Laser Scanning / Coordination / 4D

at

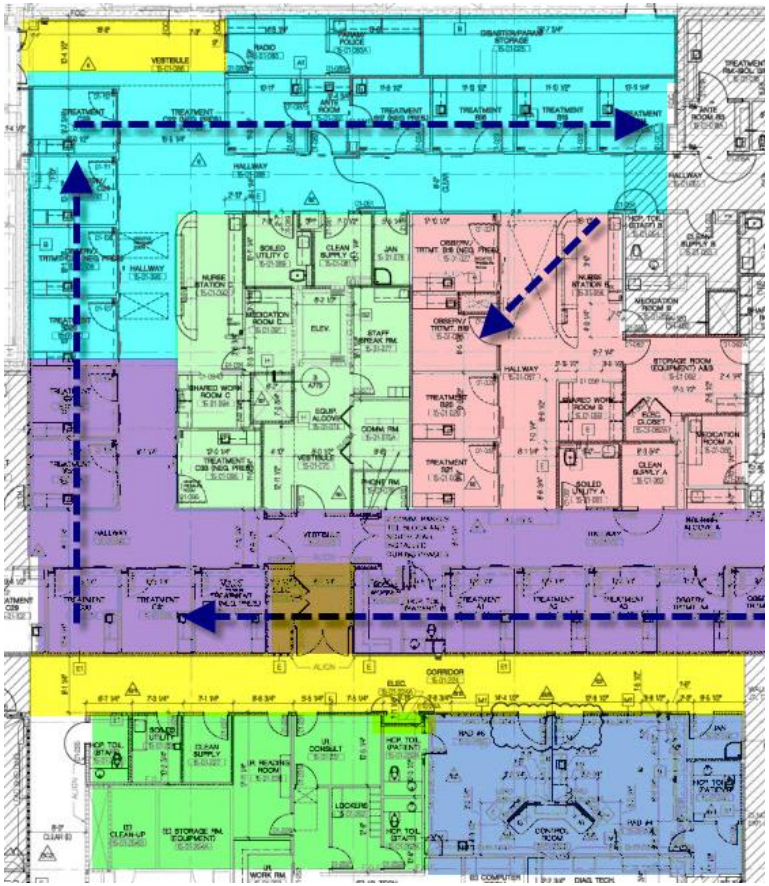
Hoag Hospital, Newport Beach CA

Project - Who?

- VDC Services Team
- Hoag Healthcare
- Kemp Brothers General Contracting
- Subcontractors

Project - What?

Phased renovation of occupied emergency room, using scanning assist (for coordination) and 4D BIM (schedule planning and production control)



Laser Scan Coordination - Why?

- *MEPF systems crossing between phases*
- *Owner required transparency to inform hospital employees*
- *Mistakes in occupied spaces are $$$*

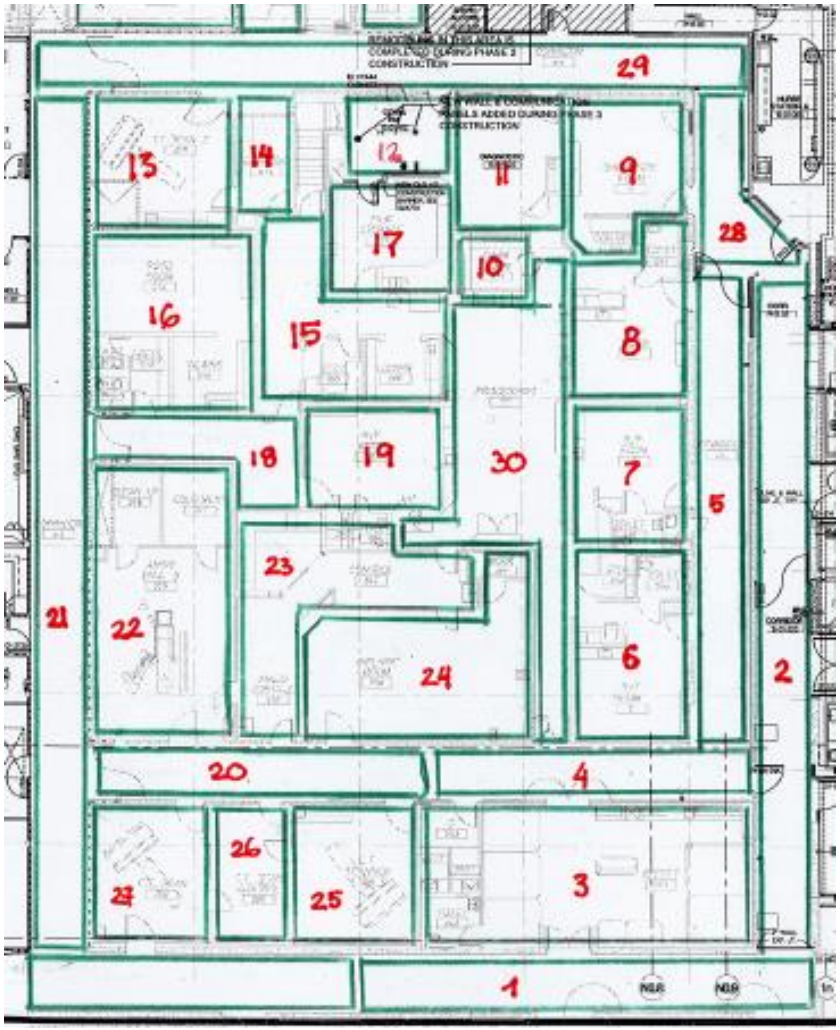
5D BIM - Why?

- *Owner 'got' Flowline w/ production control*
- *Project schedule was slipping (badly)*
- *Owner did not feel in control*
- *Owner was having trouble communicating between contractors and staff*

Process – Scanning:

- *On-site kick-off meeting*
- *Scanning session 1, 2, 3*
  - *Scan plan*
  - *Photos / videos*
  - *Sketches*
- *Point clouds used as reference by modeling team*

Scan Plans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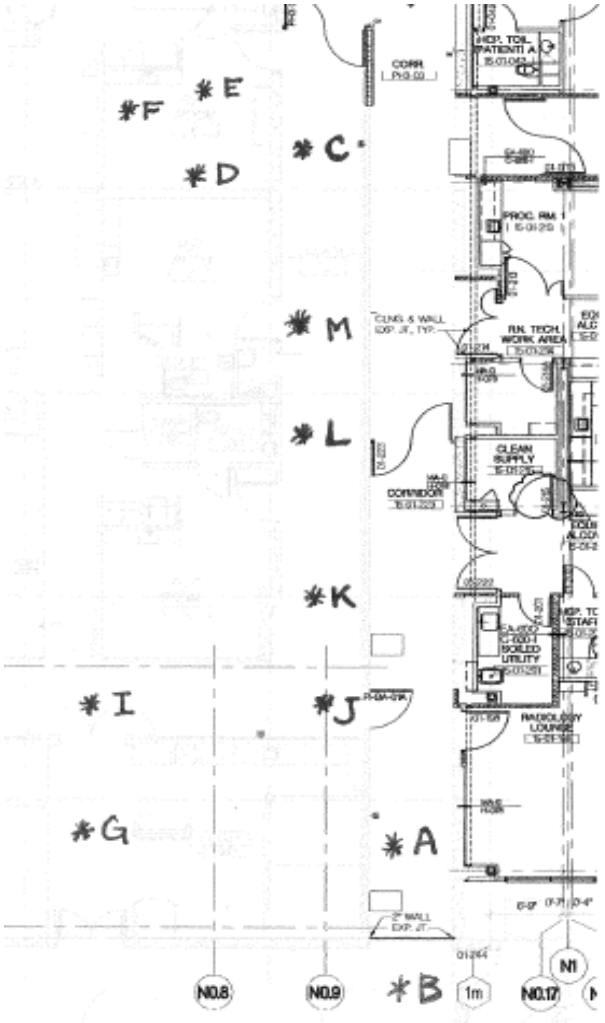
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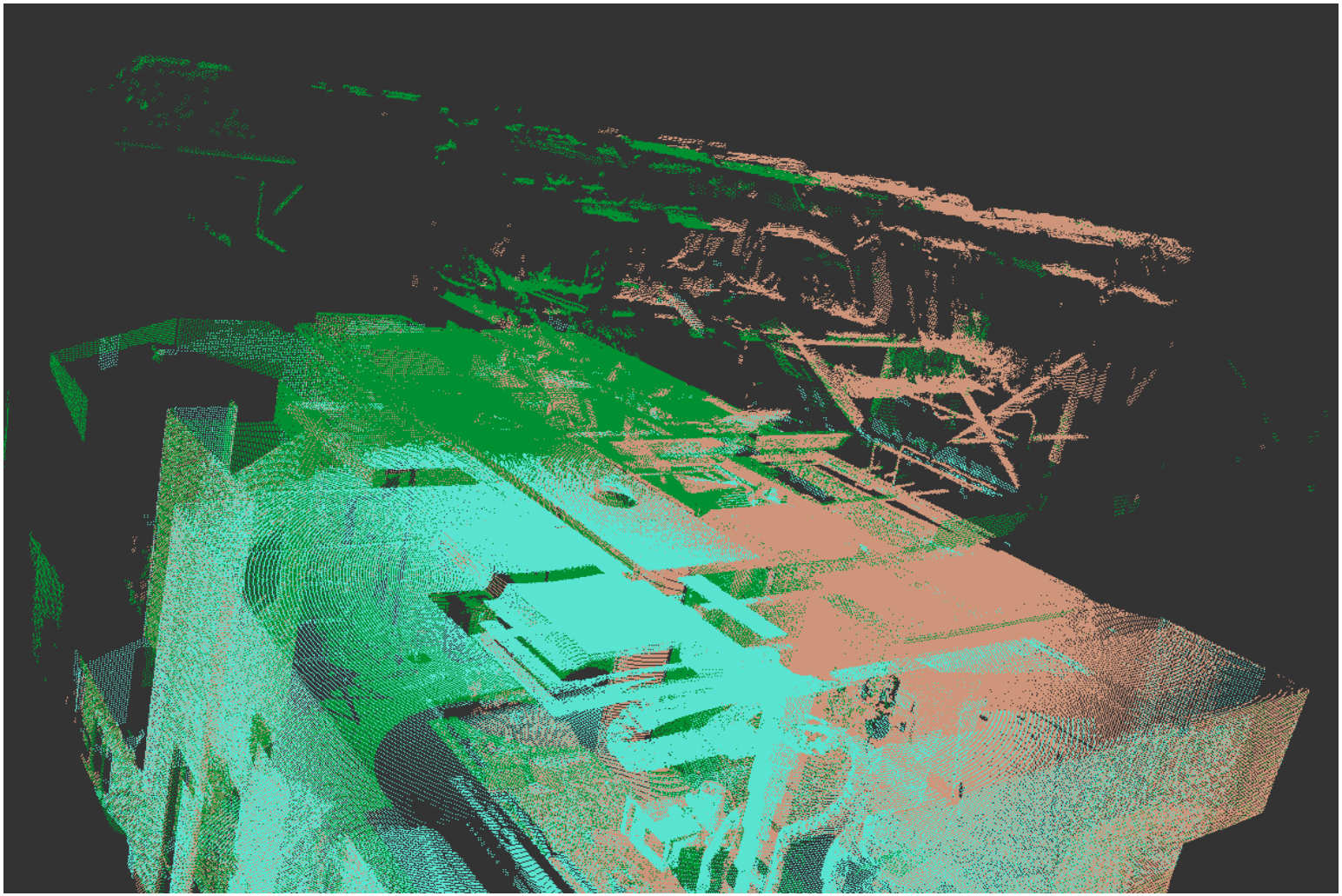
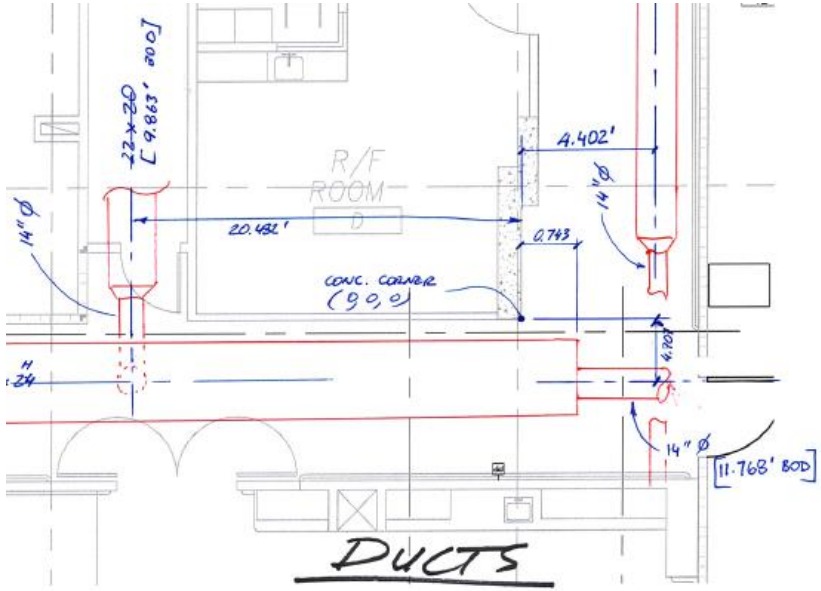
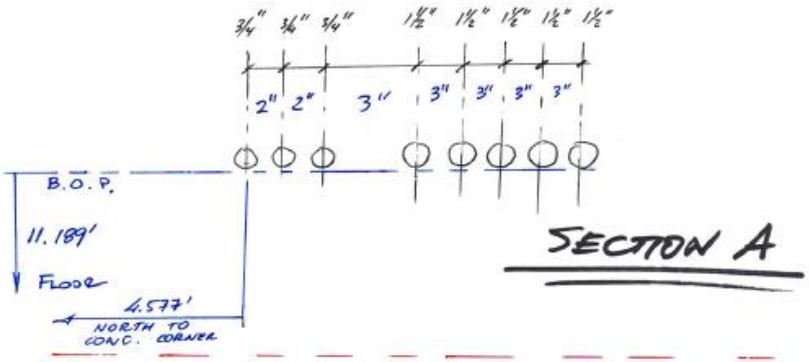


Video

Supporting Data





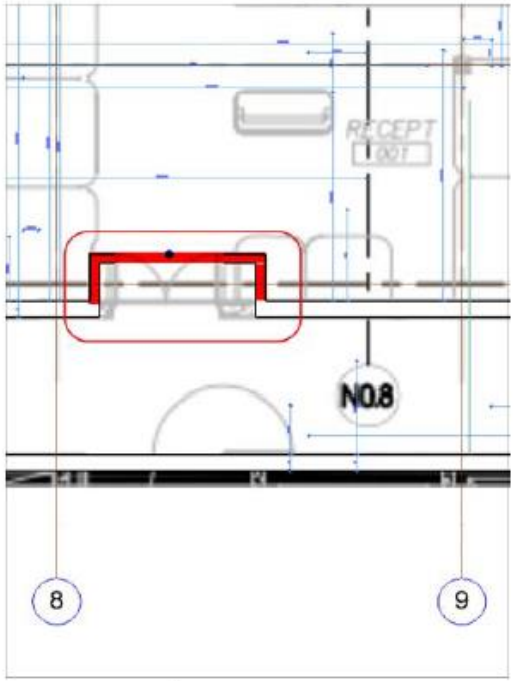
Process – Coordination:

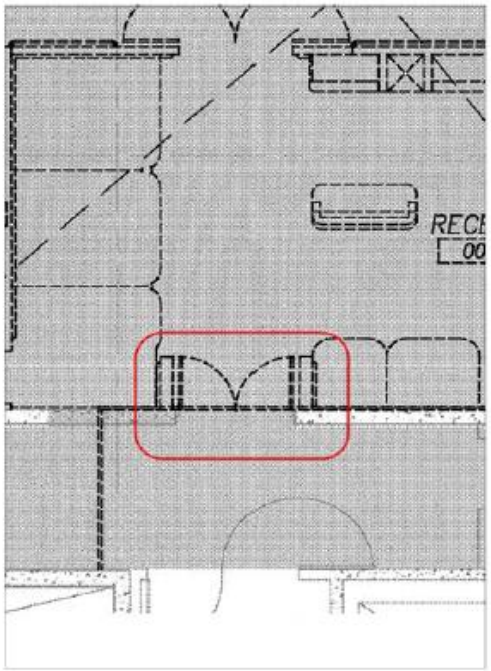
- *Identify existing to remain work*
- *Identify points of connection*
- *Filter scans for above criteria*
- *Relate scan information with sketches, photos and videos from site*
- *Model creation: separation of ETR & New*

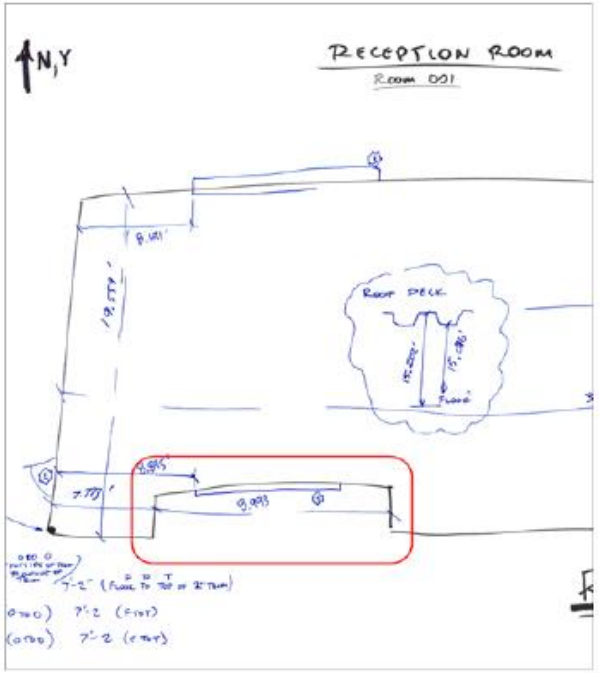
Coordination – Deliverables:

- *Composite Vico Office* ***model***
- *Seven* ***sub-models****, per discipline*
- ***Constructability report*** *(in Vico)*
- *2D installation* ***drawings****, per discipline*
- ***Photos, videos*** *and* ***sketches***

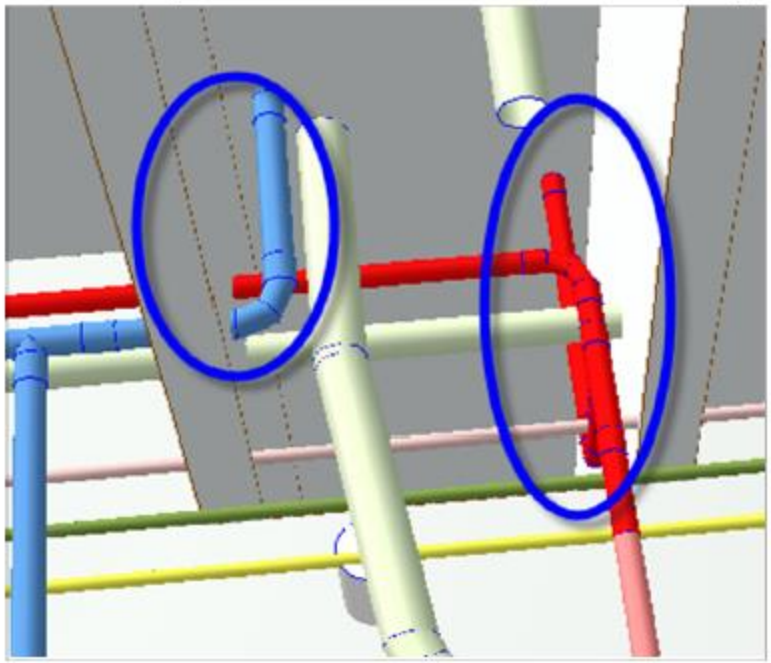
ID	INT-L-004	Trades Involved	A	Severity	Low
Description	Contradiction between scanned model and demolition first floor plan (A201.3). The position and the style of demolished walls are different on the scanned model, sketched drawing (3-reception room) and the demolition plan.				
Floor	First floor	Grid Reference	NJ-J1/8-N.08	Sheet Reference	A201.3

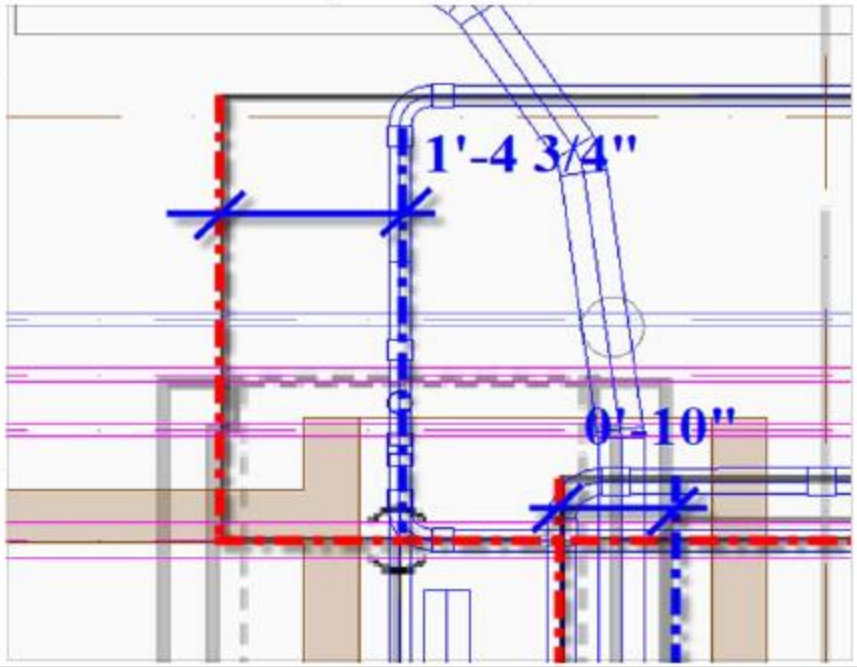






ID	MEP-K-004	Trades Involved	AP	Severity	Medium
Description	Clashes between 5 1/4" interior wall, 2" domestic hot water return pipe, 4" pneumatic tube pipe, and 2 1/2" domestic cold water pipe.				
Floor	First floor	Grid Reference	E5M-J/7-8	Sheet Reference	P211.3C; A211.3B





Modeling Assumption	DHWR was shifted to east with the distance of 1'-4 3/4", DCW pipe was shifted to west with the distance of 10" to avoid clashes.

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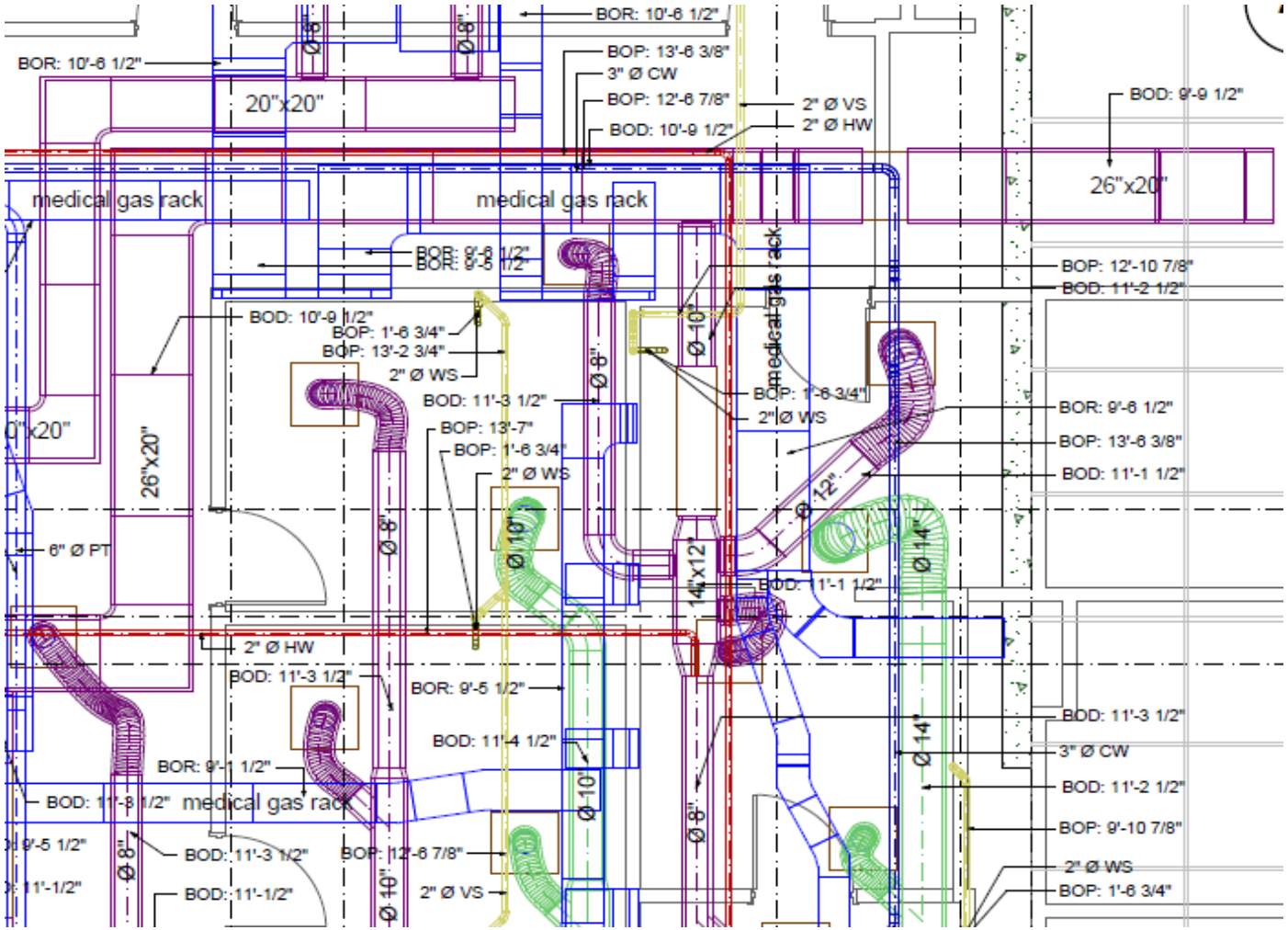

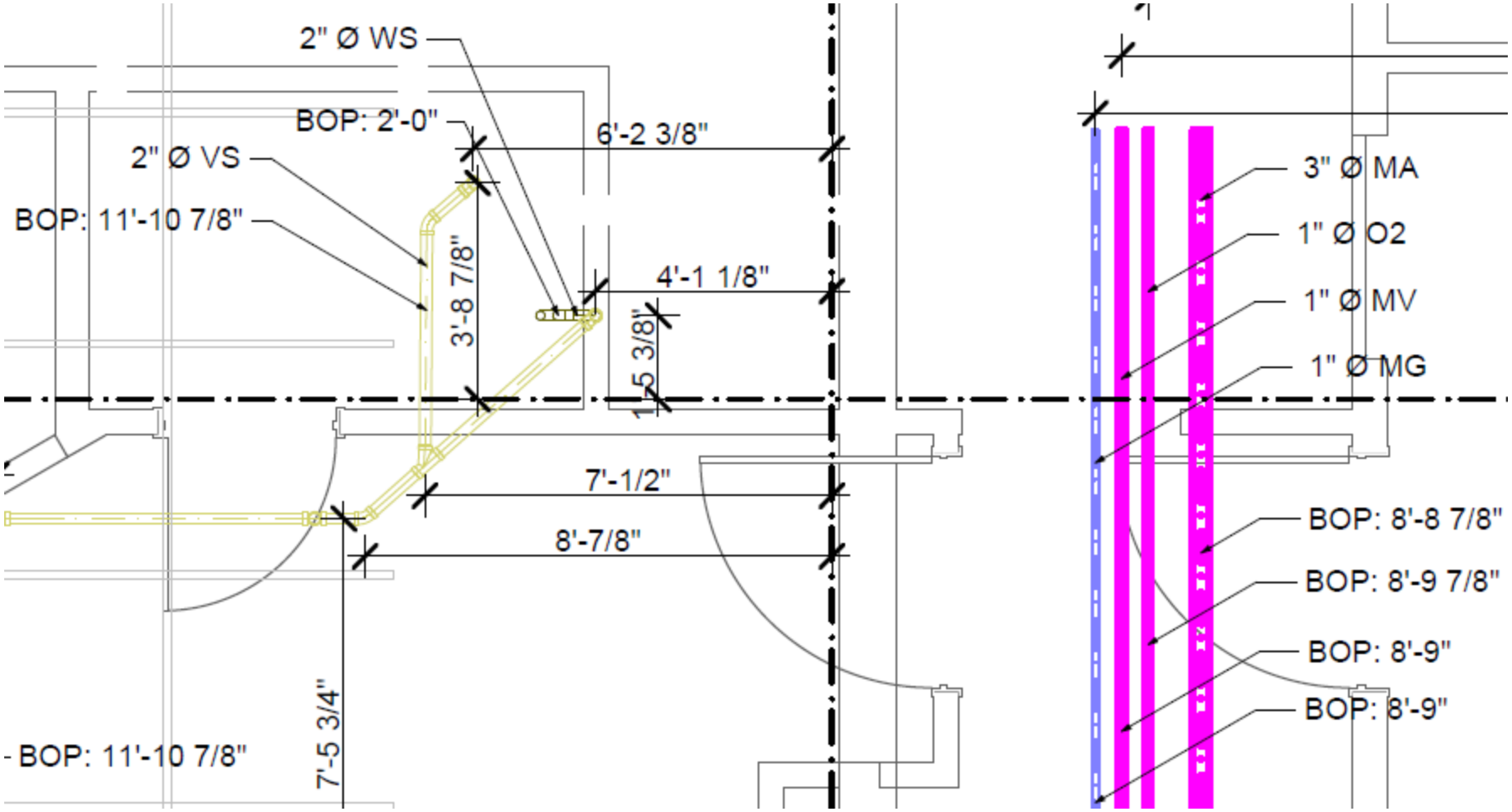
2" Ø WS
BOP: 2'-0"
2" Ø VS
BOP: 11'-10 7/8"
6'-2 3/8"
3'-8 7/8"
4'-1 1/8"
1'-5 3/8"
7'-1/2"
8'-7/8"
7'-5 3/4"
BOP: 11'-10 7/8"
3" Ø MA
1" Ø O2
1" Ø MV
1" Ø MG
BOP: 8'-8 7/8"
BOP: 8'-9 7/8"
BOP: 8'-9"
BOP: 8'-9"

Process – 4D BIM:

- *Takeoff items broken down by: Project phase, element status, MEPF system*
- *Existing CPM activities put into Vico tasks*
- *Takeoff items linked to 'cost plan' items to quantify construction activities*
- *CPM match using quantity loaded tasks*
- *On-site review meetings*

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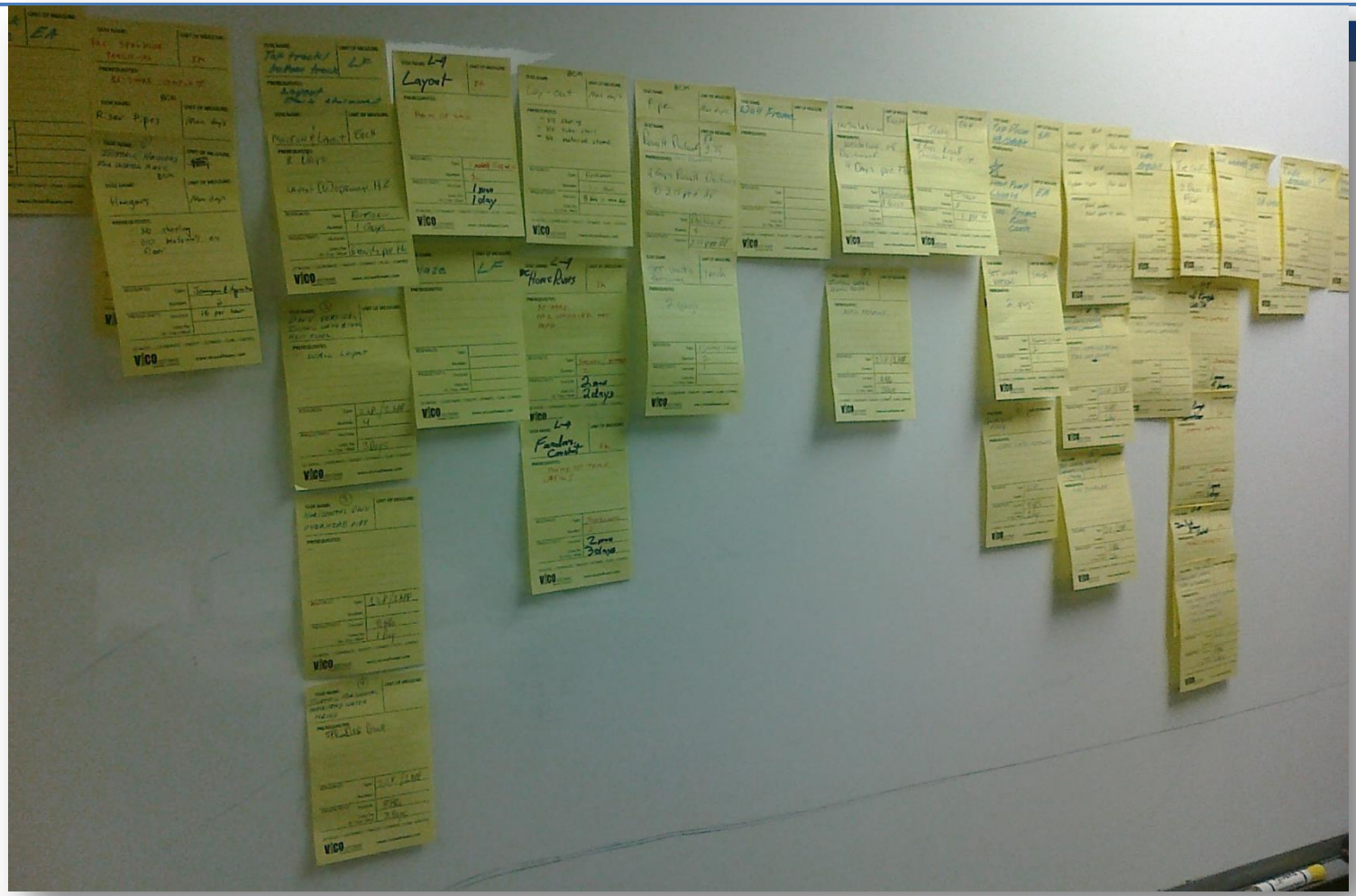

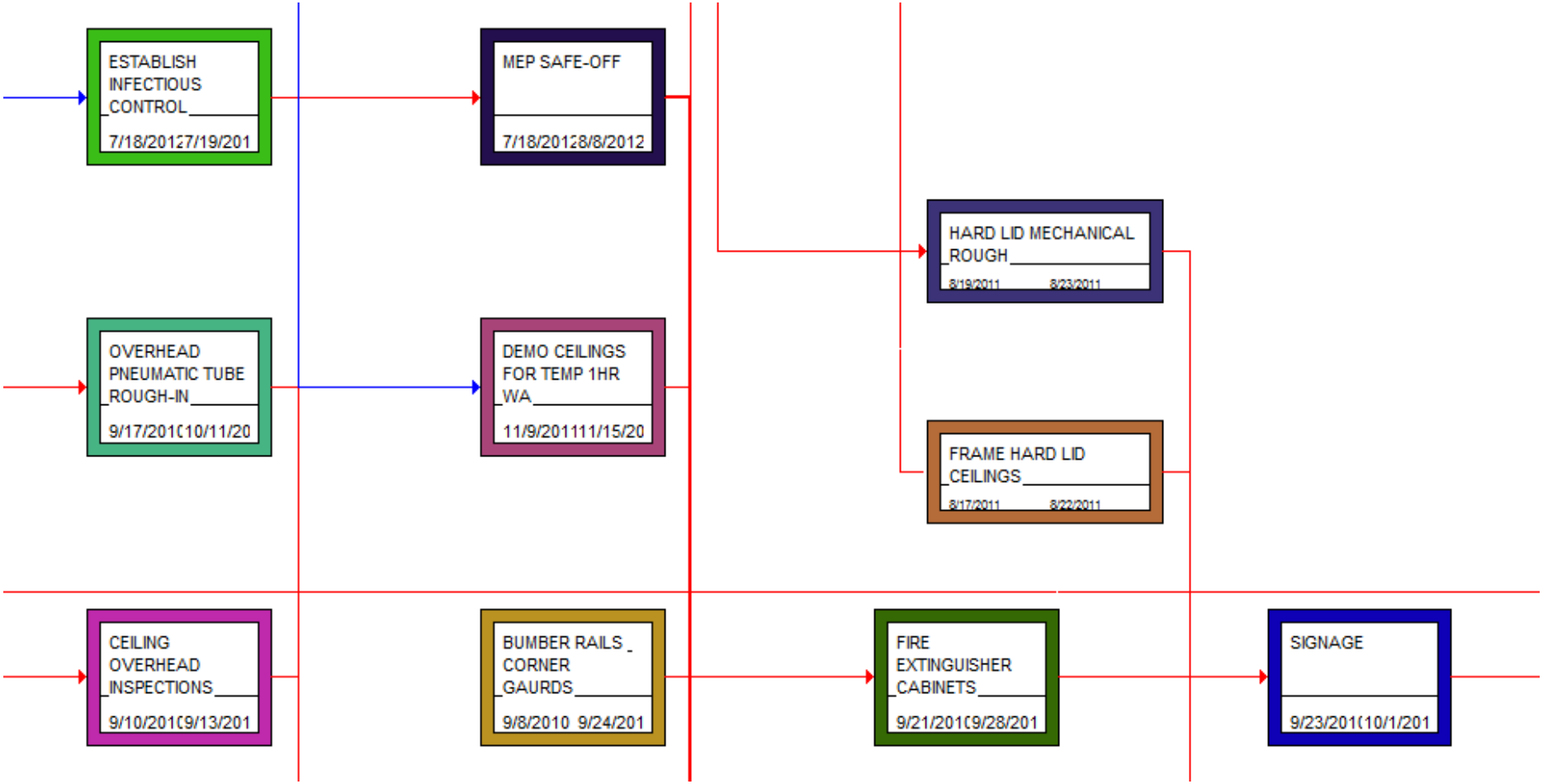
ESTABLISH INFECTIOUS CONTROL
7/18/2012 7/19/201
MEP SAFE-OFF
7/18/2012 8/8/2012
HARD LID MECHANICAL ROUGH
8/19/2011 8/23/2011
OVERHEAD PNEUMATIC TUBE ROUGH-IN
9/17/2010 10/11/20
DEMO CEILINGS FOR TEMP 1HR WA
11/9/2011 11/15/20
FRAME HARD LID CEILINGS
8/17/2011 8/22/2011
CEILING OVERHEAD INSPECTIONS
9/10/2010 9/13/201
BUMBER RAILS _ CORNER GAURDS
9/8/2010 9/24/201
FIRE EXTINGUISHER CABINETS
9/21/2010 9/28/201
SIGNAGE
9/23/2010 10/1/201

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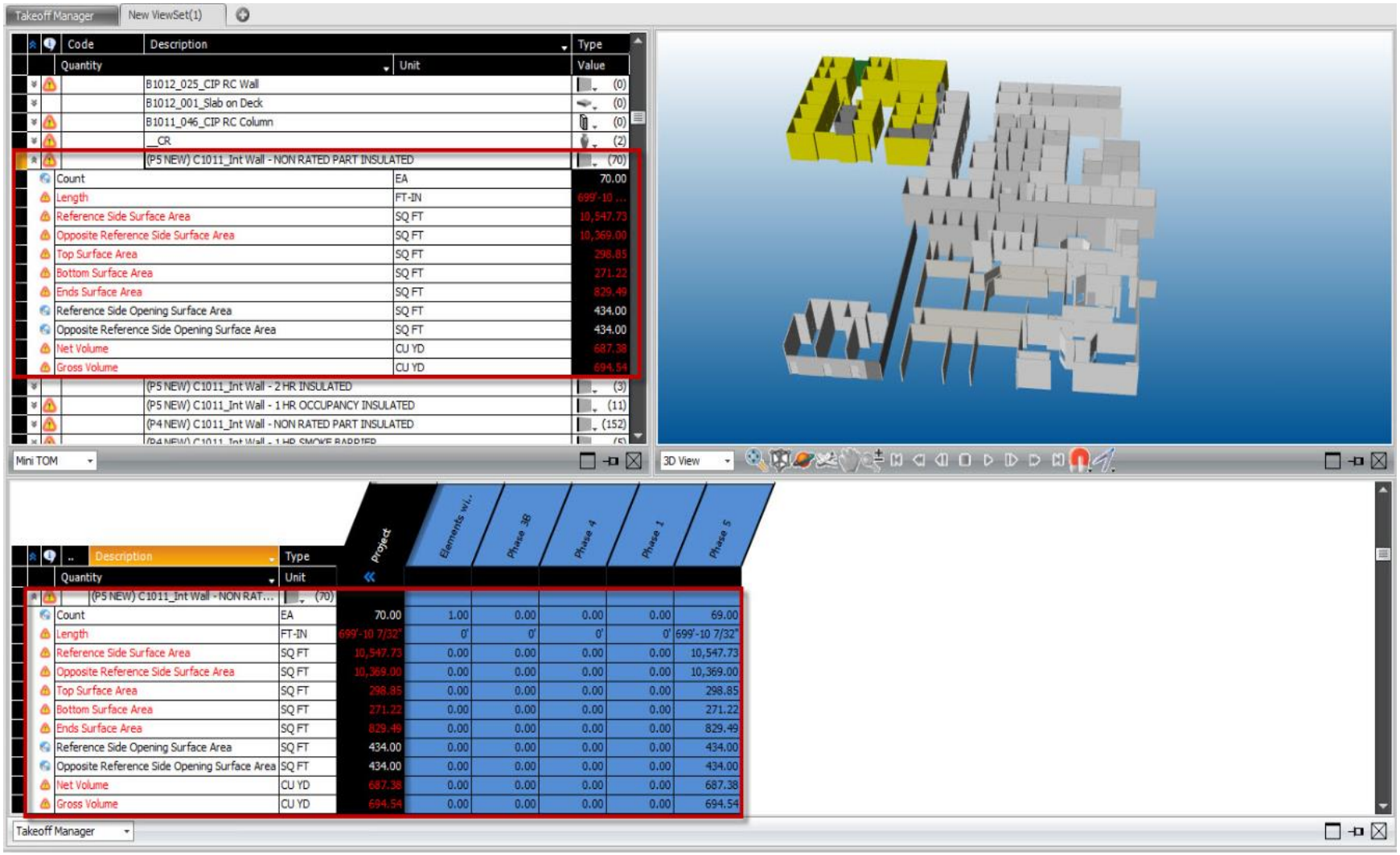
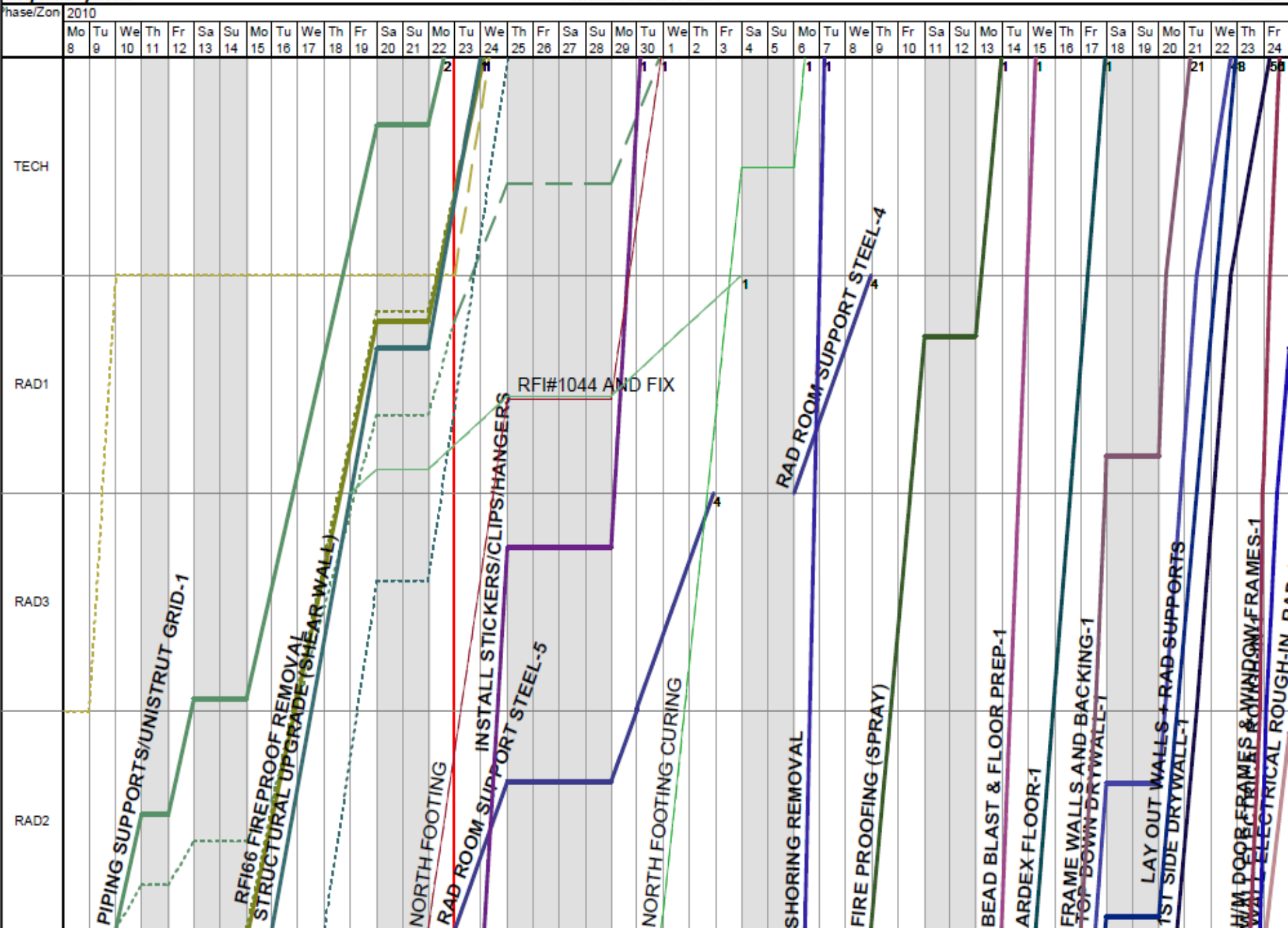


Flowline view / Phase 3B — version 11/22/2010 22:44

Responsible person:

Hoag_ICU and Imaging

Planner:



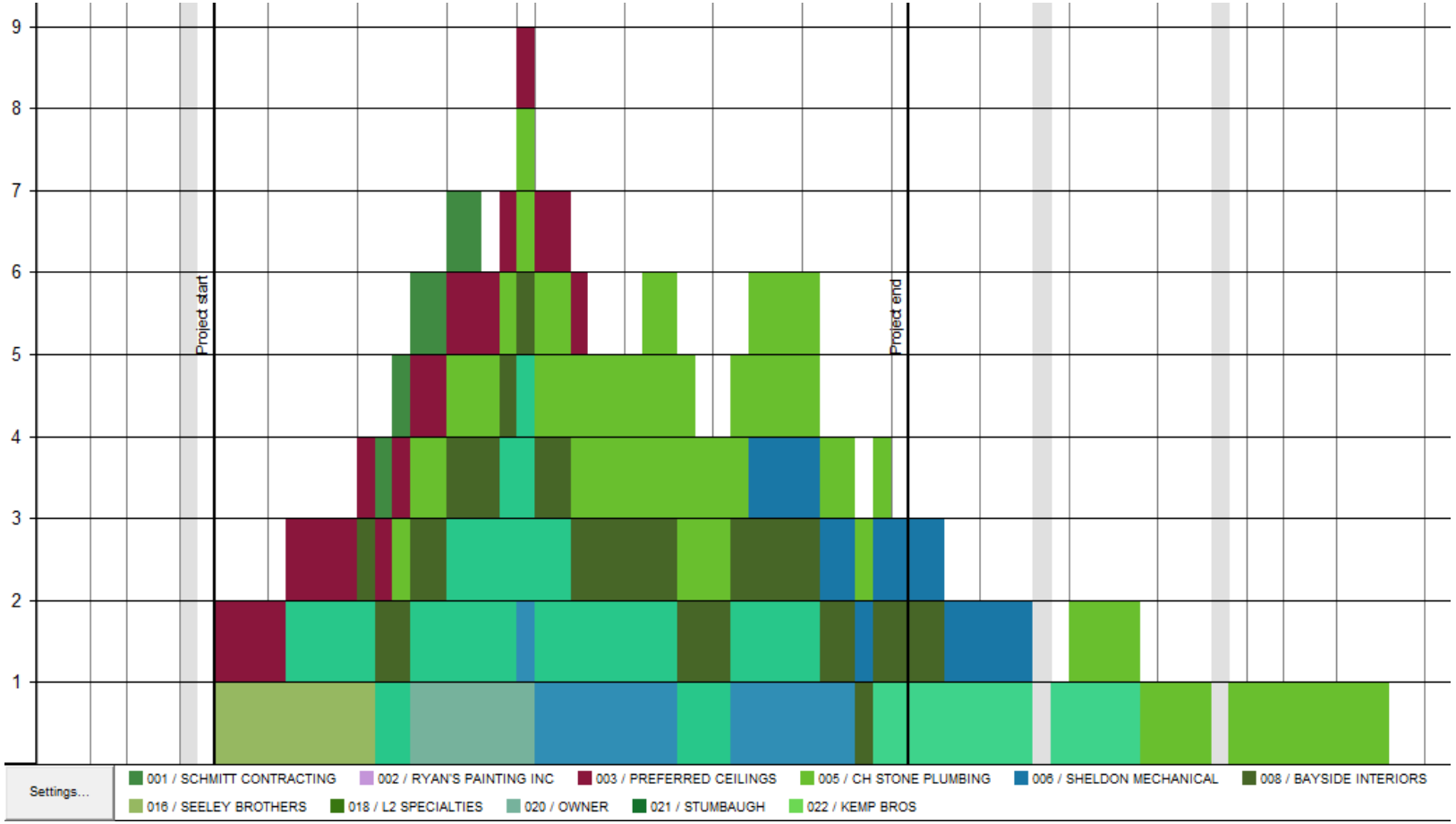
Process – Production Control:

- *Simulation presented to site team for validation of sequencing = revisions!*
- *CPM schedule durations, now quantity loaded, to site team for validation = revisions!*
- *Manpower loading of activities*
- *Production control roll-out*

Production Control - Deliverables:

- ***Vico Office*** *file, with coordinated design, element quantities and 4D tasks*
- ***Flowline*** *printouts, by phase*
- ***Gantt*** *printouts, by phase*
- ***Resource*** *histograms, by trade*
- ***Completion charts****, by trade*

Production Control - Deliverables:



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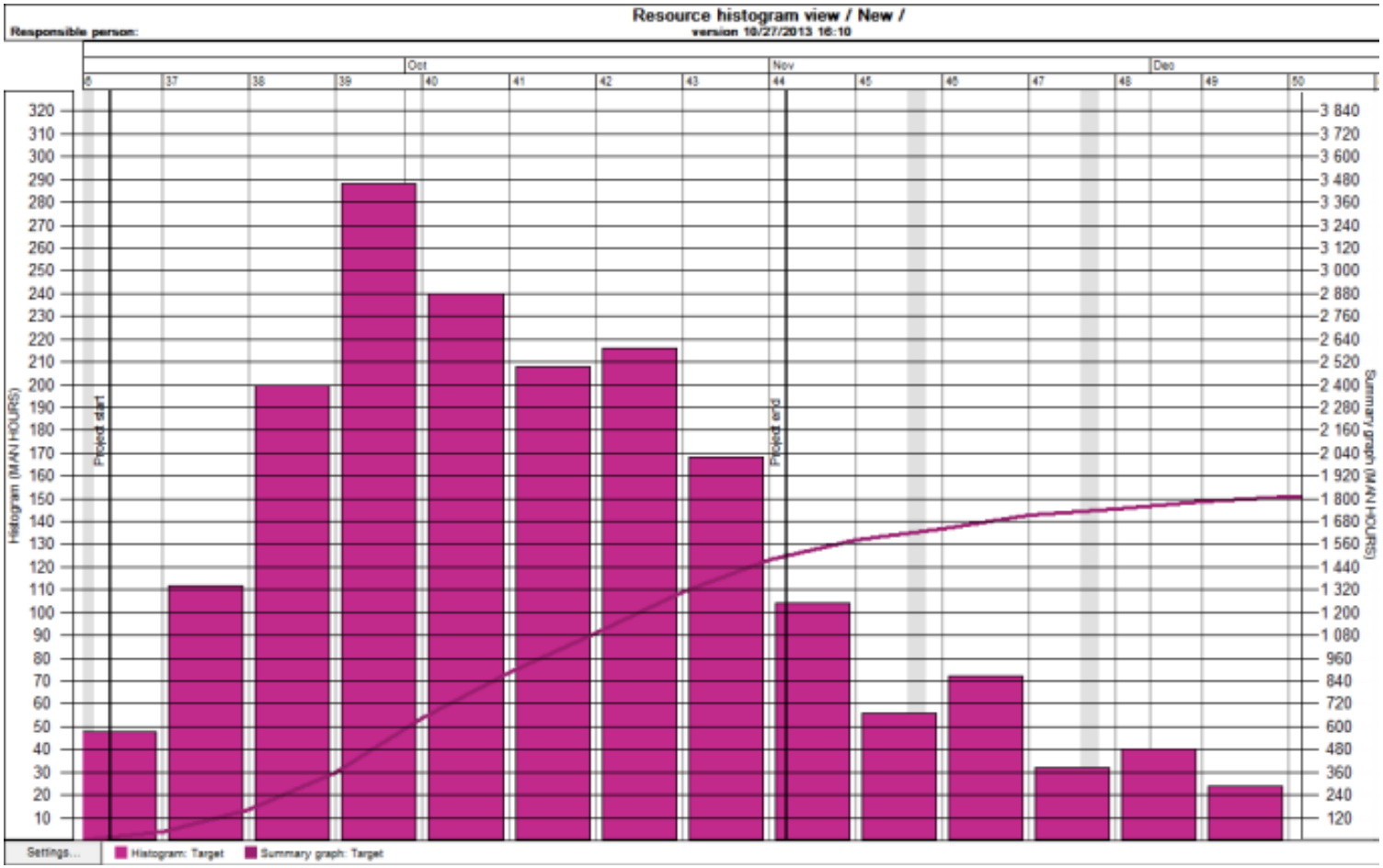
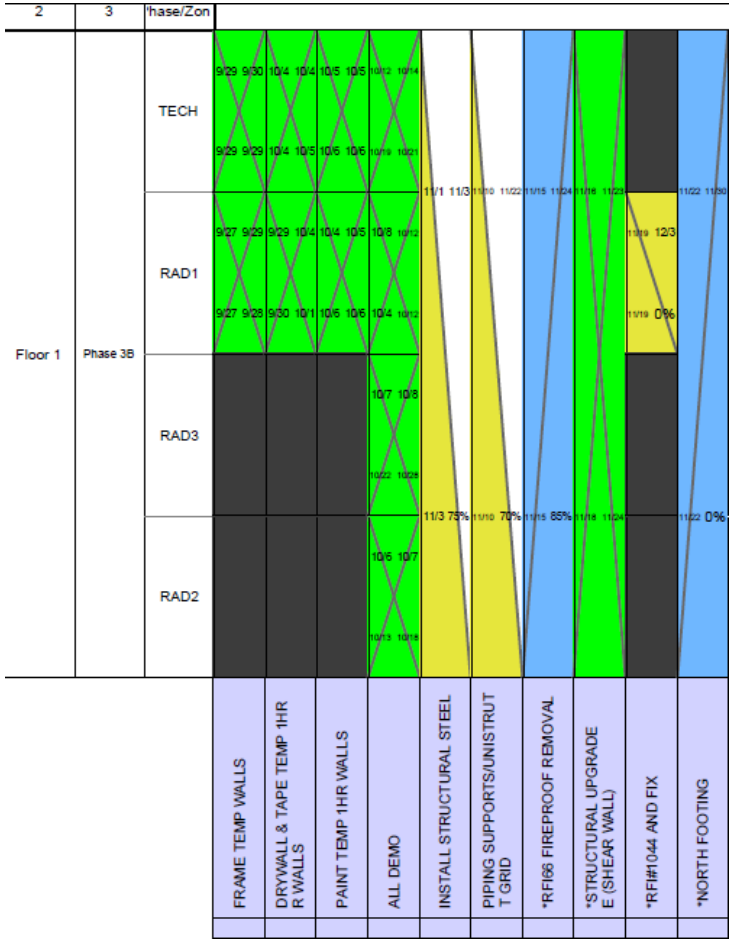


Production Control - Deliverables:



-3	PREFERRED CEILINGS								
	CEILING GRID-1								
	CEILING TILE-1								
	PATCH CEILINGS AT TEMP 1HR WALLS								
-4	CRAFTSMAN CONCRETE CUTTING								
	ALL DEMO				7	7	7	7	7
	DEMO FIXTURES & ACCESSORIES								
-4A	NEUBAUER ELECTRIC								
	IDENTIFICATION OF EXISTING					2			
	SAFE OFF				3	1	2		
	CUTOVER SYSTEMS TO REMAIN ONLINE								
	OVERHEAD ROUGH-IN								
	PANEL INSTALLATION AND TERMINATIONS								
-5	CH STONE PLUMBING								

File

Scan / Coordination - Benefits:

- ***3D Coordination***
  - ***Recognized*** *ETR, New and POC*
  - ***Recognized*** *phasing*
- ***System Priority Structure*** *driven coordination choices*
- *2D printouts for* ***non-BIM installers***

4D / Production Control - Benefits:

- *Flowline is **visual** (increased buy-in)*
- *Installation **simulations** (subs & staff)*
- *Quantity loaded tasks = **reality check!***
- ***Clarity** on project status and risk*
- *Printouts for **non-BIM installers***

Lessons Learned:

- ***Plan, Plan & Plan*** *(scanning)*
  - *Have a **backup** plan!*
- *Realistic and agreed upon **expectations***
- *Over **communicate** (VDC, GC, Subs, staff)*
- *Identify and focus on **priority elements***
- ***Small** goals / milestones*
- ***Buy-in***

Thank You!!

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On: LinkedIn