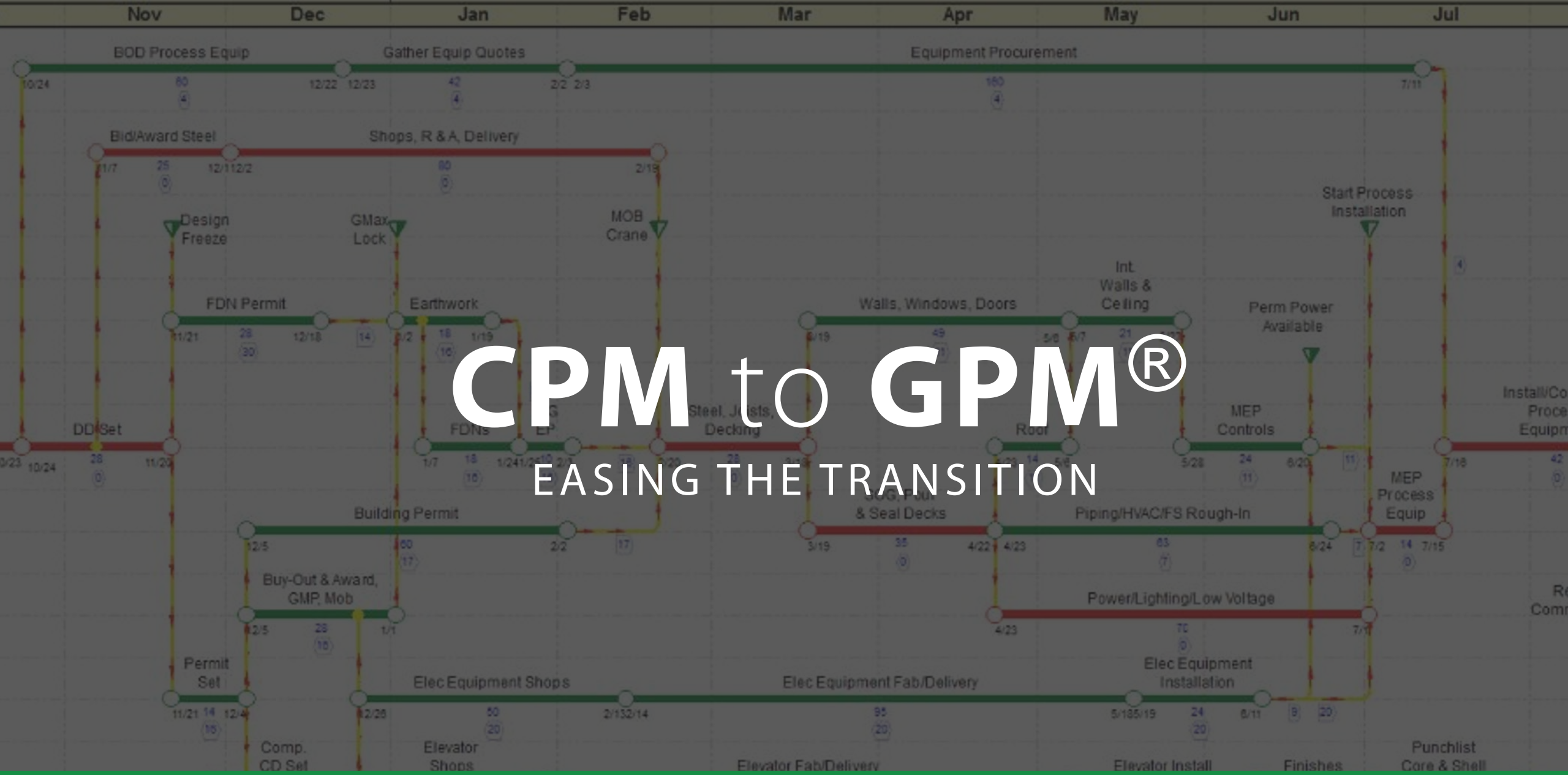


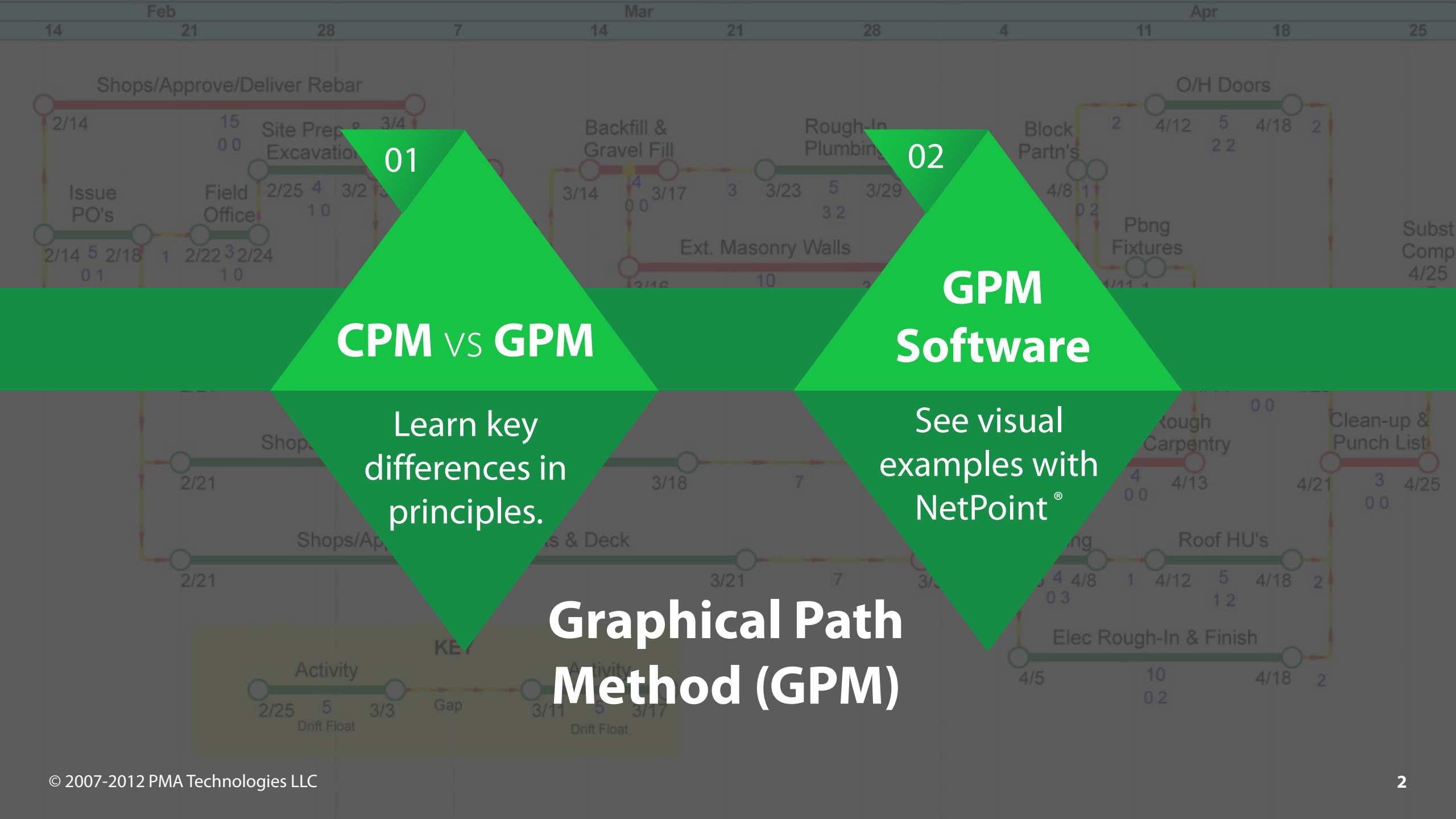
CPM to GPM®

EASING THE TRANSITION

PMA Technologies NetPoint®

© 2007-2012 PMA Technologies LLC

GPM® Graphical Path Method™



01

CPM vs GPM

Learn key differences in principles.

02

GPM Software

See visual examples with NetPoint®

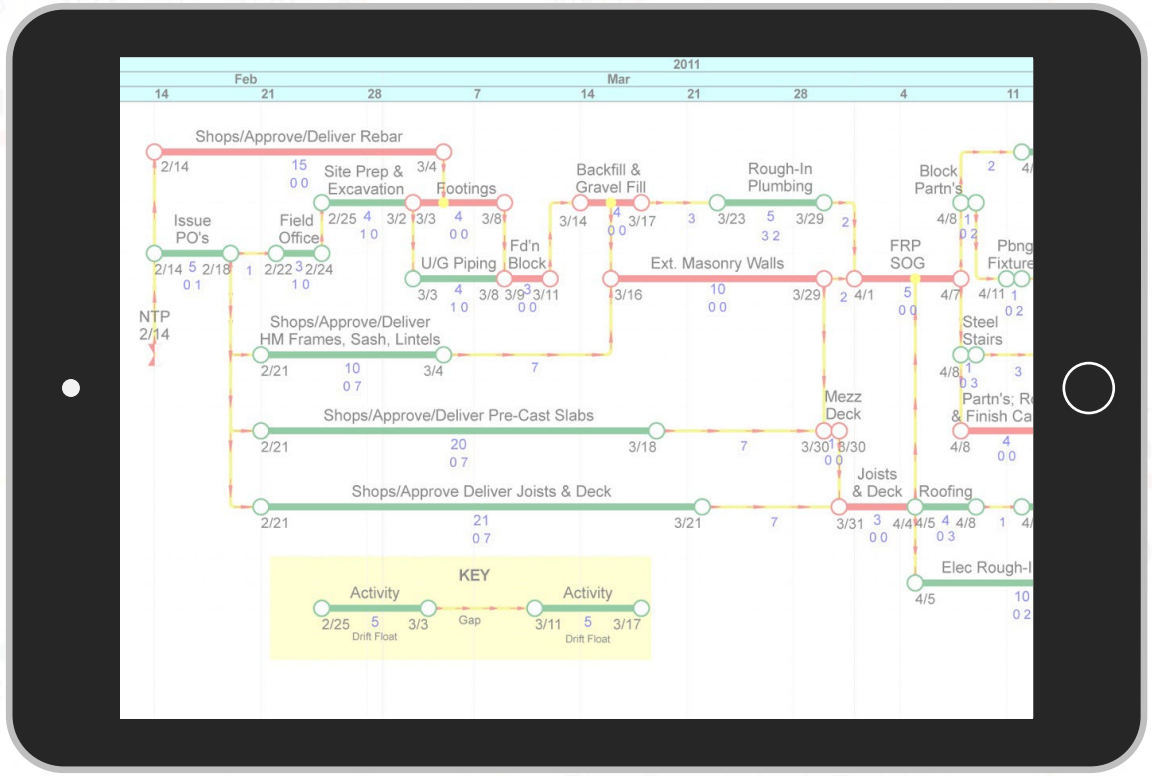
Graphical Path Method (GPM)

© 2007-2012 PMA Technologies LLC

The GPM Technology Breakthrough

Technology comprised of an **objectbase** graphical user interface based on the **logic diagramming method (LDM)**, **GPM** algorithms and **GPM/LDM** rules processors.

Both **GPM** and **LDM** are innately functional in the computing paradigm popularized by tablets and smart phones.



© 2007-2012 PMA Technologies LLC

The GPM Technology Breakthrough (cont'd)

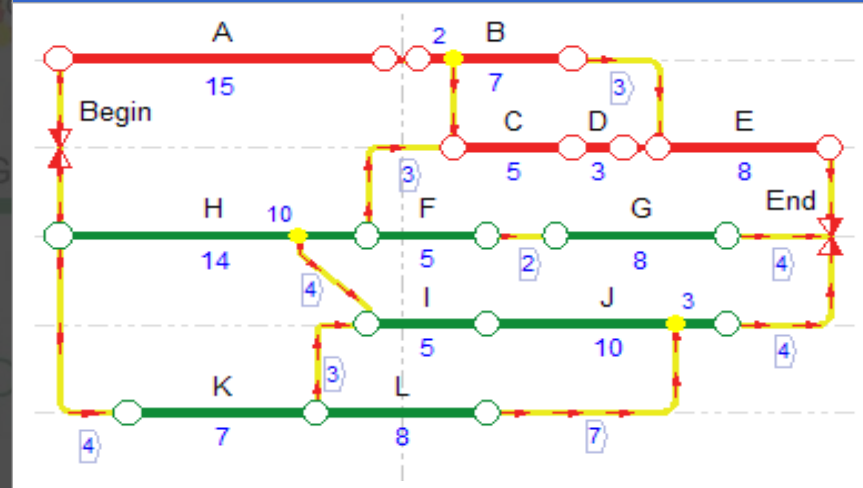
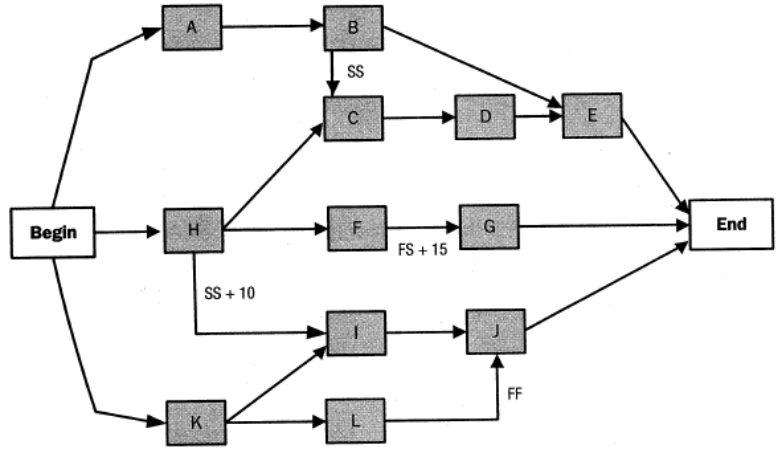
With **GPM** technology, every addition/revision/improvement made to the schedule is transparent and in real time.

CPM uses batches and several non-transparent engines: make changes, **push F9** F9 (or other appropriate key to activate the scheduling engine), request reports (activate reporting engine).



© 2007-2012 PMA Technologies LLC

Activities, Events and Relationships

GPM	CPM/PDM
	
Activity-on-Link aka Logic Diagramming Method	Activity-on-Node—Precedence Diagramming
Activities Have Start & Finish Nodes	Activities Commonly Are Boxes ***Without*** Nodes
Milestones are Stand-Alone Events	Milestones are Stand-Alone Events
Benchmarks are Zero-Total Float Milestones	Milestones with Equal SNE & FNL Constraints
A Common Node or Link Conveys FS Logic	A Separate Link Needed to Convey Each Logic Tie, Whether FS Logic or SS, FF or SF Logic (i.e., as Many Links as Relationships)
A Separate Link Needed to Convey SS & FF Logic	

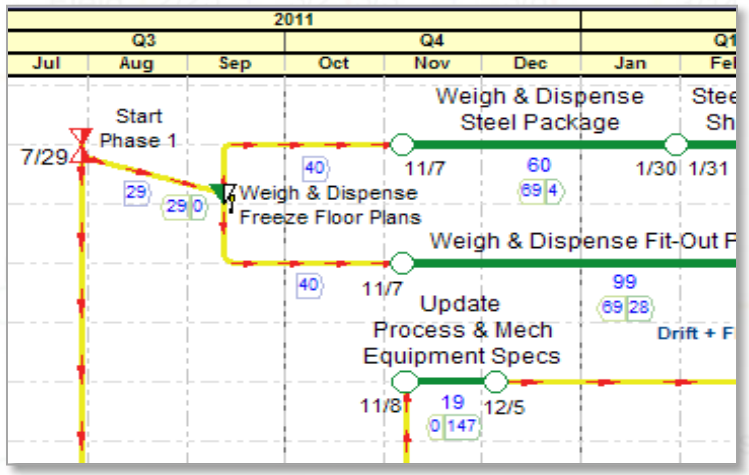
© 2007-2012 PMA Technologies LLC

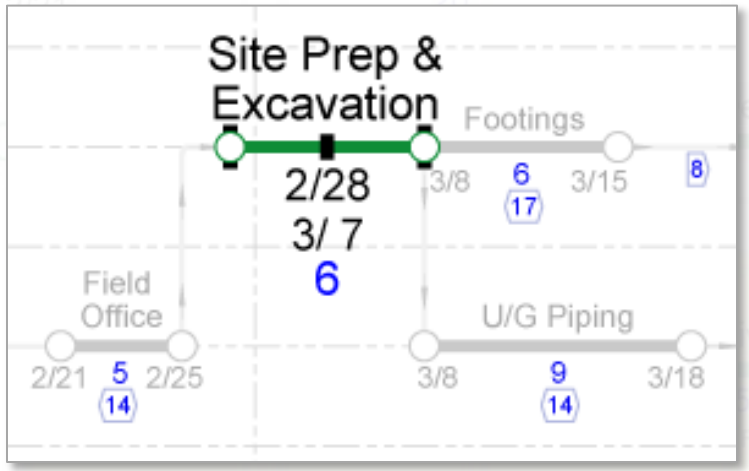
GPM and CPM Schedule Attributes

GPM	CPM/PDM
Critical Path is Activity-Logic Chain of Smallest TF	Critical Path is Activity-Logic Chain of Smallest TF
Early Start < Planned Start < Late Start is Allowed	Planned Start > Early Start is Not Possible
If Planned Start > Early Start, Activity Has ***Drift***	Drift is Necessarily Zero (Planned = Early Start)
If Planned Start < Late Start, Activity Has Float	If Early Start < Late Start, Activity Has Total Float
Drift + Float is Total Float	Float and Total Float are One and the Same
Link Gap Measures Logic Tie Leeway	Logic Tie Leeway Is Not a Concept in CPM
Activity Buffer = Minimum Gaps to its Successors	Free Float Is the Equivalent of Buffer
SNE Constraints Allowed But Rarely Necessary	SNE Constraints Needed to Impose Planned Dates
Actual Dates Are Allowed Left of the Data Date	Actual Dates Are Allowed Left of the Data Date
Total Floats Are Calculated Left of the Data Date	Total Floats Are Bogus Zeroes Left of the Data Date
As-Built Critical Path Exists Left of the Data Date	As-Built Critical Path Cannot be Determined

© 2007-2012 PMA Technologies LLC

NetPoint is the Software Embodiment of GPM & LDM



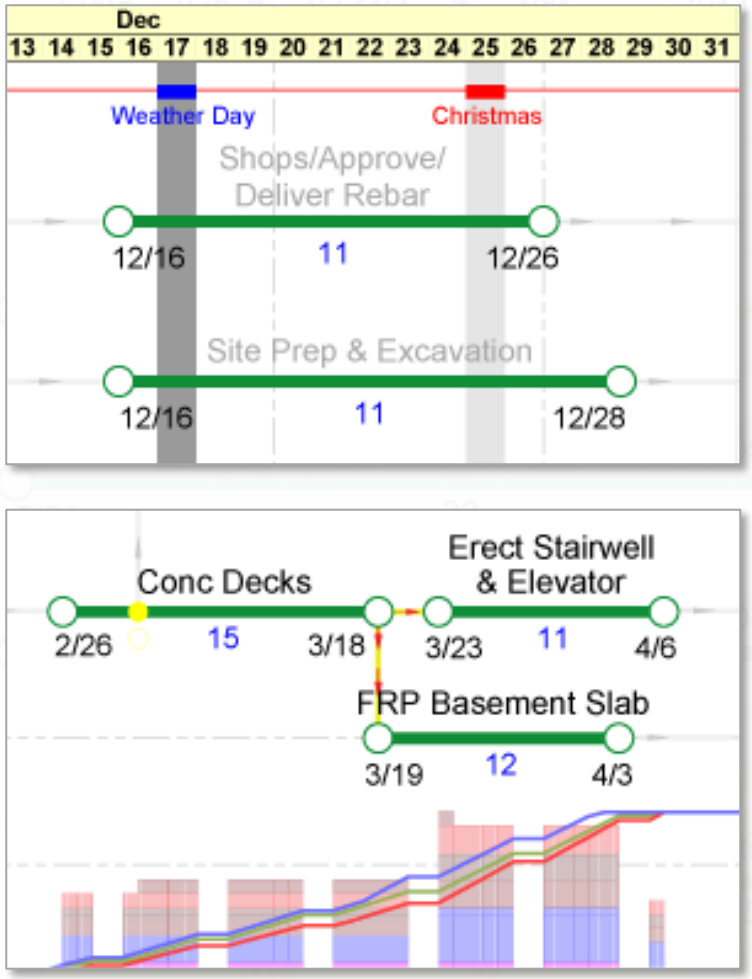


Benefits of using GPM/NetPoint:

- Allows users to build networks graphically, in real time
- Is efficient for surface and gestural computing
- Combines arrow diagramming techniques with PDM logic
- Allows the network to be built on a time-scaled calendar
- Cognitively responsive planning platform for what-ifs

© 2007-2012 PMA Technologies LLC

NetPoint is the Software Embodiment of GPM & LDM (cont'd)

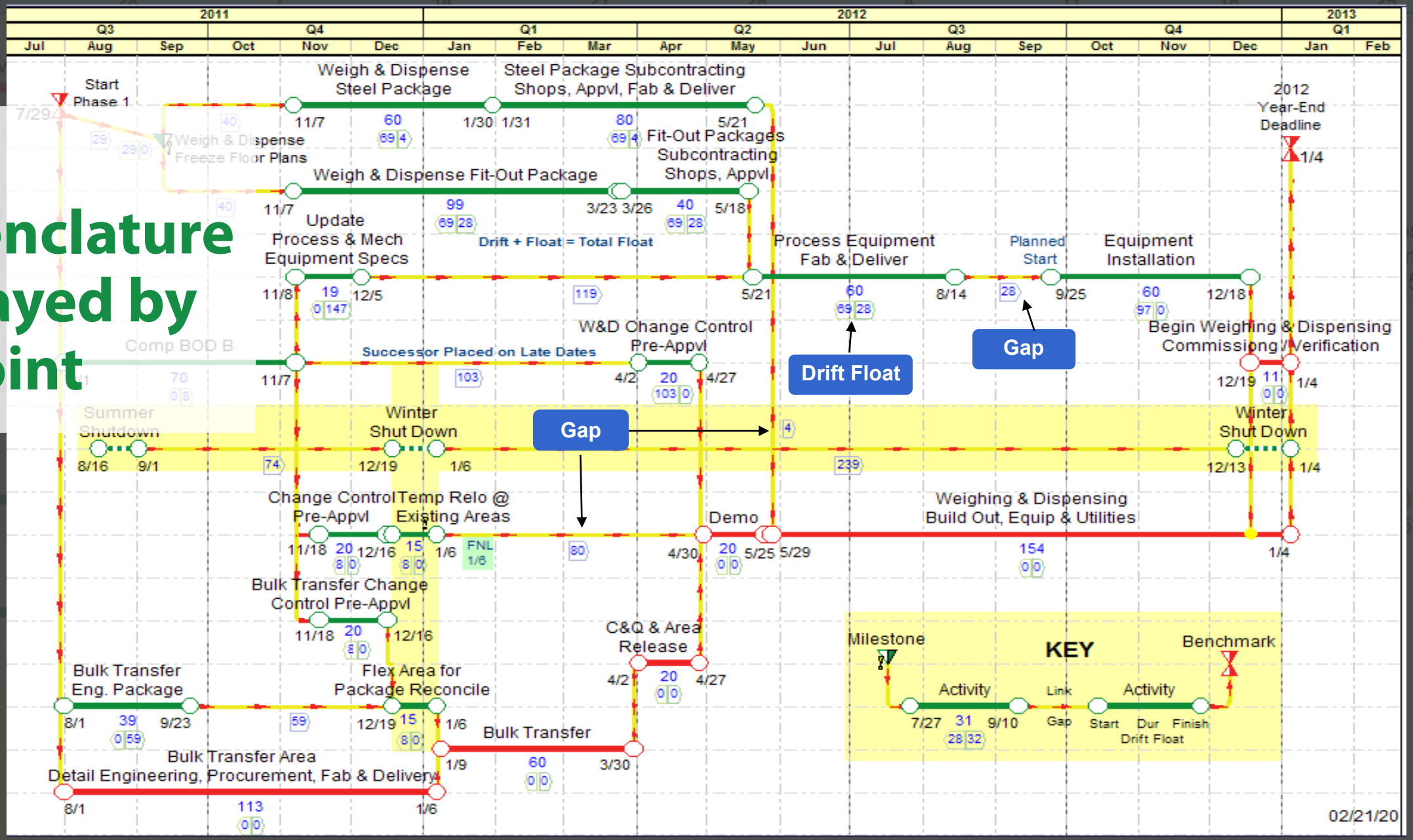


Benefits of using GPM/NetPoint:

- Permits simultaneous planning and scheduling
- Allows networks to be built backwards (pull planning)
- Restores transparency in scheduling (asymmetry has been the norm of late)
- Allows multiple calendars and time units other than days, e.g., hours
- Works with **CPM** and interfaces with P6, MSProject & Excel

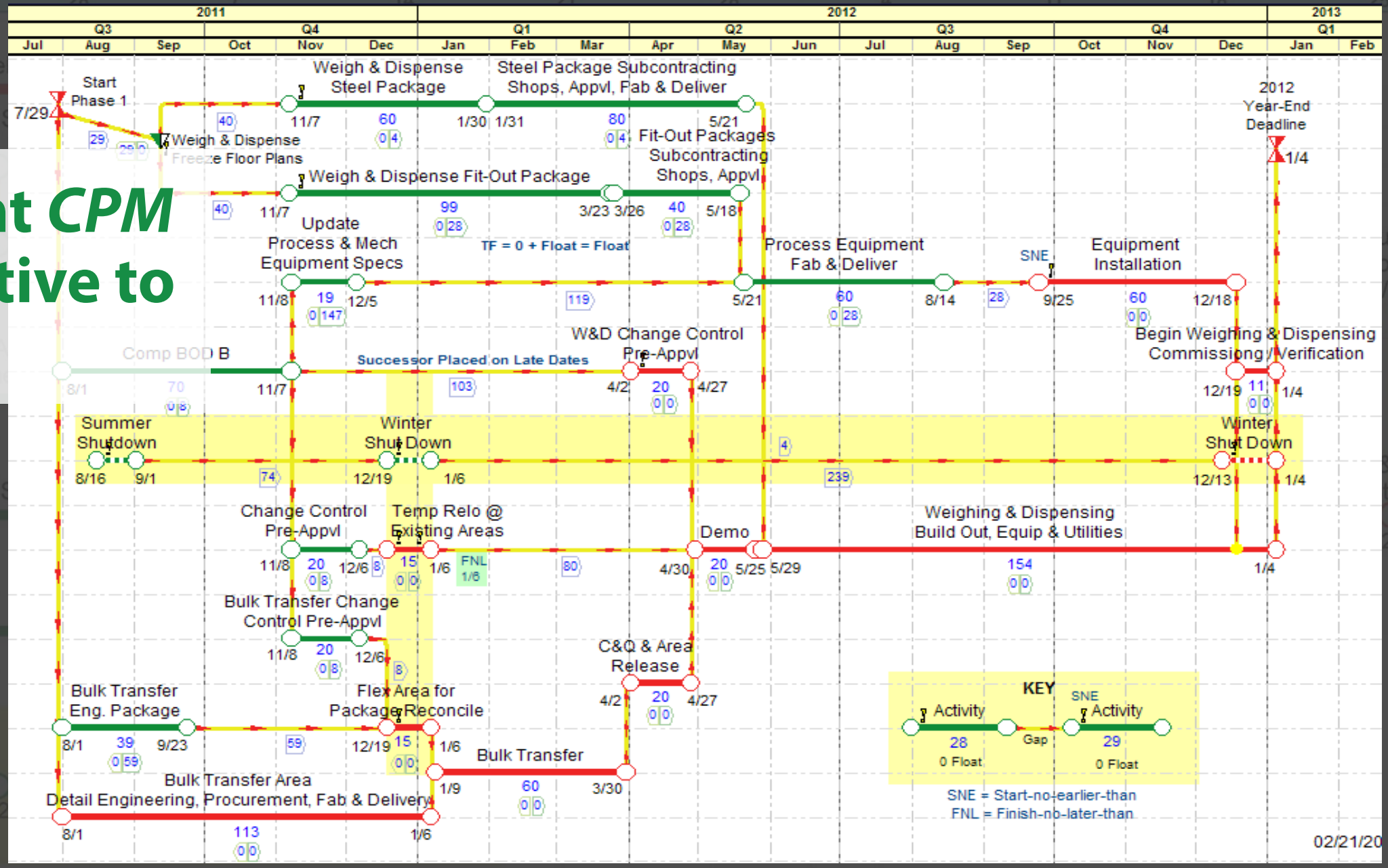
© 2007-2012 PMA Technologies LLC

GPM Nomenclature Displayed by NetPoint



© 2007-2012 PMA Technologies LLC

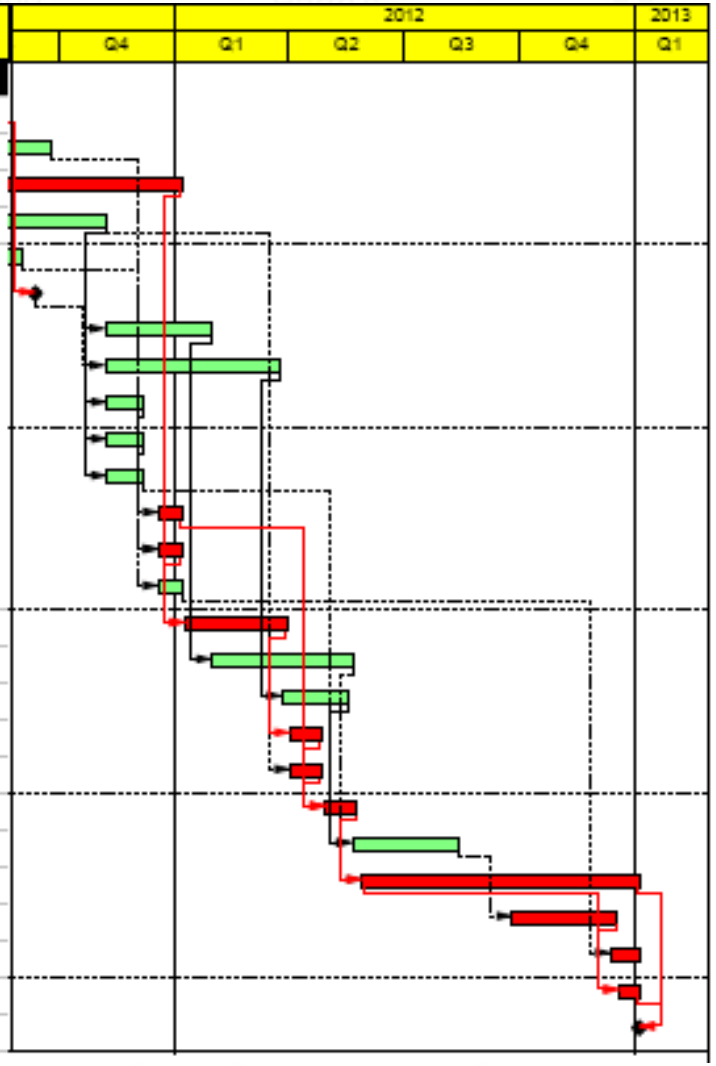
NetPoint *CPM* Alternative to GPM



© 2007-2012 PMA Technologies LLC

Primavera P6 CPM Schedule Layout

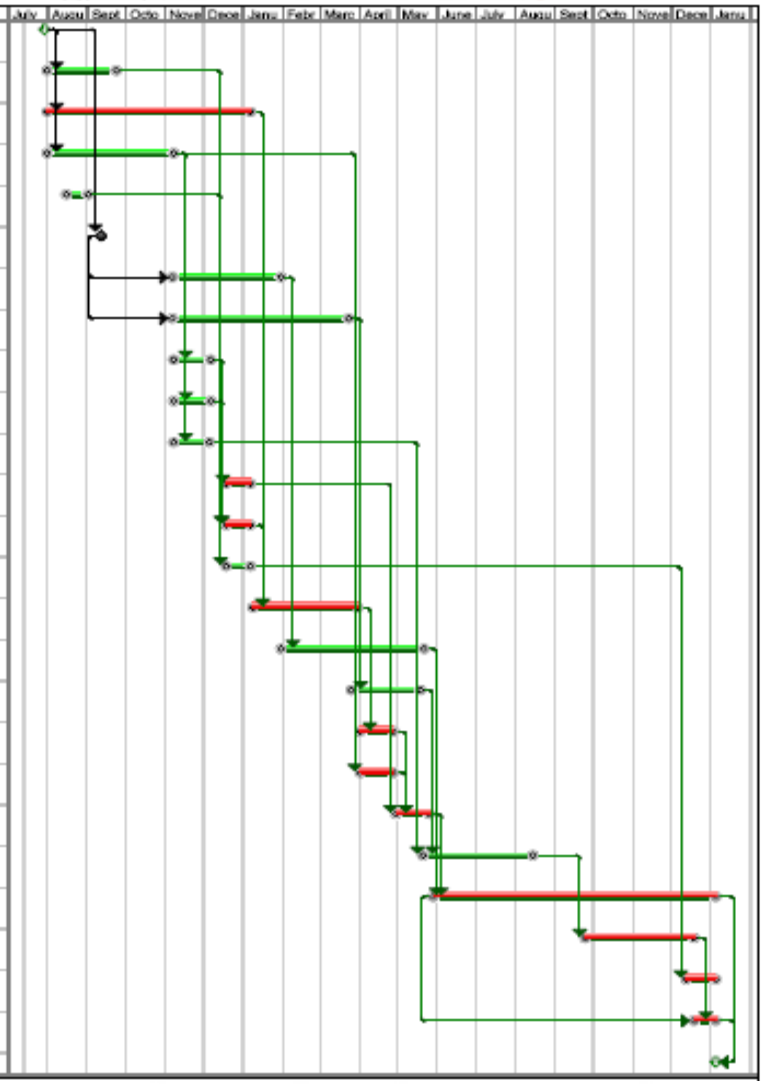
Activity ID	Activity Name	Dur.	Start	Finish	Total Float	Predecessors
Total		**375**	**30-Jul-11**	**04-Jan-13**	**0**	
~A1000	Phase 1	0		30-Jul-11*	0	
~A1030	Bulk Transfer Eng. Package	39	01-Aug-11	23-Sep-11	59	~A1000
~A1130	Bulk Transfer Area Detail Engineering, Procurement, ...	113	01-Aug-11	06-Jan-12	0	~A1000
~A1240	Comp BOD B	70	01-Aug-11	07-Nov-11	8	~A1000
~A1230	Summer Shutdown	13	16-Aug-11*	01-Sep-11	313	
~A1020	Weigh & Dispense Freeze Floor Plans	0	12-Sep-11*		0	~A1000
~A1040	Weigh & Dispense Steel Package	60	07-Nov-11*	30-Jan-12	4	~A1020
~A1060	Weigh & Dispense Fit-Out Package	99	07-Nov-11*	23-Mar-12	28	~A1020
~A1090	Change Control Pre-Appvl	20	08-Nov-11	06-Dec-11	8	~A1240
~A1120	Bulk Transfer Change Control Pre-Appvl	20	08-Nov-11	06-Dec-11	8	~A1240
~A1250	Update Process & Mech Equipment Specs	19	08-Nov-11	05-Dec-11	147	~A1240
~A1100	Temp Relo @ Existing Areas	15	19-Dec-11*	06-Jan-12*	0	~A1090
~A1110	Flex Area for Package Reconcile	15	19-Dec-11*	06-Jan-12	0	~A1120, ~A1030
~A1210	Winter Shut Down	15	19-Dec-11*	06-Jan-12	239	~A1230
~A1140	Bulk Transfer	60	09-Jan-12	30-Mar-12	0	~A1110, ~A1130
~A1050	Steel Package Subcontracting Shops, Appvl, Fab & D...	80	31-Jan-12	21-May-12	4	~A1040
~A1070	Fit-Out Packages Subcontracting Shops, Appvl	40	26-Mar-12	18-May-12	28	~A1060
~A1150	C&Q & Area Release	20	02-Apr-12	27-Apr-12	0	~A1140
~A1160	W&D Change Control Pre-Appvl	20	02-Apr-12*	27-Apr-12	0	~A1240
~A1170	Demo	20	30-Apr-12	25-May-12	0	~A1160, ~A1100, ~A1150
~A1080	Process Equipment Fab & Deliver	60	21-May-12	14-Aug-12	28	~A1070, ~A1250
~A1180	Weighing & Dispensing Build Out, Equip & Utilities	154	29-May-12	04-Jan-13	0	~A1170, ~A1050
~A1200	Equipment Installation	60	25-Sep-12*	18-Dec-12	0	~A1080
~A1190	Winter Shut Down	15	13-Dec-12*	04-Jan-13	0	~A1210
~A1220	Begin Weighing & Dispensing Commissiong / Verificat...	11	19-Dec-12	04-Jan-13	0	~A1200, ~A1180
~A1010	2012 Year-End Deadline	0		04-Jan-13*	0	~A1180, ~A1220



© 2007-2012 PMA Technologies LLC

MS Project CPM Schedule Layout

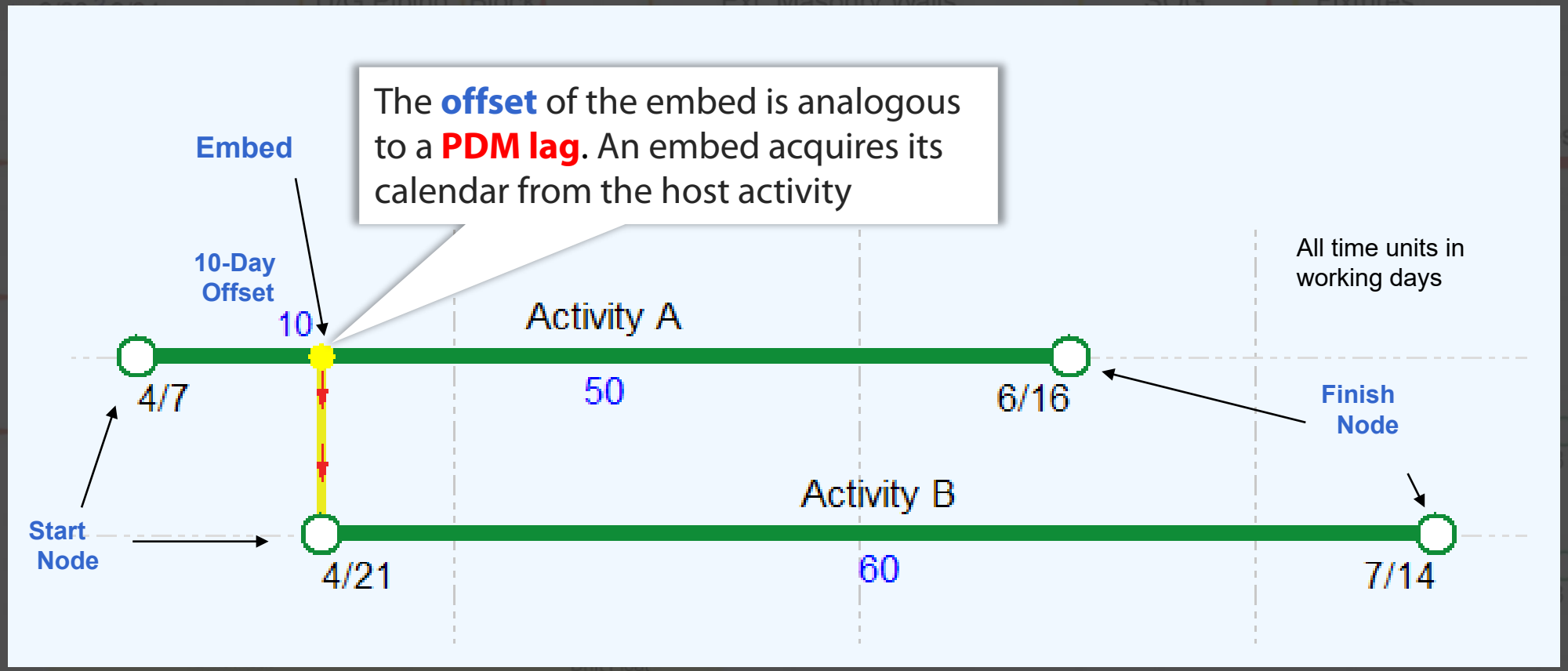
ID	Task Name	Duration	Start	Finish	Total Float	Predecessors
1	Phase 1	0 days?	Fri 7/29/11	Fri 7/29/11	0 days?	
2	Bulk Transfer Eng. Package	59 days	Mon 8/1/11	Fri 9/23/11	59 days	1
3	Bulk Transfer Area Detail Engineering, Procurement, Fab & Delivery	113 days	Mon 8/1/11	Fri 1/6/12	0 days	1
4	Comp BOD B	70 days	Mon 8/1/11	Mon 11/7/11	8 days	1
5	Summer Shutdown	13 days	Tue 8/16/11	Thu 9/1/11	313 days	
6	Weigh & Dispense Freeze Floor Plans	0 days?	Mon 9/12/11	Mon 9/12/11	0 days?	1
7	Weigh & Dispense Steel Package	80 days	Mon 11/7/11	Mon 1/30/12	4 days	6SS
8	Weigh & Dispense Fit-Out Package	99 days	Mon 11/7/11	Fri 3/23/12	28 days	6SS
9	Change Control Pre-Appvl	20 days	Tue 11/8/11	Tue 12/6/11	8 days	4
10	Bulk Transfer Change Control Pre-Appvl	20 days	Tue 11/8/11	Tue 12/6/11	8 days	4
11	Update Process & Mech Equipment Specs	19 days	Tue 11/8/11	Mon 12/5/11	147 days	4
12	Temp Relo @ Existing Areas	15 days	Mon 12/19/11	Fri 1/6/12	0 days	9
13	Flex Area for Package Reconcile	15 days	Mon 12/19/11	Fri 1/6/12	0 days	10,2
14	Winter Shut Down	15 days	Mon 12/19/11	Fri 1/6/12	239 days	5
15	Bulk Transfer	60 days	Mon 1/9/12	Fri 3/30/12	0 days	13,3
16	Steel Package Subcontracting Shops, Appvl, Fab & Deliver	80 days	Tue 1/31/12	Mon 5/21/12	4 days	7
17	Fit-Out Packages Subcontracting Shops, Appvl	40 days	Mon 3/26/12	Fri 5/18/12	28 days	8
18	C&Q & Area Release	20 days	Mon 4/2/12	Fri 4/27/12	0 days	15
19	W&D Change Control Pre-Appvl	20 days	Mon 4/2/12	Fri 4/27/12	0 days	4
20	Demo	20 days	Mon 4/30/12	Fri 5/25/12	0 days	19,12,18
21	Process Equipment Fab & Deliver	60 days	Mon 5/21/12	Tue 8/14/12	28 days	17,11
22	Weighing & Dispensing Build Out, Equip & Utilities	154 days	Tue 5/29/12	Fri 1/4/13	0 days	20,16
23	Equipment Installation	60 days	Tue 9/25/12	Tue 12/18/12	0 days	21
24	Winter Shut Down	15 days	Thu 12/13/12	Fri 1/4/13	0 days	14
25	Begin Weighing & Dispensing Commissiong / Verification	11 days	Wed 12/19/12	Fri 1/4/13	0 days	23,22SS+143 days
26	2012 Year-End Deadline	0 days?	Fri 1/4/13	Fri 1/4/13	0 days?	22FF,25FF



© 2007-2012 PMA Technologies LLC

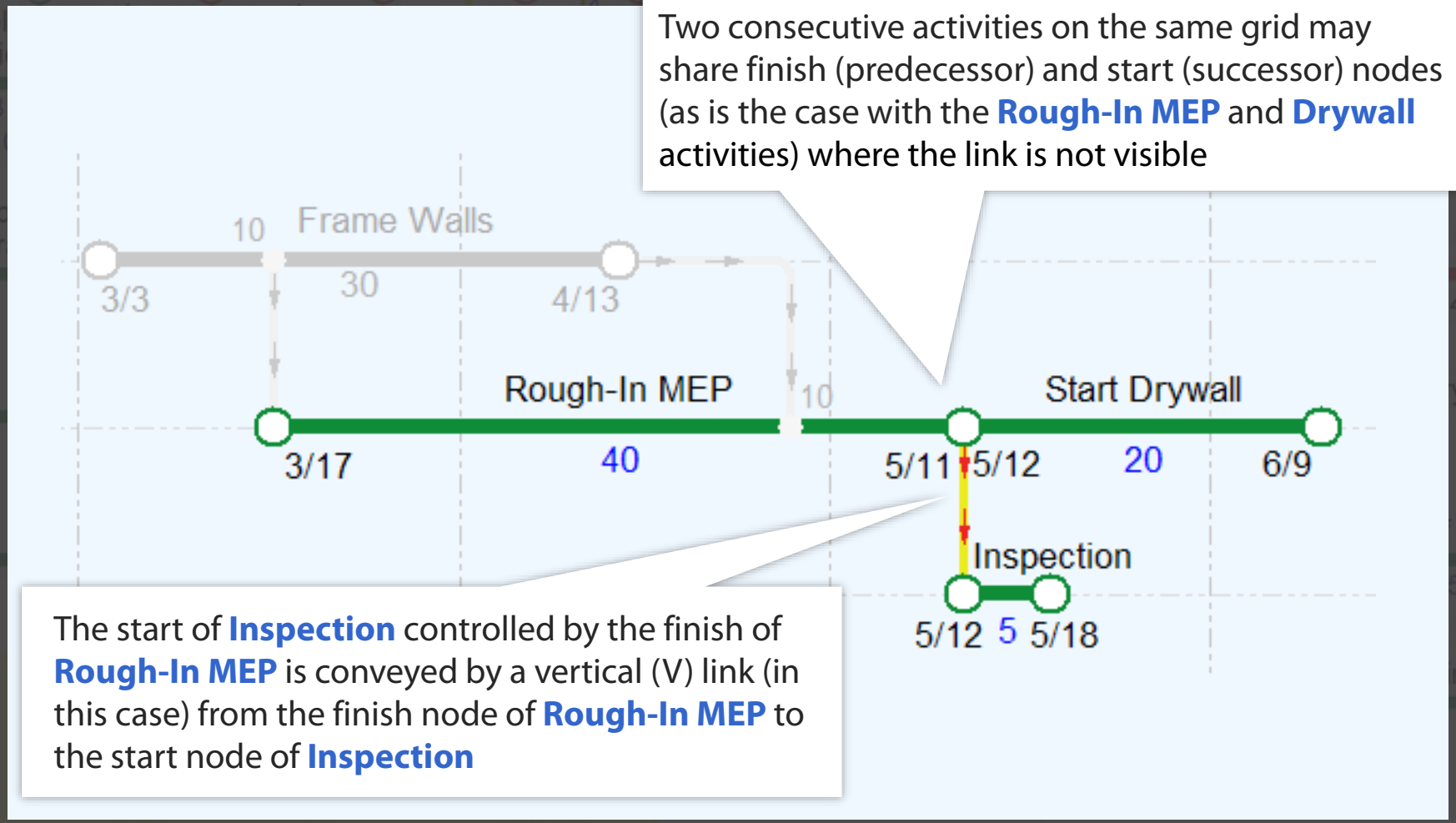
Modeling of PDM Logic

An embedded node aka embed (in between an activity start and finish nodes) denotes **PDM** aka overlapping logic



© 2007-2012 PMA Technologies LLC

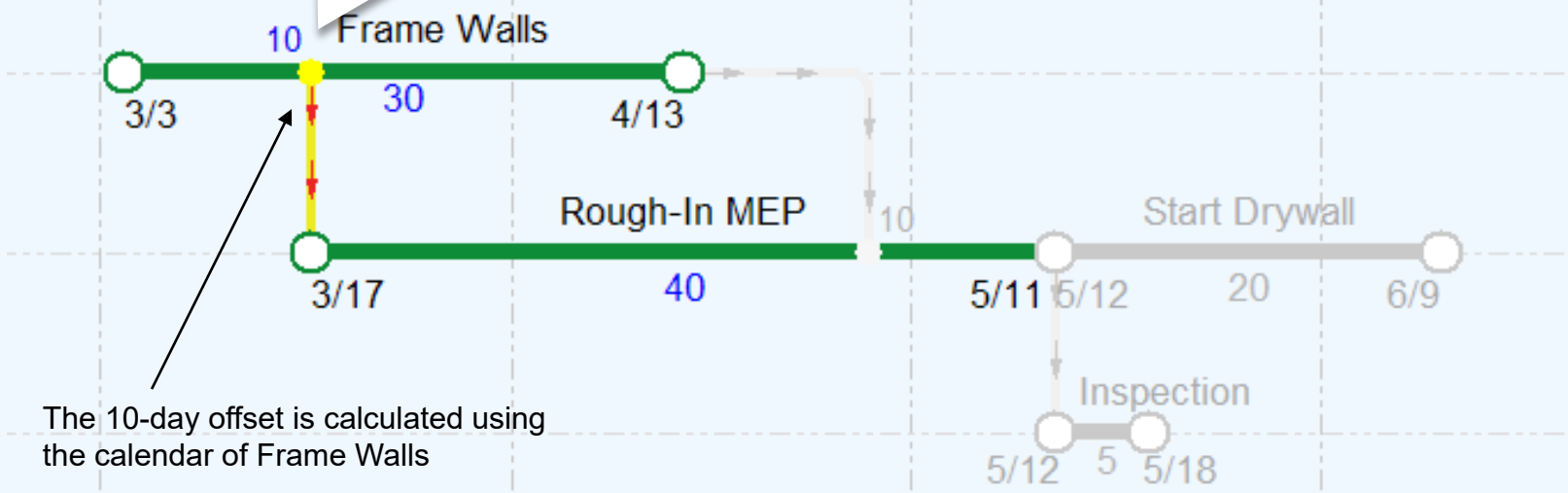
Finish-to-Start (FS) Logic



© 2007-2012 PMA Technologies LLC

Start-to-Start (SS) Logic

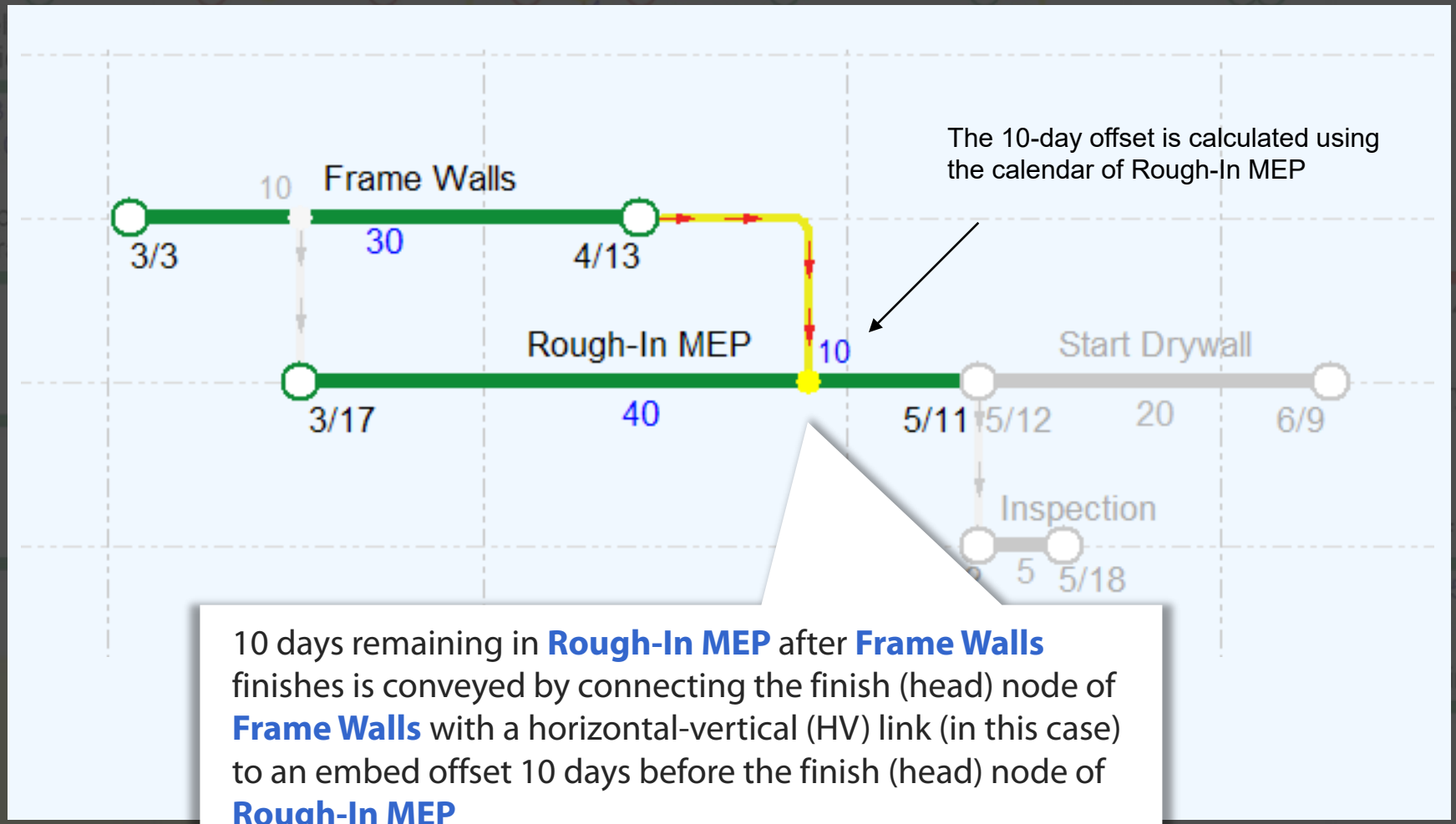
A 10-day SS logic tie between **Frame Walls** and **Rough-In MEP** is conveyed by connecting an embed offset 10 days after the start (tail) node of **Frame Walls** with a vertical (V) link (in this case) to the successor's start (tail) node



The 10-day offset is calculated using the calendar of Frame Walls

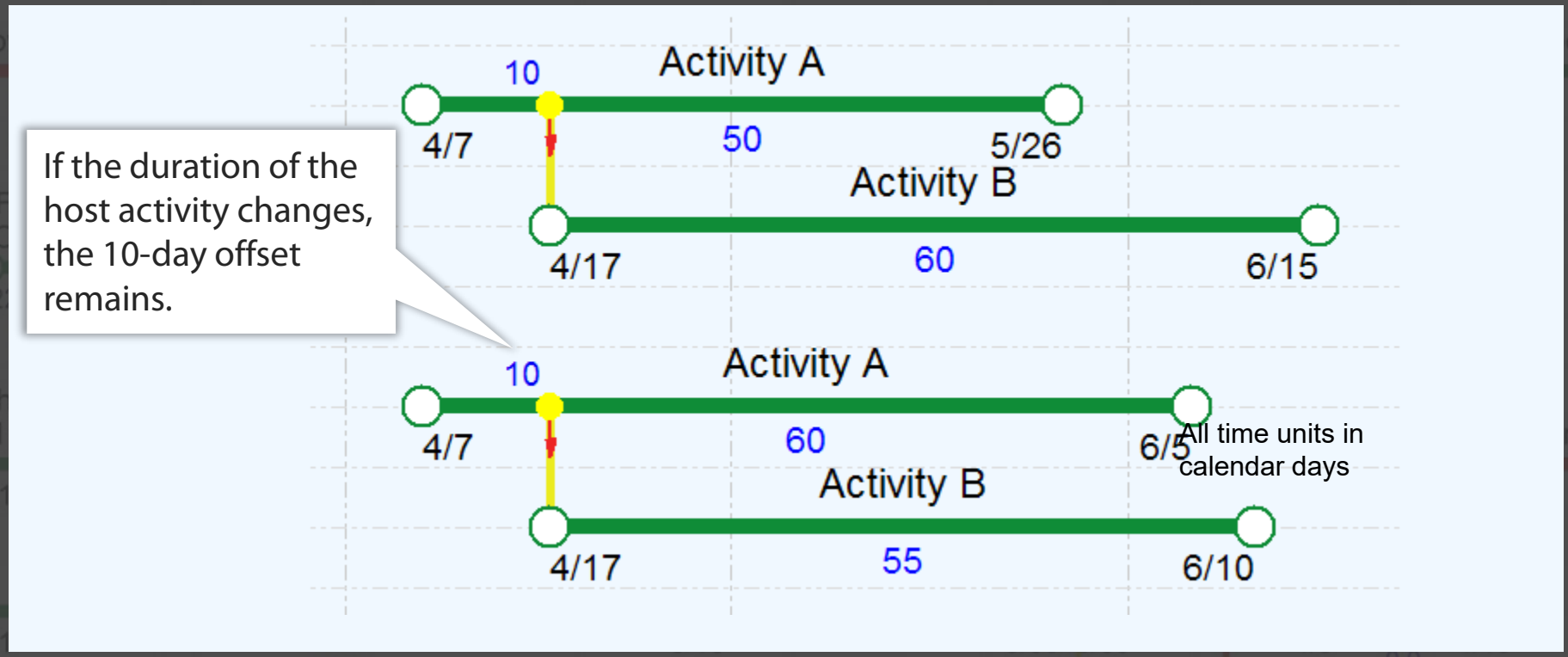
© 2007-2012 PMA Technologies LLC

Finish-to-Finish (FF) Logic



10 days remaining in **Rough-In MEP** after **Frame Walls** finishes is conveyed by connecting the finish (head) node of **Frame Walls** with a horizontal-vertical (HV) link (in this case) to an embed offset 10 days before the finish (head) node of **Rough-In MEP**

© 2007-2012 PMA Technologies LLC



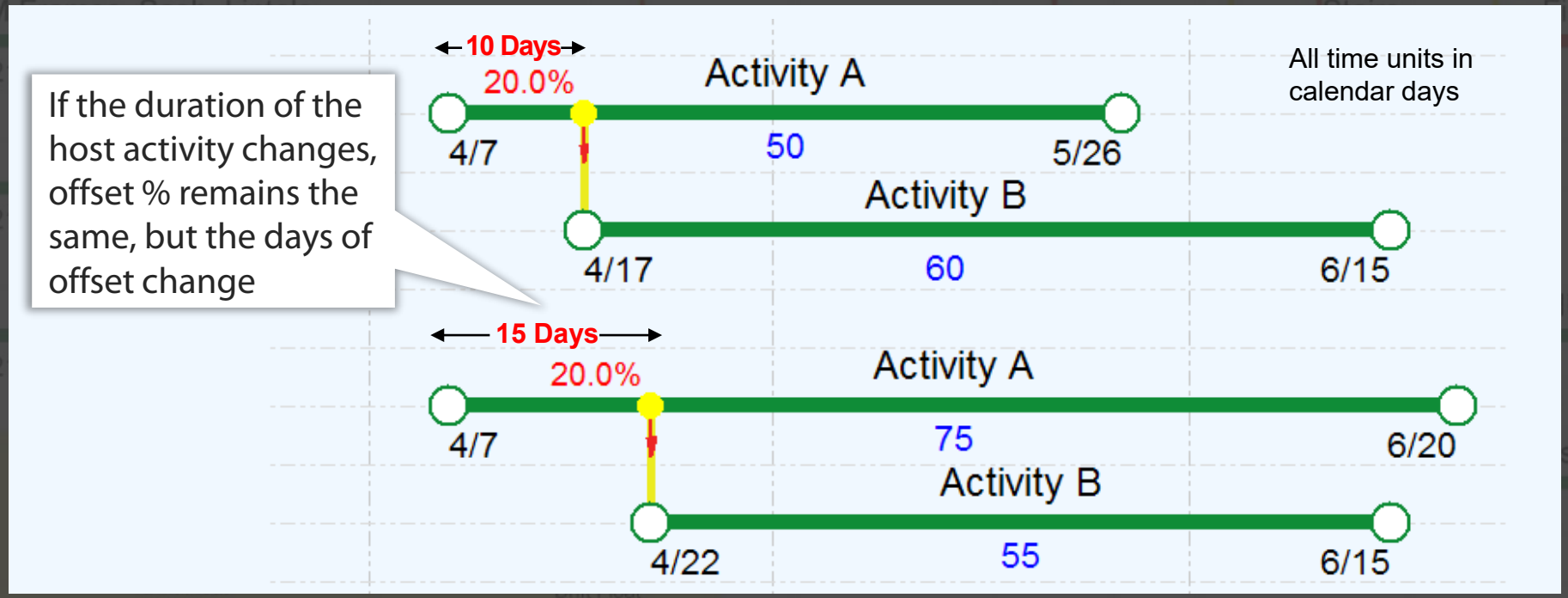
Constant Embeds (i.e., Lags in PDM)

Constant Behavior: embed offset is measured in days after the start of the predecessor for SS logic and in days before the finish of the successor for FF logic

© 2007-2012 PMA Technologies LLC
© 2007-2012 PMA Technologies LLC

Proportionate Embeds

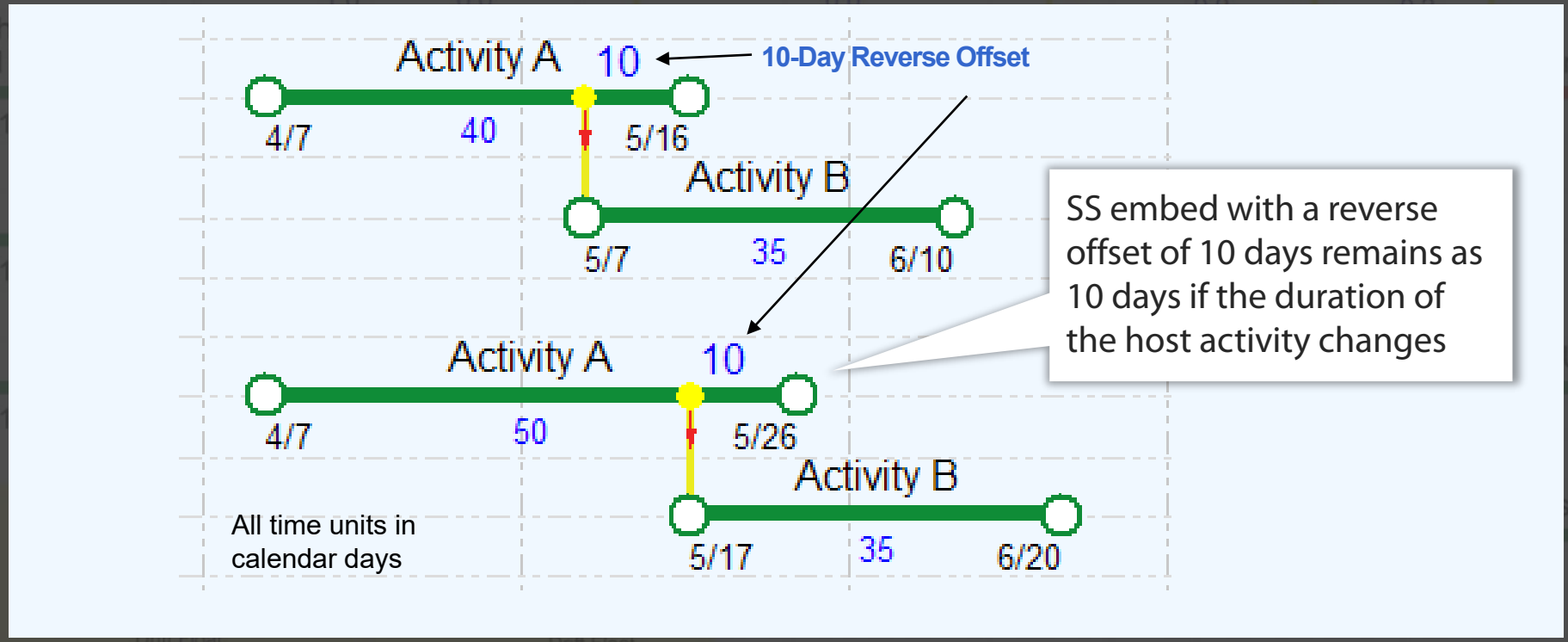
Proportionate Behavior: embed offset is measured in terms of percentage of duration; oftentimes an embed with a proportionate offset better models reality than an embed with a constant offset



© 2007-2012 PMA Technologies LLC

Reverse Embeds

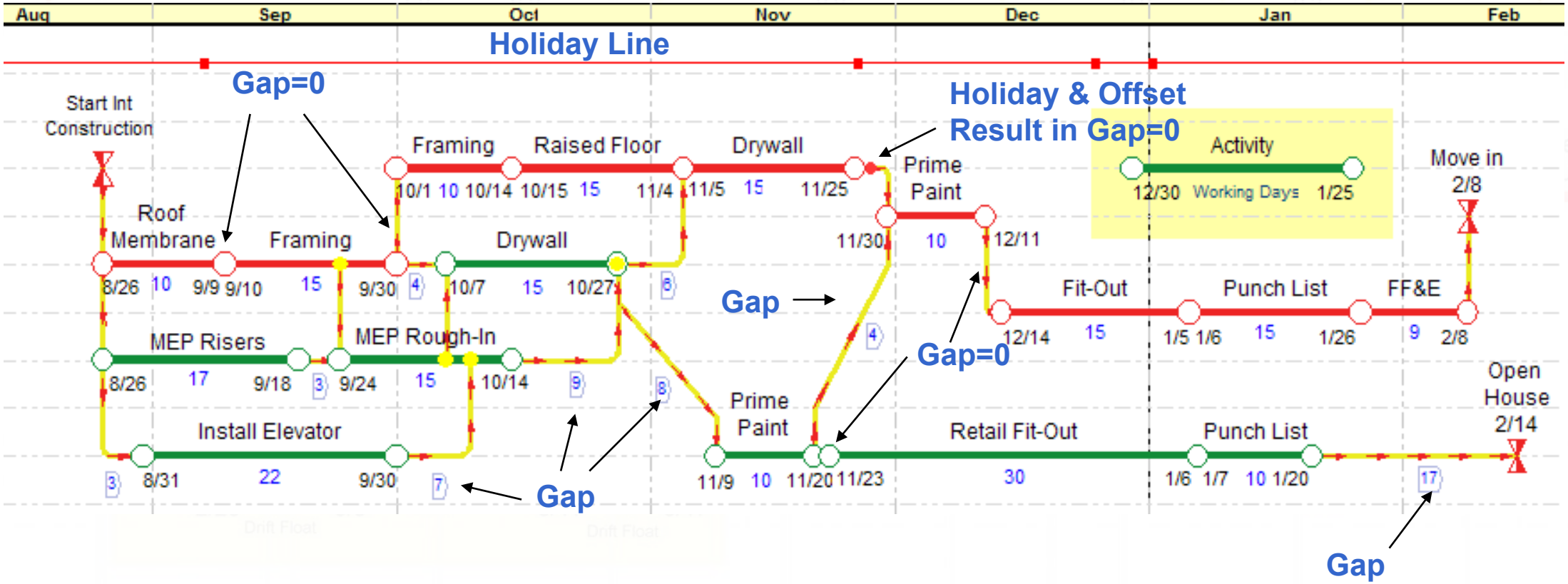
Reverse Behavior: embed offset is measured in days before the finish of the predecessor for SS logic and in days after the start of the successor for FF logic



© 2007-2012 PMA Technologies LLC

GPM Definitions

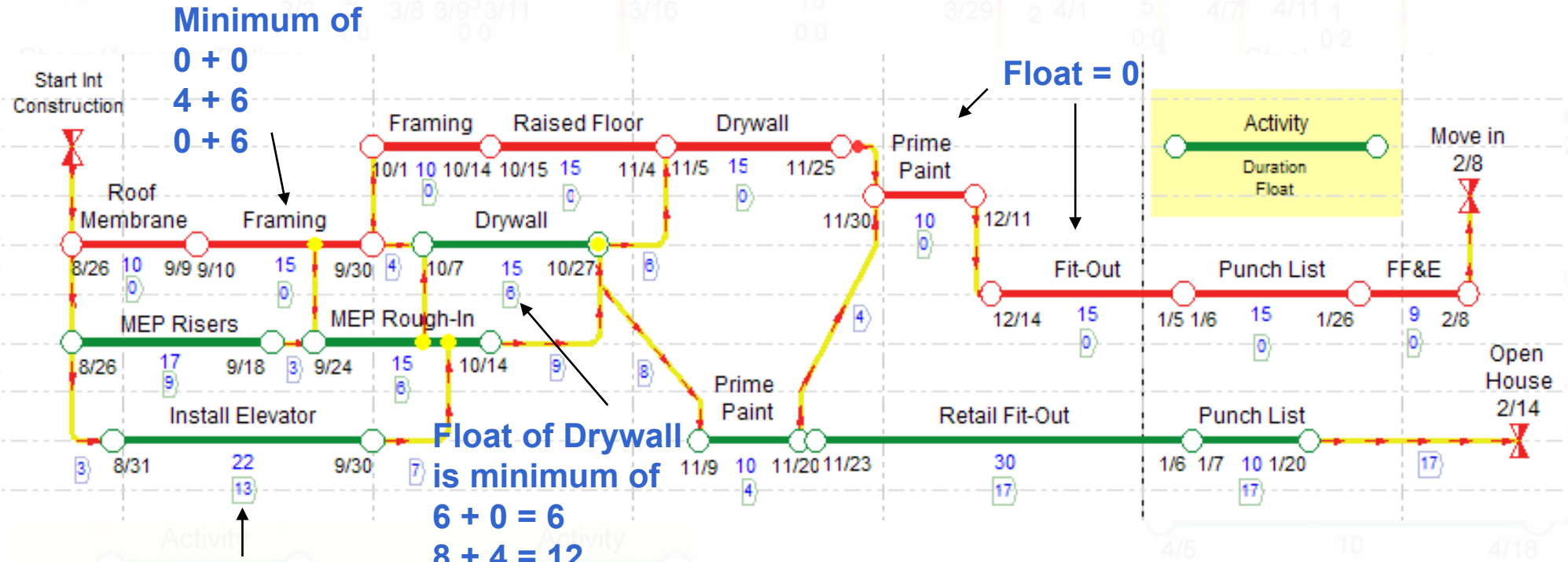
Gap: for an activity-to-activity link, gap measures days the activity may be delayed beyond its position without delaying the successor beyond its position; gaps are link-specific and drive all float attributes



© 2007-2012 PMA Technologies LLC

GPM Definitions

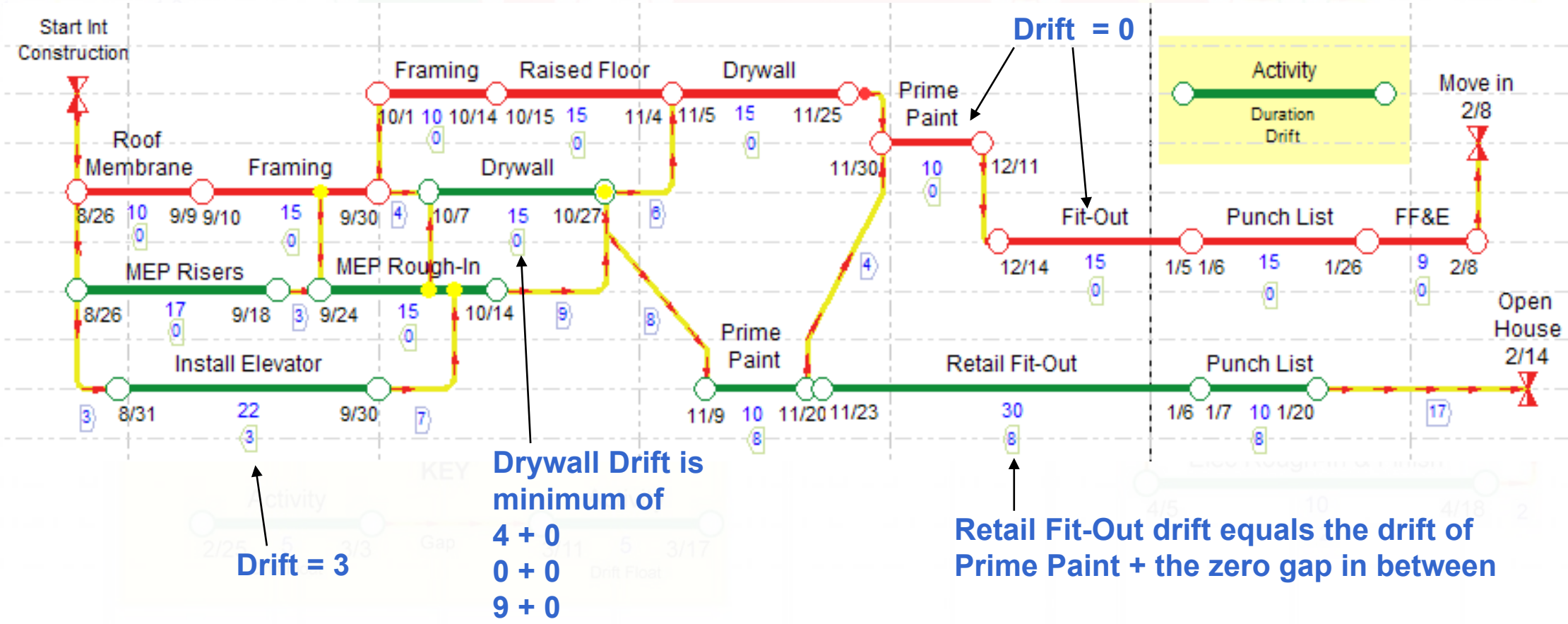
Float: for an activity, float measures days the activity may be delayed *beyond its position* without extending schedule completion, and equals the minimum of gap + successor float for all successor relationships



© 2007-2012 PMA Technologies LLC

GPM Definitions

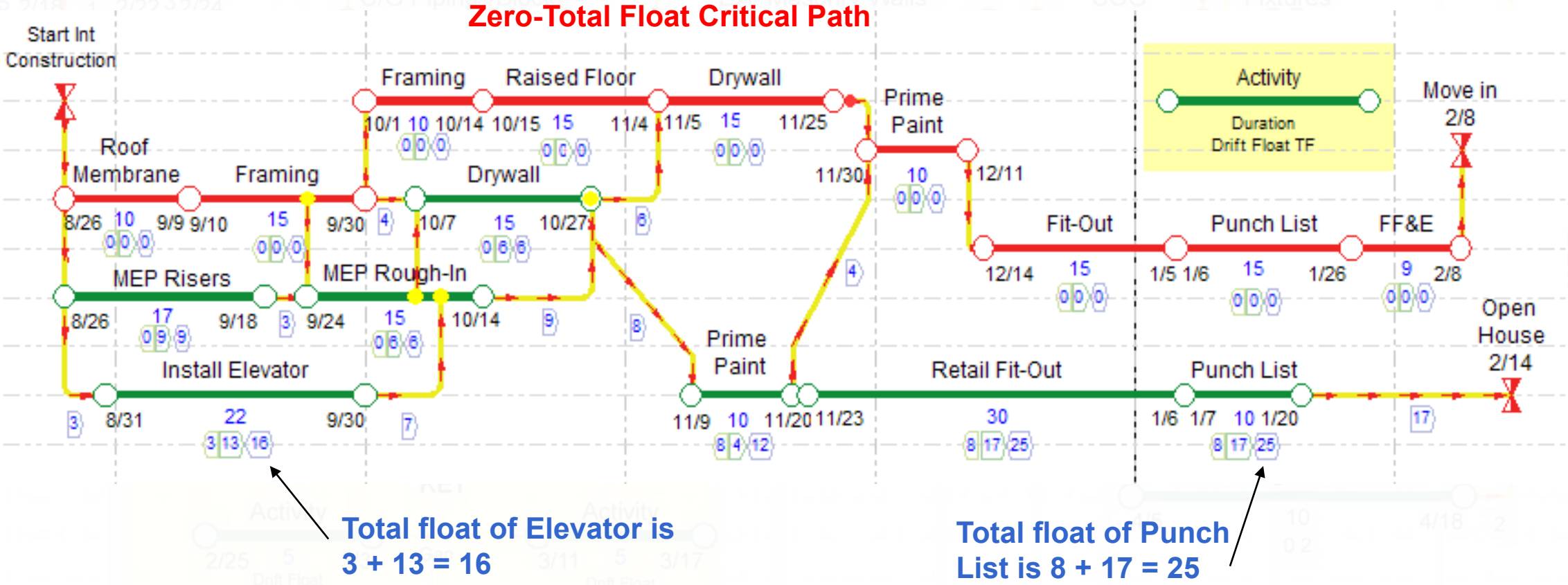
Drift: measures days the activity may gain schedule (shift to an earlier date) without forcing an earlier project start, and equals the minimum of gap + predecessor drift for all predecessors; activities placed in early dates have zero drift



© 2007-2012 PMA Technologies LLC

GPM Definitions

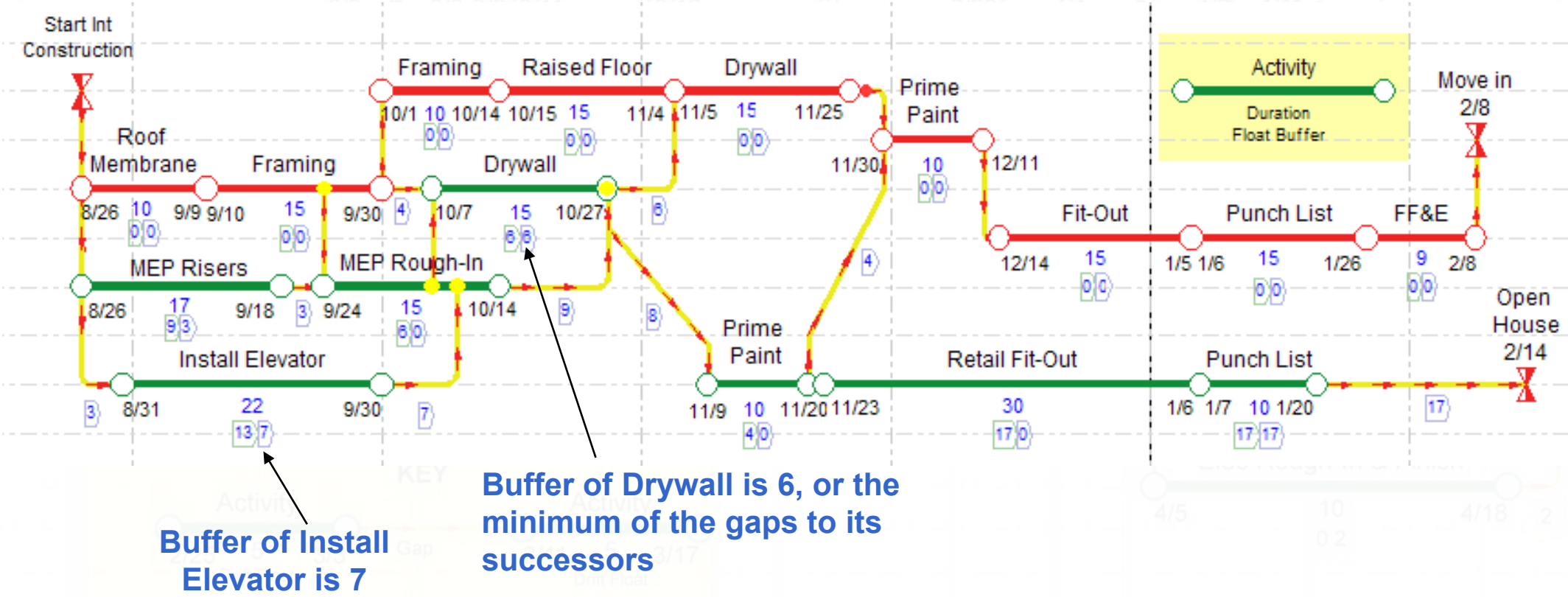
Total Float (TF): drift + float



© 2007-2012 PMA Technologies LLC

GPM Definitions

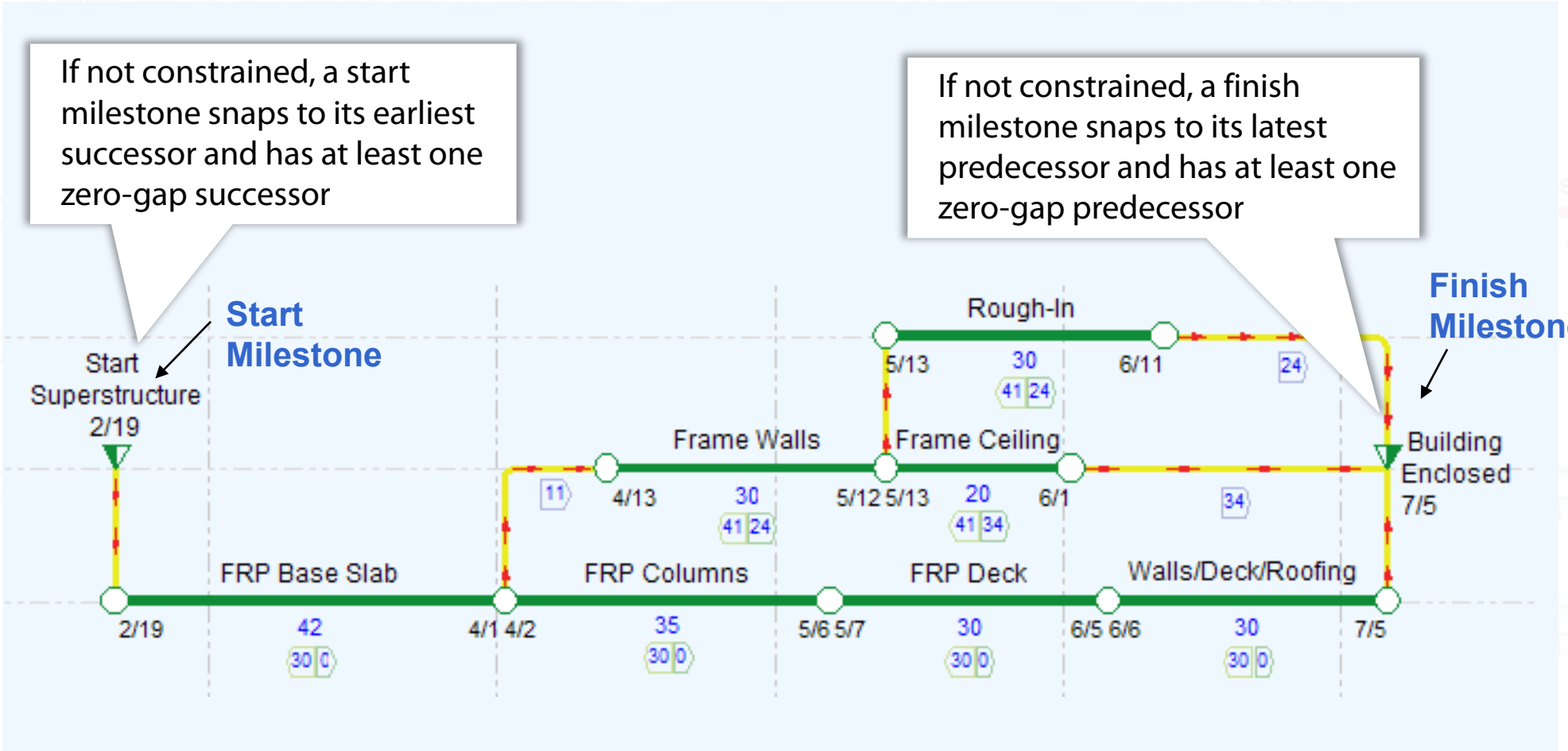
Buffer: for an activity, buffer is the minimum of all gaps between the activity and its successor activities; analogous to **CPM** free float but measured from planned dates



© 2007-2012 PMA Technologies LLC

GPM Definitions

Milestone: event pinpointing a key date in the schedule

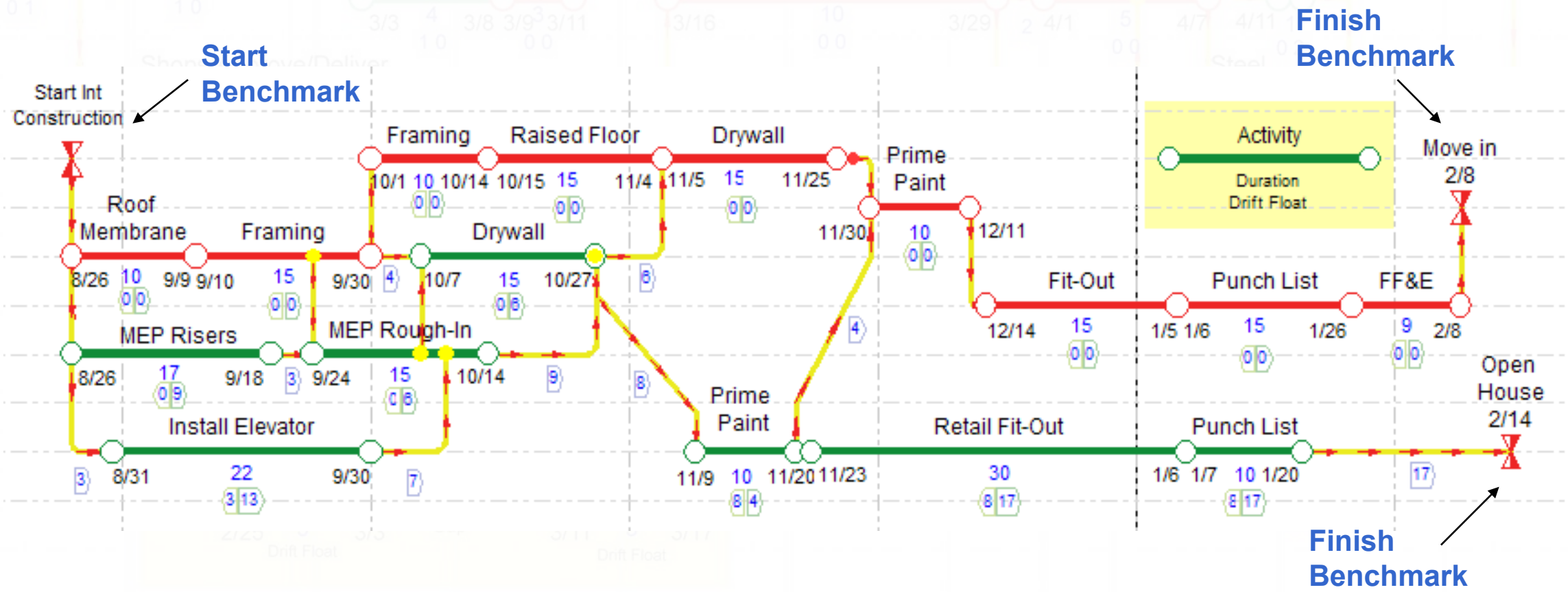


© 2007-2012 PMA Technologies LLC

GPM Definitions

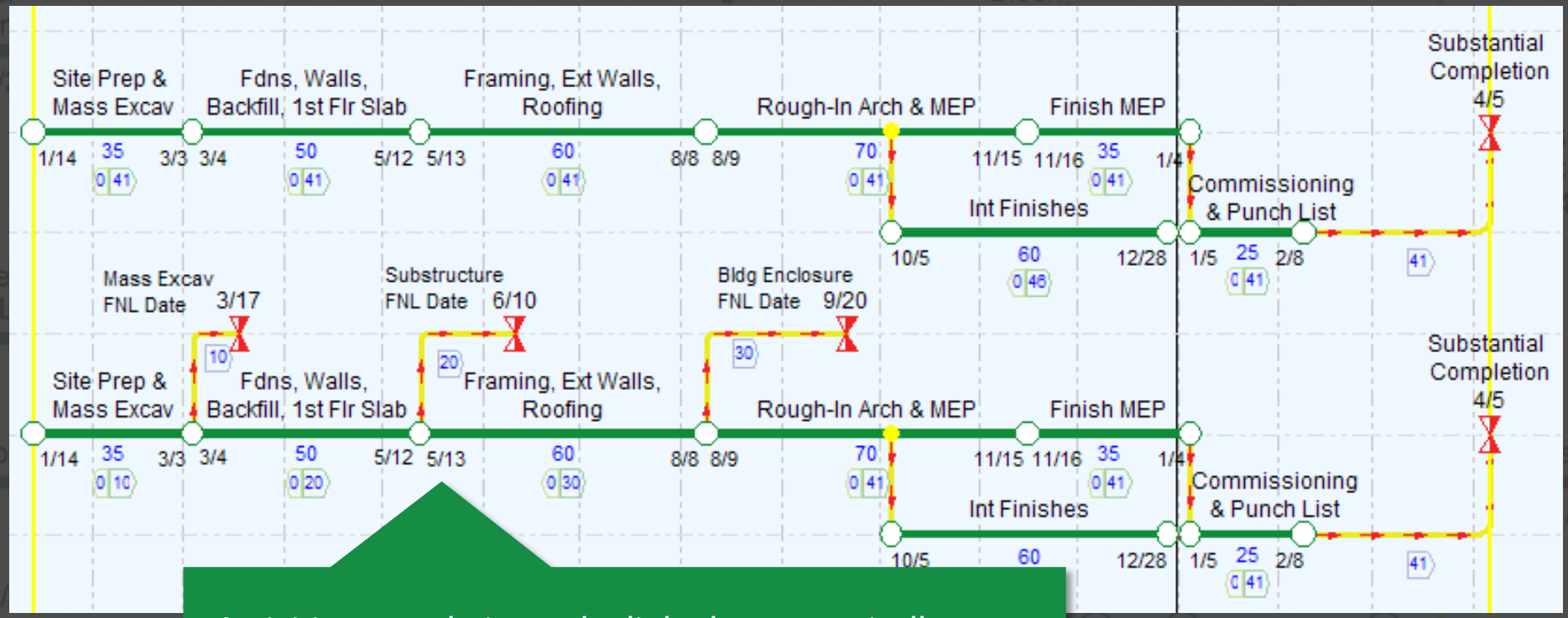
Benchmark: designates a deadline or used to *cut* floats

- Counteracts first-come, first-served total float
- Does not move due to logic; benchmark TF is necessarily zero
- Analogous to a milestone in **CPM** with equal SNE & FNL constraints



© 2007-2012 PMA Technologies LLC

Using Benchmarks to Allocate Total Float to Stages of a Project

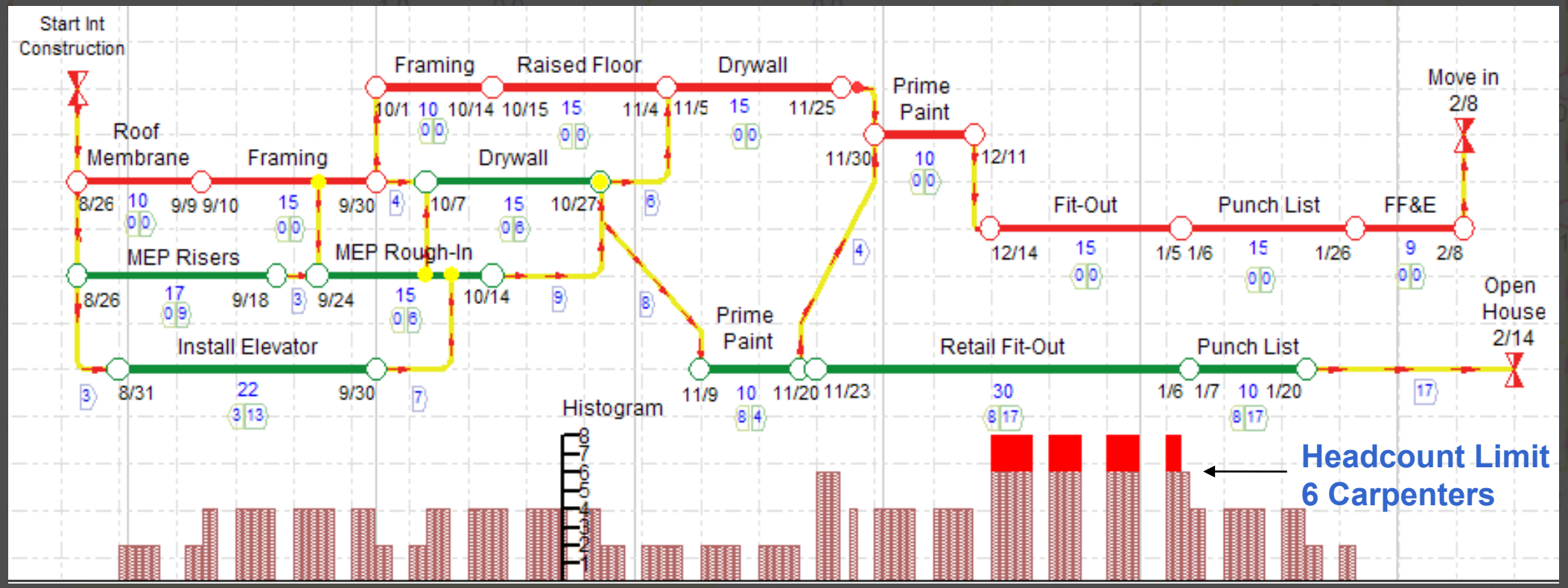


Activities on a chain can be linked to strategically-placed benchmarks where the goal is to prorate total float—otherwise accumulating downstream—to reduce total float duplication and dispel the notion that total float is *equally available* to all activities on the chain

© 2007-2012 PMA Technologies LLC

Drifts & Floats in Resource Leveling

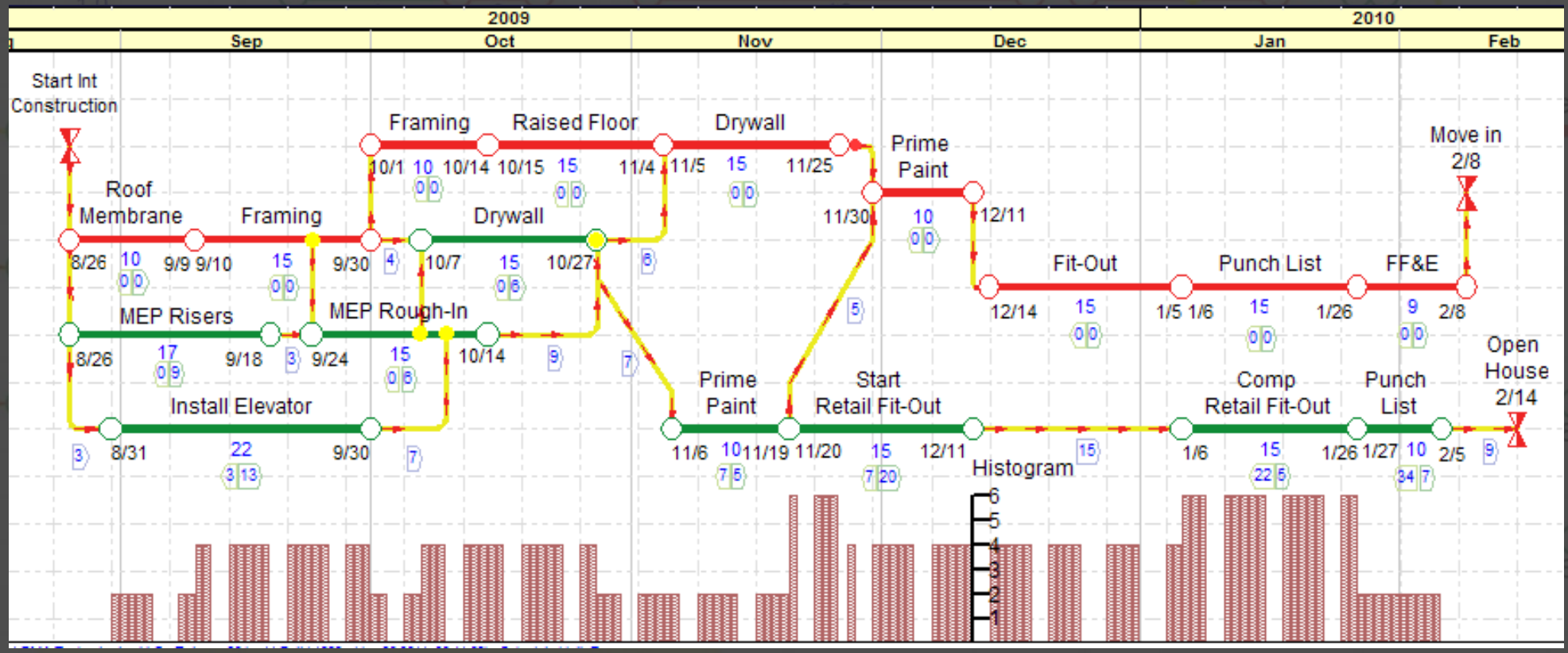
Drift is a consideration in resource leveling; an activity can be moved left or right ***within*** drift & float to level resources without impacting neither project start nor completion dates



© 2007-2012 PMA Technologies LLC

Drifts & Floats in Resource Leveling (cont'd)

GPM leveling becomes a bidirectional heuristic, as compared to **CPM** leveling, where drift is not available and a constrained activity has less flexibility



© 2007-2012 PMA Technologies LLC

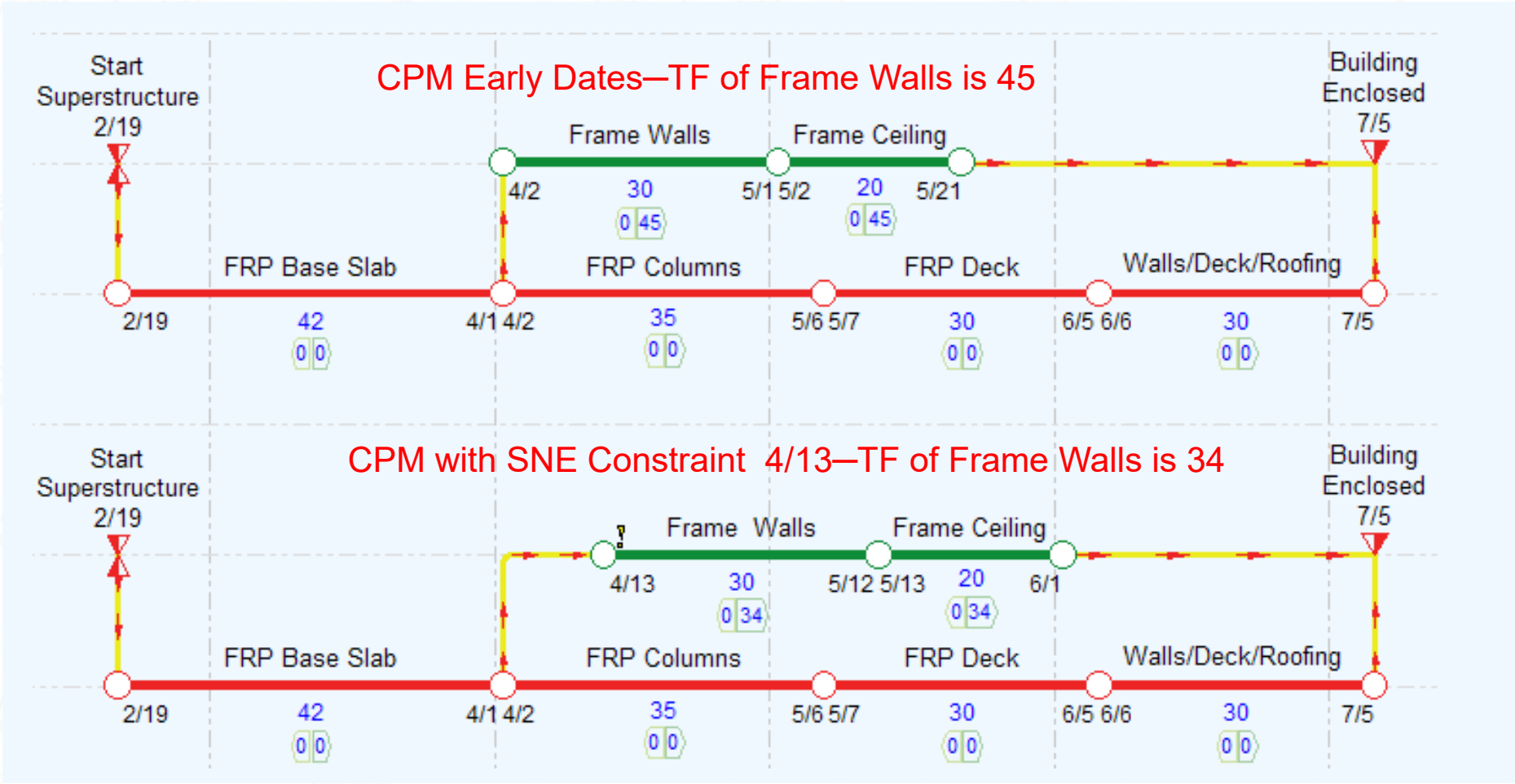
Sequence Used in Leveling Exercise

1. Split Retail Fit-Out in two 15-day activities (on 14 Dec 09)
2. Make Punch List calendar day, gap increases to 29 days
3. Float Comp Retail Fit-Out 14 days, gap reduces to 9 days
4. Drift back Start Retail Fit-out 1 day, gap to its predecessor reduces to 7 days
5. The schedule is now leveled to a headcount limit of 6 carpenters, and total float of the leveled logic chain is 31 days (or 25 days if Punch List reverts back to working days)

© 2007-2012 PMA Technologies LLC

‘Planned Dates’ in CPM

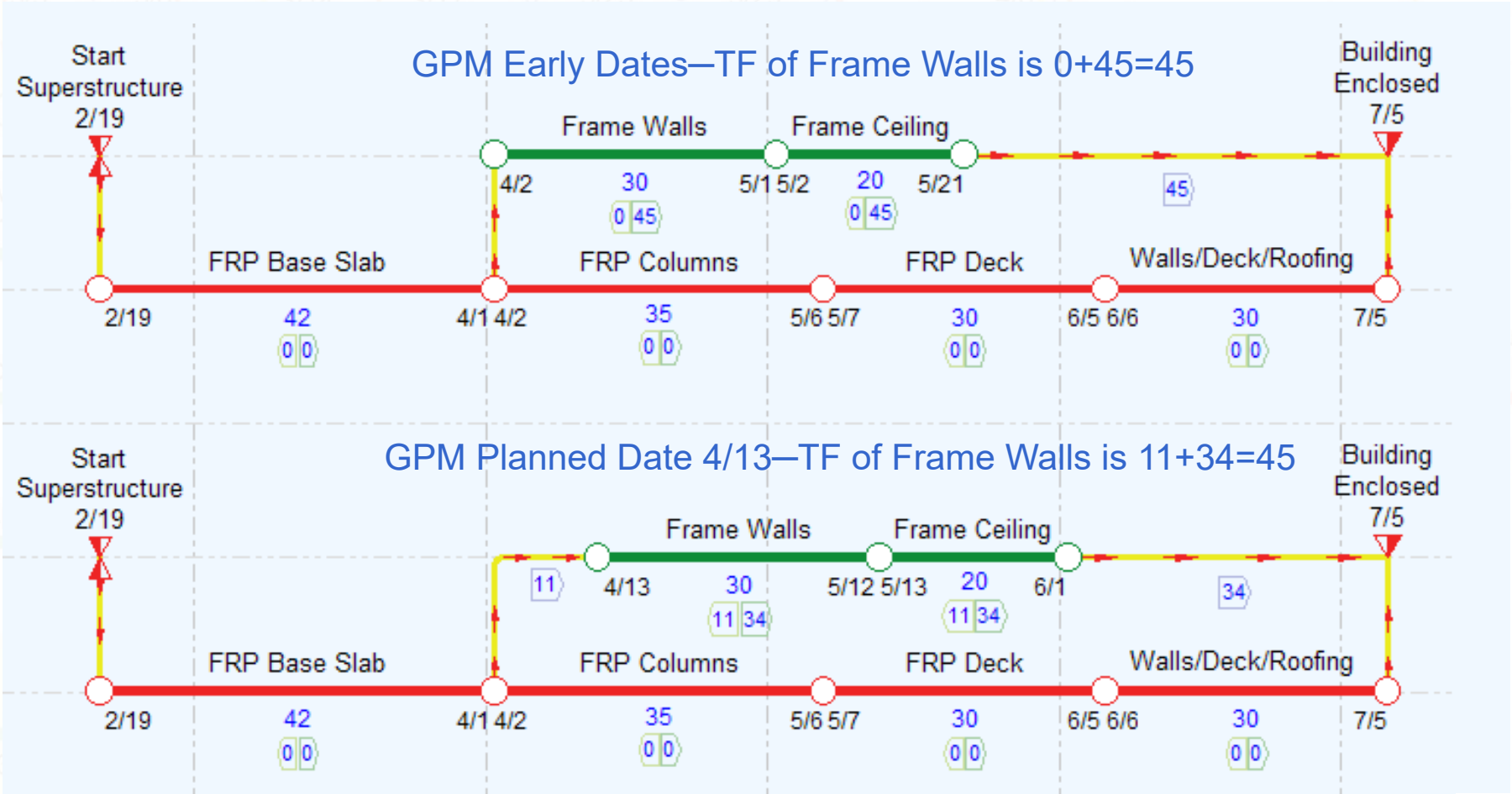
In **CPM**, to schedule an activity on other than early dates, an SNE constraint is used, which reduces total float



© 2007-2012 PMA Technologies LLC

‘Planned Dates’ in GPM

When an activity is placed anywhere between early and late dates (i.e., on planned dates), early start and total float are unaffected because drift & float increase & decrease equally



© 2007-2012 PMA Technologies LLC

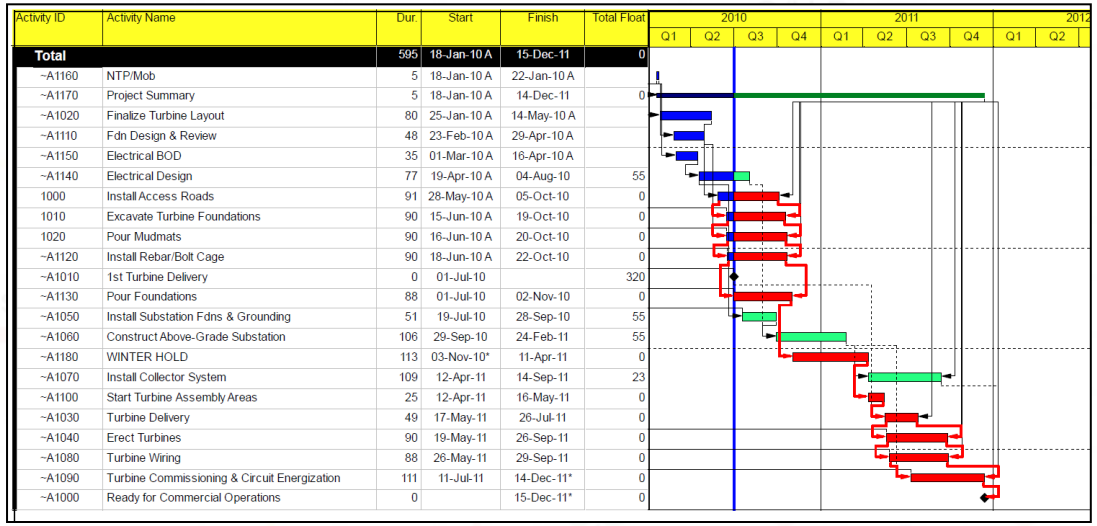
GPM and CPM Total Float Fundamentals

GPM	CPM
Activities can be positioned on other than early dates, without requiring an SNE constraint	Early dates rule
As the start of an activity is delayed, drift increases and float decreases, but TF is unaffected—sum of drift + float does not vary	SNE constraint can be used to show an activity on planned dates
For each update and data date (DD), drifts, floats and total floats are calculated left of the DD, and are considered 'forensic' vs. as-built because they may refresh as gaps right of the DD refresh	Total float (TF) is sacrificed when using SNE constraints
	Total floats cannot be determined left of the data date (calculated by **CPM** to be always zero)

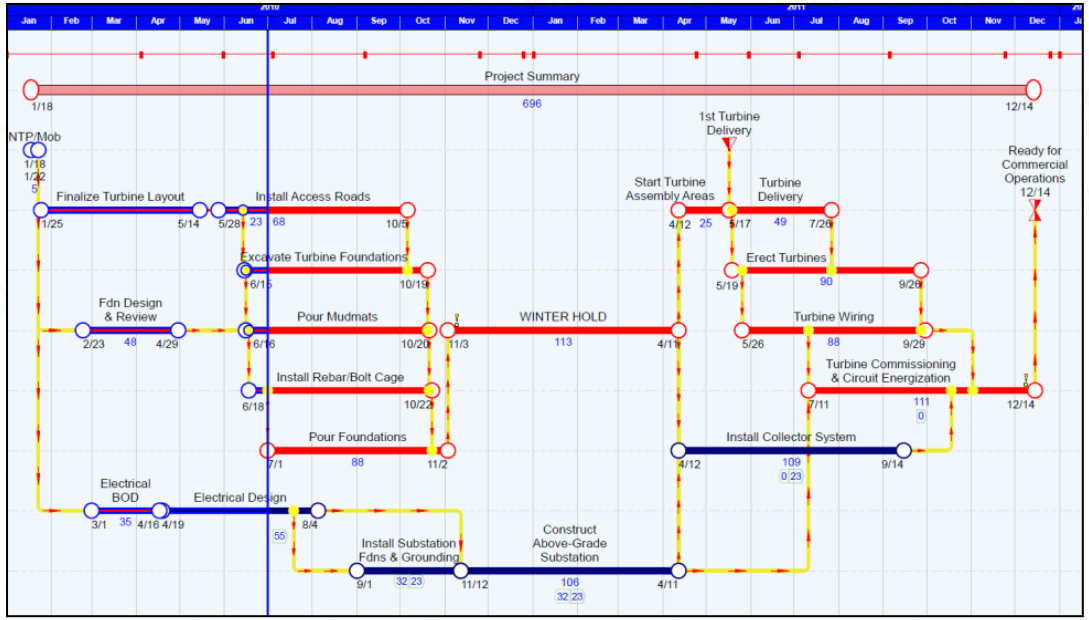
© 2007-2012 PMA Technologies LLC

When Relying on LDM, Appearance Matters

- **LDM** allows multiple activities on the same grid-line, which eliminates the 'cascading' look of **CPM** bar charts with logic
- Along with the efficiency and flexibility of this arrangement, there is a need to smartly position activities
- Avoiding data clashes ensures neat appearance

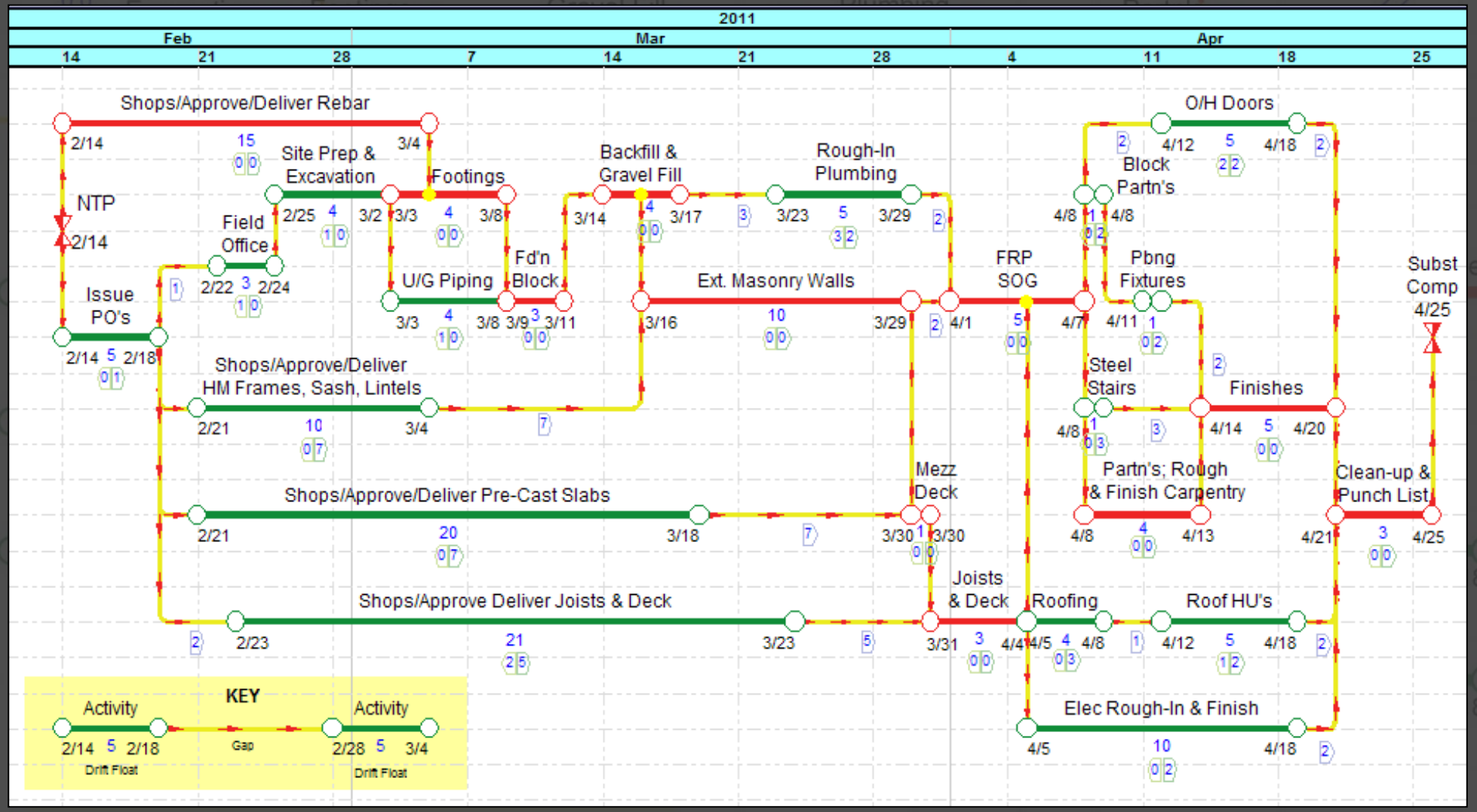


Activity ID	Activity Name	Dur.	Start	Finish	Total Float
Total		595	18-Jan-10 A	15-Dec-11	0
~A1160	NTP/Mob	5	18-Jan-10 A	22-Jan-10 A	
~A1170	Project Summary	5	18-Jan-10 A	14-Dec-11	0
~A1020	Finalize Turbine Layout	80	25-Jan-10 A	14-May-10 A	
~A1110	Fdn Design & Review	48	23-Feb-10 A	29-Apr-10 A	
~A1150	Electrical BOD	35	01-Mar-10 A	16-Apr-10 A	
~A1140	Electrical Design	77	19-Apr-10 A	04-Aug-10	55
1000	Install Access Roads	91	28-May-10 A	05-Oct-10	0
1010	Excavate Turbine Foundations	90	15-Jun-10 A	19-Oct-10	0
1020	Pour Mudmats	90	16-Jun-10 A	20-Oct-10	0
~A1120	Install Rebar/Bolt Cage	90	18-Jun-10 A	22-Oct-10	0
~A1010	1st Turbine Delivery	0	01-Jul-10		320
~A1130	Pour Foundations	88	01-Jul-10	02-Nov-10	0
~A1050	Install Substation Fdns & Grounding	51	19-Jul-10	28-Sep-10	55
~A1060	Construct Above-Grade Substation	106	29-Sep-10	24-Feb-11	55
~A1180	WINTER HOLD	113	03-Nov-10*	11-Apr-11	0
~A1070	Install Collector System	109	12-Apr-11	14-Sep-11	23
~A1100	Start Turbine Assembly Areas	25	12-Apr-11	16-May-11	0
~A1030	Turbine Delivery	49	17-May-11	26-Jul-11	0
~A1040	Erect Turbines	90	19-May-11	26-Sep-11	0
~A1080	Turbine Wiring	88	26-May-11	29-Sep-11	0
~A1090	Turbine Commissioning & Circuit Energization	111	11-Jul-11	14-Dec-11*	0
~A1000	Ready for Commercial Operations	0		15-Dec-11*	0



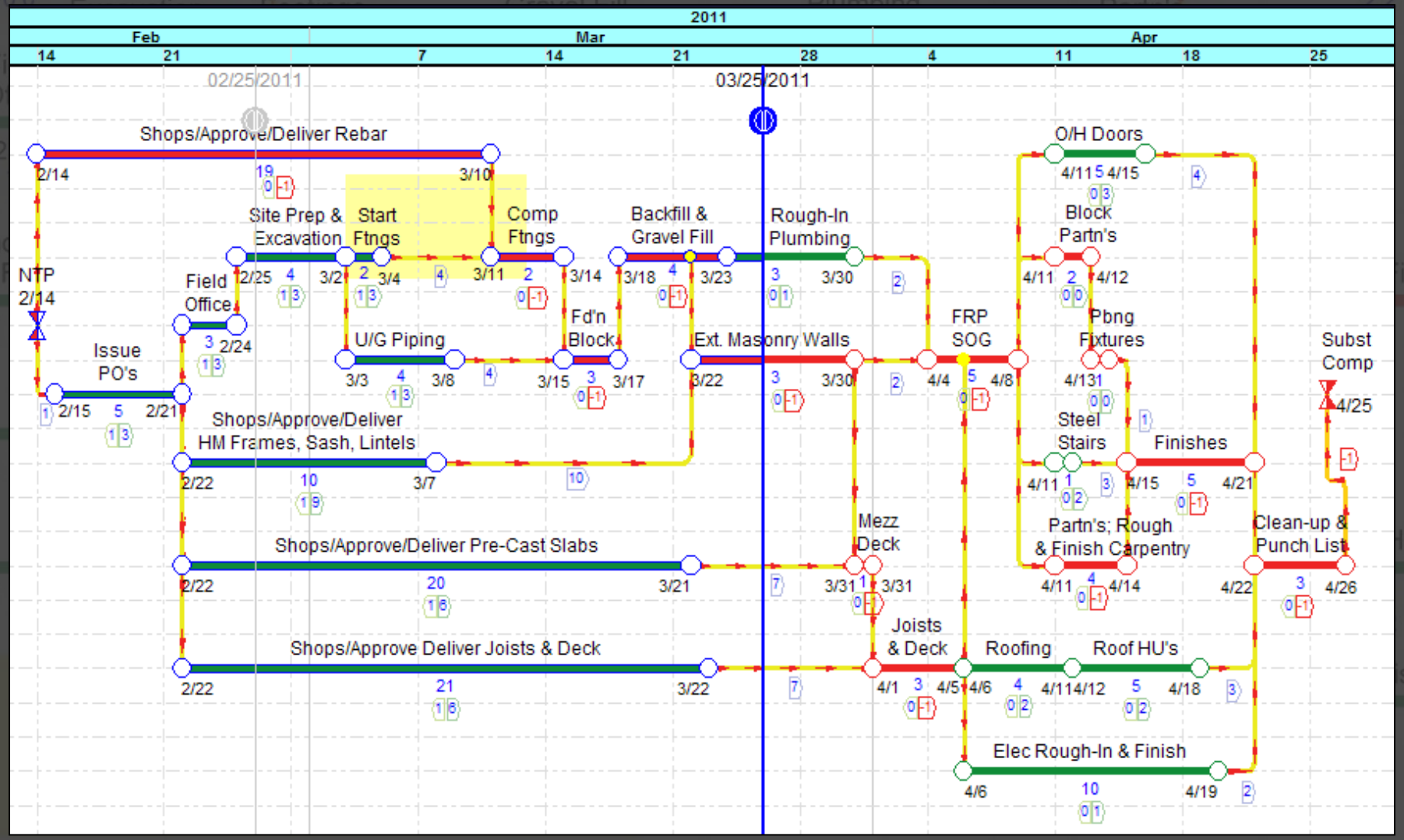
© 2007-2012 PMA Technologies LLC

Sample Schedule in NPT



© 2007-2012 PMA Technologies LLC

Sample Schedule Update



© 2007-2012 PMA Technologies LLC

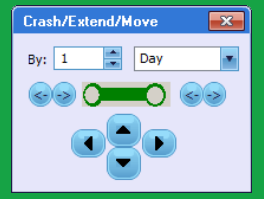
Tips for Superior NetPoint Graphics

10

Save regularly and use ‘Date Lock’ to avoid inadvertent shifting when re-gridding activities for a neat arrangement

09

Favor gestural icon when the timescale makes it difficult to crash/lengthen activities using the mouse



08

Optimize the canvas vertical dimension; use a small-interval grid layout and multiple-grid spacing for parallel activities

Stack descriptions and/or use annotations as appropriate to optimize graphical display (i.e., avoid data clashing)

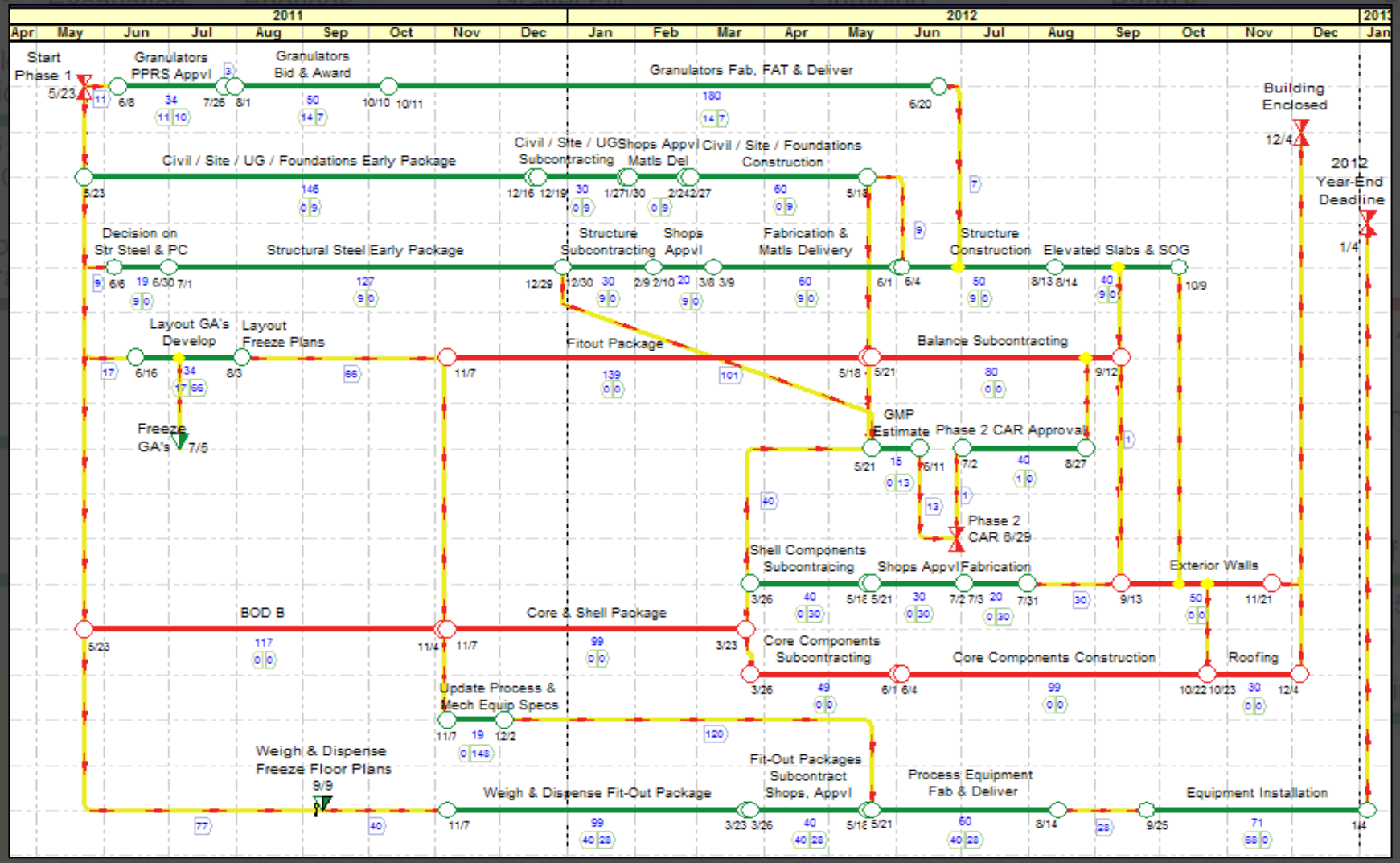
07

Avoid unnecessary wordy activity, milestone or benchmark descriptions; use standard abbreviations where possible

06

© 2007-2012 PMA Technologies LLC

NetPoint Level 2 GPM Schedule Fragnet



© 2007-2012 PMA Technologies LLC

Tips for Superior NetPoint Graphics (cont'd)

05

Avoid overlaying V links pointing in opposite directions

04

Minimize activity-link crossings

03

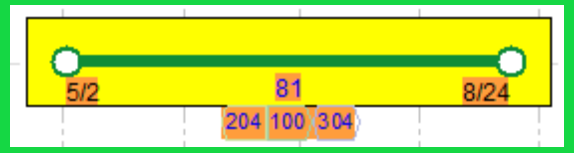
For short activities, display only start date or finish date and/or shift the activity up or down to avoid data clashing

02

Optimize calendar length vis-à-vis project duration

01

Use Custom Display (or forthcoming GEM) feature to minimize data clashing and for neatness



© 2007-2012 PMA Technologies LLC

NetPoint Global Edit Mode aka *GEM*

- The entire canvas is on *custom display*
- Global edit features include:
  - The precise display format on an activity can be mimicked onto other selected activities with a copy/paste/format feature
  - Any data displayed in a blue background can be independently positioned; if other activities are selected, when the data element is re-positioned, the respective data in the selected activities follow the same display format
  - Any displayed gap is available for independent positioning by mouse drag
- Forthcoming in near-term

© 2007-2012 PMA Technologies LLC

GPM Planning/Scheduling—Basic Rules

10

Use planned dates instead of SNE constraint dates (as SNE constraints void drift and reduce total float)

09

Minimize use of inefficient **CPM software *waterfall*** activity sequence (bar chart with logic) layout

08

Avoid a finish milestone and its predecessor activity both preceding a successor; likewise, avoid a start milestone and its successor activity both succeeding a predecessor

Define critical resources and optimize resource profile while activities/logic are being firmed up

07

Display drift and float as activities are created for ease of detecting unconnected activities—helps to avoid loose ends

06

© 2007-2012 PMA Technologies LLC

GPM Planning/Scheduling—Basic Rules (cont'd)

05

Connect open ends and orphaned ends (e.g., minimize use of activities without a FS or SS predecessor)

04

Use milestones sparingly and only for the purpose of calling out schedule status of important start & completion events

03

Use multiple calendars judiciously (e.g., avoid mixing calendar-day and working-day durations unnecessarily)

Eliminate redundant activity-to-activity logic ties that have no likelihood of becoming driving links

02

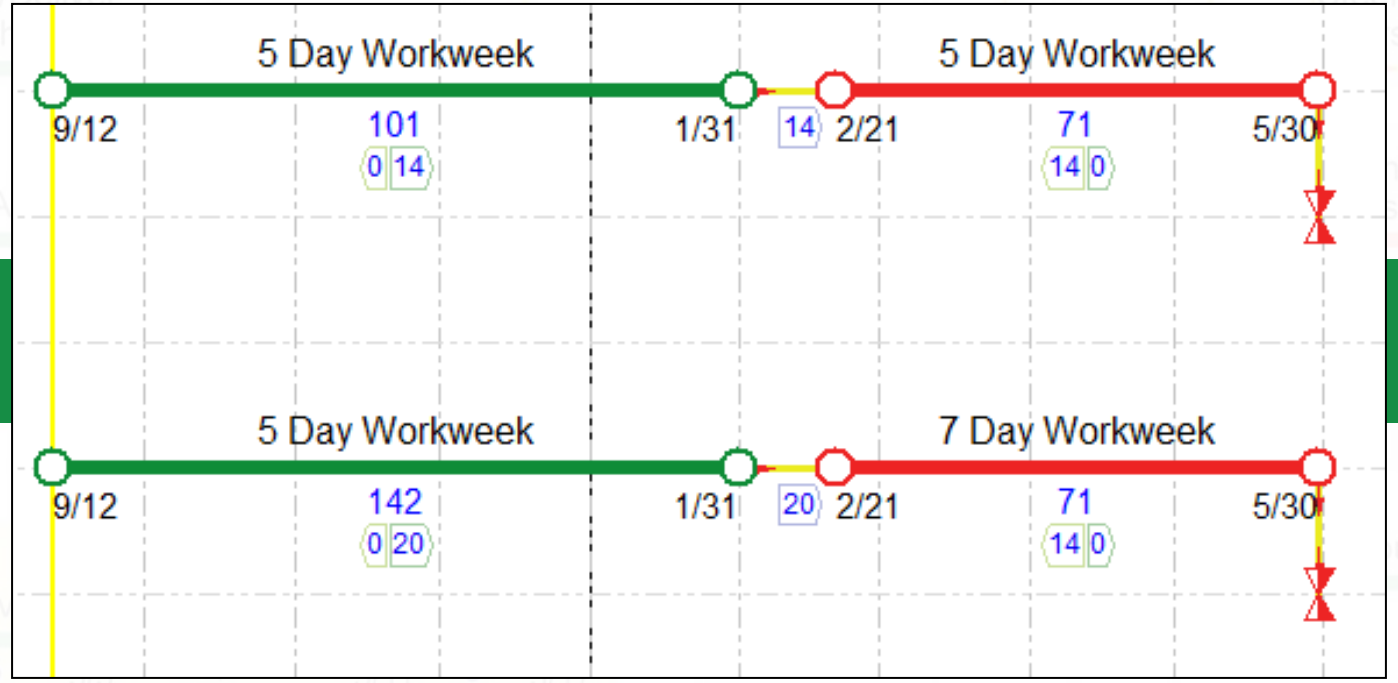
Study and become proficient in using the GPM algorithms (gap/drift/float mathematical rules)

01

© 2007-2012 PMA Technologies LLC

Advanced GPM Rules—Varying Calendars

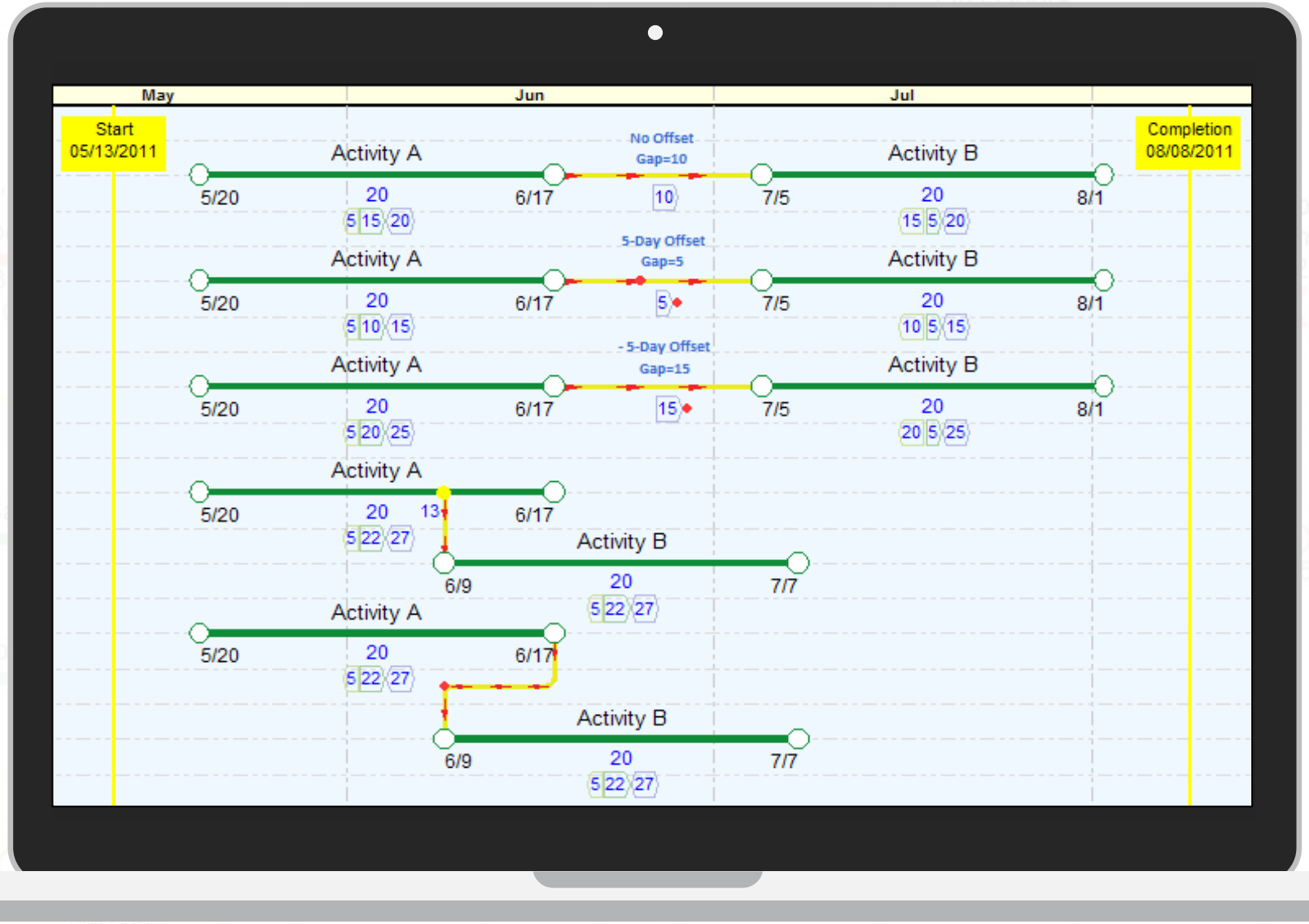
As gaps are calculated based on the predecessor's calendar (e.g., 5-day vs. 7-day work week), drift/float math are more intuitive if predecessor object and successor object are based on the same calendar



© 2007-2012 PMA Technologies LLC

Advanced GPM Rules—Negative Offsets

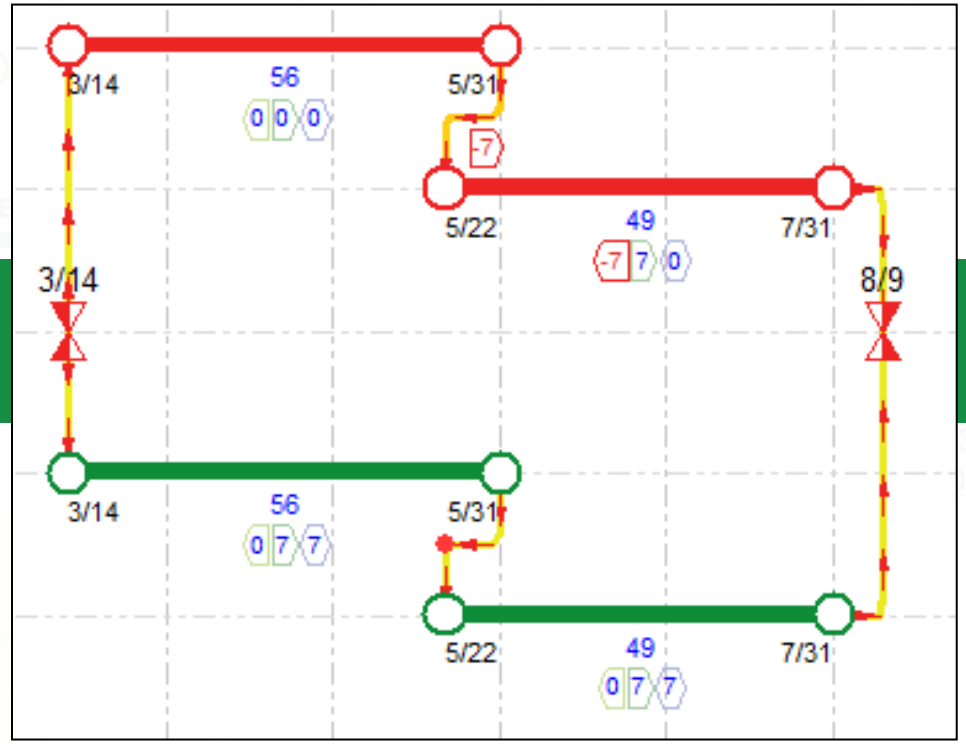
Study and become proficient in using the LDM negative-offset technique (equivalent to **PDM *lead***)



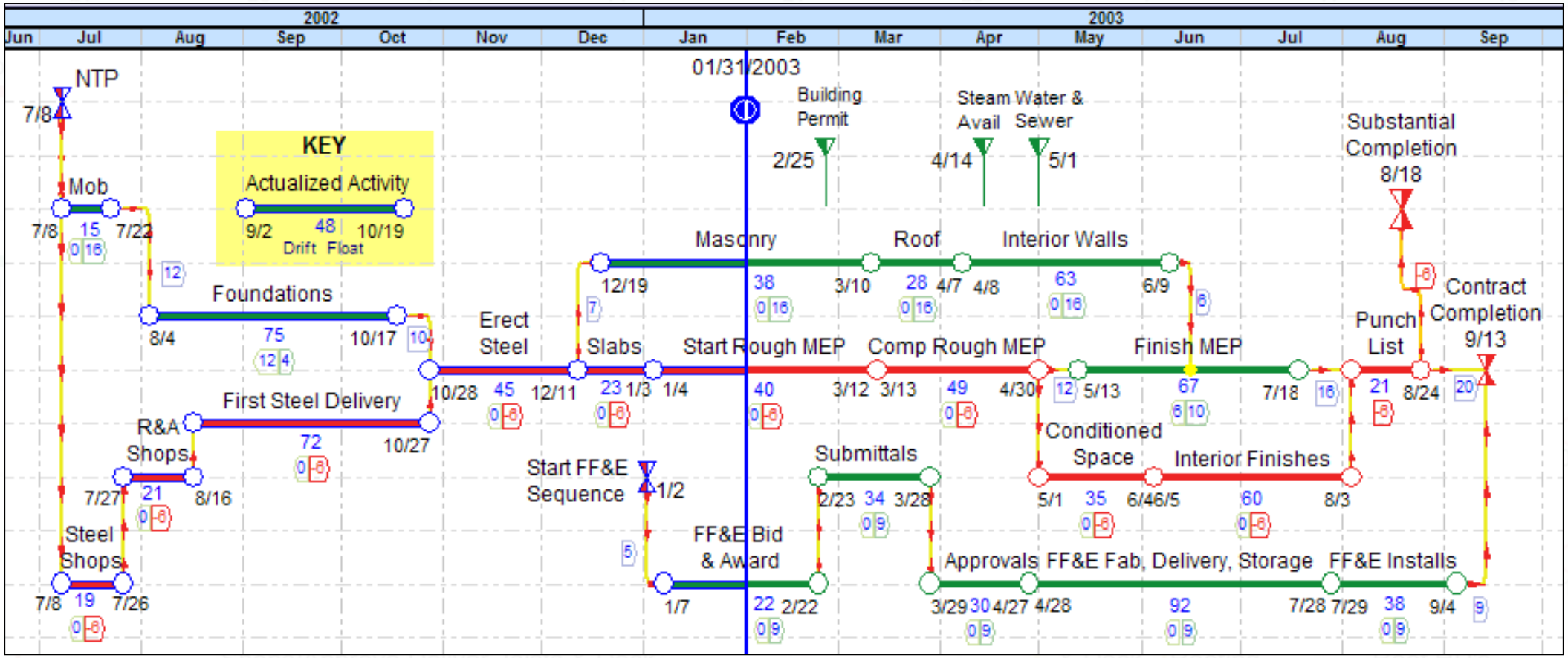
© 2007-2012 PMA Technologies LLC

Advanced GPM Rules—Negative Gaps

- Negative gaps are only allowed after turning 'logic off'
- Drifts and floats for negative gaps differ from negative offsets



© 2007-2012 PMA Technologies LLC



Advanced GPM Rules—Working Left of the DD

The **GPM** algorithms calculate true total float left of the data date for completed activities (bogus zeroes in **CPM**); **GPM** forensic total float = forensic float + forensic drift

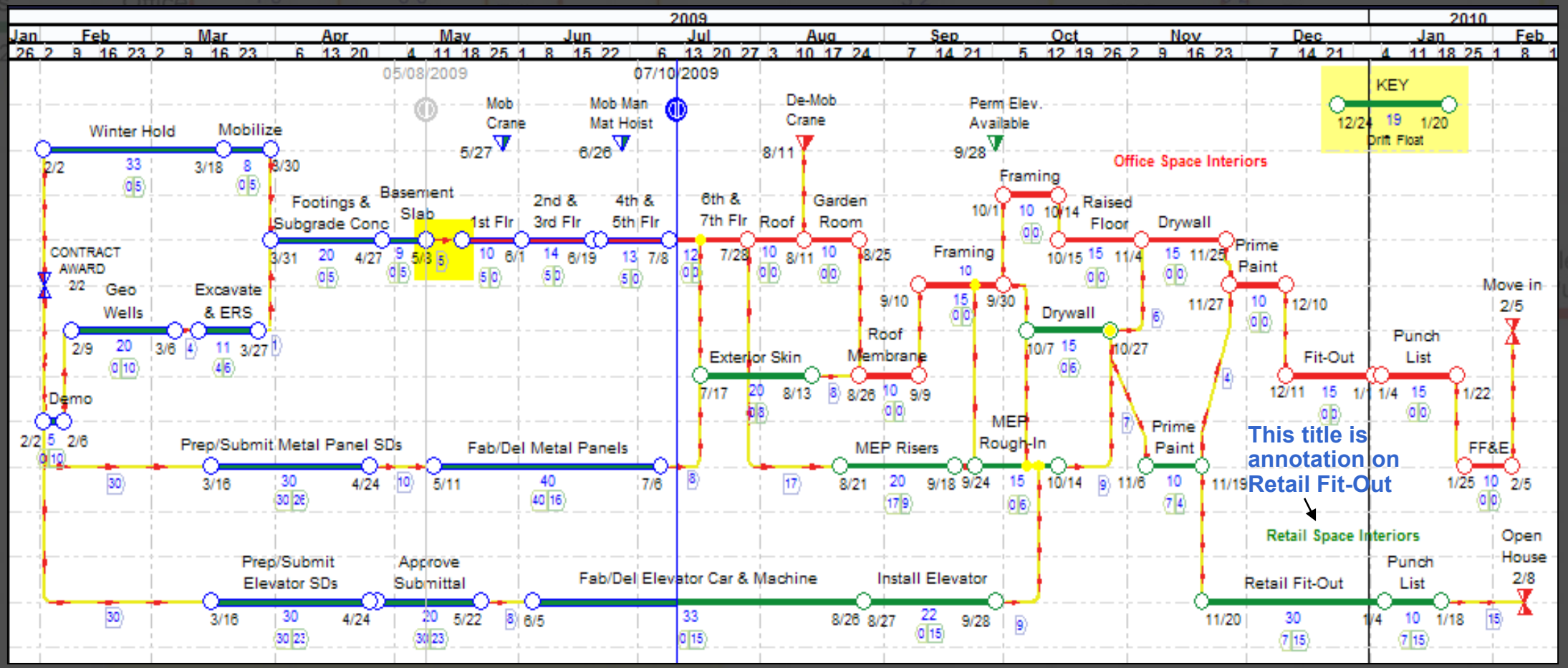
© 2007-2012 PMA Technologies LLC

Advanced GPM Rules—As-Built Critical Path; Forensic Float & Forensic Drift

- Forensic total float is dynamic: it continuously refreshes algorithmically like total floats do for remaining activities
  - In the schedule on Slide #46, if Interior Finishes is decreased to 55 days, critical path total float left of the DD refreshes to -1 day
  - Forensic total floats do not convert to as-built total floats until the final update (i.e., data date falls on the project completion date)
- The as-built critical path is located by identifying the activity-logic chain(s) with smallest forensic total floats

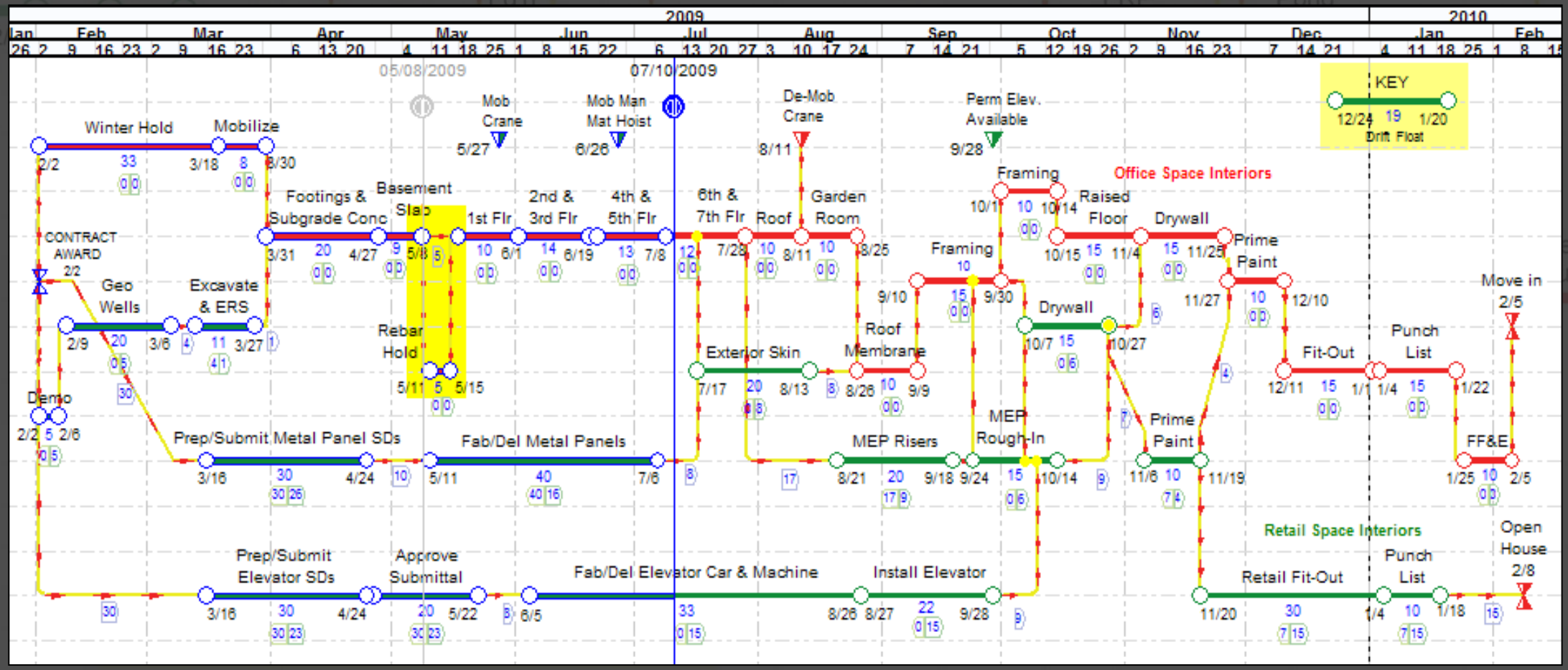
© 2007-2012 PMA Technologies LLC

Advanced GPM Rules—Bogus As-Built Critical Path Breaks



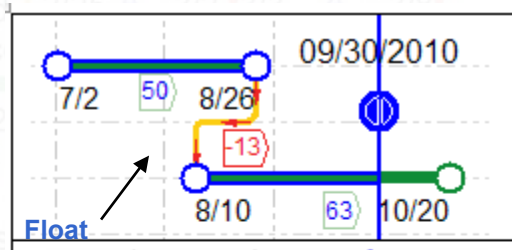
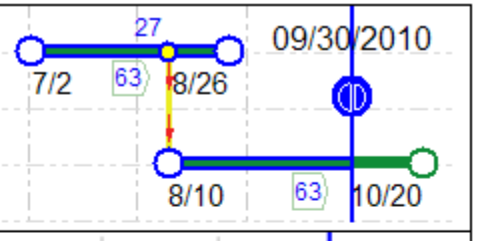
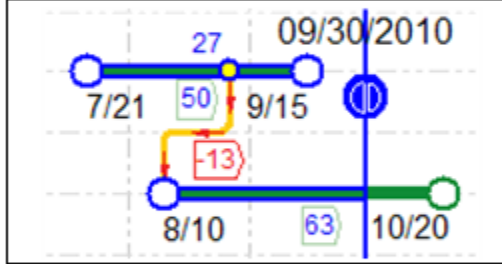
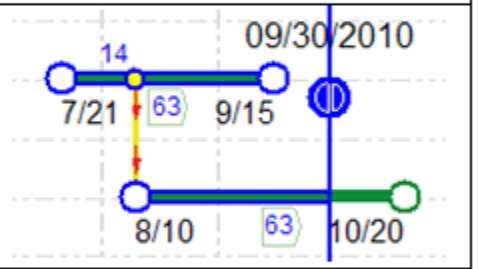
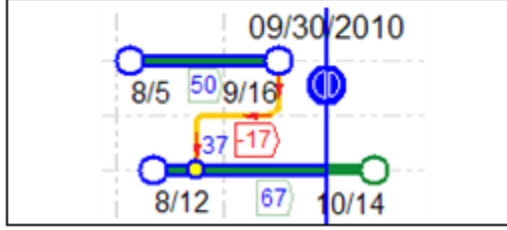
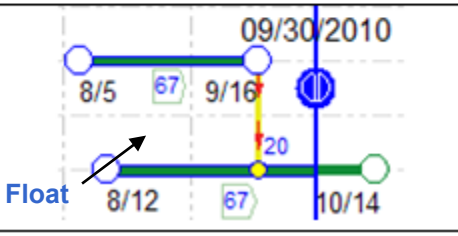
© 2007-2012 PMA Technologies LLC

Advanced GPM Rules—Using Forensic TF to Uncover Delay and Reveal As-Built Critical Path



© 2007-2012 PMA Technologies LLC

Advanced GPM Rules—Negative Gaps

	Eliminate negative-gap finish-to-start (FS) logic: (1) with a zero-gap start-to-start (SS) link (example shown); (2) with a zero-gap finish-to-finish (FF) link; (3) by subdividing the predecessor and using two FS links; or (4) by restating the relationship as a negative 13-day offset FS link	
	Eliminate negative-gap SS logic: (1) with a zero-gap SS link (example shown); (2) with a zero-gap FF link, if successor's start is ahead of the predecessor's start and its finish is after the predecessor's finish; or (3) or by subdividing the predecessor or successor (or both) and using two (or four) FS links	
	Eliminate negative-gap FF logic: (1) with a zero-gap FF link (example shown); (2) with a zero-gap SS link, if successor's actual finish is before the predecessor's and its actual start is after the predecessor's; or (3) by subdividing the successor and using two FS links	

Schemes to Eliminate Negative Gap Left of the Data Date (Data Date 09/30/09)

For a discussion on converting PDM logic to FS logic only, refer to Lu, M. & Lam, H. (2009). Transform schemes applied on non-finish-to-start logical relationships in project network diagrams. *Journal of Construction Engineering Management, 135*(9), 863–873.

© 2007-2012 PMA Technologies LLC

Summary of Contrasting GPM & CPM Fundamentals

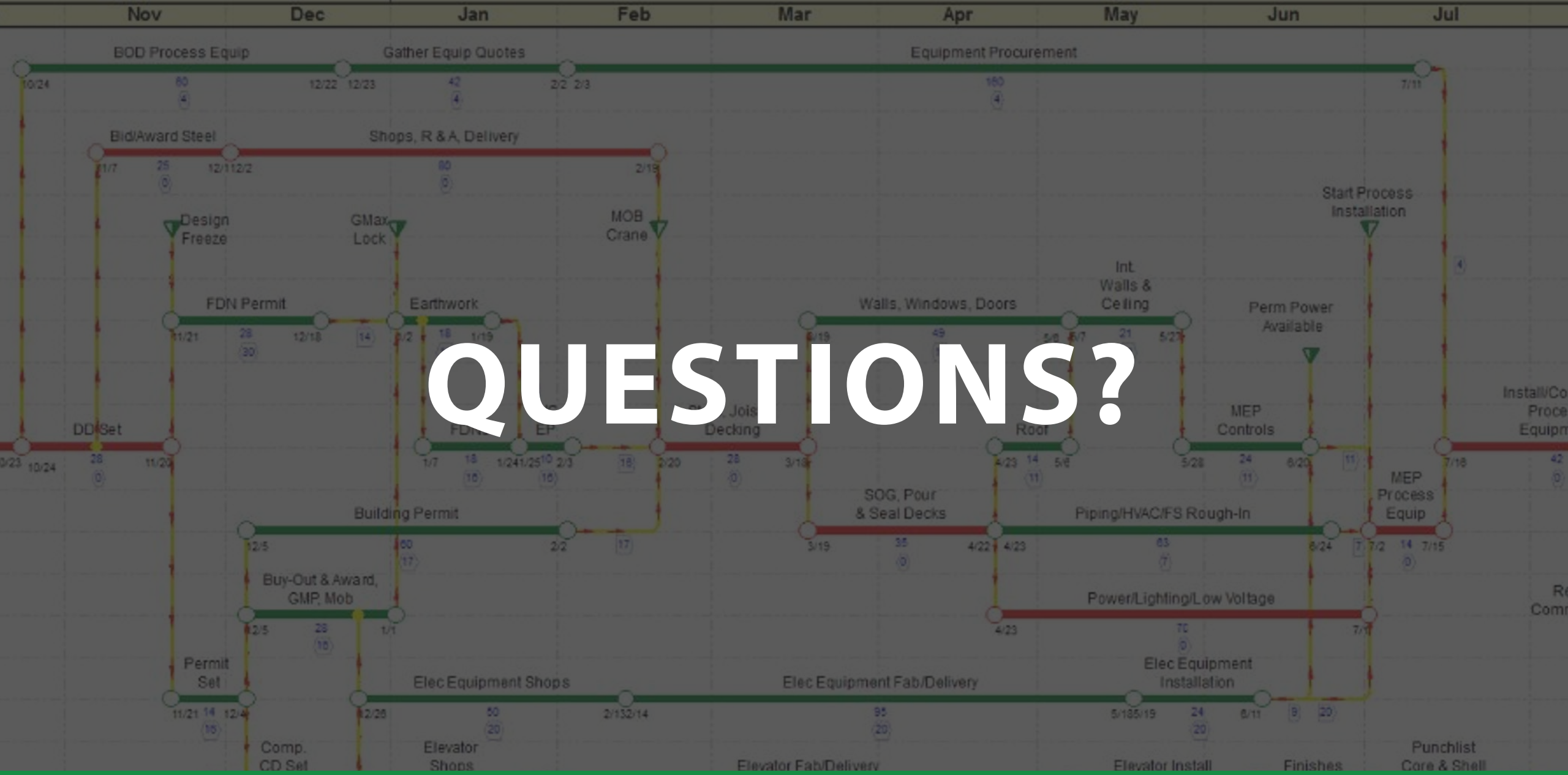
Scheduling Consideration	GPM Schedules	CPM Schedules
Diagramming Method	Logic Diagramming Method (LDM)	PDM (Rarely ADM)
Activity Placement	**Early Dates or *Planned* Dates**	CPM Early Dates
Scheduling Algorithm	Gap-Driven Float and Drift Algorithms	Forward/Backward Pass Dates Algorithm
Link Leeway Calculation	Gap (i.e., Smart Network™)	None
Activity Early Dates	Current Dates Less Drift	Calculated from Forward Pass
Activity Late Dates	Current Dates Plus Float	Calculated from Backward Pass
Activity Free Float	GPM Buffer and Drift-Buffer	CPM Free Float
Total Float Algorithm	**Drift + Float**	Late Dates Less Early Dates
Can Activity Drift Backward?	Yes, if Activity Drift is > Zero	No, Activity Drift is Always Zero
Can Activity Float Forward?	Yes, if Activity Float is > Zero	Yes, if Activity Total Float is > Zero
Impact of Planned Dates on TF	Does Not Reduce Total Float	SNE Constraint Reduces Total Float
Float Governing Technique	Benchmarks as Fixed Events	Through Equal SNE & FNL Constraints
Total Floats Left of the Data Date	**Determined From Gaps *Both Left & Right of DD***	Cannot be Determined (Always Zero)
Can Schedule Be Built Backwards?	Allows *Pull* & *Push* Schedule Generation	Early Dates/Forward Planning Bias
Computing Paradigm	Innate to Tablet Computing	PC/Laptop Computing
Software Data Structure	Objectbase	Database
Schedule Refresh Algorithm	Event-Driven (GPM Self-Healing) Algorithm	CPM Block Scheduling Algorithm
Software User Interface	Interactive, Real-Time	Batch Multiple (Calculating) Engines

© 2007-2012 PMA Technologies LLC

GPM Literature by Dr. Gui	
Title	**Venue**
Scheduling a Project at Different Levels	2011 PMI College of Scheduling Conference, San Francisco, CA
Guide to the Forensic Scheduling Body of Knowledge Part I	With G. Jentzen, D. Fredlund, D. Field & P. Spittler
GPM® and Forensic Total Float	Selected by PMI College of Scheduling for presentation at 2010 PMI Global Congress, Washington D.C.
GPM® and Forensic Total Float	2010 PMI College of Scheduling Conference, Calgary, CAN
Graphical Planning Method™	July 2009 in the *CM eJournal*
GPM®: An Objectbase Project Networking Method	2009 PMI College of Scheduling Conference, Boston, MA
Project Planning Using Logic Diagramming Method	2008 AACE International Conference, Toronto, CAN
Graphical Planning Method (A New Network-Based Planning/Scheduling Paradigm)	2008 PMI College of Scheduling Conference, Chicago, IL

GPM Literature by Other Authors	
Title	**Author & Venue**
An Algorithmic Dissection of Graphical Path Method (GPM®) Float, Drift and Total Float in Comparison to CPM Total Float	T. Mather & L. Liu, 2011 PMI College of Scheduling Conference, San Francisco, CA
From Asymmetry to Transparency in Project Planning	T. Mather, 2010 PMI College of Scheduling Conference, Calgary, CAN
History and Future of Time-Scaled Planning	J. Zann & T. Mather, 2009 PMI College of Scheduling Conference, Boston, MA

© 2007-2012 PMA Technologies LLC



QUESTIONS?

PMA Technologies NetPoint®

© 2007-2012 PMA Technologies LLC

GPM® Graphical Path Method™



THANK YOU!

© 2007-2012 PMA Technologies LLC