Systematic Model Review for Effective Coordination

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The Beck Group

About Beck:

The Beck Group is a third generation, family-owned company founded in 1912 as a general contractor. Since then we have developed into full-service builder of international renown. More than 700 designers, construction managers, engineers, real estate professionals, technology developers and highly seasoned corporate and field staff contribute to our success.
80% solution

• 80% of results come from 20% of time/effort
• Everyone has limited time and resources
• Speed vs Perfection
BIM ≠ CD’s

• BIM is rarely included in contract
• Usually seen as an “extra” from design team
• A bad model can make good drawings

However, 3D model based coordination is standard in our industry…
Modeled beams don’t match schedule
3D Coordination doesn’t work with bad BIM!

- Errors in models may not exist in drawings
  - Wastes time coordinating issues that don’t exist
- Errors in drawings may not exist in models
  - Errors are missed and result in costly time delays and re-design
Why you shouldn’t re-model

• Costs time, money, and people
• Repeating efforts of design team
• Some models are already good enough
• No guarantee that there won’t still be mistakes
What does a good solution look like?

**Fast** - takes one person 3 days

**Efficient** - targets the most important areas of the models specifically important to coordination

**Understandable** - anyone can do the review and anyone can understand the results

**Clear** - pass or fail. No room for grey areas

@BrendanANichols
**Model Review For Coordination Check Sheet**

<table>
<thead>
<tr>
<th>Project Title</th>
<th>Pass</th>
<th>Fail</th>
</tr>
</thead>
<tbody>
<tr>
<td>Structural Model</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Columns, Piers</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are modeled elements matching schedule?</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Are all drawn elements actually modeled?</td>
<td>✔</td>
<td>✔</td>
</tr>
<tr>
<td>Are modeled elements connecting properly?</td>
<td>✔</td>
<td></td>
</tr>
<tr>
<td>Beams, Girders, Joists</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are modeled elements matching schedule?</td>
<td></td>
<td>✔</td>
</tr>
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</tr>
<tr>
<td>Are modeled elements connecting properly?</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Do modeled elements match drawings for slope?</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Floors, Slabs, Roofs</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Are all drawn elements actually modeled?</td>
<td></td>
<td>✔</td>
</tr>
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<td>Do modeled elements match drawings for slope?</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Do modeled elements match drawings for thickness?</td>
<td></td>
<td>✔</td>
</tr>
<tr>
<td>Do modeled elements match drawings for major openings?</td>
<td></td>
<td>✔</td>
</tr>
</tbody>
</table>

**Part 1: Checklist**

- 40 pass fail tests
- Divided first by scope then by building element
- Checklist allows people to understand model quality quickly and focus attention on the things that need to be fixed
Model Review for Coordination
*Tests, Analysis, and Results Explained*

**Title**

**Structural Model**

**General Information**

There are a few things worth watching for with this model. In particular, schedules were not generated within Revit. All of them are raster images placed onto the sheets. Beams don’t have marks added to the families or instances so checking the beams back to the schedule has to be done manually and could lead to future mistakes. While the majority of elements are modeled adequately, some shortcuts have been taken with slab thicknesses and beams on level 1 and parking.

**Columns, Piers**

**Test: Are modeled elements matching schedule? Fail**

This test is to determine if modeled elements match elements in the schedule. Since construction and installation of elements is normally performed based on the details in the schedule, this test is to see if the modeled dimensions of the beams match these scheduled dimensions. This test is performed by generating the schedules from the model and comparing them to the corresponding drawing schedules.

Column schedule is a raster image created outside Revit. Currently everything in the schedule above the first floor is marked as for pricing only. Majority of columns are not modeled level to level and span numerous floors.

Basement P2 to first floor columns in the $3.00 were checked. 13/63 checked table entries have column dimensions that do not match the model. See attachments for which were checked and failed.

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**Part 2: Detailed Document**

Each test is broken out and detailed

Explaining:

1. How the test is done
2. Why the test matters
3. Why the model failed the test
Example test #1: Do modeled columns match scheduled columns?

<table>
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<tr>
<td><strong>Test- Are modeled elements matching schedule? Fail</strong></td>
</tr>
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</table>

This test is to determine if modeled elements match elements in the schedule. Since construction and installation of elements is normally performed based on the details in the schedule, this test is to see if the modeled dimensions of the columns match these scheduled dimensions. This test is performed by generating the schedules from the model and comparing them to the corresponding drawing schedules.

Column schedule is a raster image created outside Revit. Currently everything in the schedule above the first floor is marked as for pricing only. Majority of columns are not modeled level to level and span numerous floors.

Basement P2 to first floor columns in the S3.00 were checked. 13/63 checked table entries have column dimensions that do not match the model. See attachments for which were checked and failed.
Construction Documents Schedule  
Raster image imported into model

Graphical column schedule from model with tags  
Non-matching columns are marked
Example test #2: Does architectural lighting layout match electrical?

Test- Does architectural lighting layout match electrical? Fail

This test is to determine if Architectural layout and Electrical lighting layout match. If they don’t match, it suggests the layout between the two is un-coordinated. This results in difficulties during coordination because a light may or may not be in the place it’s modeled. This can result in missed clashes or clashes that don’t exist in the drawings. This test is performed by overlaying ceiling plans from Architecture and Electrical to see if there are any discrepancies.

Multiple lights per floor do not align. Electrical is missing some lights that Architecture has modeled.
1. Use filters to color lighting fixtures on Architectural and Electrical reflected ceiling plans.
2. Make PDFs of RCPS
3. Overlay in Bluebeam or similar PDF software
4. Look for non-matching fixtures
5. Send PDFs with review
Categorization of tests

Comprehensive Tests
  • Entire model or all elements can be checked
  • Pass if all elements pass
  • Fail if any elements fail

Spot tests
  • Cannot reasonably check entire model
  • Define sample area
  • Pass if all sampled elements pass
  • Fail if any sampled elements fail
  • Not definitive, but very telling
How to make your own review process

Focus on a specific use!

Identify your specific pain points
  • Interview people most affected
  • Understand the level of commitment you can give

Develop tests
  • How will the test be performed?
  • How long will the test take?
  • What does a failed test mean?

Put it in practice and improve
How to make it successful

Start at the right time
  • Too early and it’s not worth the effort
  • Too late and design team won’t have time to fix any issues

Don’t be confrontational
  • Design team first!
  • Explain that just because they failed your coordination tests doesn’t mean it’s a bad design or bad drawings
Thank you for your time and attention

Review documents can be found here:

https://beck.box.com/s/bxiyatkz2s1ti0yg2u8oer706wmxc0bg

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