CS13337

Building Handover with Autodesk Building Ops

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Learning Objectives

- Explore opportunities for contractors to offer expanded services to owners
- Learn how to prepare and publish BIM 360 data to deliver a better handover experience to building owners
- Set up preventive maintenance schedules for assets to reduce warranty requests
- Learn how to use Autodesk Building Ops

Description

Autodesk Building Ops is a mobile-first asset and maintenance management solution for buildings and Autodesk's first commercial Internet of Things (IoT) application. It helps general contractors deliver a better handover experience and building owners begin operations on day one, while better meeting the needs of their mobile workforce. In this instructional demo, general contractors will learn how to help building owners realize the value of BIM in construction by using Autodesk Building Ops for operations. We will publish equipment from BIM 360 Field, set up preventive maintenance schedule, and will show how to connect a building in Building Ops with one monitored with Panoramic Power sensors.

Your AU Experts

Dr. Lira Nikolovska, Senior UX Architect, Autodesk Building Ops, Autodesk, Inc.
Lira is an architect and interaction designer with over 15 years of experience in strategic design and UX design across a diverse range of industries, technologies and platforms. She is member of the Building Ops team. Prior to joining Autodesk, Lira worked at Philips Research Labs in Briarcliff NY, Strategic Design group at Philips Design in The Netherlands and taught at Rhode Island School of Design. She holds Ph.D. in Design Computation from MIT Architecture, chaired SimAUD 2012, SIGGRAPH 2010 Art Papers and SIGGRAPH 2008 Design Computation gallery, and has been member of SimAUD and ACADIA committees. Lira holds 17 patents and is recipient of the ACADIA 2012 Award for Innovative Research.

Jason Winstanley, Director, Autodesk Building Ops, Autodesk, Inc.
Jason leads the team responsible for Autodesk Building Ops. With a BIM-enabled, mobile-first approach and a keen focus on the user experience, Building Ops is transforming handover and revolutionizing the way buildings are operated. With more than 20 years of experience in the Architecture, Engineering, and Construction industry, Jason has previously held leadership positions in User Experience Design and Product Management. He's also held technical sales, sales development, and business development roles at Autodesk.

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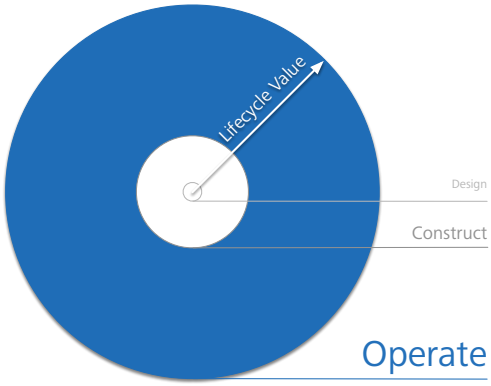
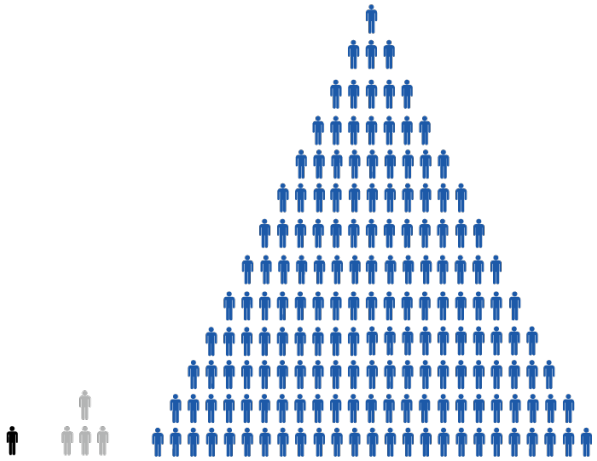
Why Building Ops?



Operations account for 80% or more of a building's lifecycle cost, yet, ask any facility manager or owner what happens during the building handover phase! According to Ampirix Owner Segment Research from September 2014, approximately half of the owners don't have a software solution for building operations.[2] It is not uncommon to spend 18-24 months logging building assets and deploying a software solution for the new building. Furthermore, majority of CMMS legacy solutions are not designed for mobile work, even though technicians vastly outnumber the number of facility managers. The diagram below is an example of the ratio between mobile technicians and facility managers / supervisors at an institution at the North East of the USA: their workforce included 1 manager, 4 supervisors and 180 technicians. While most maintenance workers and their work are mobile, and approximately 50% of the maintenance teams use mobile technologies, they mainly use their mobile phones to talk.



We also saw increased use of BIM 360 Field for post-handover activities, and knew there is demand for ways to harness the BIM data collected and enriched during design, construction and handover.

What is Building Ops?

Autodesk Building Ops is a mobile-first maintenance management solution. It focuses on the needs of the mobile workforce, building operators and facility managers. One of its objectives is to reduce the time and risk associated with deployment by connecting directly to the BIM asset data collected and continually enriched during the building design, construction and handover phases.

Building Ops offers benefits for both building owners and general contractors:

- **Improves the handover experience** by delivering building operations data from BIM 360 Field in a way that makes it immediately actionable and contextually relevant
- **Enables owners to begin operations on day one** with a turnkey maintenance and asset management solution

[2] Approximately half of the OpEx respondents reported using a third-party facilities management product. Typically this was an ad hoc system based on MS Office or Google products, though some respondents reported using Commercial systems. Roughly one in five respondents used a manual or paper-driven process and approximately 10% had no formal process or system at all. (Ampirix Owner Segment Research, Sept. 2014)

- **Offers a simple and elegant mobile and responsive web interface** that meets the needs of the mobile maintenance workforce
- **Helps contractors better service warranty requests** and reduce expenses from unmaintained equipment
- With **Panoramic Power**, makes **predictive maintenance** accessible to everyone

Who is Building Ops For?

Autodesk Building Ops is designed for general contractors, mechanical and electrical specialty contractors, and building owner/operators of multi-building small, medium, and large commercial, institutional, retail, multi-family residential, and mixed use developments.

The users of Building Ops can be building owners, maintenance managers, technicians, vendors and building occupants.

The benefits of Building Ops for general contractors include:

- Being able to use BIM 360 Field data for operations to **provide a better handover experience**
- Ability to **provide better service warranty requests** and **reduce warranty expenses** from unmaintained equipment
- Opportunity for contractors to **offer expanded services to owners**

And here are the benefits for owners:

- **Begin operations on day one.** Building Ops is designed to get the owners' maintenance team up and running quickly with an easy-to-use interface
- **Provide mobile workers with the information they need**, when they need it, and where they need it with the ability to **access and update ticket and asset information while in the field**
- **Increase occupant satisfaction** by more effectively communicating with them about their maintenance issues
- **Acquire greater insight** into the maintenance operations and asset performance

What is Panoramic Power?

Panoramic Power is an enterprise energy management solution that connects energy insights with building maintenance. It provides advanced failure detection for equipment through visualization and analysis. It uses induction-powered wireless sensors that generate alerts about sub-performing assets. By connecting a building in Panoramic Power to one in Building Ops, we can:

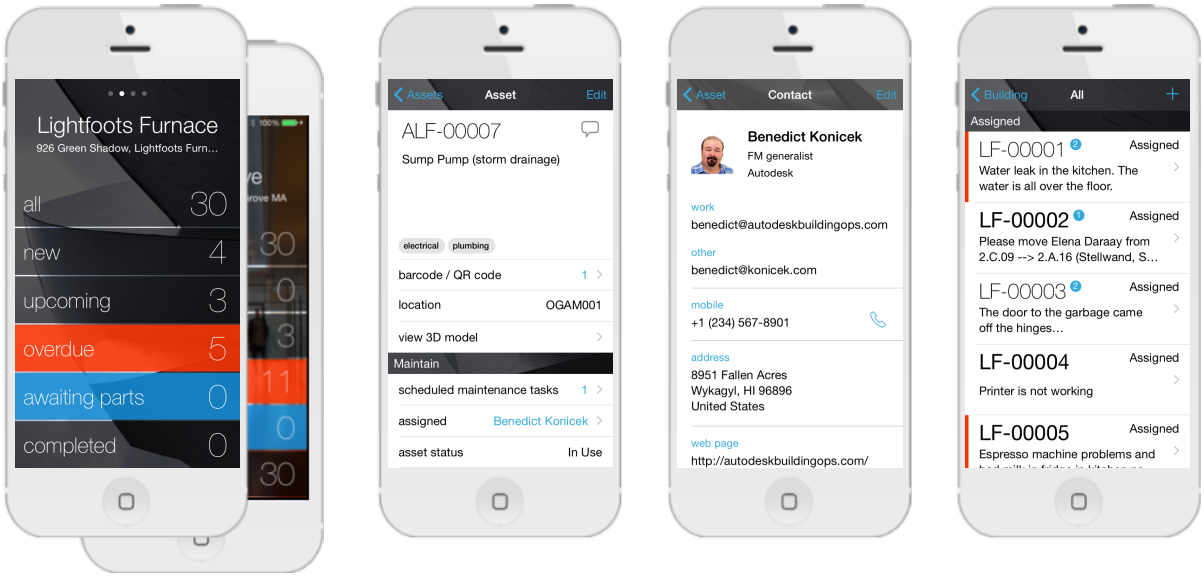
- Export the assets wired with Panoramic Power sensors (a scenario for existing buildings), and
- Receive service tickets in Building Ops using the alerts for the sub-performing assets.

I am interested. When can I get started with Building Ops?

How about right now! In the live demo at AU and in this tutorial we will show you:

- Overview of the Capabilities of Building Ops
- Export of equipment from a BIM 360 Field project to a building in Building Ops
- Set up of preventive maintenance schedule for the imported assets
- Connect a building in Panoramic Power with one in Building Ops
- View reports on preventive and reactive maintenance

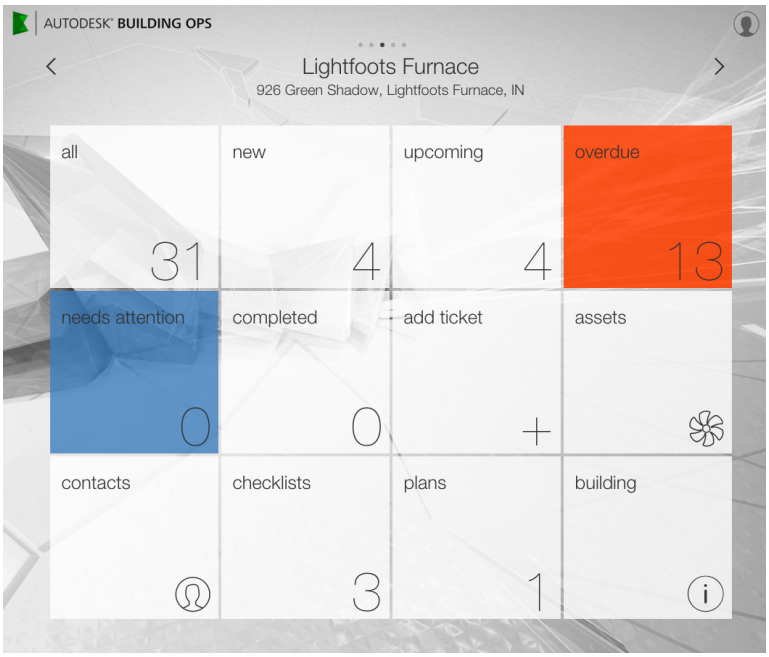
An Overview of the Capabilities of Building Ops



Autodesk Building Ops consists of 4 main components, available both on iOS and web:

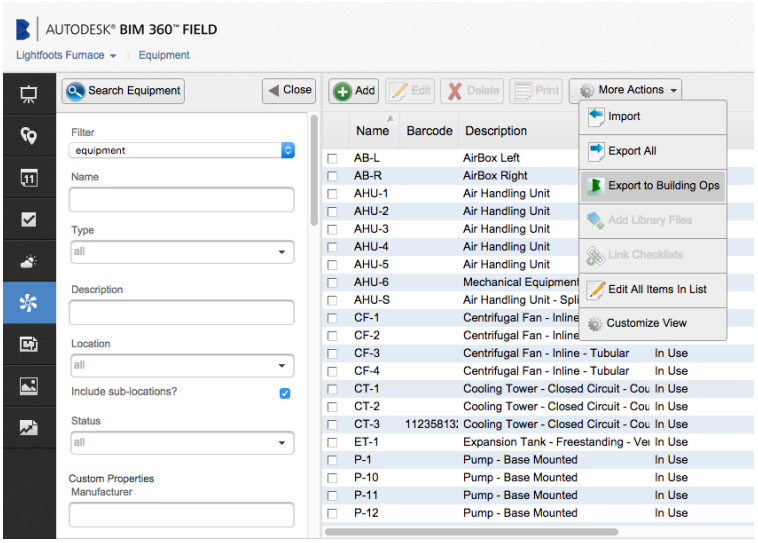
- **Dashboards** provide role-based, person-specific content and insight for building owners, managers, technicians and building occupants.
- **Assets** (equipment) can be added manually, as needed, or can be brought from BIM 360 Field, CSV spreadsheets, Panoramic Power or Revit (Revit-Building Ops technical preview will be announced at AU 2015).
- **Contacts** provide the building owner and manager with the ability to find information about technicians and vendors, and also invite / onboard new technicians to buildings they operate.
- As for **Tickets**, 4 types of tickets are available in Building Ops: A) **Reactive** tickets are ones typically filed by building occupants, B) **Preventive** tickets are created from scheduled maintenance tasks for assets, C) **Predictive** tickets are the ones when the machines themselves "request" attention and alert Building Ops, and D) **Inspection** tickets.

In Building Ops, ticket creation and management go hand in hand, and if you know how to address, for example, reactive tickets, you will know how to address every other Ticket Type. Tickets are presented together in a list of tickets and can be filtered by type, technician, due date etc.



Not every user in every context uses iOS products, and we developed a responsive web version of the app that can be used on Chrome, Internet Explorer or Safari, desktop or mobile. The image shows a web dashboard for an owner or manager, with up to date information about tickets, assets and contacts.

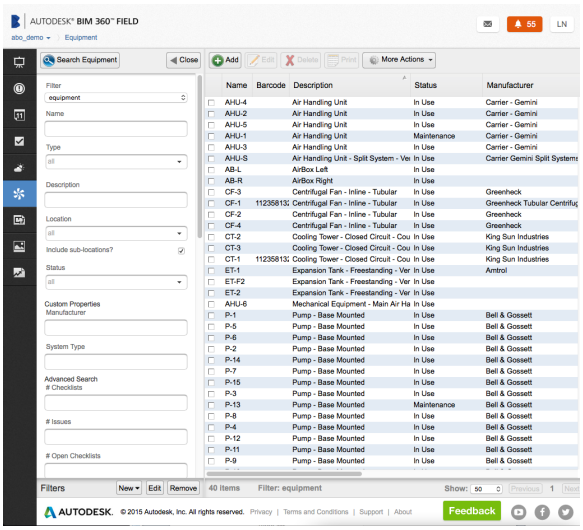
Next, it takes 18-24 months to setup CMMS, a complicated and expensive process with implementations that fail to achieve their promise as much as 70% of the time. The design and construction, as well as installation and commissioning phases of building projects, produce significant amount of valuable information. Building owners should be able to use that rich information in operations. By importing equipment from BIM 360 Field projects or a Comma Separated Value (CSV) file, Building Ops jumpstarts maintenance of a new building (log assets, create schedule of maintenance etc.). By connecting a Panoramic Power building to one in Building Ops, you can do the same with existing buildings.

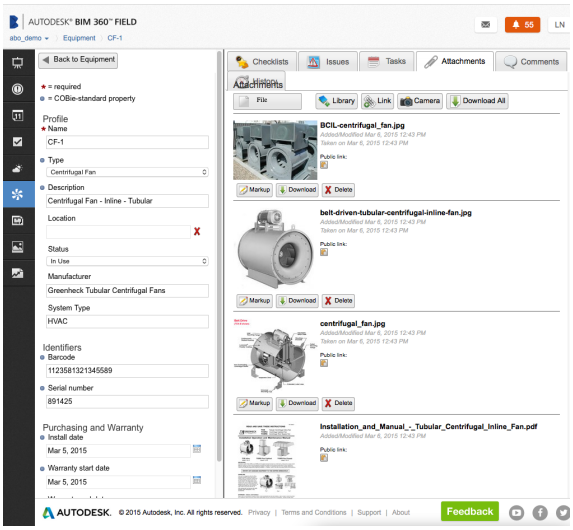


Prepare and Publish BIM 360 Field Data for Handover to Owners

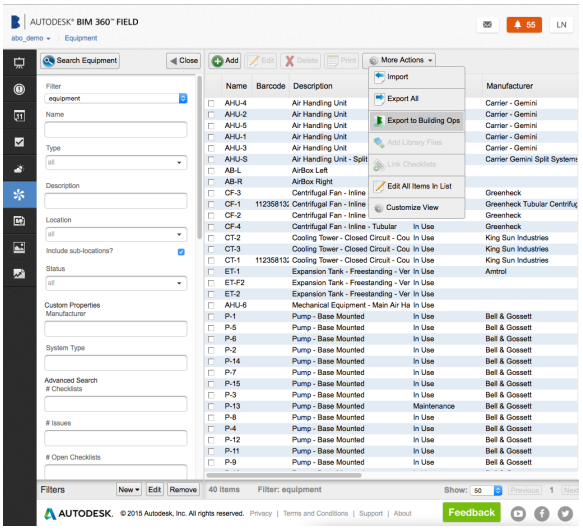
In this next section, we'll show you how to create an export code for a building in Building Ops, and use that code in a BIM 360 Field project to export equipment as assets into Building Ops.

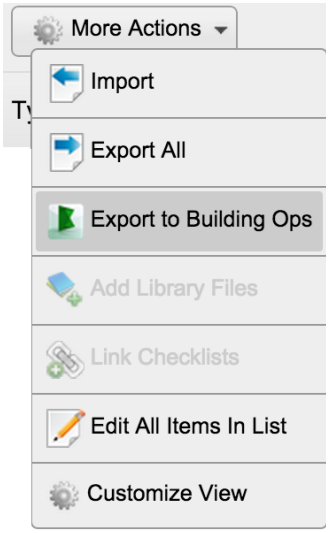
1. Open a BIM 360 Field project. The image on the left shows all the equipment we can export to a building in Building Ops. The image on the right shows details of a Centrifugal Fan that we'll export first. In addition to the 3D model from which the Fan originated, its details include images, PDFs, a barcode, and additional information added during construction and commissioning.



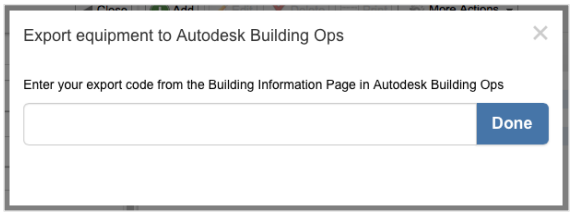


2. Go back to the list of Equipment in Field, and click "More Actions". Select "Export to Building Ops".

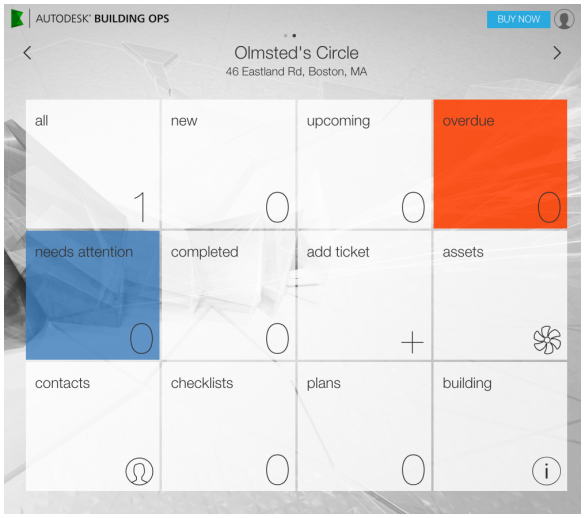


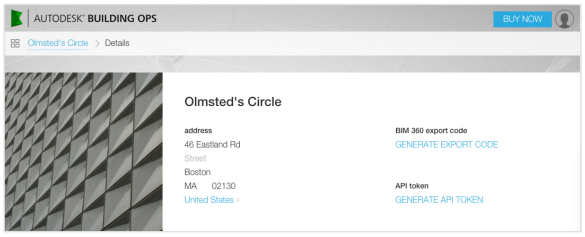


3. You will be asked for an export code. This code needs to be generated in Building Ops.

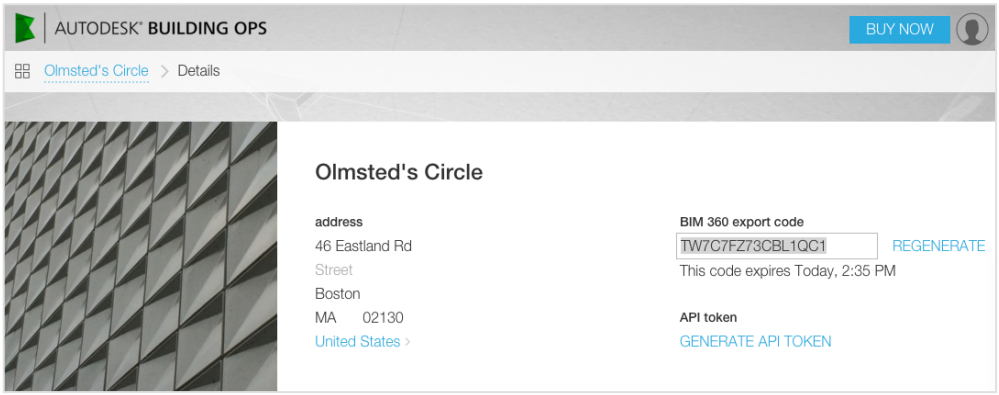


4. Go to http://autodeskbuildingops.com and navigate to the building created in Building Ops (see Exercises 1 and 2 in the next section for how to register to Building Ops and add a new building). Next, click on the "building" panel on the bottom right corner of the dashboard…

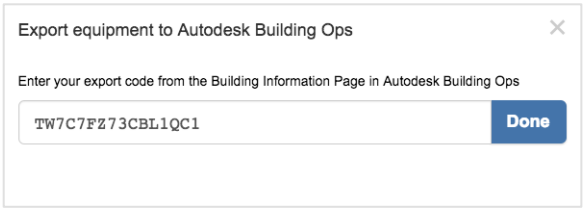


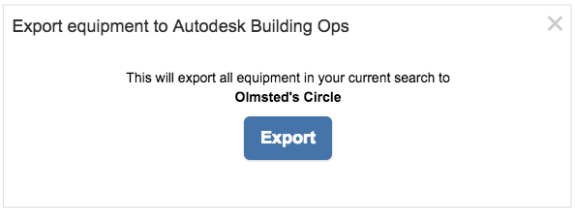


…to open the Building details. Click on "GENERATE EXPORT CODE", and copy the code.



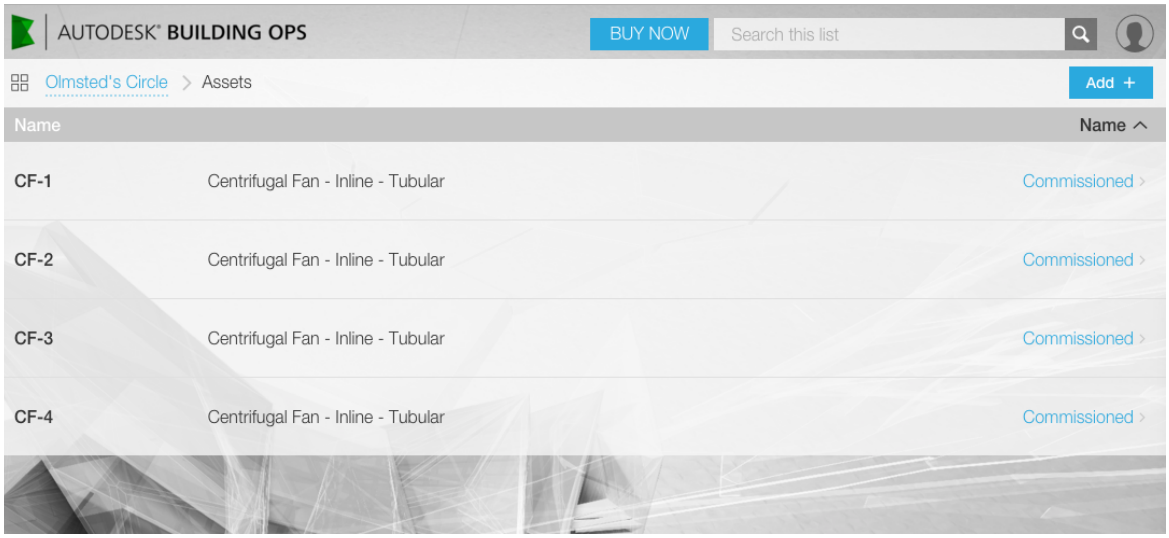
5. Go back to the Equipment page in BIM 360 Field, and paste the export code you generated in Building Ops. You will be asked to confirm the export to the building of your choice (image on right).





The selected BIM 360 Field equipment, along with the 3D model brought from BIM 360 Glue, images, PDFs and barcode added in Field during the construction and commissioning phase are exported to Autodesk Building Ops and can be viewed on both the iOS and web app.

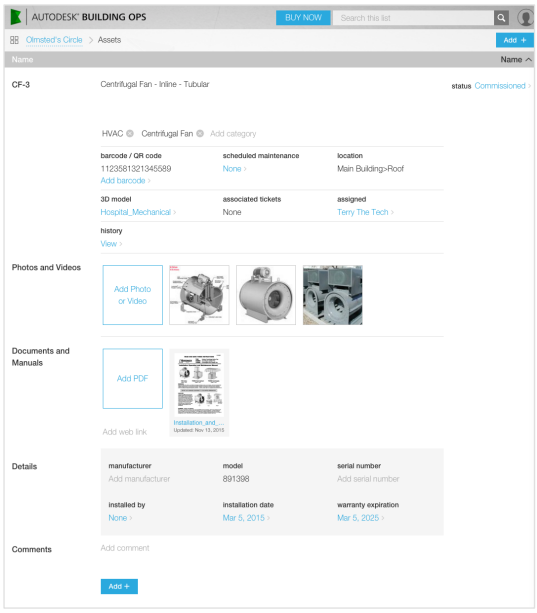
The same process can be repeated to export additional equipment from BIM 360 Field.



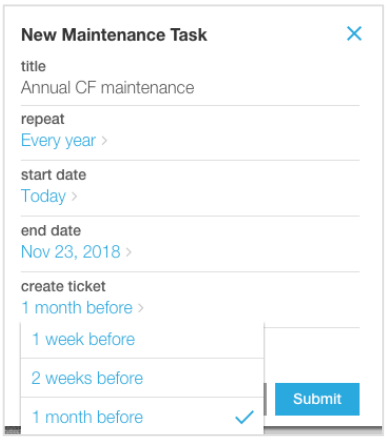
Scheduling Maintenance of Assets

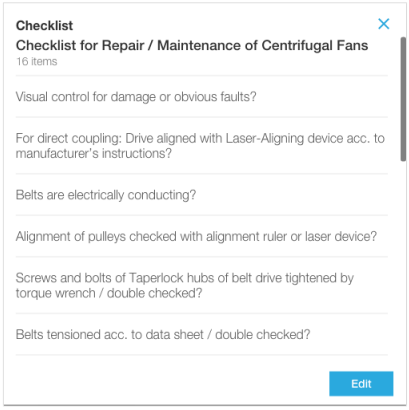
Now, let's add scheduled tasks for maintenance of the building assets, for example mechanical and electrical or other equipment. These tasks will create preventive tickets.

1. Click on one of the asset we just imported from BIM 360 Field to view its details: description, barcode, images, documents, etc. We will assign the responsibility of maintaining that asset to a Technician by clicking on the "Assigned" link and selecting an existing or adding a new technician.

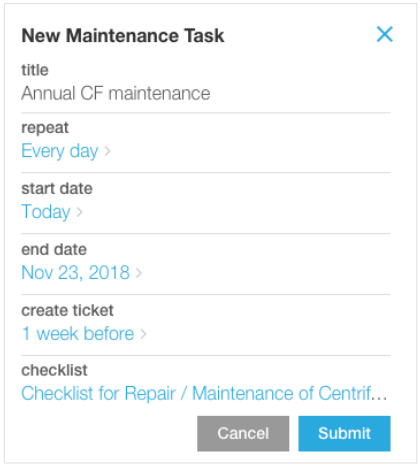


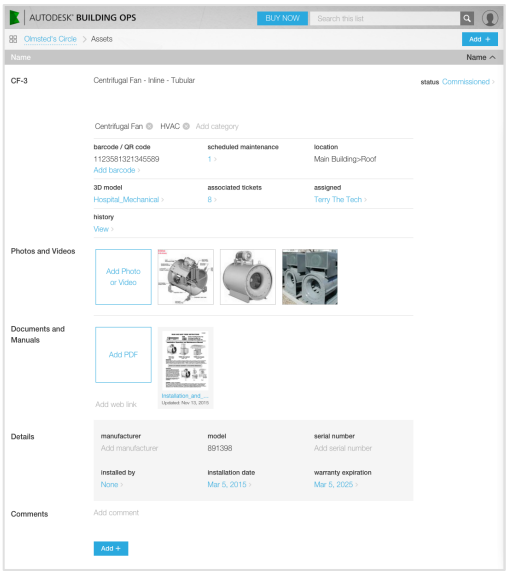
2. To create a preventive maintenance schedule, click on "Scheduled Maintenance". Add task title, repetition interval, start and end date, and when you want the ticket to be created. You can complete the creation of the scheduled maintenance task at this point, or if you want you can add a checklist. This checklist will be instantiated in the ticket created from this repeatable task. Click on None> to select an existing checklist or to add a new one.

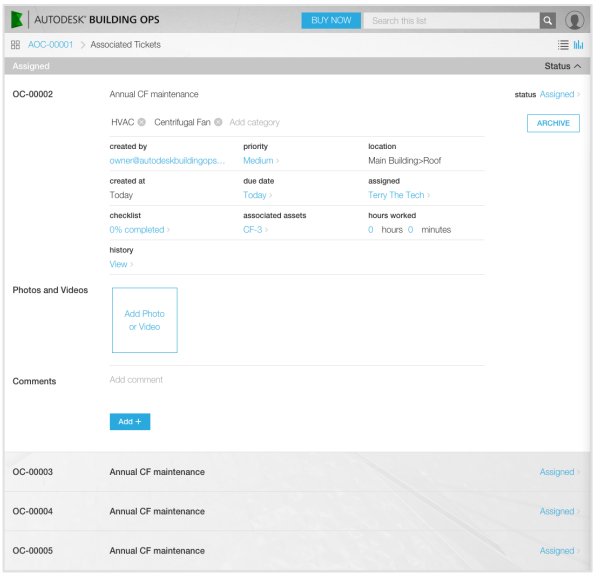




3. Click Done when you complete adding the checklist items, as well as the details of the new maintenance task. The new preventive maintenance tickets will be created and will display in the list of tickets. They are assigned to the Technician we added previously, and have due dates for the time interval in which they are scheduled.







Learn How to Use Autodesk Building Ops

Use this chapter you will learn how to:

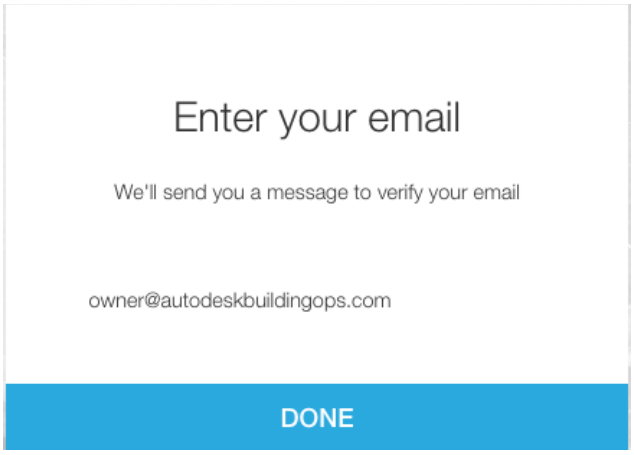
1. Join Building Ops as an Owner and Create a portfolio
2. Add your First Building
3. Add a Technician
4. Create and Assign a Ticket
5. Import Equipment (Assets) from a CSV Template
6. Prepare Equipment in BIM 360 Glue and BIM 360 Field for use in Autodesk Building Ops
7. Connect a Building in Panoramic Power to one in Building Ops, and Start Receiving Predictive Maintenance Tickets for the Assets
8. *(Repeated in context) Schedule Preventive Maintenance Tasks for an Asset*
9. Work on an Assigned Ticket as a Technician
10. Find a Specific Asset, View its Details, and Complete a Scheduled Task as a Technician
11. Join Autodesk Building Ops as an Occupant, and Add a Ticket
12. Customize and View Ticket Reports

We recommend you use following the following devices or browsers to be able to successfully follow the exercises in this document:

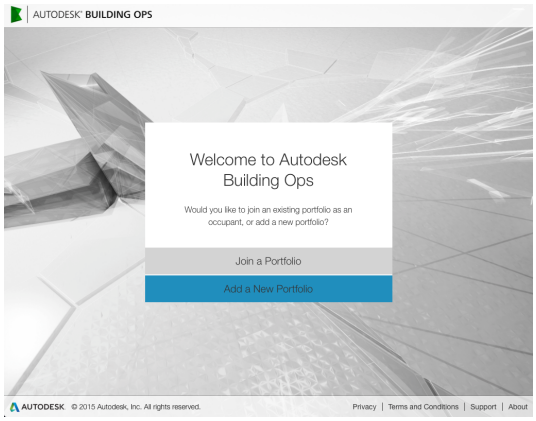
- *iOS device (iPhone 5, 6 or 6+, iPod 5 or iPad) with the latest version of iOS 8 or iOS 9*
- *Any mobile phone that can receive SMS*
- *Computer with internet access and the latest version of Safari, Chrome, or Internet Explorer*

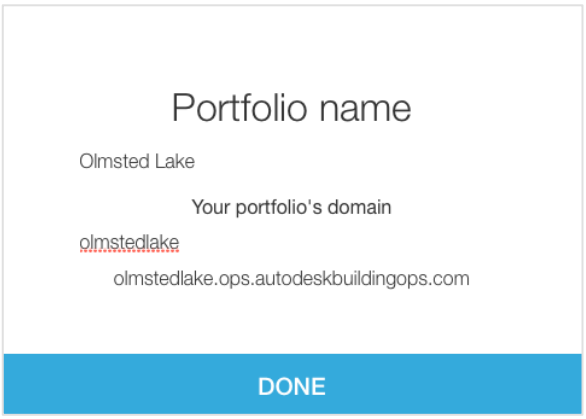
Exercise 1: Join Building Ops as an Owner and Create a Portfolio

1. On a web browser, go to http://autodeskbuildingops.com and enter your email address

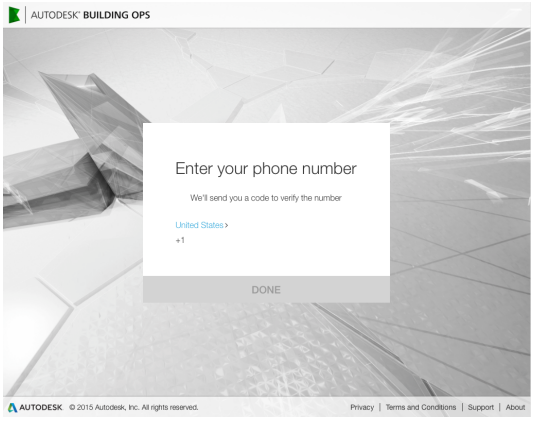


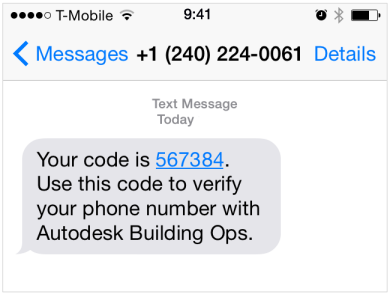
2. You will be asked whether you want to Add a new portfolio, or Join an existing one. Chose " Add new portfolio". On the next page, add the portfolio name.



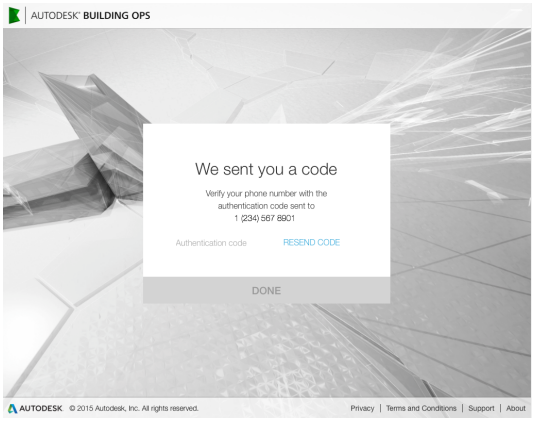


3. Building Ops will send you a confirmation email. Click on the link in the email to confirm.
4. Next, Ops will ask you to enter your mobile phone number. You will receive a text message on your mobile phone with a 6-digit authentication code. Note that this code can only be used once.

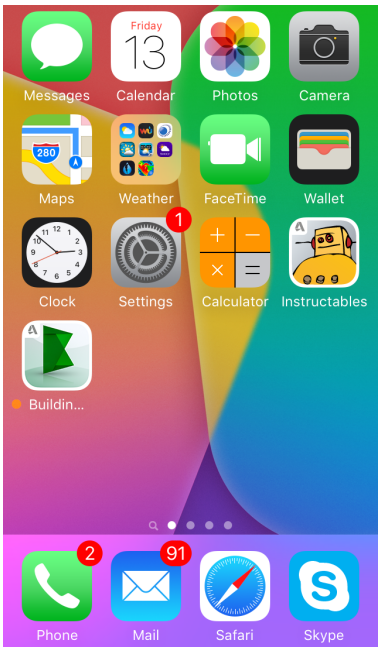




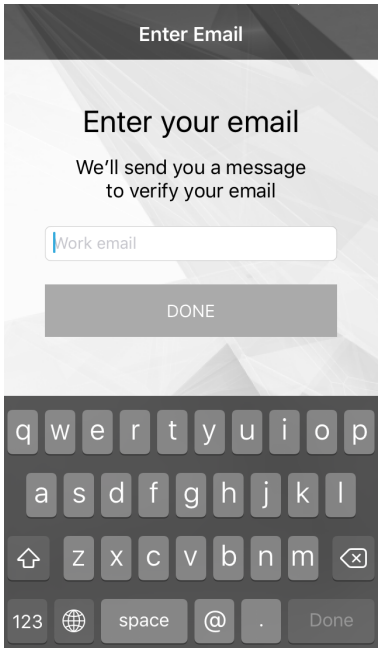
5. Enter the code. You have logged into Building Ops on the web.

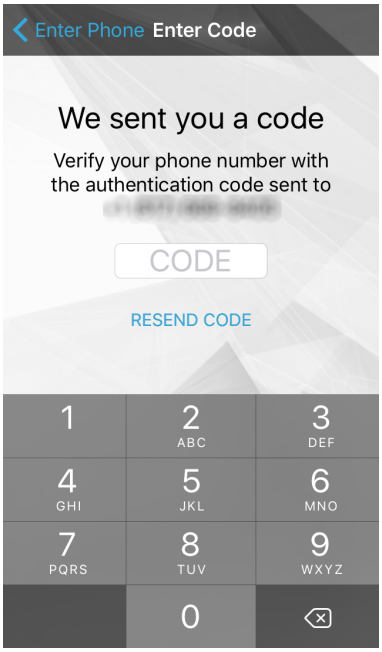


6. Now let's do the same on your iOS device: First download "Autodesk Building Ops" from the App store, and then open the app.



7. Enter the same email you used to login on the web. The Building Ops app already knows your phone number entered on the web. You will receive a 6-digit authentication code. Enter the code.

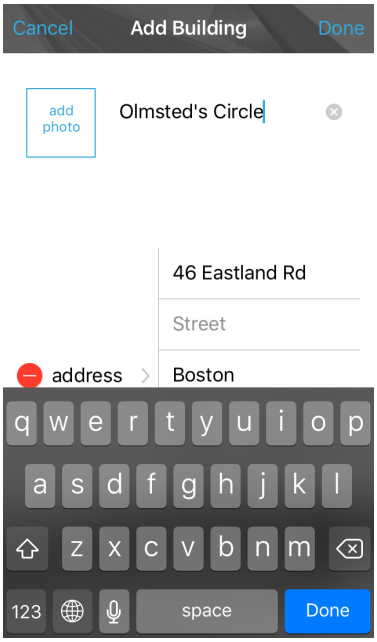


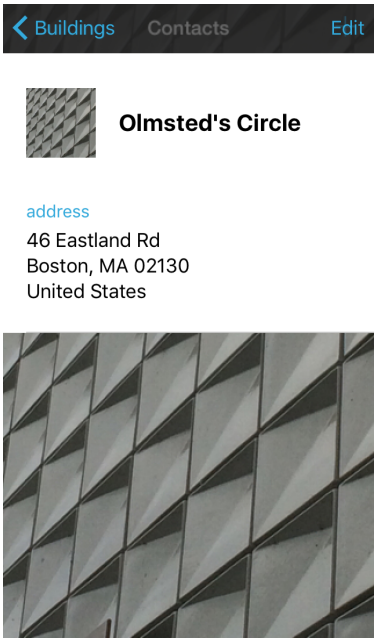


Exercise 2: Add a Building

1. You are now in the iOS app. Tap the hamburger icon "=" to see your portfolio(s). Let's add a building. Tap the "add building" panel to add your first building. You can do the same on the web.

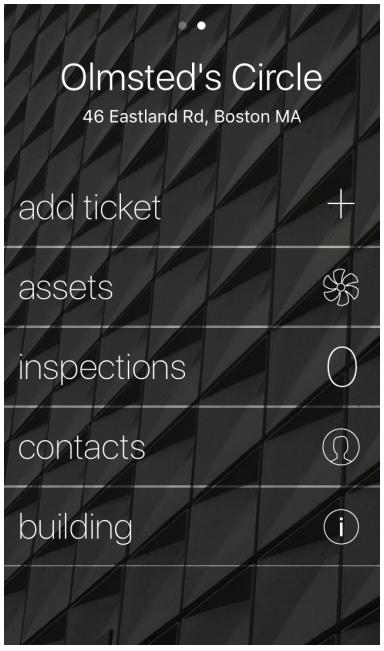
2. The new building will be geo-located if Location Services are active on your iOS device. Add a Building name and a photo. Tap "Done" to create the building and verify the building address.





Exercise 3: Add a Technician

1. Tap the "< Building" to go the new Building page.
   To add a new technician or manager, tap the "contacts" panel.



The only contact on the list will be you, the owner of the portfolio. Tap the + button on the top right corner of the page to add your first contact.

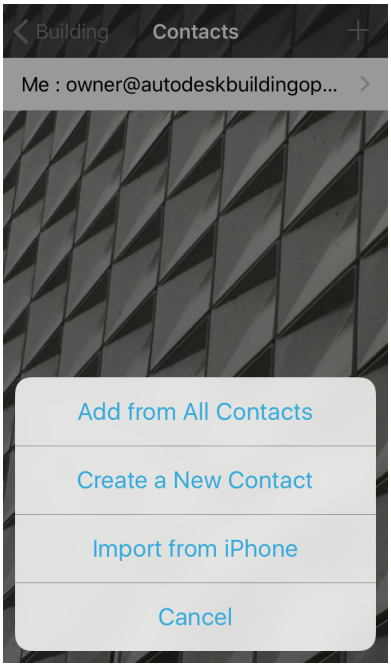
You will be asked whether you want to:

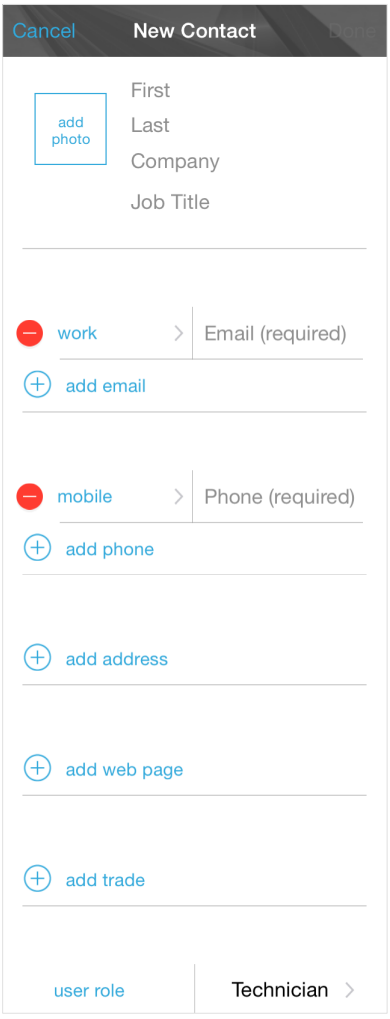
- Add from All Contacts
- Create a New Contact, or
- Import from your iPhone.

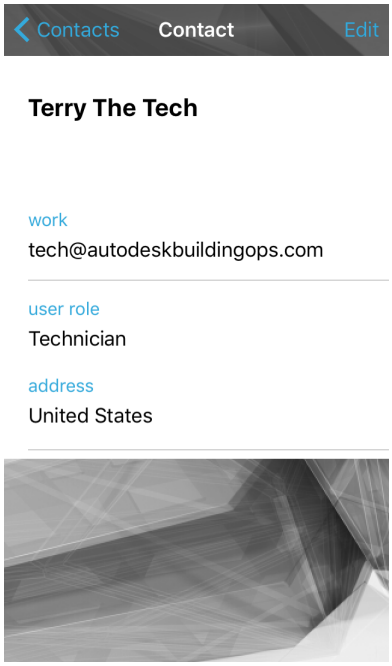
On the web, you can also import contacts from a CSV file.

2. Tap “Create a New Contact” to add a technician, vendor, manager or co-owner for your portfolio. Remember that you will need to add a different email. (This can be your private email). The email field is required to add a new contact, or you will not be able to create the new contact. The contact that you invite to join can add their mobile phone number when they register.

   Swipe down the page to reach the “User Role” field. The default user role for newly added contacts is a Technician. You can change the role to a Manager, Vendor, or Co-owner. For this exercise, keep the user role of Technician. Once the email and mobile phone number are added, tap the “Done” button to create the new contact.

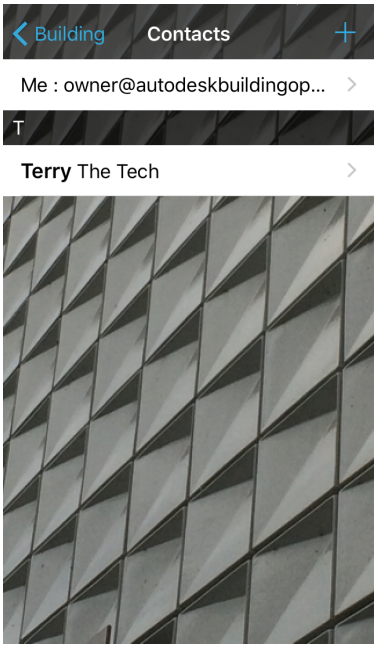


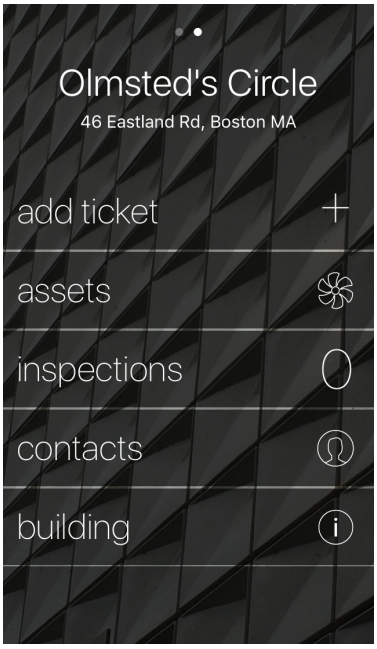




The newly created contact will receive an email message, letting them know that they’ve been added to your building in Building Ops. They will show as “Pending” on the list of contacts on the web until their first login. Tap the <Contact button on the top left side of the page (third image above) to go back to the list of contacts.

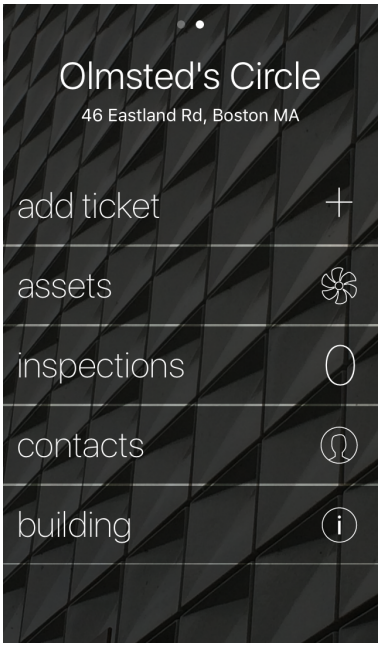
You can either add another contact, or tap the <Building button to go back to the Building page.

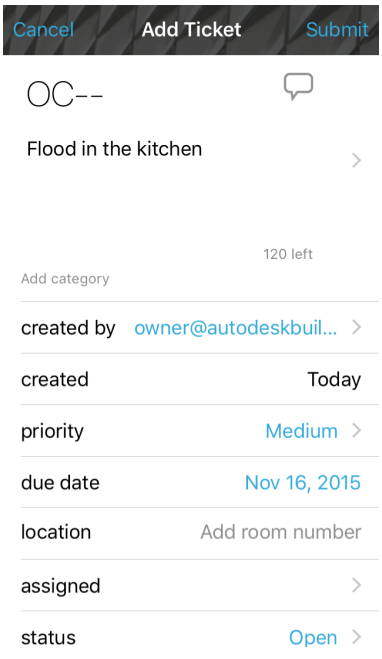




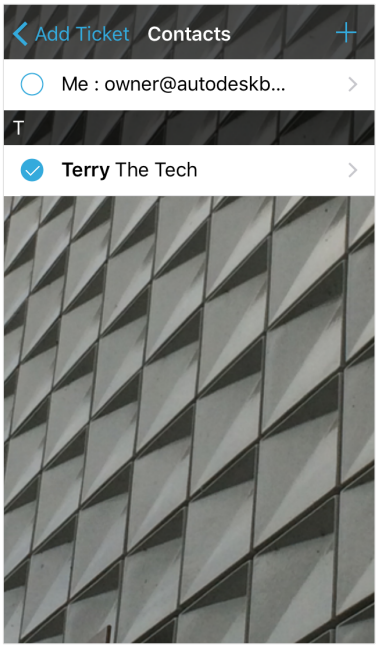
Exercise 4: Create and Assign a Ticket

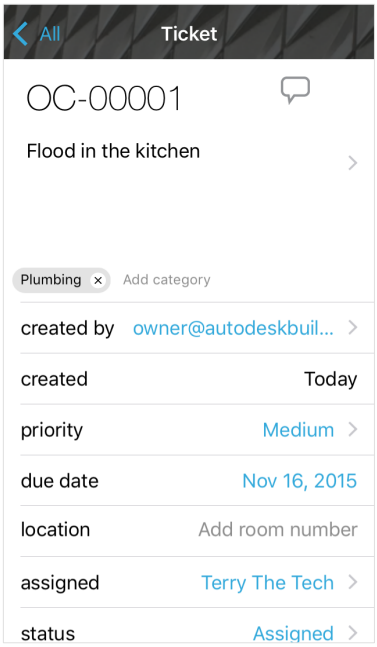
1. In this exercise we'll add a reactive ticket and assign it to the technician. On the Building page, swipe the screen up to get to the lower panels. Tap "add ticket", add description, change the priority and due date, add location, or take a photo.



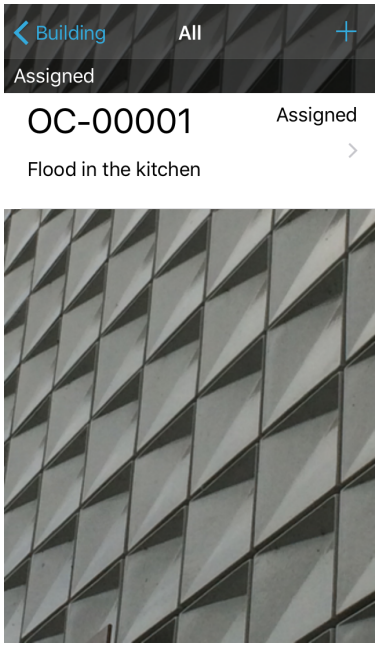


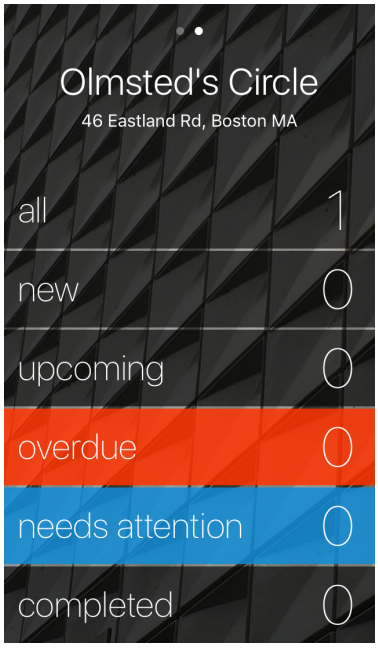
2. Lets assign this ticket to the Technician we added in the previous exercise. Tap the Assigned cell. In the list of Contacts, select the contact you want to assign to this ticket. In the Ticket details page, the Assigned field will include the name of the selected technician.





You've just created a reactive service ticket and assigned it to the technician that was added moments ago. If you'd like, add several more tickets and assign them to the same technician, or create / assign them to another technician, vendor, manager or co-owner.

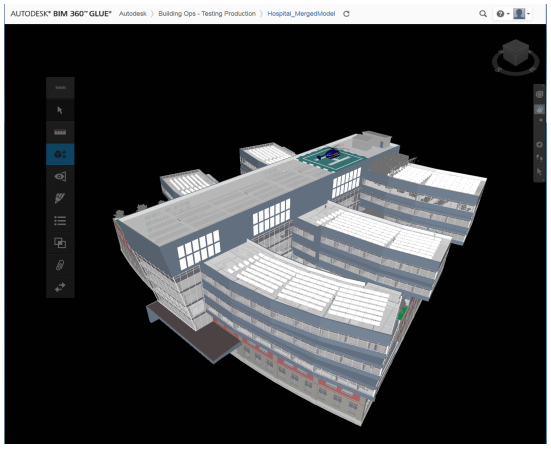


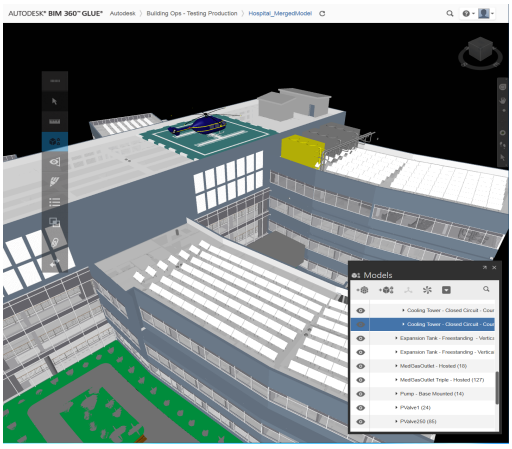


Exercise 5: Prepare equipment in BIM 360 Glue and Field for consumption by Building Ops

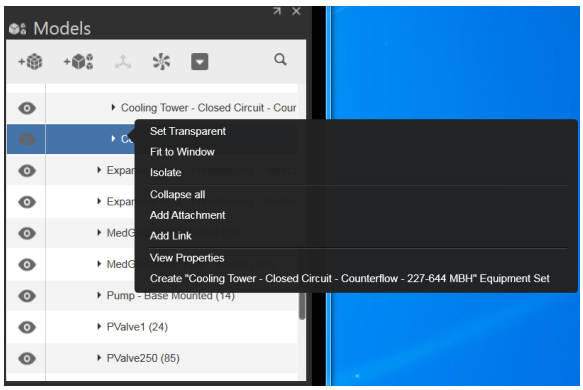
In the first part of this exercise we'll create an equipment set from a model in BIM 360 Glue, and will share that equipment set with BIM 360 Field.

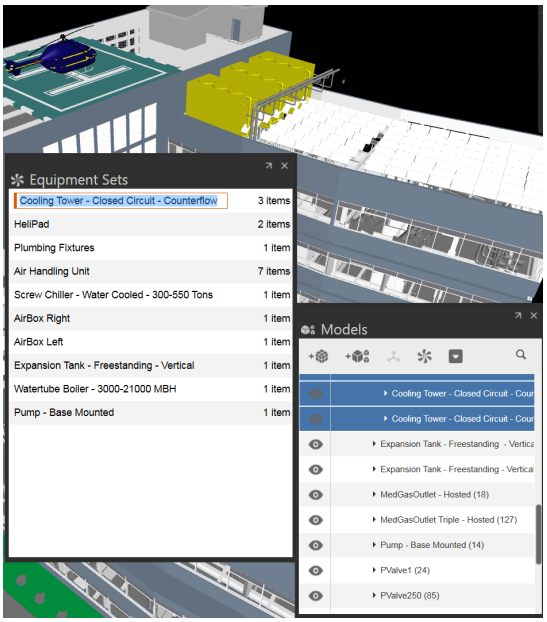
1. Open Hospital_MergedModel in BIM 360 Glue, select one of the cooling towers on the roof of the building and view it in the Model list.



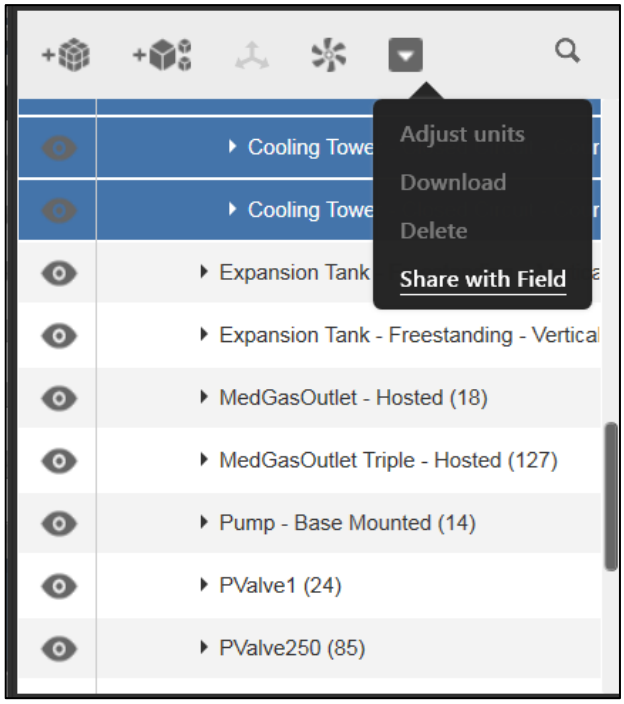


2. Right-click the "Cooling Tower" and select "Create … Equipment Set". The equipment set will be shown in the Equipment Set list. We can edit its name, but need to hit Return to confirm the creation of the Equipment set.



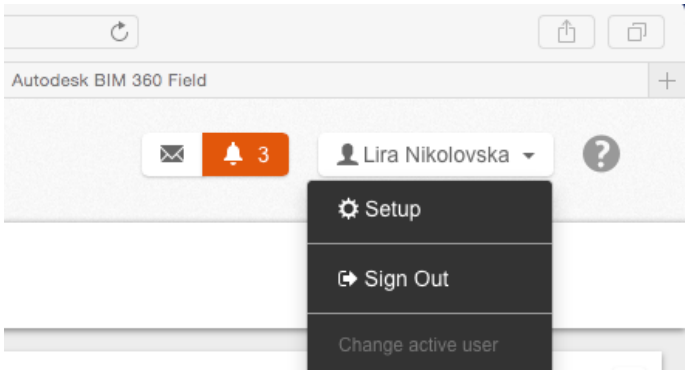


3. Share this BIM 360 Glue equipment set with BIM 360 Field. In the Models panel, click on the last button on the top of the panel and select “Share with Field”. The equipment sets are now shared with BIM 360 Field.



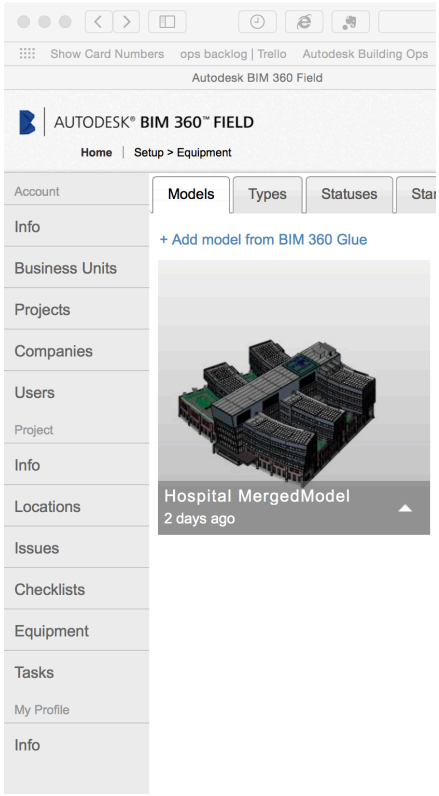
In this second part of this exercise, we’ll associate the BIM 360 Glue model with a project in BIM 360 Field and add additional equipment properties.

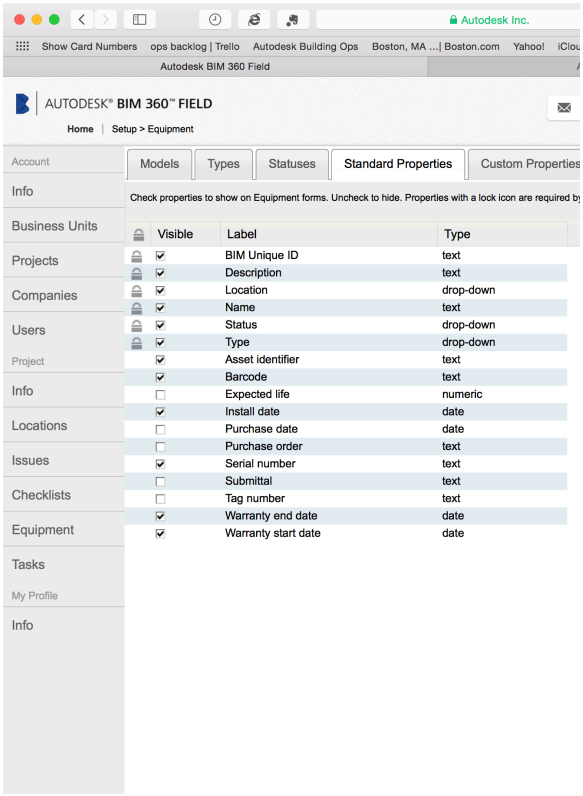
4. We are in a project in BIM 360 Field. First, we navigate to the user ID located on the right top side of the browser window. We’ll click on it, and select “Setup” from the dropdown.



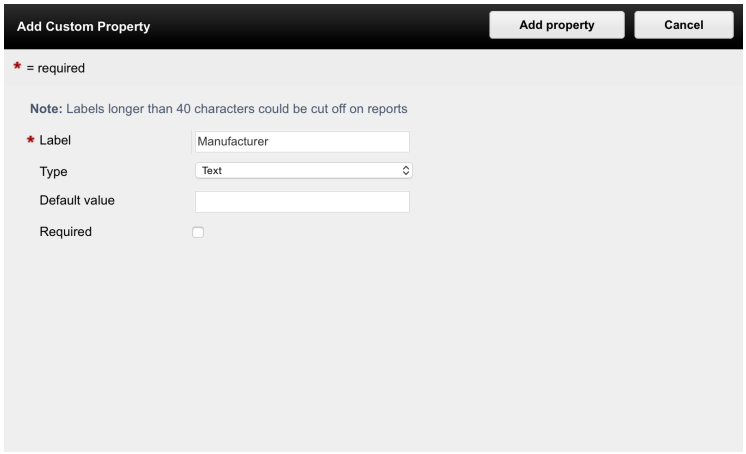
5. Click on “Equipment” on the Left menu. The Hospital model from BIM 360 Field has already been added. To add additional models, we can click on “Add model from BIM 360 Field”.

   Review the tab “Standard Properties” to choose which properties you want to include.

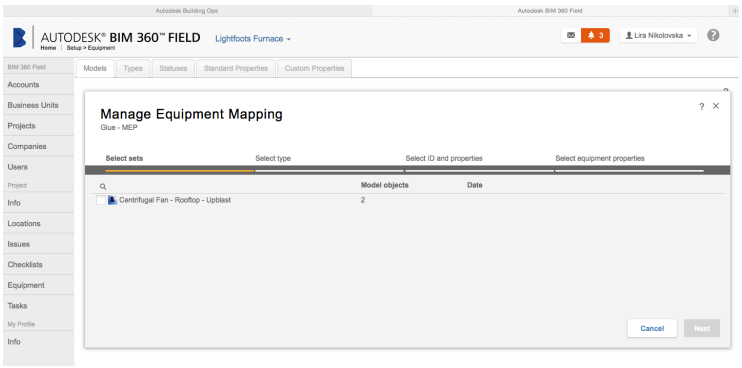




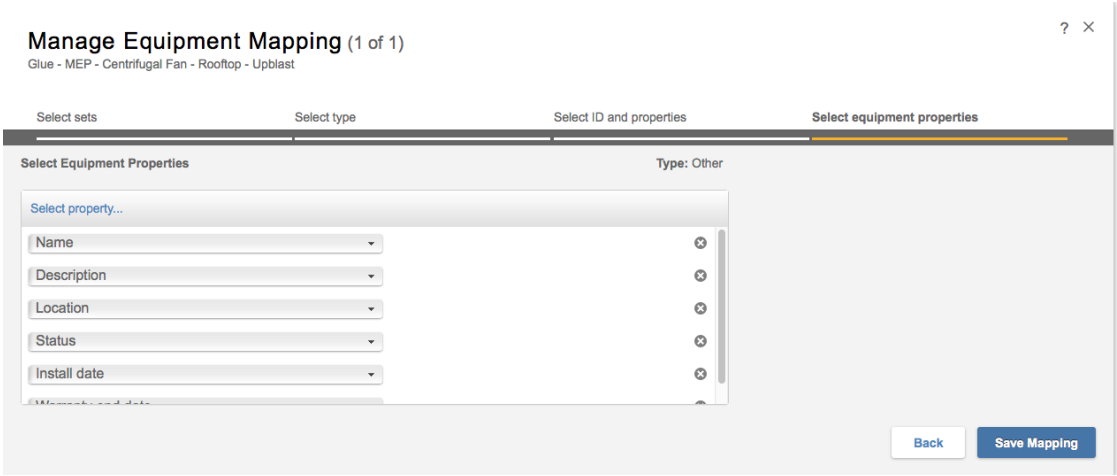
6. Click on “Custom Properties” to add additional properties.
   Add “Manufacturer” as a custom property.



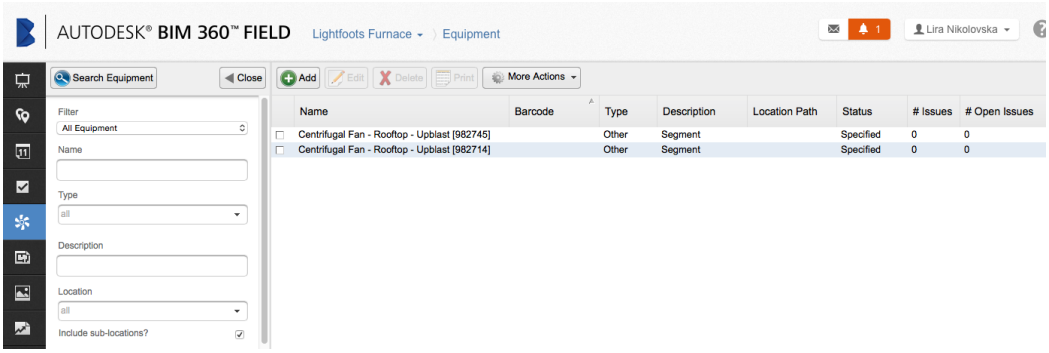
7. Now let's manage the equipment mapping. Back on the Model tab, mouse-over (or hover) the hospital thumbnail and click on "Manage equipment mapping". Select the equipment set, click Next, pick Standard mapping mode, click Next again...



8. To add equipment properties, you need to click the "Select property…" text string. Keep clicking until you create all equipment property you want mapped. The equipment is now mapped.



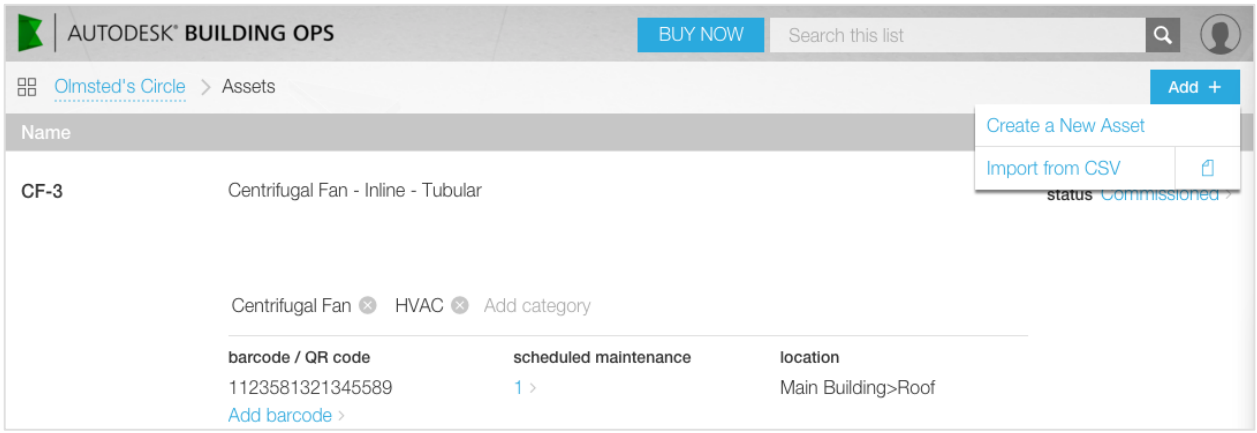
9. Go back to the equipment page to see the equipment brought from BIM 360 Glue. You can add a PDF, a photo to the equipment, a barcode etc. For this exercise, type in this barcode: **1123581321345589.** We'll use it later to search for that piece of equipment in Building Ops.



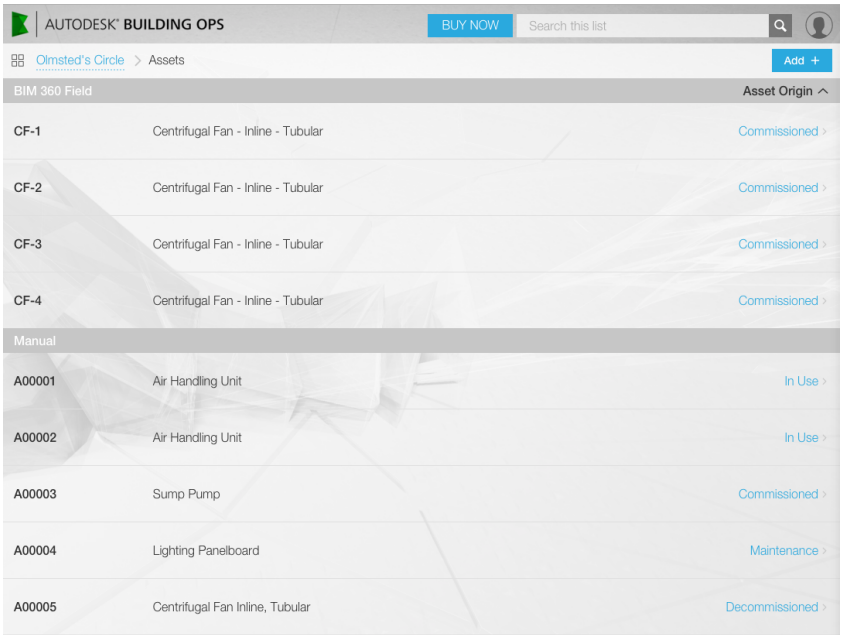
Exercise 6: Import Equipment (Assets) from a CSV Template

In addition to adding equipment to Building Ops manually or with import from BIM 360 Field, equipment can be added with import from a Comma Separate Value (CSV) file.

On the asset page for the building we created, click on the Add+ button in the right top corner of the screen. Select the Template icon to see how to rename the headers in your CSV, or to add your assets. You can also use your CSV file, but make sure to rename the headers in the CSV using the ones provided in the Ops CSV template for assets.



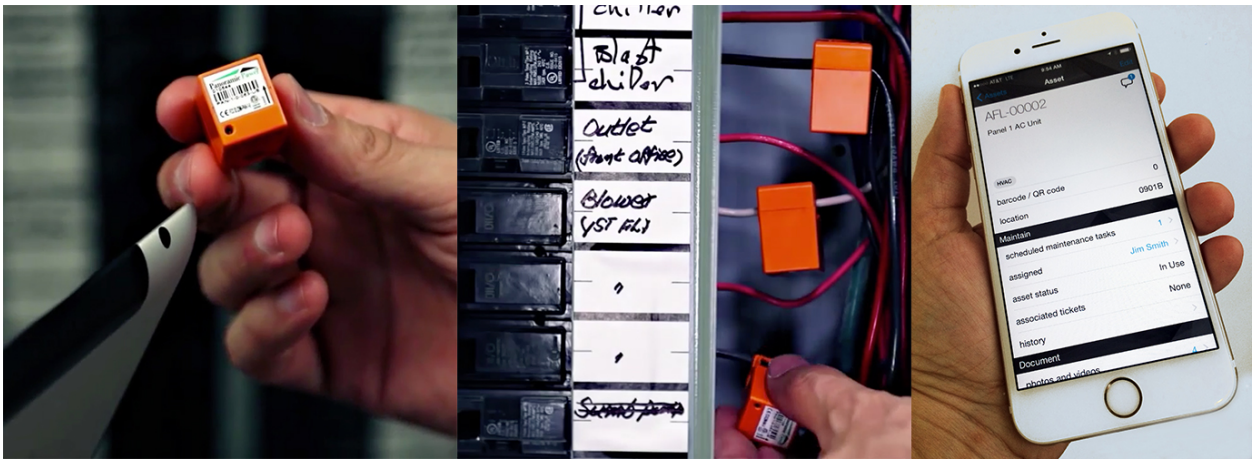
Once your CSV file is ready, select "Import from CSV" and chose the file you wish to import. The assets imported from the CSV will display in Building Ops, along the ones previously imported from Field. You can create scheduled maintenance tasks for these newly added assets, assign them to a technician, add images or documents – everything you were able to do with the assets added manually or with the export from BIM 360 Field.



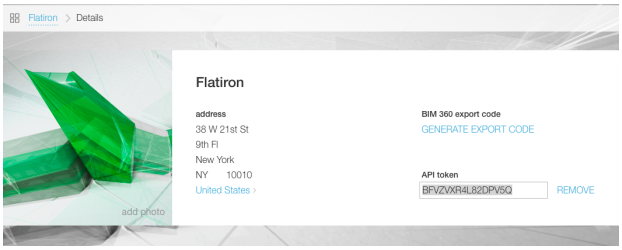
Exercise 7: Connect a Building in Panoramic Power to one in Building Ops, and Start Receiving Predictive Maintenance Tickets

These are the steps to accomplish equipment fault detection for an existing building:

- **Snap** the Panoramic Power sensor to the wire in the panel, map the sensors, and setup PowerRadar
- **Connect** the building in Panoramic Power to the one in Building Ops
- **Receive** all equipment in your building in Building Ops, as well as predictive maintenance tickets using PowerRadar alerts for the sub-performing assets



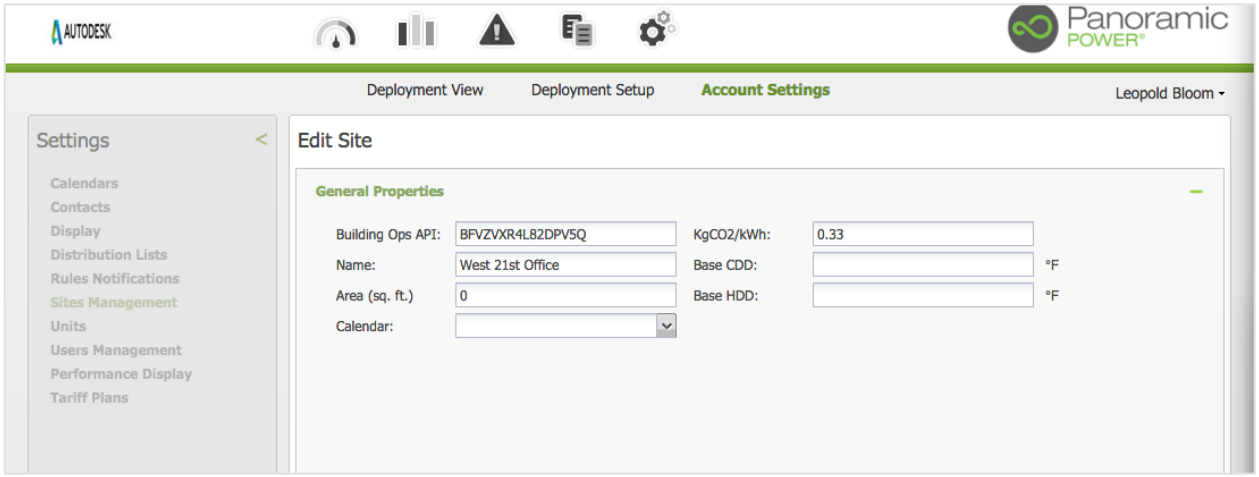
We'll start by going to the Building Ops building dashboard. Click on the "building" panel on the bottom right to access the building details page, then click on "GENERATE API TOKEN" and copy the token.

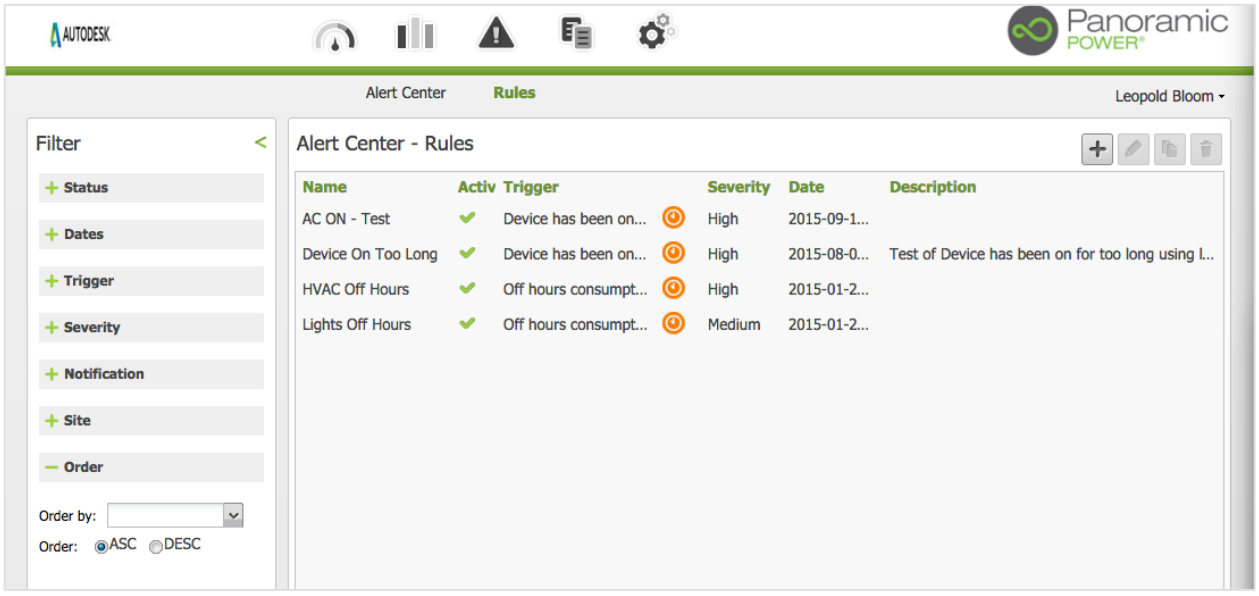


In PowerRadar, navigate to Account Settings and select Sites Management for your building.

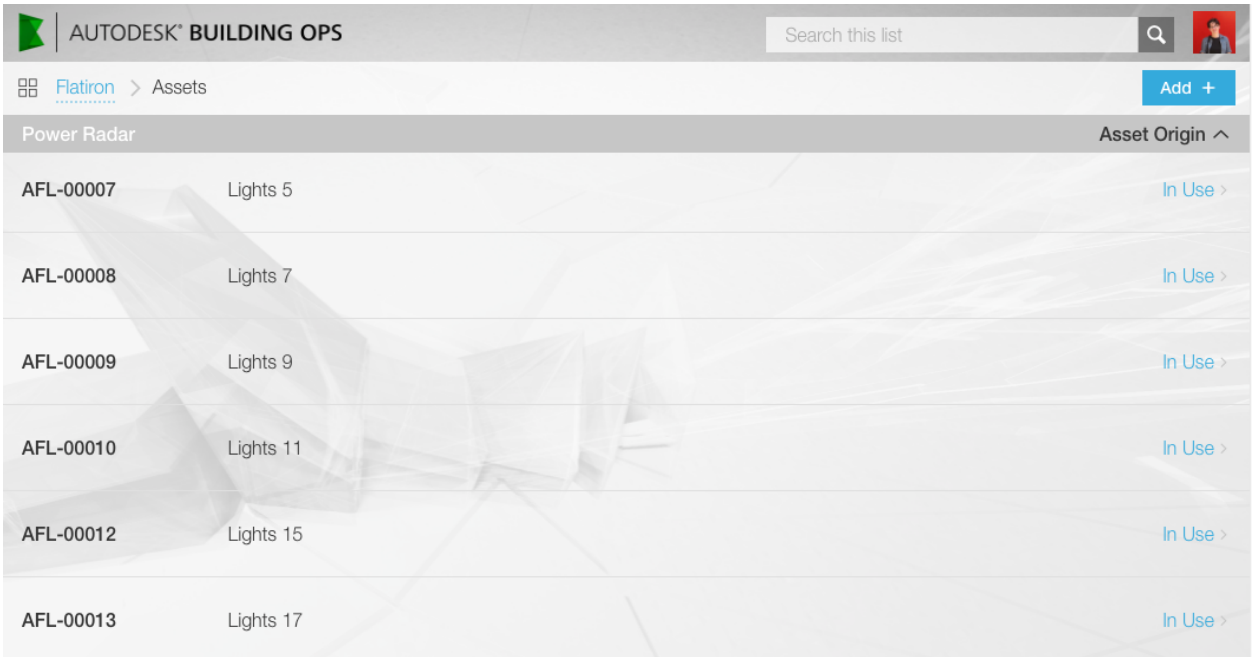
Paste the copied API token generated in Building Ops into the field labeled “Building Ops API”.

Preview the rules set up at the PowerRadar alert center to see when alerts will be launched should equipment fail to perform as expected.

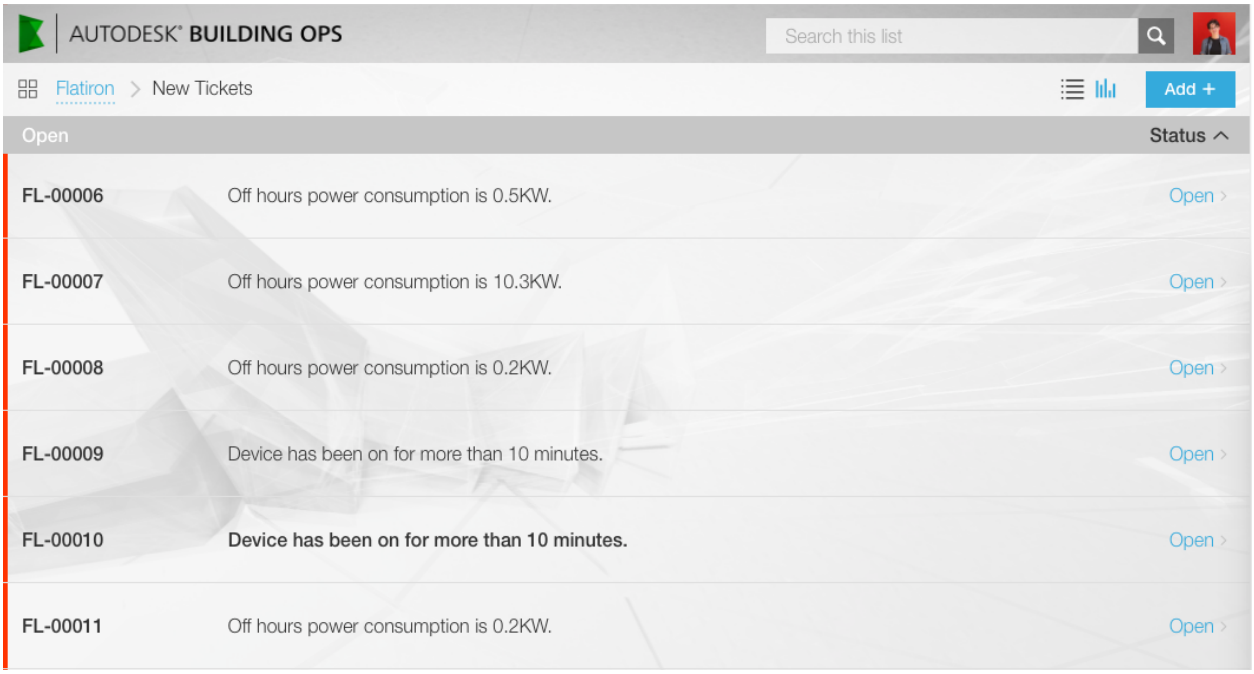




Now let's go back to our building in Building Ops and navigate to the "assets" page to see the assets that have been received by connecting the Panoramic building with the Building Ops one. The asset list in the image below is sorted by Asset Origin; if any additional assets were added manually, or via export from BIM 360 Field, they will also appear in this list.



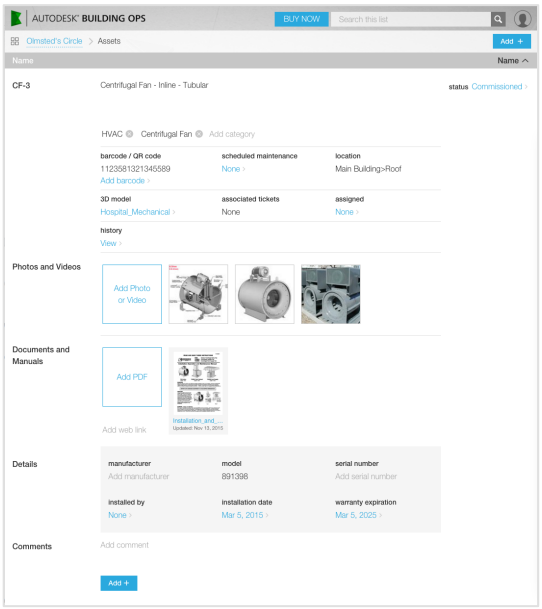
As soon as the Panoramic Power wireless, induction-powered sensors detect changes in consumption that trigger alerts in PowerRadar, they will create Tickets in Building Ops (see image below). That's it.



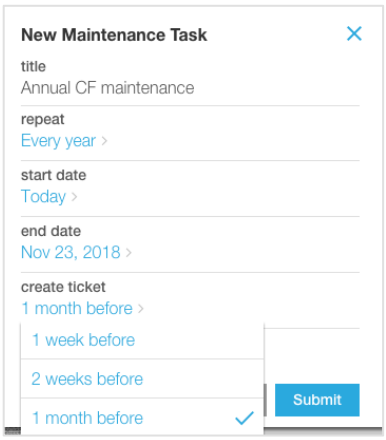
Exercise 8: Schedule Preventive Maintenance Task for an Asset, and Add a Checklist

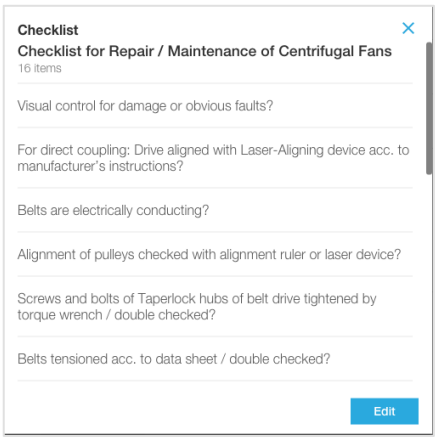
The process for adding scheduled tasks for maintenance of assets is the same regardless of the asset origin. In this section we repeat the process for scheduling tasks and creating preventive tickets.

1. On the web browser app, navigate to the Building you created in Exercise 2. Click on the "assets" panel, view the details of the asset(s) you just imported from BIM 360 Field and assign the asset to the Technician you added in Exercise 3. You can do this on both the web and iOS version of the app.

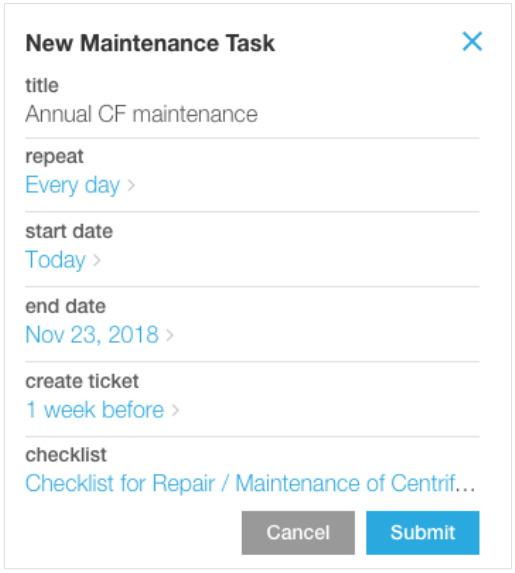


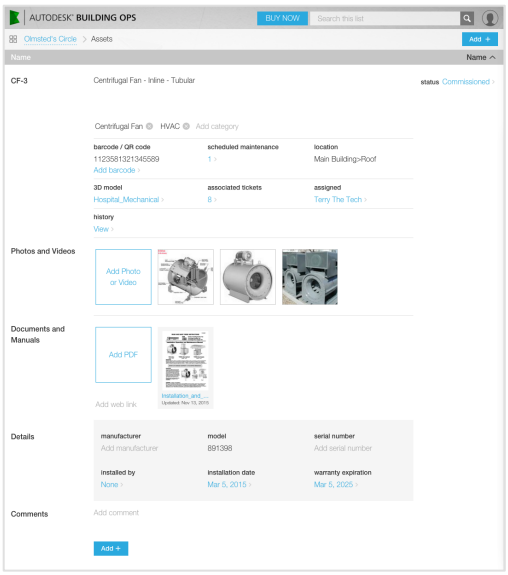
2. To create a preventive maintenance schedule or the asset, click on "Scheduled Maintenance". Add task title, repetition interval, start and end date, and when you want the tickets to be created. You can complete the creation of the scheduled maintenance task at this point, or if you want you can add a checklist. This checklist will be instantiated in the tickets created from this repeatable task. Click on None> to select an existing checklist or to add a new one.

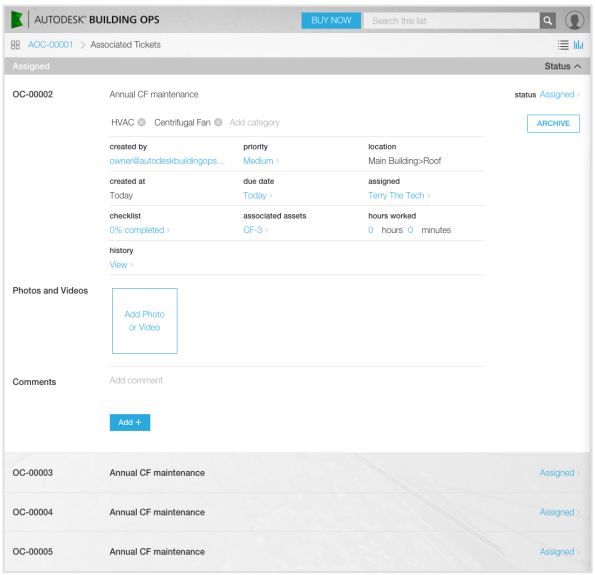




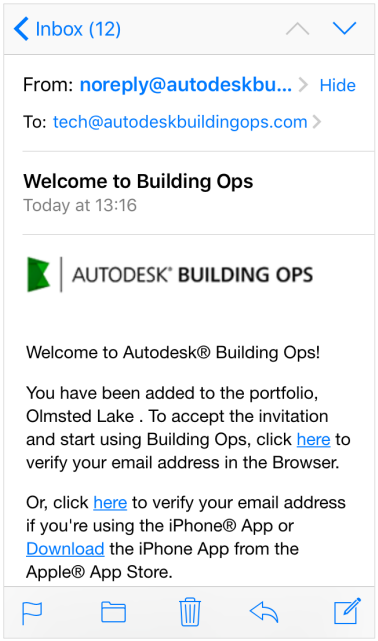
4. Click Done to complete adding the checklist items, as well as the details of the new maintenance task. The new preventive maintenance tickets will be created and will display in the list of tickets. They are assigned to the Technician we added previously, and have due dates for the time interval in which they are scheduled.







Exercise 9: Work on Assigned Ticket as a Technician

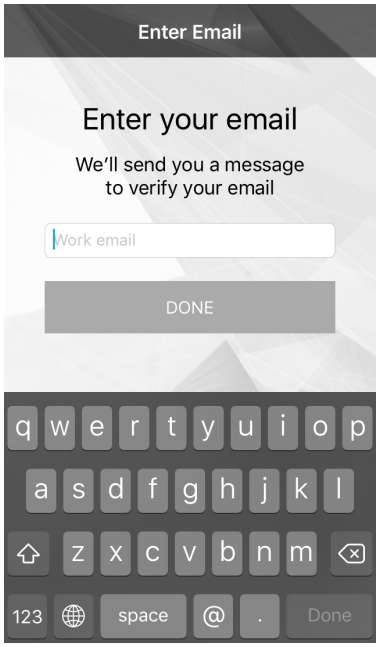


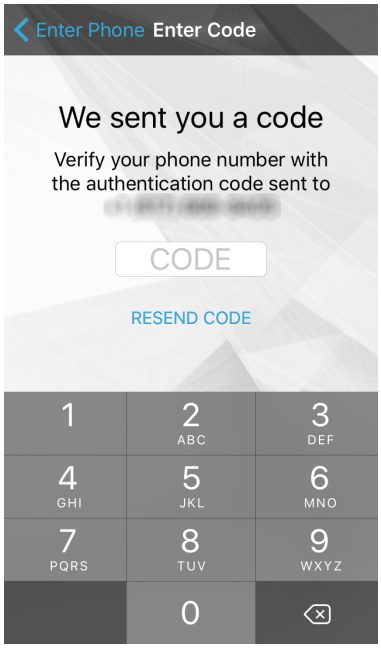
Once the (co)owner or manager adds a technician to a building, whether by adding them as a new contact or by assigning them to a ticket, the technician receives an email invite to join Building Ops.

The technician will need to look for that email on their iOS device (we'll run this exercise on an iPhone).

1. Let's start by logging out as an Owner. Go to the All Buildings page, swipe it up to access the "settings" panel on the bottom of the page and in the Settings page, tap "Logout". This will bring you back to the "GET STARTED" page.

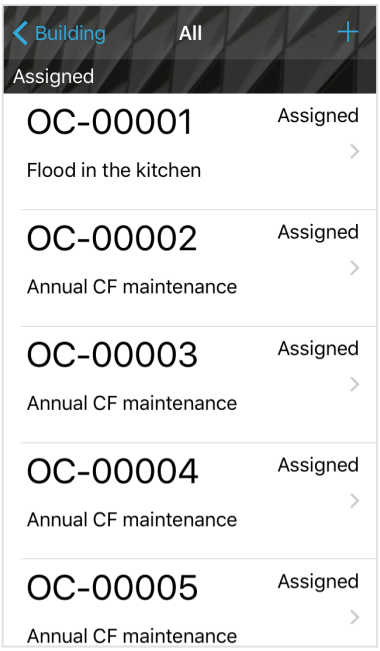
2. Enter the technician's email, their phone number, and then the 6-digit authentication code sent as a SMS to their mobile phone.



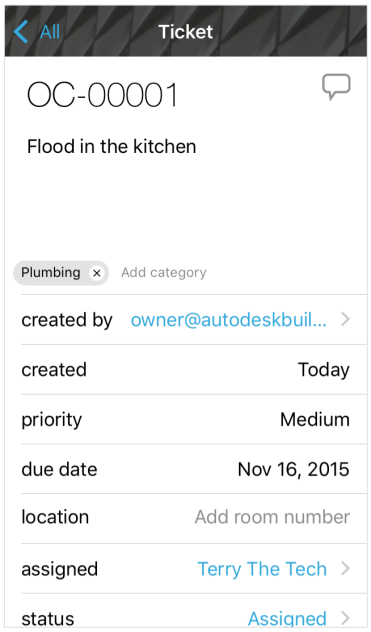


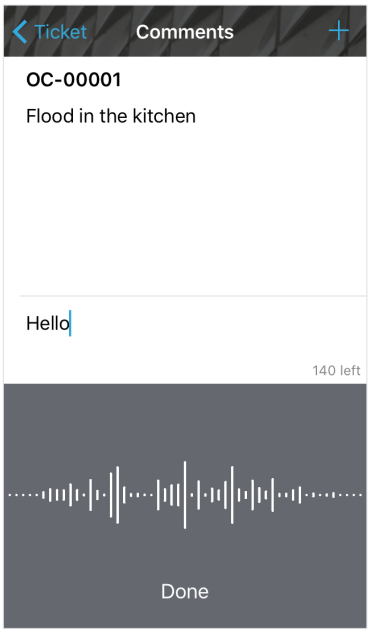
3. The All Buildings page will appear. Swipe up and down the building page to see what panels and information are available to this technician. So far there are 9 tickets, and 1 of them is upcoming.

   Let's check out all tickets. The first ticket says that there is a flood in the kitchen. Open it.

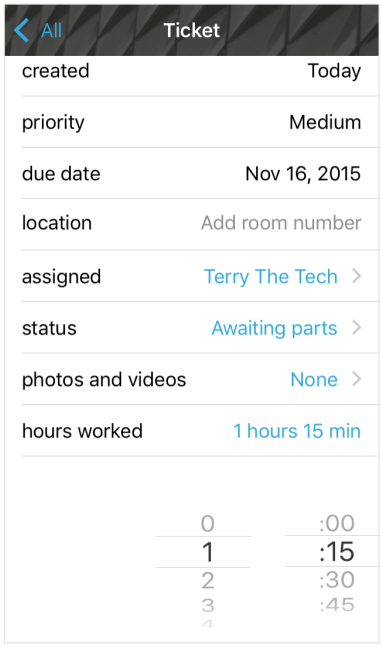


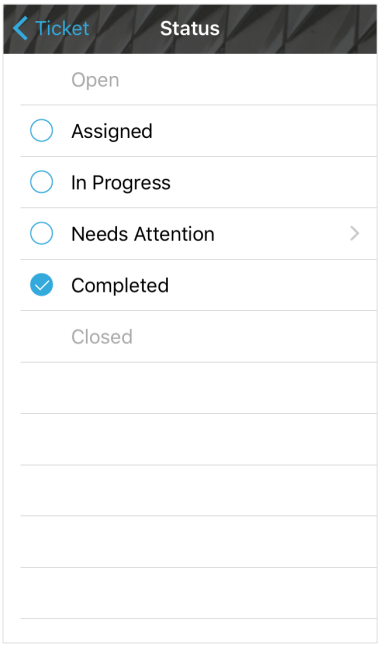
4. Add a comment to the ticket (type or speak) to inform the manager the problem is resolved.

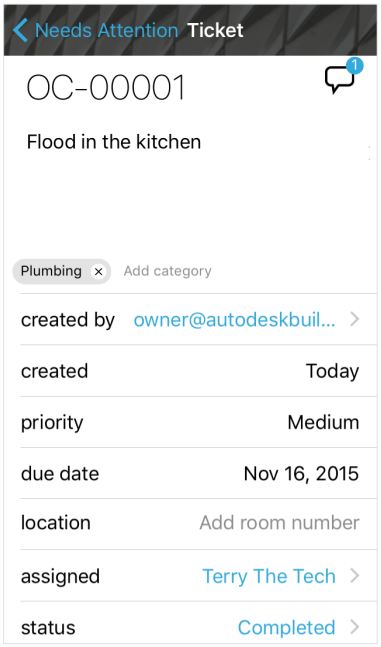




5. Next, add “hours worked” and change the ticket status to Completed. The ticket details are updated.





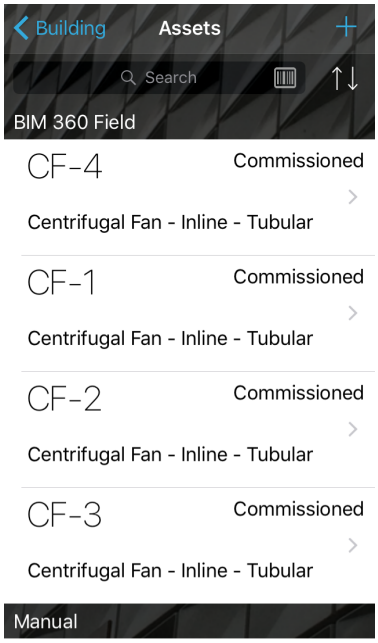


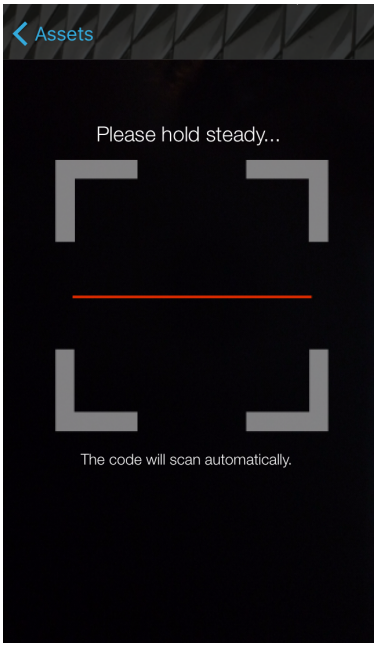
6. Go back to the Building page. The number on the panel for completed tickets now shows 1.

Exercise 10: Find a Specific Asset, View Its Details, and Work on a Preventive Ticket as a Technician

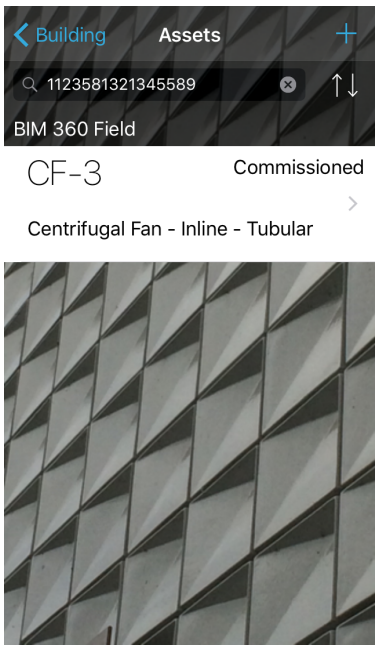
In this exercise, the technician will look for a specific asset by scanning the below QR code.

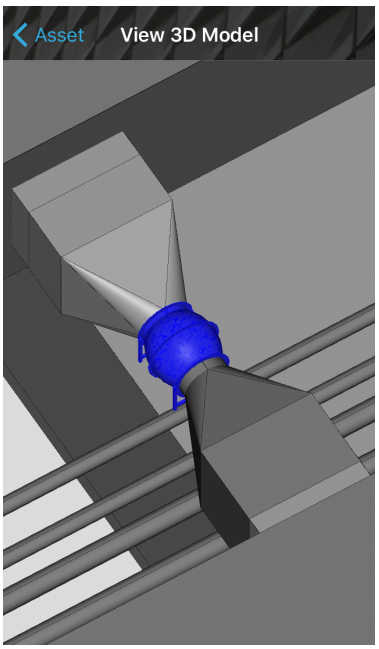
1. Go to the list of assets. Pull down the list to expose the search bar, and tap the |||| icon to search by barcode (this is the asset code we entered in Field). Scan the QR code (third image on the right).

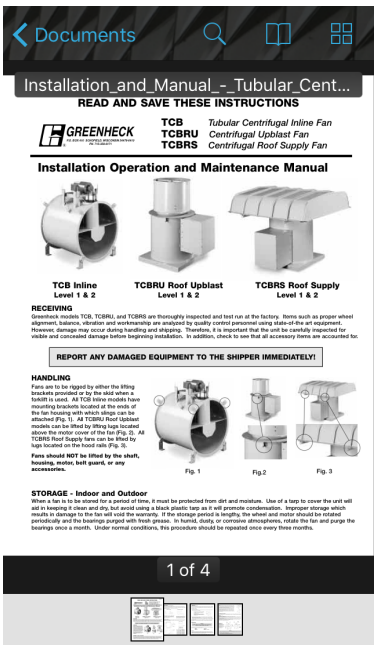




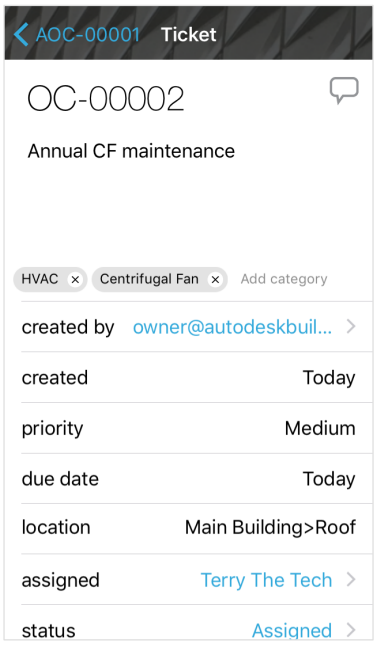
2. The search result(s) will show in the list. Open the found asset. Review its details; open the 3D model, images and PDF documentation. Add a photo or a comment if you'd like.

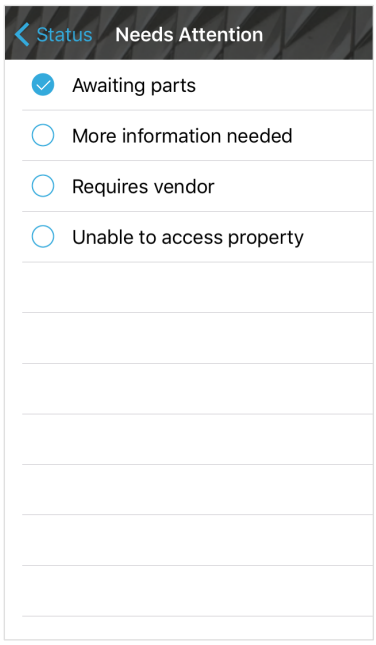


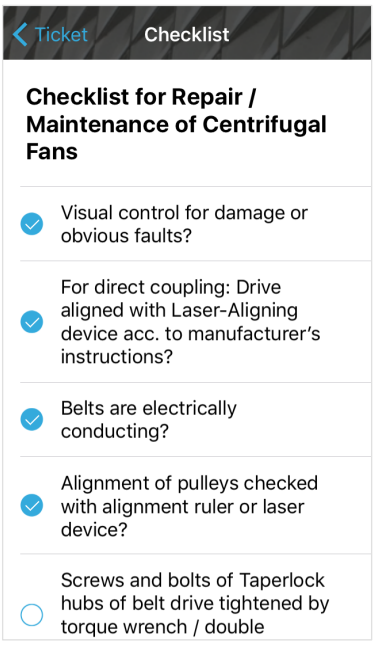




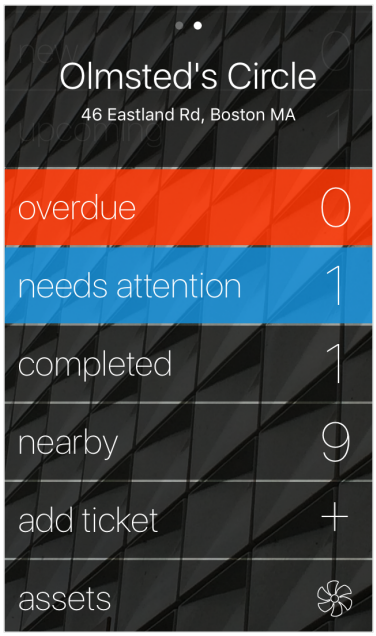
3. Open the first preventive ticket associated with the asset, and change the ticket status to “Needs Attention”. Chose from one of the “Needs Attention” reasons. Next, open the Checklist added to this ticket and start marking the items as they are completed.

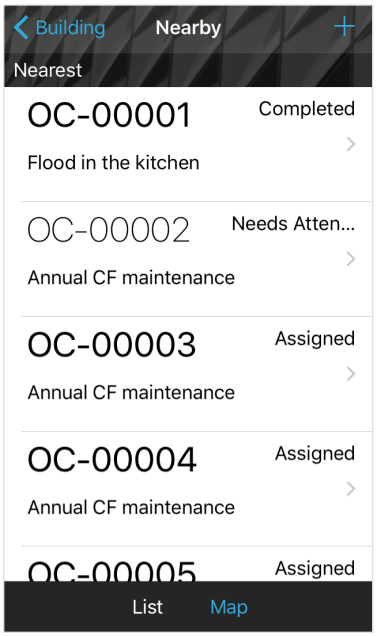


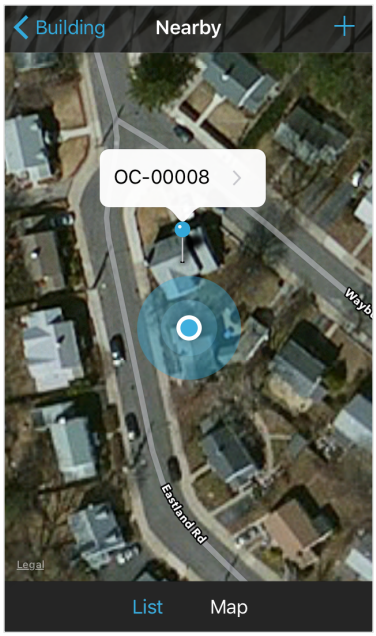




4. Now, let’s go back to the Building page and tap the “nearby” panel to review the tickets that are nearby. You can view them as a list or in a map.





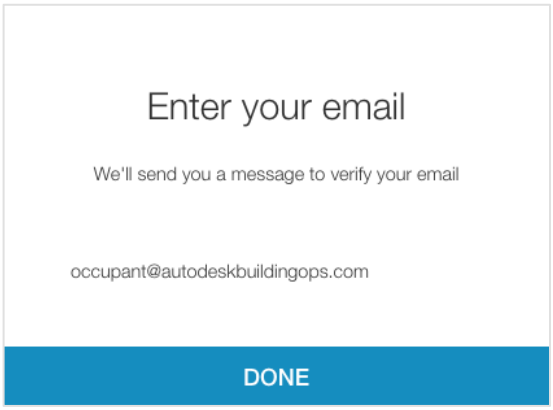


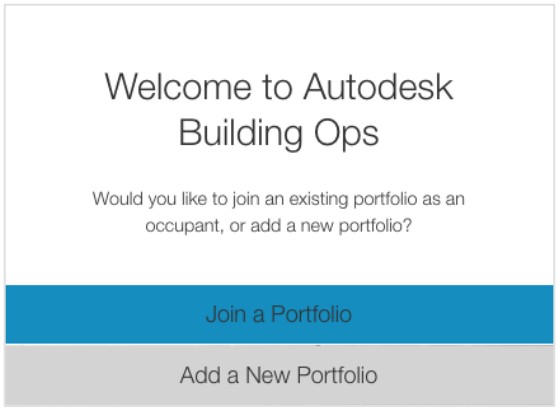
Exercise 11: Join Building Ops as an Occupant, and Add a Ticket

Joining a portfolio can happen on the web site or by using the iOS app downloaded from the App store. The Occupant can get the domain name of the portfolio from the Owner of the portfolio of buildings, either in an email or from a web site. In this demo we will work with the web app.

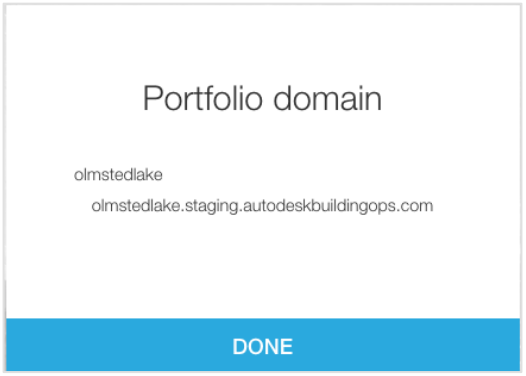
(Same steps apply with the iOS app)

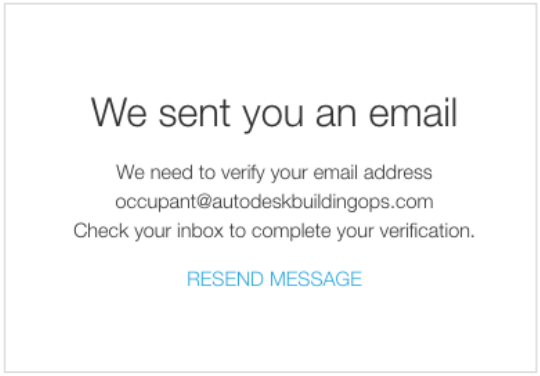
1. On a web browser, go to http://autodeskbuildingops.com and enter the occupant's email address. The occupant will be asked whether they want to Add a new portfolio, or Join an existing one. Chose " Join a Portfolio".



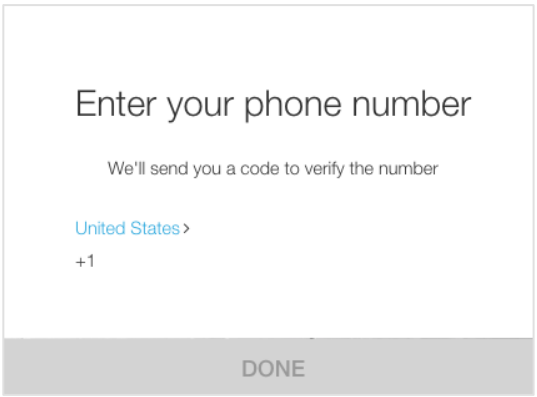


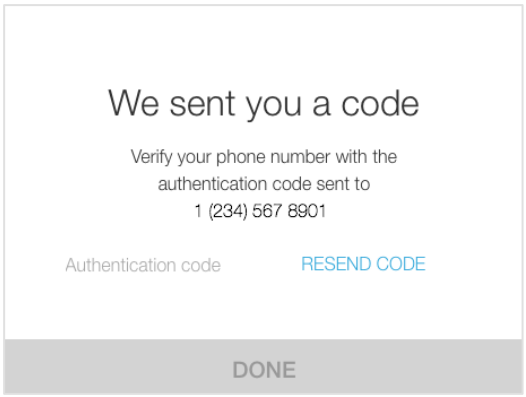
2. On the next page, add the portfolio domain. Building Ops will send a confirmation email to the occupant. Click on the link in the email to confirm.



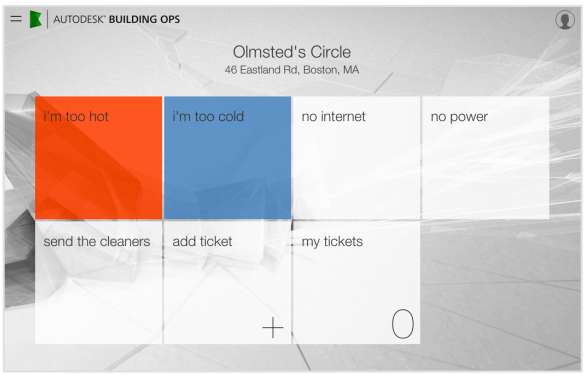


3. Next, the occupant will be asked to enter their mobile phone number. They should choose country code from the list of countries. The occupant will receive a SMS on their mobile phone with a 6-digit authentication code. Enter the code on the next page. Remember, this code can be used once.

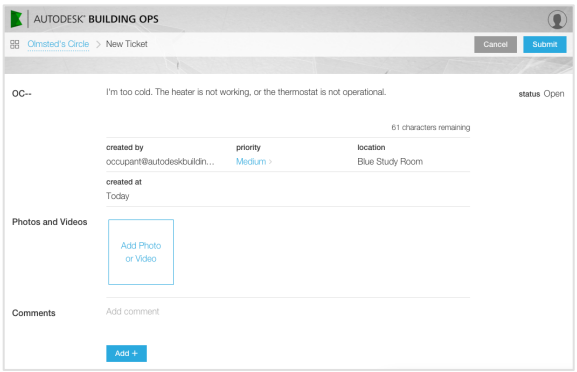




4. Notice that the occupant version of a portfolio in Autodesk Building Ops app is slightly different than the one for owners, managers and technicians. There is no All Buildings dashboard. Occupants see Buildings for which they can create tickets. On the building dashboard page, we've created several panels with most frequently filed tickets. Tap one of the panels to create a ticket.

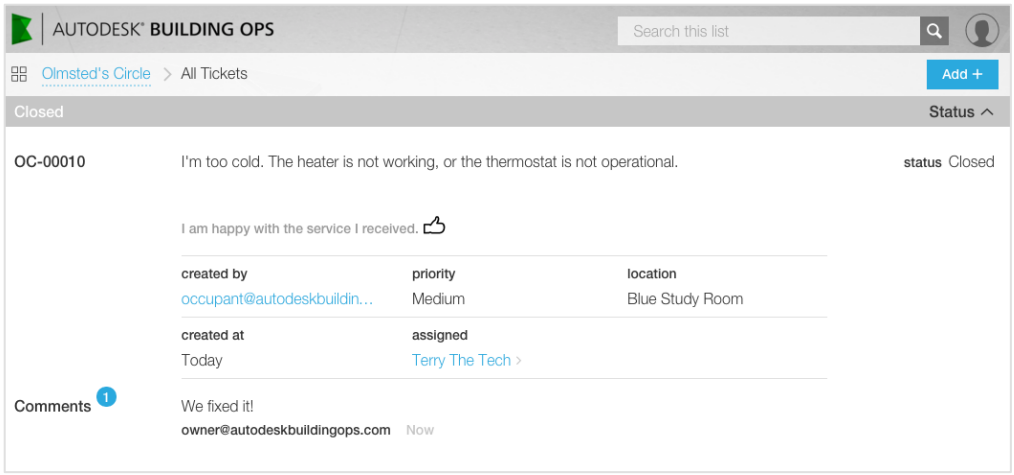


5. Add description to the ticket, location, a photo or a comment. When done with detailing the ticket, tap "Submit". The newly created ticket will show in the list of tickets for the occupant.



6. The ticket will show as a new ticket for the manager who will assign the tickets to a technician, change their priority, leave a comment for the occupant or technician etc.

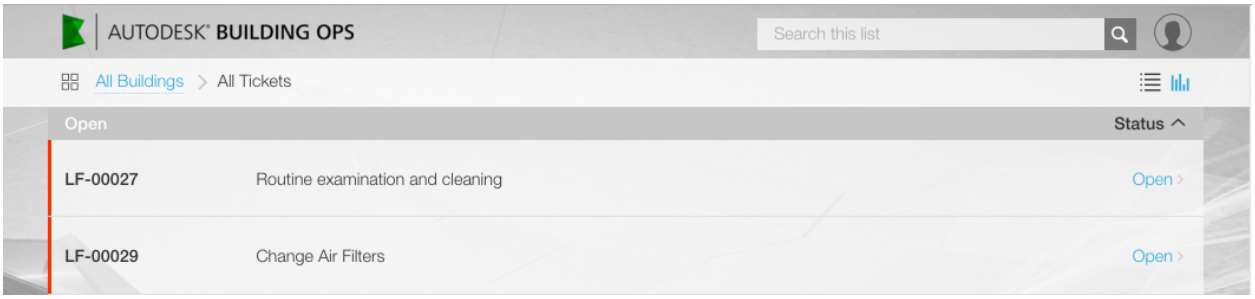
   When the work is completed and the ticket is closed, the occupant can leave positive feedback for the technical who fixed their maintenance issue.

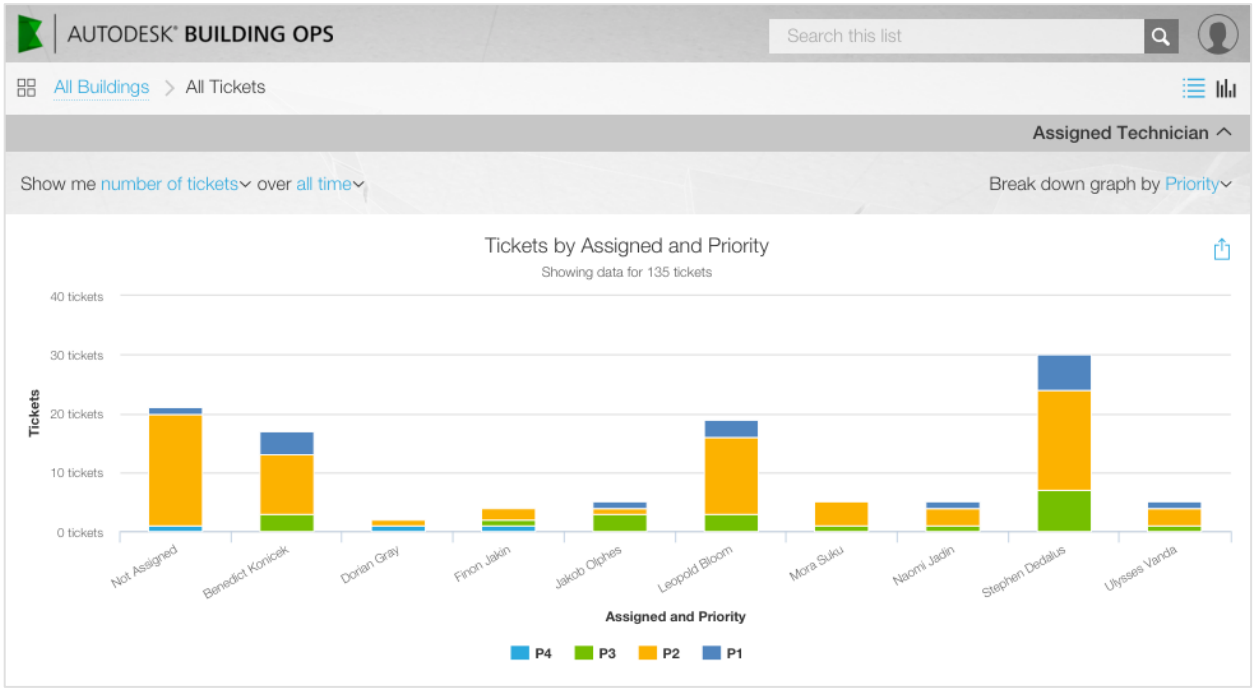


Exercise 12: Customize and View Ticket Reports

Portfolio owners, co-owners and managers can take advantage of the reporting functionality in Building Ops on the web to get up to date information about workload for their technicians, hours spent or number of tickets per asset or category, and compare trends across buildings or time.

The functionality is available as a toggle between a list and a graph view on all ticket lists for every one of the buildings.





Appendix 1: Frequently Asked Questions

- **Does Building Ops only work with BIM 360 Field?**
  Building Ops supports ticketing and the ad-hoc collection of asset data without BIM 360 Field. BIM 360 Field is one of the ways to populate Building Ops with equipment data collected during installation and commissioning. Assets can be added from CSV files or by connecting to a Panoramic building. At AU 2015, we'll show you a technical preview for export of assets from Revit into Building Ops.

- **Where does the 3D model in Building Ops come from?**
  Models aggregated in BIM 360 Glue provide additional context for understanding equipment but are not required. The element ID from the model in Glue is associated with the asset ID in Building Ops

- **How do I add information about existing buildings?**
  Assets for existing buildings may be added on an ad-hoc basis, with imports from CSV file, Revit or by connecting to a building equipped with Panoramic Power sensors. Also, BIM 360 Field may be used to import and condition asset data from other systems that output data in a tabular format, including COBIE compliant spreadsheets.

- **Will the owner need to continue to use BIM 360 Field?**
  After handover, all equipment data is stored as assets within Building Ops. BIM 360 Field is no longer required for building and asset maintenance activity.

- **What CMMS/IWMS's does Building Ops support?**
  Building Ops is a standalone CMMS. Asset data can be imported from a CSV file, Revit (technical preview at AU 2015), by connecting to a Panoramic Power building, or by using BIM 360 Field for any legacy CMMS /IWMS system that outputs data in a tabular format.

- **Is Building Ops COBIE compliant?**
  Using BIM 360 Field to manage COBIE compliant spreadsheets and exports from other systems, COBIE compliant data may be exported to Building Ops.

- **When will Building Ops do x, y, and z?**
  Building Ops was released commercially in July 2015. Updates to the application are delivered bi-weekly.

- **Are public APIs available?**
  Public APIs are not available at this stage. APIs will be exposed and documentation published at a later date.

- **Can I integrate Building Ops with my BMS or BAS?**
  Our first integration is with our partners from Panoramic Power and their PowerRadar product. We anticipate using this model to offer integrations with other systems in the future.

- **Can I export my data from Building Ops?**
  Export will be available.

- **Why is the iOS version phone only?**
  We selected the phone form factor because it best meets the needs of the technicians we met. Unlike tablets an iPhone can be used one-handed and is easily stored in a pocket.

- **Can I use it on my Android phone or tablet?**
  Yes, we have developed a fully responsive web app that can be used on smartphones and tablets from any manufacturer using any OS that provides support for modern browsers.

- **Is a private cloud or on-premise version available?**
  Building Ops is a hosted SAAS offering. No on-premise version will be available. Private cloud support is being evaluated but is not available at this time. Non-US hosts are also being evaluated.

- **When can I expect a version in my language?**
  Building Ops was designed for localization. We have translated Building Ops in Spanish (Catalan) and Portuguese (Brazilian) only 4 months after its release, and are actively seeking domain experts that will help us with evaluating these translations. We will send updates as we release Building Ops in other languages.

- **Where is Building Ops available?**
  Building Ops can be used in 43 countries worldwide. The availability includes mobile phone and address support. We add additional countries as they are requested.

- **What's on your roadmap?**
  We plan to offer a comprehensive and thoroughly modern solution that will help owners to realize the operating potential of their buildings. This is just the first step.

Appendix 2: Building Ops Glossary

Asset
Even though it is referred to as *equipment* in the construction industry or *asset* in the facility maintenance industry, an asset can be anything from air-handling unit (equipment) to a white board in a school, or (mobile) medical equipment. It depends on the industry.

BAS The acronym stands for Building Automation System.

BMS The acronym stands for Building Management System.

CMMS The acronym stands for Computerized Maintenance Management System.

IWMS The acronym stands for Integrated Workspace Management System.

Occupant domain
The word “domain" refers to, for example, autodesk.com as a domain. This is a term used in Building Ops to determine / limit what are the domains from which occupants can join. For example, if the facility manager restricts the domain to “autodesk.com” only occupant that have “autodesk.com” as domain in their email can join, not ones with yahoo, gmail etc. domain accounts.

Portfolio A portfolio is a collection of buildings managed by a single entity (a portfolio owner).

Predictive maintenance ticket
Preventive maintenance is sometimes referred to as condition monitoring. It is used to predict possible equipment defects and failures as early as possible and to eliminate equipment down time by monitoring its performance using sensors and statistical analysis. In Building Ops, we have integration with Panoramic Power. The equipment monitored with Panoramic Power’s sensors sends out alerts and notifications when the electricity consumption of the machine becomes abnormal. These alerts are received by Building Ops as (predictive) tickets. Note that predictive maintenance using sensing systems refers to an “internet of things” scenario.

Preventive maintenance ticket
Preventive or scheduled maintenance is performed at regular time intervals, to ensure that a piece of equipment does not break unexpectedly. For ex., air-handling units are often maintained every 6 months.

Reactive maintenance ticket
A reactive (also known as corrective) maintenance ticket is typically filed by building occupants when they detect a problem or issue in the building they need addressed. Typical reactive tickets are I am hot, I am cold, Internet is out etc.

Ticket
A service request filed by a customer (for example, a building occupant), or created by a technician or facility manager about something in the building that needs to be addressed or fixed. It is also known as service ticket or work order.