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WEST ELEVATION - ILLUMINANCE STUDY

lux
81727
56867
39569
27533
19158
13330
9275
6454
4491
3125
2174

Confer
Communicate
Collaborate

STEEL BEAM - W18X55
TORSIONAL CONSTANT - 1.66
AREA - 16.2 IN^2
60 LBS PER FT.
X-X AXIS - I = 890 IN^4
Y-Y AXIS - I = 44.9 IN^4

CONCRETE - FOUNDATIONS
3000 PSI
SOIL COMPACTION 45%
MODIFY PROCTOR OR 98% OF
STANDARD PROCTOR
SOIL STRATIGRAPHY - FINE
SAND "UNIFIED SOIL
CLASSIFICATION - SP"
STANDARD PENETRATION
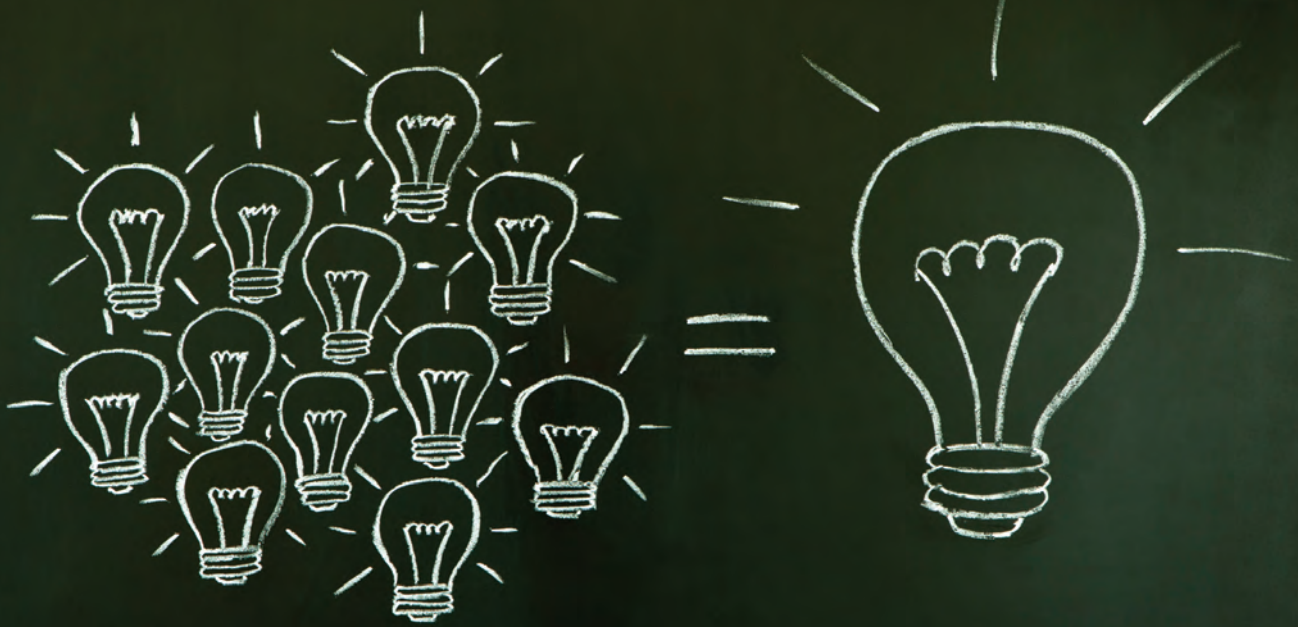TEST - AVG. N = 8
SOIL BEARING NET
ALLOWABLE - 2500 PSF

Also in this issue:

- **Gain Control with Project Navigator**
- **Part Solutions for Inventor**
- **An Interview with Seid Tursic**

STEEL TUBE COLUMN - 6X6X.5
AREA - 10.4 IN^2
35.2 LBS PER FT.
RADIUS OF GYRATION - 2.21 IN

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Revit Architecture 2013

by: Jay Zallan, Marcello Sgambelluri,
Troy Gates and Darren Roos

Coordinate and Dominate: BIM Project Success

Coordination techniques using Autodesk® Revit® software as one's Building Information Modeling (BIM) authoring platform can enable a changing of the game, as it were. Modeling and project execution capabilities are becoming so comprehensive that we need equally comprehensive processes for collaboration and coordination. Hardware, software, processes, paperwork… what is most important?

Every BIM project and, frankly, every architectural project have multidiscipline teams. The question: Are those teams working together? The best projects have the most coordinated teams, greatest dynamic information flow, and most efficient communication and interaction strategies employed.

INTERACTION | COMMUNICATION | COLLABORATION | COMPLETION

In this article we will be briefly discussing ideas that are simply too big for a 1,000-word article, let alone the over 10,000-word class paper upon which this was based.

Collaboration is work—a lot of hard work. With that in mind as well as the link below (to the entire Autodesk University (AU)

Class Handout on this), let's get on with the show.

http://bit.ly/15gbWOW

The difficult parts of coordination and collaboration are not always the technical parts; linking a file, building models, etc. are comparatively easy in the context of the entire project. There are always people who can handle the technical button pushing. The most important and often difficult main point in coordination is Interaction.

Revit models contain extensive amounts of rich and intelligent data and the use and application of these Revit models are virtually endless. Therefore, it is extremely important to establish boundaries for the Revit models with the architect, engineers, owner, and contractor.

Think of coordination between the disciplines, for any given project, as being made up of one part technology and five parts human interaction. This means that the essential ingredients for successful coordination are the personal interactions and the communication paths. Think of it this way: If you, as a Structural Engineer, do not get the information you need from the architect, how could you proceed? And vice versa.

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As we have seen, the process of effective project collaboration takes communication, but not like meeting or talking, more like the communication of artists or musicians. The Producer/Musician relationship is a good model to consider.

Using the BIM Execution Plan as the basis of your BIM orchestral score, the integral teams and players must be united in a single vision: to create as efficient a project as possible.

Given the dynamic and fluid state of many AEC projects, it is also requisite to remember what the main goal is: The Built Project. Hint: Flow with unforeseen obstacles.

Develop your orchestra—have experts in every chair. Not just decision makers, but also thinkers, creative, and technical players as well.

When all players are smoothly adept at their instrument (or discipline), then and only then can quality music possibly be created. So too in BIM.

THE BIM ORCHESTRA

If the extended team is an orchestra whose players are working in concert with one another, then the project can reach levels where the disparate parts blend with and balance out one another, working with one another's distinct offerings with harmony and productive counterpoint.

Do not take this lightly. Managing the human interaction on a project is probably the most difficult, yet potentially most rewarding, aspect to managing BIM from concept through operations.

"Who owns what and for how long" is paramount to decipher. Once decided, further plans on how to transfer these from one 'author' to another become necessary. Try to keep it easy, but provide the appropriate levels of complexity. This is the time to ask all the questions and strategize the "Project Systems." Who will do what, when, how. The AIA E202 and upcoming E203 are good places to start. Those and other necessary assets are described in-depth in the AU Handout (from that link mentioned earlier).

BIM EXECUTION PLANNING

A well-planned program between all of the AECO design professionals is fundamental to coordinated BIM. The BIM Execution Plan is a basis that establishes many things, such as how each model is organized and how each model, drawing,

document, spec., etc. is to be exchanged, developed, and formatted. This all helps the coordination process and eventually creates a smooth road.

In our minds, we do not want you to create the oft-typical Single Author Document (SAD) BIM Execution Plan (SAD BEP), otherwise referred to as a BIM Fascist Plan, where one player exhorts his or her will on the other players. That's not very team-oriented. Rather, we profess that a Coordinated BIM Execution Plan be created and authored by all players: A, E, C, and O. In other words, a true BIM Interaction Plan.

The BIM Execution Plan is the essential lifeblood of any well-coordinated Revit/BIM Project. The BEP is the guide to which all team members will adhere. That is all great in theory; however, as with all great "plans," they are only effective if everyone follows them. The best way to get everyone to follow a BIM execution plan is to have everyone contribute to its creation.

Working throughout each phase of the project it is important ...who am I kidding?... it is **mandatory** for successful endeavors to coordinate and collaborate in order to dominate!

COORDINATING CHANGES

The process and players are now known elements. The space to perform the coordination sessions have been set up.

What is the best setup? That answer comes down to budget and project type. For a 5,000 SF pad building, not much more than a conference room with a large monitor and a computer on which to view the aggregated model may suffice. For larger, more complex projects, we could use a 'Cave' where there is a computer and large monitor for each discipline, plus another with the aggregated model, so as items are discussed each player can control their needed changes, while the CM, etc. can manage the overall process.

Is there a need for or a case to make that Virtual Reality is to be used? (BTW: this would have been brought to light in the planning stages and included in the BEP.) If so, does there need to be space provided for that? Do prospective tenants/users need to have other sessions where they can virtually test the pending design, to ensure proper clearances, etc. such as in the case of Surgical Theaters, for example?

MODEL AUDITING

The following audits must be performed to assure quality and coordinated efforts and output (The Virtual Project). You may have more audits as well:
+ Visual audits (human clash detection)
+ Interference audits (clash detection reports)
+ Standards audits
+ Model integrity audits

This is all distinct from the Architectural and Engineering technical audits and reviews that need to happen.
+ Pencils-Down is no joke when considering getting projects coordinated properly!

+ Strategize pencils down so the model-lag is evened out prior to (at least) major submittals.

In every case, these live coordination sessions should use models from each discipline, individually color-coded for ease of visibility. Cut the model using a live 3D view and keep moving the 'cut line' through the building a foot or so at a time. When completed from the first direction, uncut the view and repeat the process in a perpendicular direction.

These visual audits are the same as for internal coordination, but can highlight many potential issues well before they are built or planned on being built.

COPY MONITOR WHAT YOU CAN

Using Copy Monitor can make it extremely efficient to modify the design to match new geometry or design options. Setting up the Revit model to look for the latest linked models can make reloading the latest version of consultants' models very simple and efficient. Remember that Copy Monitor works on only five elements at this time: Beams, Walls, Slabs, Grids, and Levels.

When working with a new model from a consultant, it is definitely a best practice to utilize whatever new grids or levels have been created or modified in their model. These items are the cornerstones of the BIM and should be maintained very accurately, which is easy to do if using Copy Monitor on them.

COORDINATING WITH NON-REVIT DESIGN TEAM MEMBERS

For very large Revit models, the combination of all discipline's models will, at this time, require that Autodesk® Navisworks® or VEO, etc. be used. The use of such software can make it easier to clash check and visualize very large or complex models, especially if some of the design team members are not using the Revit platform.

Another of the many useful tools that Revit has for coordination in conditions where a multi-platform BIM is in effect is the use of the 3D dwf file, which is a very lightweight file that can be emailed if necessary.

Revit is able to batch export 2D or 3D CAD files from the model, which can make it very easy to work with non-Revit consultants who require dwg or dgn files for coordination. The export of such files is streamlined and should be tailored to suit the standard layer and linetype setup for the company CADD standards.

METHODS TO ACHIEVE WELL-COORDINATED DOCUMENTS IN REVIT (A PARTIAL SUMMARY OF)

+ Set up linked views that show only specific elements and control this with view templates in each design team's Revit model, so when the models are linked there no extra elements showing.
+ Clean up models before linking/importing.
+ Consider project size before linking/importing.
+ The modeler should be aware of the frequency of revisions (weekly, bi-weekly) of the other models.

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- Origin (0 North/South, 0 East/West, 0 True Elevation) should be maintained throughout all design team members' drawings. This is much more crucial than in 2D drawings.
- The standard organization can work for smaller projects, but custom organization may be necessary for larger, more complex projects.
- Customize for intuitive understanding by others who may work on the model.
- Use "Project Parameters" and apply to Views for custom organization. (i.e., "For Reference Only" or a separation of "Perspective" and "Orthographic" for 3D views may be necessary).
- Keep in mind that copy/monitoring elements depends on the project and that there is no absolute standard.
- Consider the fact that the party responsible for the geometry (i.e., slab outline – architect) may be different than the party responsible for its properties (slab thickness and reinforcement – engineer).
- Coordination Review can be used only after copy/monitoring is set up and there will even be an automatic notification.
- Create/save HTML Coordination Review Report once Coordination Review is completed then export to Excel format because it allows for better organization and manipulation of data.
- Identify the person responsible for the "actions" (manager or modeler). Do not ignore the "add comments" option for recordkeeping purposes.
- Exporting to AutoCAD is useful for design team members who do not use Revit.
- 2D DWF may work better than 2D PDF for simpler viewing and printing.

CONSTRUCTION ADMINISTRATION

Construction, Construction Administration | Updates, Closeout, Completion, FM. This is not the time to go away from the strategy. Keep communicating...

Do Not Trust Your Beliefs
Empirical data can be helpful, but can also be hurtful if held as 'absolute' in many cases. Keeping an open mind is paramount in coordinated interactive projects such as AECO endeavors!

Teams may believe there is not much coordination that needs to occur in this phase unless the project has a large amount of addendums and supplemental submittals (which they all pretty much do!). What is more in focus is getting all the contractor's changes and additions/subtractions included into the As-Built BIM. Who is to do this? Who is to pay for this? What does the BEP say about this?

Consider this to be an extension of the CD phase, of sorts. This section refers to those areas of the project that correspond to when shop drawings are being created and eventually under "construction."

Make sure to update the structural model and ask if the architect is doing the same with his or her models.

Consider the following when updating the model in the CA phase and use a separate model if updates get in the way of submittals.

- Model updates may be required after BID Phase
- Update model per RFI responses
- Update model per shop drawing reviews
- Update model per site "fixes"
- Pro-actively document the model

COORDINATE AND DOMINATE | BIM PROJECT SUCCESS

Every building is constructed and maintained differently, due to particular needs and constraints. Plan and create accordingly.

Beginning with the end in mind is critical to ensure that the BIM project is successful throughout.

Building Information Models and the interactive AECO teams themselves must be created, coordinated, and managed. Then, finally, the virtual project delivered, constructed, and operated in a way that will best help the end user achieve the goal: using the built environment.

Jay B Zallan
Perkowitz+Ruth Architects
BIM Director
JayZallan@gmail.com
@JayZallan

Marcello Sgambelluri
John A Martin Structural Engineers
BIM Director
Marellojs@johnmartin.com
@marcellosgamb

Troy Gates
Mazzetti Nash Lipsey Burch
Design Technologies Manager
tgates@mazzetti.com | @TroyGates

Darren Roos
Bernards
Corporate BIM / VDC Director
droos@bernards.com | @darren_roos