no predecessors or successors.  Every activity except the first should have at least one predecessor.  Every activity should have at least one successor except the last activity.
- Look for missing tangible logic.  For example, is the approach slab a predecessor to the traffic rail?
- Look for logic that does not make sense.  For example, is the approach slab a predecessor to an overhead sign base for a sign nowhere in the vicinity of the slab?
- Look for large lags.  Some lags are legitimate.
- Look for date constraints. Contractually imposed dates are acceptable but those that are not will artificially diminish, sequester, available float which is prohibited by contract.  An asterisk * next to a date in the date column will signify the use of a constraint.  If it is next to an early date then an early constraint is being used; if next to a late date then a late constraint is in use.
- Look for excessive generic durations.

The SSC has created logic reports that can assist in this process.  Please refer to the **Reports** section earlier in this tutorial for printing the logic reports.  One of the reports, Activity Logic Report (see below), is organized by activity ID and the other (see below) is organized by the WBS.  Both these reports have the subject activity in bold print with the predecessors and successors listed below.  They identify the relationship type but not the lag.  These reports also contain an Owner column which is not applicable for contractor schedules.

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## Activity Logic Report

| Activity ID | Activity Name | | % Comp | Owner |
|---|---|---|---|---|
| **A1000** | **Start Construction** | | **0%** | |
| Type | Activity ID | Successor Name | % Comp | Owner |
| FS | A1020 | Removals Stage 1 Mainline | 0% | |
| | | | | |
| **A10009** | **Removals Stage 1 Mainline** | | **0%** | |
| Type | Activity ID | Predecessor Name | % Comp | Owner |
| FS | A1010 | Start Stage 2 | 0% | |
| Type | Activity ID | Successor Name | % Comp | Owner |
| FS | A10019 | Grading Stage 1 Mainline | 0% | |
| FS | A10089 | Removals Stage 1 Cross Street | 0% | |
| | | | | |
| **A10019** | **Grading Stage 1 Mainline** | | **0%** | |
| Type | Activity ID | Predecessor Name | % Comp | Owner |
| FS | A10009 | Removals Stage 1 Mainline | 0% | |
| Type | Activity ID | Successor Name | % Comp | Owner |
| FS | A10029 | Select Granular Stage 1 Mainline | 0% | |
| FS | A10099 | Grading Stage 1 Cross Street | 0% | |
| A10029 | Select Granular Stage 1 Mainline | | 0% | |

**MnDOT Baseline Review: Relationships by WBS Report**

### Cultural Resources - Work Package 2 - FHWA Funds

| CRU1000 | | Received ENM | | |
|---|---|---|---|---|
| S.P. | Activity ID | Predecessor Name | Owner | Relationship Type |
| 6012-49 | ENM1000 | Prepare & Distribute ENM | Cann1Sta | FS |
| S.P. | Activity ID | Successor Name | Owner | Relationship Type |
| 6012-49 | CRU1020 | Conduct Preliminary CRU Evaluation | Zsch1Kri | FS |

| CRU1020 | | Conduct Preliminary CRU Evaluation | | |
|---|---|---|---|---|
| S.P. | Activity ID | Predecessor Name | Owner | Relationship Type |
| 6012-49 | ENM1010 | Review & Respond to ENM by CRU | Cann1Sta | SS |
| 6012-49 | CRU1000 | Received ENM | Zsch1Kri | FS |
| S.P. | Activity ID | Successor Name | Owner | Relationship Type |
| 6012-49 | CRU1030 | Conduct Tribal Consultation | Zsch1Kri | FS |

## Step 8 – Review Logic

Run Claim Digger on all re-submitted baselines.

## Reviewing Contractor Update Schedules

### Updates

An updated schedule is produced from either the baseline or the previous accepted update schedule. The update will include activities that reflect progress and planned work. All progress consists of actual dates to the left of the data date. Planned work consists of planned dates to the right of the data date. The update is also a tool that can identify issues before they become impacts. The following steps are a guide to reviewing an update.

### Step 1 – Make a Copy and Schedule (Calculate)

It is suggested that a copy of the updated schedule be made and used to review the update. This will permit the reviewer access without limitations. If needed please refer to the **Copy and Paste Files** section earlier within this tutorial.

With the copied schedule opened the user should make sure the data date is correct and schedule (calculate) the schedule. If needed please refer to the **Scheduling (Calculate)** section earlier within this tutorial.

### Step 2 – Run Claim Digger

Claim Digger will list most of the changes made to the schedule. One potential change that Claim Digger does not disclose is changes to the calendars non-workdays or workdays. Using Claim Digger will be discussed later herein.

### Step 3 – Review Schedule Changes

All logic changes should be identified and explained by the contractor within their narrative. Unfortunately this is where most contracts are lax. Even if listed and explained by the contractor the reviewer needs to review each change themselves and determine if they are acceptable or not.

Open the Claim Digger report and select desired data and paste into an Excel spreadsheet. The data can be sorted and organized to better understand the changes that were made. The reviewer can record notes that coincide with each change which makes for good note keeping.

Changes are not limited to relationships. They also include items listed below and can present just as much effect as relationship changes:

- Original duration changes
- Calendar assignment changes
- Added activities
- Deleted activities
- Description changes
- Lag changes

Add a baseline column and bar of the previous schedule for comparison. Place the columns side-by-side of like data such as total float.

### Step 4 – Confirmation

Contractual Dates - An update review needs to confirm that the contractual dates are maintained, i.e., is the project still on schedule.  Short of a pending excusable delay and/or time extension it is not recommended that an update be accepted if it contains negative float.  MnDOT specifications have typically addressed required action in such circumstances.

Actual Dates – It is important that all actual dates be reviewed to the fullest potential.  Doing so provides for an accurate as-built record which is important and will save time if a time issue arises.  Any discrepancies between the contractor and MnDOT should be reconciled.

Confirm Progress – Overstated progress presents added time and float; ahead of schedule when you are not.  Understated progress conceals, sequesters, available time and float; behind schedule when you are not.  Inaccurate progress also hinders reviews of potential impacts which can alter a fair outcome for either party.  A day might not seem like a lot but it could be worth thousands of dollars.

Weather – As discusses earlier the schedules contain weather contingency which is time reserved for days lost to inclement weather.  An accurate recording of days lost to weather or lingering weather effects that affected production is important as-built data.  The reviewer needs to compare the days of actual weather occurrences that impacted production to the days of planned weather contingency.  Some contractors will go in and record the actuals within the calendars by either turning a workday into a non-workday or a non-workday into a workday.  The reviewer needs to compare each calendar for the changes.  Claim Digger will not provide this information.

Projections – The schedule can provide foresight to potential issues.  As time passes and work does not start the float will diminish and eventually turn near critical; ten days or less of float.  To view the diminishing float between the current and previous update install a column for the baseline total float (BL1 Total Float), place it next to the current total float column and run a filter of all activities with ten days or less of float.  The graphic to the right gives an example of Work that has not progressed as planned and is an imminent impact.

Diminishing Float Comparison

| Activity ID | Activity Name | Total Float | BL1 Total Float |
|---|---|---|---|
| Phase 3 | | | |
| NW Ramp Phase 3 | | | |
| Milestones/Removals/Grading | | | |
| 02100 | Construct Common Excavation (NW Ramp 19+25-10+00) Phas | 1.9 | 19.4 |
| 02180 | Install Select Granular/Remove Surcharge (Roadway) (NW Ra | 1.9 | 19.4 |
| 02185 | Install Aggregate Base (NW Ramp 19+25-10+00) Phase 3 | 0.8 | 23.4 |
| 02080 | Finish milestone (Switch Traffic) (NW Ramp 19+25-10+00) Pha | 3.9 | 37.0 |
| Underground/Surfacing/Finishing | | | |
| 02128 | Install Conduit & Light Bases (NW Ramp 19+25-10+00) Phase : | 1.9 | 23.1 |
| 02126 | Install Concrete Curb (NW Ramp 19+25-10+00) Phase 3 | 1.9 | 23.1 |
| 05700 | Install Light Poles (NW Ramp 19+25-10+00) Phase 3 | 1.9 | 23.1 |
| 02130 | Install Non-wearing Course (NW Ramp 19+25-10+00) Phase 3 | 5.6 | 26.8 |
| 02140 | Install Wearing Course (NW Ramp 19+25-10+00) Phase 3 | 5.6 | 26.8 |
| 02150 | Install Turf Establishment (NW Ramp 19+25-10+00) Phase 3 | 4.6 | 23.8 |
| 02160 | Install Traffic Control (NW Ramp 19+25-10+00) Phase 3 | 5.6 | 26.8 |
| W Lake Street NE Phase 3 (Holiday Gas Station) | | | |

### Step 5 – Review Out-of-Sequence Events

Primavera defines an out-of-sequence event as work completed for an activity before it is scheduled to occur.  In a conventional relationship, an activity that starts before its predecessor completes shows out-of-sequence progress.  The reviewer needs to review all out-of-sequence events.  A listing of the events can be found in the schedule log report.  Refer to the **Scheduling (Calculate)** section discussed earlier herein.  The best way to analyze the effects of these events is from within P6.

Out-of-sequence logic can cause a missing link between tangible parts of the schedule which if not corrected can lead to inaccurate float and planned dates.

**Step 6 – Review Narrative**

A review of the narrative is just as important as a review of the schedule. The reviewer needs to ensure that no contradicting statements are contained therein. If the narrative contains a notice of an impact or looming impact then the reviewer needs to ensure that the notice is accurate and respond accordingly.

Some recent MnDOT specifications require the use of a MnDOT created narrative form that can be found at http://www.dot.state.mn.us/const/tools/contracttime.html under the heading Primavera P6. Specifications will typically specify what is to be included and discussed within the narrative.

**Step 7 – Evaluate with Abilities - Restore Changes (Optional)**

Many times an update submittal will contain logic changes. Some of the changes may have been for correcting out-of-sequence events while others were to maintain progress that otherwise was impacted and non-excusable. Restoring all changes will reveal any impact. It is recommended that this be done from another copy of the update. Restoration of changes is a manual process. It will require every change listed in Claim Digger to be manually reversed. Once the changes have been restored the user will need to calculate the schedule.

If manually restoring the changes is too cumbersome then the other option is to copy the previous update and enter all confirmed progress and then calculate the schedule with the current data date.

If negative float appears upon scheduling the reviewer can analyze the impact(s) and establish responsibility. If the impacts are deemed contractor caused then they should be included within the review comments to be sent to the contractor. This review process should not be confused with a What-If analysis. This process is a review of unauthorized changes.

**What-If Analysis – Evaluate with Abilities (Optional)**

A What-If Analysis is not necessarily a step in reviewing an update. It is a process that can inform a user of an outcome of any potential issue that has, or may, arise and what the ramifications are to the project schedule. Issues can be adding scope, deleting scope, suspensions, impacts and other items. To perform a What-If Analysis the user needs to make a copy of the targeted schedule per the instructions in the **Copy and Paste Files** section earlier within this tutorial.

Once the schedule is copied the process is nothing more than modifying the schedule by adding, deleting or modifying activities that represent(s) the issue(s) to be evaluated. To add or delete activities in the schedule follow Steps 7 through 12 in the **Creating a Schedule** section earlier within this tutorial.

## Claim Digger

Claim Digger is an ancillary program within P6 that is a tool to compare changes made between schedules. Claim Digger can produce a report in a HTML or CSV file format. It can also produce an ASCII Text File. It is recommended that the user selects the HTML file to work with.

To access Claim Digger click the expressive Tools command and select Claim Digger. The Claim Digger Window will take more time than typical to pop up.
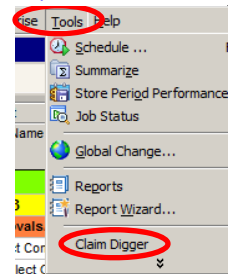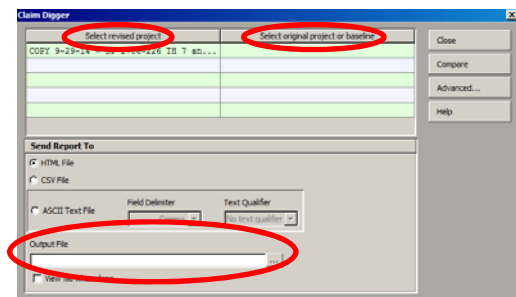
The Claim Digger Window (Figure 1) has a Select Revise Project section and a Select Original Project or Baseline section. The select window may automatically place the opened project when Claim Digger is opened. If this is the desired project, fine. If not then click the upper most cell of the select window and the Select Project Window will pop up (Figure 2). The revised project cell is where you would typically place the current update.
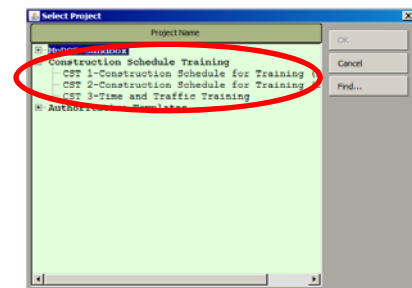
Expressive Command

Figure 1 - Claim Digger Window

The Select Project Window (Figure 2) will contain the EPS structure in an expandable and collapsible format. To expand or collapse click on the + or – box of the desired EPS; the available projects will appear. Repeat this process in the Select Original Project Window. This is where you would typically place the previous schedule to be compared against the current schedule.

The next step is to click the Output File drawdown box (Figure 1). The Save Window will pop up so give the file a name and location

as to where you want it to be saved too.

The Claim Digger Window has an advanced button if the user should choose to be selective on the data to be compared. Click on the advanced button and the Advanced Project Comparison Options Window (Figure 3) will pop up. This window has numerous check boxes to select or unselect the desired choices. All boxes are checked by default; click OK

Figure 2 – Select Project Window

You will now be back in the Claim Digger Window. Click compare and the comparison will start. To find the output file go to where you saved it.

Data within the HTML file can be copied and pasted into Excel.

Figure 3 – Advanced Project Comparison Options