Come Fly with Us in the Cloud: BIM Panel Discussion

Joshua Benoist, PE – Autodesk
Ryan Vecci – Autodesk
William Spier - Autodesk
David Butts – Gannett Fleming
Jim Bratton – EMCOR - Dynalectric

MP3174

Join us for this follow up panel discussion of the AU class "MP3169 Get Your BIM Head Out Of The Cloud." Come have a discussion with various panelists from the industry about how the cloud services can be used in a BIM collaborative workflow.

Learning Objectives

At the end of this class, you will be able to:

- Use Autodesk BIM 360 Glue for the entire collaboration workflow of an extended MEP project team
- Use Rendering As A Service as a visualization tool, BIM 360 Glue for Communication, and Building Energy Simulation for analysis
- Apply best practices to using cloud tools
- Explain how cloud fits in with BIM workflows

About the Speaker

Joshua is a Professional Engineer with ten years' experience as a MEP design engineer out of Chicago, IL. Joshua currently works for Autodesk in Premium Support Services and has been at Autodesk for 8-years. Joshua is the President of the local Granite State ASHRAE chapter. Joshua.Benoist@autodesk.com

THINGS TO KNOW FOR MY AU CLASS:

MP3164 - The 8am morning class is a 90-minute discussion and demonstration. We have many cloud and BIM programs to demonstrate. We will reserve time for questions at the end, for those that cannot attend the PANEL.

MP3174 - The 2:30pm afternoon class is a PANEL DISCUSSION follow up to the morning class. The two classes are a pair. If schedule allows, bring your questions to the Panel Forum. We have 4 panelists:

David Butts – Gannett Fleming

Jim Bratton – EMCOR - Dynalectric

William Spier - Autodesk

Ryan Vecci - Autodesk

Joshua Benoist - Autodesk

Because the two classes are a pair, the handouts will be the same. The presentation slides will be similar. Save questions for the PANEL if attending.

In the LECTURE, we will demonstrate quite a few programs and will not deep dive into any one. If you wish to see a deeper dive into one of these programs, bring the request to the PANEL! =)

***This handout was written to be a reference guide for both Discussion and Panel Classes. PLEASE DO NOT PRINT OUT, AS IT IS 128 PAGES.**

****Check out the "Additional Materials" Handout. It is a "Navisworks Quick Reference Guide," similar to a double-sided laminated version you may find in a college book store. Print it, laminate it. Hang it up on the cube wall for reference.**

Last Note: If you like this presentation, please remember to fill out a survey. Thank you for attending!

Let's discuss how "Cloud" fits in with the BIM workflows

What is BIM? That question is probably for another class, but I do want to put this in context. BIM is Building Information Modeling. In a nutshell, it's about building an accurate 3D model, and leveraging all the information inherent in that model. We can do all sorts of analyses, do coordination, collaborate, visualize, refine, use a rendered model for marketing, data-mine a model, etc.

What is Cloud? That an interesting question because, like BIM, it is always evolving. Recognizable cloud platforms are Amazon, Google, Microsoft SkyDrive, Facebook, Salesforce.com, and Autodesk 360. Someone described the cloud as a re-visitation to the old mainframe days, where computers were too expensive and limited to large corporations. Then the PC revolution occurred. Everyone wanted a smaller more portable PC, laptops, iPhones, tablets. Then broadband internet became ubiquitous with Wi-Fi and high speed connections everywhere. LTE, on a cell phone is almost as fast, or faster than many Wi-Fi connections. We can reach out and leverage modern-day mainframes thru the internet and it is as-if that program were running on the local gadget.

We are in a time where some applications make a lot of sense being local on a desktop, while other applications or features can leverage the "Cloud" mainframe. Mainframes give us raw horsepower. Throw as many CPU's at a rendering as you need. Storage can be tailored to your needs, and it's centralized! As Facebook and LinkedIn and Twitter has taught us, the "Cloud" can be leveraged for collaboration across many platforms. PC's, tablets, browsers, phones, etc. Google taught us that information is everywhere in the "Cloud." Amazon taught us that interacting thru the "Cloud," gets us books faster and is a fun experience. Autodesk, with our "Cloud" is going to teach that adding "Cloud" to your workflows (like BIM) is not only fun, but its Productive.

There are many qualities inherent in "Cloud" that we can leverage,

to name a few:

- Tailored Storage
- Computing Horsepower
- Centralized – Single Source of Truth (Versioning)
- Collaborative & Unlimited Users
- Ubiquitous & Mobile Access
- Platform Neutral
- Information Rich
- Big Data
- Augmented Reality
- Live Updates From Autodesk!! (More frequent feature updates)

We all know there are many stakeholders in any building project; especially over the entire lifespan of that building. Are you an Owner, General Contractor, Architect, Engineer, Fabricator, Contractor, Inspector, Commissioning Agent, Facility Manager, Operations or Maintenance? Different aspects of BIM and "Cloud" will have more impact to you. In the building lifespan, are you part of the Design Creation, part of the Construction/Design Execution, maybe the Facility Administration? Each adds data to the living BIM model, each has a collaborative need, and each stage has a need for analysis. Not everyone has a cubicle or a heavy-duty workstation. "Cloud" can really shine for stakeholders that are more mobile or collaborative.

Let's break it down to familiar stages in the overall building lifecycle:

- Programming & Conceptual Design
- Design Documentation (Schematic, Design Development, Construction Documentation)
- Construction & Fabrication (As-Builts)
- Commissioning & Handover
- Facility Management & Maintenance
- Renovation (As Appropriate)

The BIM model can be leveraged in all of these stages above. So can "Cloud." In the first two stages, we are "Creating" the model. In the next two, we are "Implementing and Updating" the model. In the last two stages, we mostly "Reference and Maintain" the Living model.

"Big data" is used by any company to better understand their own customers, employees, workflows and their behaviors and preferences. Companies are keen to expand their traditional data sets with social media data, browser logs as well as behavior analytics and data to get a more complete picture of their workflows and customers. The big objective, in many cases, is to create predictive models. Data harvesting the BIM model (a living document) is a means to accomplish "Big Data" to get predictive models and improve forecasting, safety records, develop more accurate bids, more accurate engineering rules of thumb, gain workflow and process efficiencies. Data is actionable. It allows one to make an informed decision.

BIM is a source of Data. And so is Cloud! Together, they equal productivity and better decisions. BIM + CLOUD = PRODUCTIVITY thru better DECISIONS

Let's talk about specific programs. Some programs sit on the desktop, but may have individual "Cloud-based" features. "Cloud" programs may be exclusively on a Mobile device, like an Apple iPad. "Cloud" programs may be entirely Web Browser based, and some may have all-three: desktop, browser and mobile platforms. Below, we classify programs by whether it supports the BIM model creation mostly on a desktop, or in a "Cloud" workflow. Each has a link to more info.

- BIM
    - ReCAP Pro – Great for roughing-in pre-existing conditions. ReCAP Pro is a desktop program that stitches together point-clouds from disparate parts of a building, into one unified cloud project that can be leveraged in Revit. Use for renovation projects, and new additions, build-outs.
    - Revit – The BIM workhorse. Builds, analyzes and refines the model, sometimes with features in the "Cloud."
    - Navisworks – The Local Design Team collaborator. It agglomerates models of different file types. Clash Detect, Markup and Collaborate between disciplines. This is your in-house desktop tool. Project Managers may use this for Timeline Staging and Quantification. It has the ability to Visualize the model fully rendered with Materials assigned in the Revit BIM model.
    - Fabrication – A collection of products that consume the BIM model, ratchets up the "Level Of Detail," and results in parts that can be quantified and fabricated for installation.
- CLOUD
    - FormIt – Great for collaboration and creating "Early Concepts." Create mass elements, geo-referenced to the job site. Outputs a Revit model, and basic info like volumes and areas.
    - ReCAP Photo – Great for roughing-in pre-existing conditions. ReCAP Photo is "Cloud" based and creates a highly-accurate point cloud from 2D photos. It leverages the Raw Horsepower in the Cloud and may take up to a day to bake the 2D photos into a highly-accurate 3D point-cloud. This point-cloud can be leveraged in Revit. Use for renovation projects, and new additions, build-outs.
    - Revit – RAAS (Rendering As A Service) – This is a feature inside Revit that sends the BIM model into the cloud to be rendered. It leverages the "Computing Horsepower" in the "Cloud" while freeing the desktop user to continue uninterrupted.
    - Revit – Building Energy Analysis - This is a feature inside Revit that sends the BIM model into the cloud to be analyzed. It leverages the "Computing

Horsepower" in the "Cloud" while freeing the desktop user to continue uninterrupted.

- Revit – Structural Analysis - This is a feature inside Revit that sends the BIM model into the cloud to be analyzed. It leverages the "Computing Horsepower" in the "Cloud" while freeing the desktop user to continue uninterrupted.
- Autodesk 360 – This is the "centralized" tool that provides "Tailored Storage" as well as being "Platform Neutral and Information Rich." It is also a communication center where a user can see their Recent Activities and Recent Design Data. ~~ALL~~ MANY file types, including images, have a viewer and a markup tool. As you navigate thru different file types saved in A360, check out the file options.
- BIM360 – Glue – This tool has a browser version as well as a tablet. Aggregate BIM models from different file types. It is a design team collaboration tool that does markups, clash detection. The model is rendered for visualization. Save viewpoints and issue markups via email to team members.
- BIM360 – Field - This tool has a browser version as well as a tablet. Aggregate BIM models from different file types. It is a design team collaboration tool that does markups, clash detection. The model is rendered for visualization. Save viewpoints and issue markups via email to team members.

- OTHERS (Not Demonstrated – Honorable Mention)

Revit – Structural Analysis	AutoCAD 360	SketchBook Pro
Fabrication CADmep	PLM 360	Fusion 360
Green Building Studio	SIM 360 pro	Constructware
Buzzsaw	InfraWorks 360	Point Layout
AutoCAD	AutoCAD Architecture	AutoCAD MEP

MORE INFO ON CLOUD SERVICES:
http://www.autodesk.com/resource-center/cloud-services

Great FAQ on A360:
http://usa.autodesk.com/adsk/servlet/ps/dl/item?siteID=123112&id=17889433&linkID=17690248

Let's discuss some best practices when using various "Cloud" tools

Free up mobile device memory by dismissing the iOS applications open in the background.

Always Sync before going into the Field!!! BIM360 Field and Glue, both have offline capabilities.

Most of the Autodesk Cloud products utilize the Autodesk "Single-Sign On" to login. Most will use and interact with files stored on A360. Those that don't use A360 are headed in that direction where it makes sense for that cloud product.

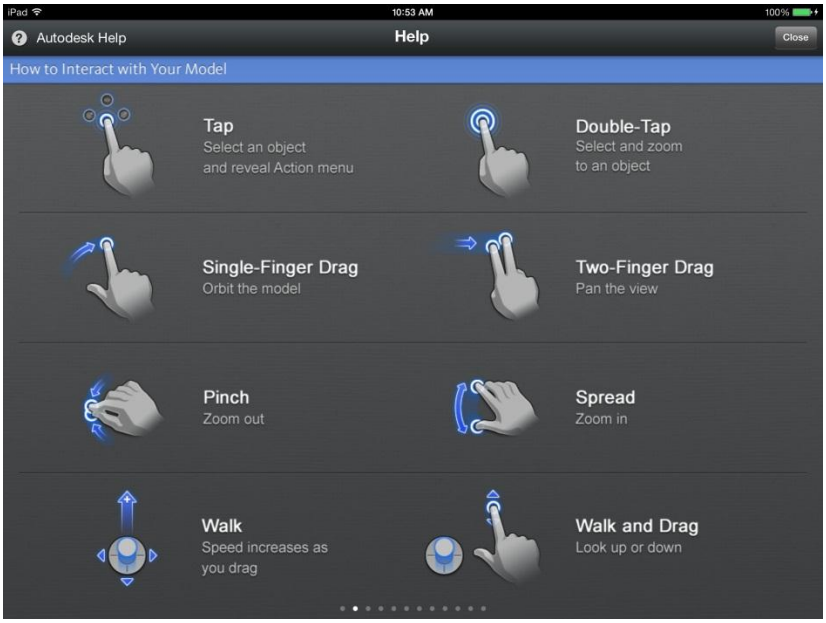
BIM 360 Field and Glue do not use A360 and both have a different method to upload files.

BIM 360 Glue is very similar to Navisworks. When do we use one versus the other? Glue is like Navisworks LT. We would never give a non-technical building owner, an installation of Revit to view a BIM model. We would give them a light-weight viewer. Glue is way more than a viewer, but nowhere near the complexity or power of Navisworks. It is a Collaboration tool, it is a Clash Detection tool, it is a Redline Markup Tool and it Aggregates models of different file formats.

The following quote holds true for any of our "Cloud" programs. Spend some time setting up selection sets, groups, viewpoints in Navisworks, or baking data into the Revit building model before uploading into BIM 360 Field or Glue.

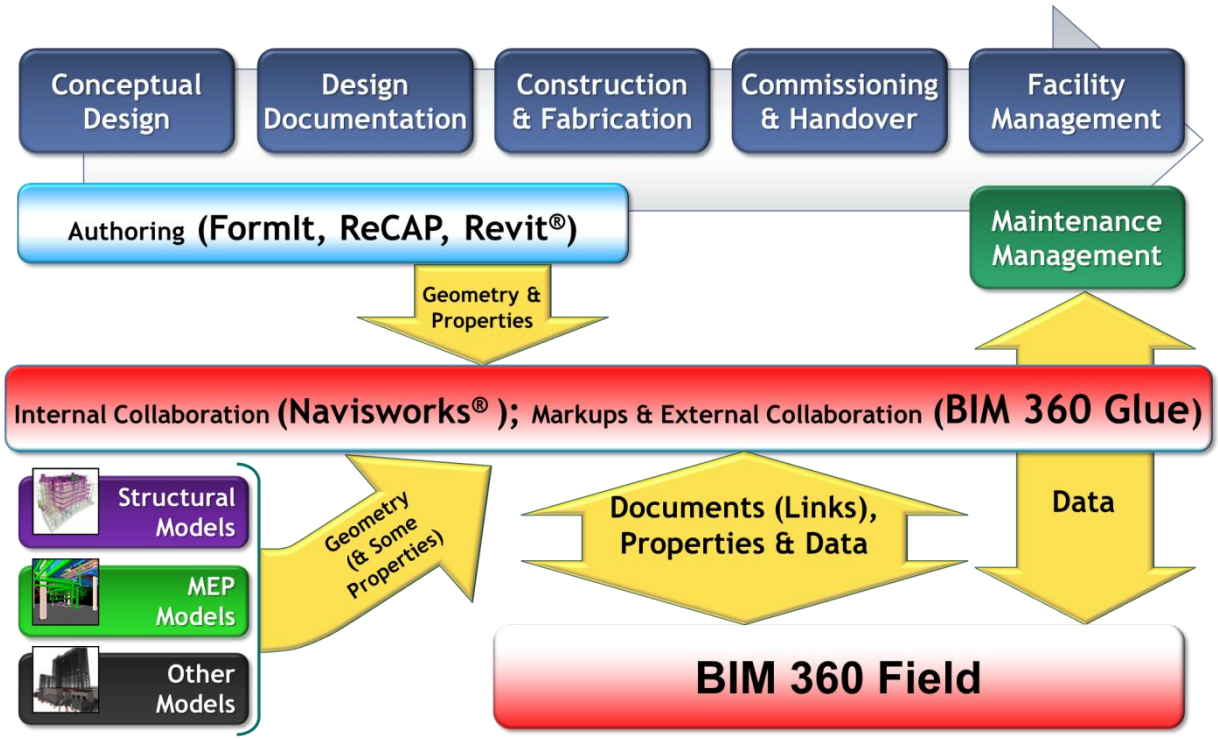
"Give me six hours to chop down a tree and I will spend the first four sharpening the axe."

- Abraham Lincoln



TIP: Gestures!!

Use Autodesk BIM 360 Glue for the entire collaboration workflow of an extended MEP project team



Let's tie in our discussion on Stakeholders. I'm a Modeler for an MEP firm. I have a cube and a workstation. I model in Revit and then switch to Navisworks to clash detect my Revit model to find and QC my own clashes before the clashes become a problem for the larger project team. Similarly, my larger project team will use Navisworks to find and fix clashes before our models get published, leave our company and become available to 3rd party project members.

We also use Navisworks later in the Construction phase to setup Viewpoints, Selection Sets, and Groups so that they are available when uploaded into BIM 360 Field.

Now, let's switch to a different stakeholder, but still part of the Design team. I'm now an Architectural Project Manager. I rarely use CAD or Revit anymore and these days, I do more Red Lining, Coordination and Project Management. I am in meetings with my immediate design team, and then I'll leave the office for meetings with the owner, 3rd party project managers, general contractors, etc. We do not have a workstation, maybe a few laptops at the meeting. More frequently, people are bringing iPads and other tablets. They are much easier to hold and deliver presentations. We can use Glue to do the visualization, redline and markup a view, email that markup direct to a colleague back in the design office. That work will be done before I get back to the office. Better yet, since the model is up in the cloud, if I ask and that person is

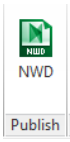
available, that work might get done and model updated all while we sit here. Now won't that impress the owner!

Let me ask if you have experienced this: The BIM Coordinator becomes a bottleneck and you wait an extra day or two for one of the other discipline models to get uploaded to your internal server for coordination? One of the promises of BIM 360 Glue, is the elimination of that bottleneck by enabling each discipline to upload their latest model for coordination in real-time. BIM 360 Glue has a plugin for Revit. When a discipline makes a change, upload the discipline specific model to Glue from the plugin. Glue will maintain individual models. The Glue user can create "Merged Models" from the individual discipline models.

BIM 360 Field has a different recommended workflow. Field is NOT an Aggregator of individual models. It also benefits from well thought out selection sets, groups and merged models in Navisworks. Always upload Field models direct from Navisworks, or use the Field Import Tool found inside the Browser based Field. Field has a Revit plugin, but it is not recommended for the first merged model upload. We will discuss why not, in a moment.

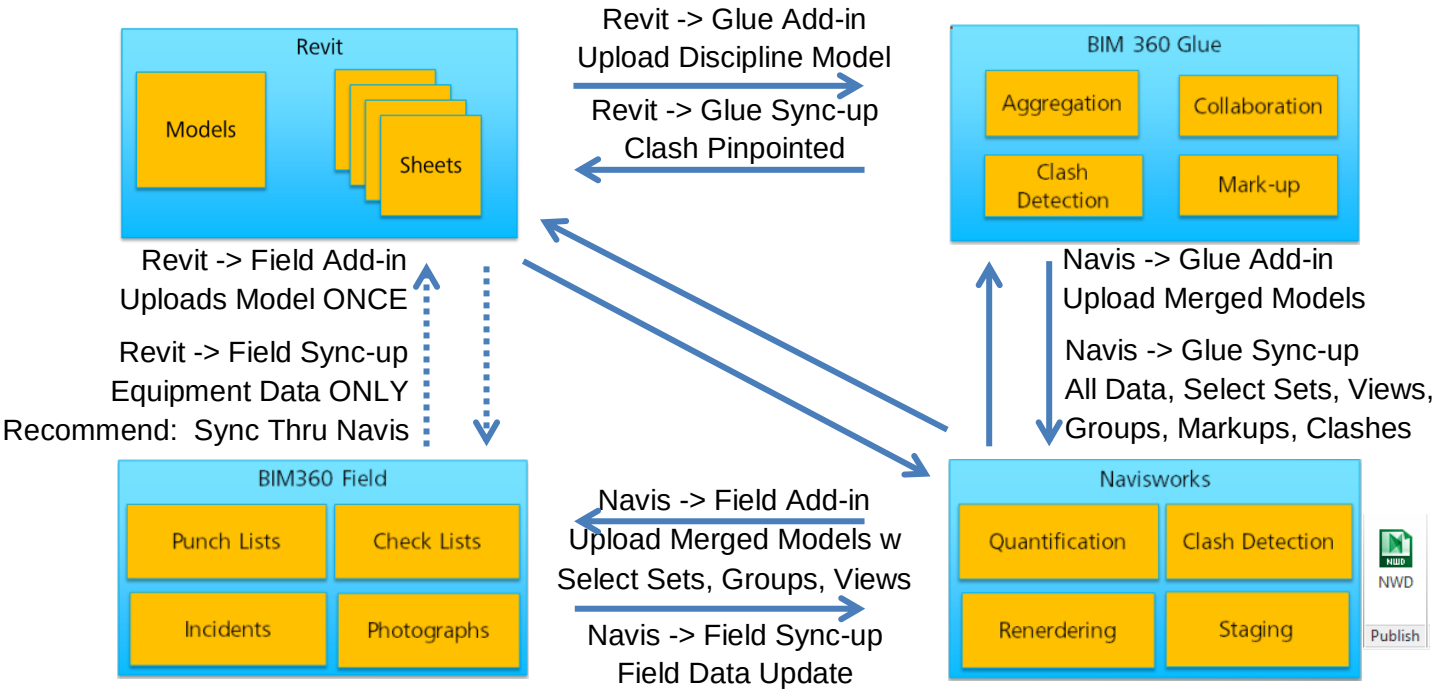
BIM 360 Field has a "Library" that will store all your construction project documents like RVT files, NWC files, Word docs, PDFs, pretty much any document file needed on a Construction Site. For Field's Visualization tool, it exclusively uses the NWD file format. If a RVT file is uploaded, Field will convert the RVT to the NWD file format for use in the "Models" visualization section. The RVT file is saved in the Library in case someone needs to download it.

If you update the RVT file stored in Field thru the Revit plugin, the NWD version of that RVT file does NOT get updated. The recommended workflow is to bring your discipline specific RVT model into Navisworks. Aggregate all the models into one or more "Merged Models." In Navisworks, setup Views, Groups and Selection Sets. Save the Navisworks merged model to a NWD file format on the local hard-drive. Then upload the NWD into Field, preferably using the Field Import tool found inside the browser based version of Field.



The Navisworks and Revit Field Plugin, will only update and sync the "Equipment" lists and properties. Though the plugin will upload the Revit model on the first use, it does not update that model on future sync's. The primary purpose of the plugin is to sync the equipment lists and other properties, not the 3D model. That may change as Field matures, but at this moment best practice is to use the browser to open Field and use the Field Import Tool.

Get all of the latest add-ins here: https://b4.autodesk.com/addins/addins.html



Autodesk BIM 360 add-in app for Autodesk Revit

The BIM 360 add-in app for Autodesk Revit supports round-trip BIM workflows between Revit and BIM 360. Use the "Glue it" feature to publish Revit models – including multiple 3D views at one time – directly to BIM 360 Glue. Use the "Clash Pinpoint" feature to isolate clashing elements from BIM 360 Glue in Revit. Update Revit models with commissioning data from BIM 360 Field to support handover, operations, and maintenance workflows.

Autodesk BIM 360 Glue add-in app for Navisworks

The BIM 360 Glue add-in app for Autodesk Navisworks 2014 supports multi-discipline BIM workflows. Open models coordinated in BIM 360 Glue directly in Navisworks to perform advanced analysis, create 4D animated timelines, perform model-based quantification, and create stunning renderings. Use the "Glue-it" feature to publish consolidated models from Navisworks directly to BIM 360 Glue to provide the extended project team easy access to the most up-to-date project data on their desktop or iPad.

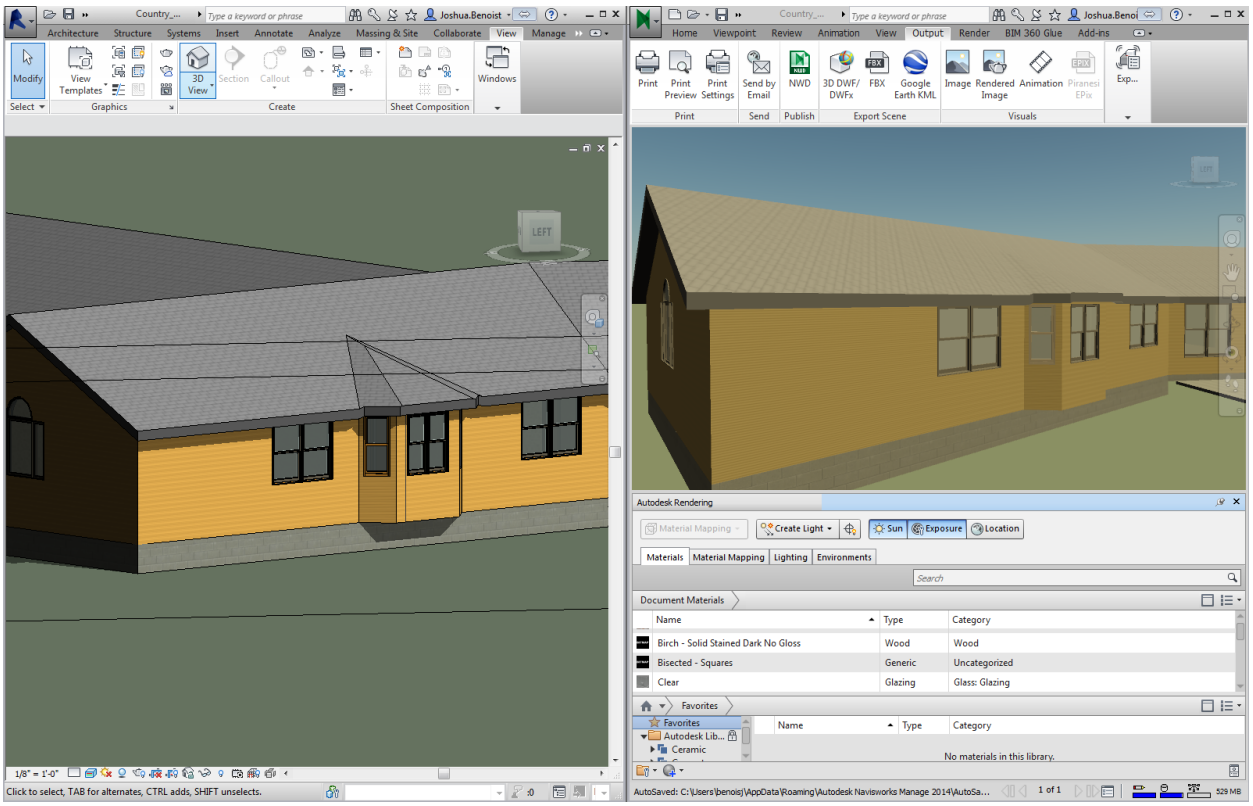
Use Rendering As-A Service as a visualization tool, BIM 360 Glue for Collaboration, and Building Energy Simulation for analysis

The key to rendering is finding a balance between the visual complexity required and the rendering speed that determines how many frames can be rendered in a given period of time.

Rendering involves a large number of complex calculations which can keep your computer busy for a long time. Rendering pulls data together from various features and interprets its own data relevant to tessellation, texture mapping, shading, clipping, and lighting.

Producing rendered images always involves making choices that affect the quality (anti-aliasing and sampling) of the images, the speed with which the images are rendered, or both.

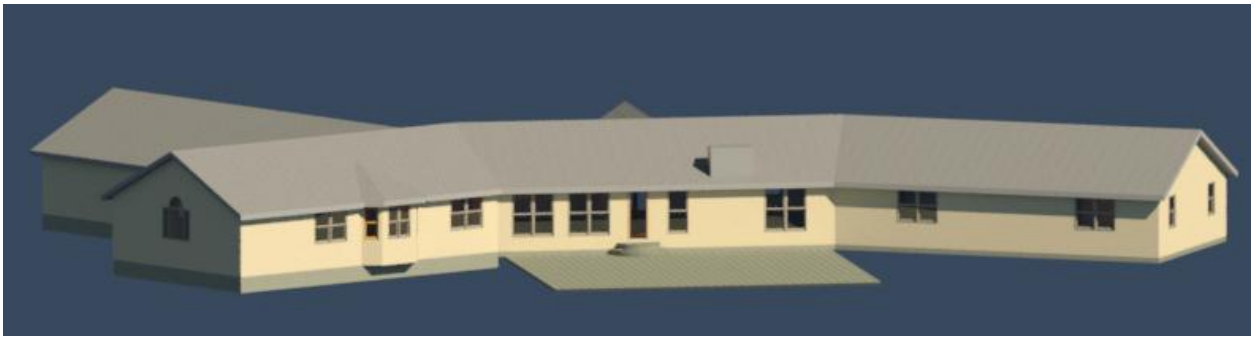
The highest quality images typically take the most time to render. The key to working efficiently is to produce good-enough quality images in as little time as possible in order to meet production deadlines. In other words, choose only the most economical values for options that let you produce images of acceptable quality for your particular project.



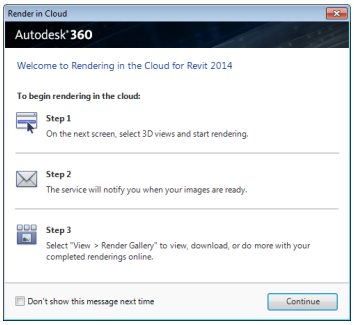
Seen above is Revit side-by-side with Navisworks in “Realistic” visualization mode. The “screen” is not rendered, but displays with materials and textures. Revit objects have pre-defined materials on most objects, and a library of materials if not. These “Autodesk Materials”

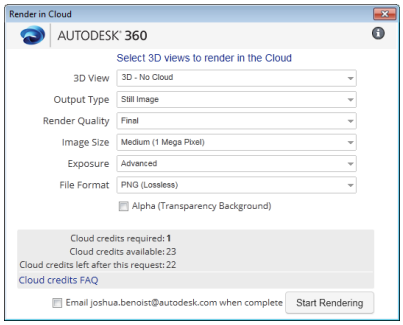
will port from Revit into Navisworks. You will notice in the above image that in the right-side image, at the bottom is the “Autodesk Rendering” panel. In this panel is a section header called “Document Materials.” You know the Revit materials have successfully transferred into Navisworks when you see them in the list here.

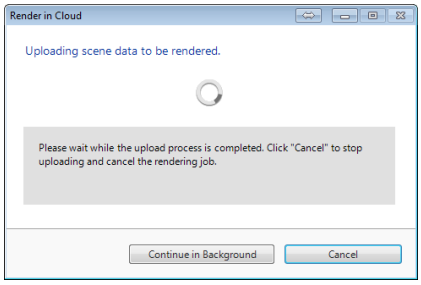
Here is a Rendered Image from Revit:



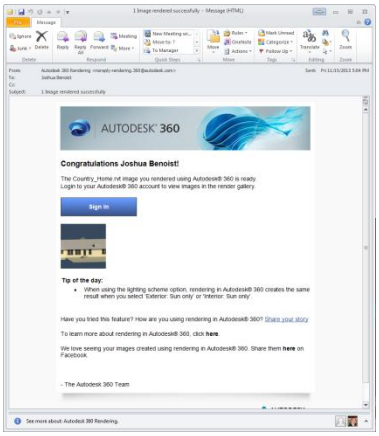
When I rendered the above in the cloud (RAAS – Rendering As A Service), it only took a few minutes because we have “Computing Horsepower” from the Cloud.



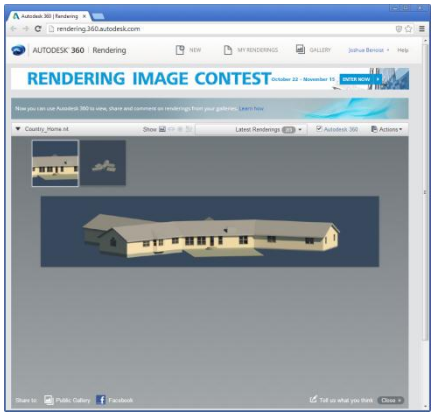




The image was emailed to me:

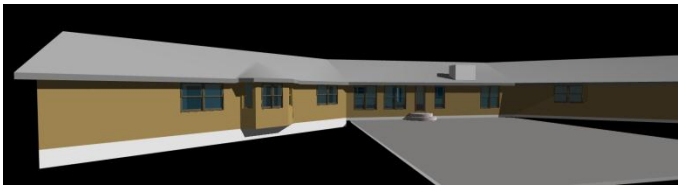


I clicked the link and a preview opened in my browser, on **A360**:

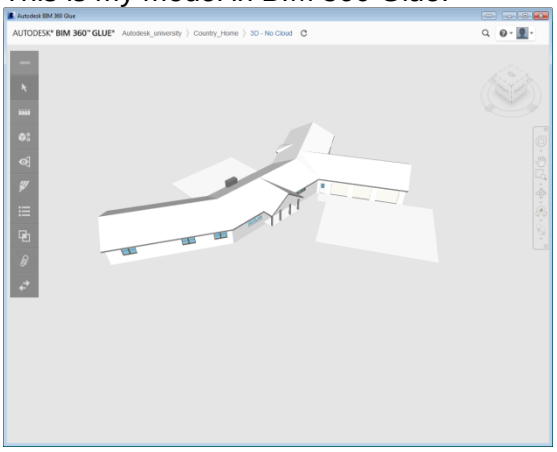


The preview allowed me to download the full rendered version, seen above.

Here is a sample rendered image from Navisworks using “Autodesk Renderer,” and then “Presenter” on the right. Neither render in the cloud, and utilize local resources.



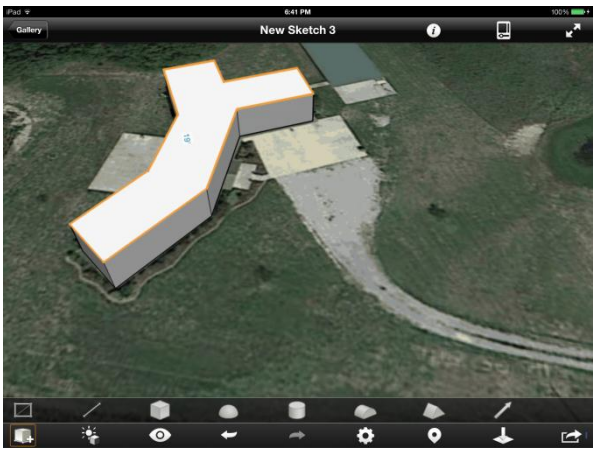
This is my model in BIM 360 Glue:



This is it in BIM 360 Field:

This is what I started with in FormIt, but I realized this conceptual model was too simple. I needed a point cloud to document existing conditions. I then tried 123D Catch. That gave me a beautiful mesh model, but I could not use it in Revit. I used ReCAP Photo and it delivered beyond my wildest dreams.

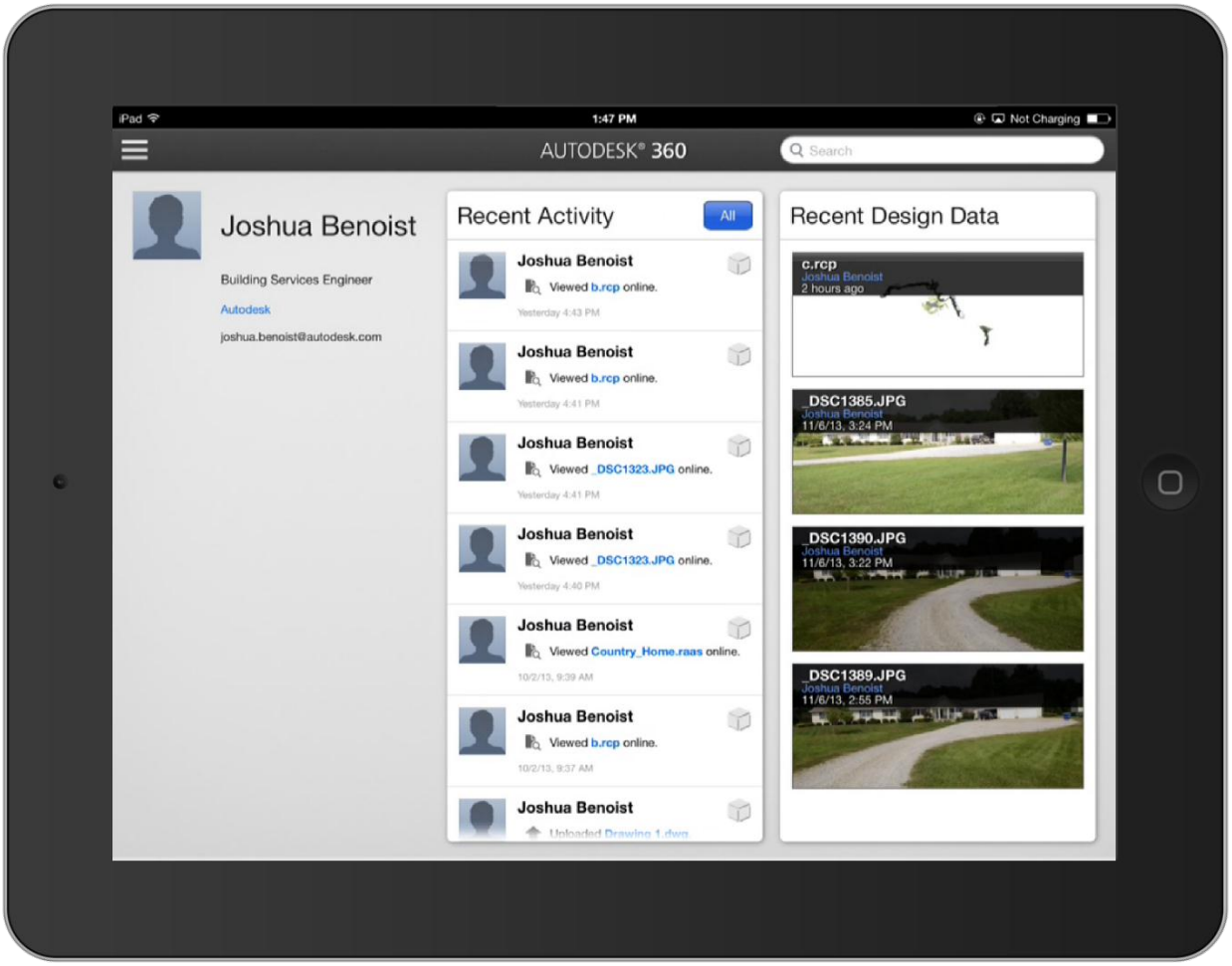
BIM 360 Field, Glue and FormIt do not have “Rendering” of static images, but will leverage the Materials for “Visualization.”



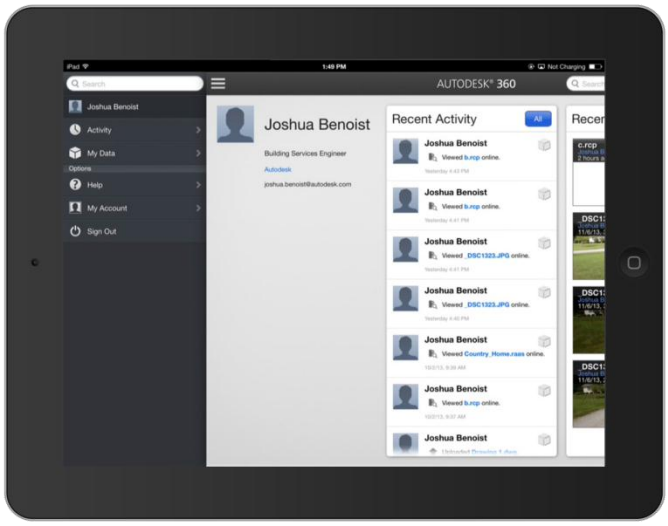

iPad
1:36 PM
Not Charging
Autodesk 360
SkyDrive
Google Drive
Dropbox
Buzzsaw
BIM 360 Glue
BIM 360 Field
InfraWorks
AutoCAD 360
Remote 3D
FormIt
123D Catch
Mail
Safari
Music
Lync 2010


COLLABORATION
ENERGY ANALYSIS
CLASH DETECTION
FIELD MANAGEMENT
ADD
RENDERING
SIMULATION
STRUCTURAL ANALYSIS
PRODUCT LIFECYCLE MANAGEMENT

Autodesk 360 (A360) - Mobile, Desktop (Plugin) and Browser Based
http://360.autodesk.com

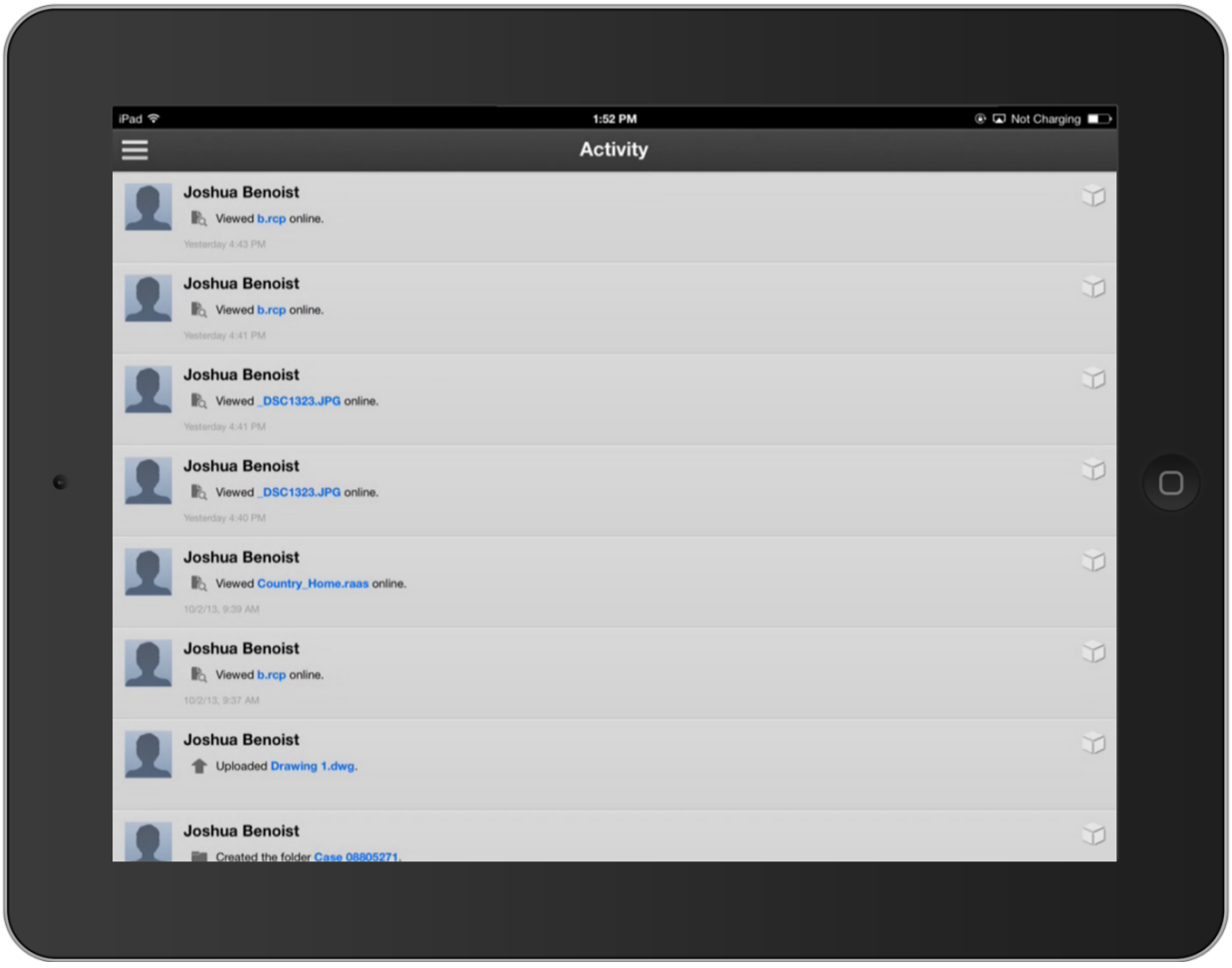


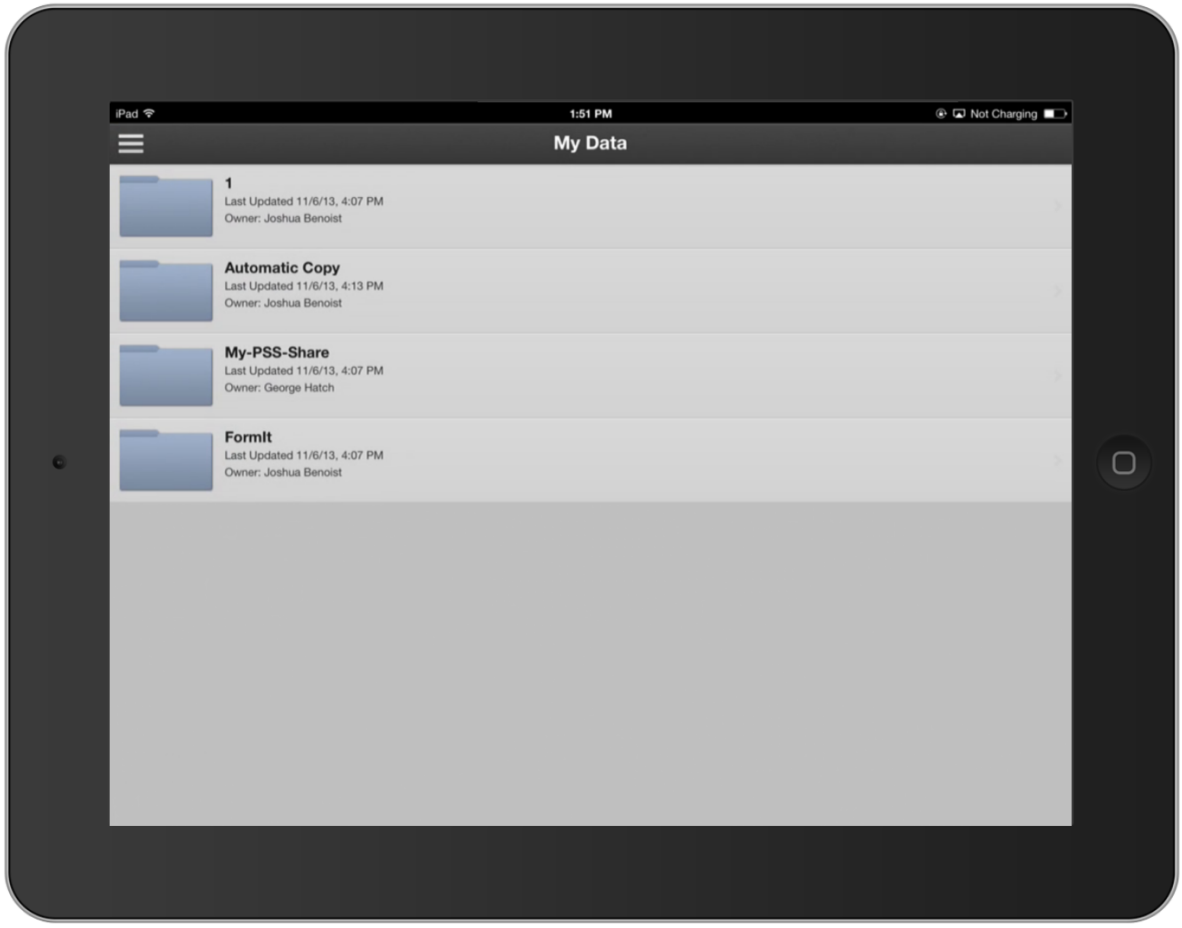
The above image shows A360 in a nutshell. It is a central place for communications, recent activities, access recent design documents, render, markup tools, etc.



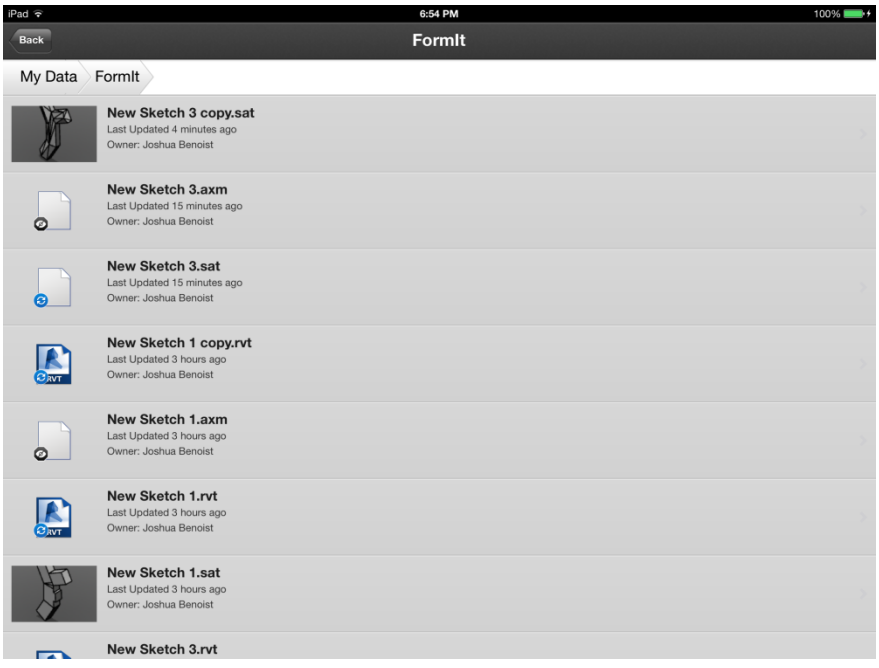
Swipe from left to right to access the menu. In the Menu, you can quickly get to your library "My Data," or to your account.

The below is found under "Activity."



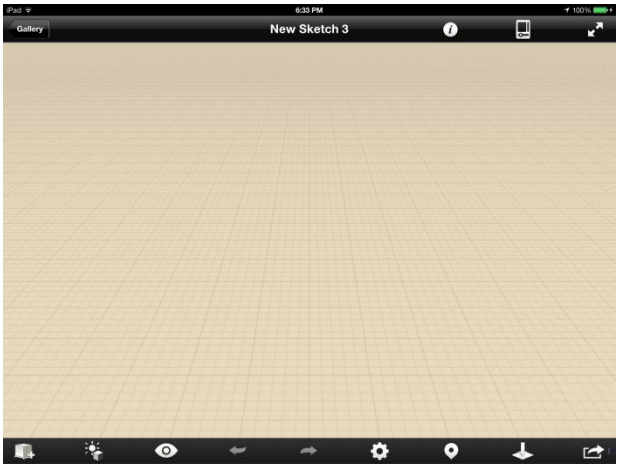


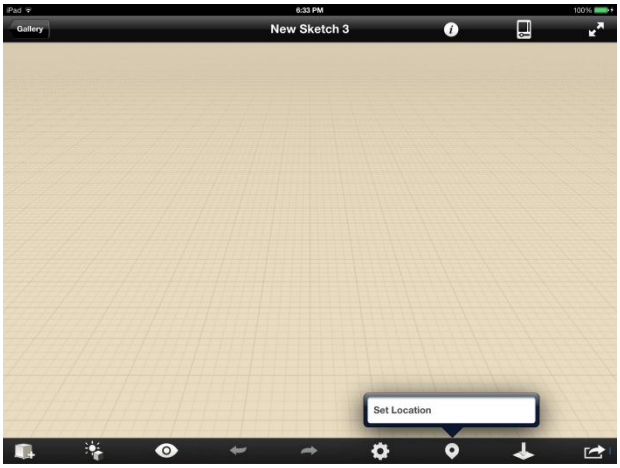
After selecting “My Data” it takes me to the folders. You can set a location on your local hard-drive to sync automatically to the “Automatic Copy” folder. When you use FormIt, it creates the folder seen above. The folder labeled “1” is one that I created myself. The folder “My-PSS-Share” is a folder that a team-mate created and shared with my team. Observe that “George Hatch” is the owner of the shared folder. He can set accessibility and permissions.

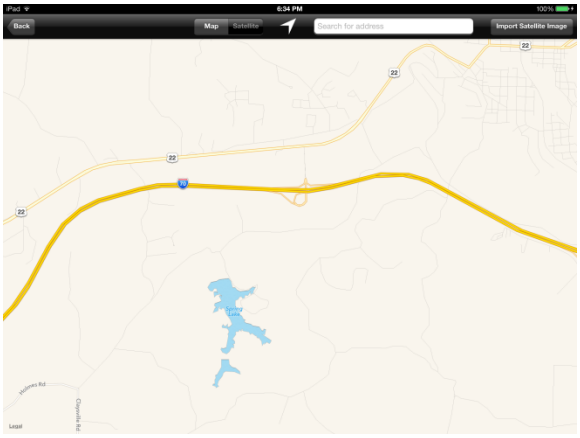


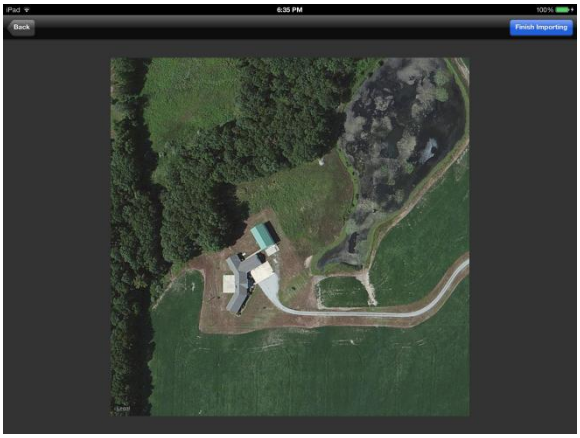
In the FormIt folder, you can see the various file types created when using FormIt. The RVT file type is of interest because Architects can utilize FormIt to navigate to a project site and iterate thru conceptual massing and site layout. Then bring that RVT file right into Revit.

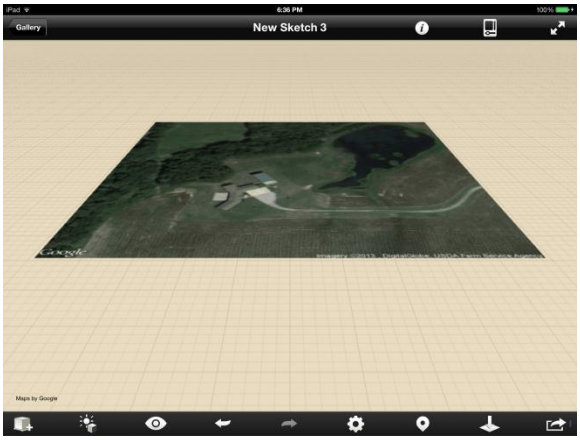
FormIt – Mobile Based



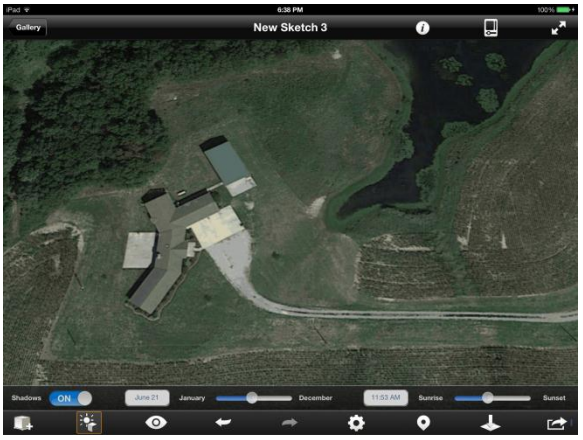








Let's take a quick tour of the user interface in FormIt

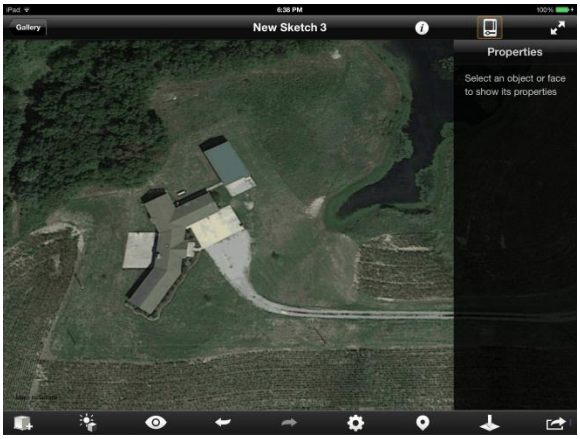


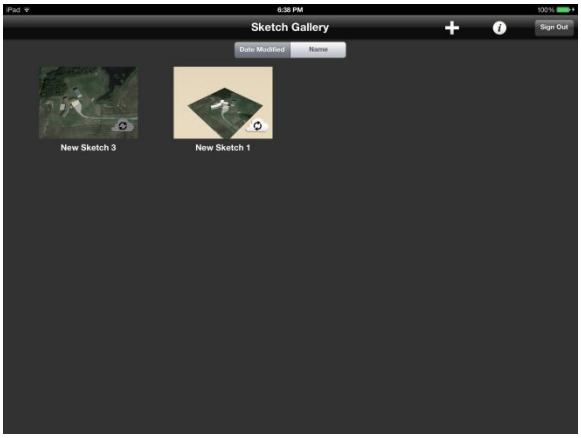

Gallery
New Sketch 3
View
Navigate
Home 3D View
Top View
Fit View
Fit to Model
Fit to Model & Image
Shadows
December
Sunrise
Sunset


Gallery
New Sketch 3
Settings
Application Settings
Snap to Grid
OFF
Snap to Objects
ON
Sketch Settings
Units
Imperial
Visual Style
Levels
Space Usage Graph
OFF
Display Grid
ON
Shadows
ON
January
Sunset

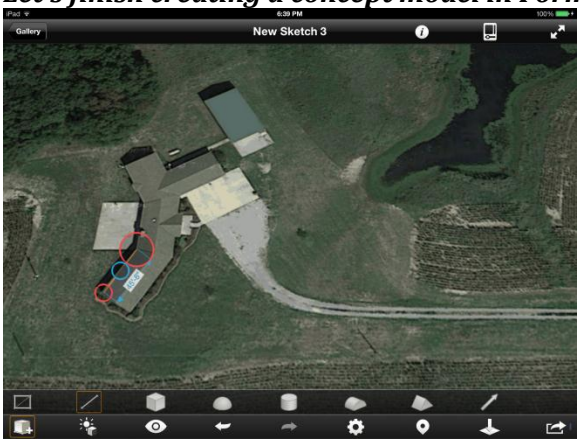

Gallery
New Sketch 3
Import
Images
3D Models
Shadows
ON
January
December
Sunset

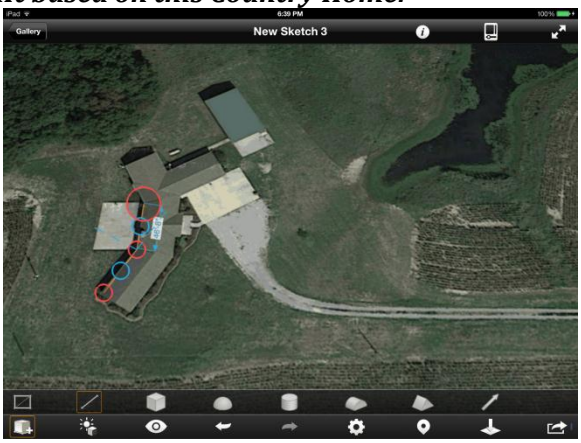

Gallery
New Sketch 3
Send To
Photo Library
Email
Shadows
ON
January
December
Sunrise


Gallery
New Sketch 3
Properties
Select an object or face
to show its properties

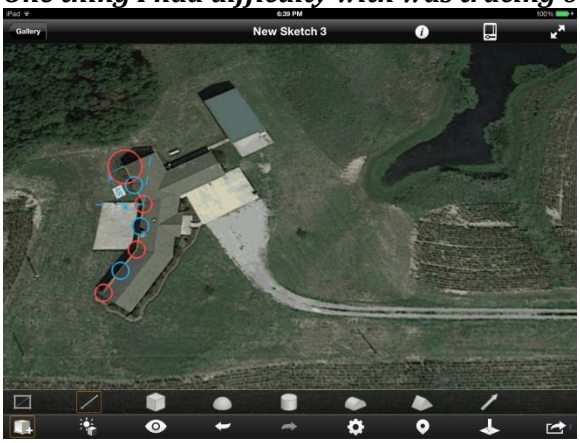


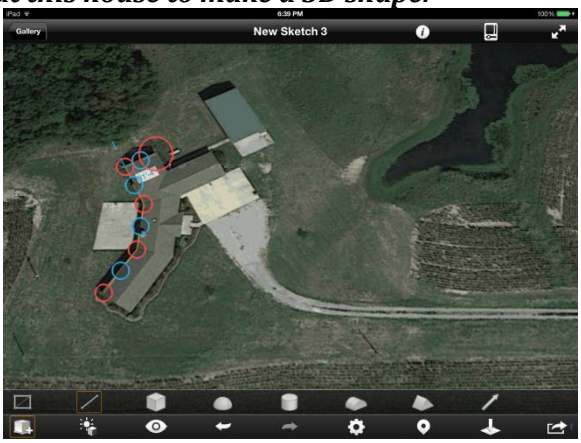
Let's finish creating a concept model in FormIt based on this Country Home:





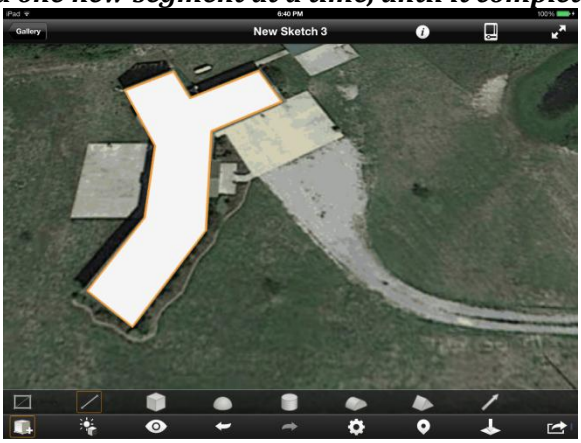
One thing I had difficulty with was tracing out this house to make a 3D shape.



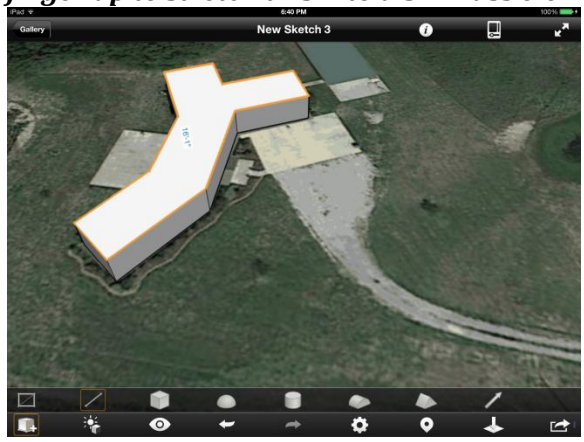


I learned that when drawing these lines, it's like connect the dots. Finger down at point A, drag to Point B, let up. To make the next line segment, this is the tricky part, you have to set Finger down in the Red circle of Point B and Drag a new segment to Point C, then let up on the finger. If your finger misses the red circle, or you lift up prior to dragging a new segment, it aborts completely and disappears.

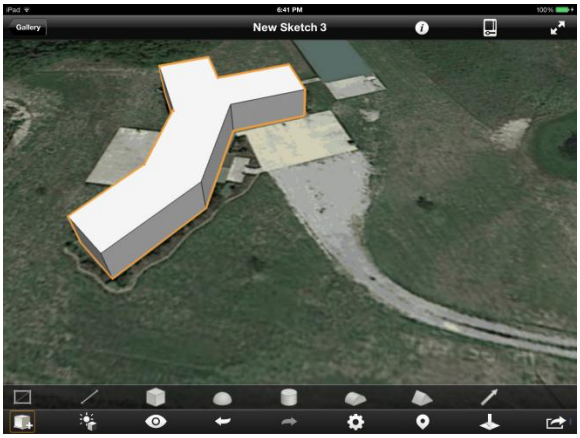
You can see from image to image that we add one new segment at a time, until it completes.

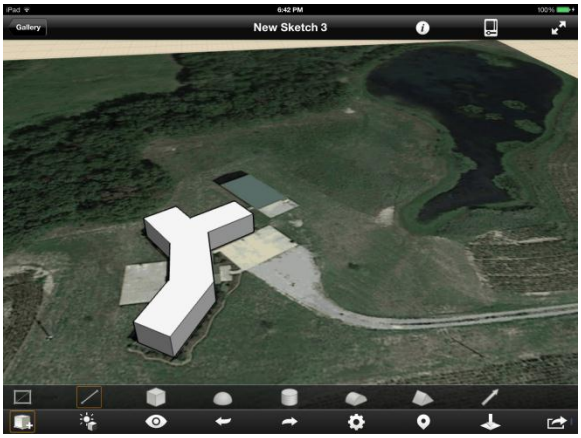


IMMEDIATELY: Unless you want a 2D region, tap finger down inside white region and drag finger up to stretch this into a 3D mass element. There are no second chances.

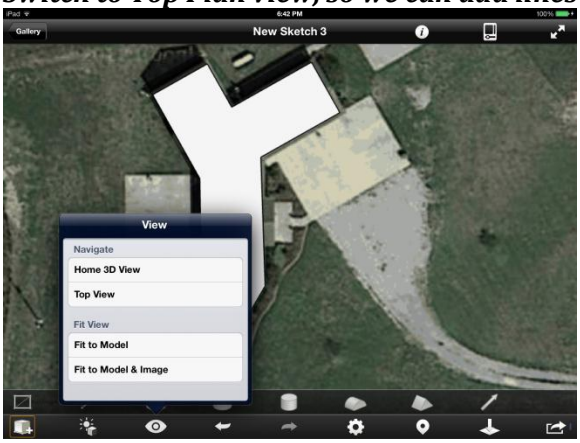


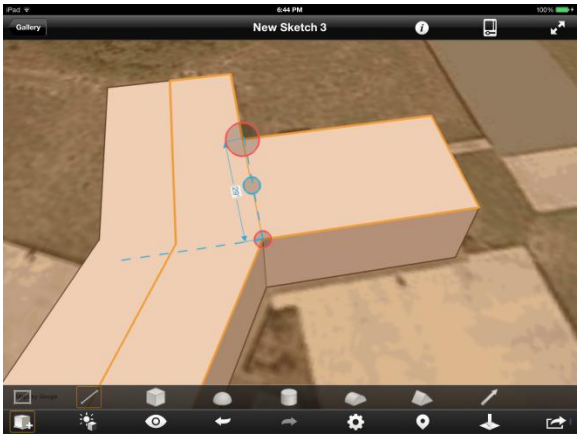
If you miss converting it to a 3D body, you may have to redraw the region from scratch. That's all I found to resolve it.

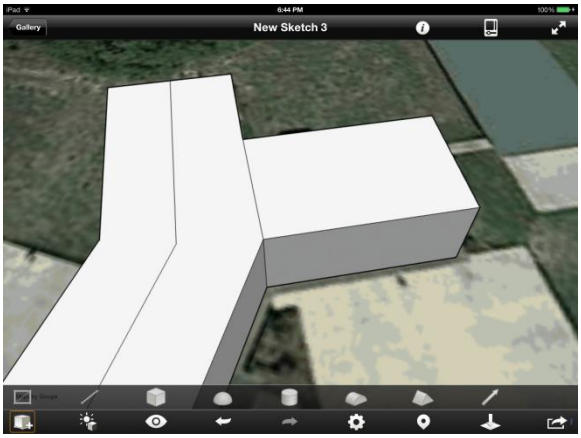




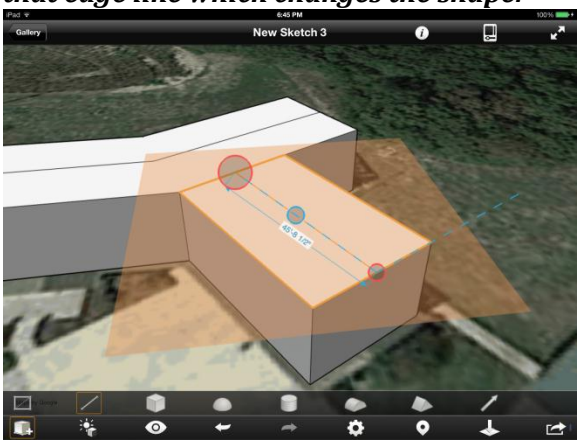
Switch to Top Plan view, so we can add lines to mid-point making the roof ridgelines.

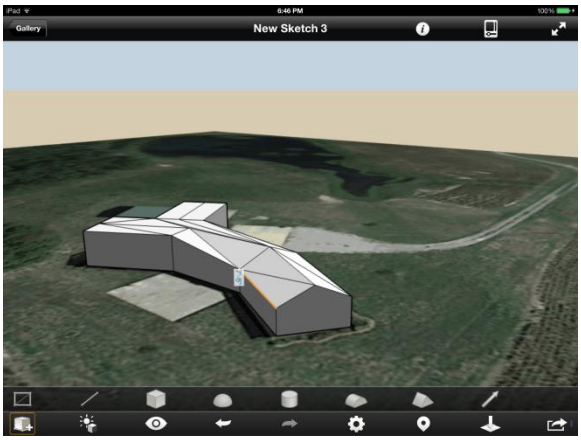


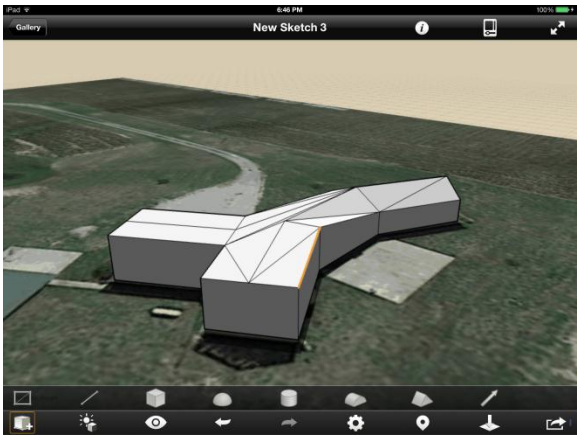


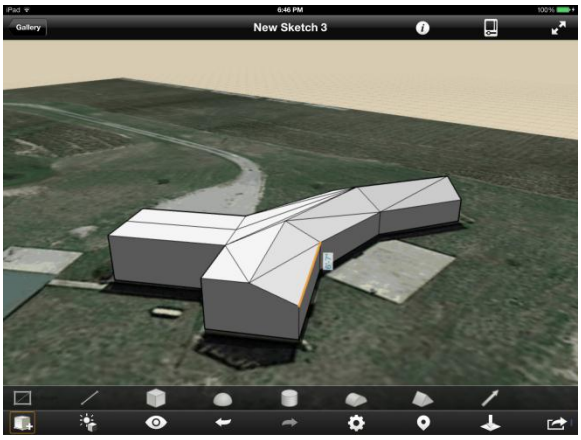


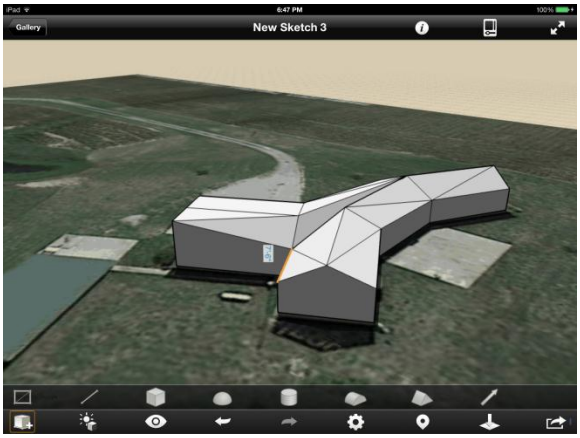
Double-tap a edge line to select it. Then without letting up on finger, drag finger down to move that edge line which changes the shape.

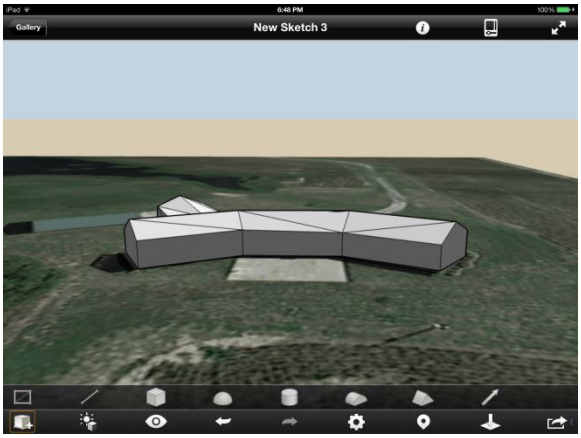


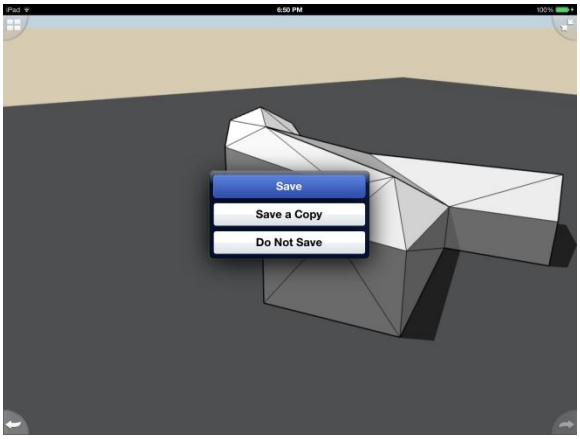


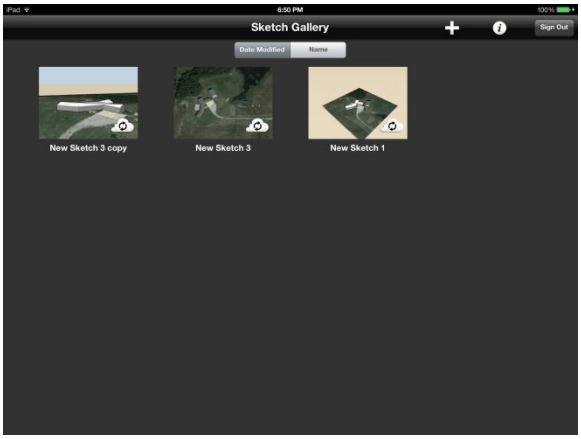




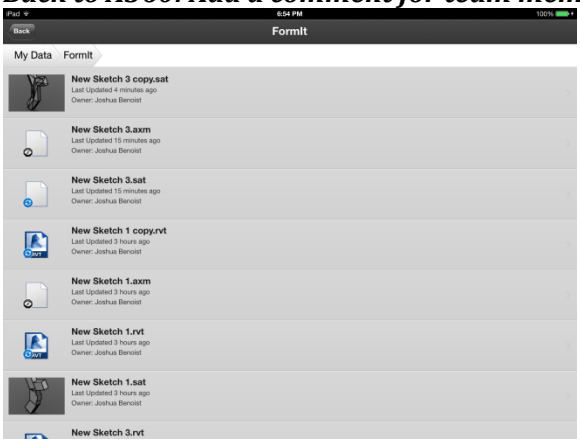


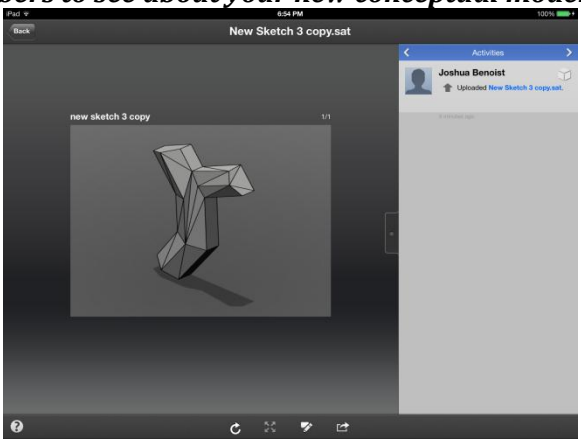


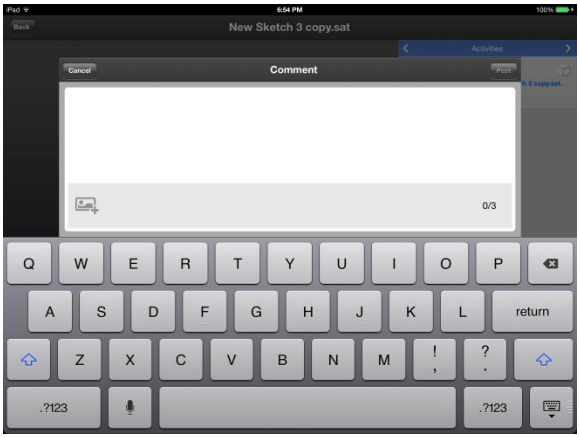


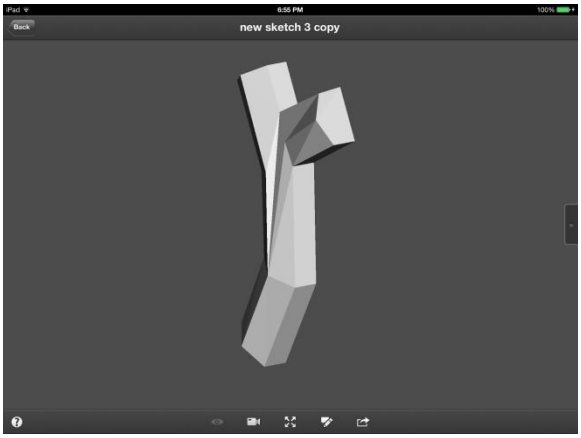


Back to A360: Add a comment for team members to see about your new conceptual model.

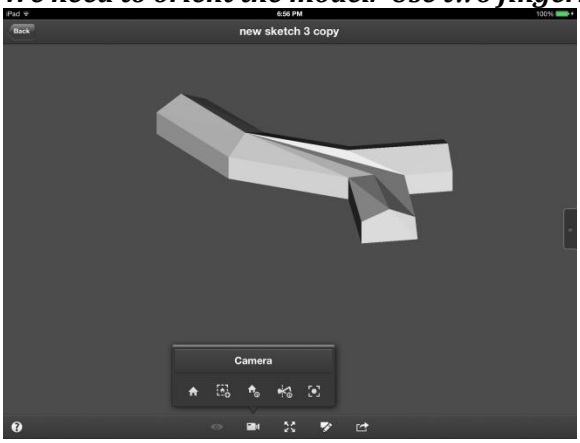


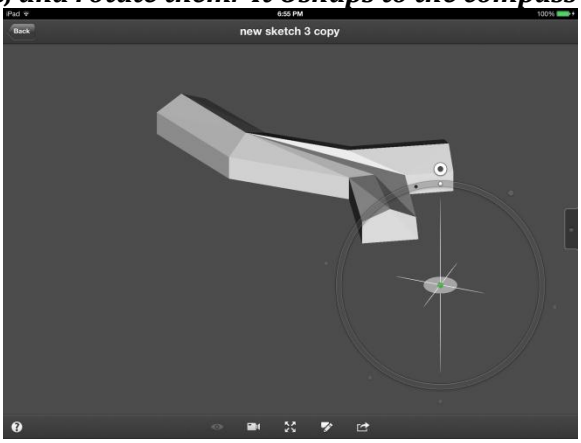


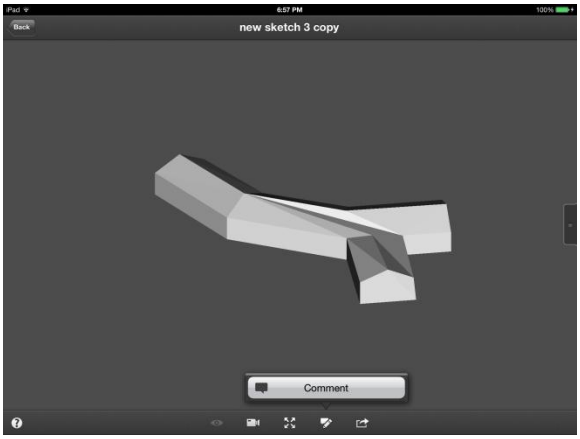


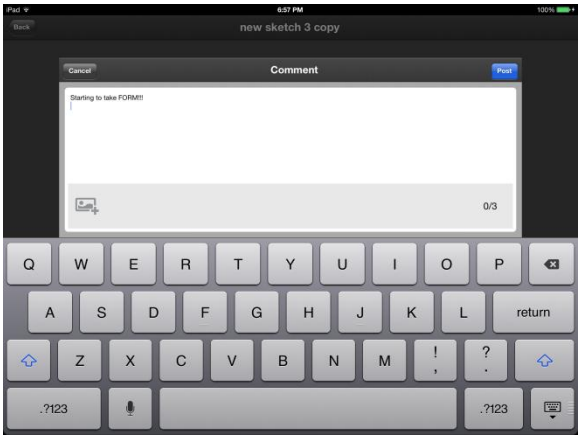


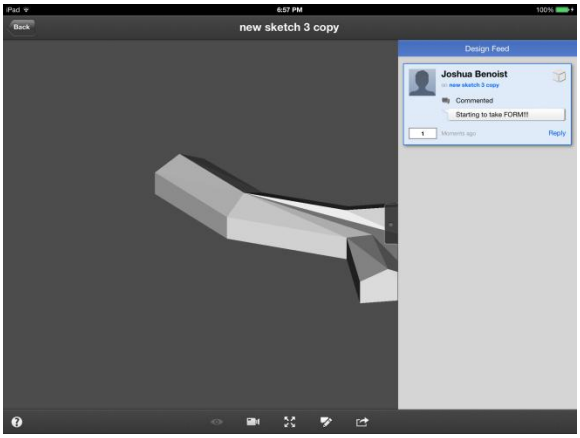
We need to orient the model. Use two fingers, and rotate them. It Osnaps to the compass-axes.

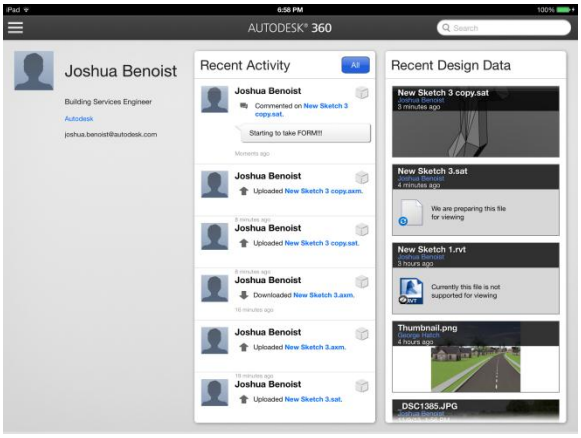










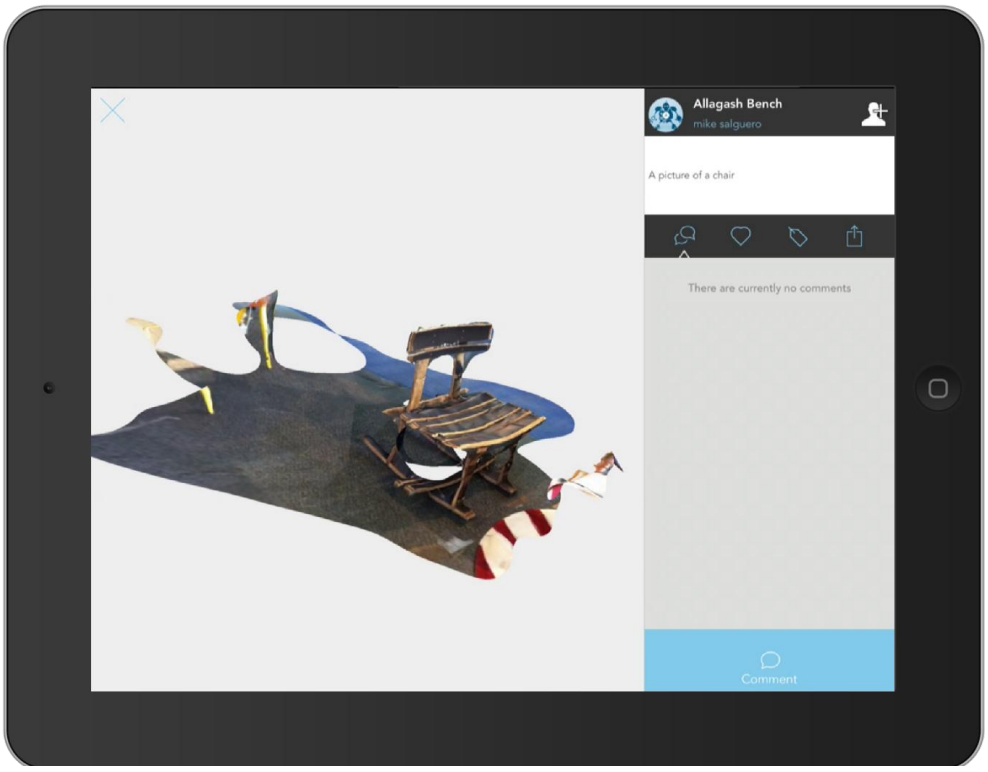


Notice upon posting the new comment, it appears in your model. It also appears in your Design Feed. If your folder is share with team-members, it appears in their Activity Feed. It will also send everyone an email with link. How's that for collaboration!

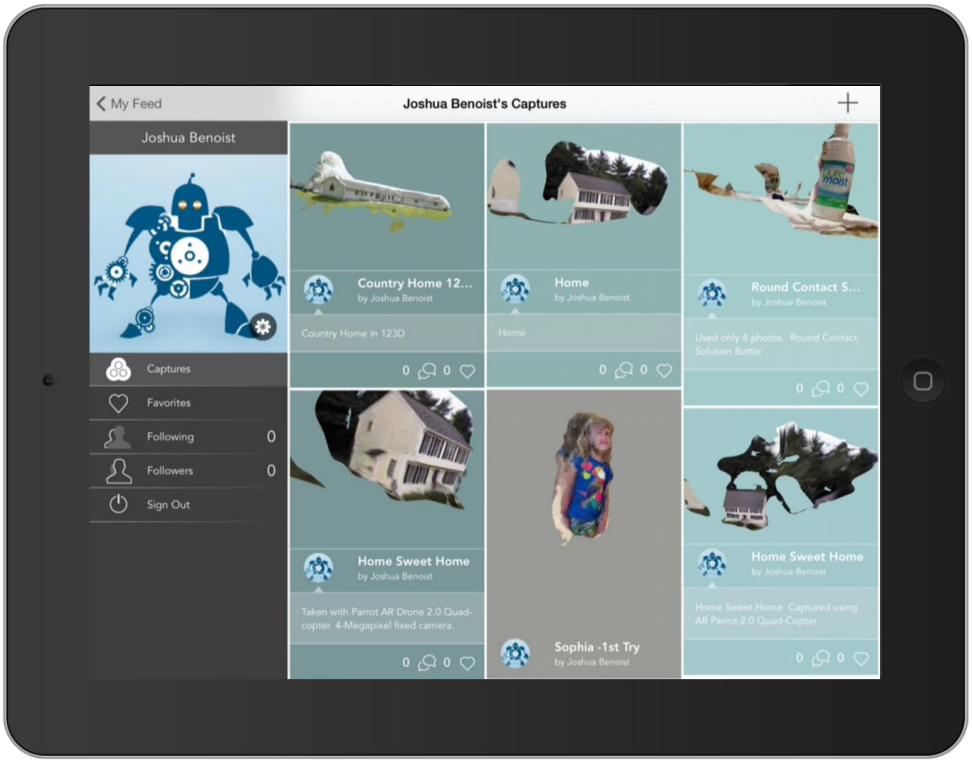
123D Catch – Mobile, Desktop and Browser Based (Chrome Exclusive)
http://apps.123dapp.com/catch/

123D Catch is available on mobile phones and tablets, web browser (Chrome exclusively till others catch up to HTML5 standards), and a desktop flavor. 123D Catch is geared towards the public consumer who wants to make small 3D models that can be sent to a 3D printer. It does a great job on small objects, but not so great on a building as large as a house. 123D Catch has a "Premium" version that will export the 3D model. "Create and use your 3D models for non-commercial and commercial purposes."

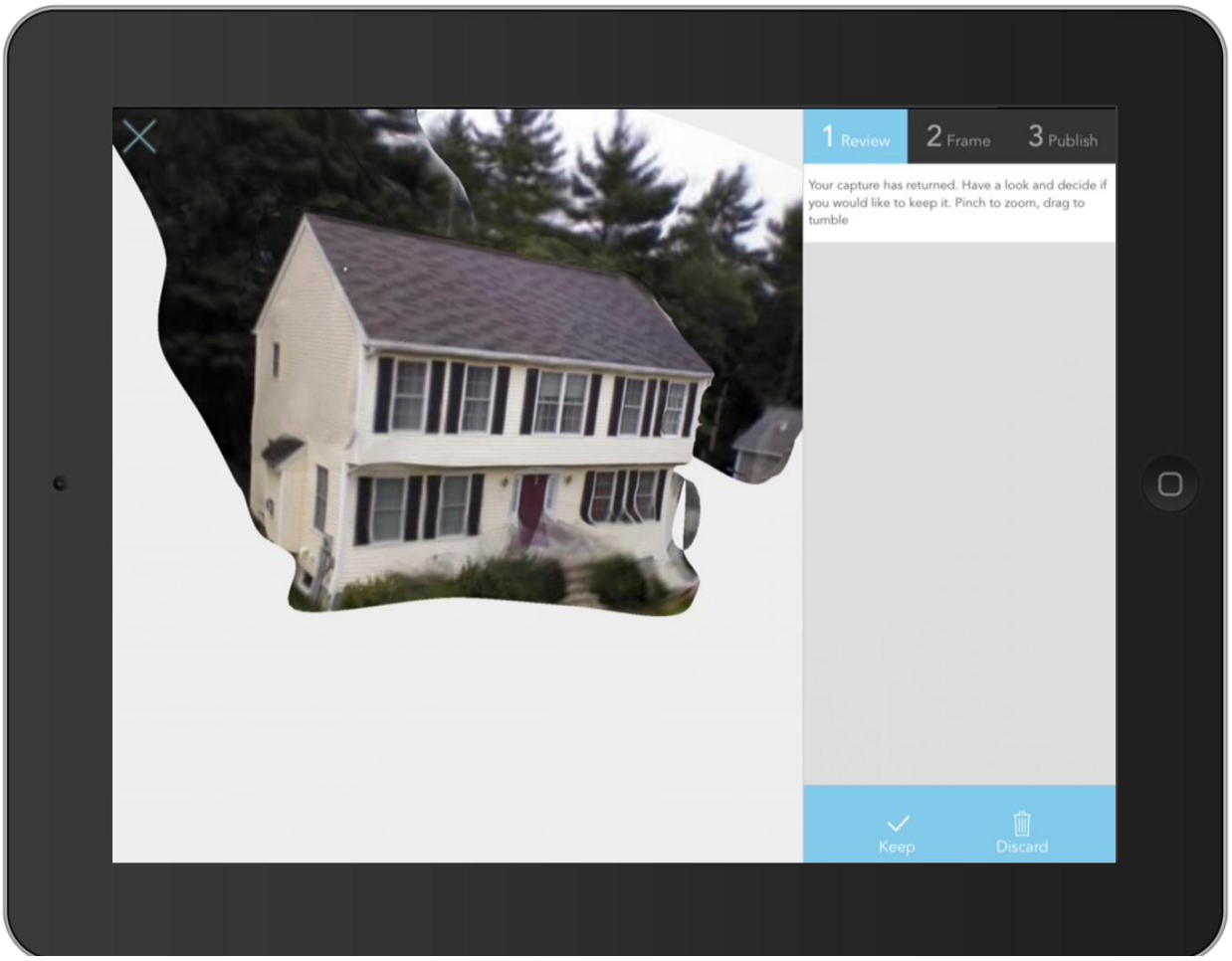
TIP: Don't use 123D Catch to make point clouds of existing Buildings, use ReCAP Photo! However, if you want to interior-decorate maybe for a Rendering, use 123D Catch to grab small objects and furniture. Make that 123D mesh into a point cloud. Use ReCAP Pro to "Merge" point clouds.



Here's a few of my 123D Catch attempts

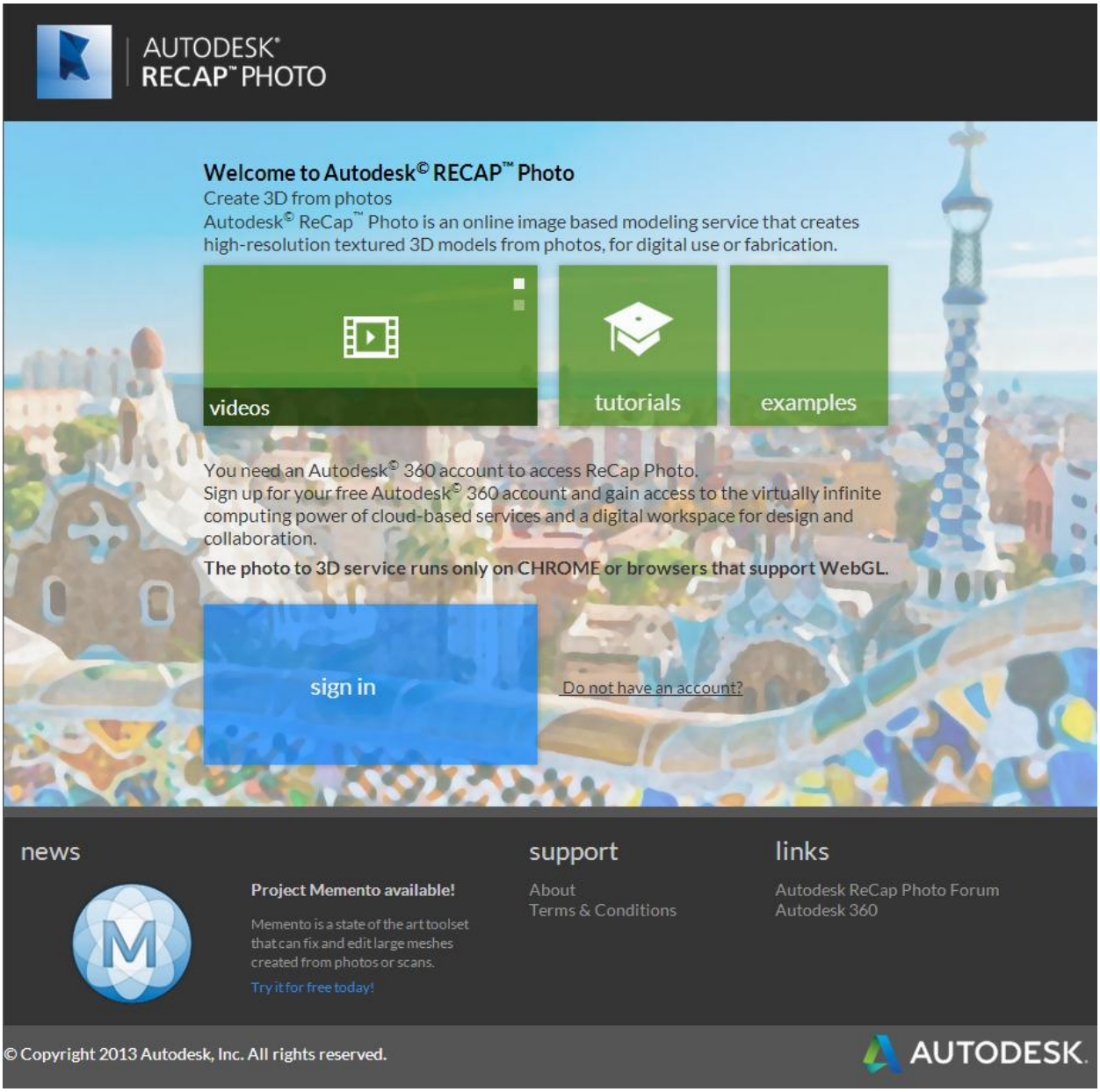


So I learned the hard way, not to use 123D Catch for Buildings, for making point clouds that can be used professionally. That said, 123D Catch can be fun and will make a building mesh.



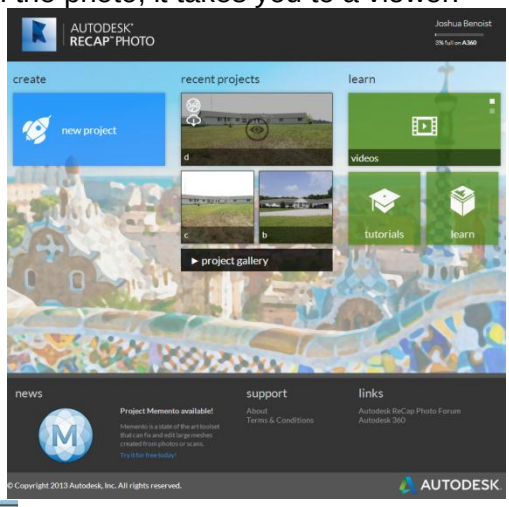
ReCAP Photo – Browser Based (Chrome Exclusive)

http://recap.autodesk.com



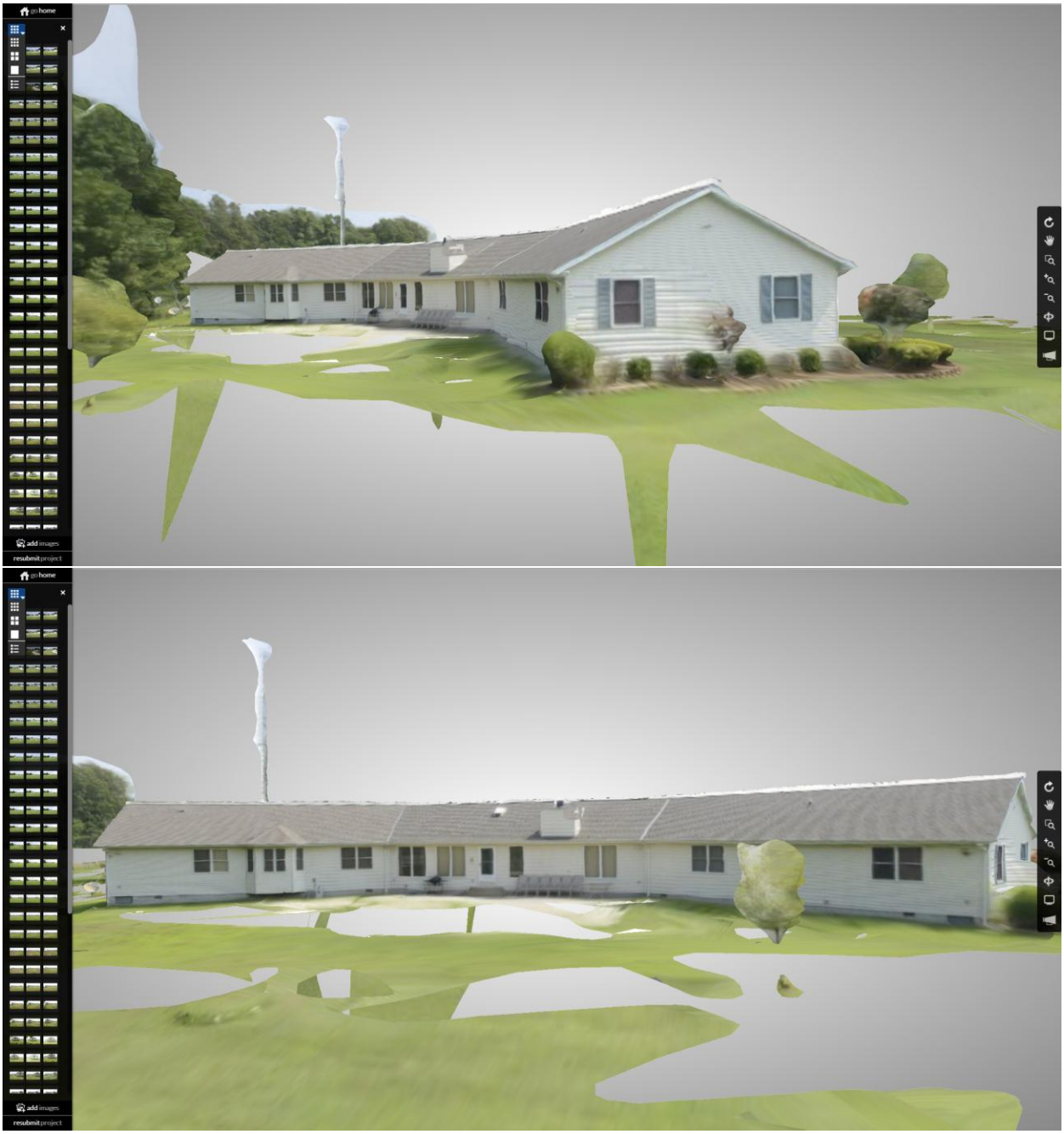
There are 3 similar programs that are inter-related. 123D Catch, ReCAP Photo and ReCAP Pro. 123D Catch and ReCAP Photo create 3D photo-rendered meshes. ReCAP Photo creates 3D photo-rendered point clouds and a few other file formats. ReCAP Pro does not create point clouds, but aggregates multiple point clouds into one “Merged Point Cloud Project.”

This is what you see after signing in to ReCAP Photo on Chrome Browser. When you hover your mouse over a recent project, you see the options to be taken to the files on A360, or to download the files locally. By clicking on the photo, it takes you to a viewer.



Here's the ReCAP point cloud viewer. It's native file format is a RCM mesh file, but exports RCS, FBX, OBJ and IPM. Over the next set of photos, look at the quality of the 3D mesh.


Orbit
Pan
Zoom Rectangle
Zoom In
Zoom Out
Turn around
Transparency
Show Mesh
Show Cameras
Write feedback
go home
add images
resubmit project


go home
add images
resubmit project
go home
add images
resubmit project


go home
add images
resubmit project


go home
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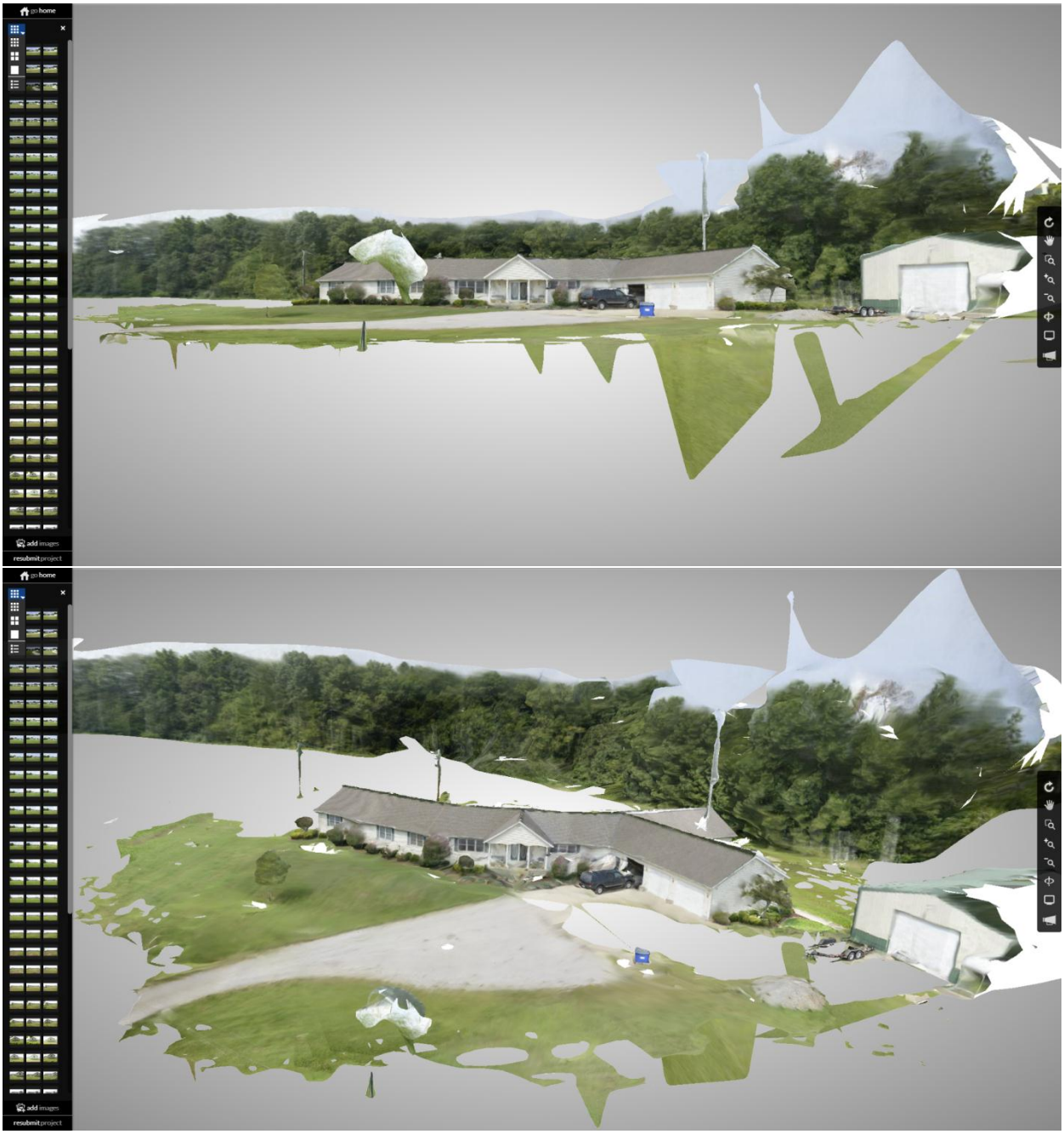
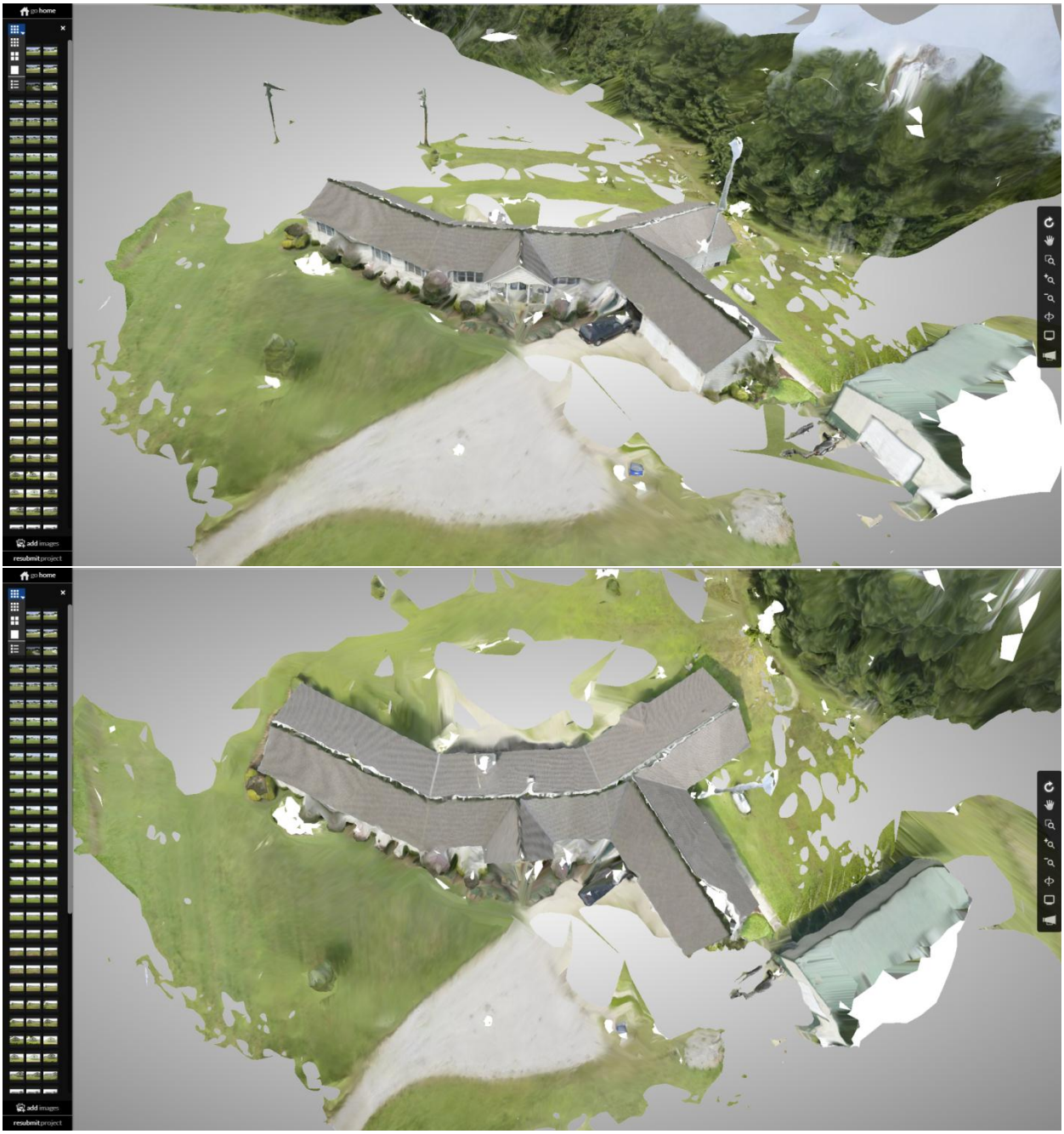
go home
add images
resubmit project


go home
add images
resubmit project

Seriously, 10.34 million mesh triangles! You can see from the quality photos that ReCAP Photo is a serious program for documenting existing conditions in commercial buildings.


go home
add images
resubmit project
go home
add images
resubmit project

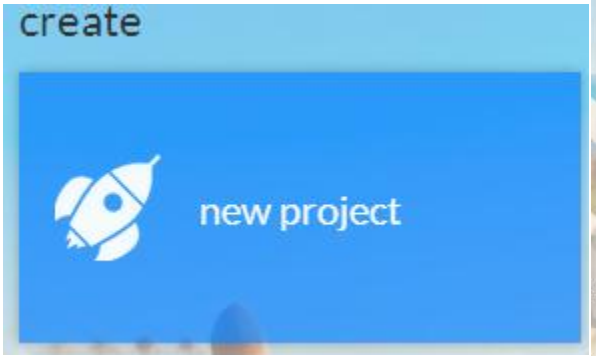

go home
add images
resubmit project
go home
add images
resubmit project

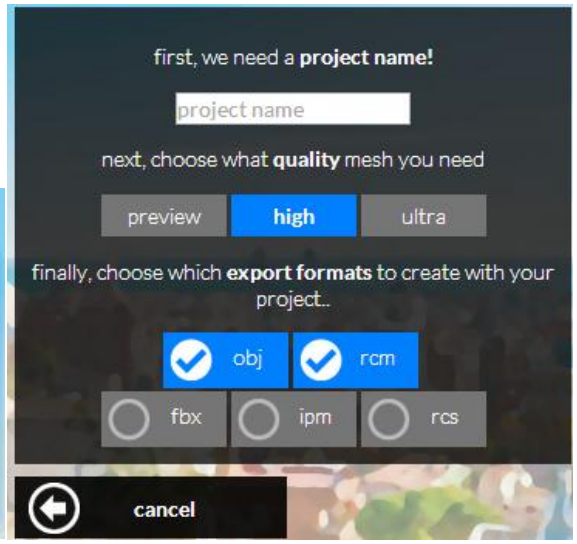
I can use that in Revit! Import the RCS point cloud file. Then trace the point cloud.

To make this ReCAP project, I took a Nikon 20 megapixel camera and walked a circle around this country home. Took 128 photos, each around 23 megabytes. It took hours to upload these photos and though 123D Catch has a photo quantity limit around 60. ReCAP did not have a quantity limit and took all 128 photos. It was uploaded to the server and took over 24 hours to bake on the server before the server allowed me to view the result. It was worth the wait, because I downloaded the RCS point cloud. Imported it into a new Revit project and with minimal setup, I began tracing the point cloud with walls, windows, doors. I found the window manufacturer and exact models up on SEEK website. Downloaded the families and they were a match to what I could see in the point cloud. I had my Revit model finished in less than a day.

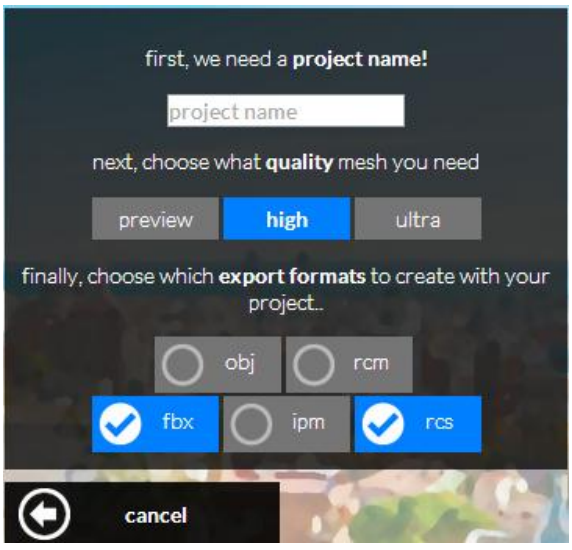
Can you imagine using this on an existing commercial building? A renovation, a build-out, a new expansion? Use ReCAP Photo to generate point clouds outside and inside the building. Go room by room! Use ReCAP Pro to combine all of these individual point clouds into a "Merged Point Cloud." Bring that into Revit.

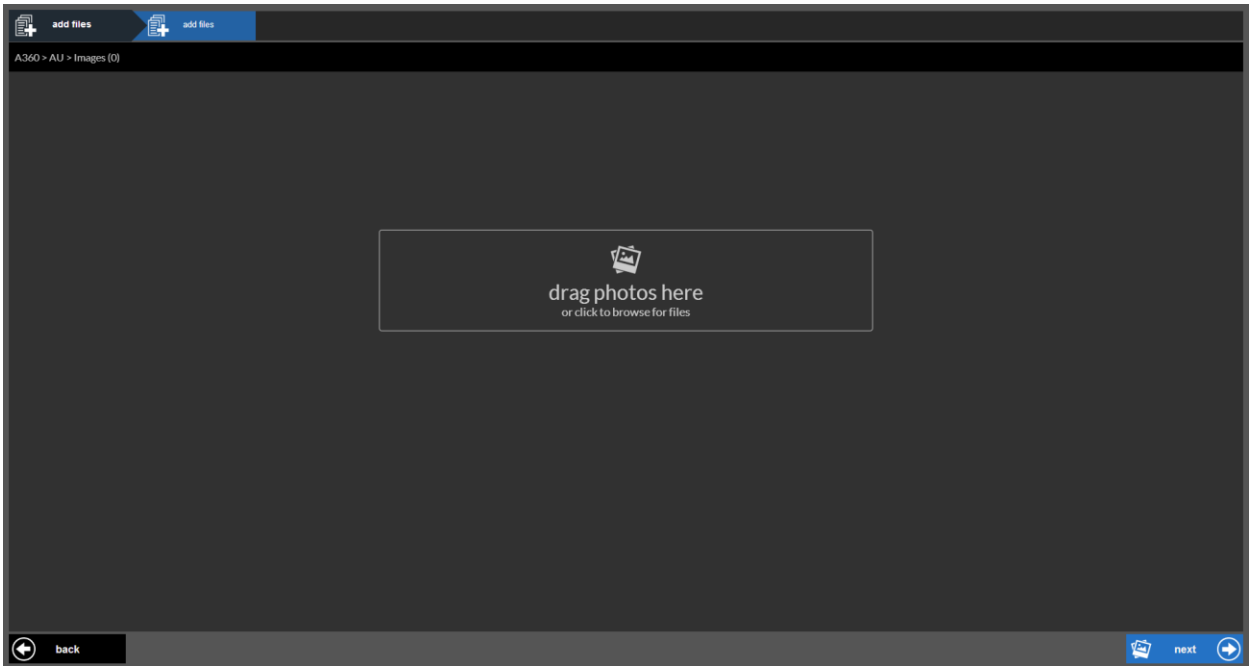
Using ReCAP Photo:



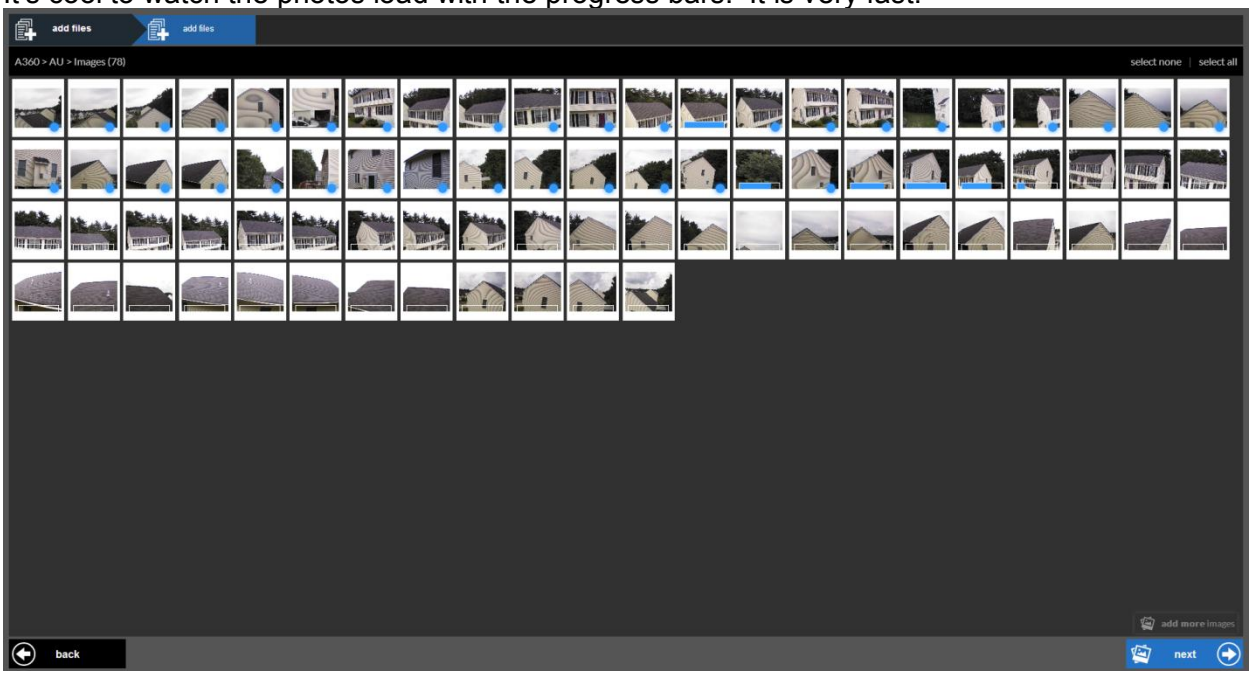


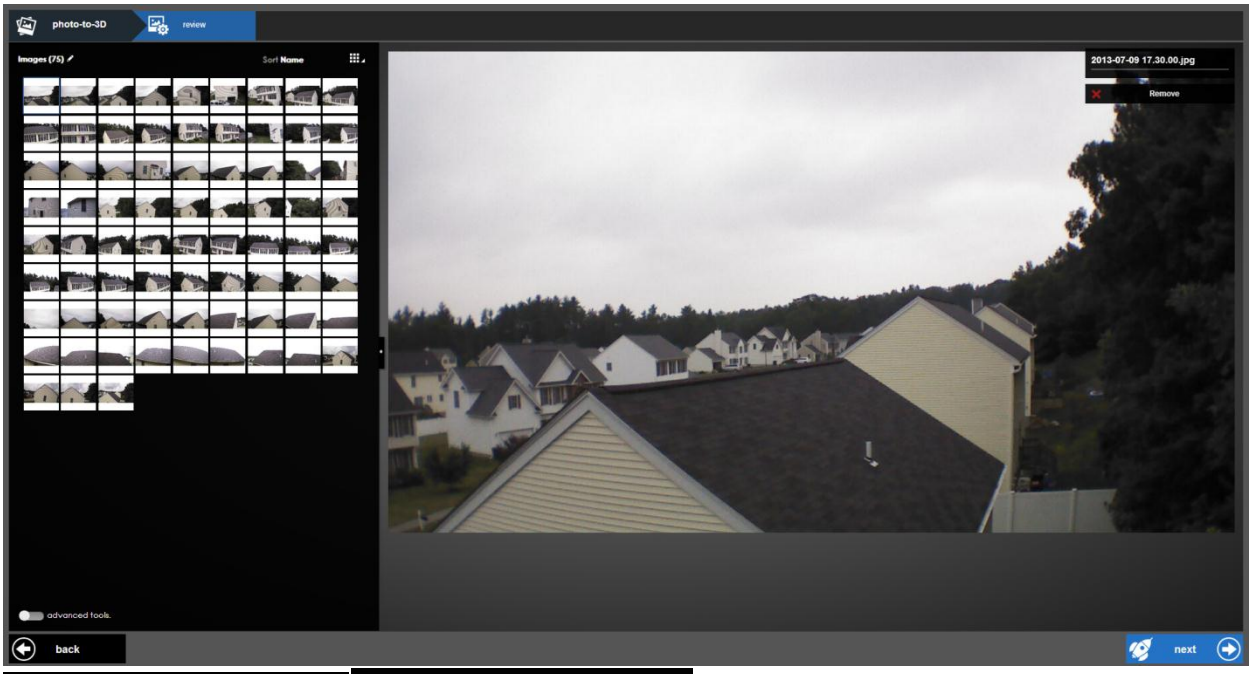
My first mistake was on this screen. The default values are OBJ and RCM, neither will work in Revit. My second mistake was also here. After learning that I needed an RCS file for Revit, I started over and selected ALL file types. DO NOT SELECT ALL FILE TYPES IF YOU ARE IN THE FREE A360 with 5 GB of space. My 128 photos at 23 MB each was 2.6 GB, over half my A360 capacity. The FBX, OBJ, RCM and RCS can be 1 GB each. When you run up against the 5 GB limit on the A360 free account, ReCAP doesn't make the remaining files in the list. You get the first few file types, but no files that put you over the storage limit. I did not know that and spent considerable time trying to determine why ReCAP could not create a RCS file. I spoke with the developers who pointed me in the right direction. After cleaning out my A360 account of unnecessary files and re-baking with only the RCS and FBX file types requested, I got my requested files. On a side note, the developers are now aware and may address this at some point in a future release to be more graceful by providing a full storage warning.

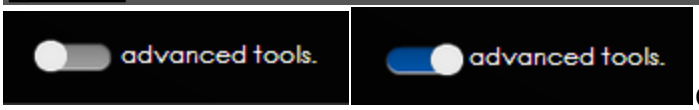




It's cool to watch the photos load with the progress bars. It is very fast.

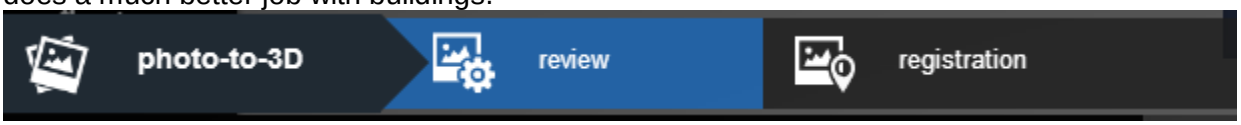


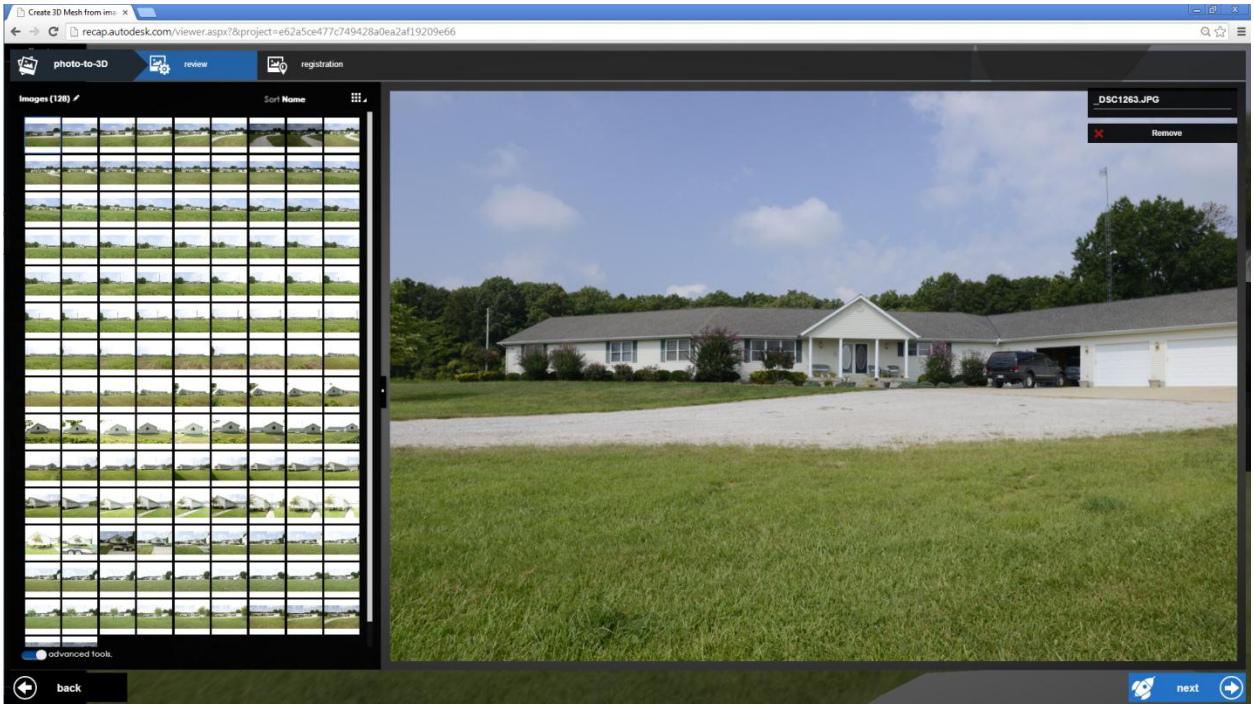




On this screen, make sure to turn on the "Advanced Tools" in the bottom left. Here's the next mistake I made. I clicked "Next" thinking it would now take me to an Advanced screen. Instead it starts baking on the server and I missed the "Advanced Tools." So after you turn on the "Advanced Tools," immediately go to the top and select on "Registration." That takes you to a new screen where you can select points in an image on the left and map it to the same point in a different photo on the right which should be from a different perspective. I learned that *sometimes* it is good to go nuts adding points, and *sometimes* ReCAP does a great job on it's own with no additional points.

Here's what I have experienced so far. If my set of photos, taken in a circle around a building is incomplete or has a few fuzzy photos, or aims up and aims down not being consistent in elevation, or fails to overlap from photo to photo, ReCAP (and 123D Catch) will fail to stitch them together. You will get a result, but it looks like a photo printed on aluminum foil and then crumpled. To get the beautiful Country_Home point cloud, I walked my circle and counted my steps. Four paces forward and two left consistently, turn and face center of building and make sure the entire building is captured in the photo, used the roofline as a frame of reference in each photo. My first bake, I used the Advanced Setting and added a single point of reference in an area where I was concerned I may not have been consistent enough. It made the most beautiful point cloud. I then re-baked with no point, and it turned out even better. I tried with many points, and it messed up in a few areas. I suspect too much input over-constrains the model and doesn't allow ReCAP to do it's own thing. That said, when using 123D Catch for smaller objects, adding points seemed to help. ReCAP is just a much more powerful tool and does a much better job with buildings.

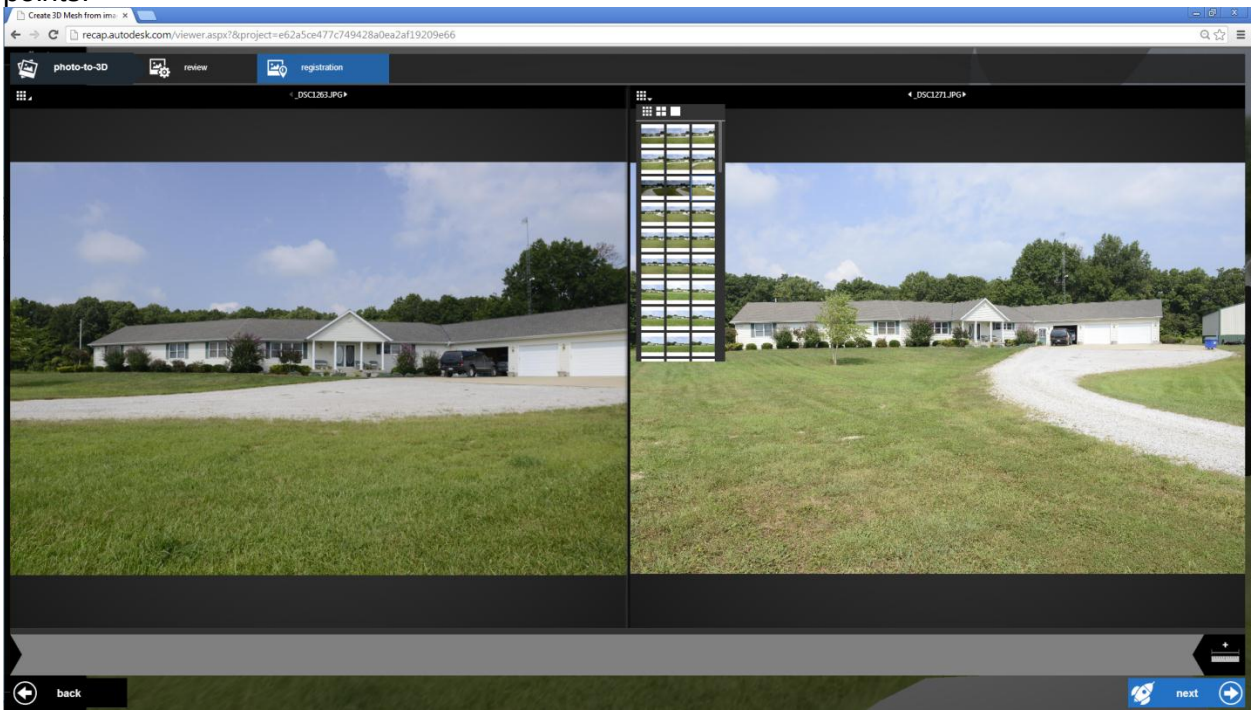




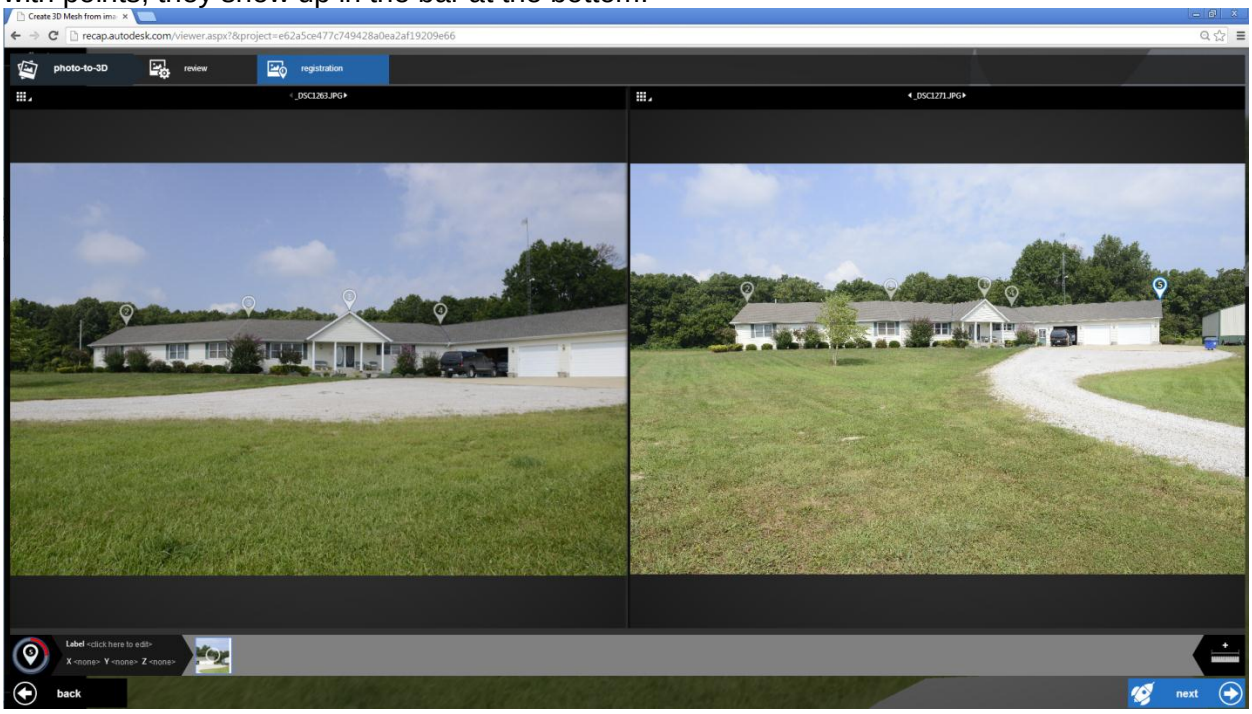
Look close at this next image below. You can see in the thumbnails how I walked around the Country Home and how it tends to look like frames in a motion picture. That overlap of photos really helps ReCAP to stitch. The more obsessive you are about this, the better it turns out.


Images (128)
Sort Name
advanced tools.

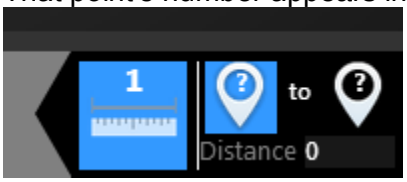
Choose a photo on the left and right that have the same scene but slightly different vantage points.

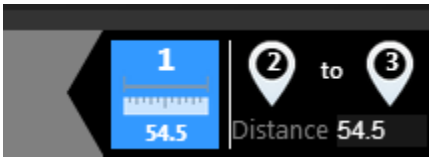


Then start adding points on the left, and find their match on the right. If you need to go back and redo a point, you can select the desired point in the left image to make it current again. You can then delete it, or switch to the image on right and add it's counterpart. Ass you add photos with points, they show up in the bar at the bottom.

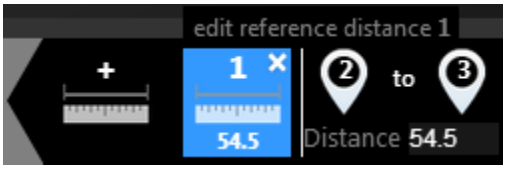


At the bottom right, just above the “Next” button is a Ruler. That is very important. ReCAP does not know the scale from the photos. It needs some reference points and a reference distance. Click on the first point on the ruler, go to the left image and select an existing point. That point number now appears in the ruler. Now pick a second existing point in the left image. That point’s number appears in the second slot. Type in the known reference distance.

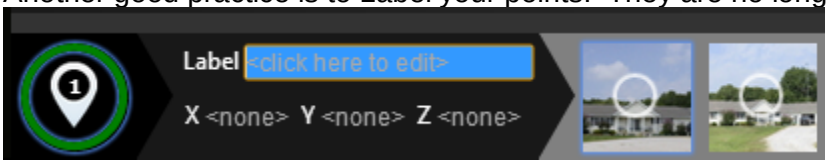




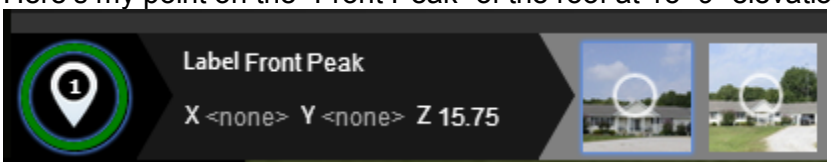
Now, you can add more than one reference distance by selecting on the ruler a second time. See below.



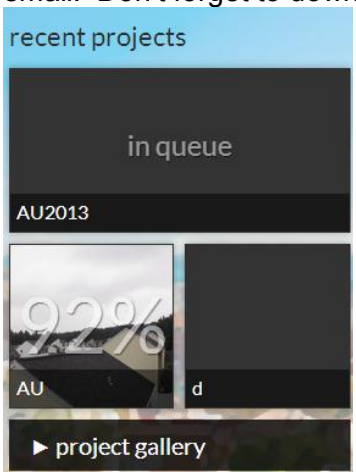
Another good practice is to Label your points. They are no longer just a number.

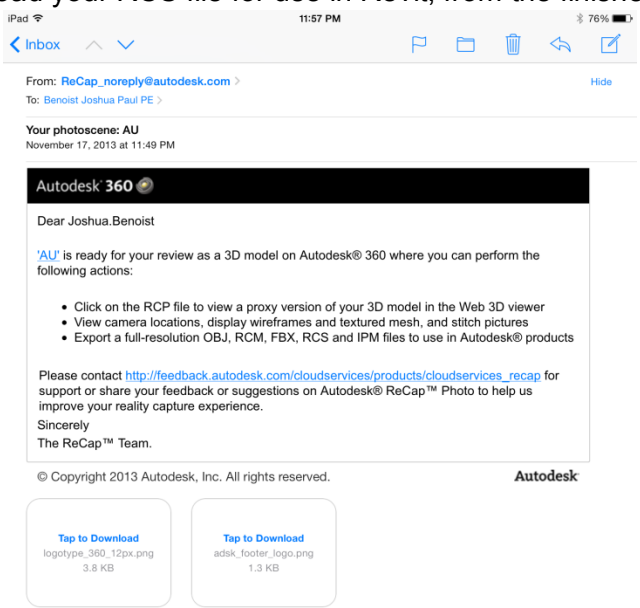


Here’s my point on the “Front Peak” of the roof at 15’-9” elevation.

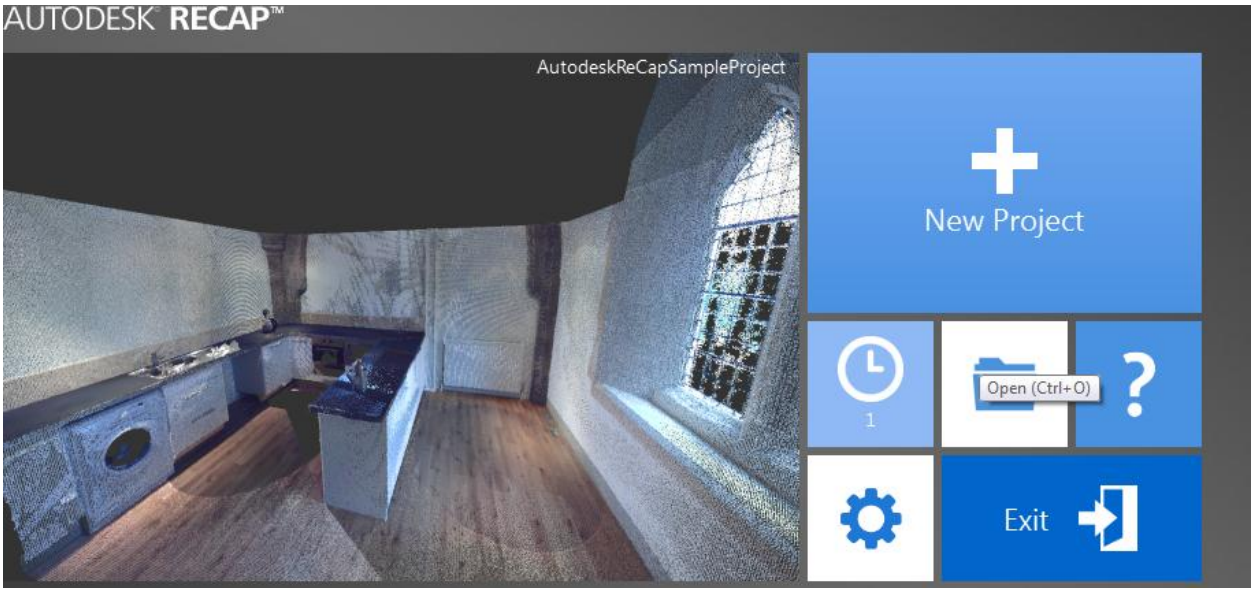


In the ReCAP Home Screen, Recent Projects, it will tell you what project is currently “baking” or “in queue.” If a project is further along in it’s bake cycle, it will tell you the % finished. In the image below, you can see my “AU” project is 92% baked. When it finishes, it sends me an email. Don’t forget to download your RCS file for use in Revit, from the finished project!

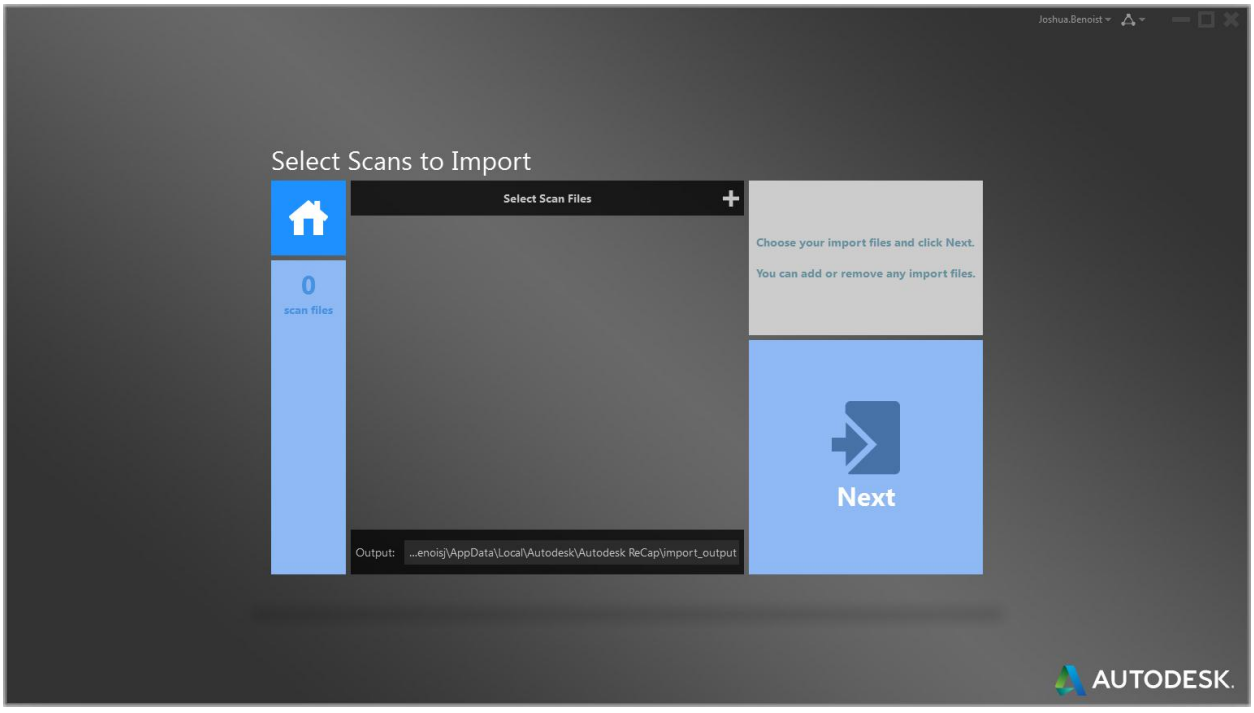


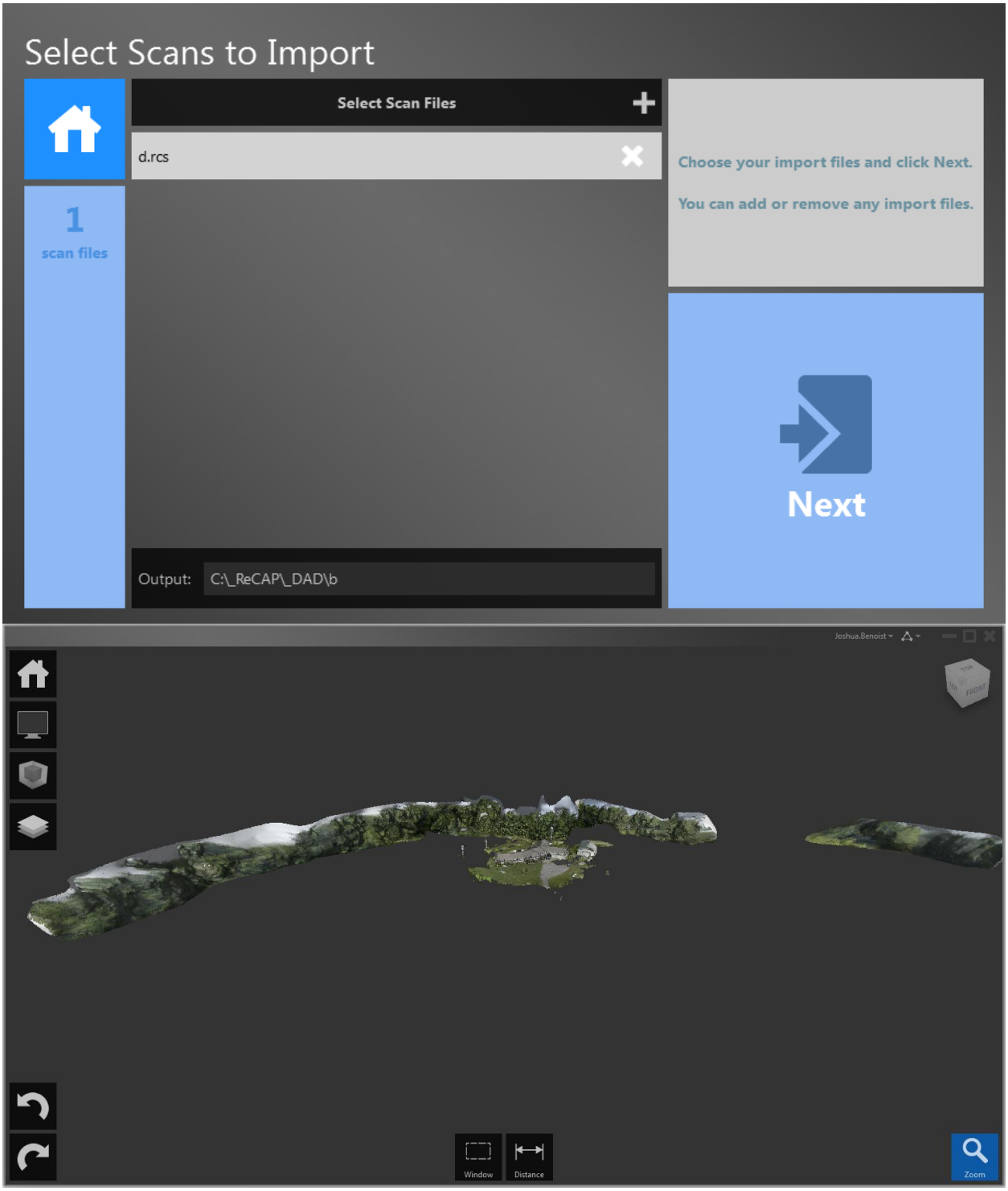


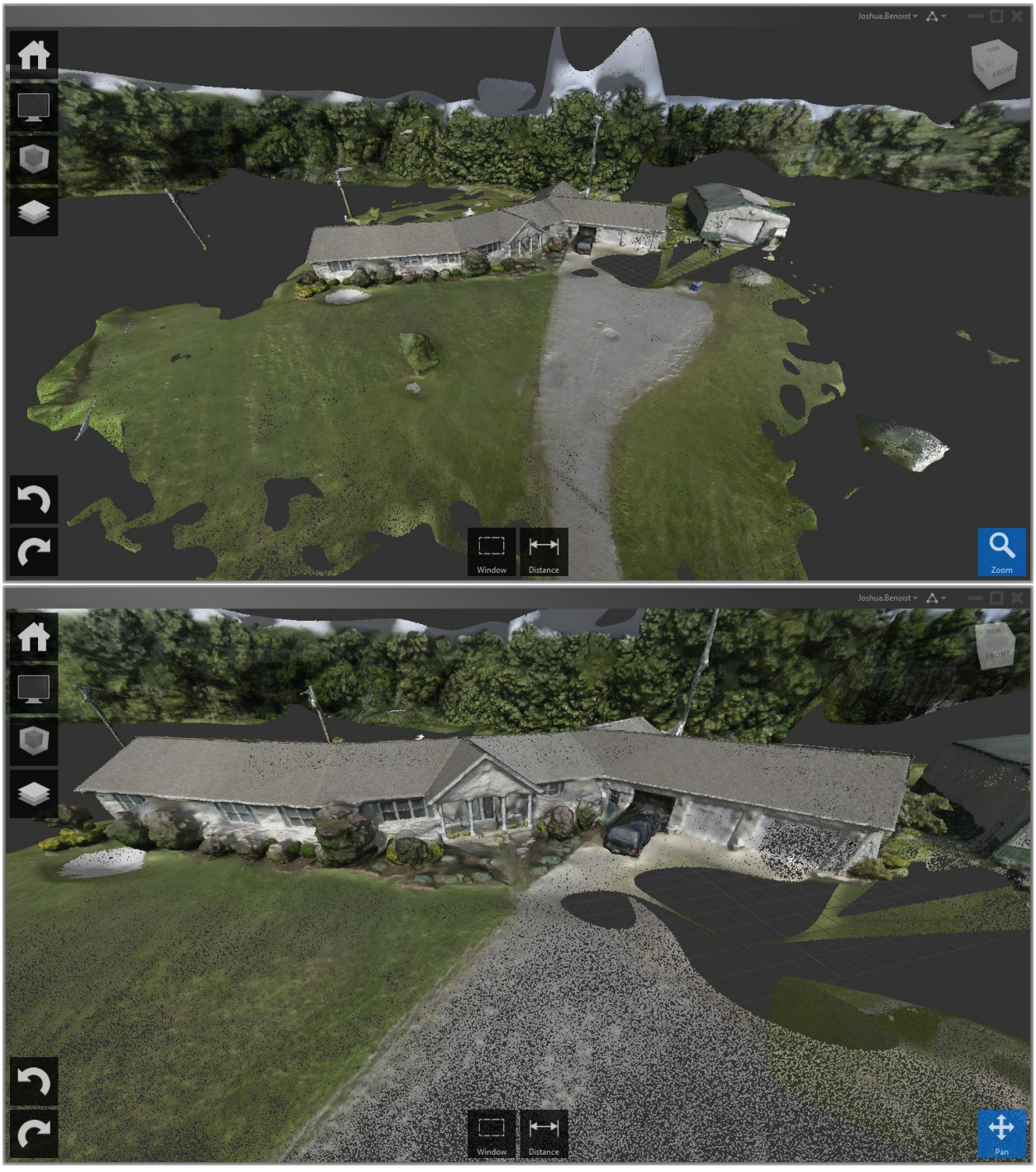
ReCAP Pro

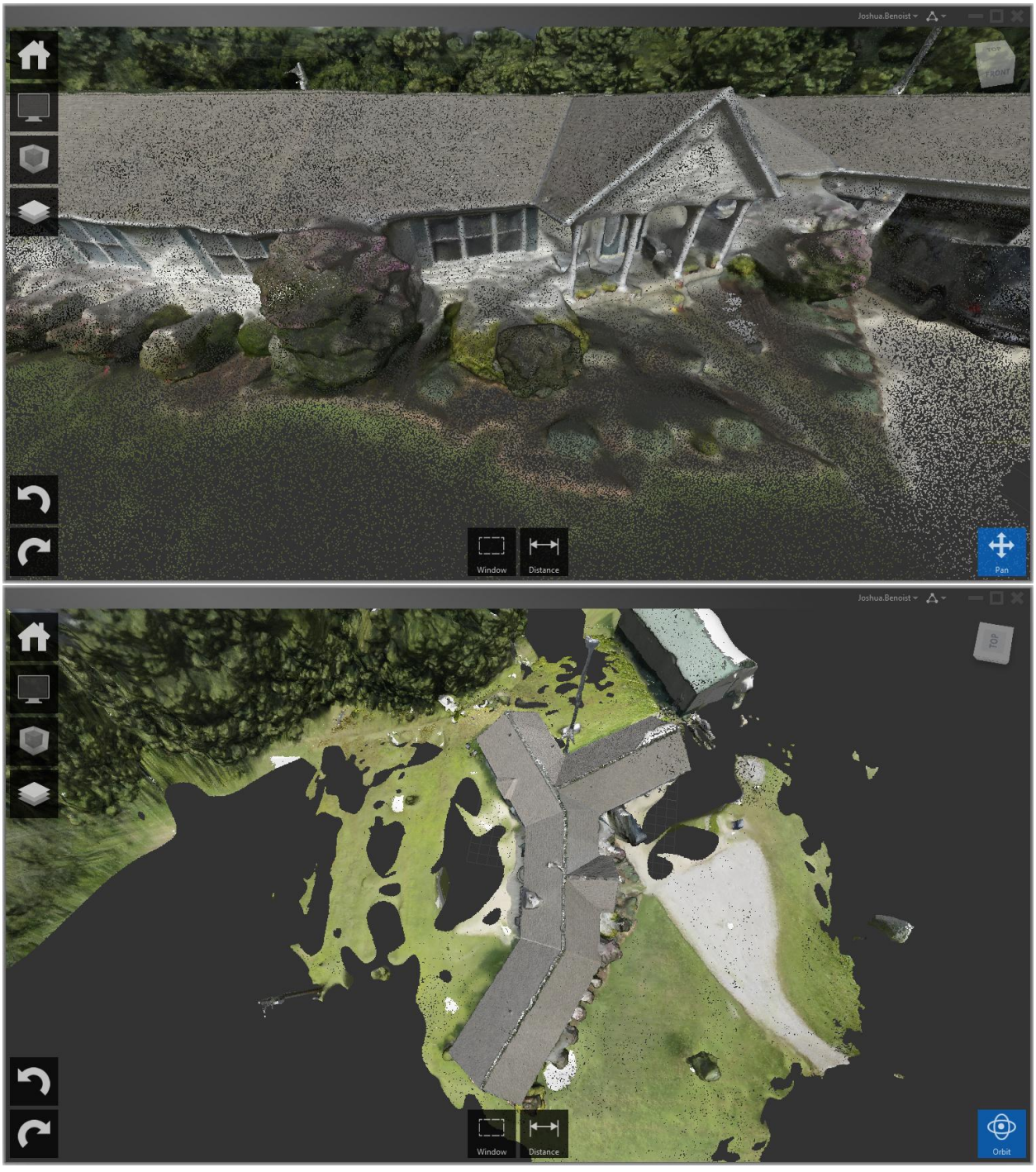


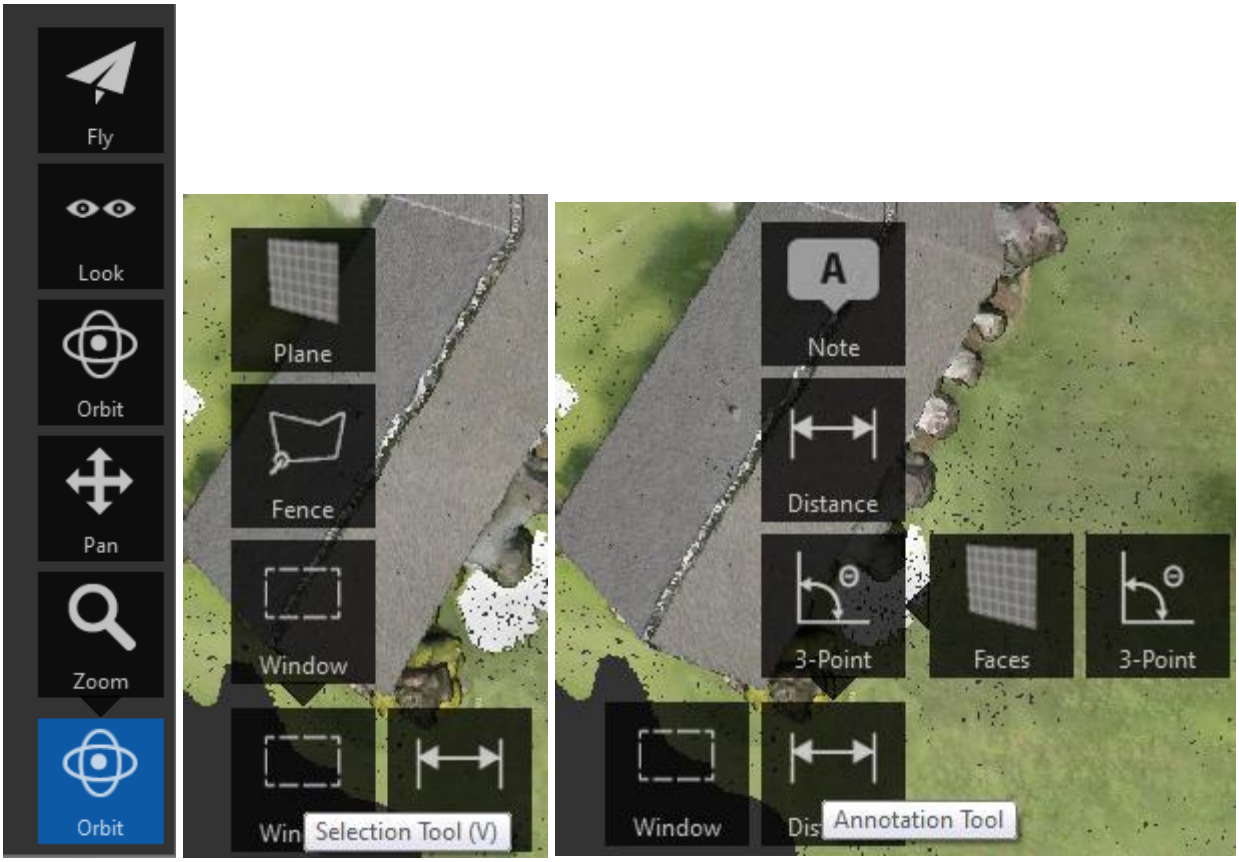
ReCAP Pro will take multiple point clouds and combines them into a single “Merged Point Cloud.”




Select Scans to Import
Select Scan Files
d.rcs
1
scan files
Choose your import files and click Next.
You can add or remove any import files.
Next
Output:
C:_ReCAP_DAD\b
Joshua.Benoist
FRONT
Window
Distance
Zoom


Joshua.Benoist
FRONT
Window
Distance
Zoom
Joshua.Benoist
FRONT
Window
Distance
Pan


Joshua.Benoist
Window
Distance
Pan
Joshua.Benoist
TOP
Window
Distance
Orbit


Fly
Look
Orbit
Pan
Zoom
Orbit
Plane
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Window
Win
Selection Tool (V)
A
Note
Distance
3-Point
Faces
3-Point
Window
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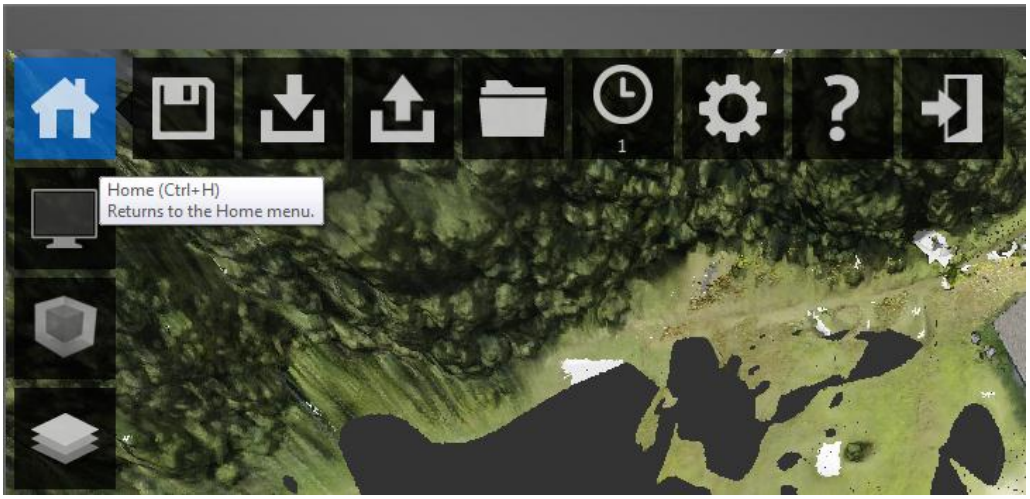
Annotation Tool


1
Home (Ctrl+H)
Returns to the Home menu.

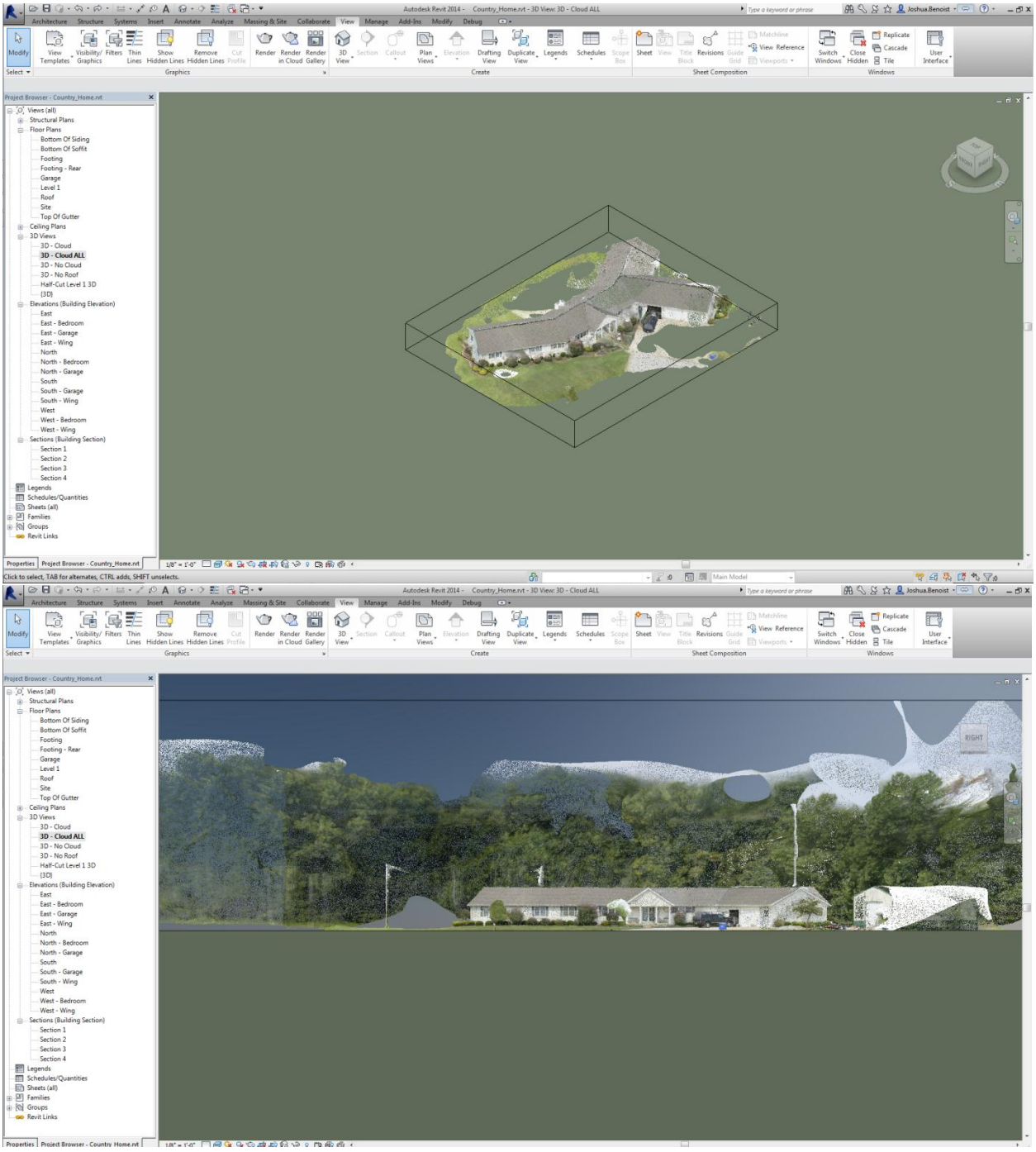

Color Mode (/)
Sets the color mode used to display points.
RGB
Elevation
Intensity
Normal
Scan Location
Points
Sets the display options for points.
Point Display
Update Origin
Toggle UI Elements
Shows or hides elements of the user interface.
Scan Location
Annotation
Perspective
Tools
Lighting Settings
Lighting Sides
Shader Model
Edge Highlighting

When finished, Export your “Merged Point Cloud” as a RCP file type (ReCAP Project).

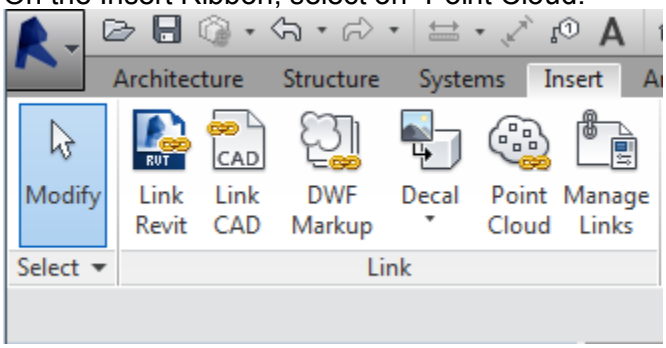
Revit - Desktop

Revit needs no introduction. It is the BIM powerhouse. My presentation here is about using "Cloud" resources with BIM. So this reference guide would not be complete without some discussion or demonstration that includes Revit. My ReCAP Photo point cloud was brought into Revit, traced over, and I leveraged that point cloud to make this Revit model in less than a day.

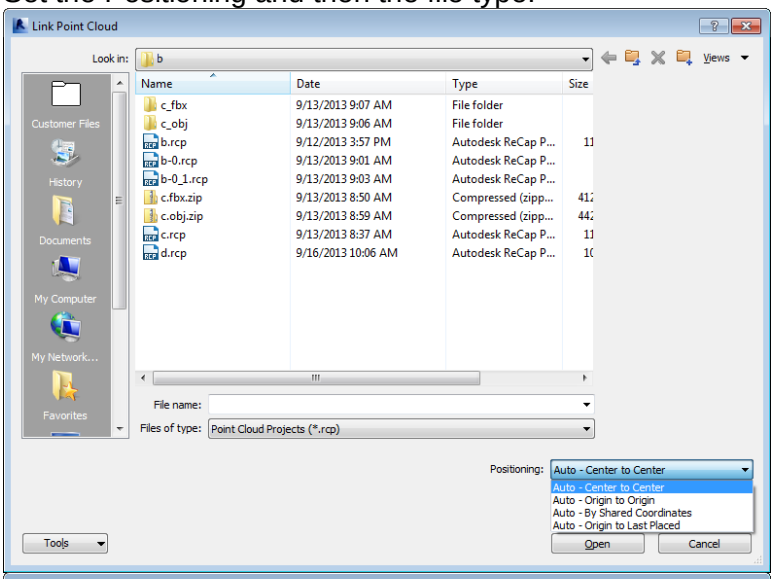
Here, I walk us thru those steps. I'm skipping project setup and a bunch of BIM stuff, and will just focus on what's needed to rough-in this model.

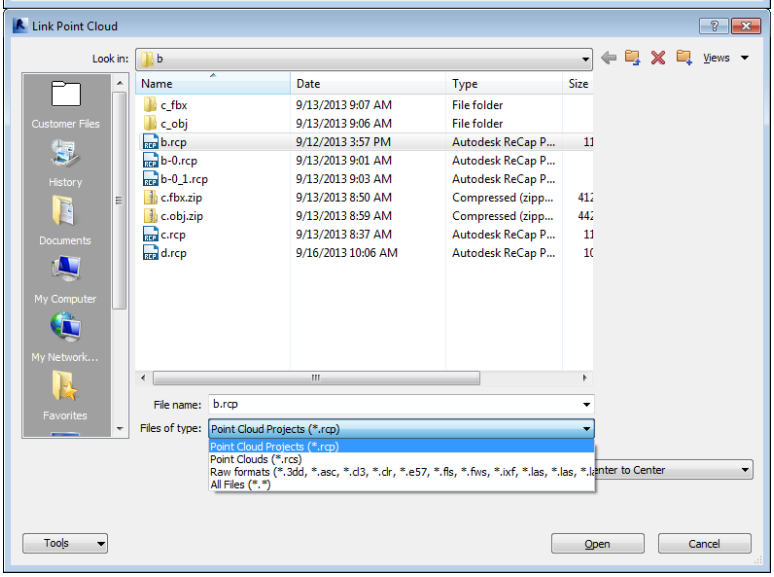


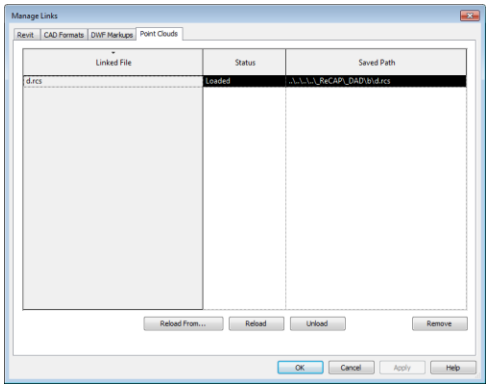
On the Insert Ribbon, select on “Point Cloud.”



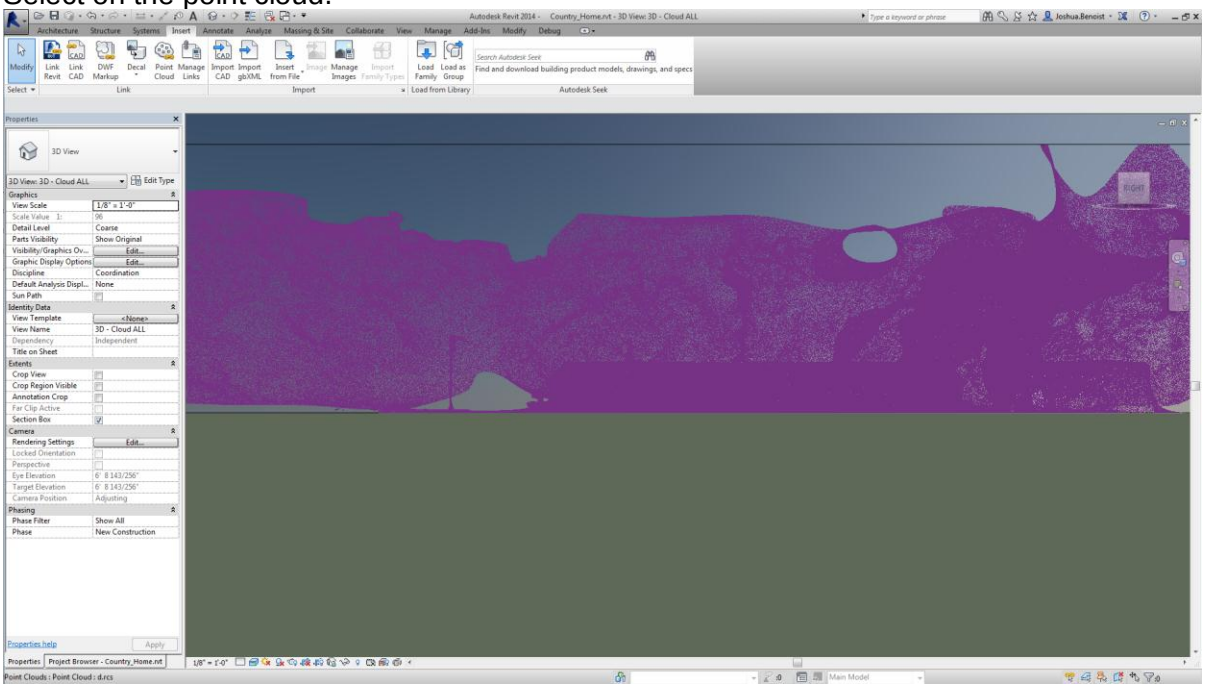
Set the Positioning and then the file type.



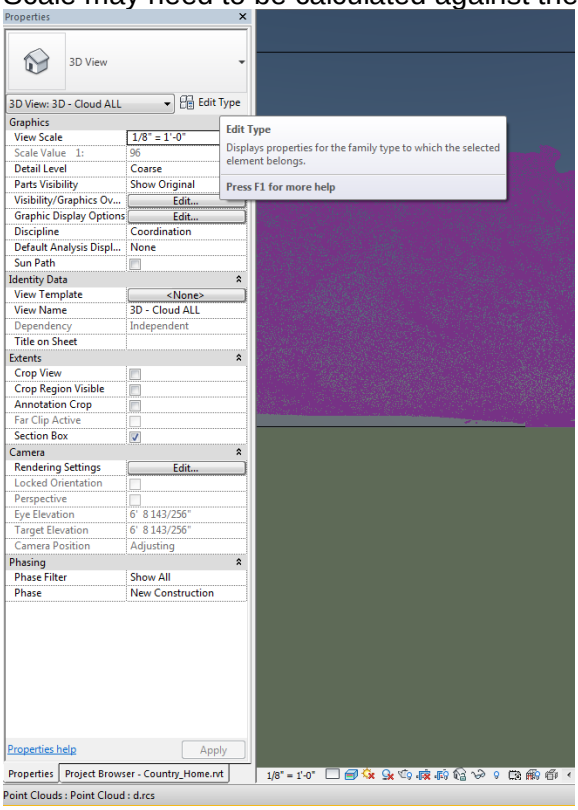


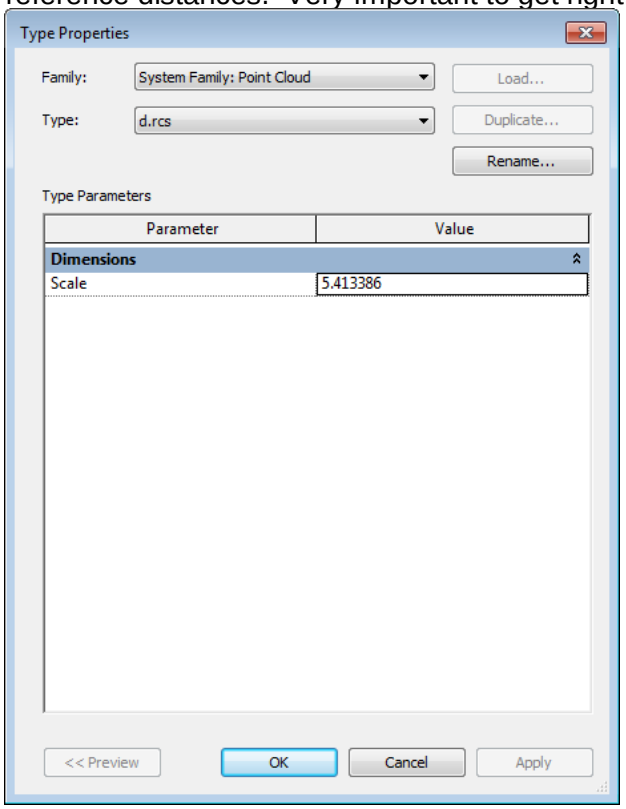


Select on the point cloud.

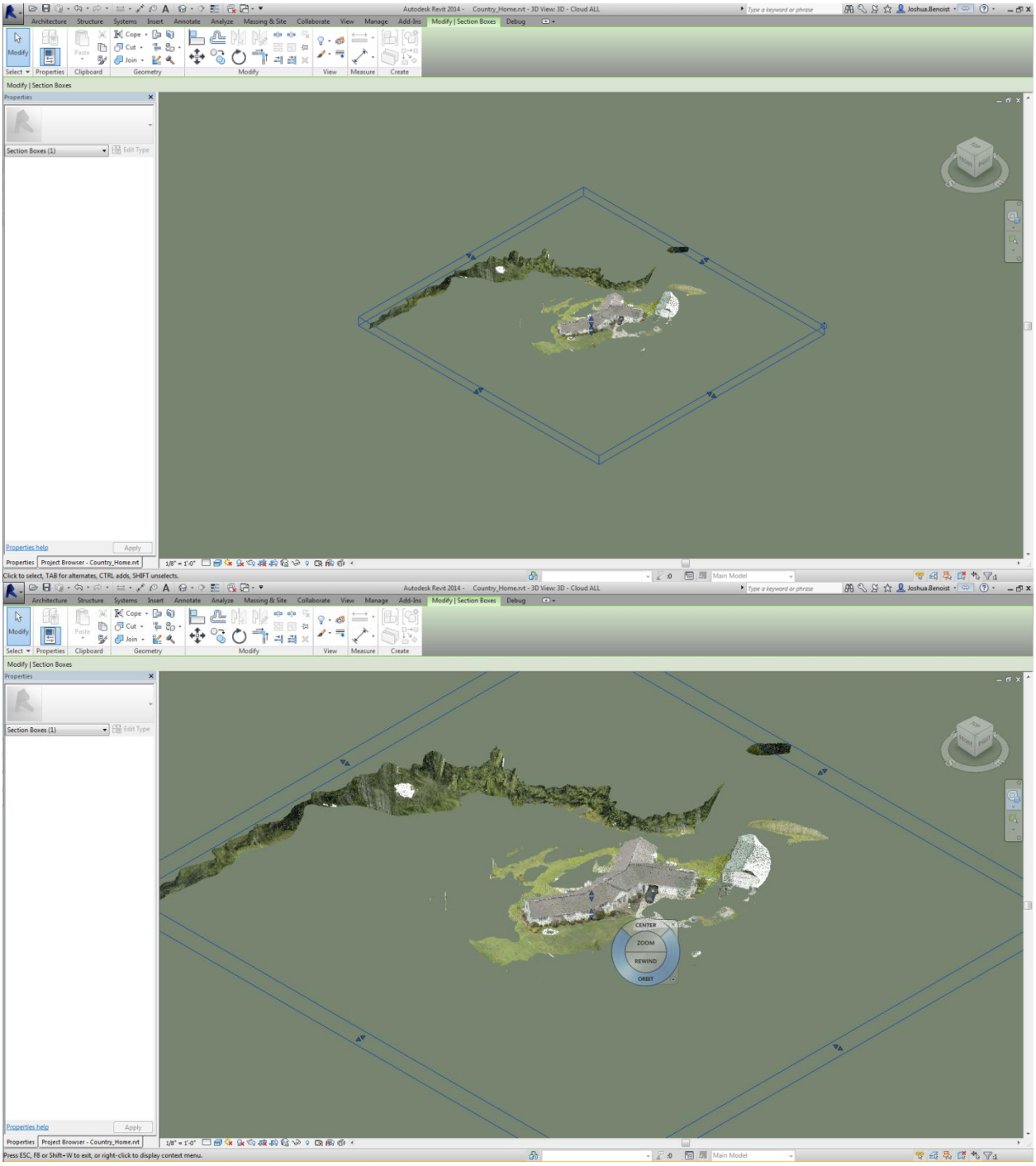


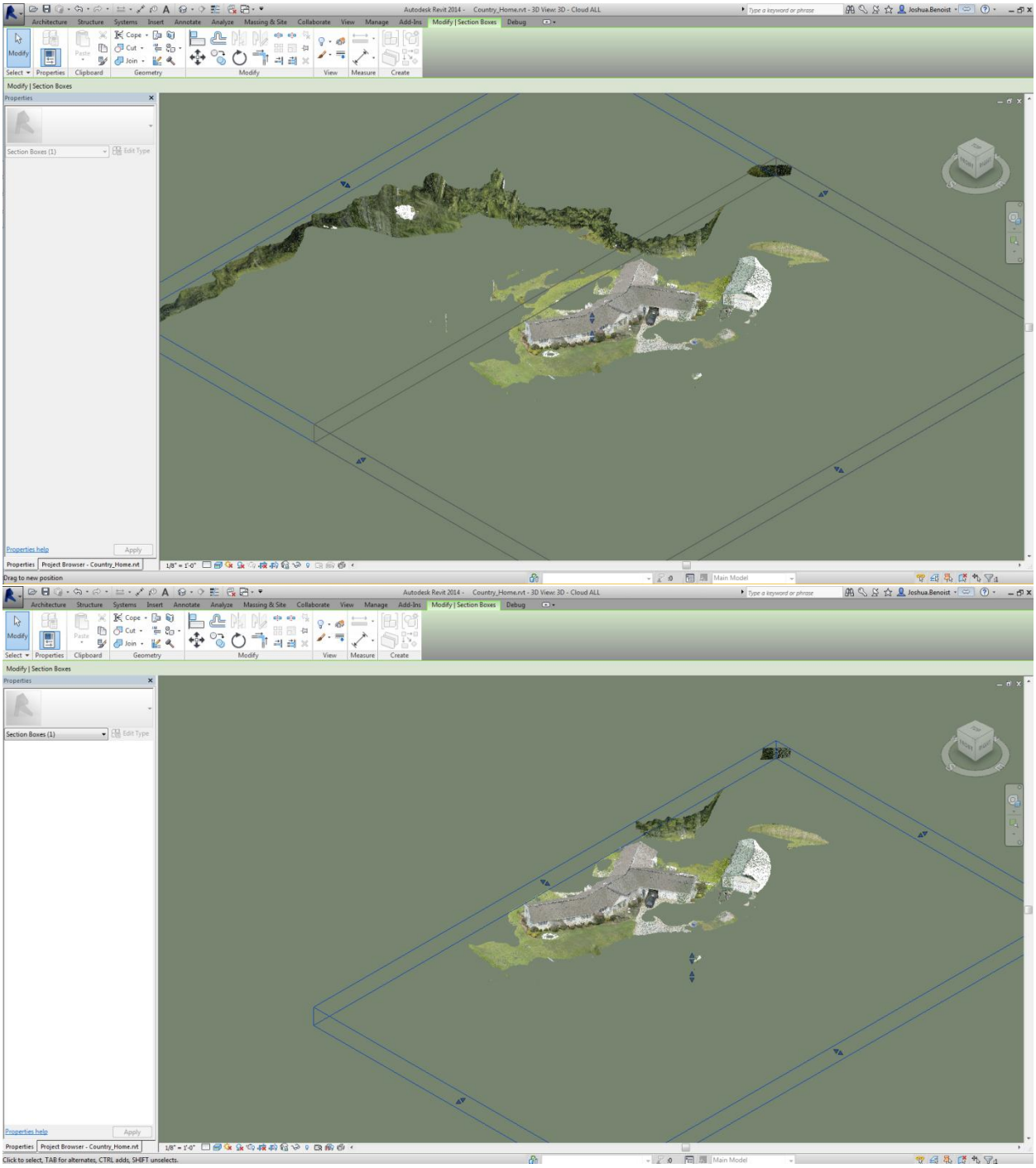
Switch to the Property Palette and Edit Type. In Type Properties, set the Cloud Scale. The Scale may need to be calculated against the reference distances. Very important to get right.

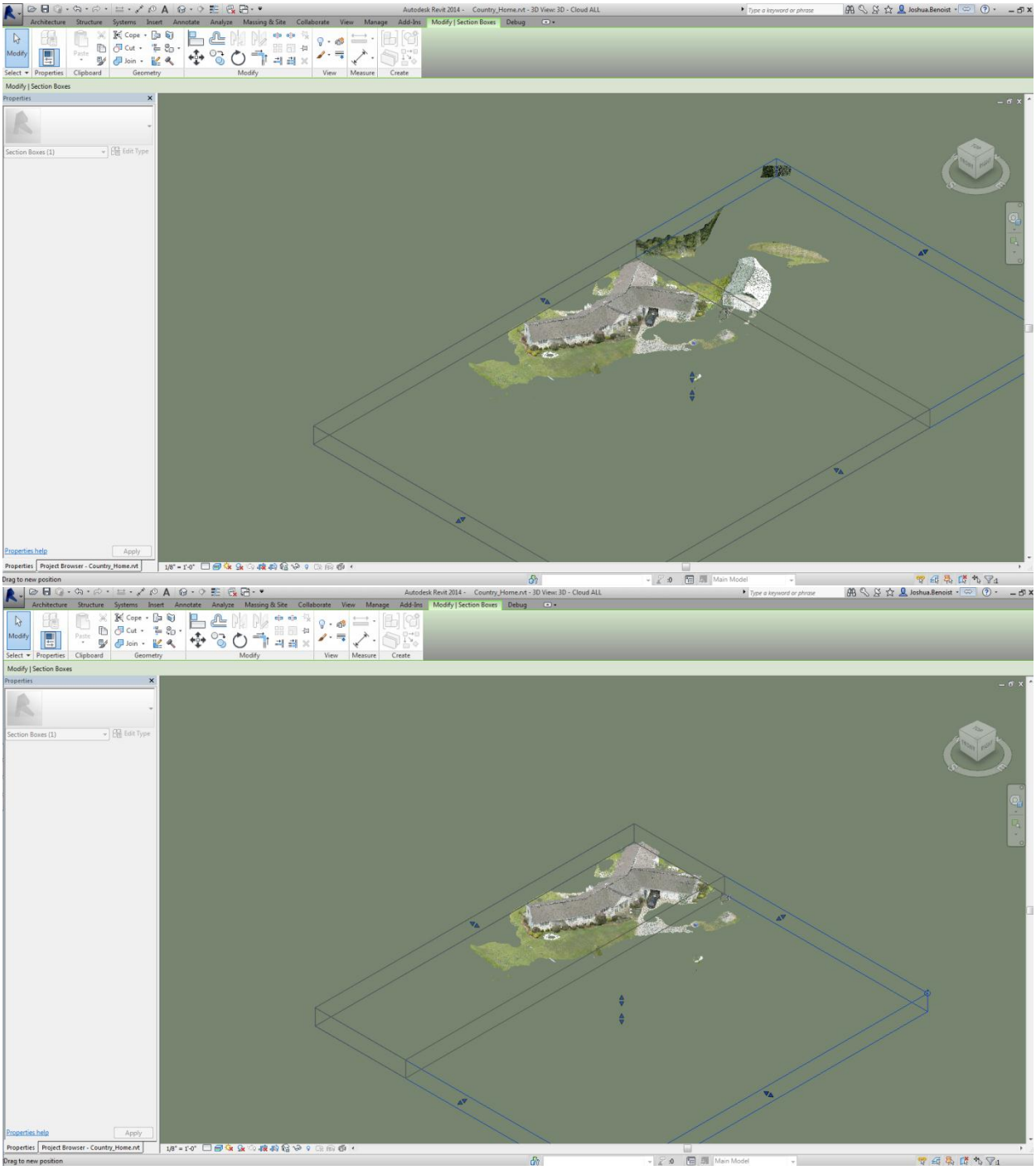


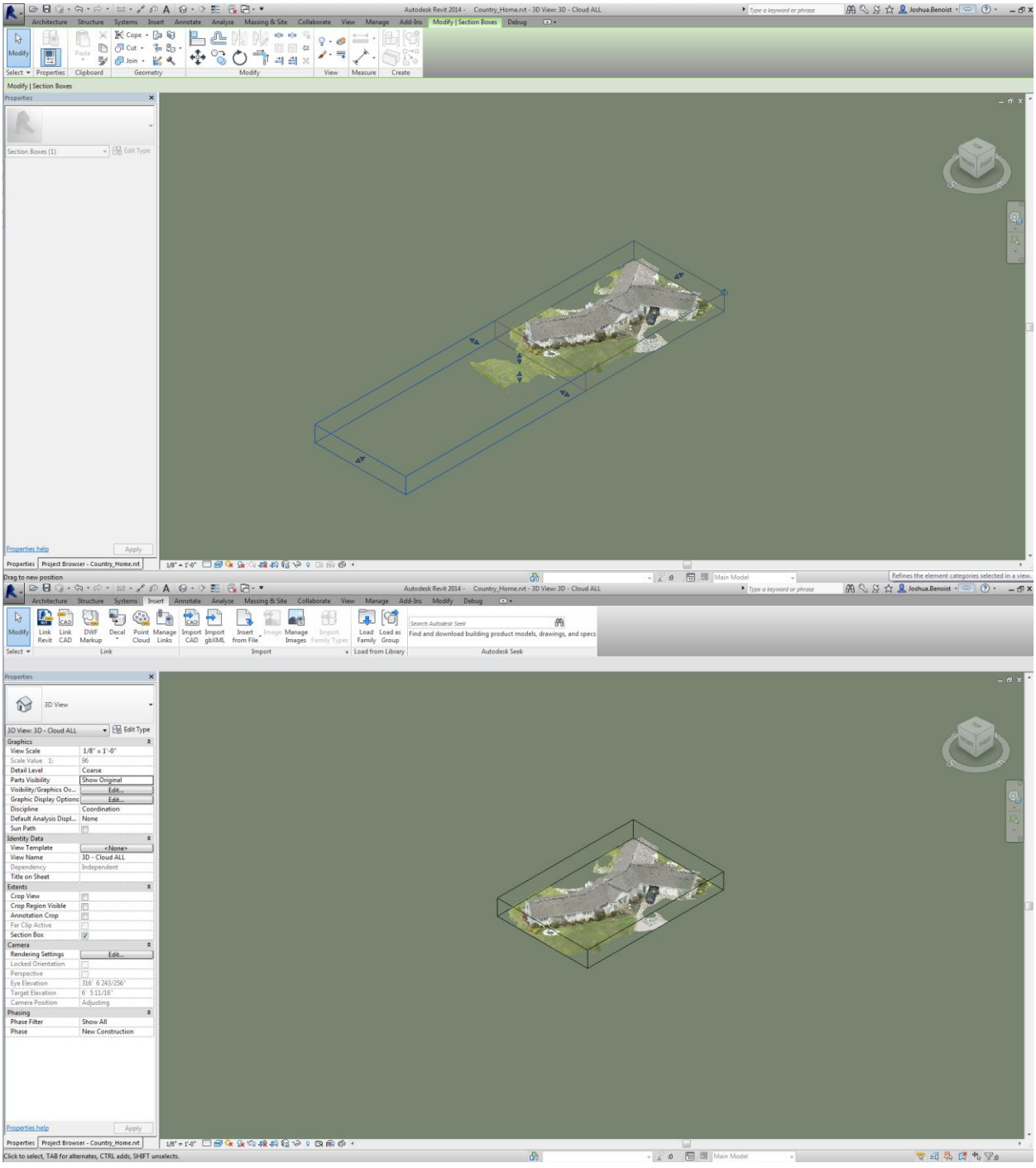


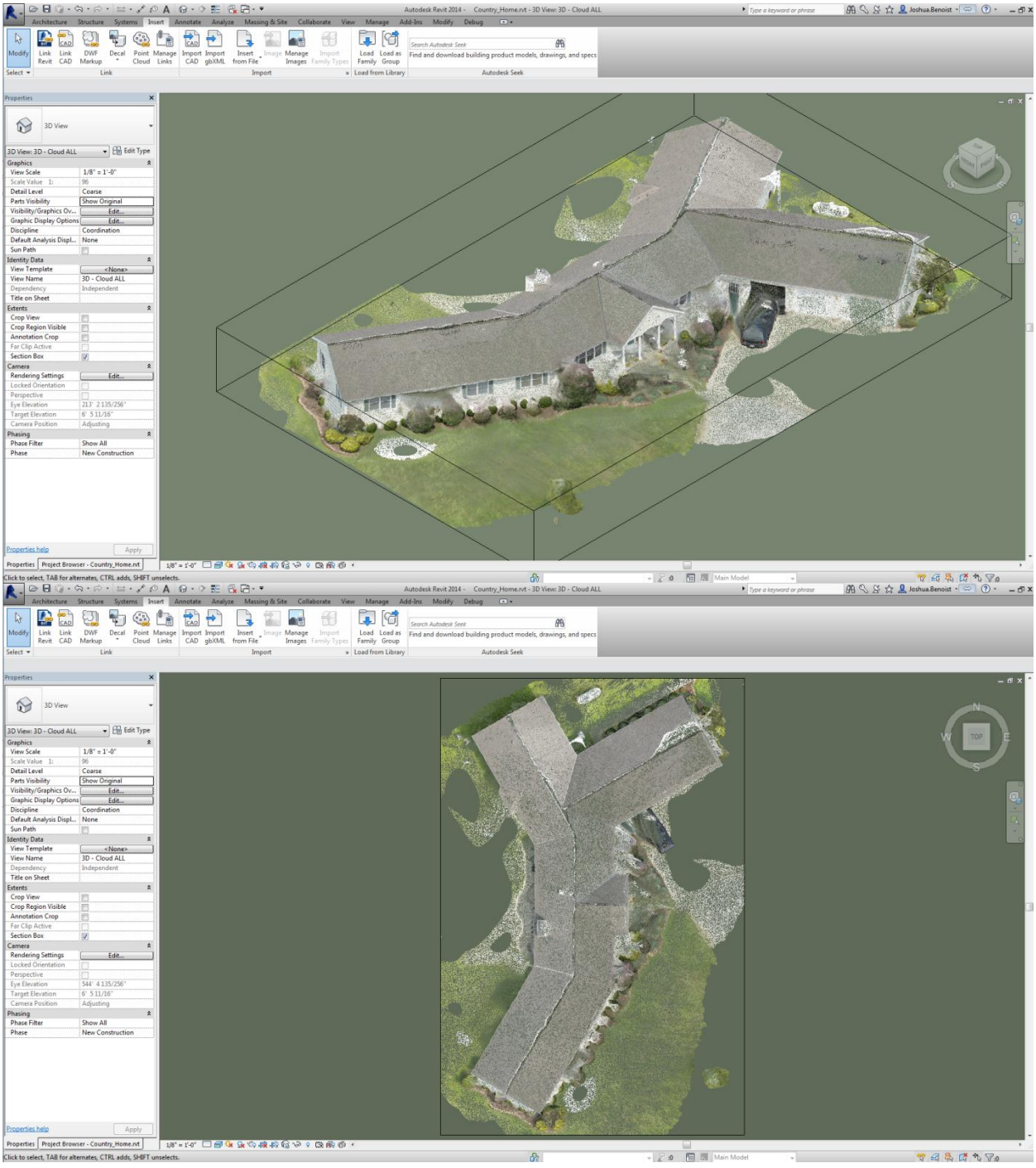
Next step is to set the clipping boundaries. Top, front, back, left and right.


Autodesk Revit 2014 - Country_Home.rvt - 3D View: 3D - Cloud ALL
Modify | Section Boxes
Section Boxes (1)
Properties help
Apply
Project Browser - Country_Home.rvt
Click to select, TAB for alternates, CTRL adds, SHIFT unselects.
CENTER
ZOOM
REWIND
ORBIT
Press ESC, F8 or Shift+W to exit, or right-click to display context menu.

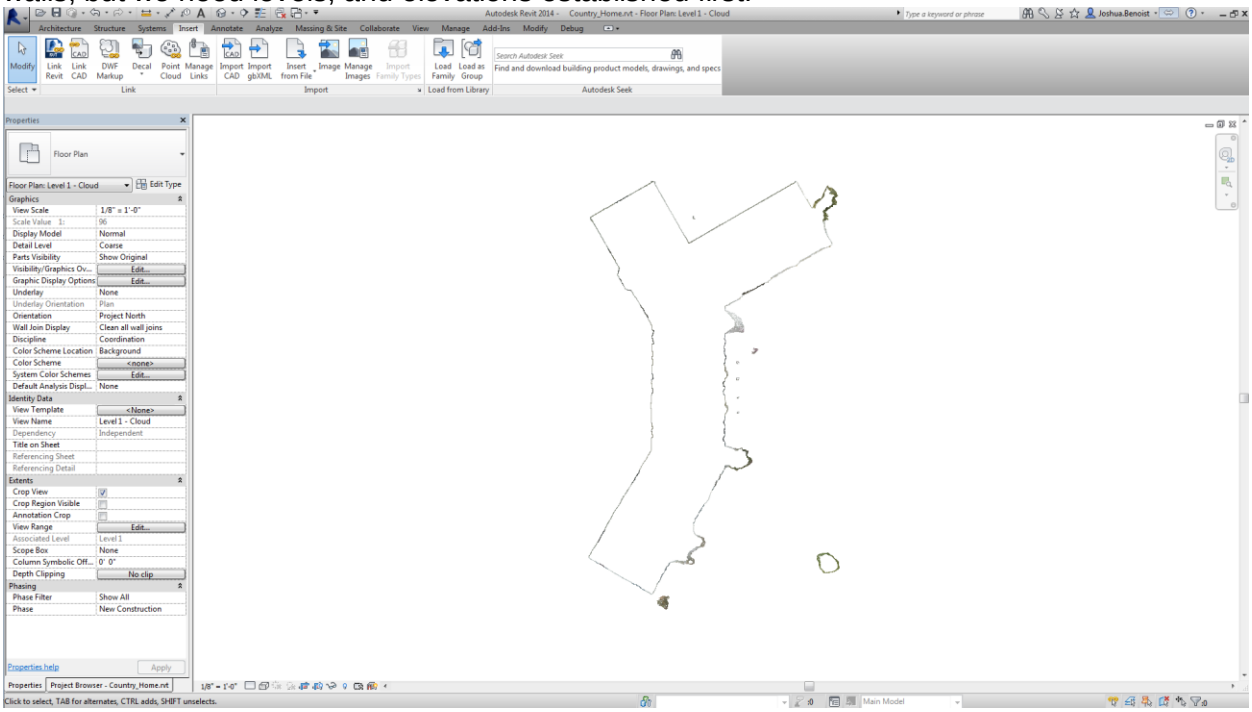

Autodesk Revit 2014 - Country_Home.rvt - 3D View: 3D - Cloud ALL
Modify | Section Boxes
Properties
Section Boxes (1)
Edit Type
Properties help
Apply
Project Browser - Country_Home.rvt
Drag to new position
Main Model
Click to select, TAB for alternates, CTRL adds, SHIFT unselects.


Autodesk Revit 2014 - Country_Home.rvt - 3D View: 3D - Cloud ALL
Modify | Section Boxes
Properties
Section Boxes (1)
Edit Type
Properties help
Apply
Project Browser - Country_Home.rvt
Drag to new position
Main Model

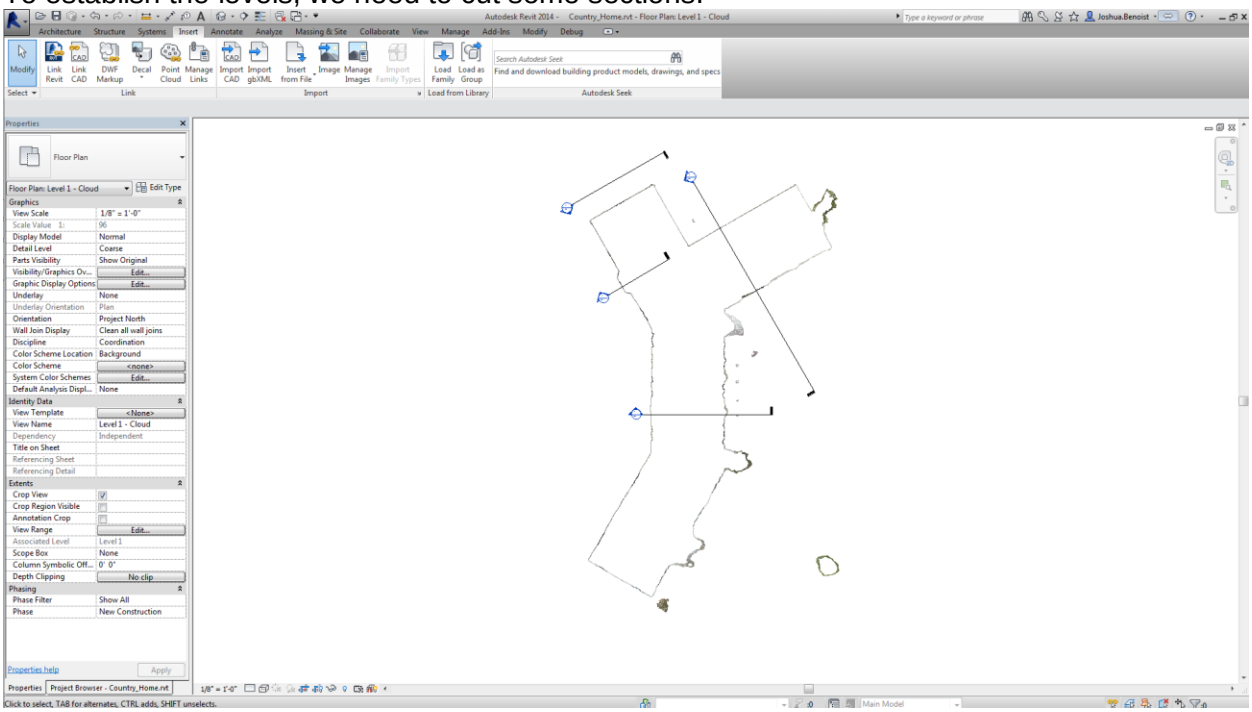



Autodesk Revit 2014 - Country_Home.rvt - 3D View: 3D - Cloud ALL
Architecture Structure Systems Insert Annotate Analyze Massing & Site Collaborate View Manage Add-Ins Modify Debug
Modify Link Revit Link CAD DWF Markup Decal Point Cloud Manage Links Import CAD Import gbXML Insert from File Image Manage Images Import Family Types Load Family Load as Group
Find and download building product models, drawings, and specs
Link Import Load from Library Autodesk Seek
Properties
3D View
3D View: 3D - Cloud ALL
Edit Type
Graphics
View Scale 1/8" = 1'-0"
Scale Value 1: 96
Detail Level Coarse
Parts Visibility Show Original
Visibility/Graphics Ov... Edit...
Graphic Display Options Edit...
Discipline Coordination
Default Analysis Displ... None
Sun Path
Identity Data
View Template <None>
View Name 3D - Cloud ALL
Dependency Independent
Title on Sheet
Extents
Crop View
Crop Region Visible
Annotation Crop
Far Clip Active
Section Box
Camera
Rendering Settings Edit...
Locked Orientation
Perspective
Eye Elevation 213' 2 135/256"
Target Elevation 6' 5 11/16"
Camera Position Adjusting
Phasing
Phase Filter Show All
Phase New Construction
Properties help
Apply
Properties
Project Browser - Country_Home.rvt
Click to select, TAB for alternates, CTRL adds, SHIFT unselects.
Main Model
Autodesk Revit 2014 - Country_Home.rvt - 3D View: 3D - Cloud ALL
Eye Elevation 544' 4 135/256"
TOP

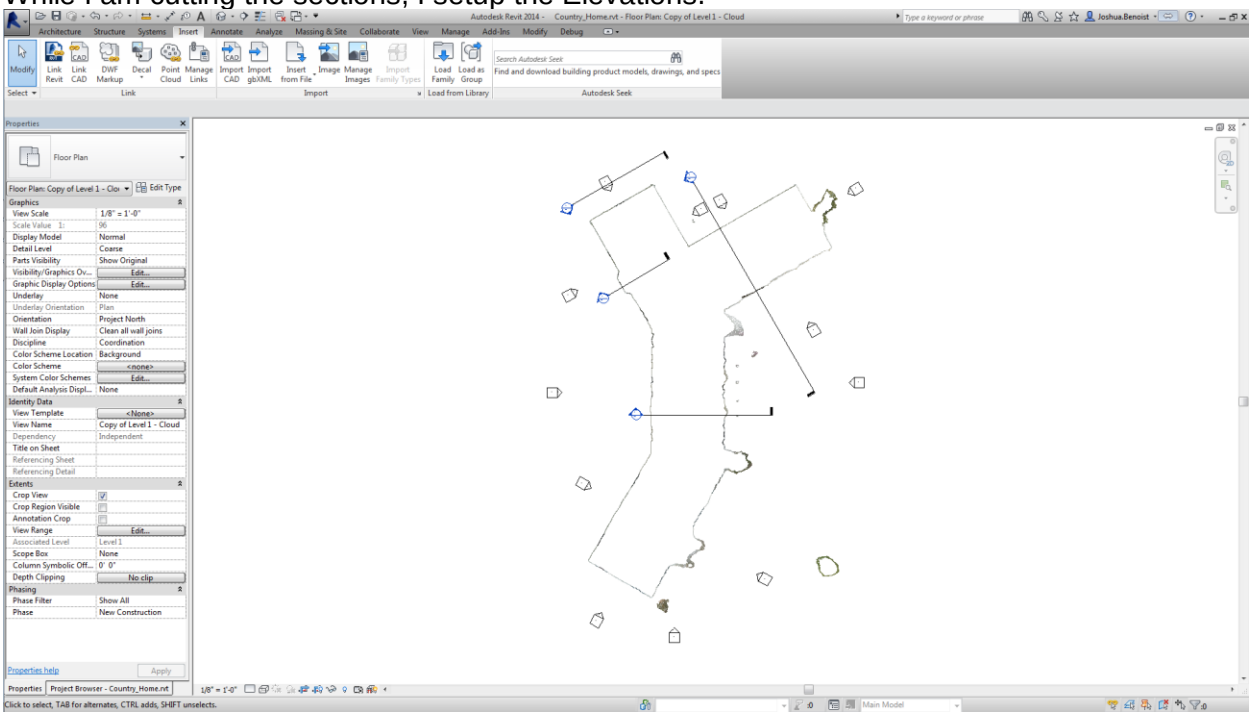
In a Floor Plan view, the Cloud will be cut by the cut plane. That makes it easy to trace with walls, but we need levels, and elevations established first.



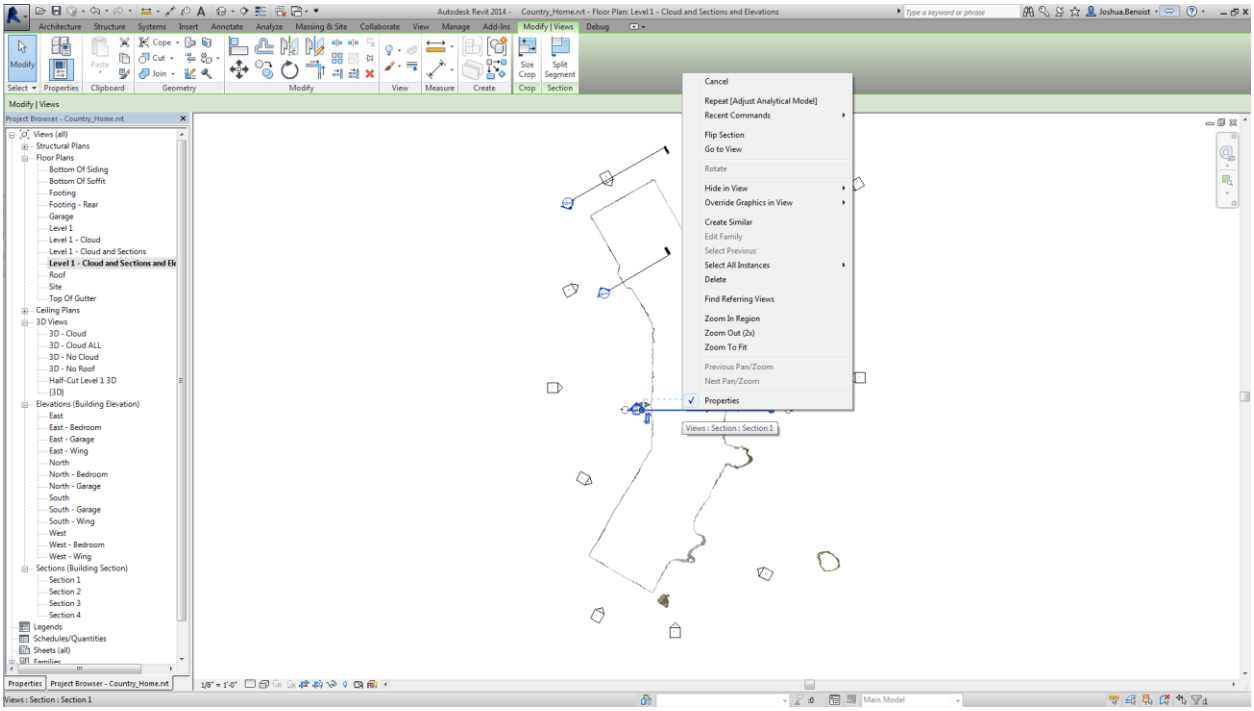
To establish the levels, we need to cut some sections.

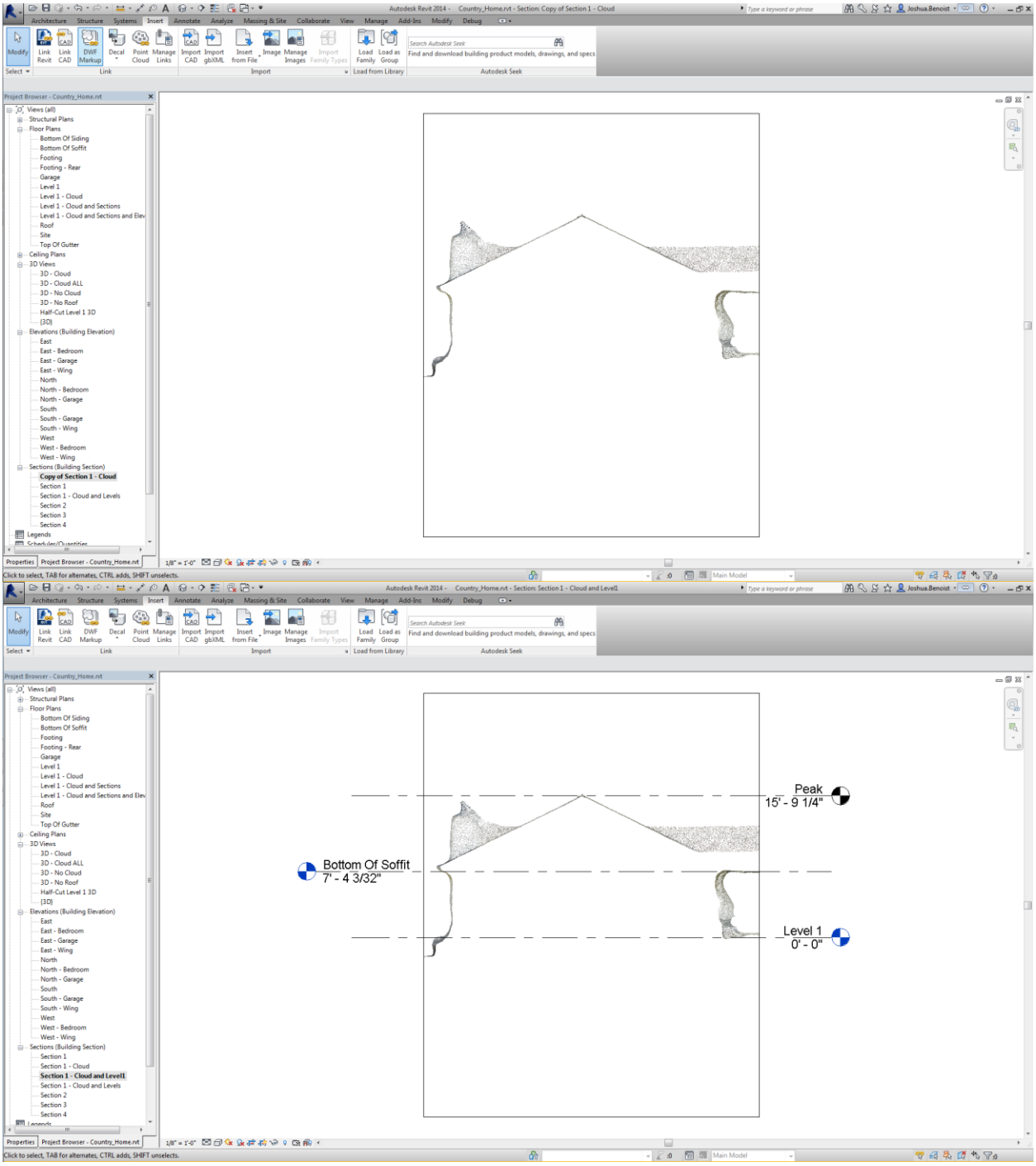


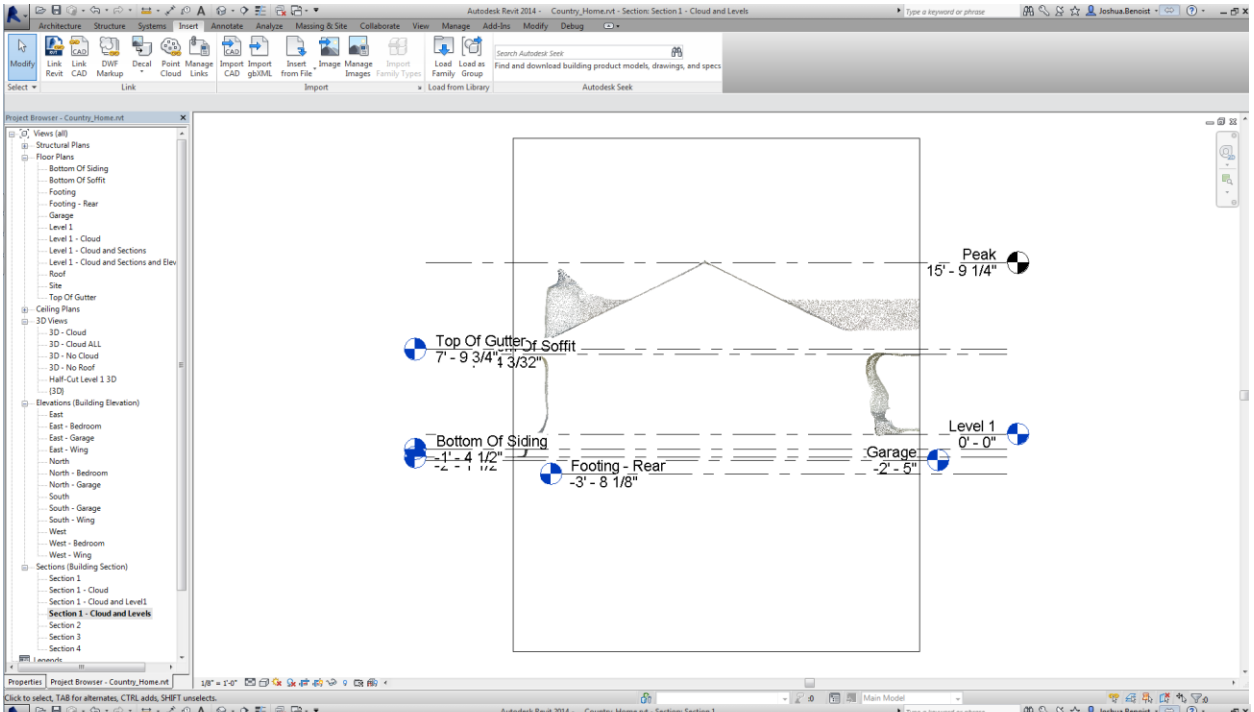
While I am cutting the sections, I setup the Elevations.

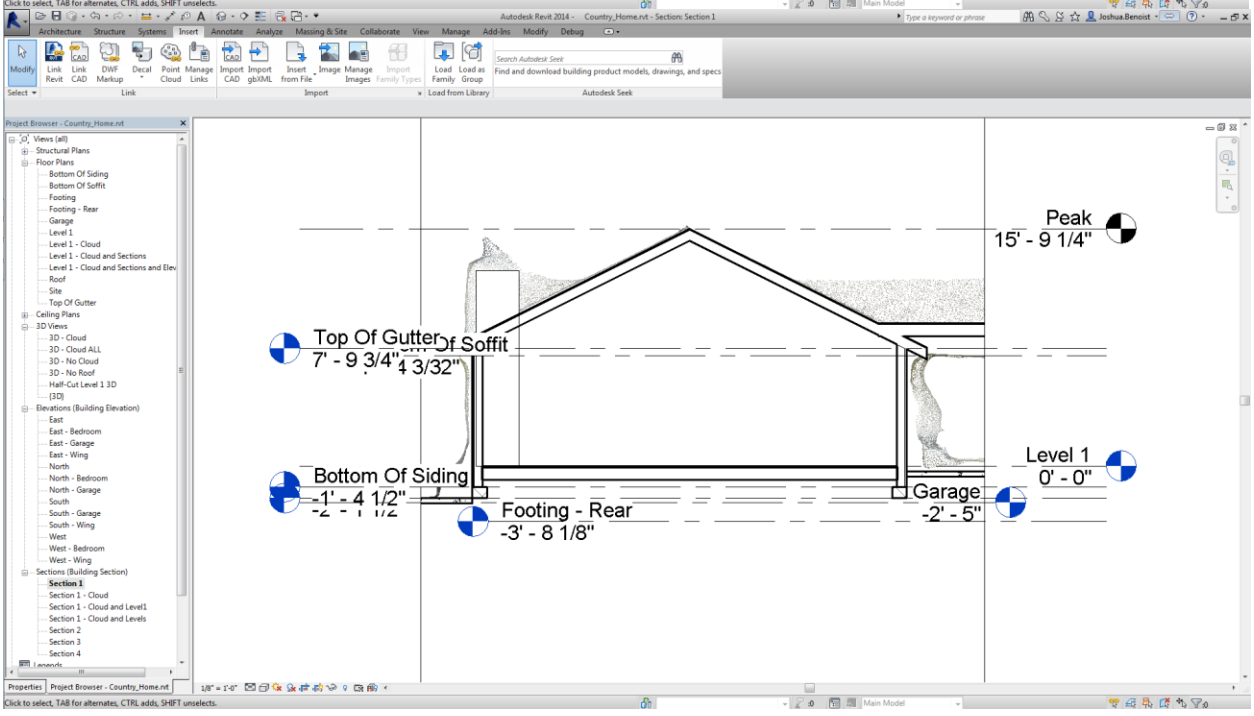


Go to view.

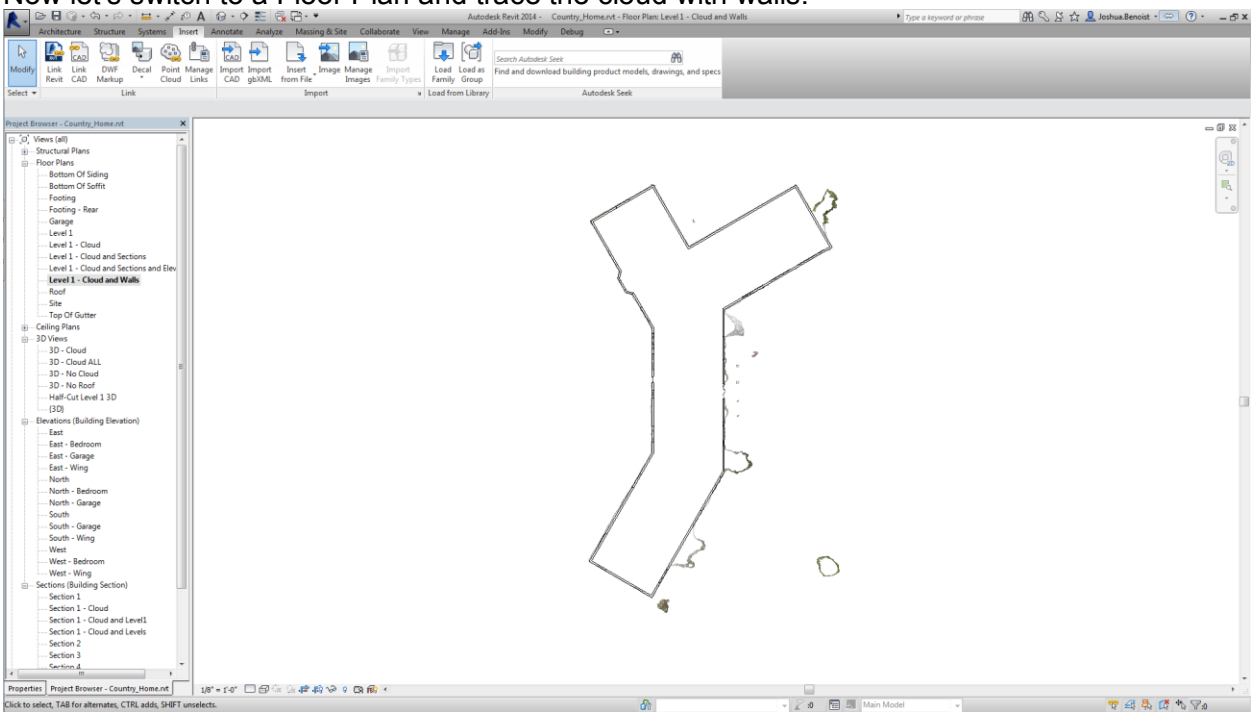



Peak
15' - 9 1/4"
Bottom Of Soffit
7' - 4 3/32"
Level 1
0' - 0"

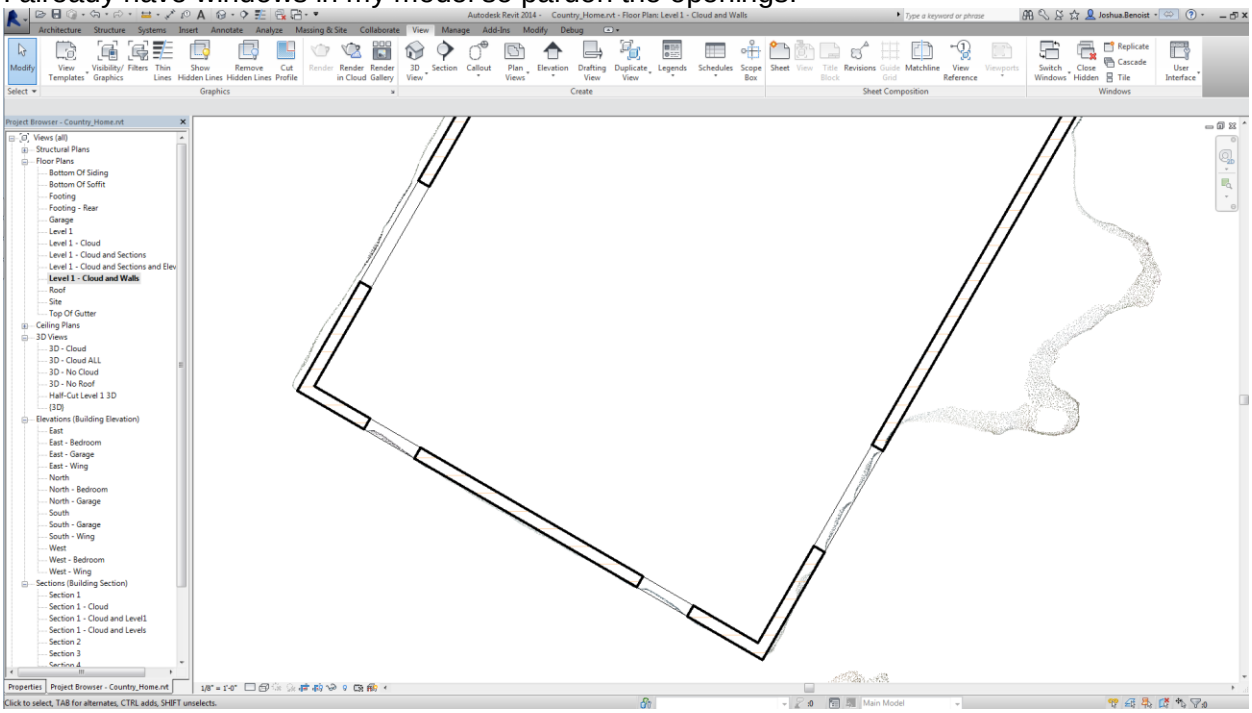

Peak
15' - 9 1/4"
Top Of Gutter
7' - 9 3/4"
Bottom Of Siding
-1' - 4 1/2"
Footing - Rear
-3' - 8 1/8"
Level 1
0' - 0"
Garage
-2' - 5"


Peak
15' - 9 1/4"
Top Of Gutter
7' - 9 3/4"
Bottom Of Siding
-1' - 4 1/2"
Footing - Rear
-3' - 8 1/8"
Level 1
0' - 0"
Garage
-2' - 5"

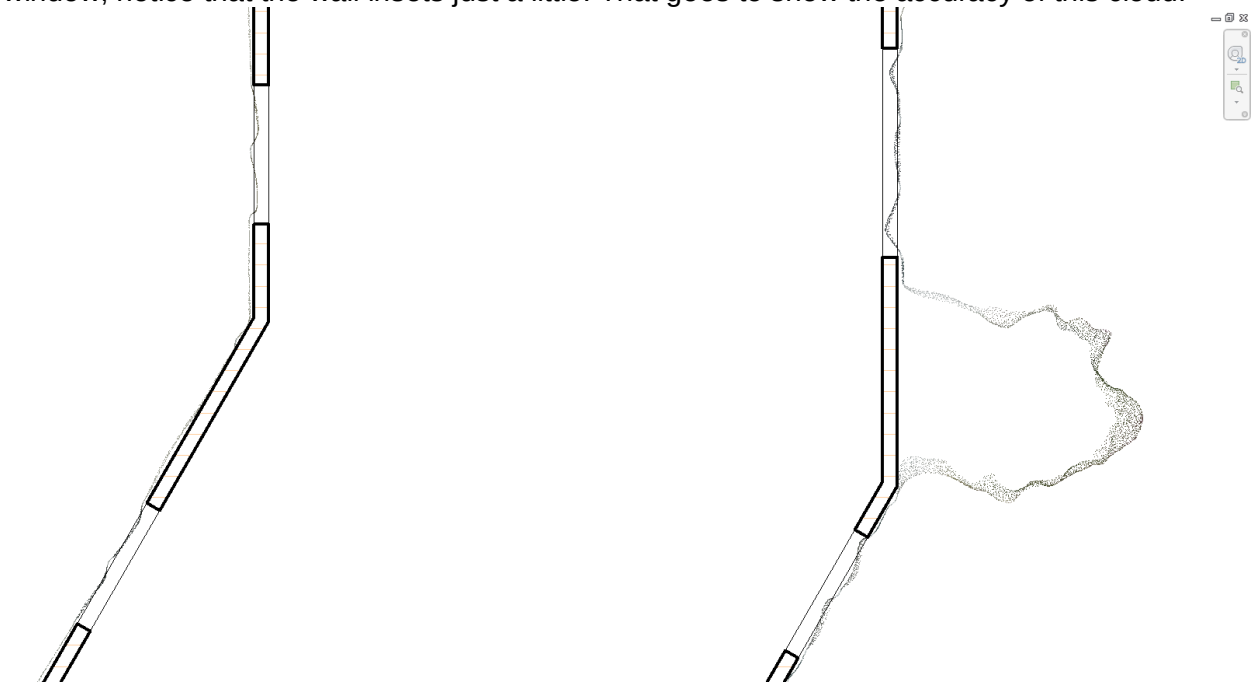
Now let's switch to a Floor Plan and trace the cloud with walls.



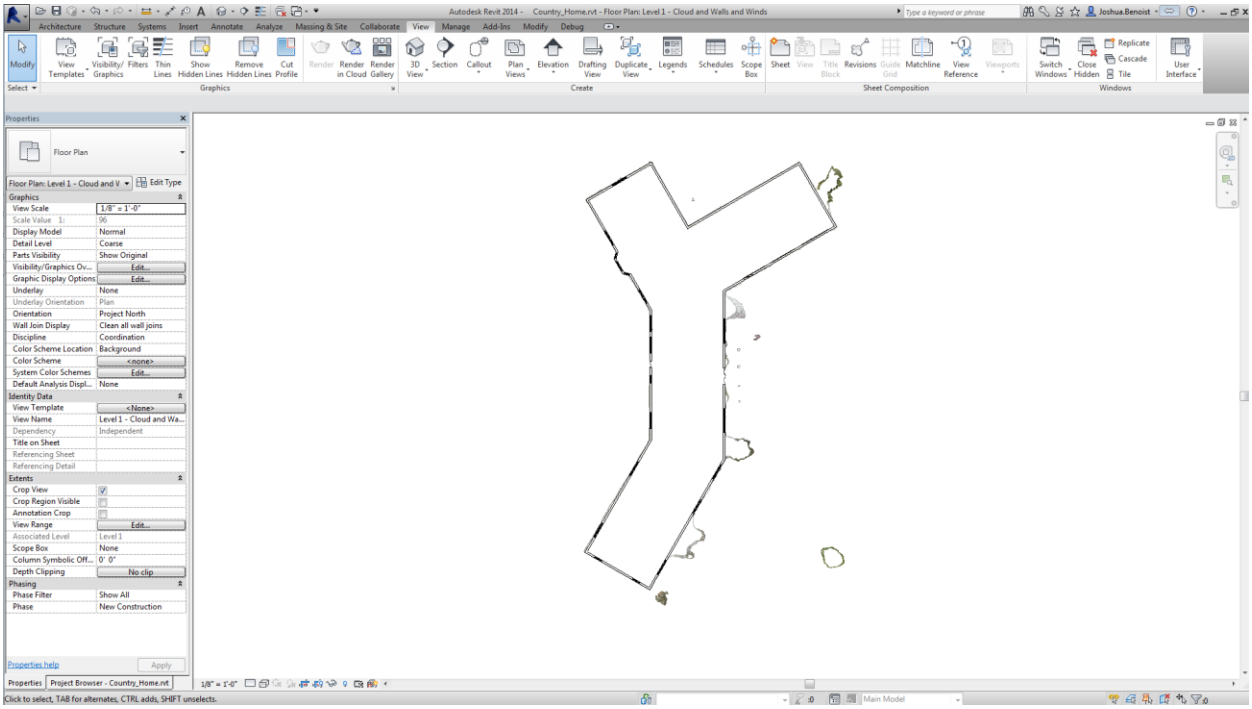
I already have windows in my model so pardon the openings.



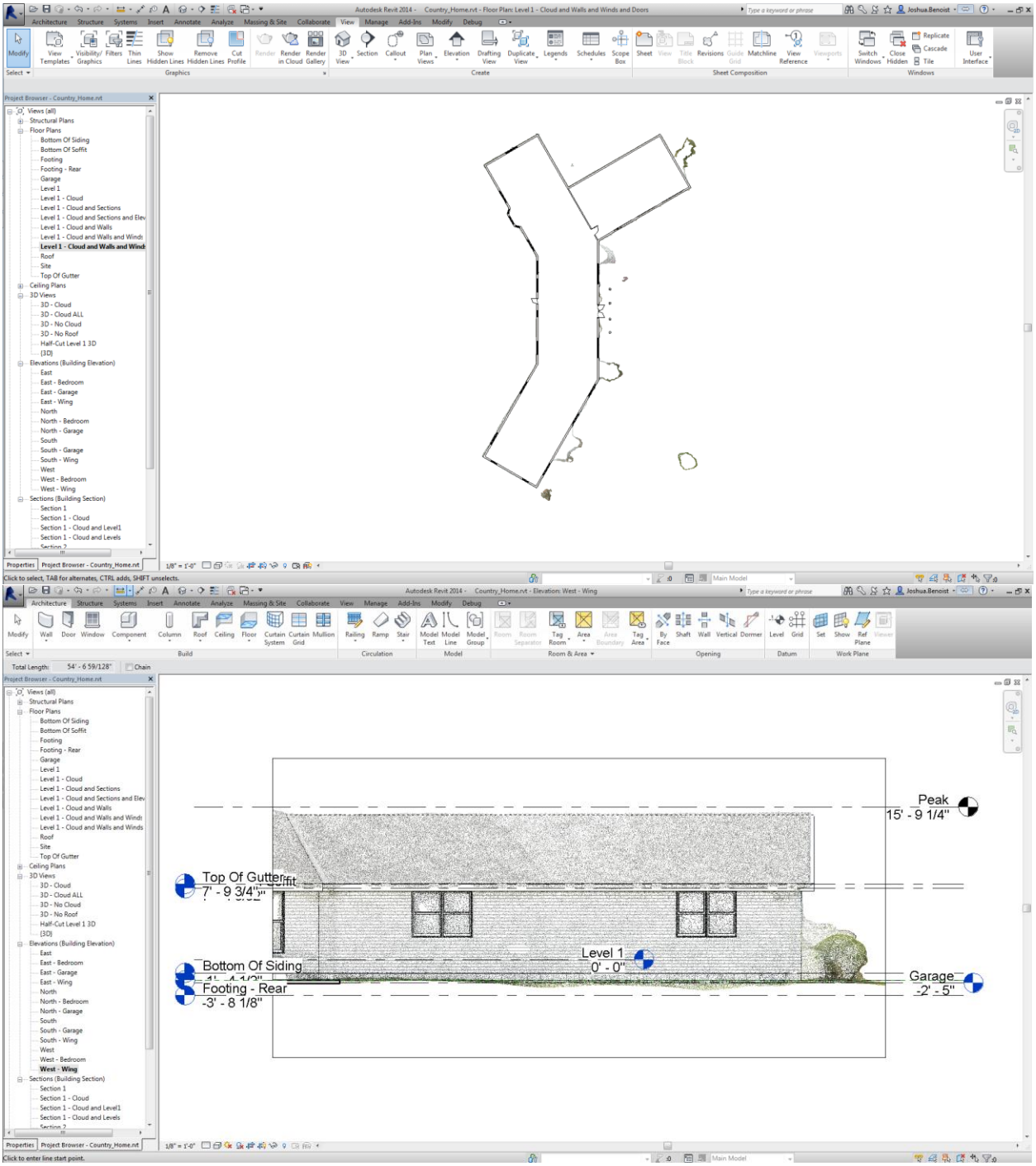
In this image, notice that the walls hug the cloud. The cloud is like paint on the wall. So at each window, notice that the wall insets just a little. That goes to show the accuracy of this cloud.



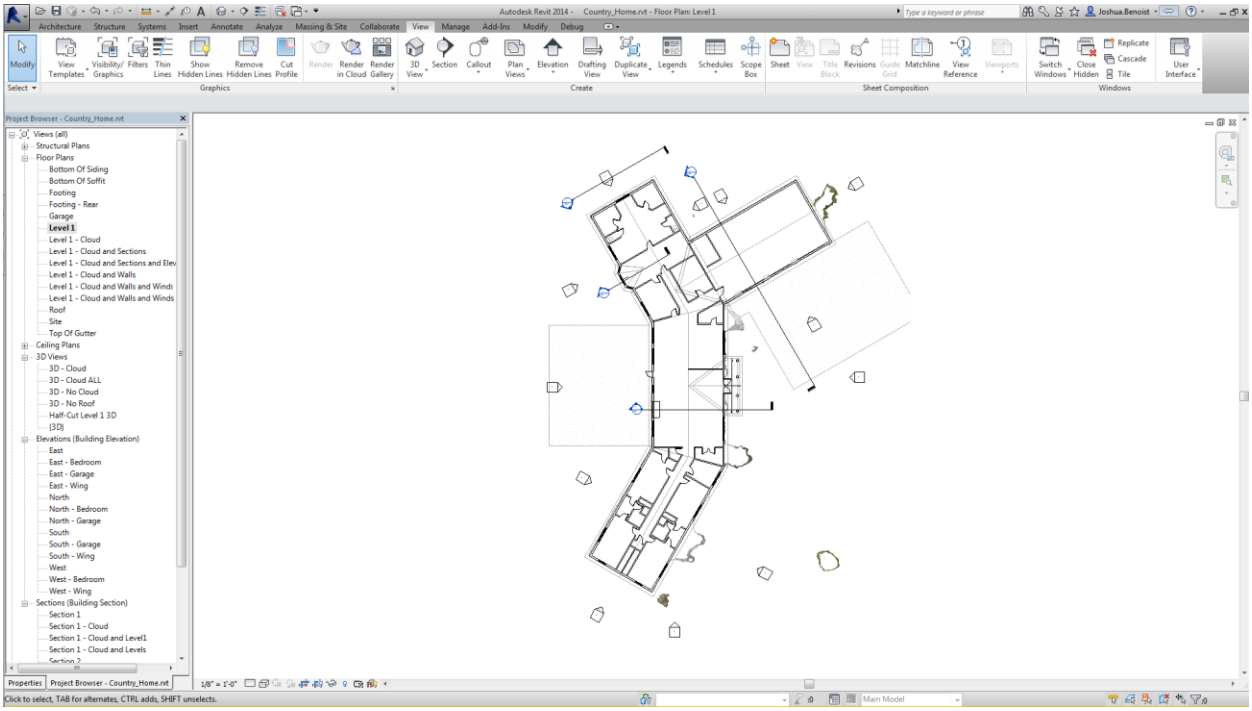
Add in windows.



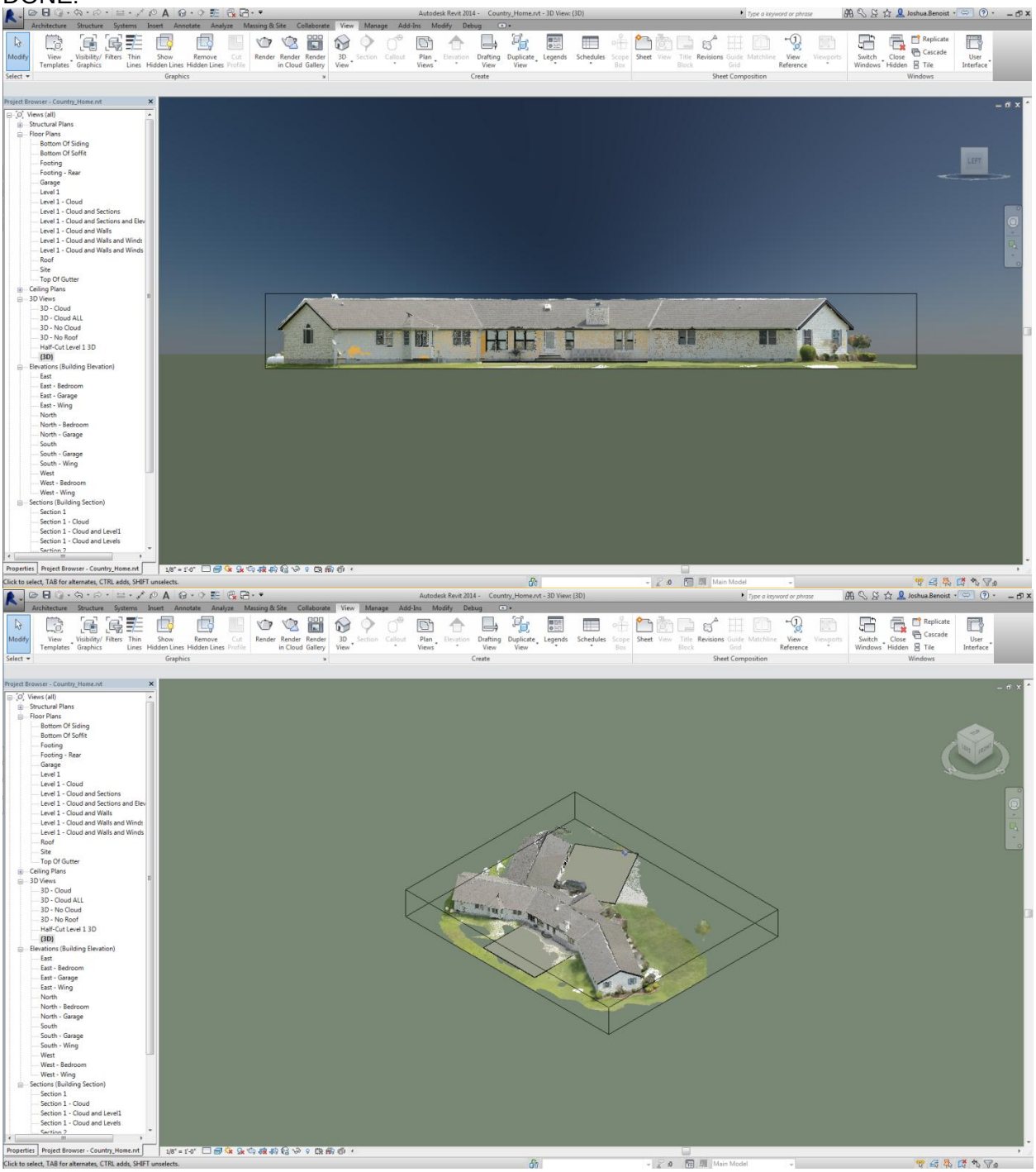
Add in doors and other external features.

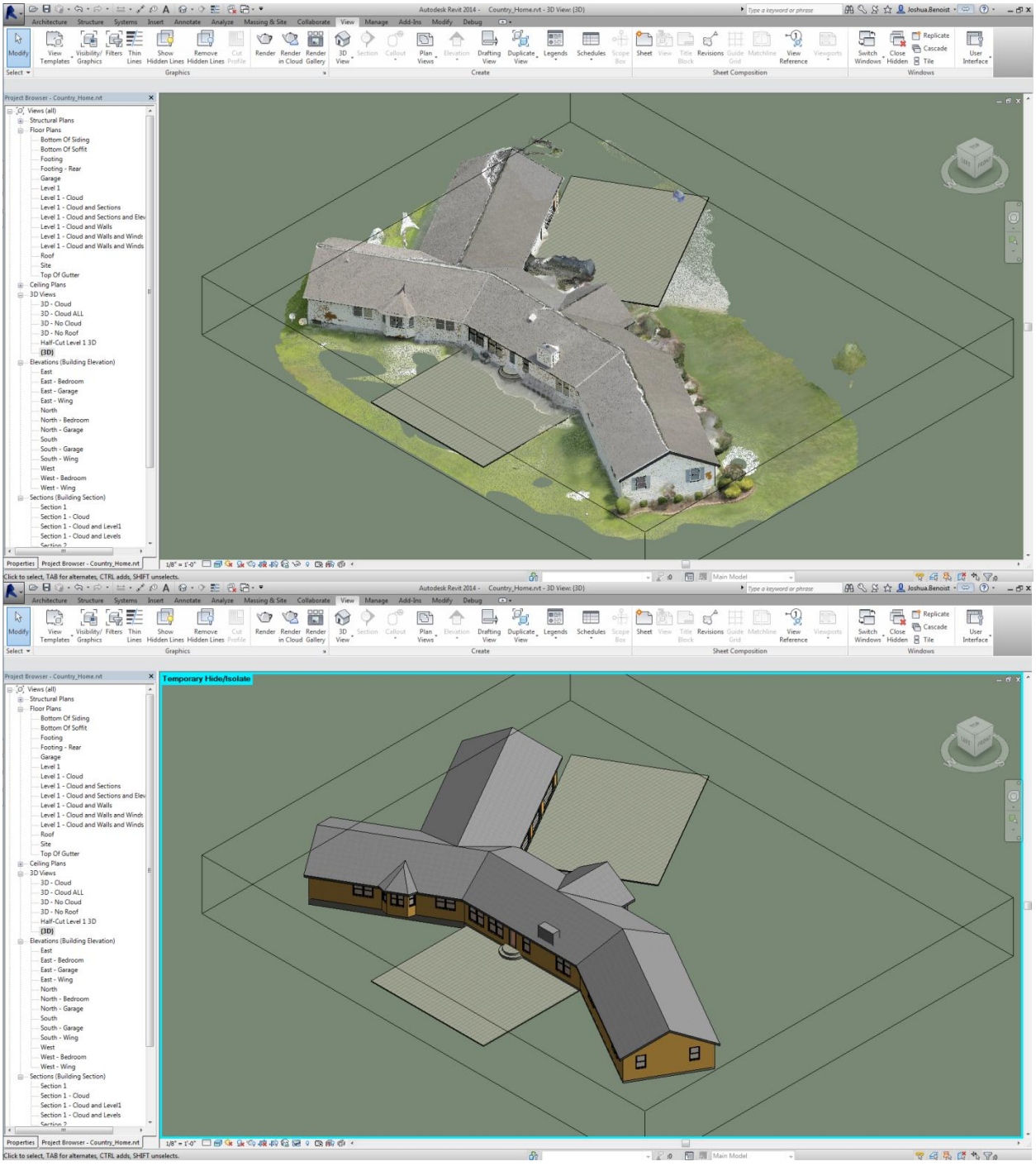


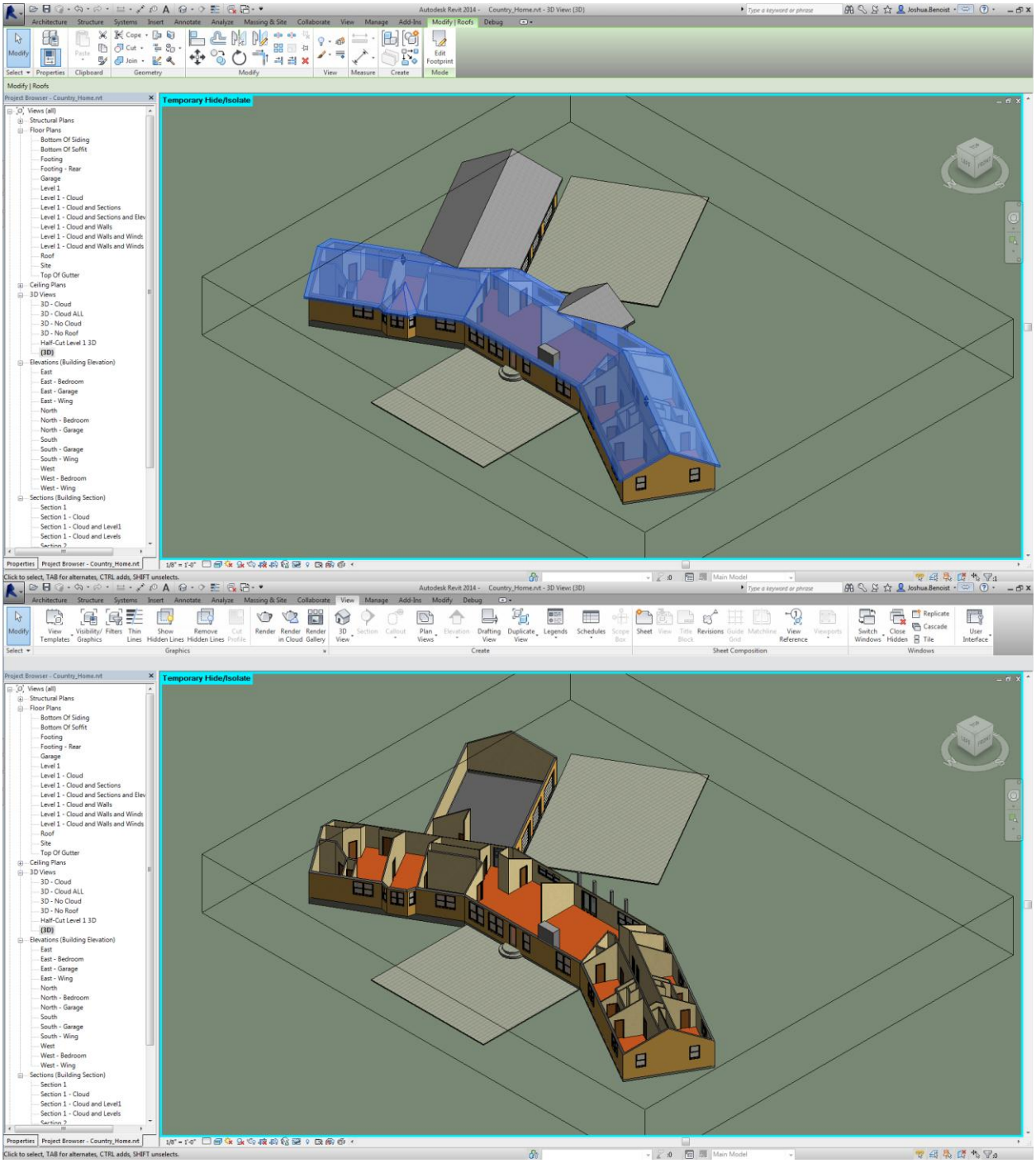
Add in internals and roof. DONE!

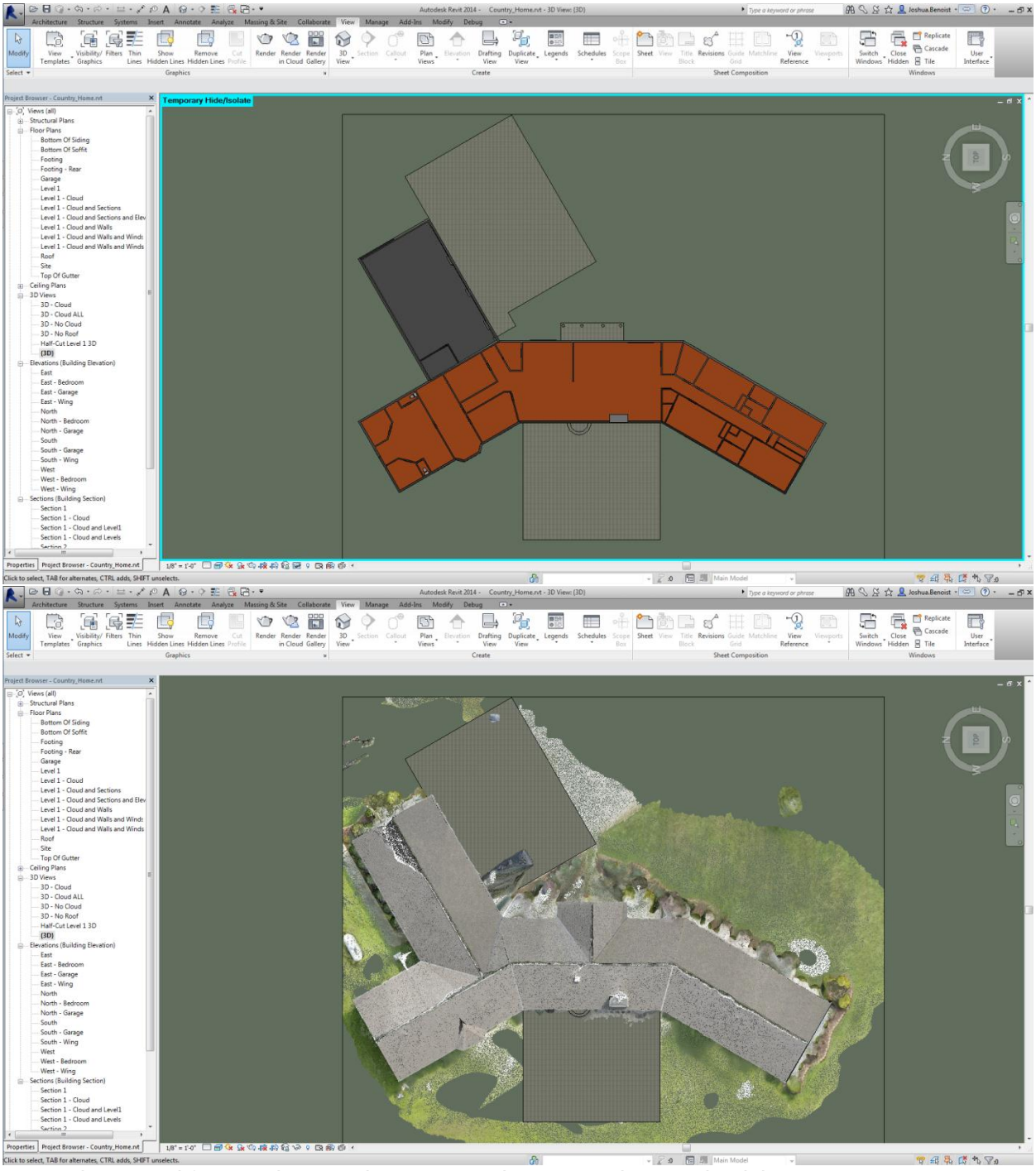


DONE!



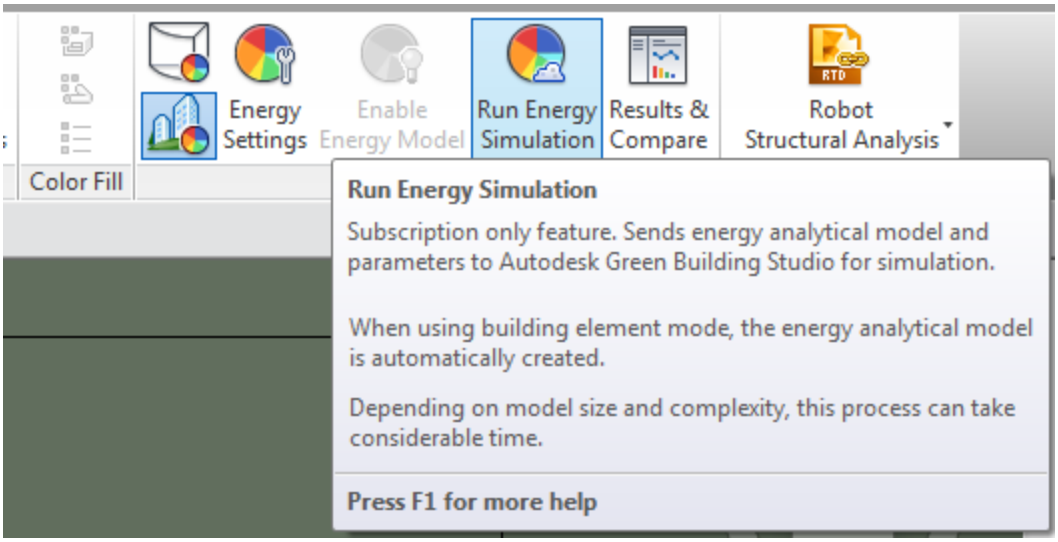

Temporary Hide/Isolate


Temporary Hide/Isolate
Temporary Hide/Isolate



Pretty darn good for two days work. ReCAP Photo + Revit = Productivity

Now that we have ourselves a model. We can analyze it.



This next report, is just a sample of what the above Energy Analysis can do. It is not a report from my model.

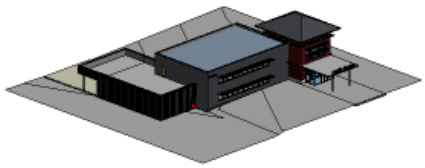
Results > 56750_BPA > 56750_BPA Analysis

AUTODESK.

56750_BPA
56750_BPA Analysis

Analyzed at 4/16/2013 12:01:32 PM
Version 2014.1.28.2302(DOE-2.2-44e4)

Energy Analysis Result



Building Performance Factors

Location:	Boston, MA
Weather Station:	59315
Outdoor Temperature:	Max: 92°F/Min: 5°F
Floor Area:	10,699 sf
Exterior Wall Area:	7,244 sf
Average Lighting Power:	1.03 W / ft²
People:	37 people
Exterior Window Ratio:	0.33
Electrical Cost:	$0.14 / kWh
Fuel Cost:	$1.16 / Therm

Energy Use Intensity

Electricity EUI:	13 kWh / sf / yr
Fuel EUI:	53 kBtu / sf / yr
Total EUI:	98 kBtu / sf / yr

Life Cycle Energy Use/Cost

Life Cycle Electricity Use:	3,930,999 kWh
Life Cycle Fuel Use:	157,651 Therms
Life Cycle Energy Cost:	$339,273

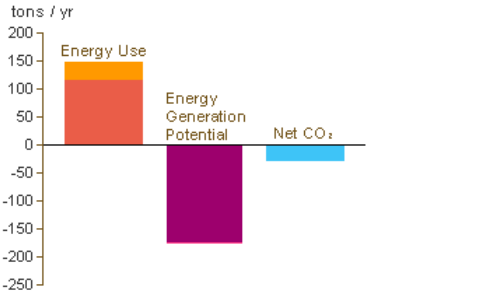
*30-year life and 6.1% discount rate for costs

Renewable Energy Potential

Roof Mounted PV System (Low efficiency):	63,597 kWh / yr
Roof Mounted PV System (Medium efficiency):	127,195 kWh / yr
Roof Mounted PV System (High efficiency):	190,792 kWh / yr
Single 15' Wind Turbine Potential:	5,127 kWh / yr

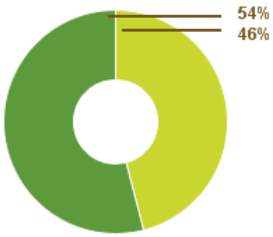
*PV efficiencies are assumed to be 5%, 10% and 15% for low, medium and high efficiency systems

Annual Carbon Emissions



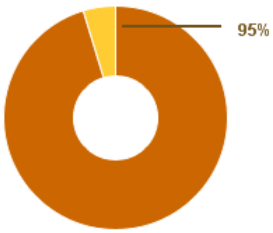
	(tons / yr)
Electricity Consumption	117
Fuel Consumption	30
Roof PV Potential (High Efficiency)	-171
Single 15' Wind Turbine Potential	-4
Net CO₂	-28

Annual Energy Use/Cost



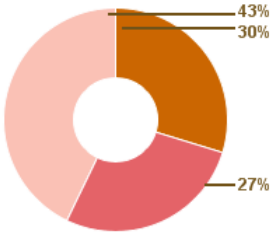
Electricity	46%	$18,829	131,033	kWh
Fuel	54%	$6,080	5,255	Therms
		$24,910		

Energy Use: Fuel



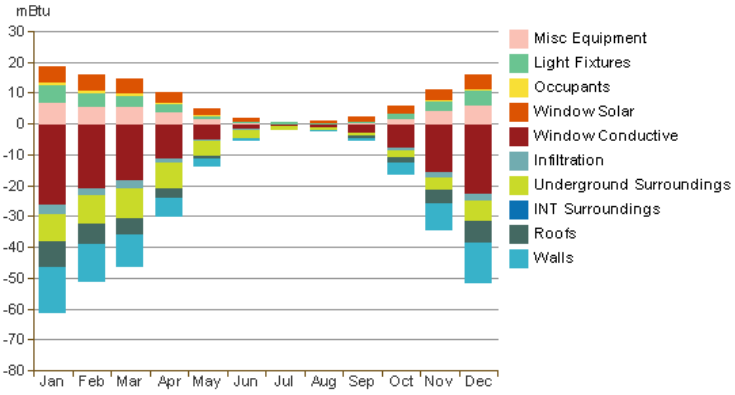
			(Therms)
HVAC	95%	$5,795	5,008
Domestic Hot Water	5%	$285	246
		$6,080	5,254

Energy Use: Electricity

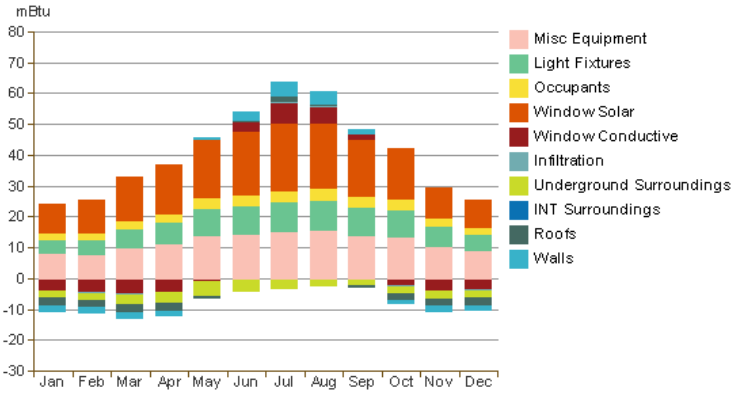


			(kWh)
HVAC	30%	$5,597	38,954
Lighting	27%	$5,166	35,954
Misc Equipment	43%	$8,065	56,124
		$18,828	131,032

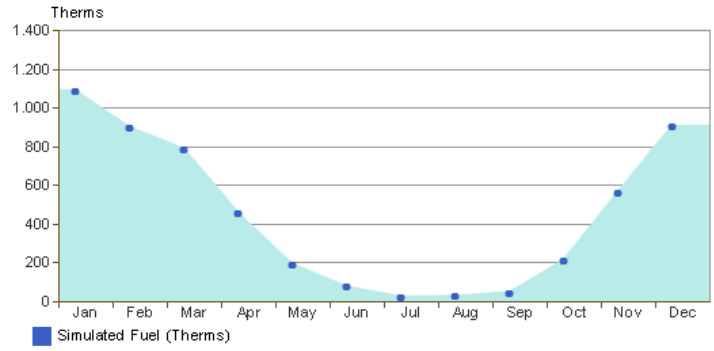
Monthly Heating Load



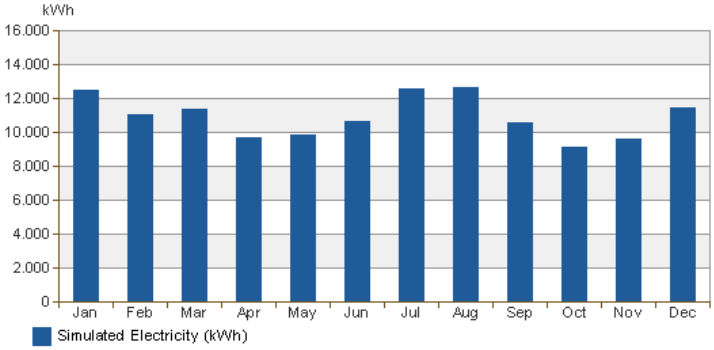
Monthly Cooling Load



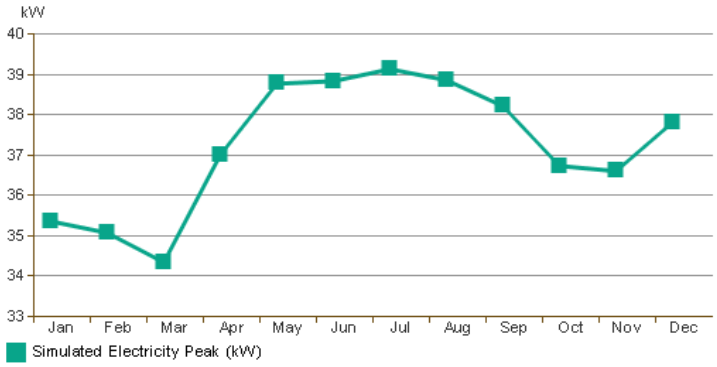
Monthly Fuel Consumption



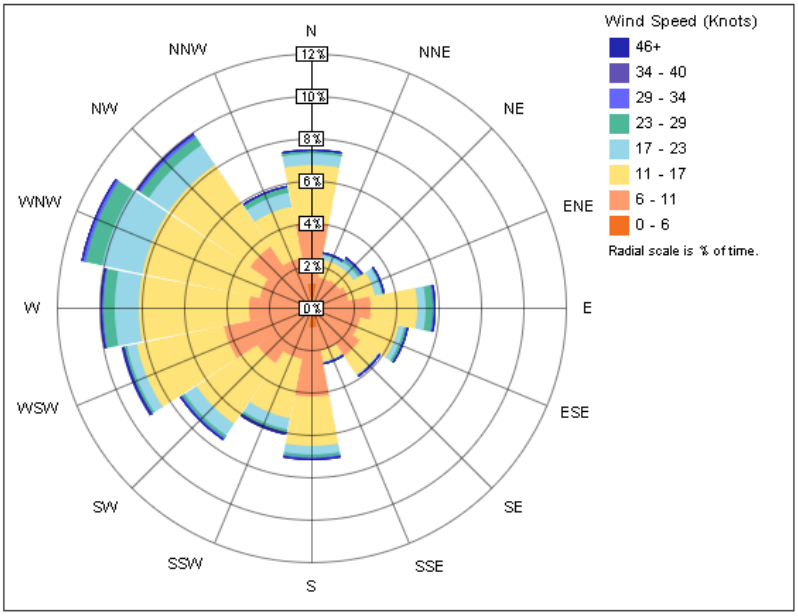
Monthly Electricity Consumption



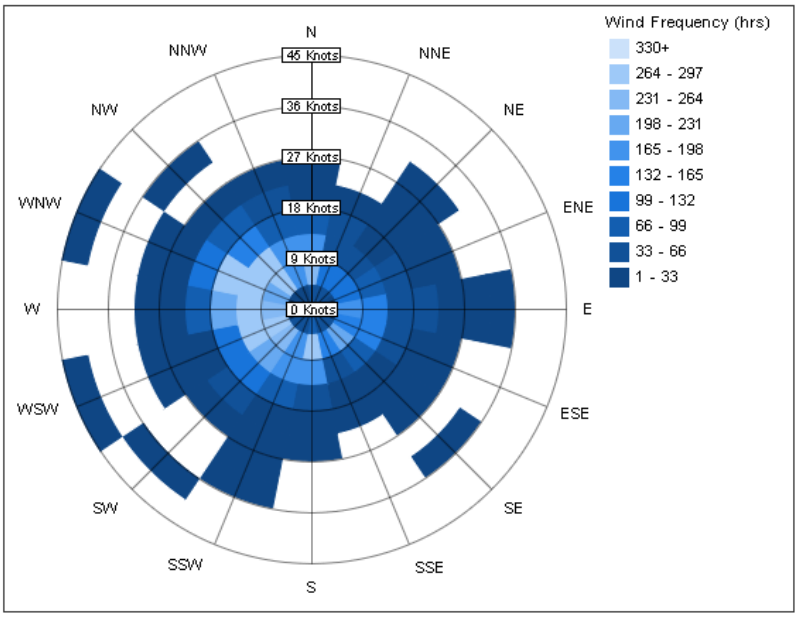
Monthly Peak Demand



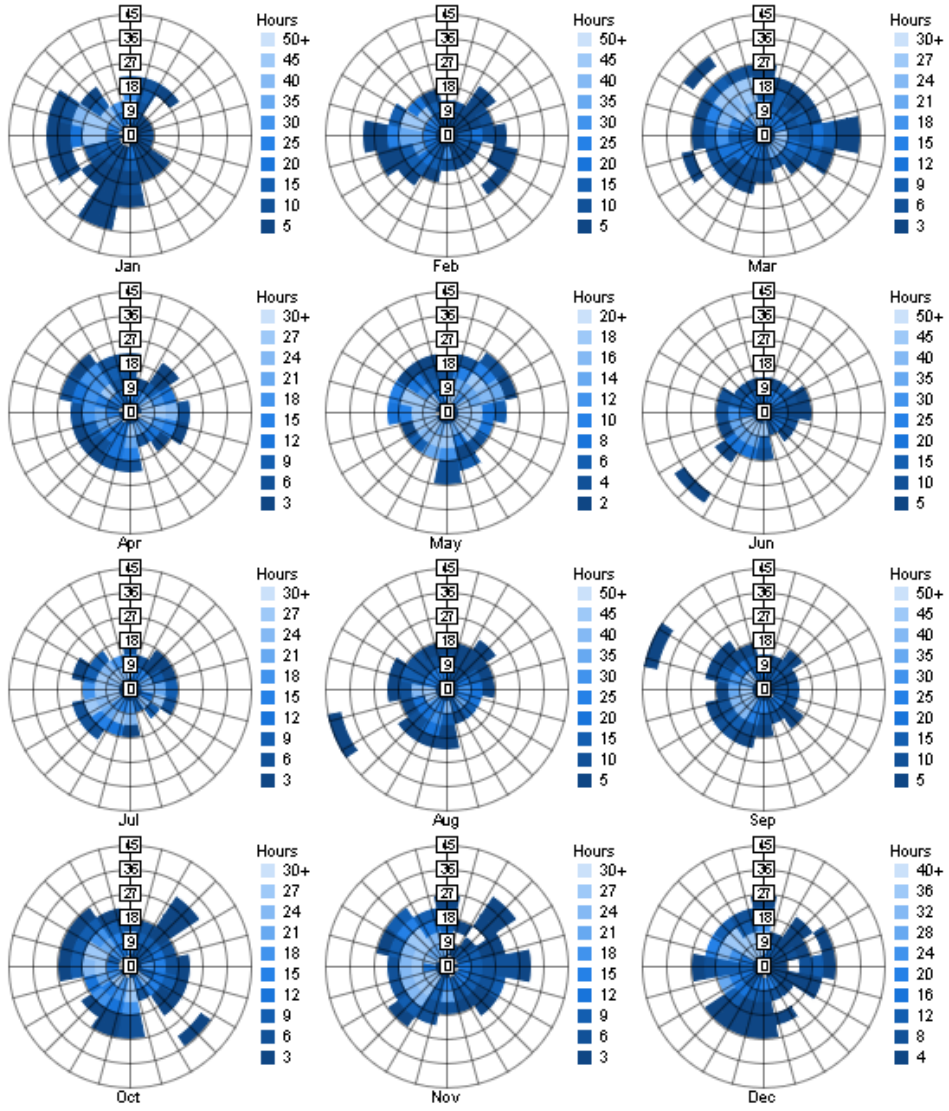
Annual Wind Rose (Speed Distribution)



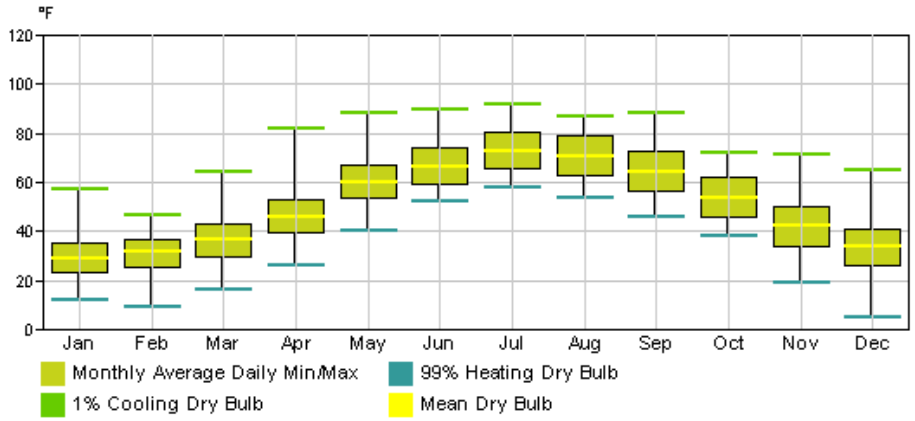
Annual Wind Rose (Frequency Distribution)



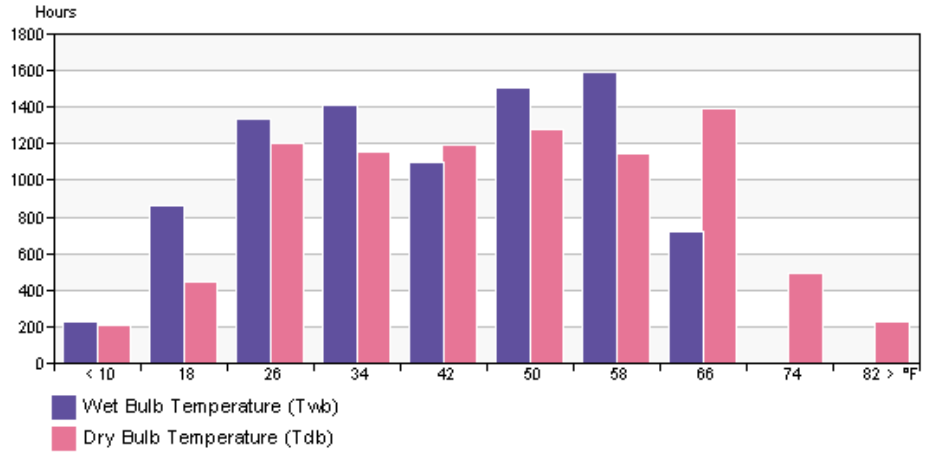
Monthly Wind Roses



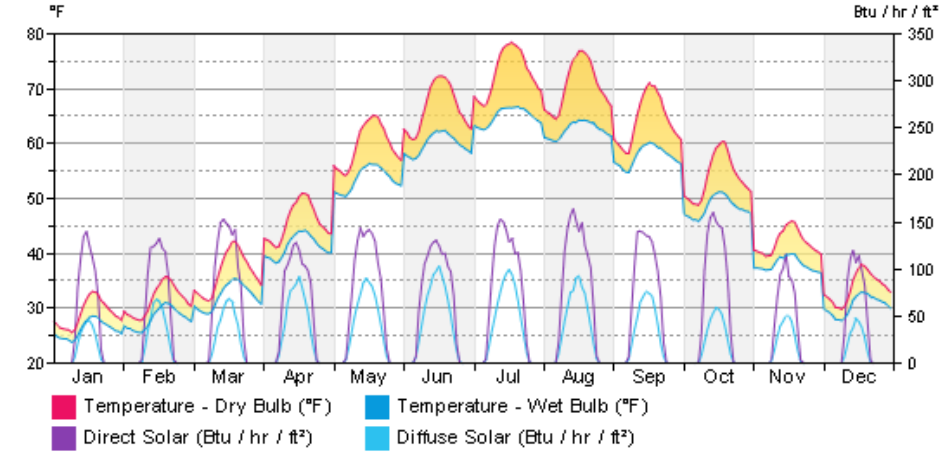
Monthly Design Data



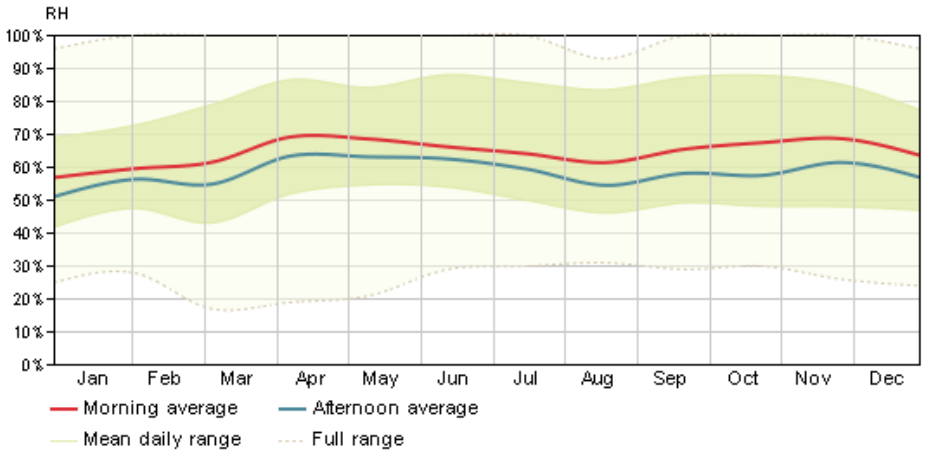
Annual Temperature Bins



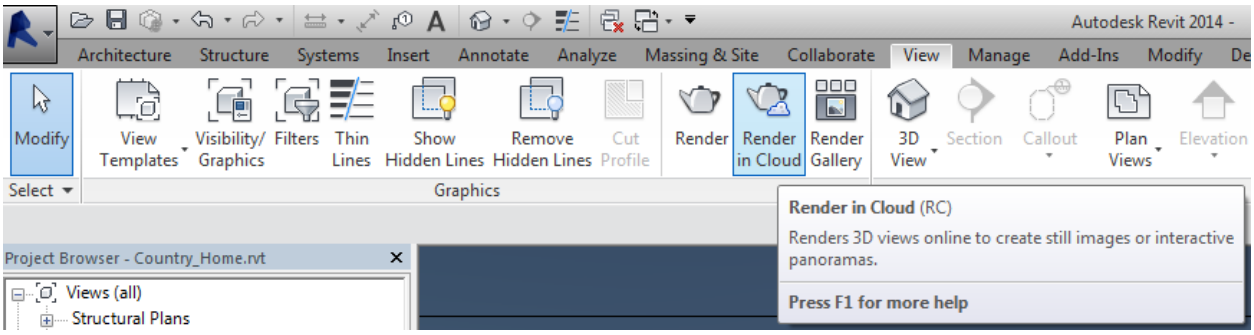
Diurnal Weather Averages

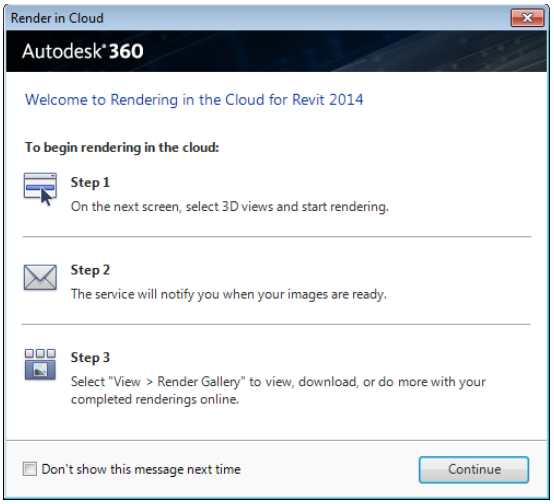


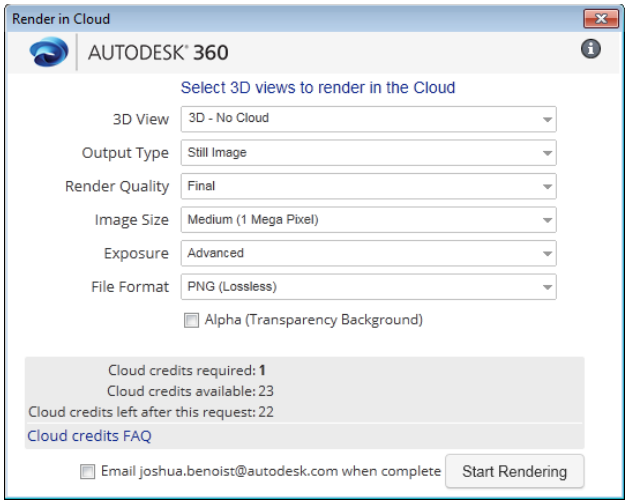
Humidity



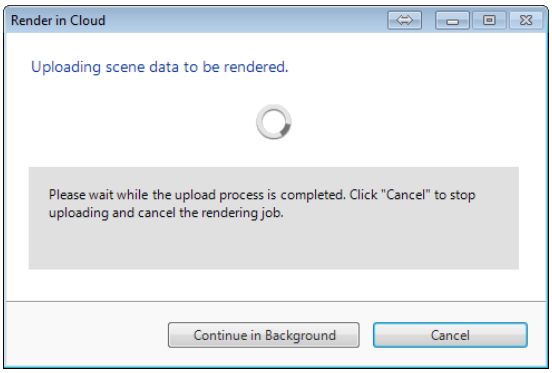
Of course, we mentioned Rendering As A Service, much earlier in this Reference Guide, but this section would not be complete without a quick walk thru.

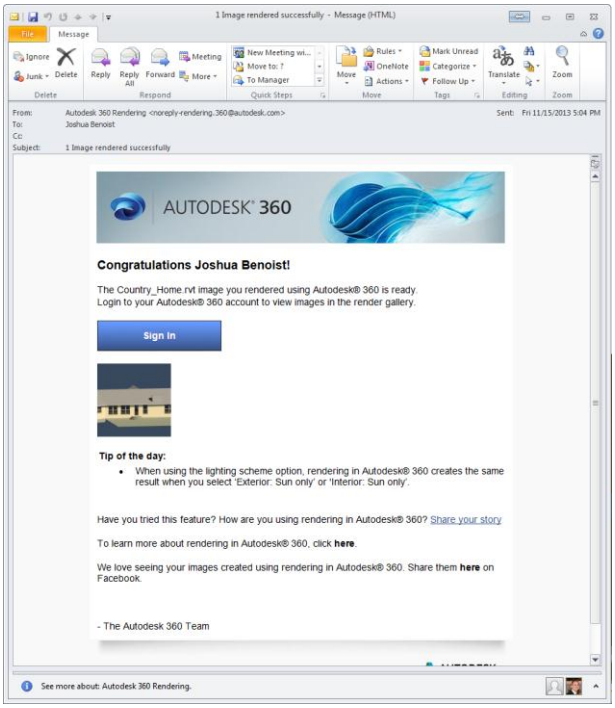




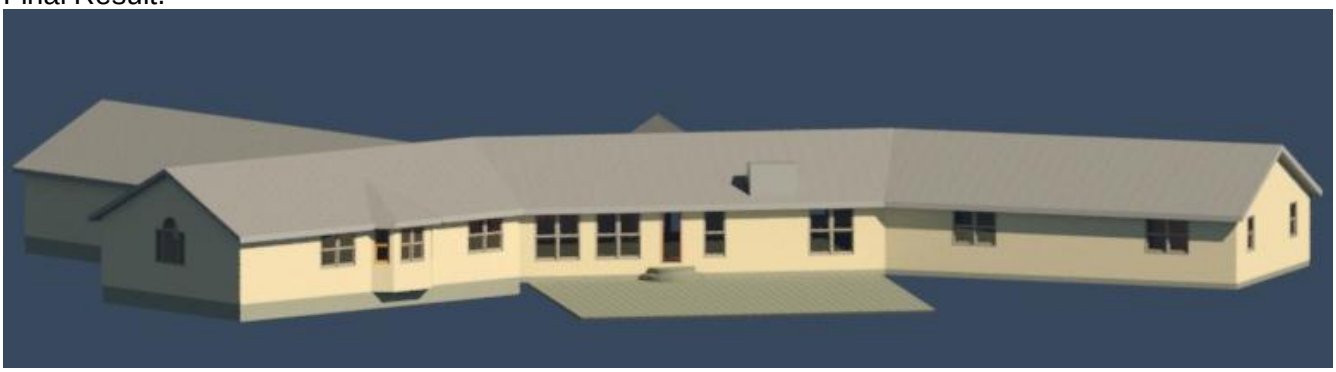


You get an email when it finishes.



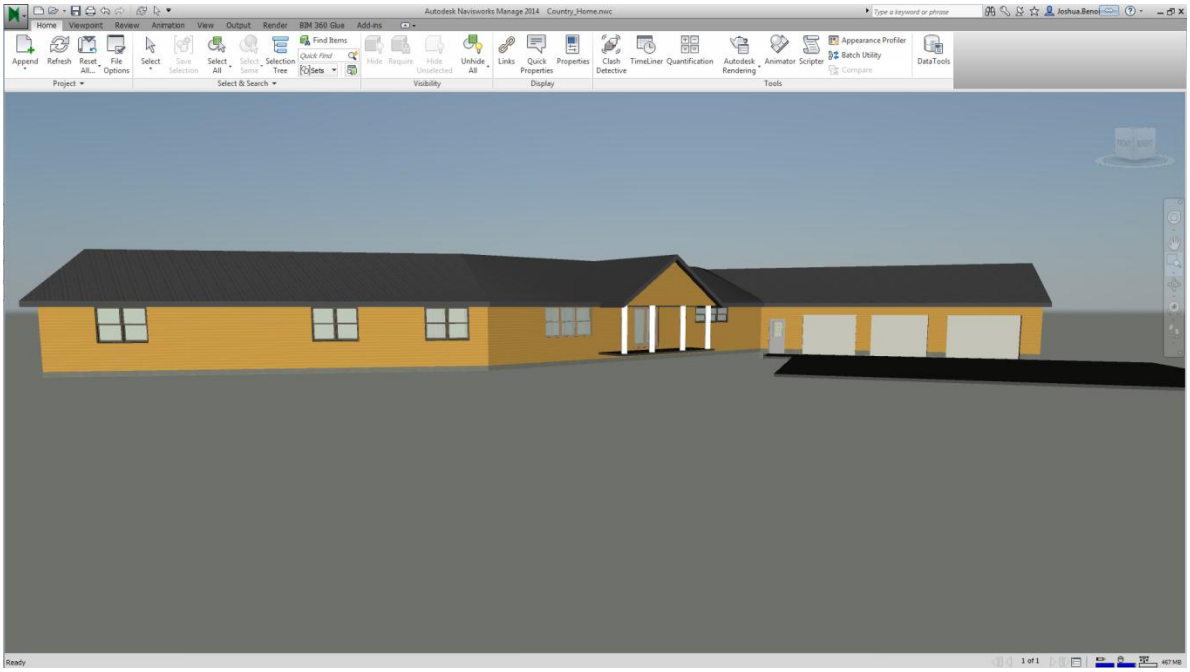


Final Result.

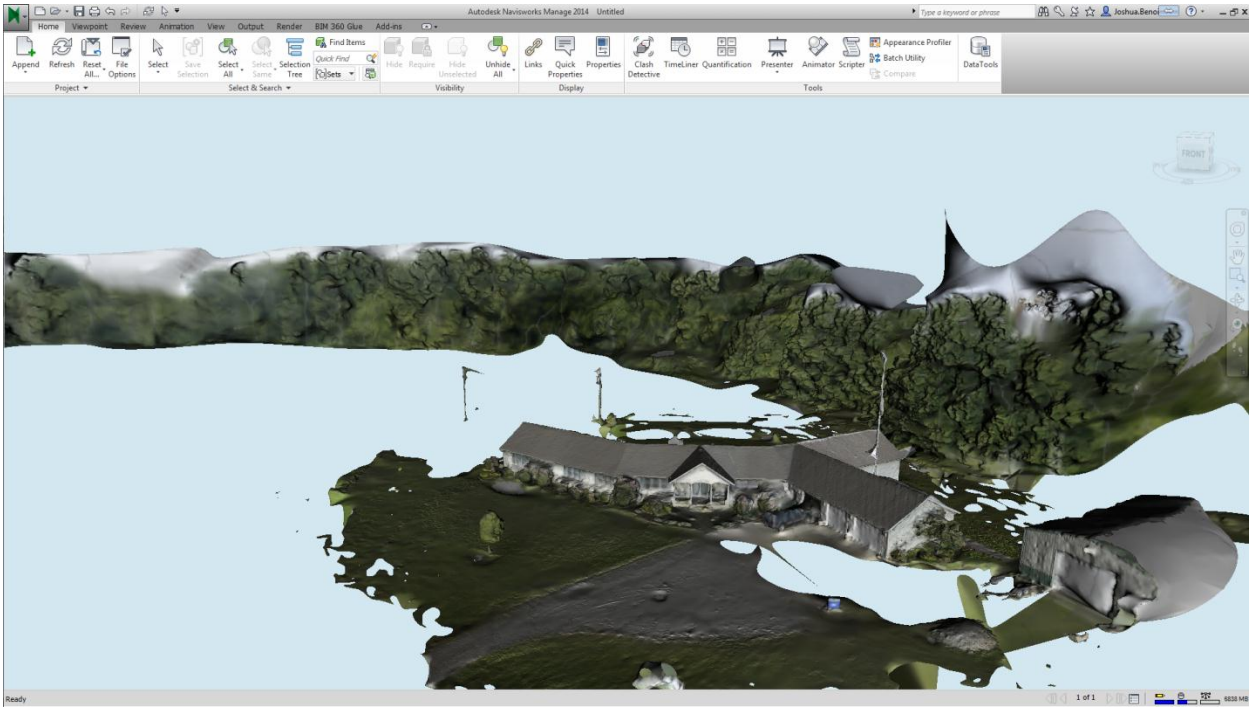


Navisworks – Desktop Based

I'm not going to spend much time on Navisworks here in this Reference Document. See my Navisworks 2014 Quick Reference Guide, found in my class "Additional Materials Handout." It deep dives into Navisworks. For our purposes here, I'll show how this Country_Home model ports from Revit and ReCAP. Navisworks will accept many file types. The FBX from ReCAP is one, and of course the finished Revit model. Let's see how it looks here.



Here's the FBX file in Navisworks.



GLUE – Mobile and Desktop

Capture Design Intent + Design Reality by adding in contractors to design team during design stages.

Can communicate with Constructware.

Immersive Walkthroughs. Gravity and gesture based. Gyroscope navigation for "Augmented Reality!"

http://help.autodesk.com/view/BIM360/ENU/

Weekly Training Webinars:

http://s5.parature.com/link/portal/15108/15138/Article/60/Autodesk-BIM-360-Weekly-Training

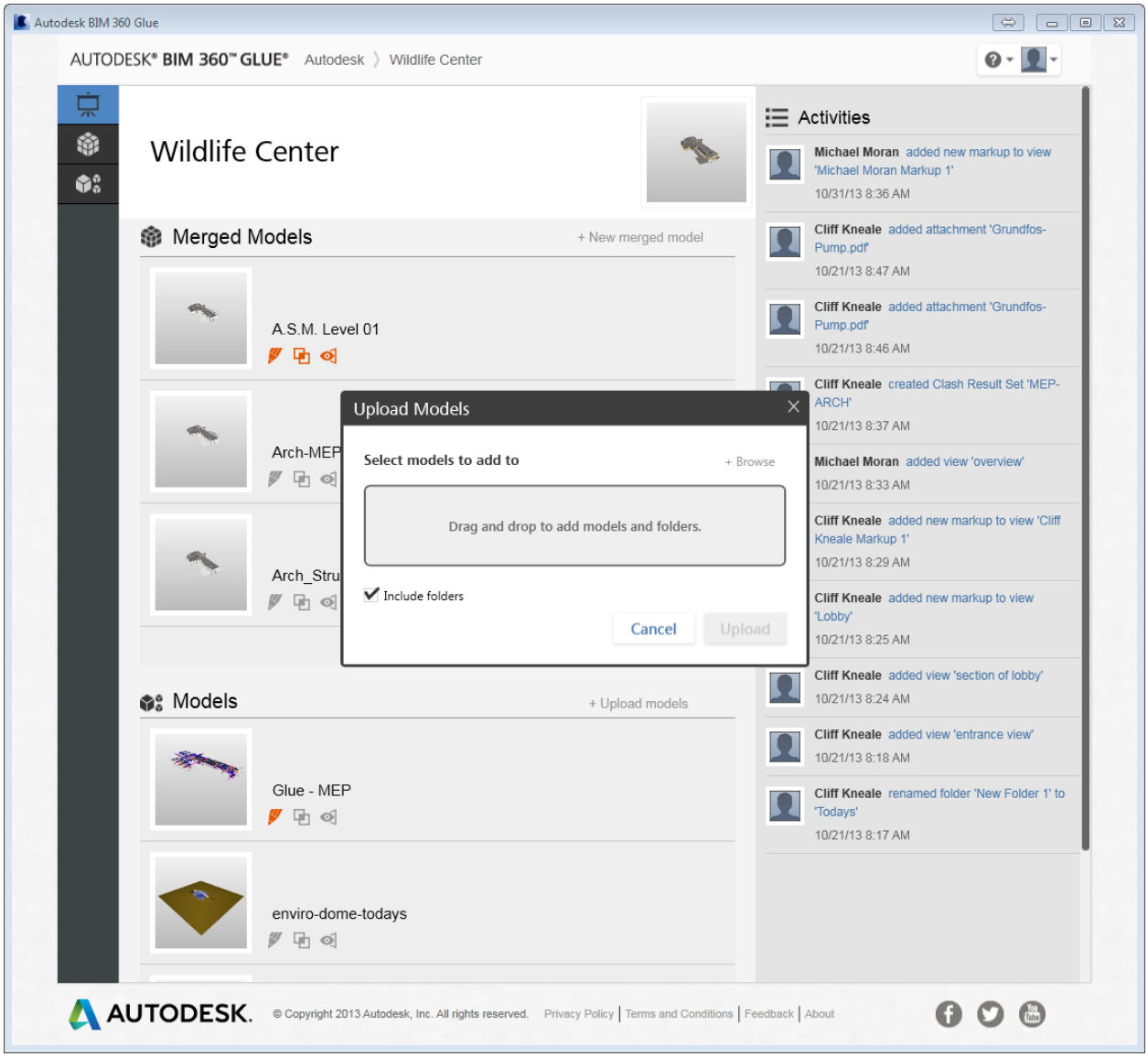
https://www.youtube.com/playlist?list=PLY-ggSrSwbZggRXiXLDQKSbBV9hw2wYSH&feature=view_all

No email distribution lists allowed in Glue. We lose accountability and the capability for end users to reply and track responses. It is a collaborative tool.

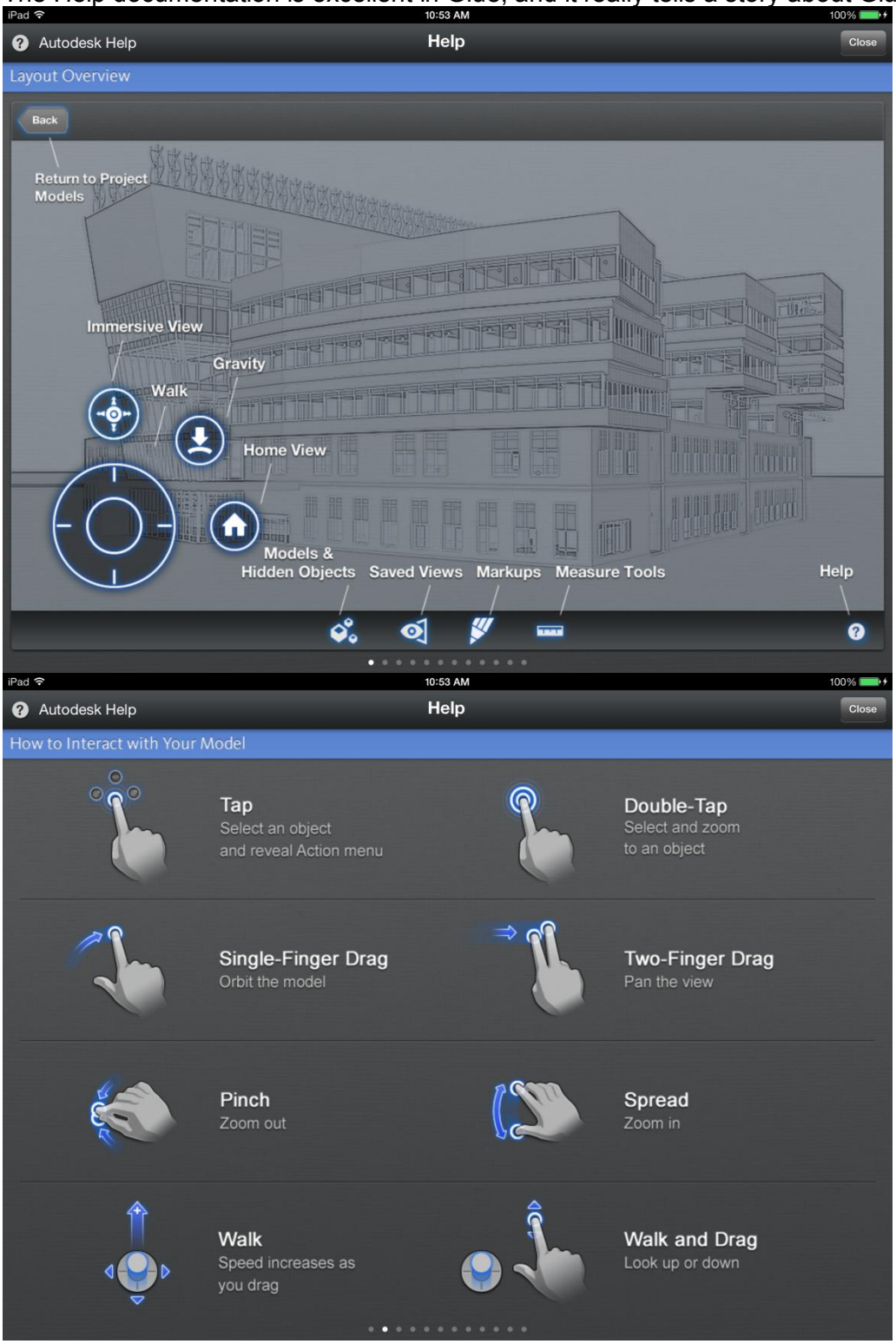
Develop Nomenclature for Views: Building 1 – Level A – Mechanical; Building 1 – Level A – Structural…so that Merged Models from different disciplines are clear and match up to each other's model.

What's one of the first things you want to do after creating a Merged Model? Create Viewpoints and Folders for: RFI's, Clashes, Views

The BIM Coordinator is not going to be the bottleneck anymore. Each discipline will upload their own changes to their own models in a collaborative team effort.



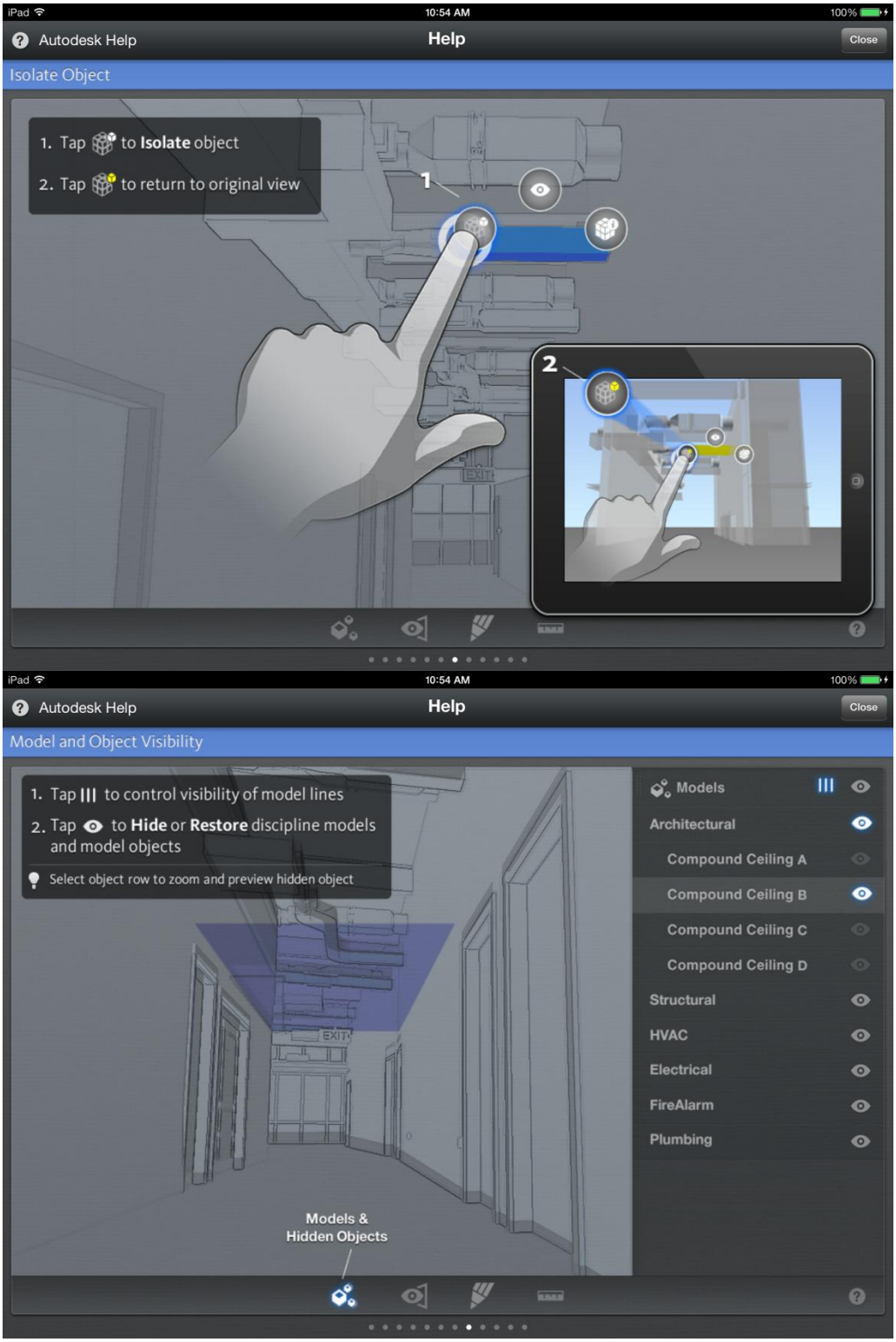
The Help documentation is excellent in Glue, and it really tells a story about Glue's capabilities.

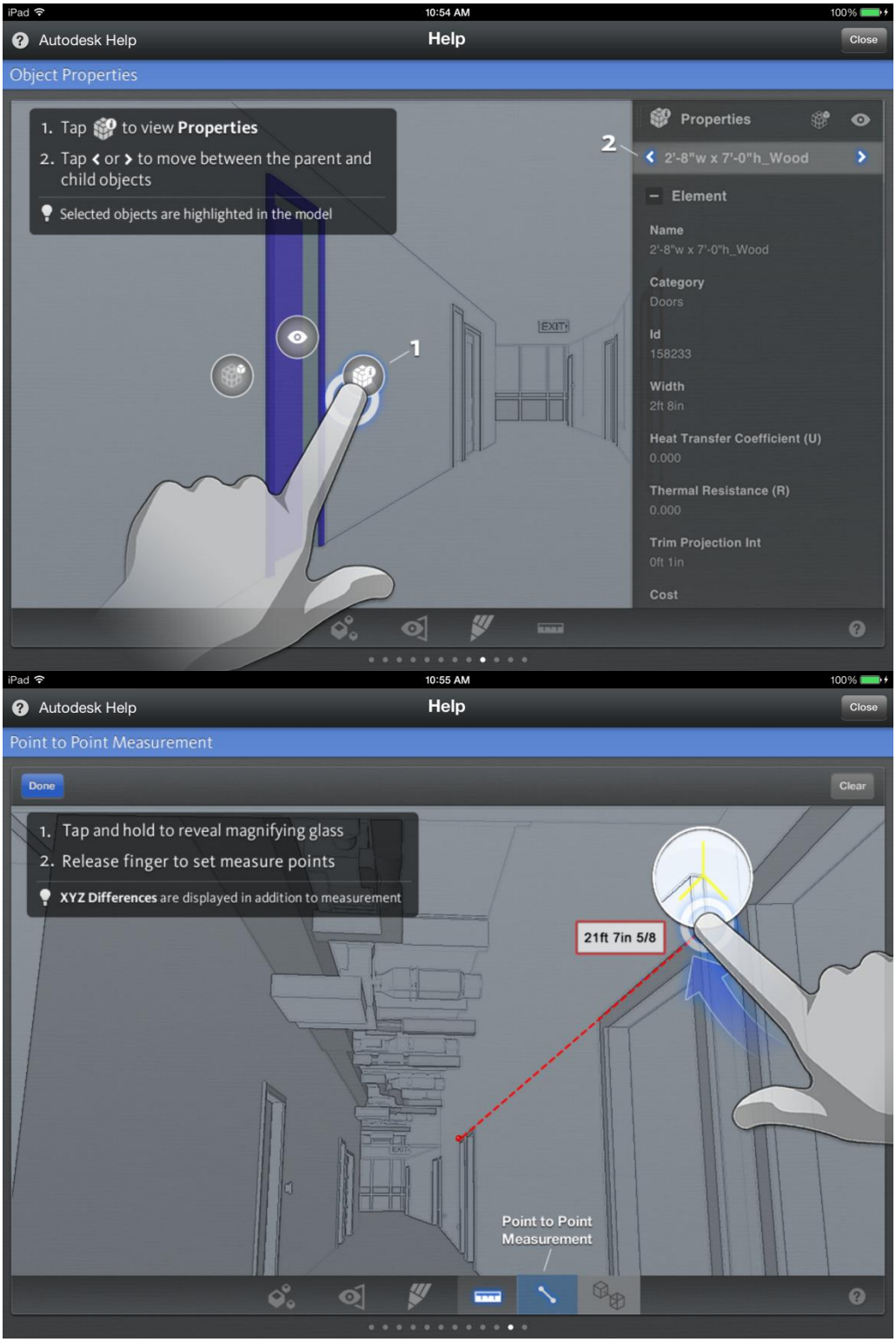



iPad
10:53 AM
100%
Autodesk Help
Help
Close
Walk and Gravity
1. Use the Walk Widget to move around
2. Optionally, tap to activate Gravity
Gravity adds realism inside your model, stopping you from walking through objects
2
1

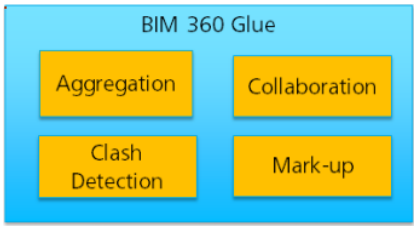

iPad
10:53 AM
100%
Autodesk Help
Help
Close
Immersive View
1. Hold the Immersive View button
2. Move the iPad to look around virtual model


iPad
10:54 AM
100%
Autodesk Help
Help
Close
Home View
Tap if you are lost
Your model zooms out to default Home View
iPad
10:54 AM
100%
Autodesk Help
Help
Close
Action Menu
Select object to use Action menu
Tap to Isolate object
Tap to Hide object
Tap to view object Properties
Hide
Isolate
Properties


iPad
10:54 AM
100%
Autodesk Help
Help
Close
Isolate Object
1. Tap to Isolate object
2. Tap to return to original view
1
2
iPad
10:54 AM
100%
Autodesk Help
Help
Close
Model and Object Visibility
1. Tap to control visibility of model lines
2. Tap to Hide or Restore discipline models and model objects
Select object row to zoom and preview hidden object
Models
Architectural
Compound Ceiling A
Compound Ceiling B
Compound Ceiling C
Compound Ceiling D
Structural
HVAC
Electrical
FireAlarm
Plumbing
Models & Hidden Objects

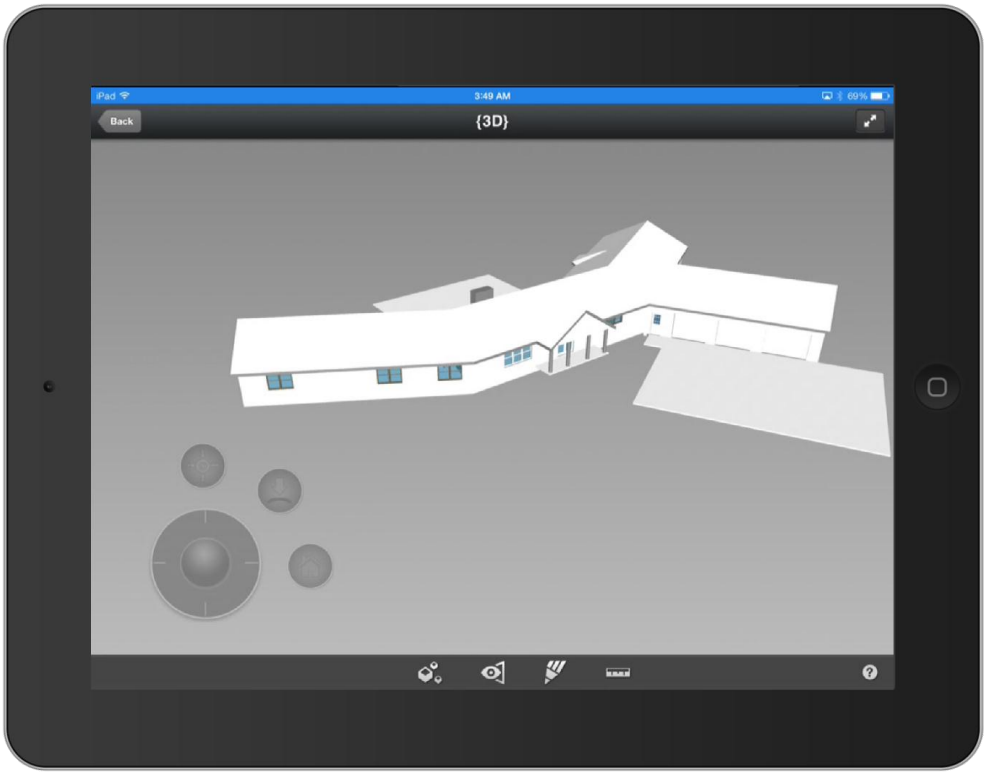

iPad
10:54 AM
100%
Autodesk Help
Help
Close
Object Properties
1. Tap to view Properties
2. Tap ‹ or › to move between the parent and child objects
Selected objects are highlighted in the model
1
2
Properties
2'-8"w x 7'-0"h_Wood
Element
Name
2'-8"w x 7'-0"h_Wood
Category
Doors
Id
158233
Width
2ft 8in
Heat Transfer Coefficient (U)
0.000
Thermal Resistance (R)
0.000
Trim Projection Int
0ft 1in
Cost
EXIT
iPad
10:55 AM
100%
Autodesk Help
Help
Close
Point to Point Measurement
Done
Clear
1. Tap and hold to reveal magnifying glass
2. Release finger to set measure points
XYZ Differences are displayed in addition to measurement
21ft 7in 5/8
Point to Point Measurement

If you think Glue is just a visualization tool, it's soo much more!



Glue is a very light-weight tool that anybody can use and learn. Contrast that to Navisworks. If I'm in need of collaboration on my project, I'm using Glue on my Tablet. As a Licensed Professional Engineer that prior to Autodesk, frequently did markups and reviews, Glue would have been a desirable option.

Let’s see what the Country_Home project looks like in Glue.

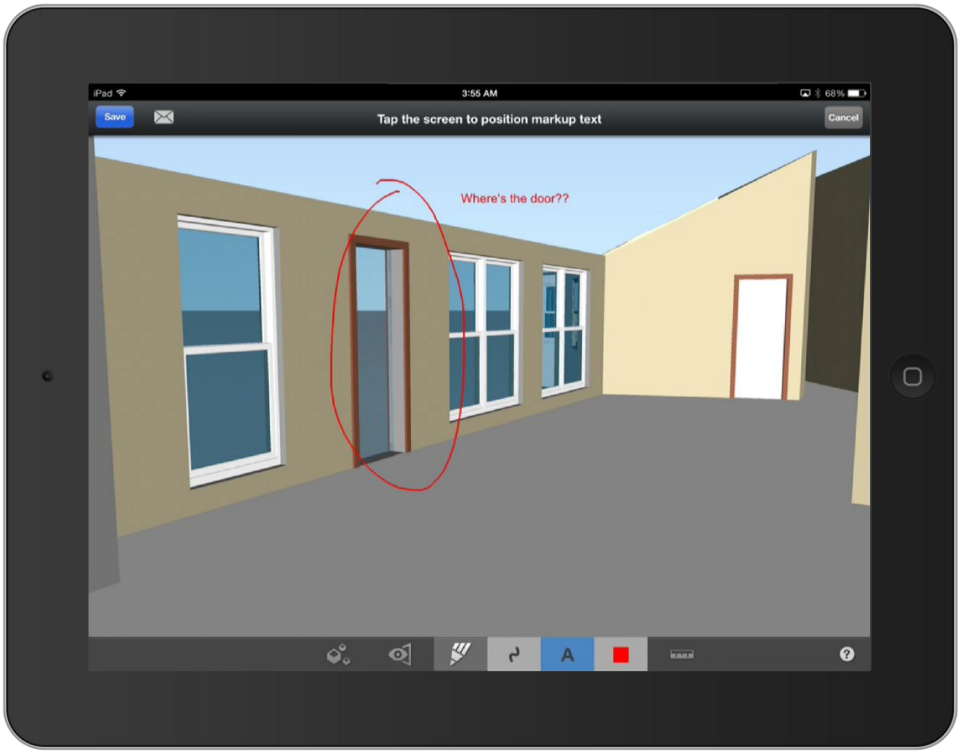


Used the Hide Object, to disappear the roof.

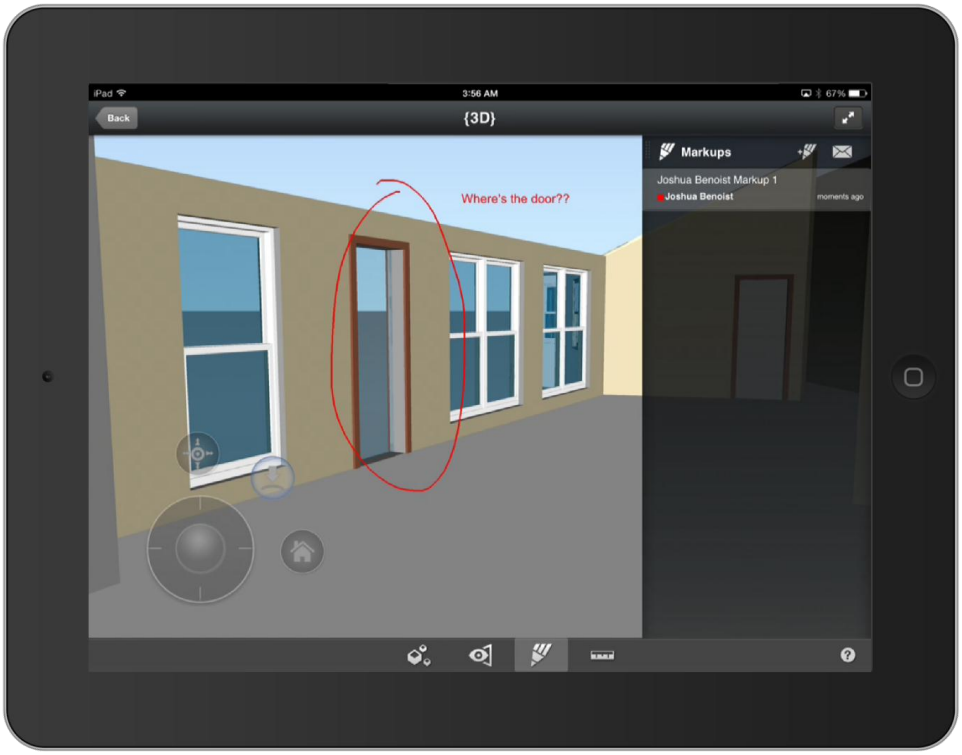
Used the Navigation tools and Gravity to do a walk-thru looking for issues.

Found an issue.

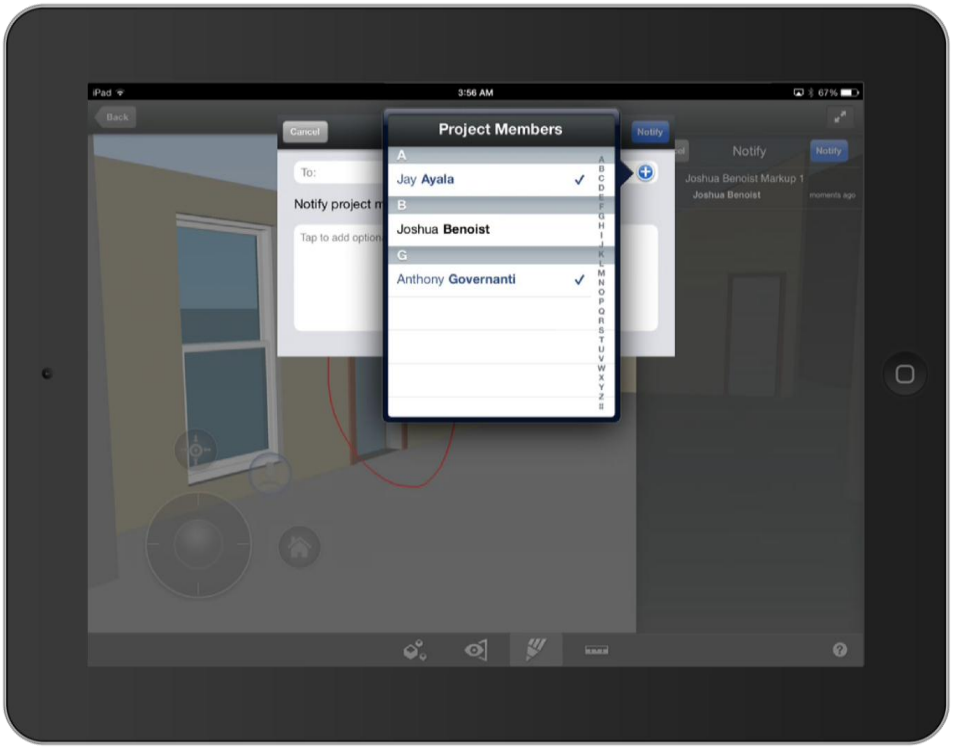
Marked up a view with redline and text.



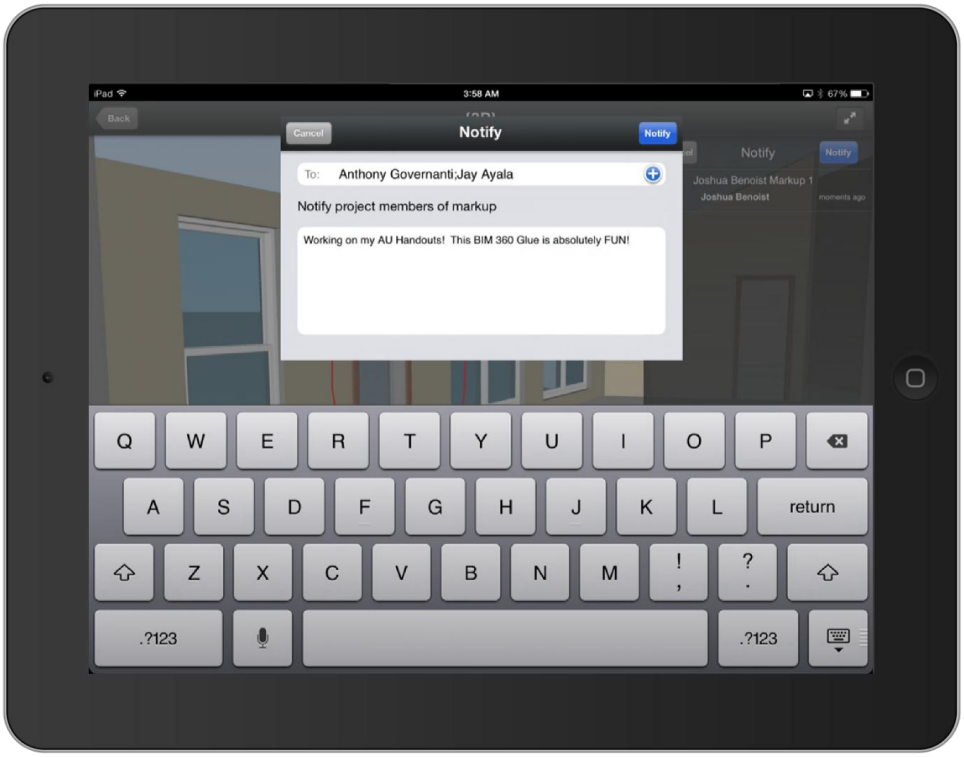
Upon “Save” it will add “Markup 1.” I next click on the Envelope to send a Notification.



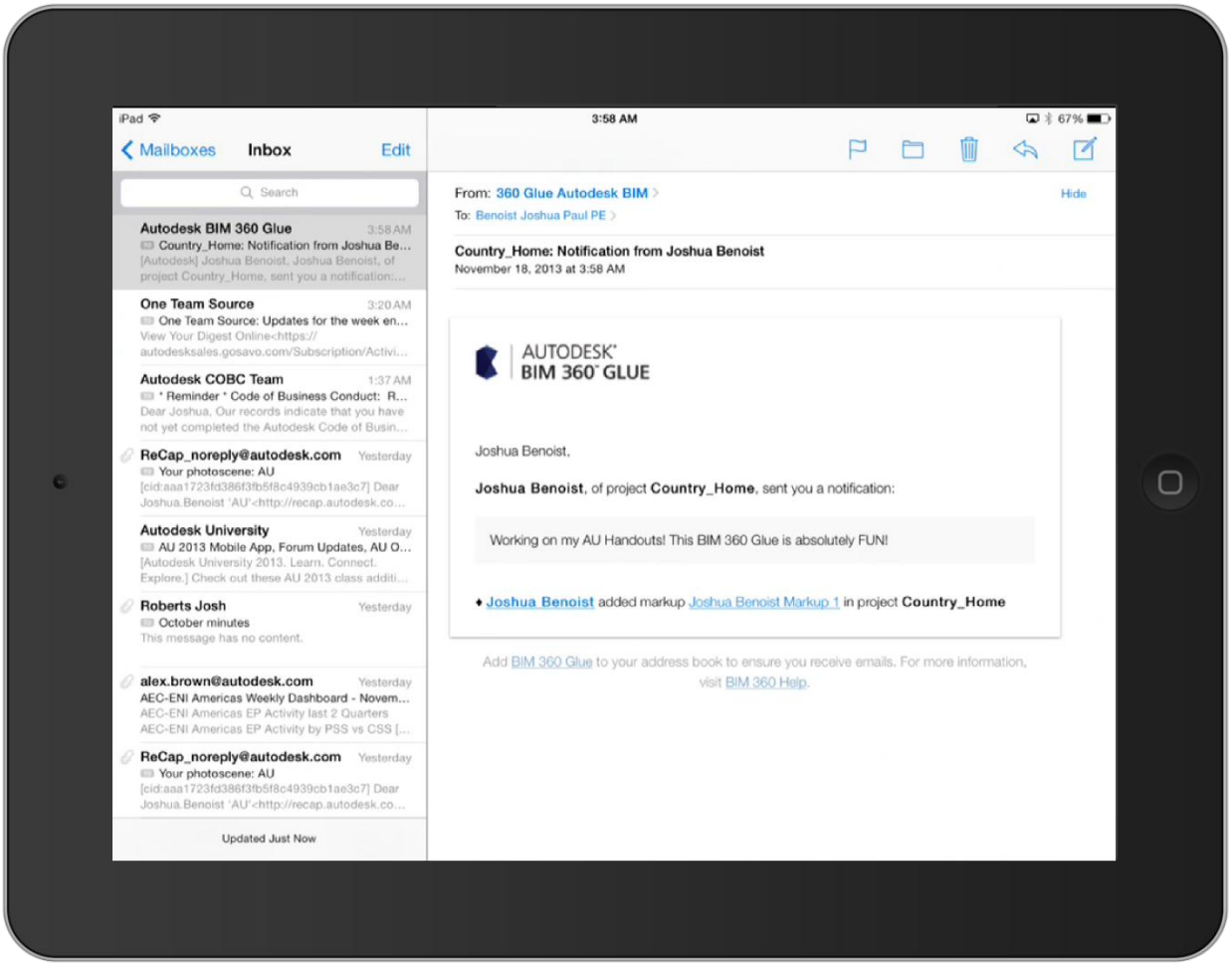
Select the project members for the Notification.



Type in a message. Click Notify button.



It sends everyone a Notification Email with link to the Markup and Issue.



Now that's collaboration!! It's Fun, and it's Productive.

Field – Mobile and Browser Based (Chrome Exclusive)
http://manage.velasystems.com

All you ever wanted to know about Field:

http://support.velasystems.com/ics/support/kbanswer.asp?deptID=15138&task=knowledge&questionID=187

Here's a new term to know: "Field BIM" – Contributing to the Living BIM Model from the construction site. As-Builts, Issues, Serial Numbers, Photos, Reference Documents, Barcodes

Field is the General Contractor's one centralized repository for all issues.

Field provides a streamlined communication across the project team.

Field enables the General Contractor to track an issue's status to resolution.

It provides standardization to a process that is typically done with a pad of paper and re-logging hand notes into a computer often after hours.

Therefore it provides a Robust Information Capture on the spot.

It is savvy about Roles: GC, Subcontractor, etc. GC creates issues, Subs cannot create issues. Subs can mark work complete and view their own issues. Project Engineer, Superintendent

General Contractor creates an Issue (Checklist, Punchlist, Quality, Safety, Commissioning) >>> Open >>> Sub-contractor completes work and updates status >>> Work Completed >>> GC Re-inspection >>> Pass-Fail-Address

Checklist Inspection >>> Non-conformance Issue ID'd >>> Open >>> Sub Completes work & Updates status >>> Work Completed >>> GC Re-Inspects >>> Pass-Fail-Addresses

Who Does Work, What Work, Due By When, Where Issue Located, Why Comments, Process Kicked Off To Completion

Root Cause Analysis > Secondary Damage, Why, Safety, Circumstances, Pictures

Safety Inspections – Make everyone safety observers. Track positive & negative outcomes with root causes. Analyze and manage trends in safety information. Infractions > 3-strike rules. Safer projects

Who Logs Issues can be flexible, but typically the GC. Can be modified to allow Owner, Architect, Design Team Members, Subs.

Can create custom attributes for issues.

Has Masterformat and Uniformat Spec Attributes.

FIELD IS NOT AN RFI SYSTEM

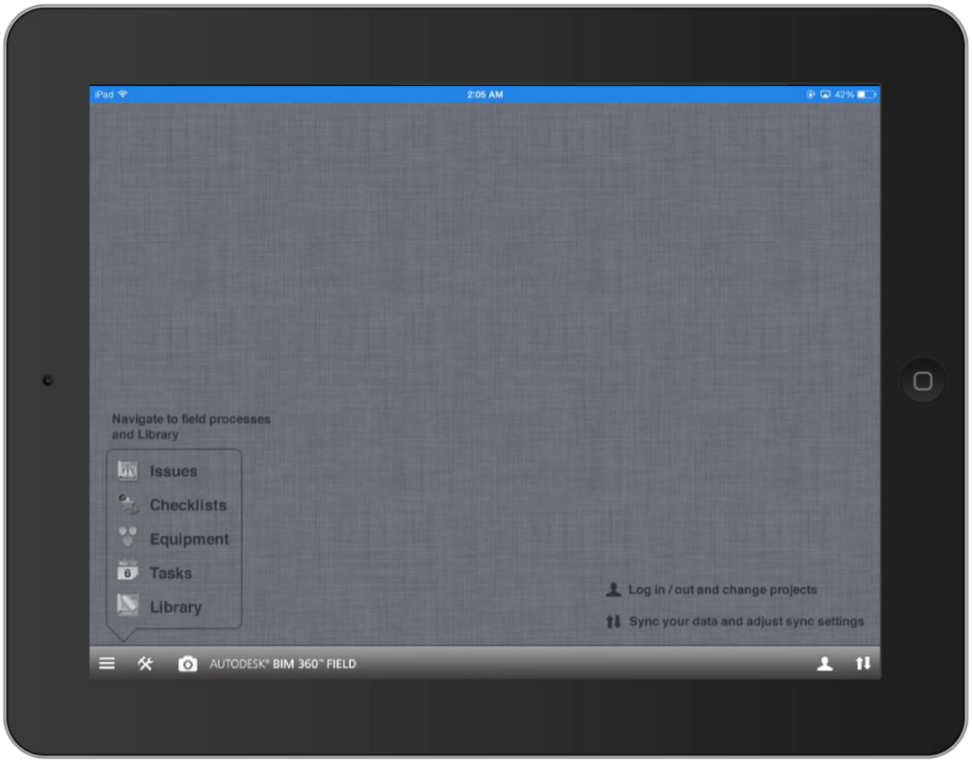
Before Import: Pre-define folder structure. Similar to Revit Views: Elevations, Floor Plans, RCP's, 3D Models, Sheets, Specifications, Documents. You will see this folder hierarchy in the photos.

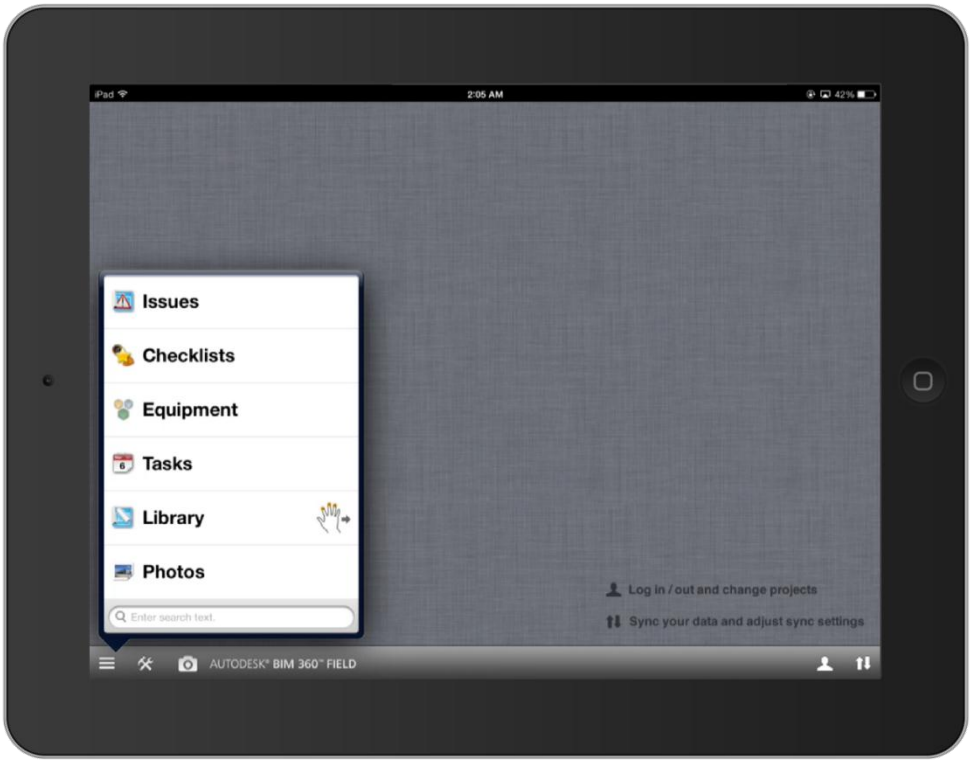
TIP: In order to have a folder, a minimum of 1 document must exist at the lowest level in the folder tree. A parent folder that contains a sub-folder that contains a sub-folder, must have a file in the lowest sub-folder. If no file exists in the deepest sub-folder, that folder and any empty parents, will be cleaned off the system. The file must also have more than 0 kb.

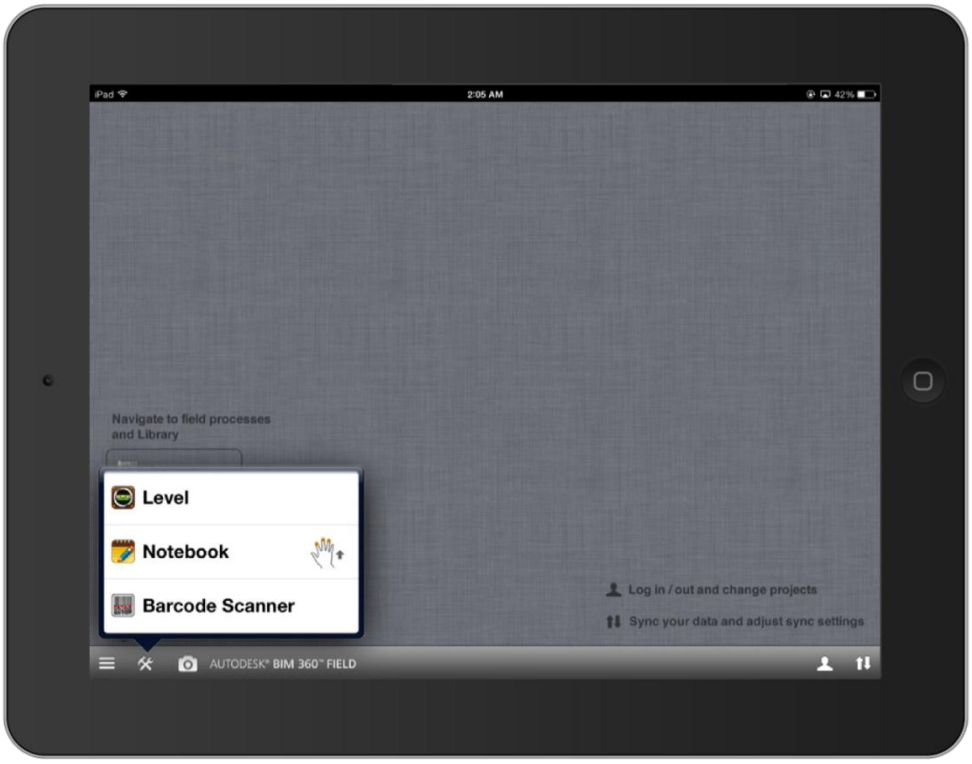
In "Locations" construction phasing may not have rooms yet. Can structure "Locations" such that you have different methods…by columns, by rooms, by levels.

Locations: Use the "Sample.csv" file as the template for further Imports.

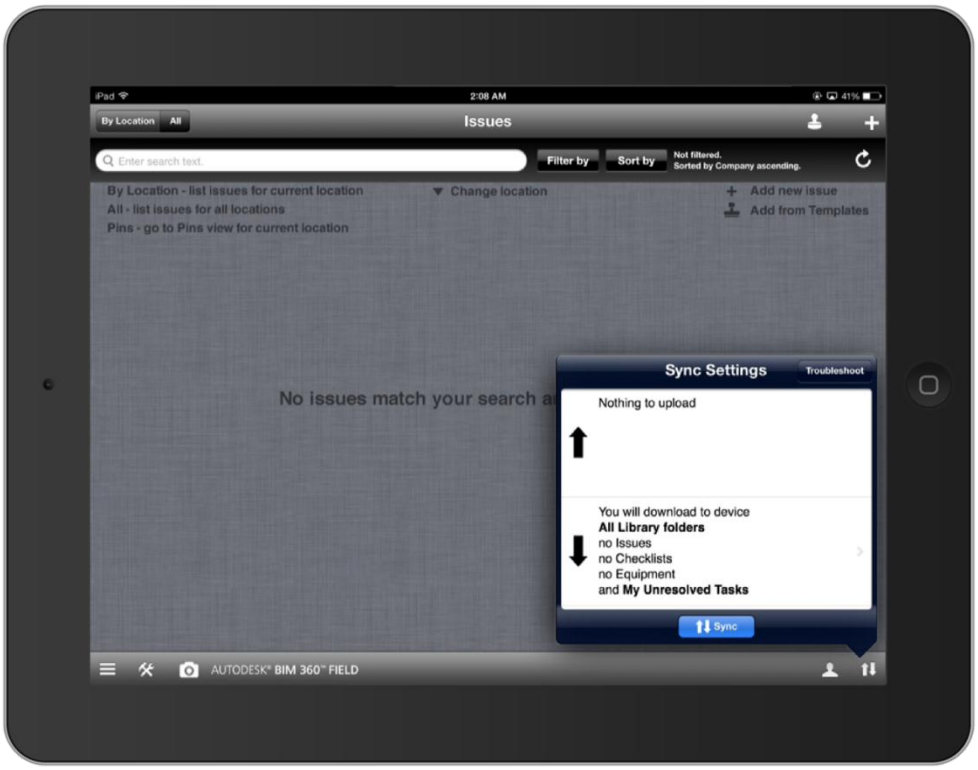
Let's take a tour thru Field. Most of these images are self-explanatory. This is the start page after logging on.

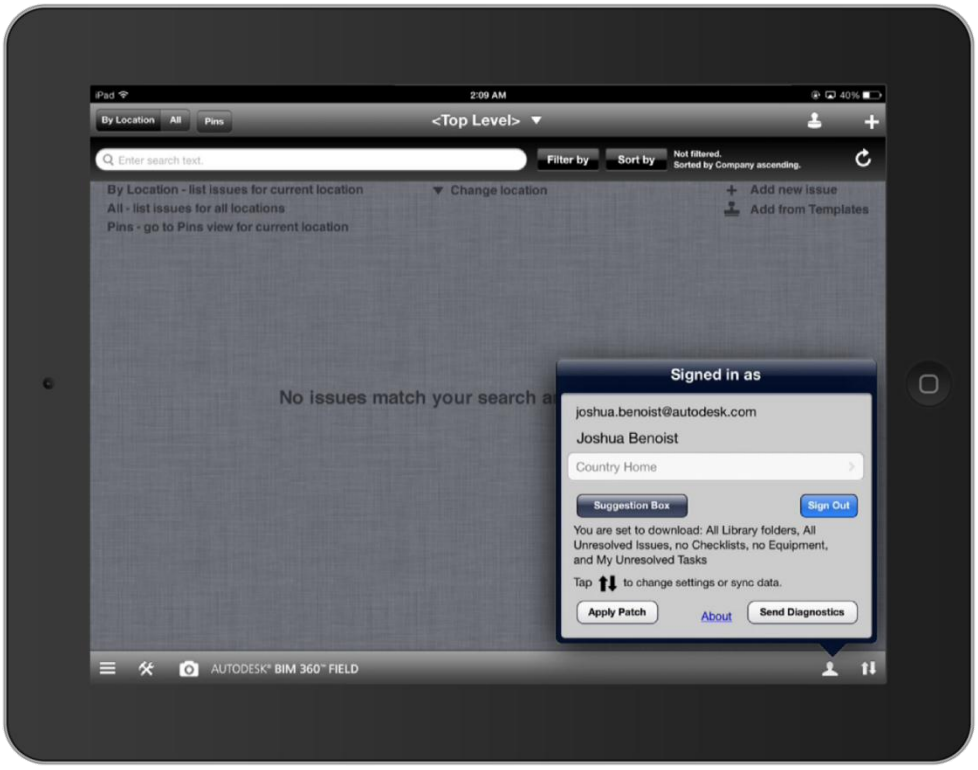


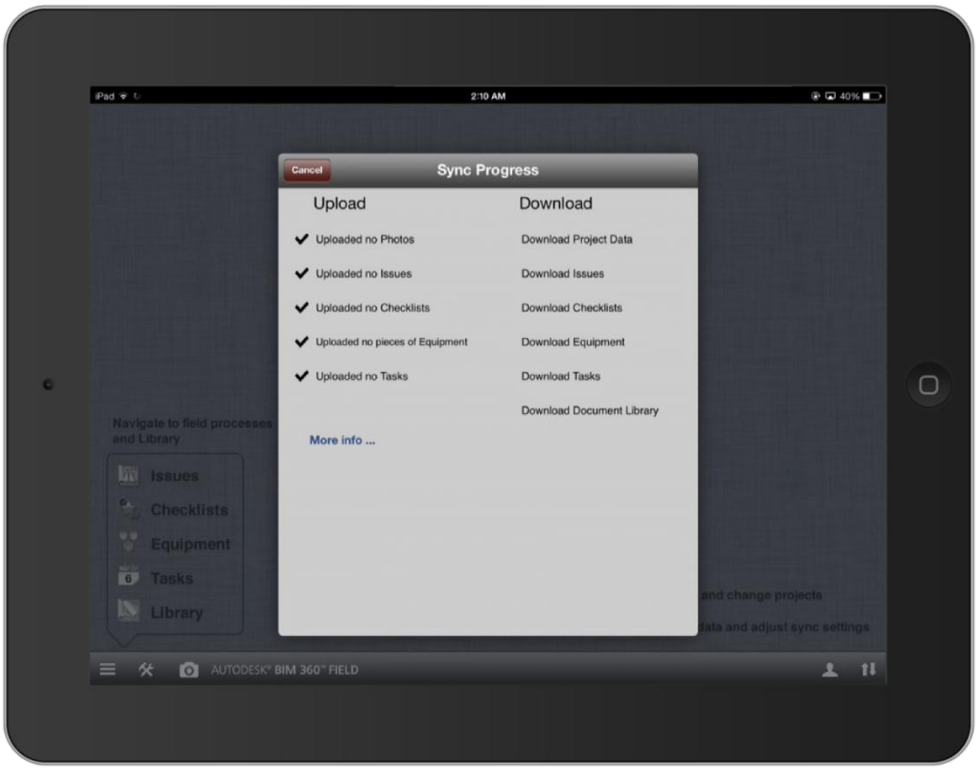

iPad
2:05 AM
42%
Issues
Checklists
Equipment
Tasks
Library
Photos
Enter search text.
Log in / out and change projects
Sync your data and adjust sync settings
AUTODESK® BIM 360™ FIELD

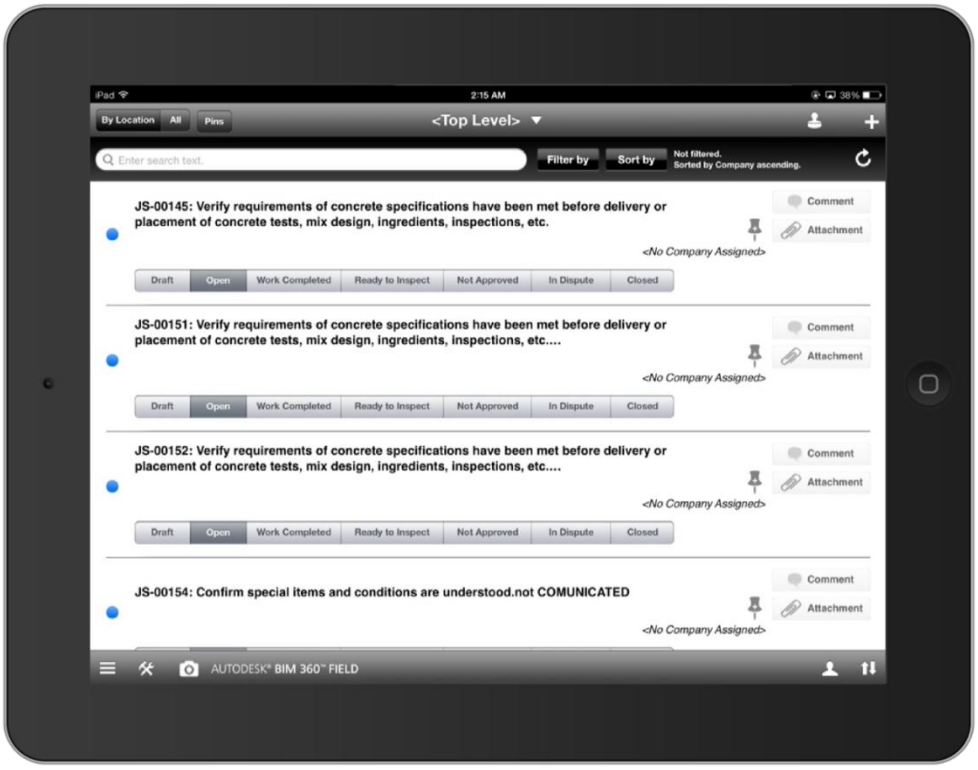

iPad
2:05 AM
42%
Navigate to field processes and Library
Level
Notebook
Barcode Scanner
Log in / out and change projects
Sync your data and adjust sync settings
AUTODESK® BIM 360™ FIELD

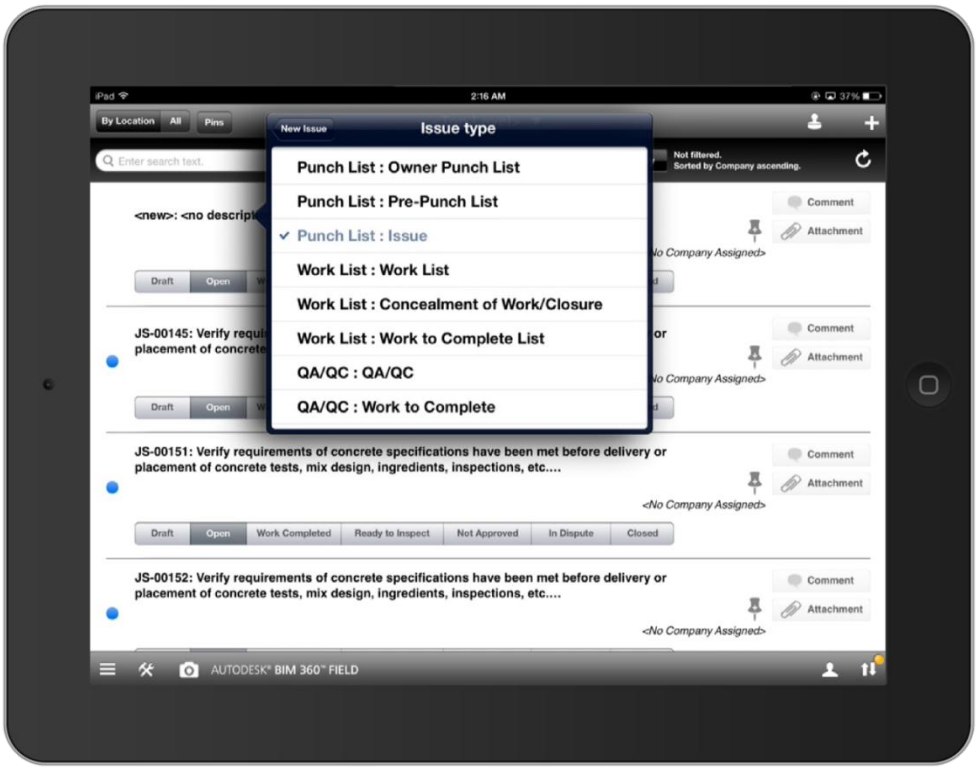
Click the camera button and it takes you to this screen.

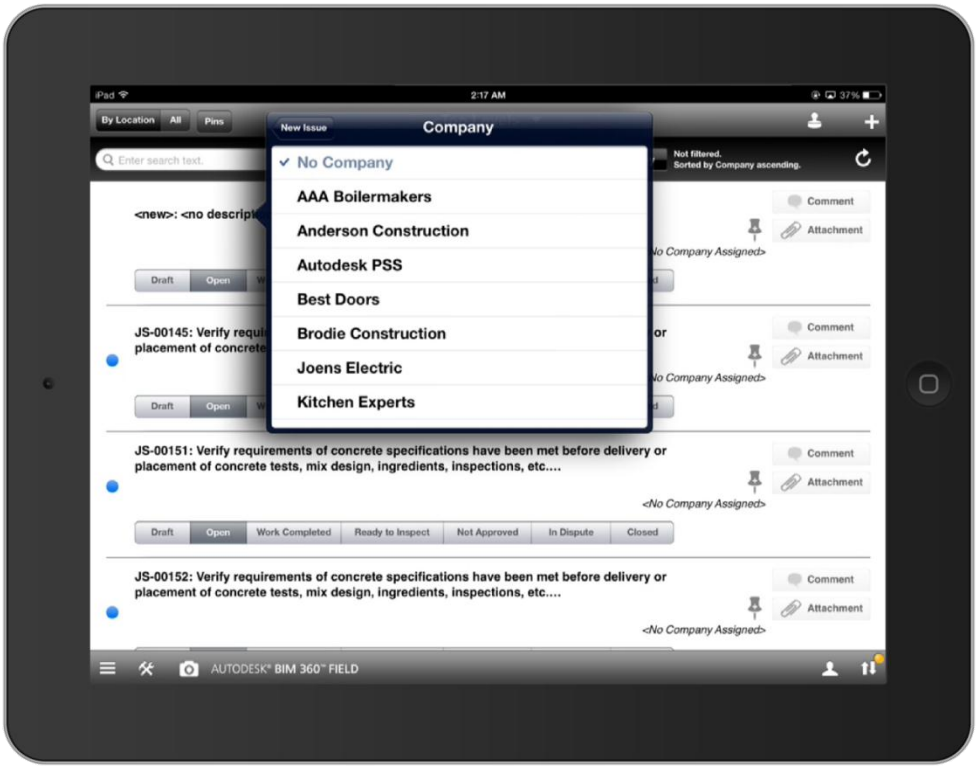


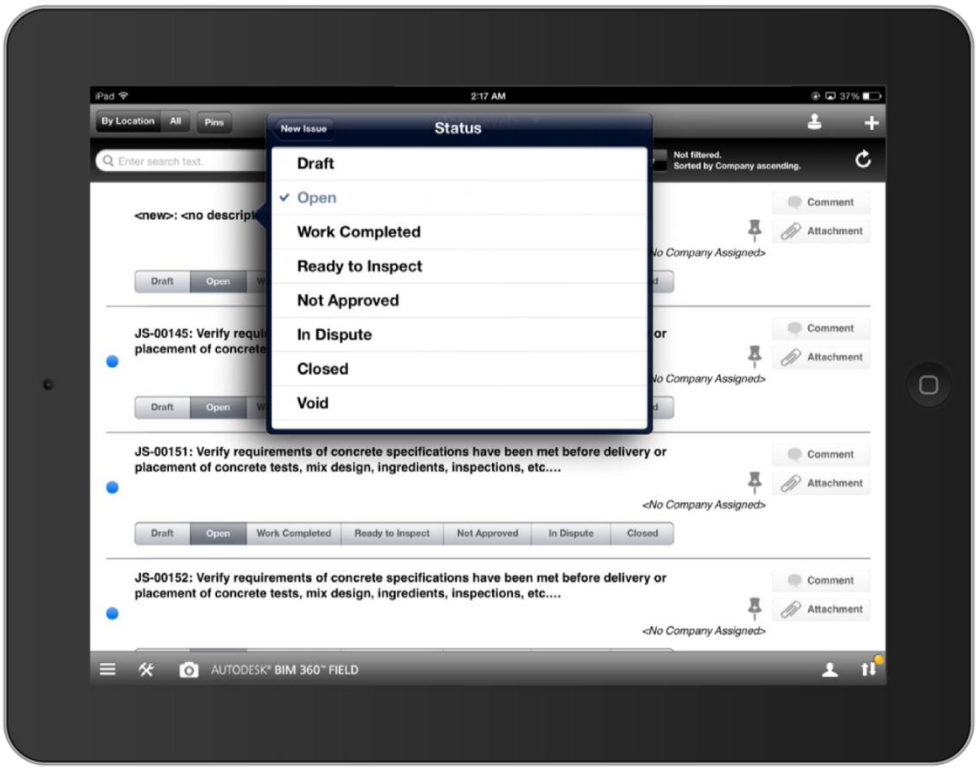

iPad
2:09 AM
40%
By Location
All
Pins
<Top Level>
Enter search text.
Filter by
Sort by
Not filtered.
Sorted by Company ascending.
By Location - list issues for current location
All - list issues for all locations
Pins - go to Pins view for current location
Change location
Add new issue
Add from Templates
No issues match your search a
Signed in as
joshua.benoist@autodesk.com
Joshua Benoist
Country Home
Suggestion Box
Sign Out
You are set to download: All Library folders, All Unresolved Issues, no Checklists, no Equipment, and My Unresolved Tasks
Tap to change settings or sync data.
Apply Patch
About
Send Diagnostics
AUTODESK® BIM 360™ FIELD

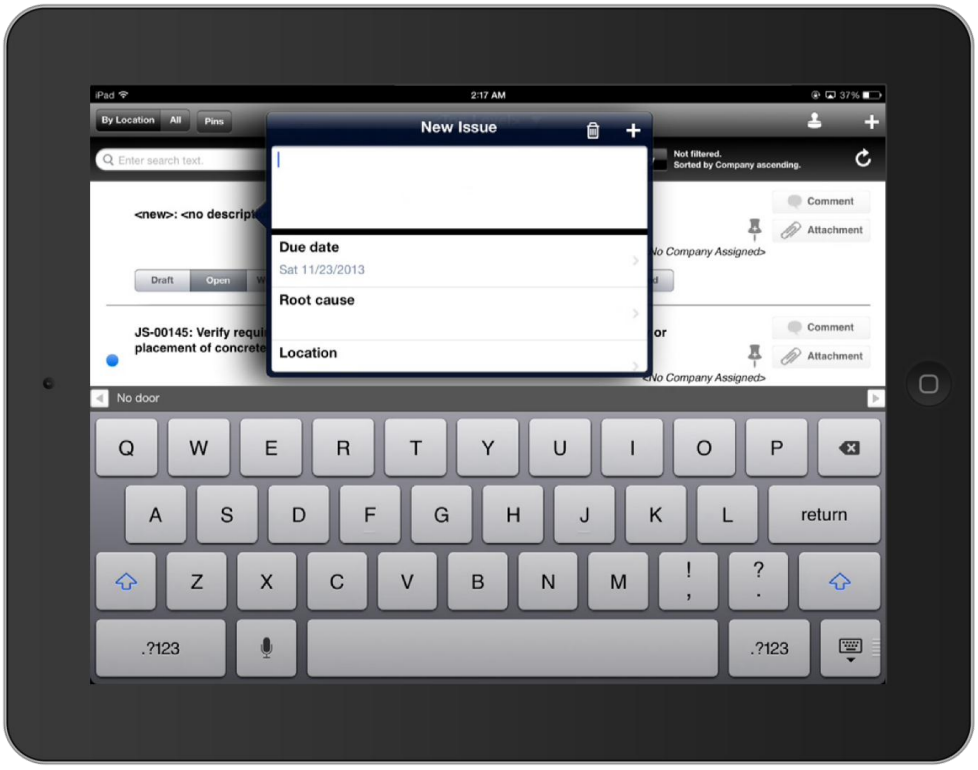

iPad
2:10 AM
40%
Cancel
Sync Progress
Upload
Download
Uploaded no Photos
Uploaded no Issues
Uploaded no Checklists
Uploaded no pieces of Equipment
Uploaded no Tasks
Download Project Data
Download Issues
Download Checklists
Download Equipment
Download Tasks
Download Document Library
More info ...
Navigate to field processes and Library
Issues
Checklists
Equipment
Tasks
Library
and change projects
data and adjust sync settings
AUTODESK® BIM 360™ FIELD

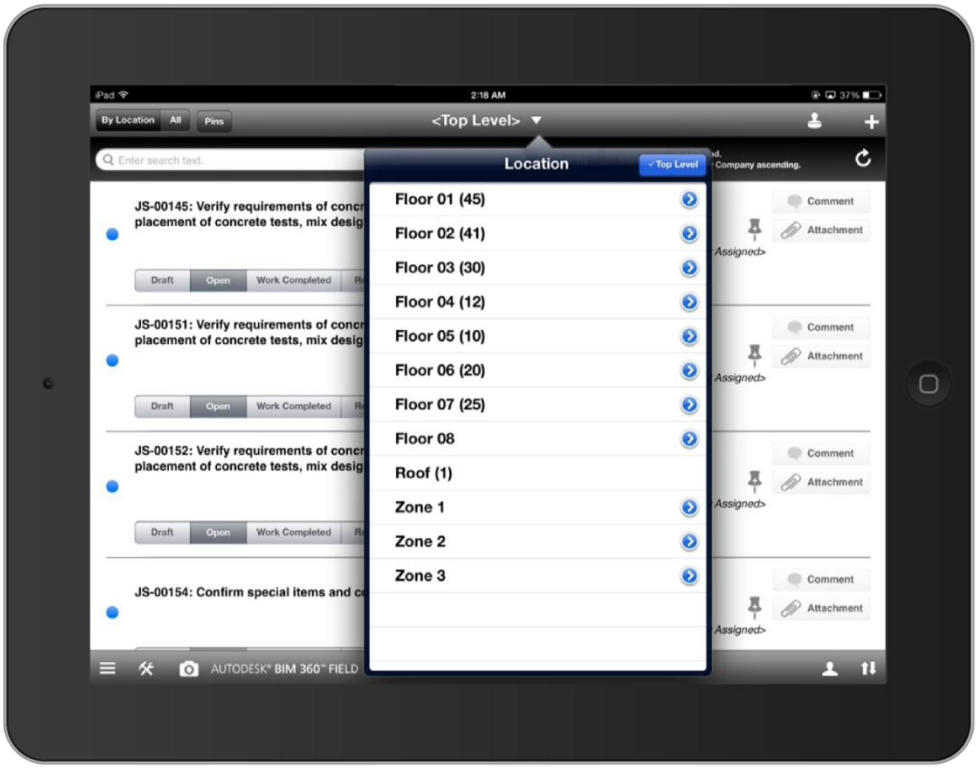

iPad
2:15 AM
38%
By Location
All
Pins
<Top Level>
Enter search text.
Filter by
Sort by
Not filtered.
Sorted by Company ascending.
JS-00145: Verify requirements of concrete specifications have been met before delivery or placement of concrete tests, mix design, ingredients, inspections, etc.
Comment
Attachment
<No Company Assigned>
Draft
Open
Work Completed
Ready to Inspect
Not Approved
In Dispute
Closed
JS-00151: Verify requirements of concrete specifications have been met before delivery or placement of concrete tests, mix design, ingredients, inspections, etc....
JS-00152: Verify requirements of concrete specifications have been met before delivery or placement of concrete tests, mix design, ingredients, inspections, etc....
JS-00154: Confirm special items and conditions are understood.not COMUNICATED
AUTODESK® BIM 360™ FIELD

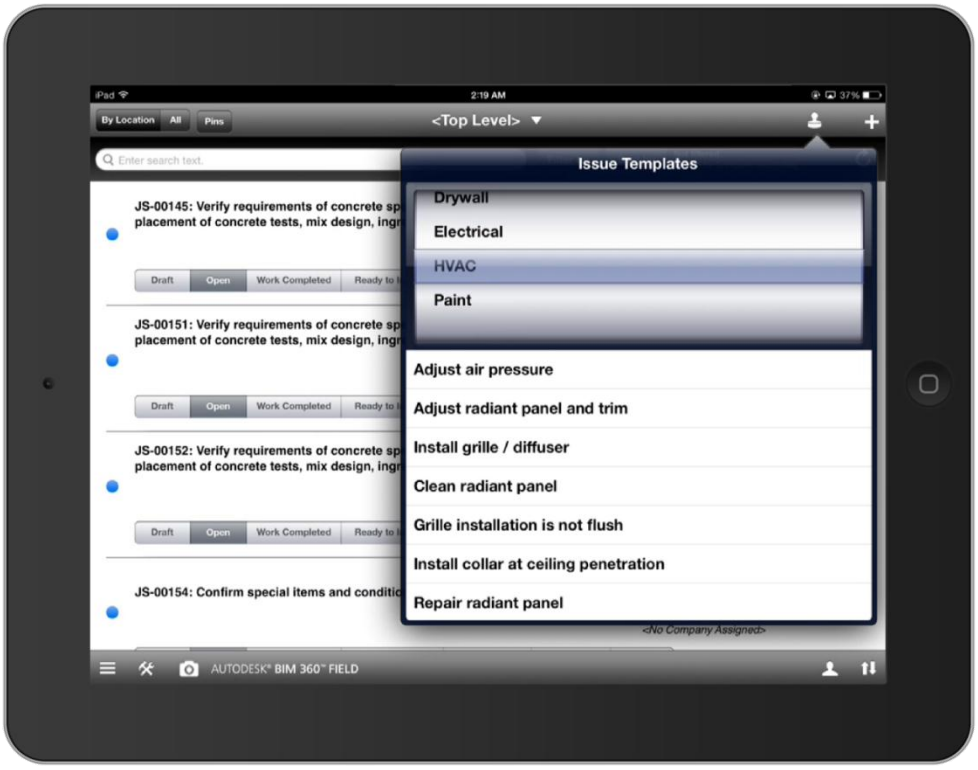

iPad
2:16 AM
37%
By Location
All
Pins
New Issue
Issue type
Punch List : Owner Punch List
Punch List : Pre-Punch List
Punch List : Issue
Work List : Work List
Work List : Concealment of Work/Closure
Work List : Work to Complete List
QA/QC : QA/QC
QA/QC : Work to Complete
Not filtered.
Sorted by Company ascending.
Comment
Attachment
Draft
Open
Work Completed
Ready to Inspect
Not Approved
In Dispute
Closed
JS-00151: Verify requirements of concrete specifications have been met before delivery or placement of concrete tests, mix design, ingredients, inspections, etc....
JS-00152: Verify requirements of concrete specifications have been met before delivery or placement of concrete tests, mix design, ingredients, inspections, etc....
<No Company Assigned>
AUTODESK® BIM 360™ FIELD

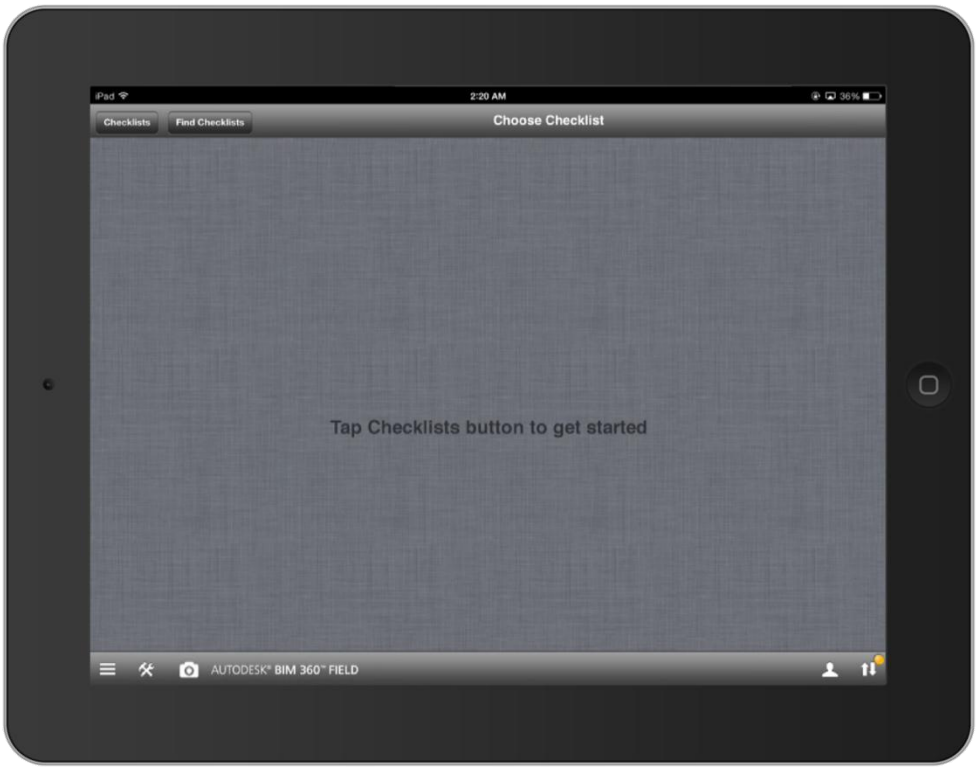

iPad
2:17 AM
37%
By Location
All
Pins
New Issue
Company
No Company
AAA Boilermakers
Anderson Construction
Autodesk PSS
Best Doors
Brodie Construction
Joens Electric
Kitchen Experts
Enter search text.
Not filtered.
Sorted by Company ascending.
Comment
Attachment
<No Company Assigned>
Draft
Open
Work Completed
Ready to Inspect
Not Approved
In Dispute
Closed
JS-00145: Verify requi
placement of concrete
JS-00151: Verify requirements of concrete specifications have been met before delivery or placement of concrete tests, mix design, ingredients, inspections, etc....
JS-00152: Verify requirements of concrete specifications have been met before delivery or placement of concrete tests, mix design, ingredients, inspections, etc....
AUTODESK® BIM 360™ FIELD

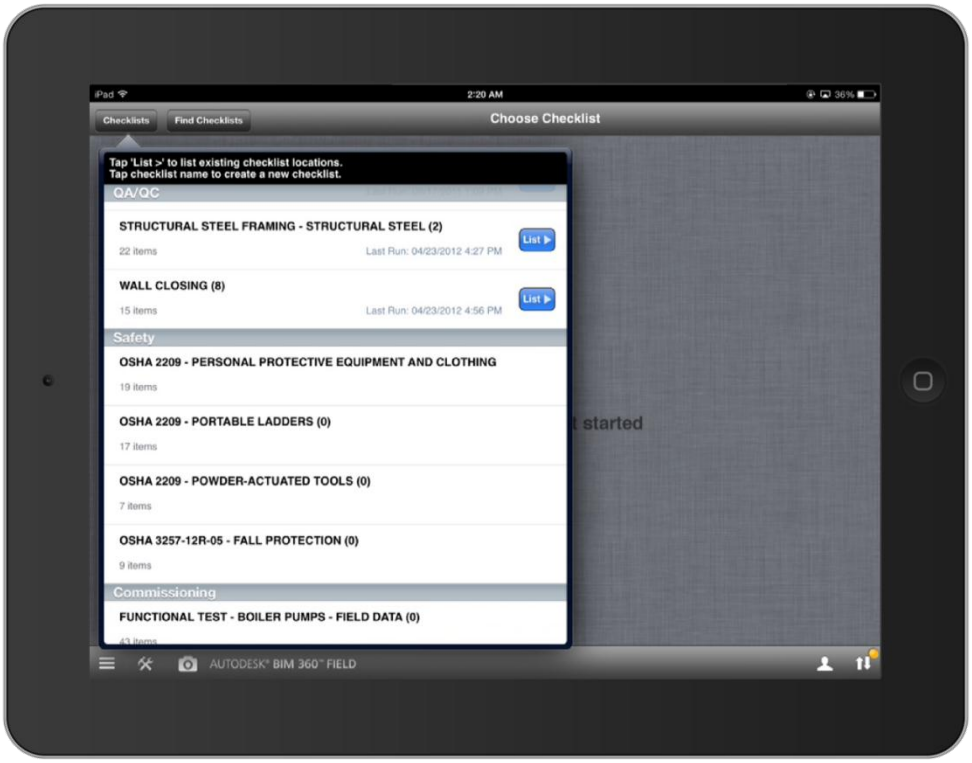

iPad
2:17 AM
37%
By Location
All
Pins
New Issue
Status
Draft
Open
Work Completed
Ready to Inspect
Not Approved
In Dispute
Closed
Void
Enter search text.
Not filtered.
Sorted by Company ascending.
Comment
Attachment
<No Company Assigned>
Draft
Open
Work Completed
Ready to Inspect
Not Approved
In Dispute
Closed
JS-00145: Verify requi
placement of concrete
JS-00151: Verify requirements of concrete specifications have been met before delivery or placement of concrete tests, mix design, ingredients, inspections, etc....
JS-00152: Verify requirements of concrete specifications have been met before delivery or placement of concrete tests, mix design, ingredients, inspections, etc....
AUTODESK® BIM 360™ FIELD

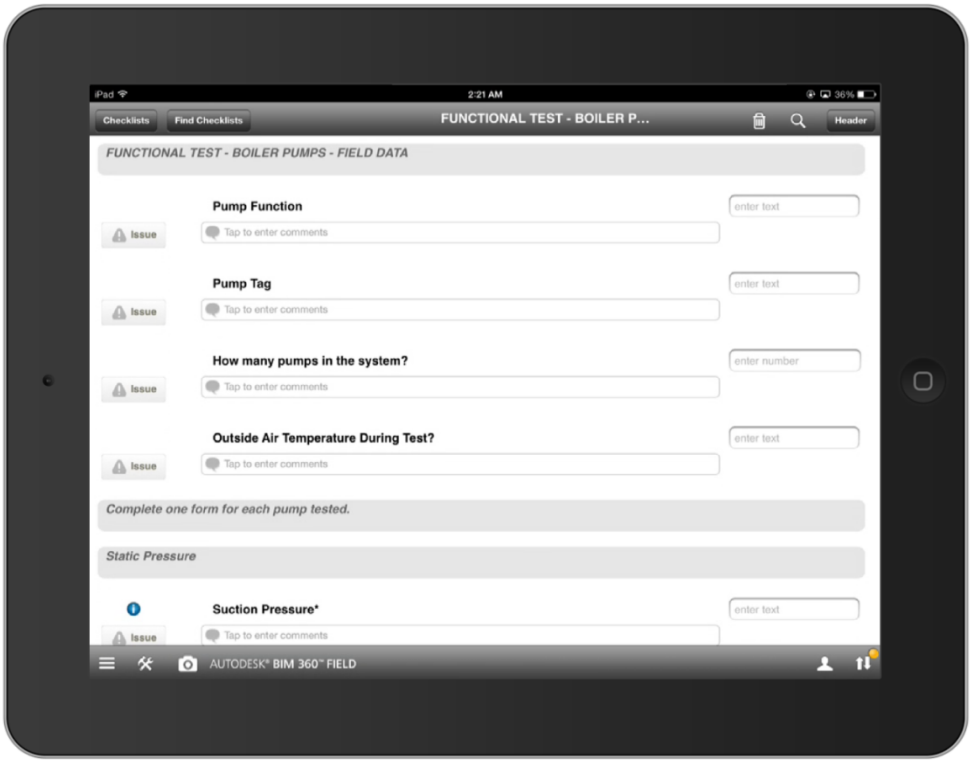

New Issue
Due date
Sat 11/23/2013
Root cause
Location
No door

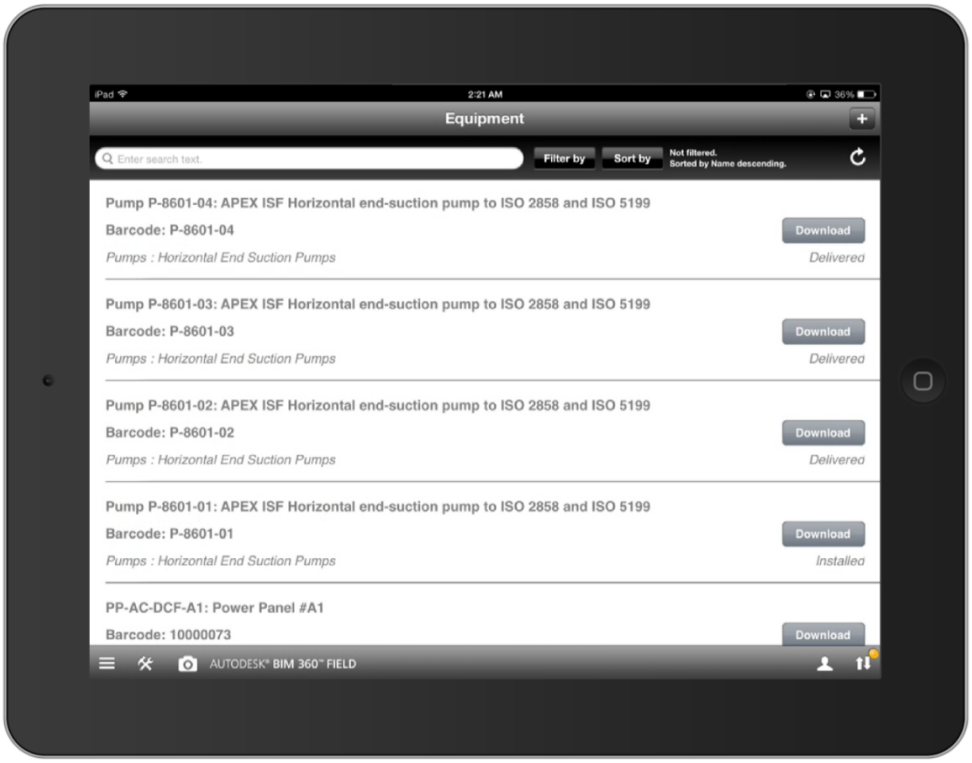

<Top Level>
Location
Top Level
Floor 01 (45)
Floor 02 (41)
Floor 03 (30)
Floor 04 (12)
Floor 05 (10)
Floor 06 (20)
Floor 07 (25)
Floor 08
Roof (1)
Zone 1
Zone 2
Zone 3

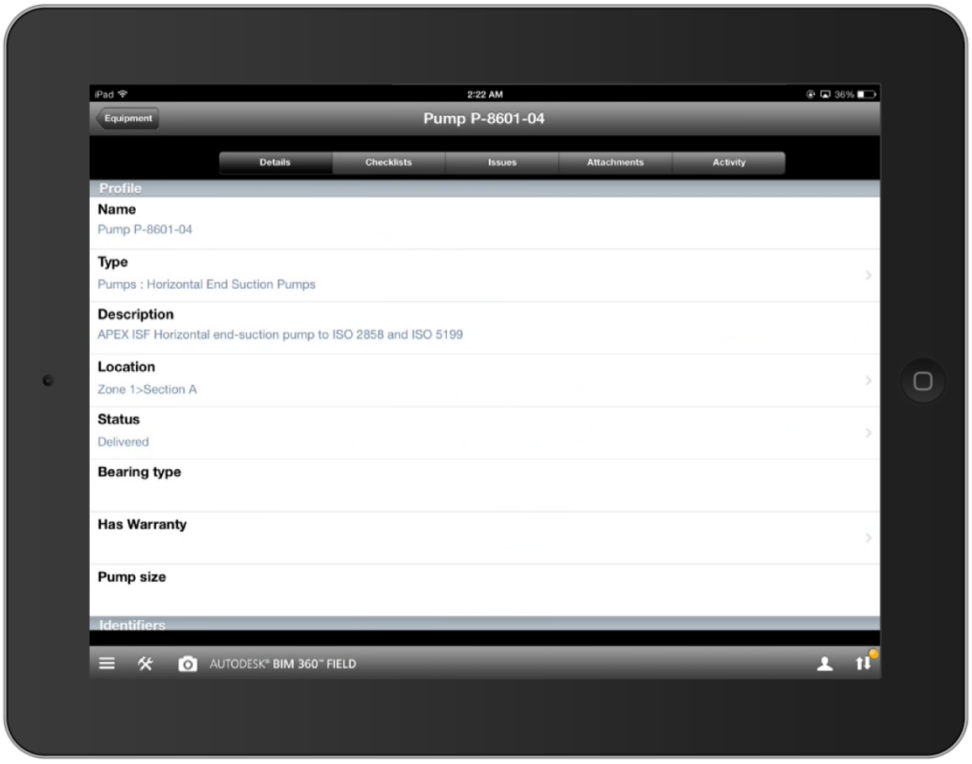

iPad
2:19 AM
37%
By Location
All
Pins
<Top Level>
Enter search text.
Issue Templates
Drywall
Electrical
HVAC
Paint
JS-00145: Verify requirements of concrete sp
placement of concrete tests, mix design, ingr
Draft
Open
Work Completed
JS-00151: Verify requirements of concrete sp
placement of concrete tests, mix design, ingr
JS-00152: Verify requirements of concrete sp
placement of concrete tests, mix design, ingr
JS-00154: Confirm special items and conditio
Adjust air pressure
Adjust radiant panel and trim
Install grille / diffuser
Clean radiant panel
Grille installation is not flush
Install collar at ceiling penetration
Repair radiant panel
<No Company Assigned>
AUTODESK® BIM 360™ FIELD

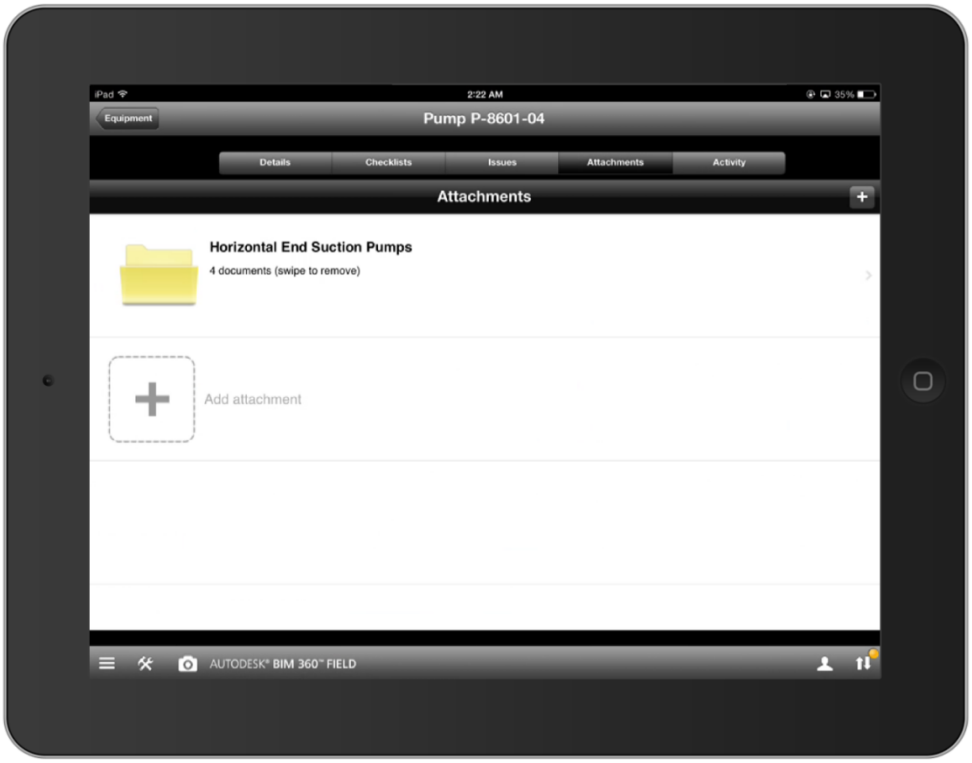

iPad
2:20 AM
36%
Checklists
Find Checklists
Choose Checklist
Tap Checklists button to get started
AUTODESK® BIM 360™ FIELD

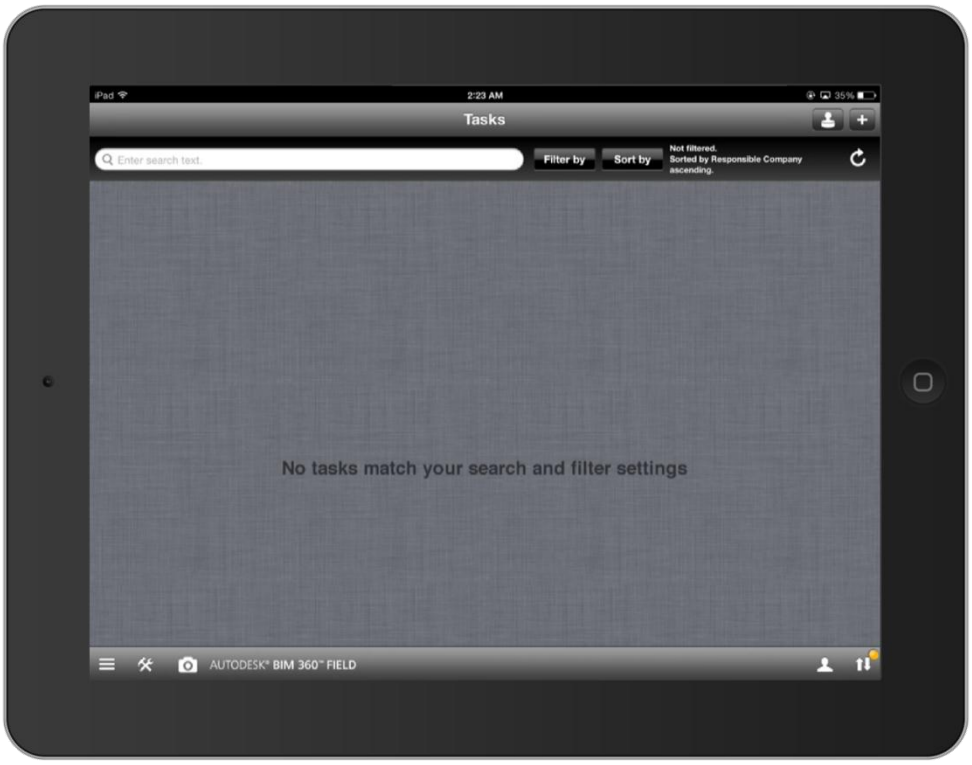

iPad
2:20 AM
36%
Checklists
Find Checklists
Choose Checklist
Tap 'List >' to list existing checklist locations.
Tap checklist name to create a new checklist.
QA/QC
STRUCTURAL STEEL FRAMING - STRUCTURAL STEEL (2)
22 items
Last Run: 04/23/2012 4:27 PM
List
WALL CLOSING (8)
15 items
Last Run: 04/23/2012 4:56 PM
List
Safety
OSHA 2209 - PERSONAL PROTECTIVE EQUIPMENT AND CLOTHING
19 items
OSHA 2209 - PORTABLE LADDERS (0)
17 items
OSHA 2209 - POWDER-ACTUATED TOOLS (0)
7 items
OSHA 3257-12R-05 - FALL PROTECTION (0)
9 items
Commissioning
FUNCTIONAL TEST - BOILER PUMPS - FIELD DATA (0)
started
AUTODESK® BIM 360™ FIELD

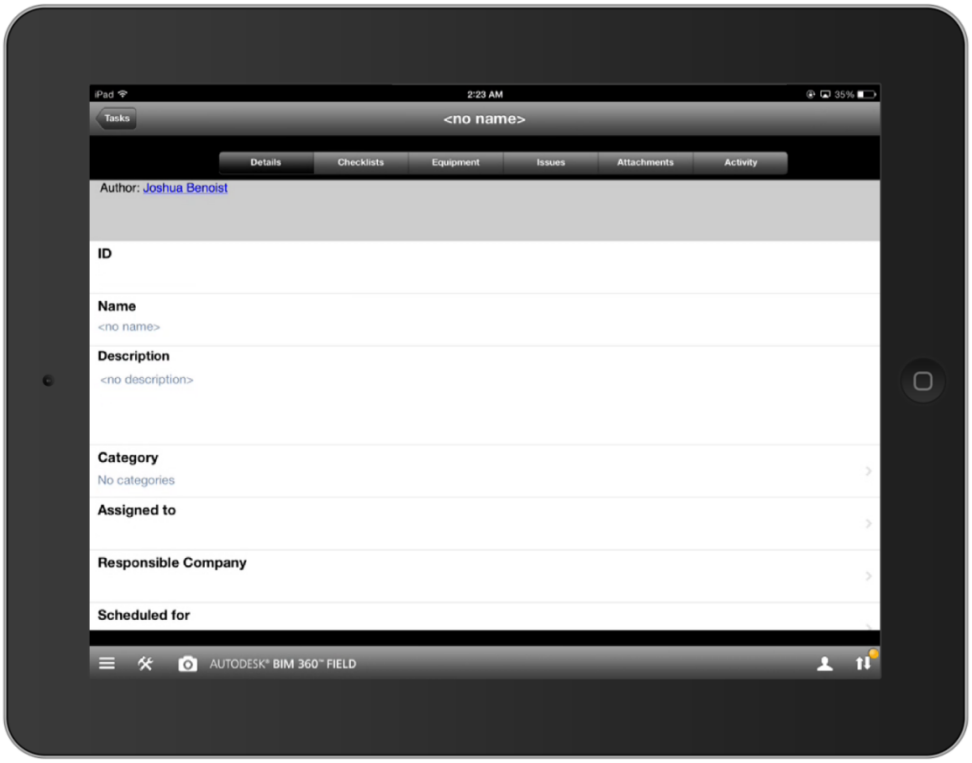

iPad
2:21 AM
36%
Checklists
Find Checklists
FUNCTIONAL TEST - BOILER P...
Header
FUNCTIONAL TEST - BOILER PUMPS - FIELD DATA
Pump Function
enter text
Issue
Tap to enter comments
Pump Tag
enter text
Issue
Tap to enter comments
How many pumps in the system?
enter number
Issue
Tap to enter comments
Outside Air Temperature During Test?
enter text
Issue
Tap to enter comments
Complete one form for each pump tested.
Static Pressure
Suction Pressure*
enter text
Issue
Tap to enter comments
AUTODESK® BIM 360™ FIELD

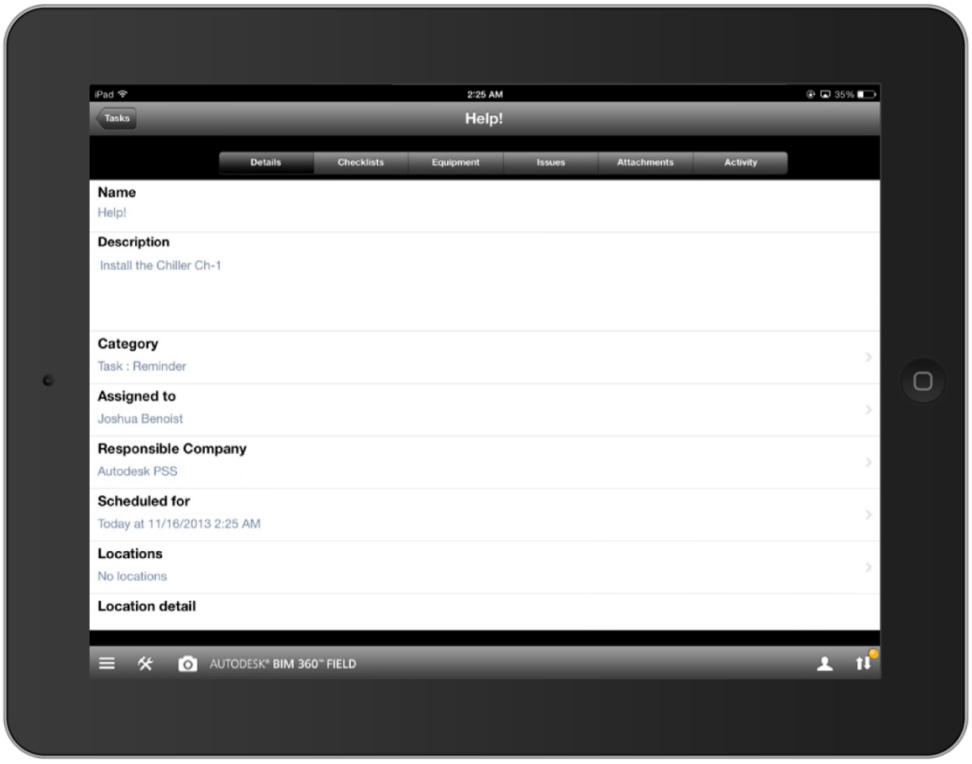

iPad
2:21 AM
36%
Equipment
Enter search text.
Filter by
Sort by
Not filtered.
Sorted by Name descending.
Pump P-8601-04: APEX ISF Horizontal end-suction pump to ISO 2858 and ISO 5199
Barcode: P-8601-04
Download
Pumps : Horizontal End Suction Pumps
Delivered
Pump P-8601-03: APEX ISF Horizontal end-suction pump to ISO 2858 and ISO 5199
Barcode: P-8601-03
Download
Pumps : Horizontal End Suction Pumps
Delivered
Pump P-8601-02: APEX ISF Horizontal end-suction pump to ISO 2858 and ISO 5199
Barcode: P-8601-02
Download
Pumps : Horizontal End Suction Pumps
Delivered
Pump P-8601-01: APEX ISF Horizontal end-suction pump to ISO 2858 and ISO 5199
Barcode: P-8601-01
Download
Pumps : Horizontal End Suction Pumps
Installed
PP-AC-DCF-A1: Power Panel #A1
Barcode: 10000073
Download
AUTODESK® BIM 360™ FIELD

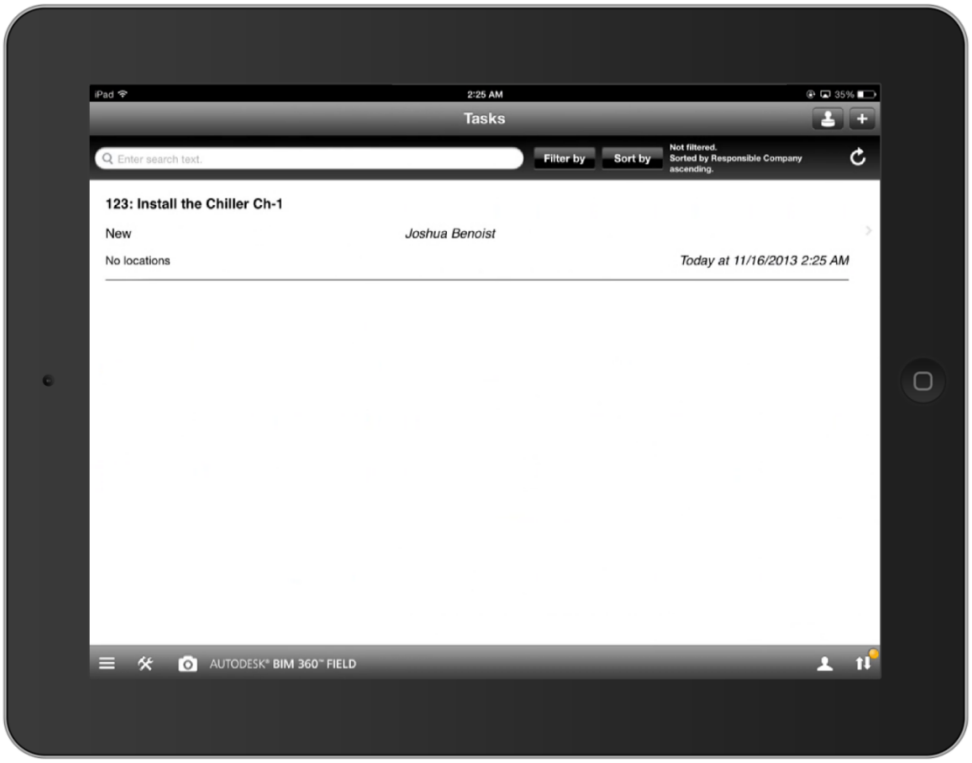

iPad
2:22 AM
36%
Equipment
Pump P-8601-04
Details
Checklists
Issues
Attachments
Activity
Profile
Name
Pump P-8601-04
Type
Pumps : Horizontal End Suction Pumps
Description
APEX ISF Horizontal end-suction pump to ISO 2858 and ISO 5199
Location
Zone 1>Section A
Status
Delivered
Bearing type
Has Warranty
Pump size
Identifiers
AUTODESK® BIM 360™ FIELD

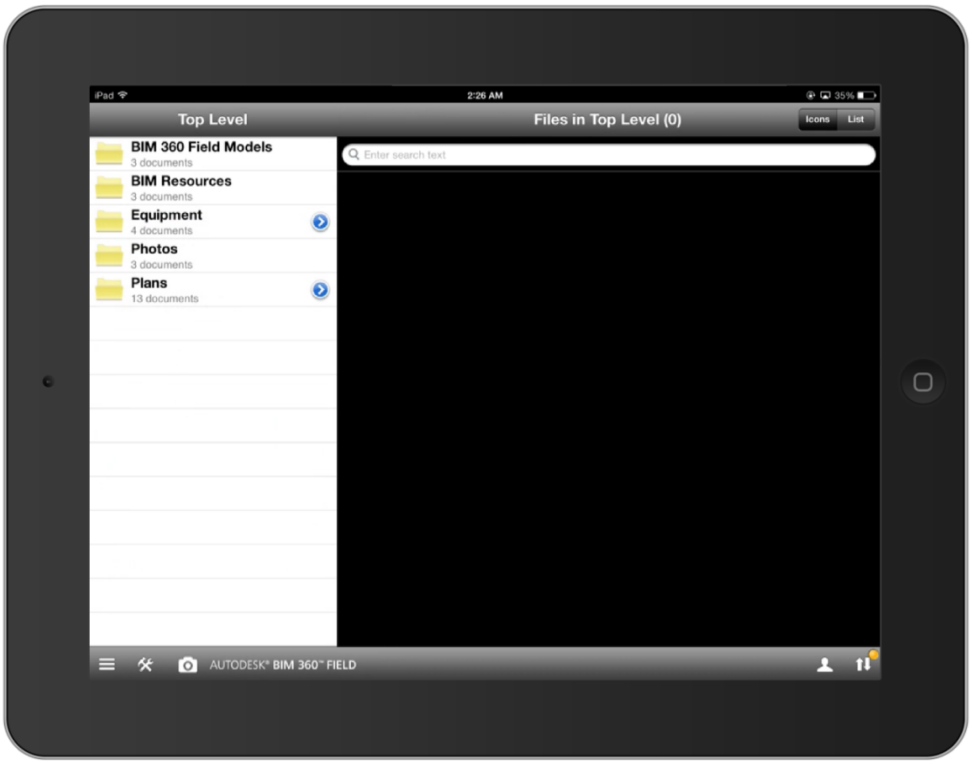

iPad
2:22 AM
35%
Equipment
Pump P-8601-04
Details
Checklists
Issues
Attachments
Activity
Attachments
Horizontal End Suction Pumps
4 documents (swipe to remove)
Add attachment
AUTODESK® BIM 360™ FIELD


iPad
2:23 AM
35%
Tasks
Enter search text.
Filter by
Sort by
Not filtered.
Sorted by Responsible Company ascending.
No tasks match your search and filter settings
AUTODESK® BIM 360™ FIELD


iPad
2:23 AM
35%
Tasks
<no name>
Details
Checklists
Equipment
Issues
Attachments
Activity
Author: Joshua Benoist
ID
Name
<no name>
Description
<no description>
Category
No categories
Assigned to
Responsible Company
Scheduled for
AUTODESK® BIM 360™ FIELD


iPad
2:25 AM
35%
Tasks
Help!
Details
Checklists
Equipment
Issues
Attachments
Activity
Name
Help!
Description
Install the Chiller Ch-1
Category
Task : Reminder
Assigned to
Joshua Benoist
Responsible Company
Autodesk PSS
Scheduled for
Today at 11/16/2013 2:25 AM
Locations
No locations
Location detail
AUTODESK® BIM 360™ FIELD


iPad
2:25 AM
35%
Tasks
Enter search text.
Filter by
Sort by
Not filtered.
Sorted by Responsible Company ascending.
123: Install the Chiller Ch-1
New
Joshua Benoist
No locations
Today at 11/16/2013 2:25 AM
AUTODESK® BIM 360™ FIELD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BIM Resources
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Equipment
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Photos
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Plans
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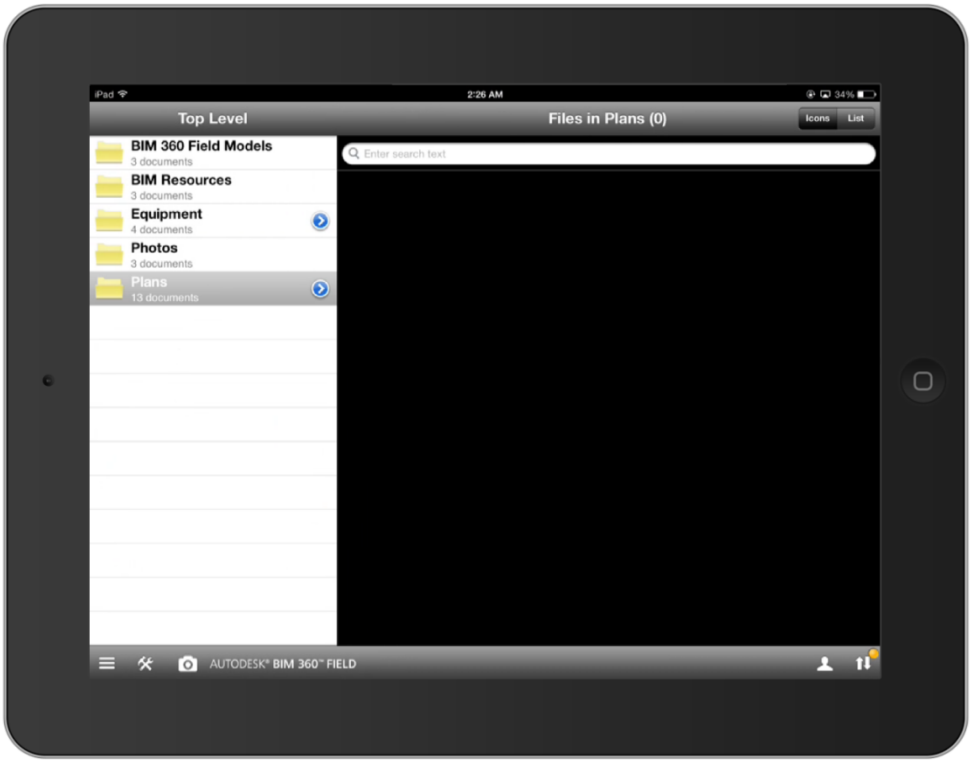
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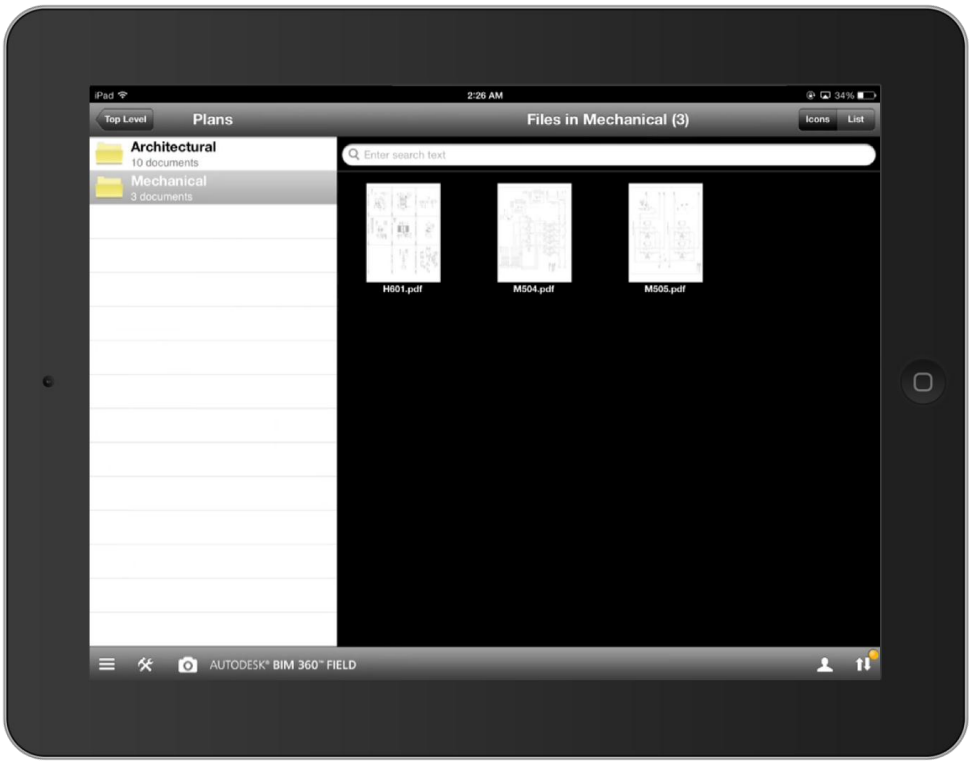
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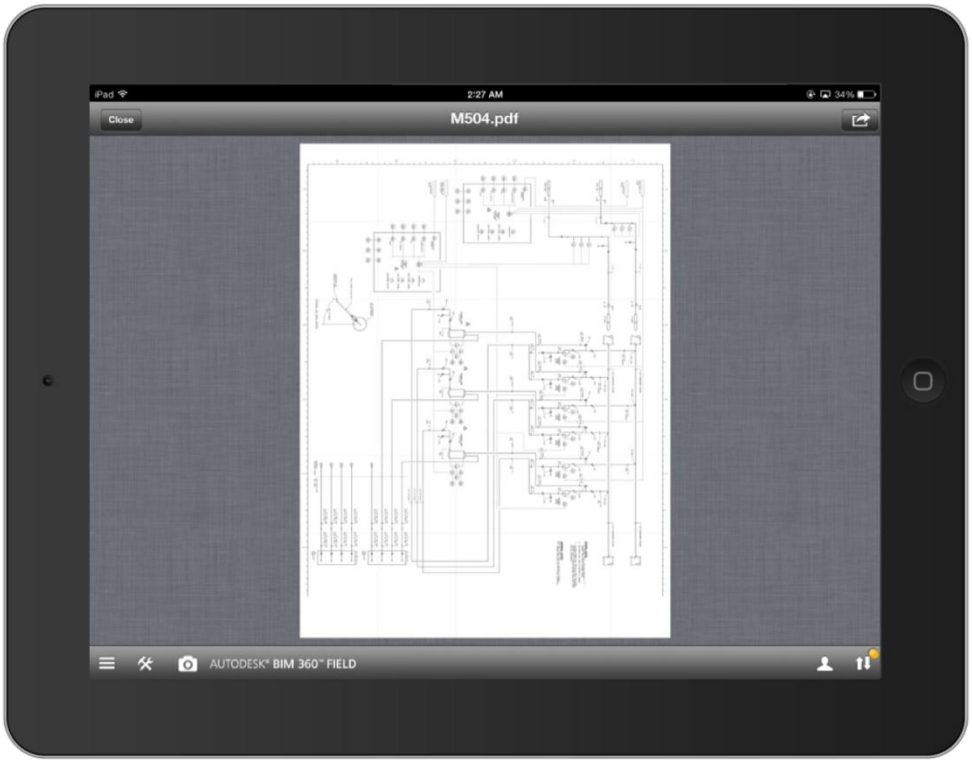
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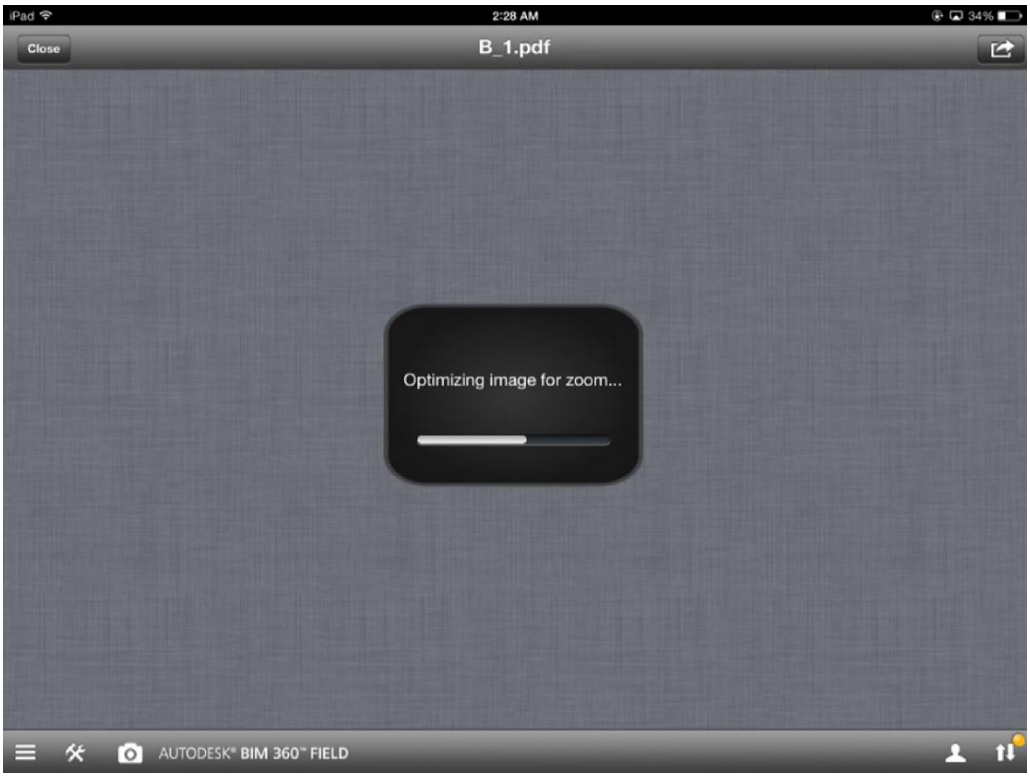
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AUTODESK® BIM 360™ FIELD


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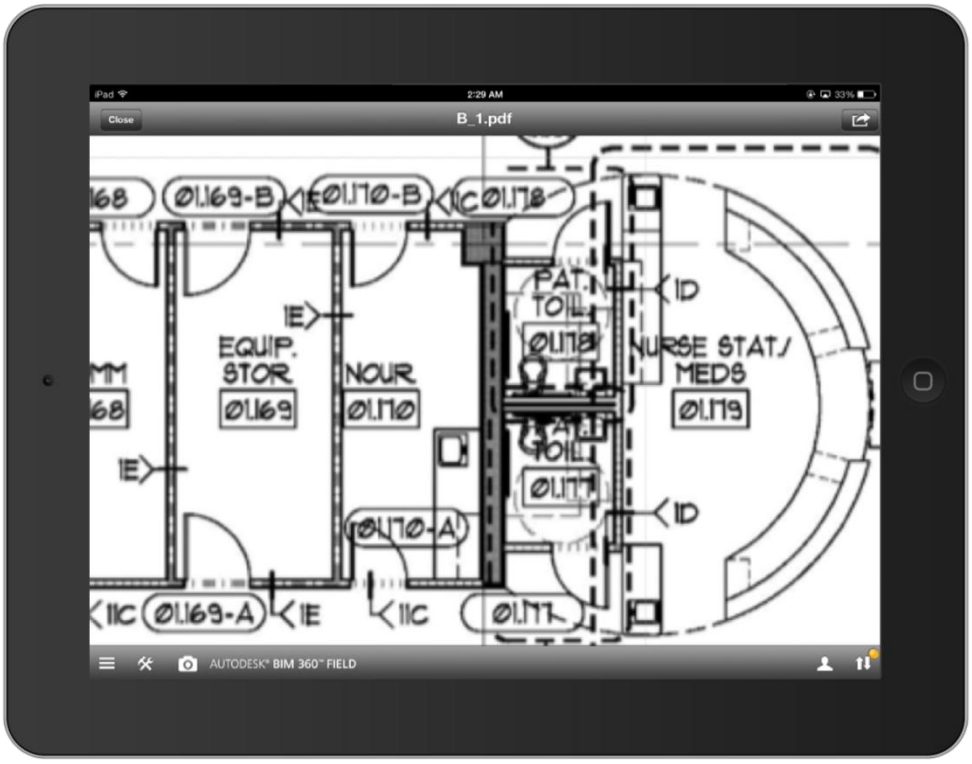
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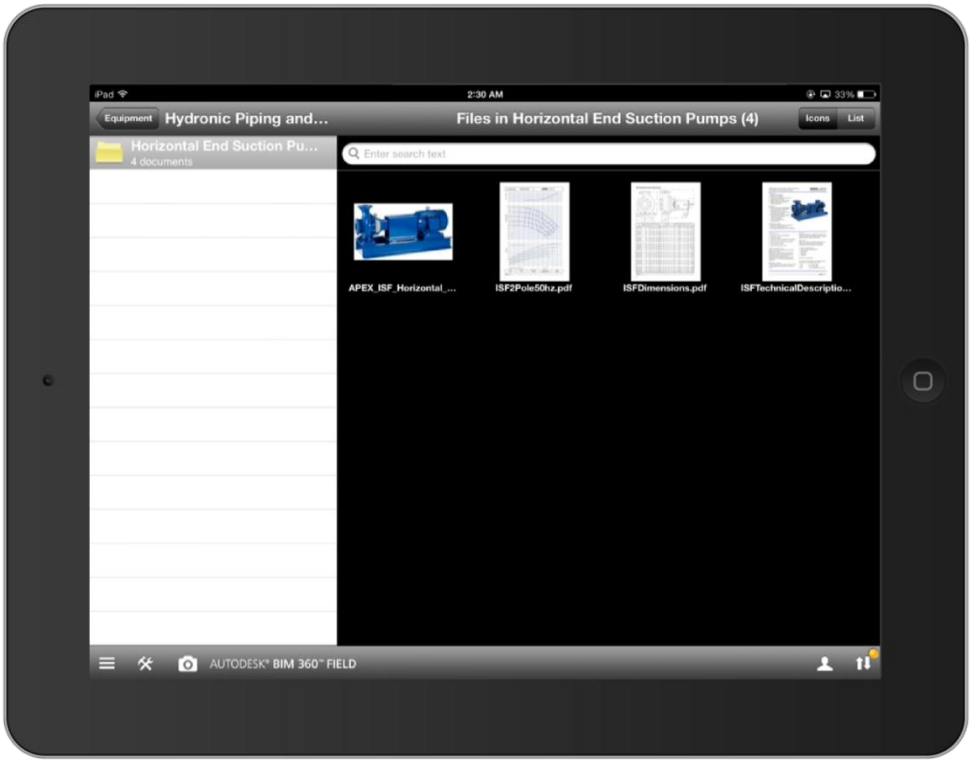
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Equipment
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ISFDimensions.pdf
ISFTechnicalDescriptio...
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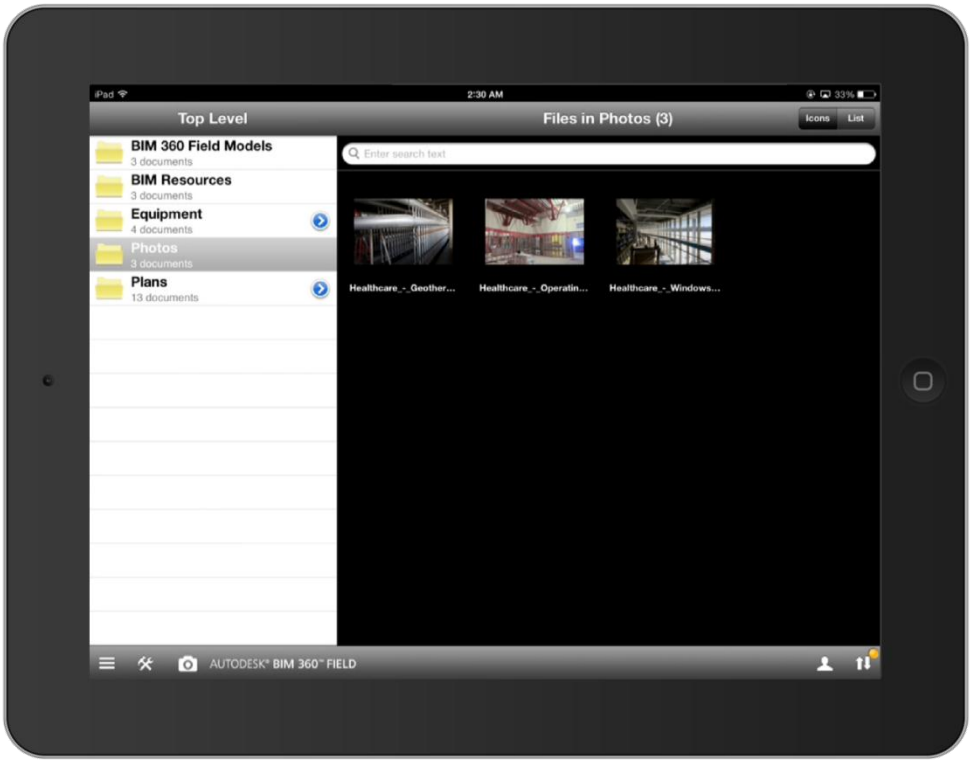
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Files in Photos (3)
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BIM Resources
3 documents
Equipment
4 documents
Photos
3 documents
Plans
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Healthcare_-_Geother...
Healthcare_-_Operatin...
Healthcare_-_Windows...
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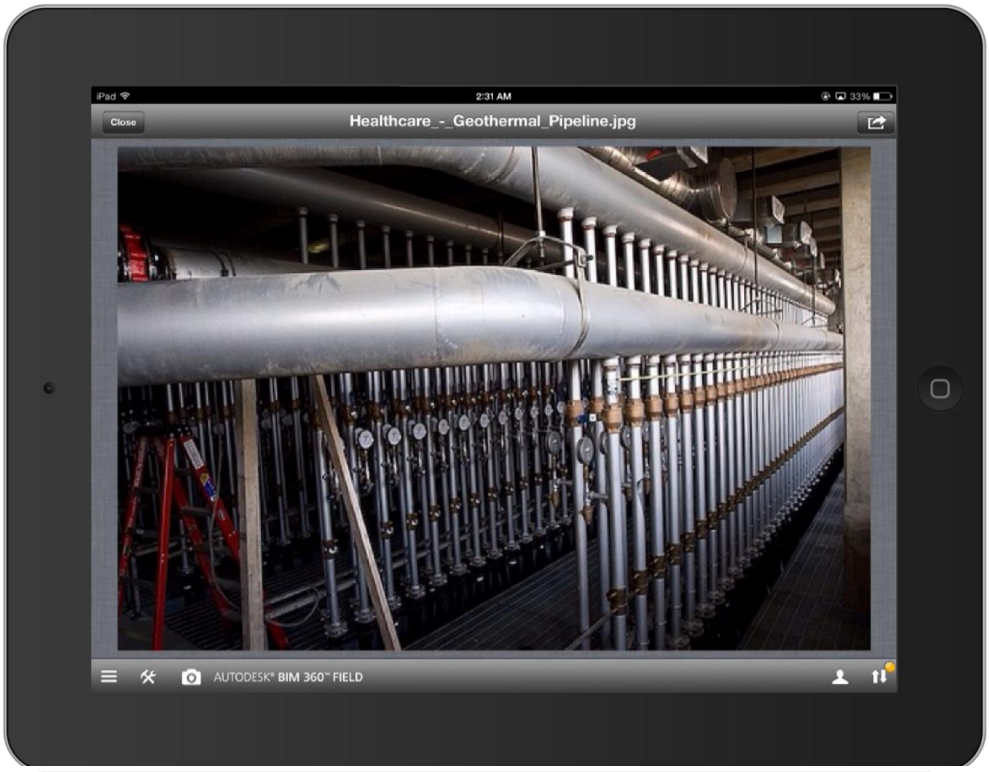
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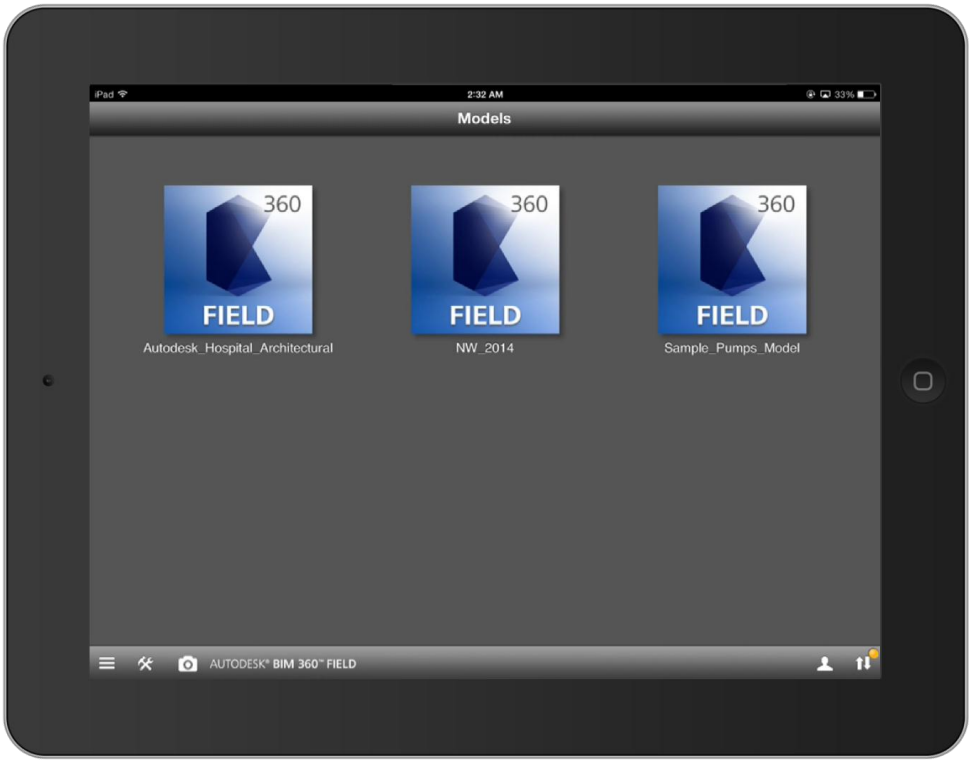
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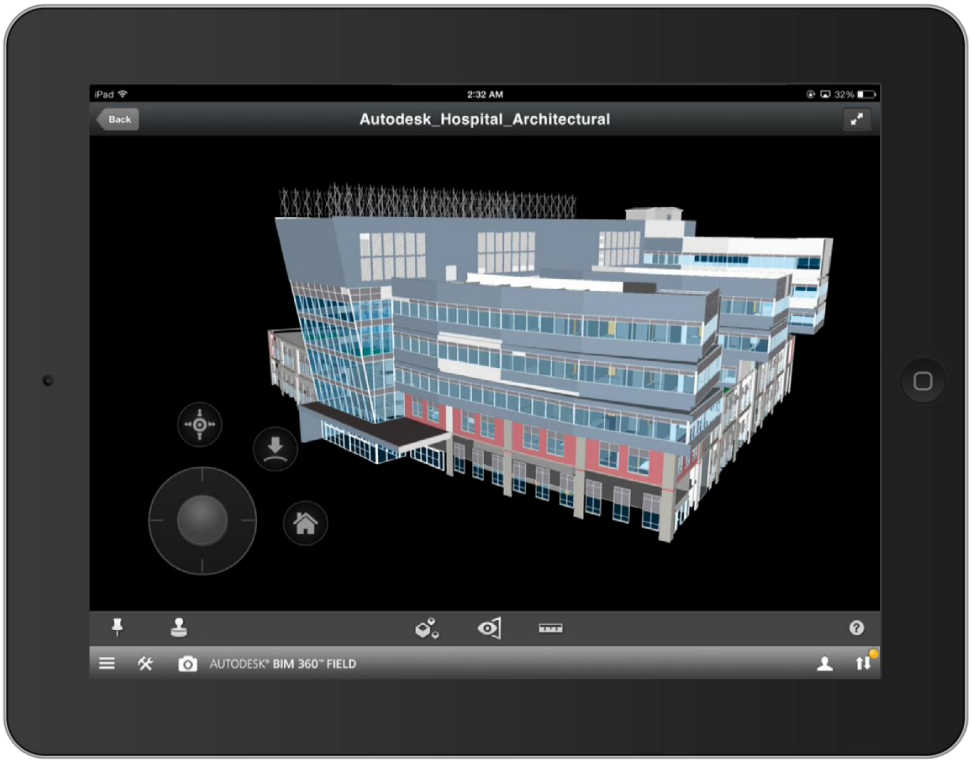
Models
360
FIELD
Autodesk_Hospital_Architectural
360
FIELD
NW_2014
360
FIELD
Sample_Pumps_Model
AUTODESK® BIM 360™ FIELD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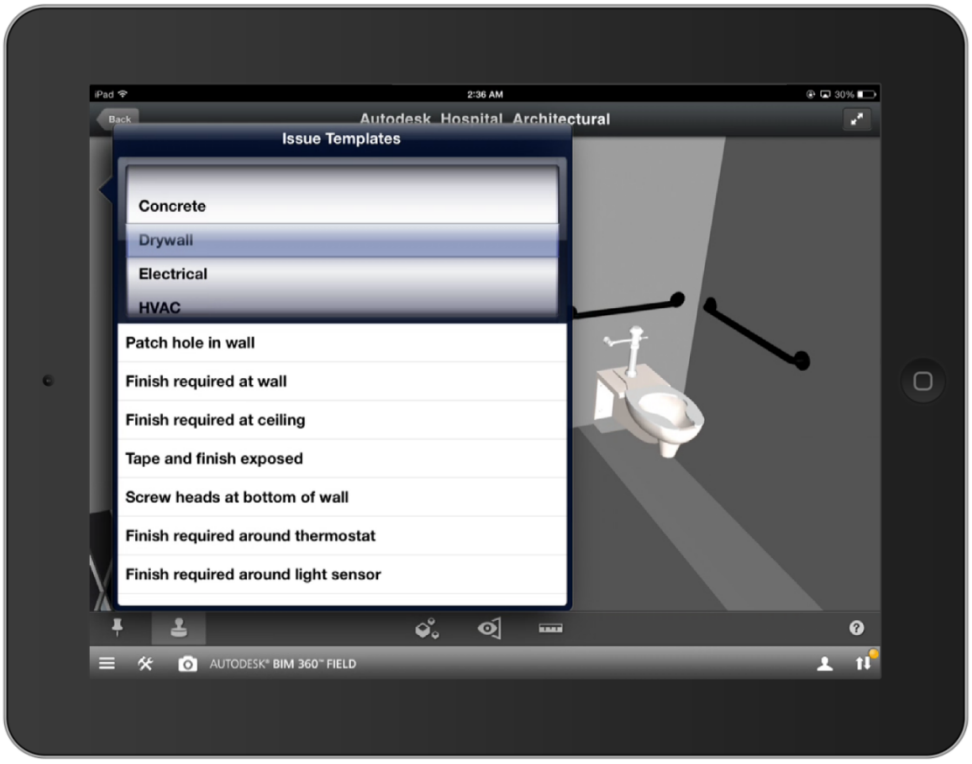
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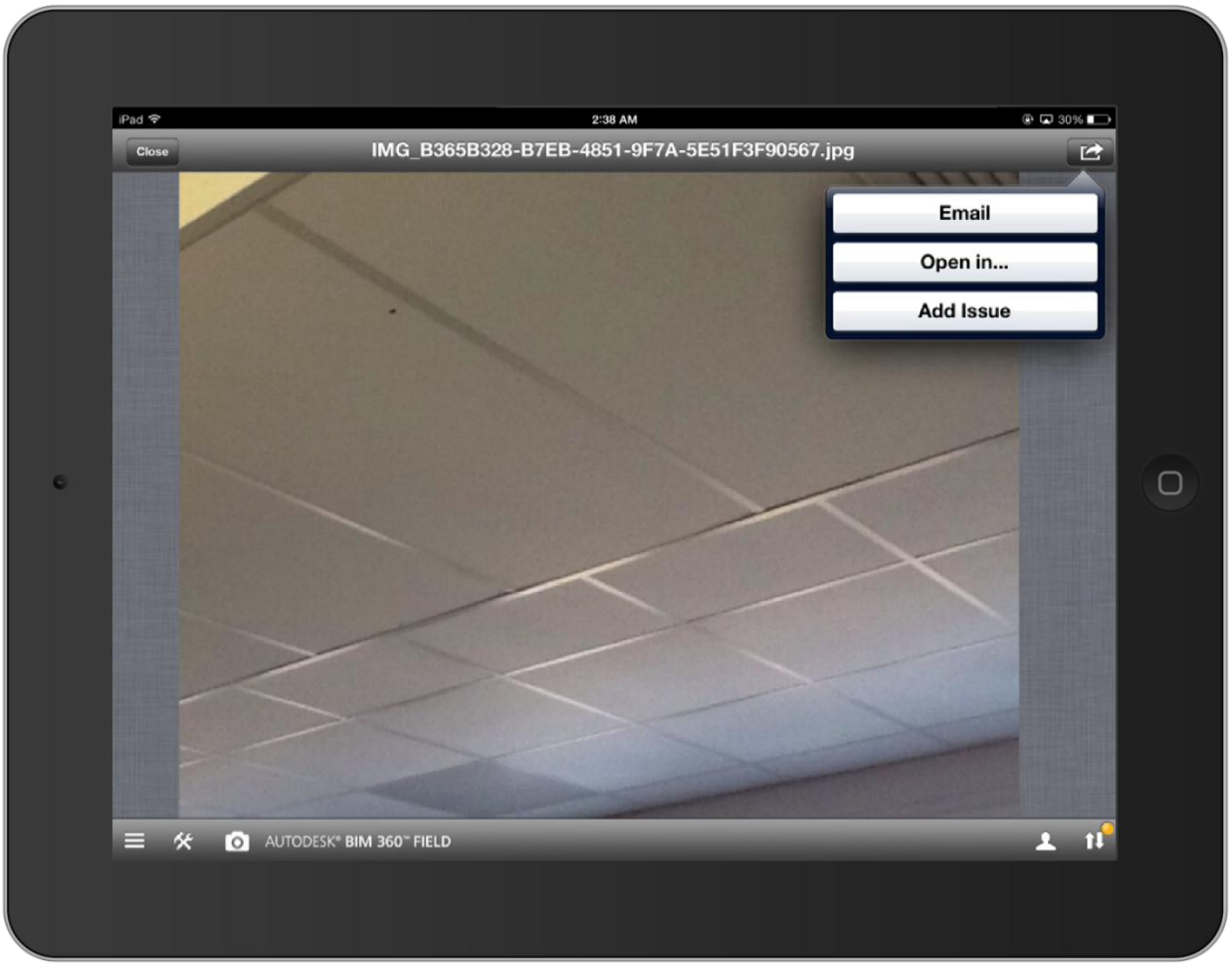
Autodesk_Hospital_Architectural
Issue Templates
Concrete
Drywall
Electrical
HVAC
Patch hole in wall
Finish required at wall
Finish required at ceiling
Tape and finish exposed
Screw heads at bottom of wall
Finish required around thermostat
Finish required around light sensor
AUTODESK® BIM 360™ FIELD



Now that you have perused thru the photos of various sections in Field, think about the Abraham Lincoln quote used at the beginning of this handout. Field is very powerful, you will get more out of it by spending time setting it up. Build your checklists, locations, companies, views, folder structures, etc.

"Give me six hours to chop down a tree and I will spend the first four sharpening the axe."

- Abraham Lincoln

Let's see the Country_Home project in Field.

Notice that the navigation is almost identical to the Navigation in Glue.

At this stage, we have gone from taking Photos, to obtaining a point cloud in ReCAP Photo, to building and analyzing a model in Revit, to clash detection in Navisworks, markups and collaboration in BIM 360 Glue, and to construction management in BIM 360 Field. There are soo many more great "Cloud" programs that we haven't mentioned like PLM 360 and Infraworks 360!

APPENDIX

All cloud products & services

PRODUCTS & SERVICES	PRIMARILY USED FOR	HOW TO BUY	FOR USE WITH
 **Autodesk 360** View, edit, share files, and get the mobile app plus 5GB of storage.	Collaboration File viewing Storage	Free	No other products required
 **Autodesk PLM 360** Manage product lifecycle with lower upfront costs, no capital expenditures or installation.	Product lifecycle management	Pay as you go	No other products required
 **AutoCAD 360** View, edit, and share Autodesk® AutoCAD® files using your smartphone or tablet.	Drafting (documentation) Collaboration Storage	Free	No other products required
 **BIM 360 Glue** Collaborate in the cloud in real time on modeling and clash detection from your office or mobile device.	BIM management Collaboration Clash detection	Project term contract	No other products required
 **BIM 360 Field** Perform on-site field management for timely collaboration and reporting on your mobile device.	Field management Commissioning Handover	Project term contract	No other products required
 **Buzzsaw** Manage documents, models, and data in the cloud.	Collaboration Storage	Included with Vault Professional (Subscription) Pay as you go	No other products required
 **Configurator 360** Customize products for quoting and access model design.	Product modeling	Free for 90 days	No other products required
 **Energy Analysis for Revit** Quickly determine energy consumption and lifecycle costs of building designs.	Energy analysis Building sustainability	Included with Subscription	Building Design Suite
 **Fusion 360** Accelerate industrial and mechanical design and collaboration.	Industrial and mechanical design Collaboration	Free for 90 days	No other products required
 **Green Building Studio** Perform whole building energy analysis to design toward carbon neutrality.	Energy and water use analysis for building design	Included with Subscription	Building Design Suite Factory Design Suite Infrastructure Design Suite
 **InfraWorks 360** Quickly and easily create 3D models to perform civil infrastructure design and planning.	Civil infrastructure Design Simulation	Included with Subscription	Building Design Suite Infrastructure Design Suite
 **InfraWorks 360 Pro** Aggregate data, develop proposals, and manage large models in the cloud.	Collaboration Civil design Communication	Pay as you go	No other products required
 **Mockup 360** Create and collaborate on mechanical design mockups in real time.	Digital mockups Clash detection Collaboration	Free for 90 days	No other products required
 **Optimization for Inventor** Test the performance of multiple product design options.	Product performance testing	Included with Subscription	Product Design Suite Plant Design Suite Building Design Suite Factory Design Suite
 **Rendering in Autodesk 360** Produce photorealistic images and panoramas.	Rendering Visualizations	Included with Subscription	AutoCAD® Design Suite Building Design Suite Factory Design Suite Infrastructure Design Suite Plant Design Suite Product Design Suite
 **Sim 360** Run mechanical simulations anywhere, anytime at a fraction of the cost of traditional simulation software.	Mechanical simulation Structural design Fluid flow Injection molding	Pay as you go	No other products required
 **Structural Analysis for Revit** Design and analyze structural models as part of the BIM process.	Structural engineering BIM modeling	Included with Subscription	Building Design Suite Infrastructure Design Suite Plant Design Suite

AUTODESK® BIM 360™ GLUE®
BIM Management for Multi-disciplinary Project Teams

Autodesk BIM 360 Glue File Compatibility

File Formats Supported by Autodesk BIM 360 Glue

Autodesk Applications	
AutCAD (2008-2014)	.DWG, .DWF, .DWFx, .DXF, .3DS, .FBX
AutoCAD Architecture (2008-2014)	.DWG, .DWF, .DWFx, .DXF, .3DS, .FBX
AutoCAD MEP (2008-2014)	.DWG, .DWF, .DWFx, .DXF, .3DS, .FBX
Autodesk Plant 3D (2010-2014)	.DWG, .DWF, .DWFx, .DXF, .3DS, .FBX
Autodesk CAD-Duct	.DWG, .DXF, .3DS
Autodesk Navisworks Manage (2008-2014)	.NWD, .NWC, .NWF , .DWF
Autodesk Inventor 5 to 11, (2009-2014)	.IPT, .IAM, .IPJ, .IGES, .STEP, .JT, .FBX
AutoCAD Civil 3D (2008-2014)	.DWG, .DWF, .DWFx, .DXF, .3DS, .FBX
MDT (8 to 2009)	.DWG, .DXF, .3DS, .VRML
Revit Architecture (2008-2014)	.DWG, .DWF, .DWFx, .DXF, .DGN, .FBX
Revit Structure (2008-2014)	.DWG, .DWF, .DWFx, .DXF, .DGN, .FBX, .CIS/2
Revit MEP (2008-2014)	.DWG, .DWF, .DWFx, .DXF, .DGN, .FBX
Autodesk 3ds Max 8 to 2014	.DWG, .DXF, .3DS, .IGES, .FBX
Autodesk VIZ 2008	.DWG, .DXF, .3DS
Autodesk Maya	.DXF, .IGES, .VRML

Bentley	
AutoPLANT	.DWG, .DXF, .3DS
MicroStation J	.DWG, .DXF, .DGN, .IGES, .STEP, .VRML
MicroStation v8 to 8.5, XM (8.9)	.DWG, .DXF, .DGN, .IGES, .STEP, .VRML
ProSteel 3D	.DWG, .DXF, .3DS, .CIS/2
TriForma J	.DWG, .DXF, .DGN, .IGES, .STEP, .VRML
TriForma v8 to 8.9	.DWG, .DXF, .DGN, .IGES, .STEP, .VRML

Graphisoft	
ArchiCAD 10 to 16	.DWG, .DXF, .DGN, .IFC
Constructor 2007 to 2010	.DWG, .DXF, .DGN

AceCad	
StruCad	.DXF, .CIS/2

auto.des.sys	
form.z	.DWG, .DXF, .3DS, .IGES, .STL, .VRML

AEC	
CADPIPE	.DWG, .DXF, .3DS

ITandFactory	
CADISON	.DXF, .3DS
TRICAD MS	.VRML

Kubotek USA	
CADKEY	.DWG, .DXF, .IGES, .STEP

M.A.P.	
CAD-Duct	.DWG, .DXF, .3DS

McNeel North America	
Rhino	.DWG, .DXF, .3DS, .IGES, .STEP

Mensch und Maschine	
RoCAD	.DWG, .DXF, .3DS

MultiSUITE	
MultiSTEEL	.DWG, .DXF, .3DS

Nemetschek	
Allplan	.DWG, .DXF, .DGN, .IFC

PROCAD	
3DSMART	.DWG, .DXF, .3DS

PTC	
Pro/ENGINEER	.IGES, .STEP, .VRML, .JT
CADDS 5	.IGES, .STEP

QuickPen	
PipeDesigner 3D	.DWG, .DXF, .3DS
DuctDesigner 3D	.DWG, .DXF, .3DS

RAM International	
CADstuio	.DWG, .DXF, .3DS

AVEVA	
PDMS	.RVM

CADopia	
IntelliCAD	.DWG, .DXF

CEA Technology	
Plant-4D	.DWG, .DGN

COADE, Inc.	
CADWorx Plant	.DWG, .DXF, .3DS
CADWorx Pipe	.DWG, .DXF, .3DS
CADWorx Steel	.DWG, .DXF, .3DS

COINS	
BSLink	.DWG, .DXF, .3DS
Framing	.DWG, .DXF, .3DS

CSC	
3D+	.DWG, .CIS/2

Dassault Systemes	
CATIA	.DXF, .IGES, .STEP, .JT

Hannappel SOFTWARE GmbH	
elcoCAD R4	.DWG, .DXF, .3DS

Intergraph	
PDS	.DWG, .DXF, .DGN, .IGES, .STEP

Informatix	
MicroGDS	.MAN

SolidWorks	
SolidWorks	.DWG, .DXF, .IGES, .STEP, .VRML, .JT

Trimble	
Tekla Structures	.DGN, .VRML, .CIS/2
Xsteel	.DGN
SketchUp (up to V7)	.SKP, .DWG, .3DS

think3	
thinkdesign	.DWG, .DXF, .IGES, .STEP

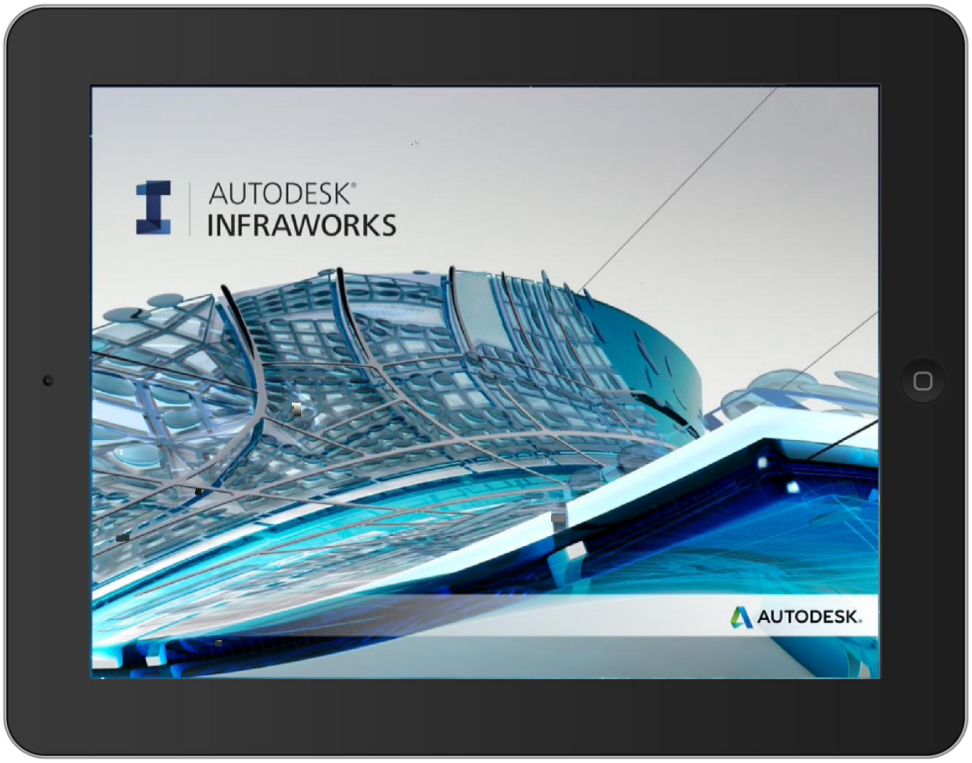
UGS	
I-deas	.DXF, .IGES, .STEP, .JT
Solid Edge	.IGES, .STEP, .JT
NX (Unigraphics)	.DXF, .IGES, .STEP, .JT
FactoryCAD	.DWG, .DXF, .3DS

UHP Process Piping	
AFabPro Pipe	.DWG, .DXF, .3DS
X-plant	.DWG, .DXF, .3DS

2D Formats	
Autodesk AutoCAD	.DWG
Autodesk DWF	.DWF, .DWFx

Laser Scan Formats	
ASCII Laser File	.ASC, .TXT
Faro	.FLS, .FWS, .IQSCAN, .IQMOD, .IQWSP
Leica	.PTS, .PTX
Riegl	.3DD
Z+F	.ZFC, .ZFS

InfraWorks – Mobile, Desktop and Browser Based ??



Used by Civil Engineers