# BIM Execution Plans That Are Actually Executable

Nick Dyer

Integrated Construction Manager

# Course Introduction

- Description
  - Many of our BIM Execution Plans (BEPs) are full of software requirements, file type requirements, and upload requirements. By the time it’s all on paper, you have a document full of requirements and no actions. In this session, we’ll present strategies and lessons learned in creating a BEP that is actionable and still holds everyone accountable to the guidelines needed to create a successful coordination phase of construction. Go beyond a glorified CAD management plan and clash assignments to create shared success for all project stakeholders.

# Course Introduction

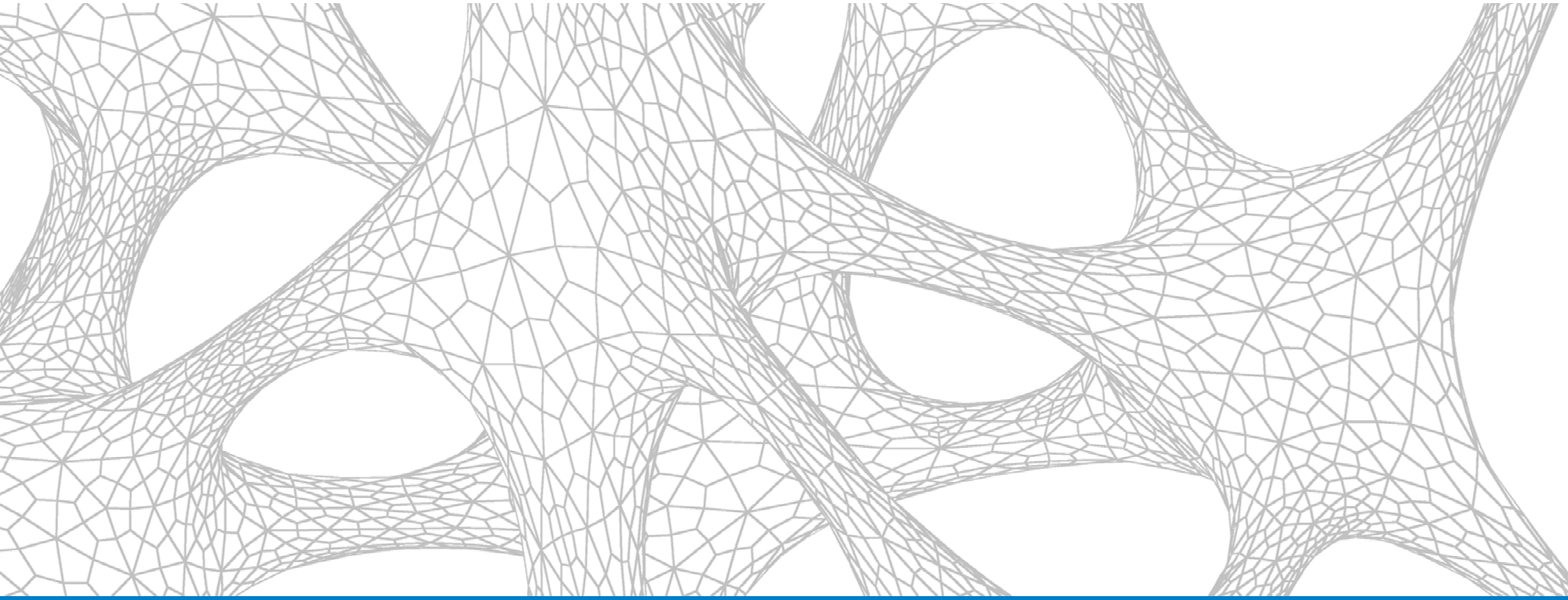
- Learning Objectives
  - Learn how to create BIM Execution Plans that are scalable to project requirements
  - Learn how to create BIM Execution Plans that can be used for both design and construction coordination
  - Learn how to incorporate BIM Execution Plan elements into contracts
  - Learn how to plan and hold contextual meetings to increase coordination productivity

# Introductions

- Nick Dyer
  - I have been with Okland Construction for the past 6 years. I have been working mostly on health care and higher education projects, with some others sprinkled in-between. I have worked on projects in Utah, Arizona, Idaho, Colorado, and Hawaii.
- Okland Construction
  - Okland Construction Company was founded in 1918 in Salt Lake city, Utah. We have offices in Salt Lake City, Utah, Tempe, AZ and Boise, ID and currently have active projects in 19 states. We are a general contractor and have built or are building just about anything you can think of.

# Introductions

- Our BIM Tool Bag
  - We use a variety of different tools, but in this course we will be focusing on the use of Revit, Navisworks Manage, and BIM 360 Glue.



# Creating BIM Execution Plans that are scalable: What's on the Menu?

# What is the purpose of a BIM Execution Plan?

- Modeling Practice?
- Communication Exercise?
- Both?
- Neither?

# What is the purpose of a BIM Execution Plan?

- Common terminology says a BIM Execution Plan (BEP) should define who does what, when they do it, and where they do it.
  - The Model is a tool to keep track of issues and decisions.

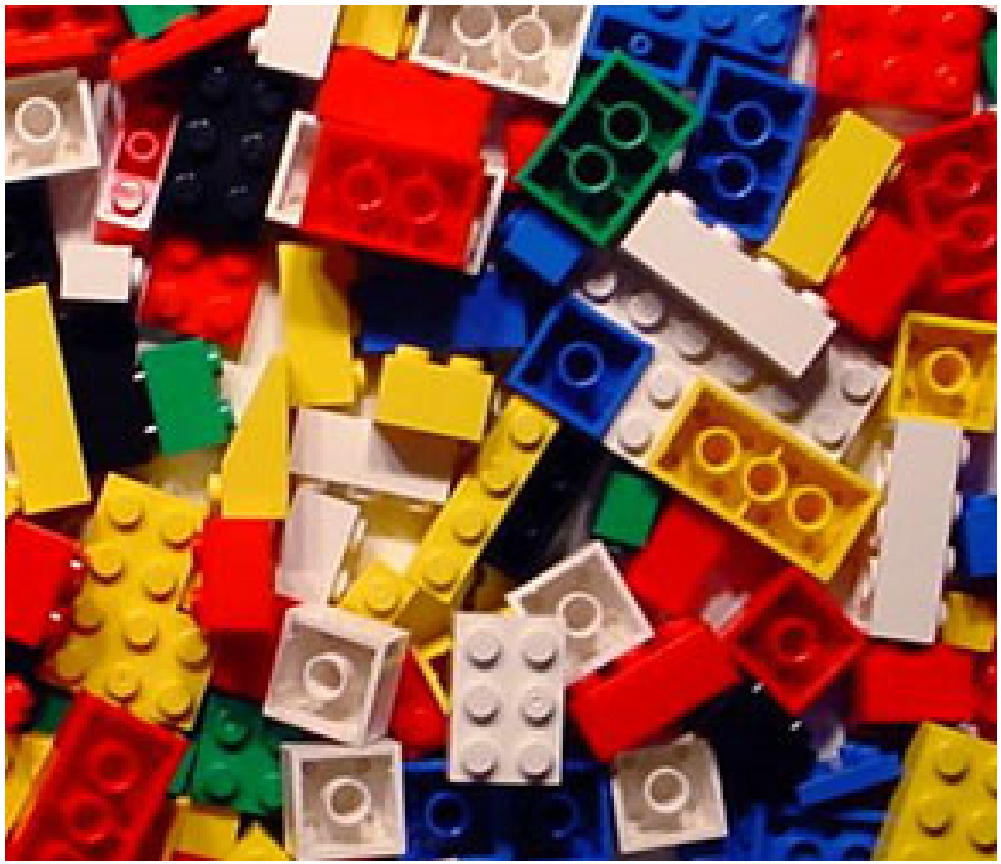
# 3D Coordination Phases

- Phase I: Pre-Construction/Design Coordination
- Phase II: Construction Coordination
- Phase III: Record Model/Final Deliverable

- Questions
  - What phases do need for your project?
  - What phases do you have the opportunity to perform?

# Building your BEP Template

- Your template contains the parts and pieces you need to build your project specific BIM Execution Plan.
- Questions to keep in mind
  - What does my project need?
  - What do I have the opportunity to do?
  - What is the goal of my plan?



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# Building you BEP Template

- Phase I and Phase II
  - Administration
  - Modeling Requirements
  - Clashing Procedure
  - Meetings
- Phase III
  - Final Deliverables
- Administration
  - Roles
  - Coordination Schedule
  - Modeling Responsibilities
  - Model Ownership & Copyright
  - Coordination Meetings

# Roles

- Owner or Owner's rep
- Design Team
- Design Team Modelers
- Project Manager
- Superintendent
- BIM Manager
- Subcontractor Superintendent
- Subcontractor Modeler

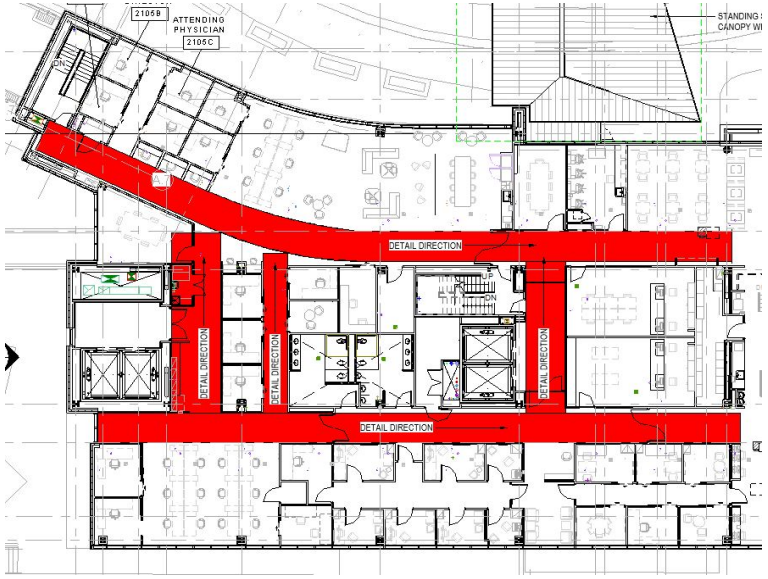
- Questions
  - Who should participate?
  - What is their role?
  - How detailed are their roles?

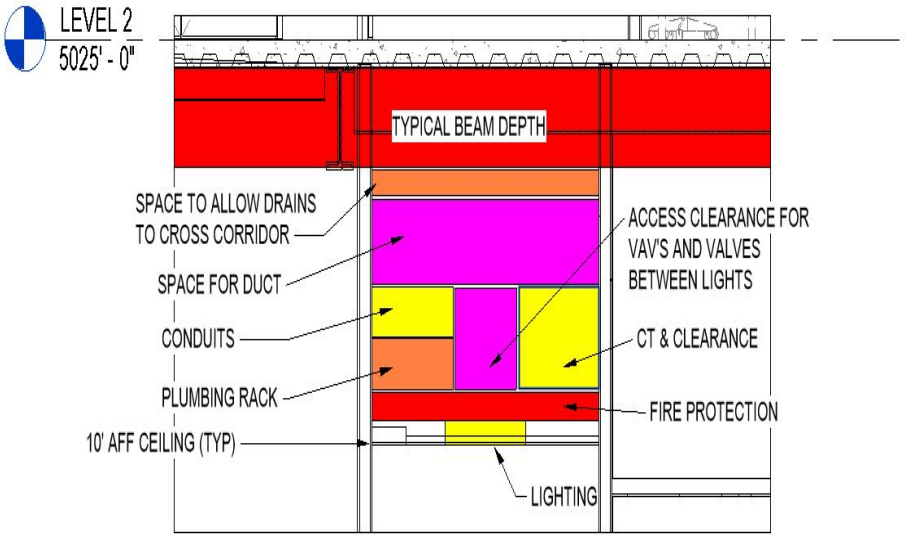
# Design Coordination Schedule

- When should we start?
  - Starting to early means there is nothing to talk about
  - Starting to late means their isn’t enough time
- Good Rules of thumb
  - 100% Design Development
  - 50% Construction Documents
  - 100% Construction Documents starts the Construction Coordination Process

# Design Coordination Schedule

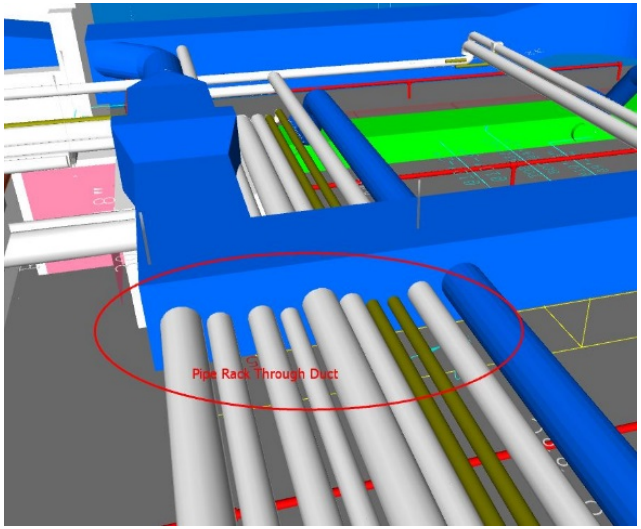
- 100% Design Development
  - Rules of the Road



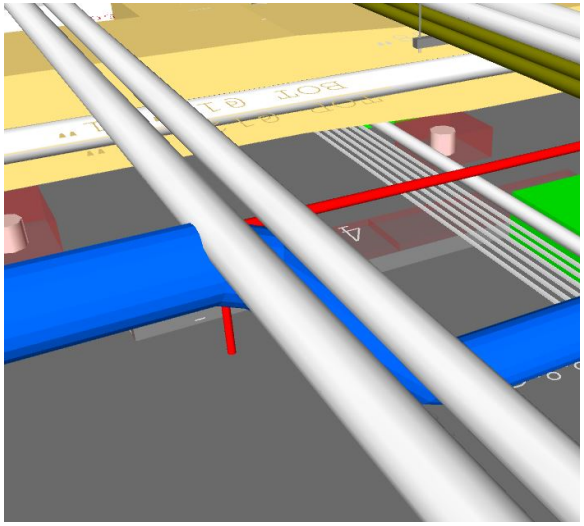



# Design Coordination Schedule

- 50% Construction Documents
  - Start Looking at Specific Clashes




Clash to be addressed



Clash that can be ignored, for now

# Construction Coordination Schedule

- Work Backwards

| Level / Location | Construction Start |
|---|---|
| **Building 1** | |
| Basement | 1/5/2018 |
| Level 01 | 2/2/2018 |
| Level 02 | 3/2/2018 |
| Level 03 | 4/6/2018 |
| Level 04 | 5/4/2018 |
| Level 05 | 6/1/2018 |
| Penthouse | 7/6/2018 |

# Construction Coordination Schedule

- What the earliest date you can get started

| Level / Location | Submit Equipment Submittal | Construction Start |
|---|---|---|
| **Building 1** | | |
| Basement | 10/16/2017 | 1/5/2018 |
| Level 01 | 10/16/2017 | 2/2/2018 |
| Level 02 | 10/16/2017 | 3/2/2018 |
| Level 03 | 10/16/2017 | 4/6/2018 |
| Level 04 | 10/16/2017 | 5/4/2018 |
| Level 05 | 10/16/2017 | 6/1/2018 |
| Penthouse | 10/16/2017 | 7/6/2018 |

# Construction Coordination Schedule

- Add all needed phases of Construction Coordination

| | EQ Submittal | | Content Modeling | | | | BIM Coordination | | | | Shop Drawing Process | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level / Location | Submit Equipment Submittal | Days | Start | Finish | Days | Model Upload | Coord. Start | Coord. Finish | Days | Model Sign-off | Shop Dwg Start | Shop Dwgs Finish | Days to generate SD | Shop Drawing Review Time | Material Fab & Procurement | Ready for Const. Start | Days | Construction Start |
| **Building 1** | | | | | | | | | | | | | | | | | | |
| Basement | 12/31/2017 | 1 | 1/1/2018 | 1/1/2018 | 0 | 1/2/2018 | 1/3/2018 | 1/3/2018 | 0 | 1/4/2018 | 1/5/2018 | 1/5/2018 | 0 | 0 | 0 | 1/5/2018 | 0 | 1/5/2018 |
| Level 01 | 1/28/2018 | 1 | 1/29/2018 | 1/29/2018 | 0 | 1/30/2018 | 1/31/2018 | 1/31/2018 | 0 | 2/1/2018 | 2/2/2018 | 2/2/2018 | 0 | 0 | 0 | 2/2/2018 | 0 | 2/2/2018 |
| Level 02 | 2/25/2018 | 1 | 2/26/2018 | 2/26/2018 | 0 | 2/27/2018 | 2/28/2018 | 2/28/2018 | 0 | 3/1/2018 | 3/2/2018 | 3/2/2018 | 0 | 0 | 0 | 3/2/2018 | 0 | 3/2/2018 |
| Level 03 | 4/1/2018 | 1 | 4/2/2018 | 4/2/2018 | 0 | 4/3/2018 | 4/4/2018 | 4/4/2018 | 0 | 4/5/2018 | 4/6/2018 | 4/6/2018 | 0 | 0 | 0 | 4/6/2018 | 0 | 4/6/2018 |
| Level 04 | 4/29/2018 | 1 | 4/30/2018 | 4/30/2018 | 0 | 5/1/2018 | 5/2/2018 | 5/2/2018 | 0 | 5/3/2018 | 5/4/2018 | 5/4/2018 | 0 | 0 | 0 | 5/4/2018 | 0 | 5/4/2018 |
| Level 05 | 5/27/2018 | 1 | 5/28/2018 | 5/28/2018 | 0 | 5/29/2018 | 5/30/2018 | 5/30/2018 | 0 | 5/31/2018 | 6/1/2018 | 6/1/2018 | 0 | 0 | 0 | 6/1/2018 | 0 | 6/1/2018 |
| Penthouse | 7/1/2018 | 1 | 7/2/2018 | 7/2/2018 | 0 | 7/3/2018 | 7/4/2018 | 7/4/2018 | 0 | 7/5/2018 | 7/6/2018 | 7/6/2018 | 0 | 0 | 0 | 7/6/2018 | 0 | 7/6/2018 |

# Construction Coordination Schedule

- Add typical durations to all areas

| | EQ Submittal | | Content Modeling | | | | BIM Coordination | | | | Shop Drawing Process | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level / Location | Submit Equipment Submittal | Days | Start | Finish | Days | Model Upload | Coord. Start | Coord. Finish | Days | Model Sign-off | Shop Dwg Start | Shop Dwgs Finish | Days to generate SD | Shop Drawing Review Time | Material Fab & Procurement | Ready for Const. Start | Days | Construction Start |
| **Building 1** | | | | | | | | | | | | | | | | | | |
| Basemer | 10/9/2017 | 21 | 10/30/2017 | 11/13/2017 | 14 | 11/14/2017 | 11/15/2017 | 12/6/2017 | 21 | 12/7/2017 | 12/8/2017 | 12/22/2017 | 14 | 7 | 7 | 1/5/2018 | 0 | 1/5/2018 |
| Level 01 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 21 | 2/2/2018 |
| Level 02 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 49 | 3/2/2018 |
| Level 03 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 84 | 4/6/2018 |
| Level 04 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/19/2017 | 12/10/2017 | 21 | 12/11/2017 | 12/12/2017 | 12/26/2017 | 14 | 7 | 7 | 1/9/2018 | 115 | 5/4/2018 |
| Level 05 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 140 | 6/1/2018 |
| Penthouse | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 175 | 7/6/2018 |

# Construction Coordination Schedule

- What can be done about the bust?

| | EQ Submittal | | Content Modeling | | | | BIM Coordination | | | | Shop Drawing Process | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level / Location | Submit Equipment Submittal | Days | Start | Finish | Days | Model Upload | Coord. Start | Coord. Finish | Days | Model Sign-off | Shop Dwg Start | Shop Dwgs Finish | Days to generate SD | Shop Drawing Review Time | Material Fab & Procurement | Ready for Const. Start | Days | Construction Start |
| **Building 1** | | | | | | | | | | | | | | | | | | |
| Basement | 10/16/2017 | 14 | 10/30/2017 | 11/13/2017 | 14 | 11/14/2017 | 11/15/2017 | 12/6/2017 | 21 | 12/7/2017 | 12/8/2017 | 12/22/2017 | 14 | 7 | 7 | 1/5/2018 | 0 | 1/5/2018 |
| Level 01 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 21 | 2/2/2018 |
| Level 02 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 49 | 3/2/2018 |
| Level 03 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 84 | 4/6/2018 |
| Level 04 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/19/2017 | 12/10/2017 | 21 | 12/11/2017 | 12/12/2017 | 12/26/2017 | 14 | 7 | 7 | 1/9/2018 | 115 | 5/4/2018 |
| Level 05 | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 140 | 6/1/2018 |
| Penthouse | 10/16/2017 | 21 | 11/6/2017 | 11/20/2017 | 14 | 11/21/2017 | 11/22/2017 | 12/13/2017 | 21 | 12/14/2017 | 12/15/2017 | 12/29/2017 | 14 | 7 | 7 | 1/12/2018 | 175 | 7/6/2018 |

# Construction Coordination Schedule

- What can be done with the float?

| | EQ Submittal | | Content Modeling | | | | BIM Coordination | | | | Shop Drawing Process | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Level / Location | Submit Equipment Submittal | Days | Start | Finish | Days | Model Upload | Coord. Start | Coord. Finish | Days | Model Sign-off | Shop Dwg Start | Shop Dwgs Finish | Days to generate SD | Shop Drawing Review Time | Material Fab & Procurement | Ready for Const. Start | Days | Construction Start |
| **Building 1** | | | | | | | | | | | | | | | | | | |
| Basement | 10/16/2017 | 14 | 10/30/2017 | 11/13/2017 | 14 | 11/14/2017 | 11/15/2017 | 12/6/2017 | 21 | 12/7/2017 | 12/8/2017 | 12/22/2017 | 14 | 7 | 7 | 1/5/20 | 8 | 0 | 1/5/2018 |
| Level 01 | 10/30/2017 | 21 | 11/20/2017 | 12/4/2017 | 14 | 12/5/2017 | 12/6/2017 | 12/27/2017 | 21 | 12/28/2017 | 12/29/2017 | 1/12/2018 | 14 | 7 | 7 | 1/26/20 | 8 | 7 | 2/2/2018 |
| Level 02 | 11/27/2017 | 21 | 12/18/2017 | 1/1/2018 | 14 | 1/2/2018 | 1/3/2018 | 1/24/2018 | 21 | 1/25/2018 | 1/26/2018 | 2/9/2018 | 14 | 7 | 7 | 2/23/20 | 8 | 7 | 3/2/2018 |
| Level 03 | 1/1/2018 | 21 | 1/22/2018 | 2/5/2018 | 14 | 2/6/2018 | 2/7/2018 | 2/28/2018 | 21 | 3/1/2018 | 3/2/2018 | 3/16/2018 | 14 | 7 | 7 | 3/30/20 | 8 | 7 | 4/6/2018 |
| Level 04 | 1/29/2018 | 21 | 2/19/2018 | 3/5/2018 | 14 | 3/6/2018 | 3/7/2018 | 3/28/2018 | 21 | 3/29/2018 | 3/30/2018 | 4/13/2018 | 14 | 7 | 7 | 4/27/20 | 8 | 7 | 5/4/2018 |
| Level 05 | 2/26/2018 | 21 | 3/19/2018 | 4/2/2018 | 14 | 4/3/2018 | 4/4/2018 | 4/25/2018 | 21 | 4/26/2018 | 4/27/2018 | 5/11/2018 | 14 | 7 | 7 | 5/25/20 | 8 | 7 | 6/1/2018 |
| Penthouse | 4/2/2018 | 21 | 4/23/2018 | 5/7/2018 | 14 | 5/8/2018 | 5/9/2018 | 5/30/2018 | 21 | 5/31/2018 | 6/1/2018 | 6/15/2018 | 14 | 7 | 7 | 6/29/20 | 8 | 7 | 7/6/2018 |

# Construction Coordination Schedule

- Model sign-off and start of next area need to be about the same

| | BIM Coordination | | | |
|---|---|---|---|---|
| Model Upload | Coord. Start | Coord. Finish | Days | Model Sign-off |
| | | | | |
| [illegible] | [illegible] | 12/6/2017 | 21 | 12/7/2017 |
| 12/5/2017 | 12/6/2017 | 12/27/2017 | 21 | [illegible] |
| [illegible] | [illegible] | 1/24/2018 | 21 | 1/25/2018 |
| 2/6/2018 | 2/7/2018 | 2/28/2018 | 21 | 3/1/2018 |
| 3/6/2018 | 3/7/2018 | 3/28/2018 | 21 | 3/29/2018 |
| 4/3/2018 | 4/4/2018 | 4/25/2018 | 21 | 4/26/2018 |
| 5/8/2018 | 5/9/2018 | 5/30/2018 | 21 | 5/31/2018 |

# Construction Coordination Schedule

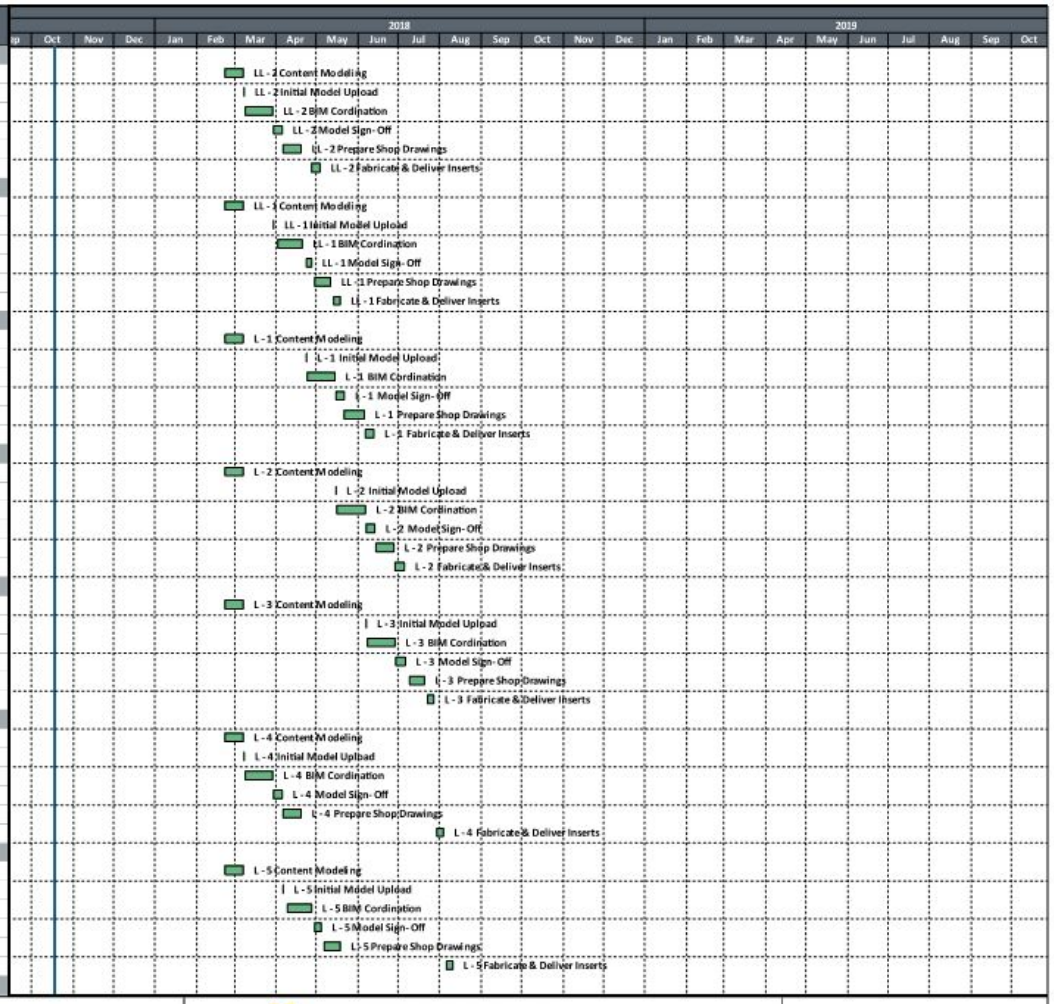
- Adjust float accordingly

| Level / Location | EQ Submittal | | Content Modeling | | | | BIM Coordination | | | | Shop Drawing Process | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Submit Equipment Submittal | Days | Start | Finish | Days | Model Upload | Coord. Start | Coord. Finish | Days | Model Sign-off | Shop Dwg Start | Shop Dwgs Finish | Days to generate SD | Shop Drawing Review Time | Material Fab & Procurement | Ready for Const. Start | Days | Construction Start |
| **Building 1** | | | | | | | | | | | | | | | | | | |
| Basement | 10/16/2017 | 14 | 10/30/2017 | 11/13/2017 | 14 | 11/14/2017 | 11/15/2017 | 12/6/2017 | 21 | 12/7/2017 | 12/8/2017 | 12/22/2017 | 14 | 7 | 7 | 1/5/20 | 0 | 1/5/2018 |
| Level 01 | 10/30/2017 | 21 | 11/20/2017 | 12/4/2017 | 14 | 12/5/2017 | 12/6/2017 | 12/27/2017 | 21 | 12/28/2017 | 12/29/2017 | 1/12/2018 | 14 | 7 | 7 | 1/26/20 | 7 | 2/2/2018 |
| Level 02 | 11/21/2017 | 21 | 12/12/2017 | 12/26/2017 | 14 | 12/27/2017 | 12/28/2017 | 1/18/2018 | 21 | 1/19/2018 | 1/20/2018 | 2/3/2018 | 14 | 7 | 7 | 2/17/20 | 13 | 3/2/2018 |
| Level 03 | 12/12/2017 | 21 | 1/2/2018 | 1/16/2018 | 14 | 1/17/2018 | 1/18/2018 | 2/8/2018 | 21 | 2/9/2018 | 2/10/2018 | 2/24/2018 | 14 | 7 | 7 | 3/10/20 | 27 | 4/6/2018 |
| Level 04 | 1/2/2018 | 21 | 1/23/2018 | 2/6/2018 | 14 | 2/7/2018 | 2/8/2018 | 3/1/2018 | 21 | 3/2/2018 | 3/3/2018 | 3/17/2018 | 14 | 7 | 7 | 3/31/20 | 34 | 5/4/2018 |
| Level 05 | 1/23/2018 | 21 | 2/13/2018 | 2/27/2018 | 14 | 2/28/2018 | 3/1/2018 | 3/22/2018 | 21 | 3/23/2018 | 3/24/2018 | 4/7/2018 | 14 | 7 | 7 | 4/21/20 | 41 | 6/1/2018 |
| Penthouse | 2/13/2018 | 21 | 3/6/2018 | 3/20/2018 | 14 | 3/21/2018 | 3/22/2018 | 4/12/2018 | 21 | 4/13/2018 | 4/14/2018 | 4/28/2018 | 14 | 7 | 7 | 5/12/20 | 55 | 7/6/2018 |

# Co

- C

| Activity ID | Activity Name | Rem Dur | Start | Finish |
|---|---|---|---|---|
| Lower Level 2 | | | | |
| E.2060 | LL - 2 Content Modeling | 10 | 22-Feb-18 | 07-Mar-18 |
| E.2070 | LL - 2 Initial Model Upload | 1 | 08-Mar-18 | 08-Mar-18 |
| E.2080 | LL - 2 BIM Cordination | 15 | 09-Mar-18 | 29-Mar-18 |
| E.2090 | LL - 2 Model Sign- Off | 5 | 30-Mar-18 | 05-Apr-18 |
| E.2100 | LL - 2 Prepare Shop Drawings | 10 | 06-Apr-18 | 19-Apr-18 |
| E.2110 | LL - 2 Fabricate & Deliver Inserts | 5 | 27-Apr-18 | 03-May-18 |
| Lower Level 1 | | | | |
| E.2120 | LL - 1 Content Modeling | 10 | 22-Feb-18 | 07-Mar-18 |
| E.2130 | LL - 1 Initial Model Upload | 1 | 30-Mar-18 | 30-Mar-18 |
| E.2140 | LL - 1 BIM Cordination | 15 | 02-Apr-18 | 20-Apr-18 |
| E.2150 | LL - 1 Model Sign- Off | 5 | 23-Apr-18 | 27-Apr-18 |
| E.2160 | LL - 1 Prepare Shop Drawings | 10 | 30-Apr-18 | 11-May-18 |
| E.2170 | LL - 1 Fabricate & Deliver Inserts | 5 | 14-May-18 | 18-May-18 |
| Level 1 | | | | |
| E.2180 | L - 1 Content Modeling | 10 | 22-Feb-18 | 07-Mar-18 |
| E.2190 | L - 1 Initial Model Upload | 1 | 23-Apr-18 | 23-Apr-18 |
| E.2200 | L - 1 BIM Cordination | 15 | 24-Apr-18 | 14-May-18 |
| E.2210 | L - 1 Model Sign- Off | 5 | 15-May-18 | 21-May-18 |
| E.2220 | L - 1 Prepare Shop Drawings | 10 | 22-May-18 | 05-Jun-18 |
| E.2230 | L - 1 Fabricate & Deliver Inserts | 5 | 06-Jun-18 | 12-Jun-18 |
| Level 2 | | | | |
| E.2240 | L - 2 Content Modeling | 10 | 22-Feb-18 | 07-Mar-18 |
| E.2250 | L - 2 Initial Model Upload | 1 | 15-May-18 | 15-May-18 |
| E.2260 | L - 2 BIM Cordination | 15 | 16-May-18 | 06-Jun-18 |
| E.2270 | L - 2 Model Sign- Off | 5 | 07-Jun-18 | 13-Jun-18 |
| E.2280 | L - 2 Prepare Shop Drawings | 10 | 14-Jun-18 | 27-Jun-18 |
| E.2290 | L - 2 Fabricate & Deliver Inserts | 5 | 28-Jun-18 | 05-Jul-18 |
| Level 3 | | | | |
| E.2300 | L - 3 Content Modeling | 10 | 22-Feb-18 | 07-Mar-18 |
| E.2310 | L - 3 Initial Model Upload | 1 | 07-Jun-18 | 07-Jun-18 |
| E.2320 | L - 3 BIM Cordination | 15 | 08-Jun-18 | 28-Jun-18 |
| E.2330 | L - 3 Model Sign- Off | 5 | 29-Jun-18 | 06-Jul-18 |
| E.2340 | L - 3 Prepare Shop Drawings | 10 | 09-Jul-18 | 20-Jul-18 |
| E.2350 | L - 3 Fabricate & Deliver Inserts | 5 | 23-Jul-18 | 27-Jul-18 |
| Level 4 | | | | |
| E.2360 | L - 4 Content Modeling | 10 | 22-Feb-18 | 07-Mar-18 |
| E.2370 | L - 4 Initial Model Upload | 1 | 08-Mar-18 | 08-Mar-18 |
| E.2380 | L - 4 BIM Cordination | 15 | 09-Mar-18 | 29-Mar-18 |
| E.2390 | L - 4 Model Sign- Off | 5 | 30-Mar-18 | 05-Apr-18 |
| E.2400 | L - 4 Prepare Shop Drawings | 10 | 06-Apr-18 | 19-Apr-18 |
| E.2410 | L - 4 Fabricate & Deliver Inserts | 5 | 30-Jul-18 | 03-Aug-18 |
| Level 5 | | | | |
| E.2420 | L - 5 Content Modeling | 10 | 22-Feb-18 | 07-Mar-18 |
| E.2430 | L - 5 Initial Model Upload | 1 | 06-Apr-18 | 06-Apr-18 |
| E.2440 | L - 5 BIM Cordination | 15 | 09-Apr-18 | 27-Apr-18 |
| E.2450 | L - 5 Model Sign- Off | 5 | 30-Apr-18 | 04-May-18 |
| E.2460 | L - 5 Prepare Shop Drawings | 10 | 07-May-18 | 18-May-18 |
| E.2470 | L - 5 Fabricate & Deliver Inserts | 5 | 06-Aug-18 | 10-Aug-18 |
| Penthouse | | | | |




This schedule reflects current planning and thinking. Okland reserves the right to make ongoing, but reasonable adjustments thereto by rearranging start dates, sequences, durations, completion dates, etc

OKLAND

# Modeling Responsibilities

- Phase I – Preconstruction/Design
  - Language aimed at the Design Consultants
  - The goal of this language is just to cover which design consultants will be modeling and which will not.
  - Almost always, there will be no exceptions
- Questions
  - Are any design consultants exempt?
  - What about design assist subcontractors?

# Modeling Responsibilities

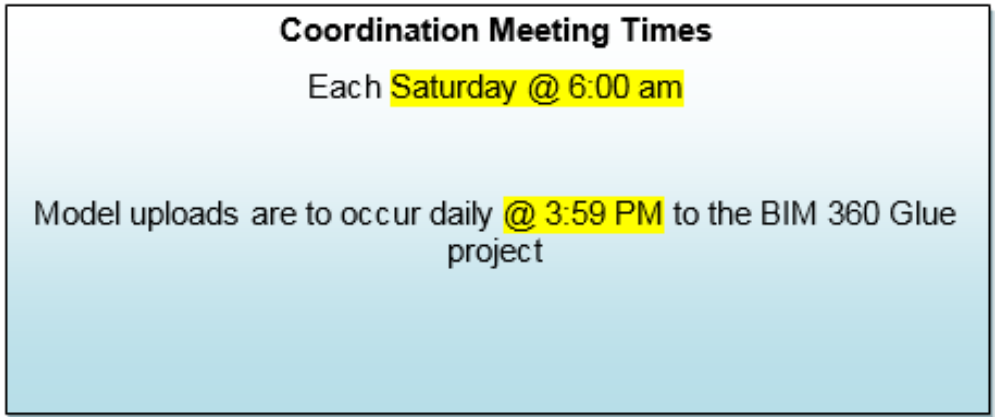
- Phase II – Const. Coordination
  - Language aimed at the subcontractors
  - Should reference what will be provided by the design team.
  - Should build on requirements from the design BEP.
- Questions
  - What will the design team continue to provide?
  - Was there any pre-construction coordination?

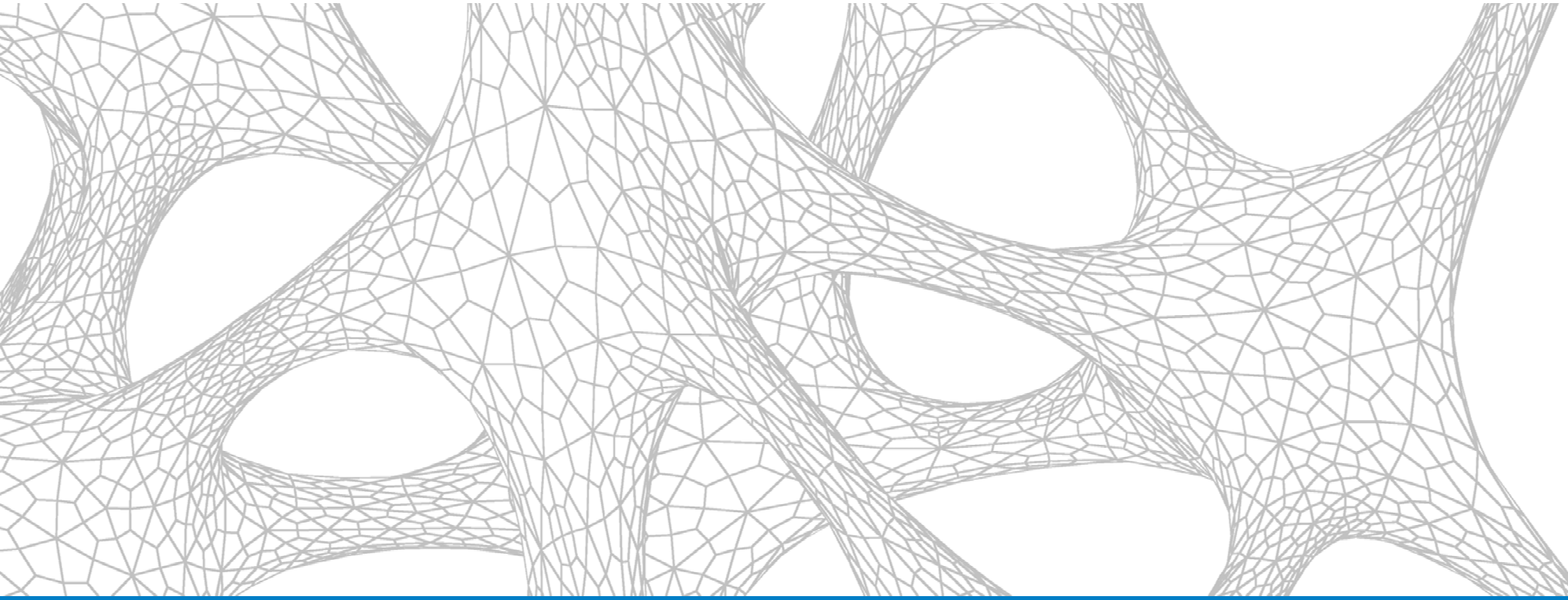
# Model Ownership and Copyright

- Almost always, the owner will own the model at the end of the project.
- Make sure everybody is aware this is the case

# Coordination Meeting Times

- Both Phases
  - Should include the regularly scheduled time and meeting place.
  - Ridiculous times force everybody to change the time to be appropriate for the project.
- Questions
  - Is anybody in a different time zone?
  - Are there any other meetings that need to be noted here?





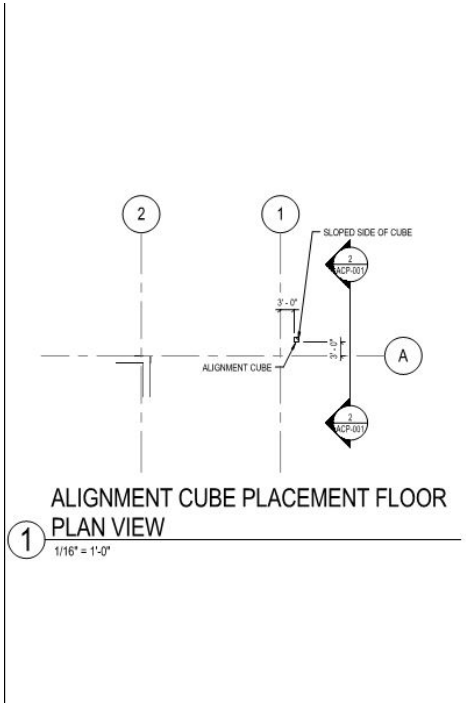
# Modeling Requirements: The modeling exercise of the plan

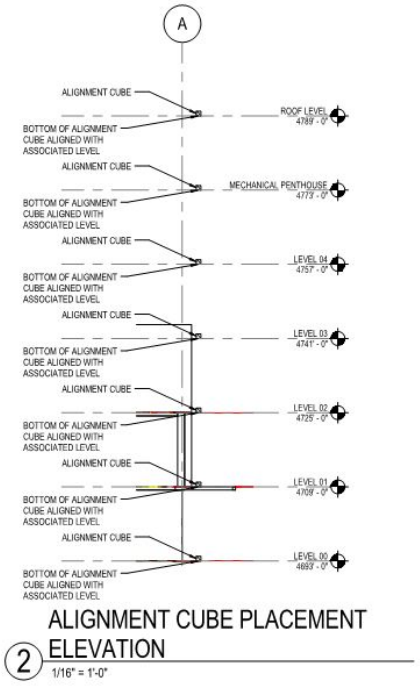
# Origins and Orientation

- Both Phases
  - Should be dictated so everybody is aware and there is uniformity between authoring softwares
- Questions
  - Civil Coordinates or something internal to the project?
  - How are drawing sheets oriented?

# Origins and Orientation: The Alignment Cube

- No matter the origin, the alignment cube creates a visual aid to see even small misalignment



# Levels of Development or Detail (LODs)

- LOD Definitions
  - Easiest place to start are the AIA definitions
  - Only use the even numbered full 100 incriments
    - 50's refer to no modeled elements of a model.
    - Thus, by definition, a 350 model is really only a 300 model with additional 2D information
  - These are minimums, and best modeling practices should always be followed.

# Levels of Development

- Create a template wish list of elements you would like
- Define who is responsible for modeling which elements

- Questions
  - What level of development is needed?
  - What elements are important to my project?
  - What do I have the opportunity to coordinate?
  - What level of detail does Revit or AutoCAD MEP already provide?

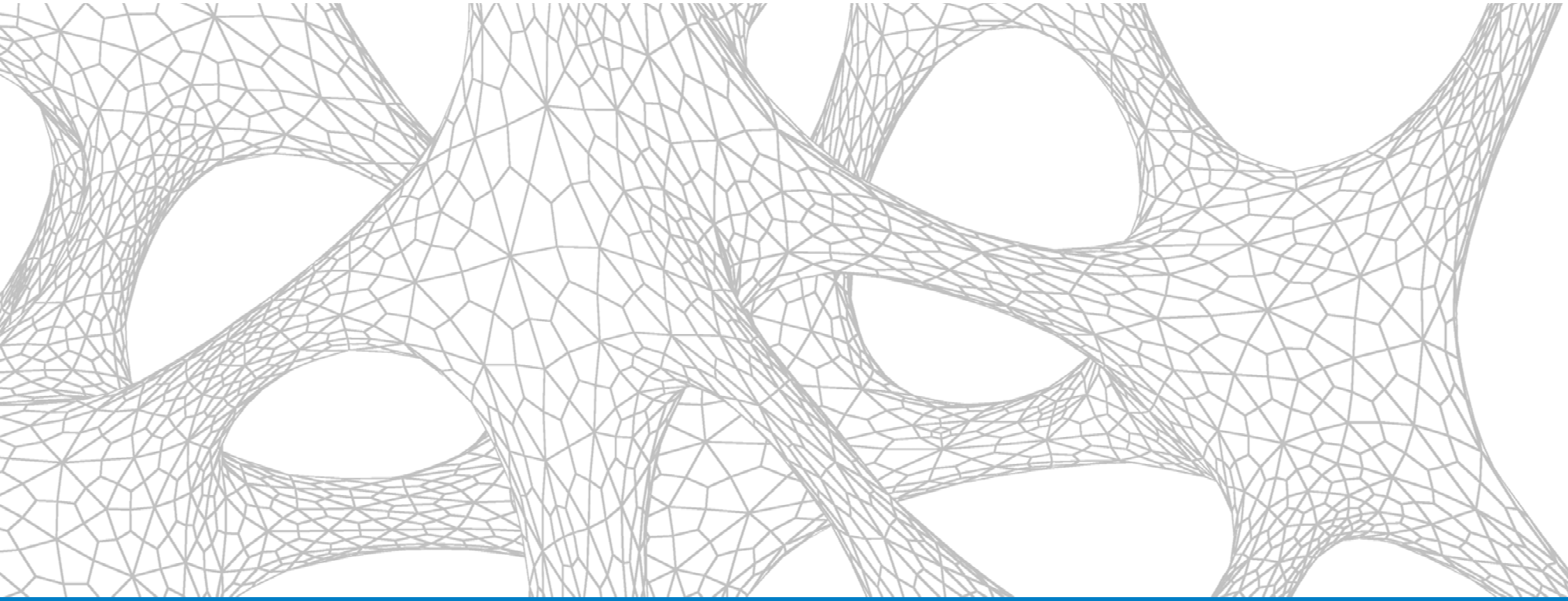
| **Model Name/**<br><br>**Systems Included** | **Level of Detail (LOD)**<br><br>***Please include as a minimum the following components*** | **Responsibility** |
|---|---|---|
| Architectural | 1) Furniture – LOD 200<br>2) Millwork – LOD 200<br>3) Doors – LOD 200<br>4) Windows – LOD 200<br>5) Floors – LOD 200<br>6) Walls – LOD 300<br>7) Curtain Walls – LOD 300<br>8) Ceilings – LOD 300<br>9) Roof Systems – LOD 300<br>10) Specialty equipment – LOD 300 | Architect |
| Concrete Foundation<br><br>Concrete Walls<br><br>Concrete SOG<br><br>Concrete Decks | 1) Concrete Slabs – LOD 300<br>2) Concrete Footings – LOD 300<br>3) Concrete Walls – LOD 300<br>4) Concrete Penetrations – LOD 200<br>5) Concrete Openings – LOD 200 | Structural Engineer |
| Masonry Walls<br><br>Masonry Shafts | 1) CMU Walls – LOD 300<br>2) CMU Openings – LOD 200<br>3) CMU Embeds – LOD 300<br>4) CMU Penetrations – LOD 200 | Structural Engineer |
| Structural Steel<br><br>Misc. Steel<br><br>Steel Stairs/Rail | 1) Steel Columns – LOD 400<br>2) Steel Beams – LOD 400<br>3) All Structural Steel Connections. – LOD 400<br>4) All Steel Embeds and embedded items. – LOD 400<br>5) All stairs, catwalks, grating, and their support systems – LOD 400.<br>6) All hangars and support systems. – LOD 400<br>7) All embeds being provided for other trades. – LOD 400 | Steel Erector |

# Naming Conventions

- People need to know what is contained in each model.
- Names should correspond to modeling scopes
  - Plumbing models should say “Plumb” or “Pipe” somewhere in the name
- Questions
  - Every firm has their own internal naming conventions, do I build on that or define it for them?
  - Names by area and scope?
    - Just scope?
  - Is naming searchable?
    - By Scope? Area? Both?

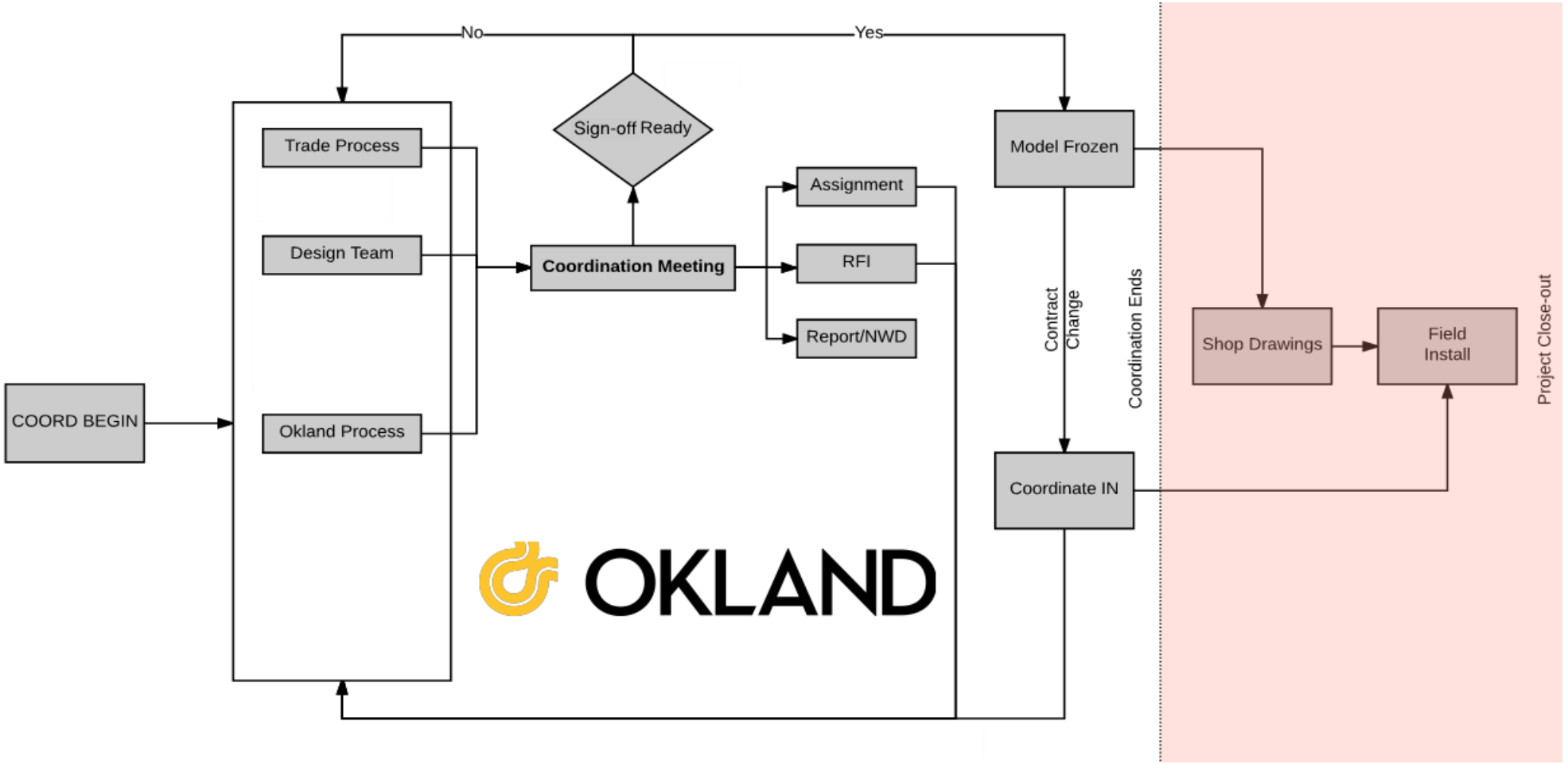
# File Types

- During design, most firms will use Revit.
- To avoid the need for multiple plug-ins, .nwc files are easiest to share.
- Revit and AutoCAD 2018 features integration with Glue and Navisworks to allow geometry to be shared via the coordination model.
- Questions
  - What are my sub-consultants/subcontractors using?
  - Are .nwc's the best way to view everyones information?
  - Do we need multiple formats?



# Clashing Procedure

# Clashing Procedure



# The Clash Hierarchy

- You will need a methodical way to define clash batches so you can avoid:
  - Duplicate Clashes
  - Wasted time fishing through duplicate clashes
  - Easily start conversation
- Clashes are meant to start conversations, not end them.
- Questions
  - What systems are important to my owner?
  - What systems are important to me?
  - What systems are expensive to move?
  - What systems are likely to create changes to the design?

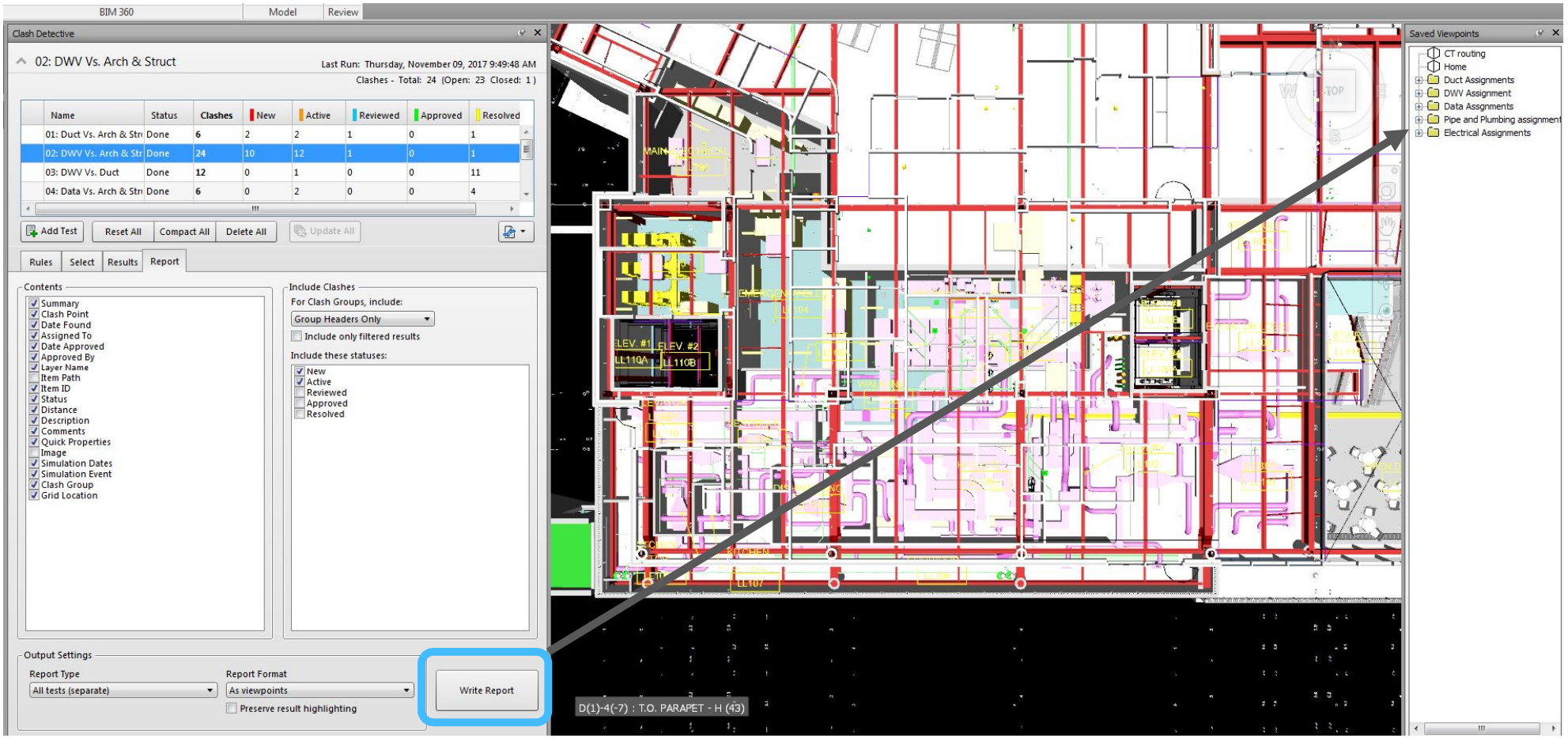
# The Clash Hierarchy

i) Architecture – including lights
ii) Structural
iii) DWV
iv) Duct
v) Pneumatic tube
vi) Fire mains
vii) Mech. Pipe
viii) Domestics, med gas, process, misc. plumbing
ix) Electrical
x) Data
xi) Fire branches

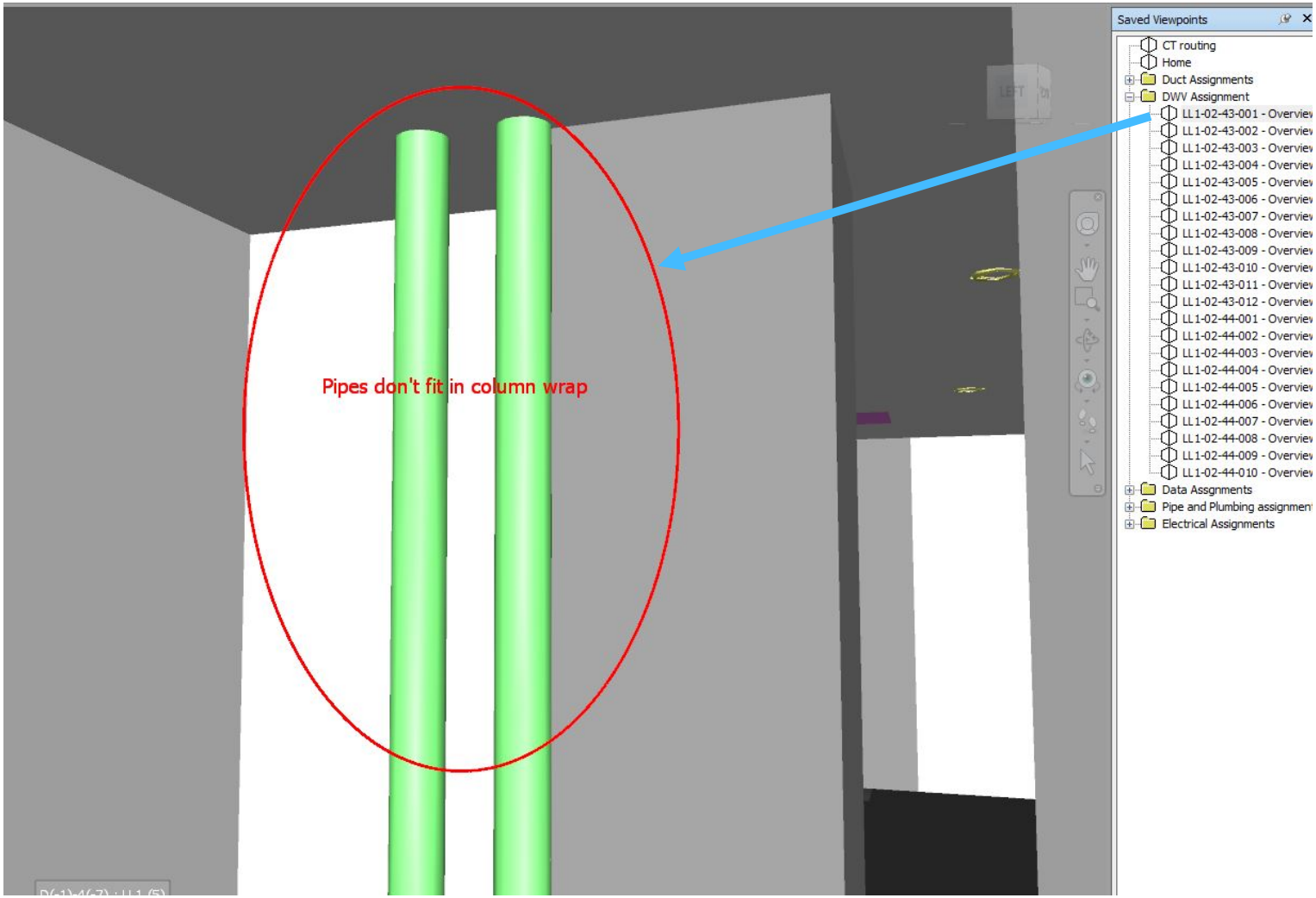
# Clash Grouping and Assignments

- Questions
  - How am I going to make assignments visible to all team members, not just the modelers?

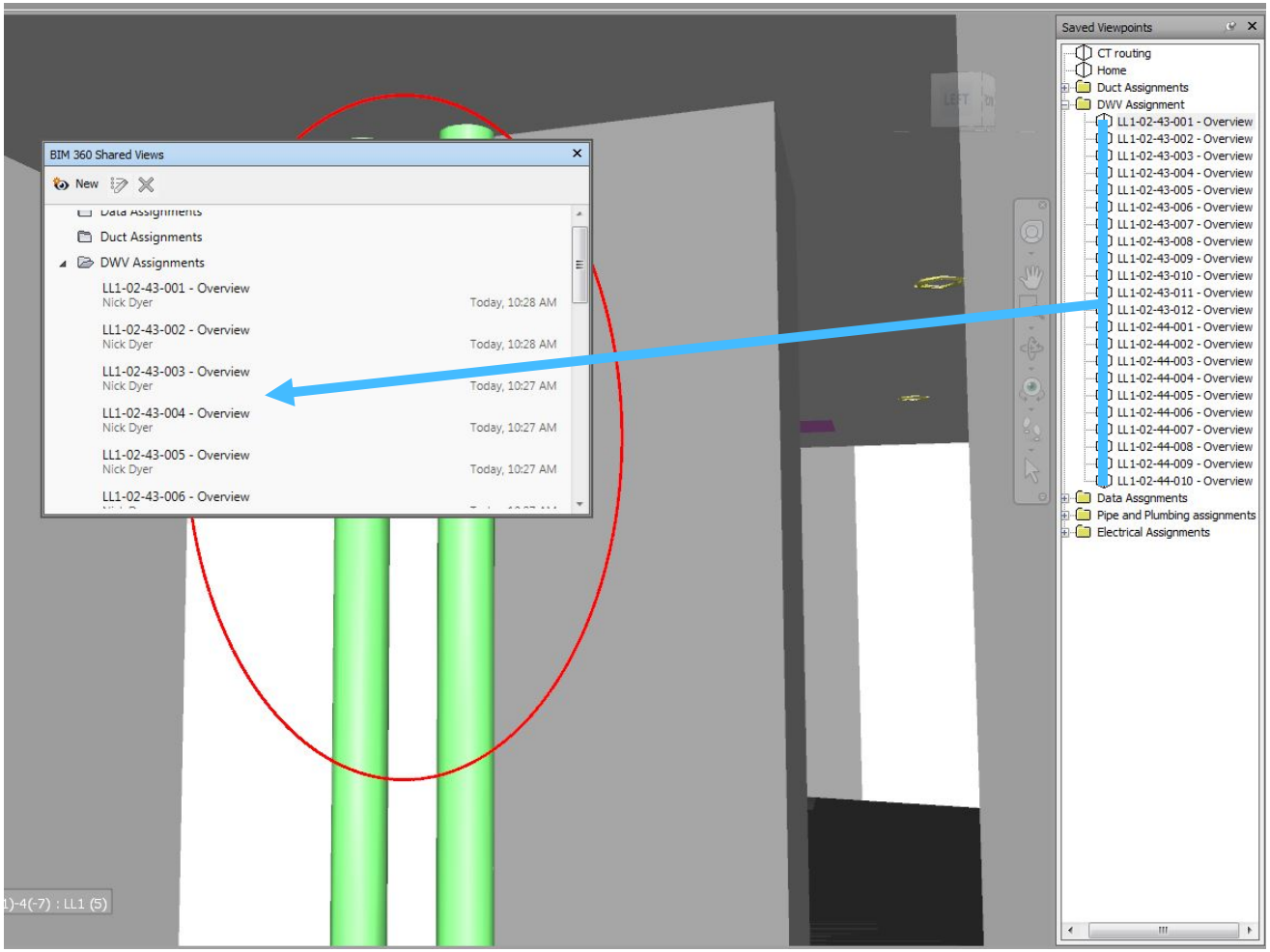
# Clash Grouping and Assignments



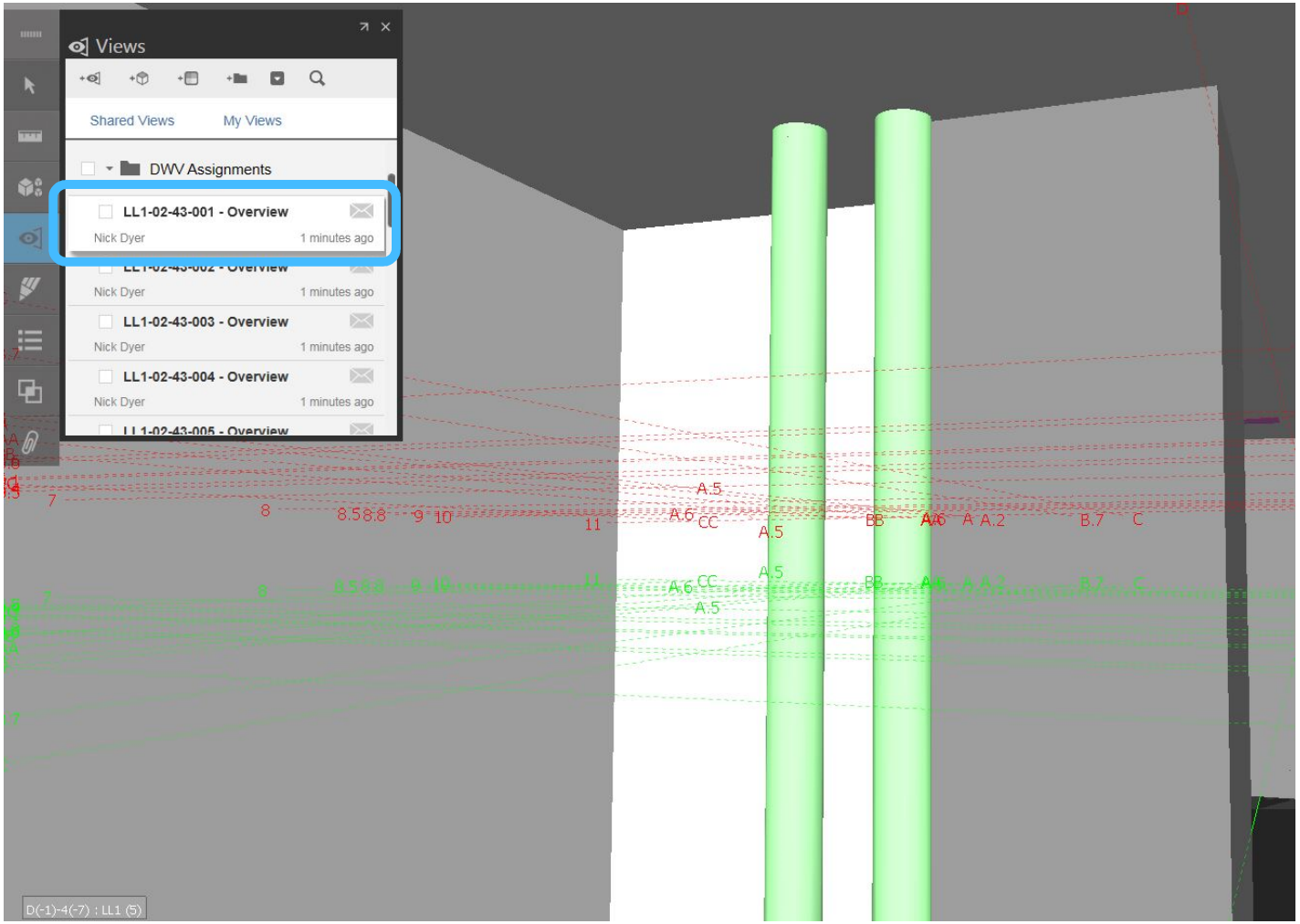
# Clash Grouping and Assignments



# Clash Grouping and Assignments



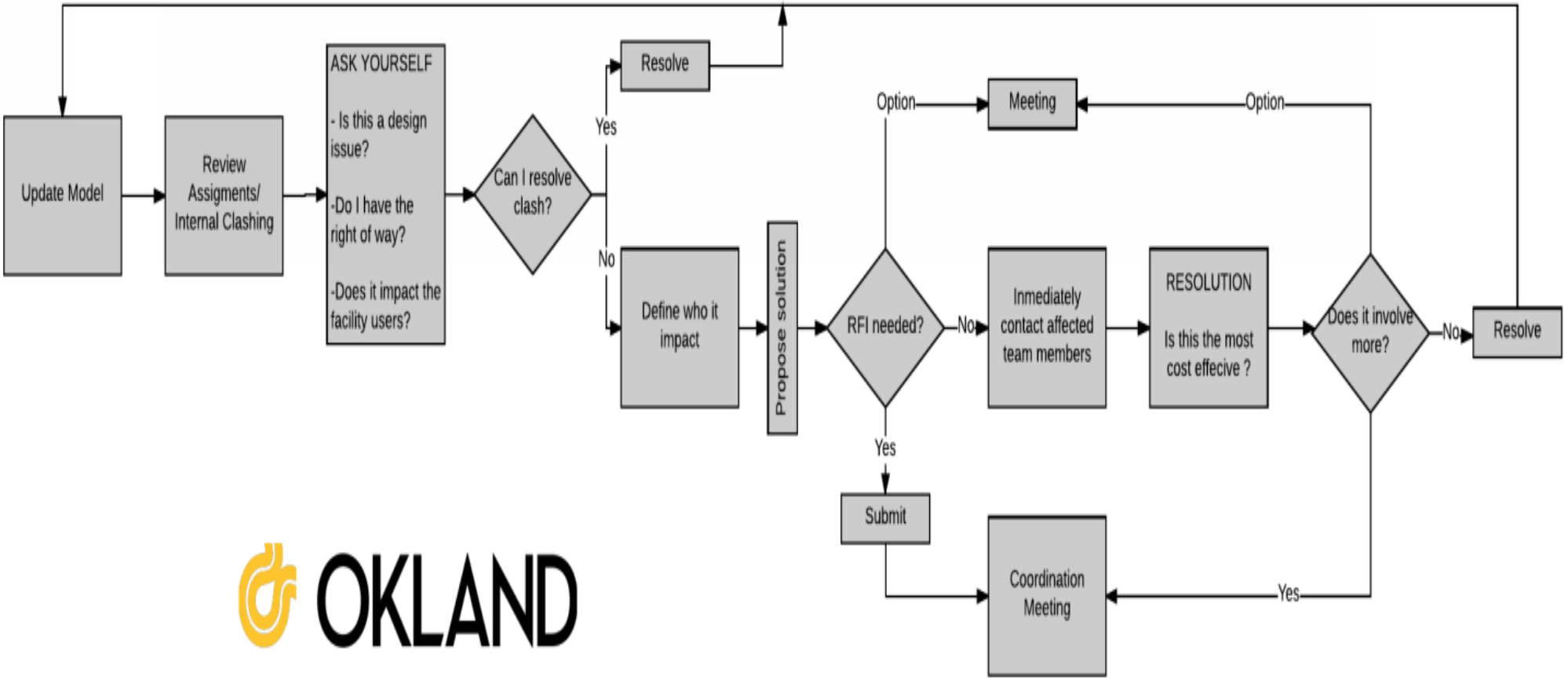
# Clash Grouping and Assignments



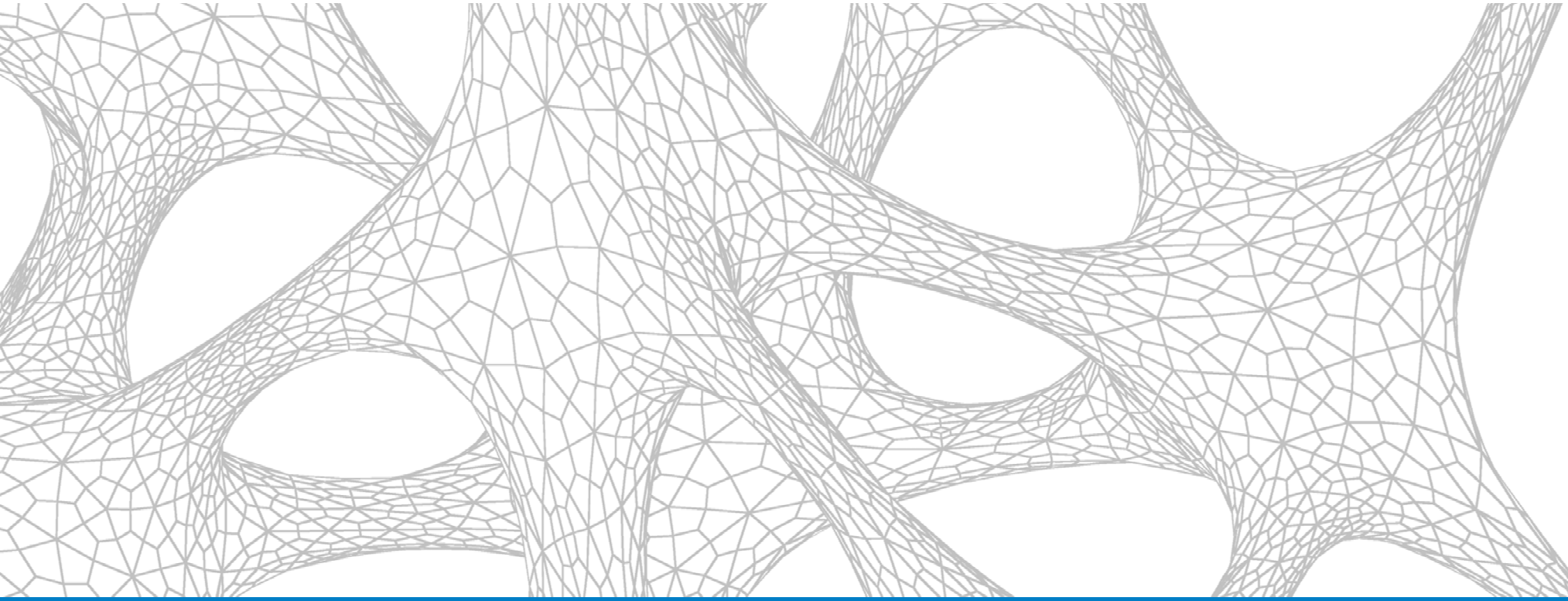
# Clash Grouping and Assignments

- Your BEP should define who groups your clashes
- Grouping clashes yourself has 2 major benefits
  - 1: You control assignments
  - 2: Your modelers spend time resolving clashes, not grouping them
- Should define a naming convention for clash assignments
- Questions
  - How am I going to make assignments visible to all team members, not just the modelers?

# Clashing Resolution Procedure




OKLAND



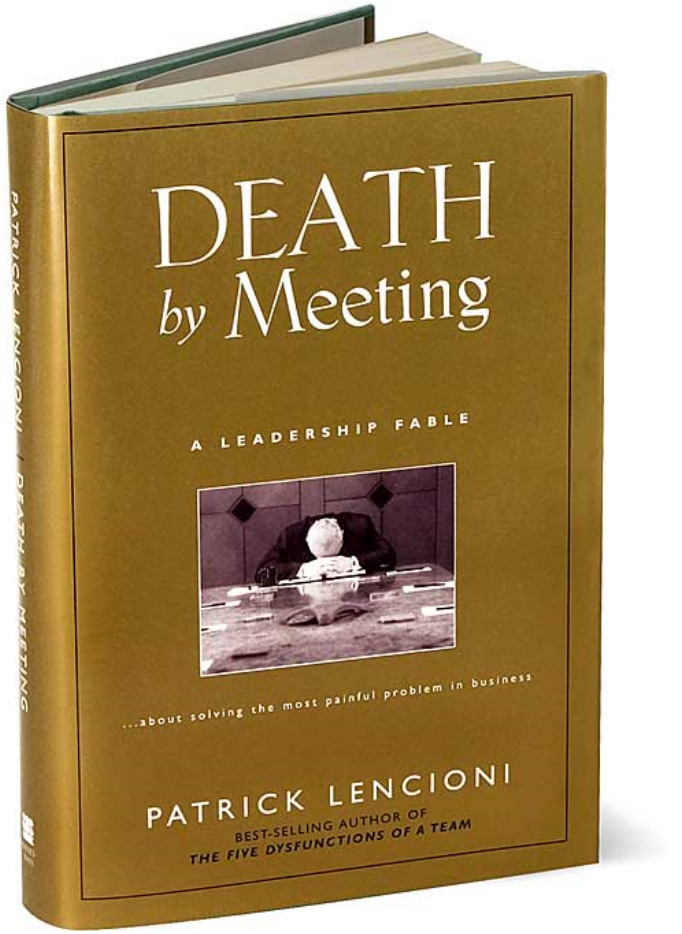
# Meetings

# Conference Calls in Real Life

Saatchi & Saatchi “Tripp Crosby: Conference Call in Real Life” *Green Tricycle Studios.* YouTube, 19 June, 2017. Web. 2 November 2017

# Death By Meetings

- Advocates for more meetings with different purposes.
- 4 typical meetings
  - Kick-off meeting
  - Daily Stand-up Meeting
  - Weekly Coordination Meeting
  - Sign-Off Meeting




https://www.tablegroup.com/books/dbm

# Kick-off Meeting Agenda

- Introductions
  - Should Always be an “In-Person” Meeting
- Goals for Coordination
- Review of Schedule
- Review of BEP
- “Rules of the Road”
- Overall Model Review
- Next Meeting
- Questions
  - What goals do I have for coordination?
  - What is important to my project?

# Daily Standup Meeting

- 10-15 minute meeting, on the phone
- No official agenda
  - Follow up on priorities from the previous day
  - Daily priorities for the project
- WARNING!
  - Do not let these turn into mini coordination meetings
- Questions
  - Modelers should attend at a minimum, but is there anyone else?

# Weekly Coordination Meeting

- Plan 1 to 2 hours.
  - If they go longer, try to hold more meetings
- Some structure
  - Don’t over plan, over prepare
- Questions
  - Do you need more than 1 per week?
  - Can you cover more than 1 area/level in a single meeting?

# Weekly Meeting Agenda

- Attendance
  - Establishes patterns for who is present and who never shows up
- Review of Schedule
- Open Items
- New Items
  - Items from your review and from your subs.
- Questions
  - Other Items?
  - Who takes meeting minutes?
    - Defined in the roles section?

OKLAND

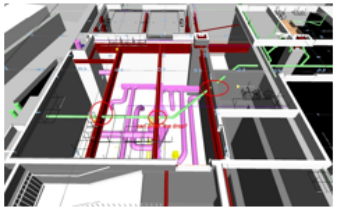
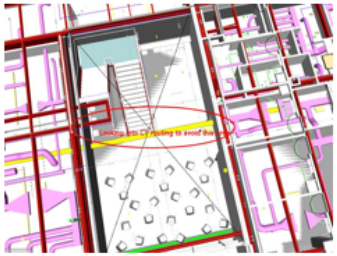
| | |
|---|---|
| **Project:** | **Mock Building** |
| **Date:** | **10/31/2017** |
| **Location:** | Gotomeeting |

# 3D Coordination Meeting 3

## Attendees (C= Call in, P=Present on site, L=Late)

| Y | N | Name (Company) | Y | N | Name (Company) | Y | N | Name (Company) |
|---|---|---|---|---|---|---|---|---|
| | X | Jared Francom () | | | | | | |
| | X | Brian Murphy () | | | | | | |
| C | | Nick Dyer () | | | | | | |
| | X | Preston Shepherd () | | | | | | |
| LC | | Eric Thompson () | | | | | | |
| C | | James Steadman () | | | | | | |
| C | | Dallen Romriell () | | | | | | |
| | X | Jared Smith () | | | | | | |
| C | | Bill Borck () | | | | | | |
| C | | Justin Luke () | | | | | | |
| C | | Matt () | | | | | | |
| | X | Andrew () | | | | | | |
| | X | Jennifer Bradley () | | | | | | |
| | | | | | | | | |
| | | | | | | | | |

## Meeting Notes/Actions

| Item | Date Closed | Description | Resolution/Comments |
|---|---|---|---|
| 171017-01 | | Plumbing - All pipes 1 1/2" or bigger is all in the model plumbing and mechanical pipe, no VRF trays yet<br>Duct - 70%-80%<br>Lights - 90%<br>Cable Tray - 90%<br>Electrical Conduits - 0%<br>Architectural FFKR - 90% - Interiors, C&S is 100% | 10/24/17 - Duct 85-95%, Light and Cable 95%, Conduit coming shortly.<br>10/31/17 - Electrical the same, VBFA is about the same also |
| 171024-01 | | Reviews LL3, Sounds like this line can move down, VBFA to verify<br>  | 10/31/17 - Just a clash, VBFA has confirmed that it can move down. Model should be updated soon. |
| 171024-02 | | Review of LL1, BNA looking into re-routing this cable tray<br>  | 10/31/17 - BNA looking into the routin issue. Should be updated soon. |
| 171024-03 | | Generall reviews of all other level revieled that there are lots of Duct Vs. Structural clashes throughout the building. VBFA is working on resolving these. Next largest amount of clashes concerns DWV systems conflicting with Duct. This is typical of all floors. | 10/31/17 - VBFA has been focused on content creation to this point, but that is pretty much complete. More time will be dedicated to looking at clash resolution. |

# Weekly Meeting Clash Grouping

- Group clashes and create clash assignments BEFORE your meeting.
- Create Special Clash Groups
  - All MEP Vs. Arch & Struct
  - Duct Vs. Everybody Else
- Clash batches like this reveal areas where everybody has trouble.
- Questions
  - What is my proposed solution?
  - Is this the entire group or just 1 or 2 people?

# Weekly Meeting: Discussion Leader

- Be the leader, not the dictator
- Encourage conflict, not fighting
- Every person in your meeting is there for a reason.
  - Everyone's voice will be heard
  - It will encourage trust, which will lead to more transparency.

# Weekly Reporting

- “When performance is measured, performance improves. When performance is measured and reported back, the rate of improvement accelerates” – Thomas S. Monson
- Subs need to be measured for 2 main reasons
  - 1) LOD Completeness
    - If they don’t have anything modeled, they also don’t have any clashes, but there is no value to anyone
  - 2) Because everyone needs to know where everyone else is.

# Weekly Reporting

## Clash Weekly Report

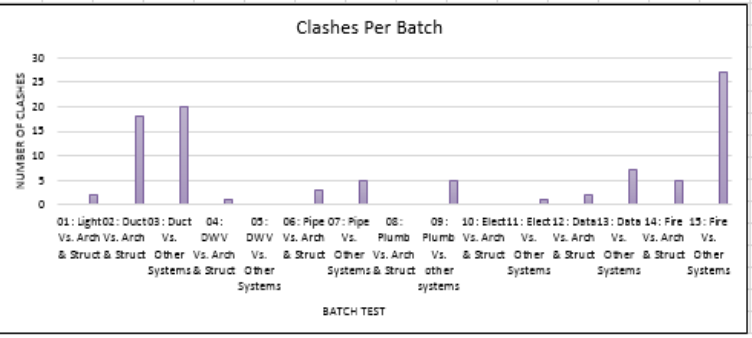
| Project | Mock Building |
|---|---|
| Date | 3/31/2018 |
| Week | 6 |

### Progress

| Trade | % Modeled | % Coordina | % Constructed |
|---|---|---|---|
| Duct | 96% | 96.96% | |
| DWV | 80% | 97.73% | |
| Mech. pipe | 50% | 95.98% | |
| Plumbing | 90% | 97.69% | |
| Electrical | 95% | 99.93% | |
| Lighting | 65% | 96.72% | |
| Data | 75% | 98.26% | |
| Fire | 80% | 96.00% | |
| | | | |
| Totals | 79% | 97.29% | |

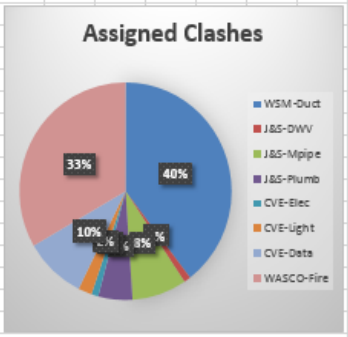
### Clash Batch Breakdown

| Batch Test | Qty |
|---|---|
| 01: Light Vs. Arch & Struct | 2 |
| 02: Duct Vs. Arch & Struct | 18 |
| 03: Duct Vs. Other Systems | 20 |
| 04: DWV Vs. Arch & Struct | 1 |
| 05: DWV Vs. Other Systems | 0 |
| 06: Pipe Vs. Arch & Struct | 3 |
| 07: Pipe Vs. Other Systems | 5 |
| 08: Plumb Vs. Arch & Struct | 0 |
| 09: Plumb Vs. other systems | 5 |
| 10: Elect Vs. Arch & Struct | 0 |
| 11: Elect Vs. Other Systems | 1 |
| 12: Data Vs. Arch & Struct | 2 |
| 13: Data Vs. Other Systems | 7 |
| 14: Fire Vs. Arch & Struct | 5 |
| 15: Fire Vs. Other Systems | 27 |



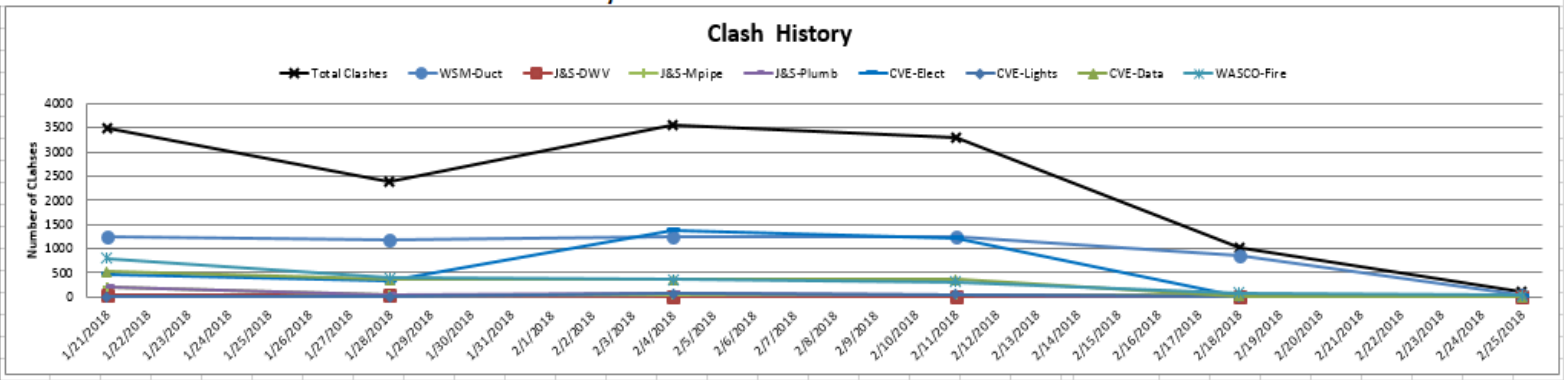

### Assigned Clashes

| Trade | QTY |
|---|---|
| WSM-Duct | 38 |
| J&S-DWV | 1 |
| J&S-Mpipe | 8 |
| J&S-Plumb | 5 |
| CVE-Elec | 1 |
| CVE-Light | 2 |
| CVE-Data | 9 |
| WASCO-Fi | 32 |



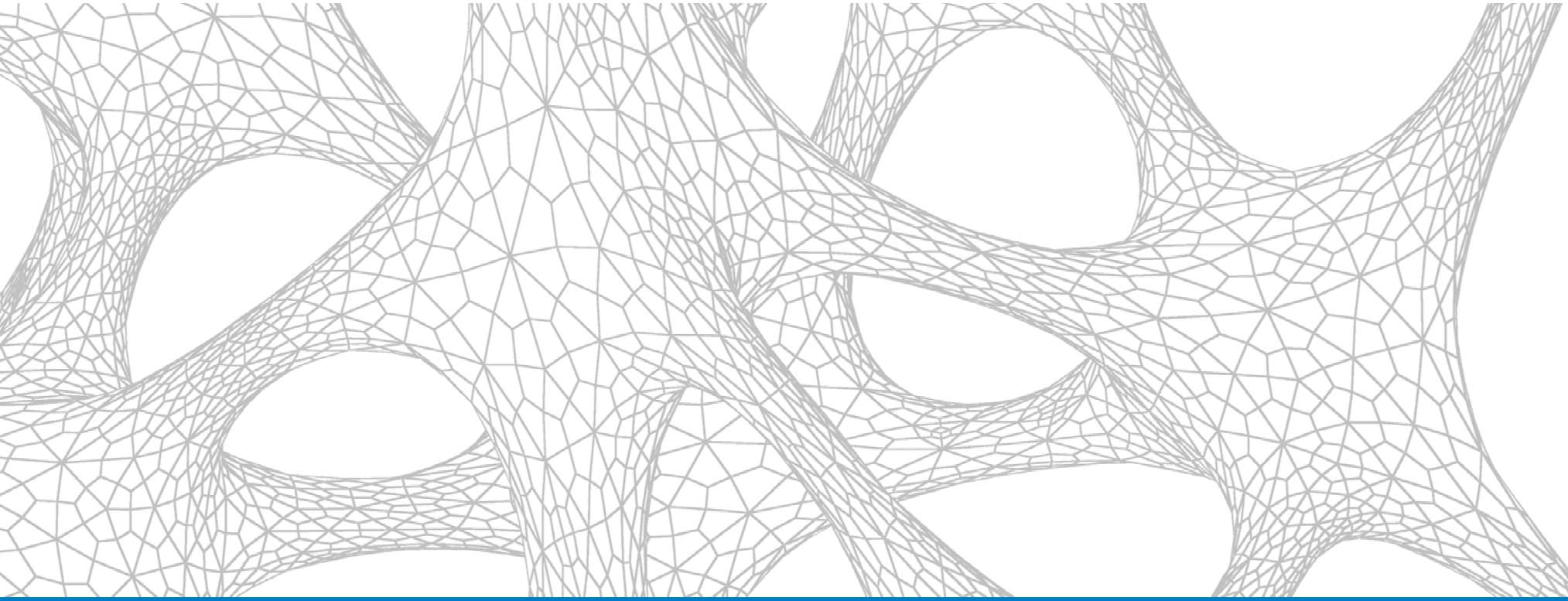

### Clash History

| Clash Date | Total Clashes | Comments |
|---|---|---|
| 1/21/2018 | 3480 | First Week |
| 1/28/2018 | 2369 | |
| 2/4/2018 | 3538 | |
| 2/11/2018 | 3293 | |
| 2/18/2018 | 1026 | |
| 2/25/2018 | 96 | |
| 3/4/2018 | 0 | |
| 3/11/2018 | 0 | |
| 3/18/2018 | 0 | |
| 3/25/2018 | 0 | |
| 4/1/2018 | 0 | |
| 4/8/2018 | 0 | |
| 4/15/2018 | 0 | |
| 4/22/2018 | 0 | |
| 4/29/2018 | 0 | |
| 5/6/2018 | 0 | |



# Sign-Off Meeting

- The purpose of the sign-off meeting is to formalize that you are moving on to a new area.
- 2 drivers for sign-off
  - Area is clash free
  - Schedule
- Detailed review of all open issues
  - Clash assignments still exist, don’t waste time reviewing individual assignments
- Questions
  - Do we have any float to allow more time if needed for coordination?



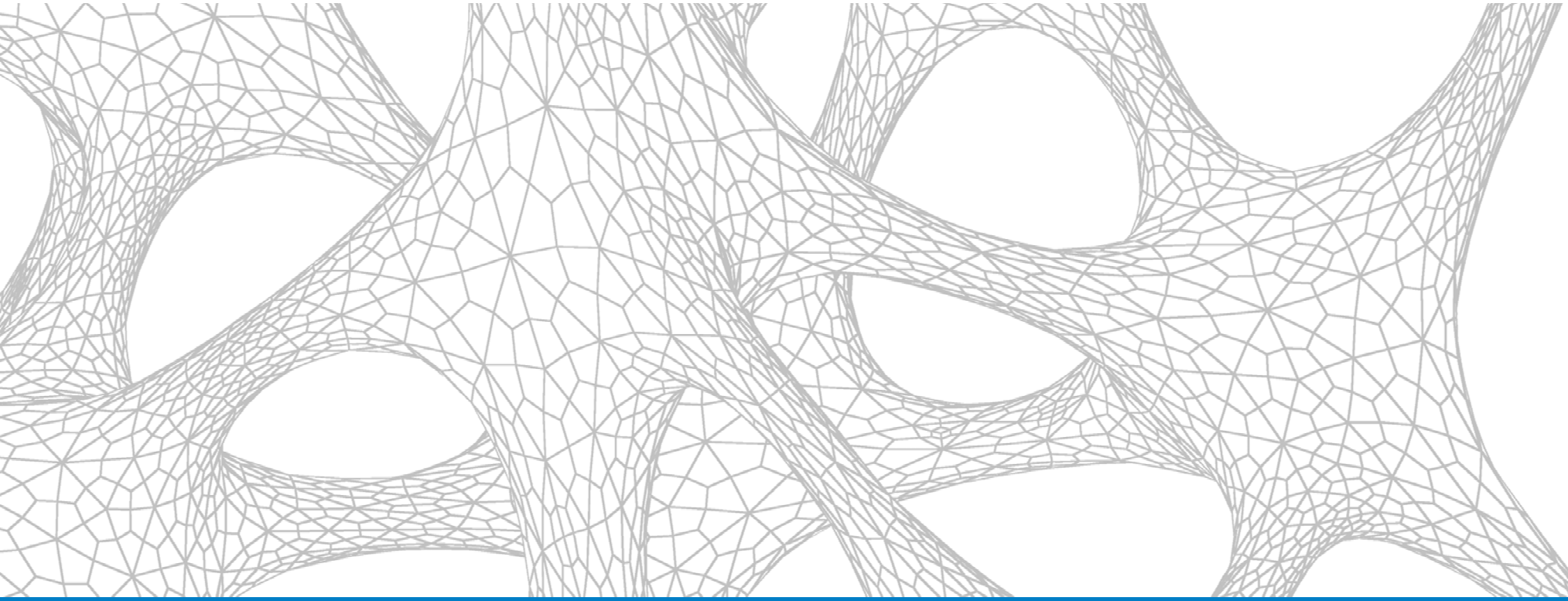
# Final Deliverables

# Final Deliverable

- Change per project Standards
  - Could probably cut and paste most of what an Owner or Architect may require
- At a minimum, the Owner should be given all the information
- Questions
  - If the Owner has no specific requirements, what works best as a template?
  - Is there any training required for the Owner?

# Final Deliverable: Boiler Plate Language

- Models-  Each Trade will be responsible to providing the following files for EACH separate model provided:
  - NavisWorks – NavisWorks Cache (.nwc)
  - 3D AutoCAD (.dwg) or a Revit (.rvt) file
- If a single overall file is available that includes models for all the separate levels or areas, this file shall also be submitted.
- The digital files are to be posted to BIM 360 Glue.
- The General Contractor will provide the owner with all filed on an external hard drive.



# Summary

# Create BIM execution plans that are scalable to project requirements

- Add or remove phases as needed
- Use levels of development to scale up or down modeling requirements

# Create BIM execution plans that can be used for both design and construction coordination

- Create outlines for both phases of work
- Use levels of development to scale up modeling requirements as more decisions are made

# Incorporate BIM execution plans elements into contracts

- The entire plan can be used as a contract exhibit
- Just the modeling requirements can be included to help subcontractors define their scopes

# Plan and hold contextual meetings to increase coordination productivity

- Daily, weekly, and sign-off meetings
- Discussions rather than directions
- Clash grouping with special clash batches
- Weekly reporting

# Q/A

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