Guide: Matterport for Construction Documentation

Published April 24th, 2017

Introduction

This guide is intended for construction, construction management, or engineering firms using Matterport to **document the construction of new buildings**. The guide contains **construction-industry specific tips** as well as links to general help content on support.matterport.com.

The Value of Construction Documentation

Documentation is a **critical part** of any new construction project. Stakeholders such as the general contractor and the owner need documentation at important milestones to verify construction is being performed to standards and according to design.

Verification based on good documentation **lowers the amount of rework** due to error. For example, it's easier to fix electrical and plumbing issues before putting up drywall.

Documentation also helps with maintenance once the building is complete. The facility manager can later review documentation to **find critical maintenance information**, saving valuable time and money for the building owner and operator.

How Matterport can Help

Matterport is an ideal solution for construction documentation. A Matterport Space offers an immersive, interactive 3D experience that's easier to manage than thousands of 2D photos. Key features for the construction industry include:

- **Take measurements from the 3D Space** with 99% accuracy. Learn how.
- **Export point clouds, floor plans, and reflected ceiling plans to CAD/BIM programs** such as AutoCAD and Revit. Learn how.
- **Tag the 3D Space to create visual punch lists and operation manuals.** Add a short description and an external link with more information. Learn how.
- **Link to specific spots in the 3D Space.** Reduce friction and time to resolution by communicating to stakeholders *exactly* where the problem is. Learn how.

Questions?

Visit matterport.com/aec to learn more about Matterport and the construction industry.

Email our Architecture, Engineering, and Construction team for specific questions.

Visit support.matterport.com for general tutorials, FAQs, and to contact our support team.

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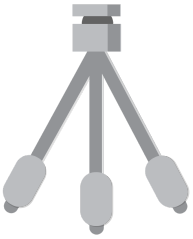
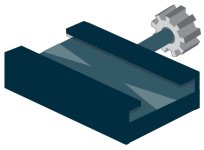
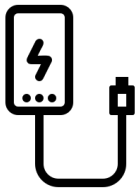
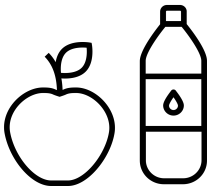
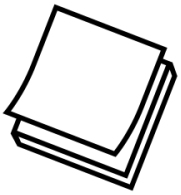
Scan

Gather your Equipment

Required			
			
Matterport Camera	Tripod 3⁄8”-16 UNC mount for 10 lb (5 kg)	Quick Release Clamp (⅜“-16 UNC thread)	Apple® iPad™ with Matterport Capture app

Learn more about what you need to scan.

Optional			
			
Power bank & charging cord Your iPad is likely to run out of battery before the camera	**Notepad & pencil/pen** Take notes and follow up later	**Food, snacks, & water** For scanning jobs that take a long time	**Post-it notes or spray paint** If you plan on doing milestone documentation

Learn How to Scan

Watch this video to learn how to scan

The same scanning principles apply for both real estate and construction.

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Read 10 easy steps
for scanning your first model

Learn best practices
for long-term success

Visit support.matterport.com for additional tips and tricks.

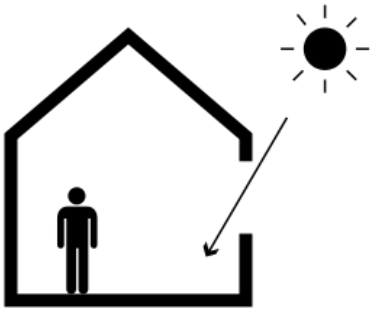
Schedule the Job

Scan when the site is less active, such as the end of the workday or on the weekend. Other people in the scanning path can cause alignment errors or just make the imagery look bad.

You can scan an active site but you just have to be careful. Learn more.

Avoid direct sunlight because it interferes with the camera's infrared depth sensors. Even tinted windows can let infrared light in. Be careful at these times:

- 8 to 10 am from the east (sunrise)
- 4 to 6 pm from the west (sunset)
- 11 am to 1 pm from skylights (noon)



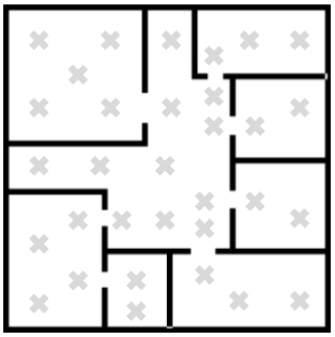
Plan your Path

Explore once you arrive to get a feeling for the site. Look for:

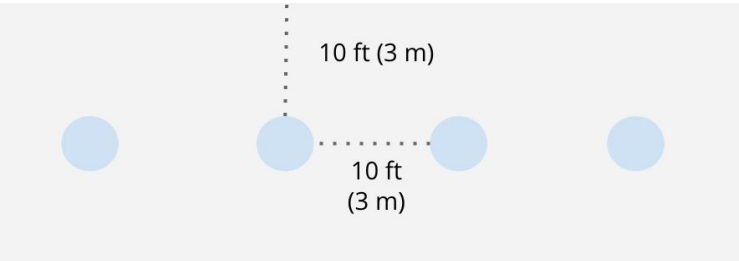
- Direct sunlight — can cause alignment issues
- Important areas — take a few extra scans there
- Dangerous areas — avoid or take extra precautions

Create a 2D drawing of the site or print a floor plan before you arrive. Plan about how many scans you'll do in each area.

Mark your map and mark the ground after every scan. Mark the ground with tape or spray paint. When you return to scan again, place the tripod on the same positions. Exact placement is not required, but *placing at about the same positions really helps* when comparing the old and new.



Basic Scanning Tips



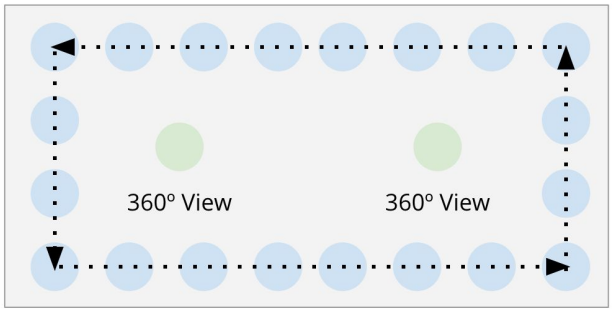
Place each scan about 8 to 12 ft apart (2.5 to 3.5 m).

Shorten to 5 to 8 ft (1.5 to 2 m) or even shorter if you experience alignment issues.

For empty spaces, you can place around 10 ft from the wall.

Every scan should have a line-of-sight to a previous scan.

This is more important once the walls go up and the construction site is crowded with equipment.



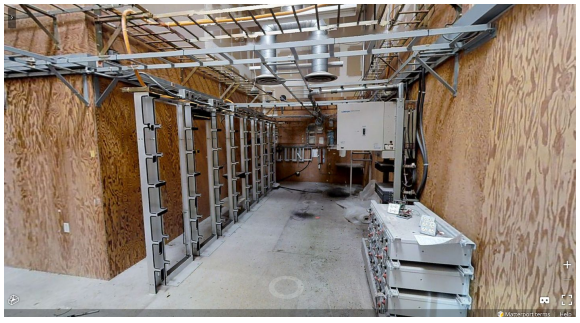
For empty 'shell' buildings, 3D Scan the perimeter first.

Then take 360° Views at key points in the middle. Learn more about 360° Views.

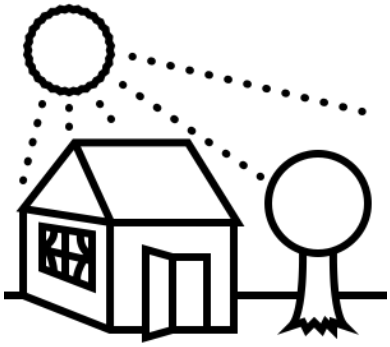
See an example ▸

Take more scans in the important areas.

What's important depends on you and your stakeholders. These can be server rooms, MEP rooms, or others. Stakeholders want to review these areas in detail, **so take multiple scans at different angles and heights**.



Scanning Outside



Switch to "360º View" mode to scan outside.

360º Views are great for a "curb view" of the site. They are also a great way to capture significant items outside such as a sewage tank, air conditioning unit, or the roof.

You can take a 360º View at any time. 360º Views do not collect 3D data (will not be included in a point cloud file) and aren't aligned to other scans, so there are no alignment issues. Learn more about 360º Views.

Scan the inside first, then scan the outside. You can use *3D Scan* mode to scan outside, such as to scan a path to detached building. However, this is not supported.

Save outside scans to the end, even if there are only a few. This avoids alignment issues that might happen later. Learn more about scanning outside. Consider using drone photography outside.

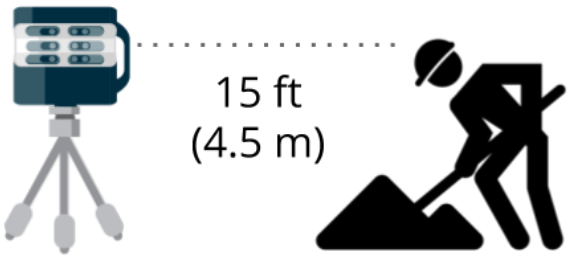
Scanning around Others

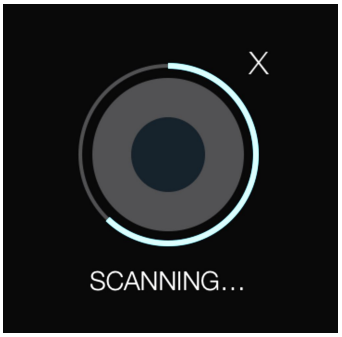
Keep it simple and scan when the site is empty such as the weekend. When people appear in the scan, it looks bad and causes alignment problems.

You can still scan if people are around. Just make sure **they don't appear in the camera's field of view while it is scanning.**

Keep people at least 15 ft (4.5 m) from the camera so they won't contribute 3D depth data and cause alignment issues.

However, they will still appear in the 2D panorama (Inside View in 3D Showcase).





Point the camera to a high-traffic area and then scan.

If someone walks into the camera's field of view, quickly tap X to cancel the scan. Point the camera to the high-traffic area and then try again.

The camera will always rotate in a clockwise direction. It rotates and stops six times at each 60º sector.

Scanning for Milestone Documentation

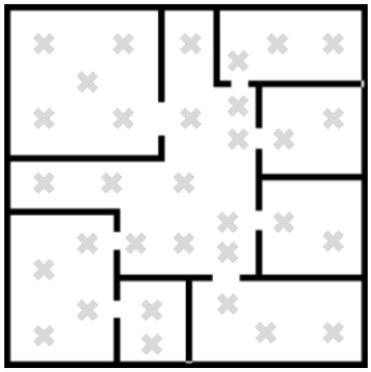
Construction documentation is most useful when you have **multiple Matterport Spaces** that show the **same building at different phases** of construction, such as after a concrete pour and before drywall goes up.

You can then **compare the view from the same position at different phases** to see what changed across time.

However, to do this you have to **scan at the exact same positions** every time you scan.

Mark the floor with tape, spray paint, or post-it notes after every scan. When you scan again after the next milestone, place the camera in the exact same locations.

Mark your 2D floor plan after every scan. If your markings are lost or covered up, refer to the plan.



Duplicating a previous model and then rescanning the new areas is NOT suggested. While this is an easy solution, this can lead to inaccuracy since your stakeholders are not clear about what exactly is new and what is old.

Repetitive & Empty Architecture

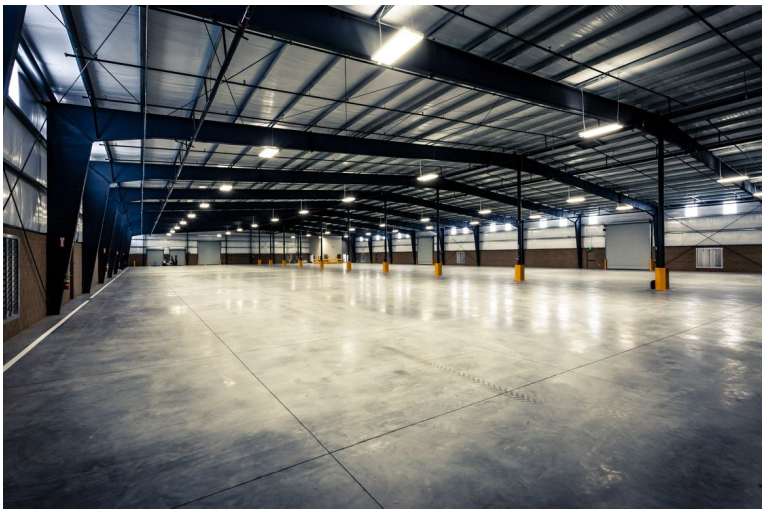
Repetitive architecture such as a **long empty hallway or lots of columns** can cause alignment issues.

This is because 3D data from several scans appears *too much alike* to the Capture app, so it places (aligns) the scans incorrectly.

Emptiness (**absolutely nothing** within the camera's range except the floor) can also cause alignment issues in the app.

This is because there is **nothing to reflect the infrared light** back to the camera.

So multiple scans can appear *too much alike* and are thus aligned incorrectly.



For both cases, **add unique 3D objects** to the site aid alignment. Learn more.

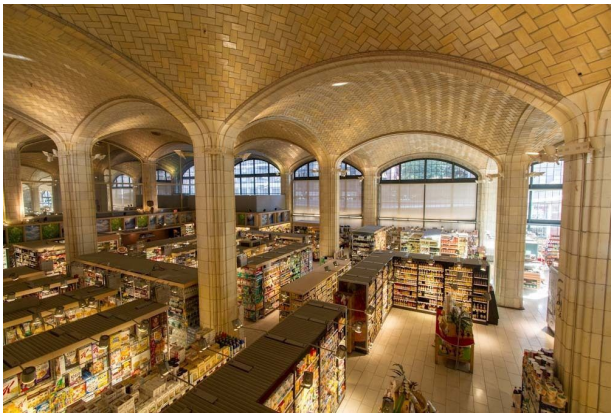
Stairs, Ceilings, & Floors

Learn how to scan stairs and multiple floors.

The Matterport camera captures data across all 360º horizontal degrees, but there are some vertical limits. For most cases, scanning at normal eye level is good enough.

Upper Limits (Ceilings)

For normal ceilings up to 25 ft (7.5 m) high, the camera will capture the ceiling **perfectly fine**. Just place the camera at **normal eye level** (5 to 6 ft, or 1.5 to 2 m).



Areas with double or triple-high ceilings such as a cafeteria or a grocery store can be scanned as well with extra-tall tripods.

In addition, you may also want **more 3D data of what's on the ceiling**, such as the ventilation ducts, so you can generate a better point cloud for BIM. See example ▸

Or you may just want better 2D imagery of the HVAC or electrical for closer inspection.

First **take a scan at normal, eye-level height**. Then **extend the tripod as high as possible** and take another scan.

We suggest using an **extra-high tripod** such as the Manfrotto 028B that can extend up to 8 ft (2.5 m).

Remember, the camera cannot scan directly above itself. So to capture 3D data or 2D imagery of what's on the ceiling, you have **scan around the desired spot.**

For more information about **reflected ceiling plans**, please email aec@matterport.com.

Lower Limits

The camera can easily capture the floor. Just place the camera at **normal eye-level** and **scan like normal**.

> Remember, the camera cannot scan directly below itself. So to capture 3D data or specific imagery about something on the floor, **scan around the desired spot.**

If the object you're scanning for BIM is very close to the floor, or if the details are right on the ground, then it helps to **take a low scan**.

Lower the tripod **as low as it can possibly go**. We suggest a height of around 3 ft (1 m).

Use this to help you "fill in the black spaces" that you see in the Capture app. Learn more.

Safety

Follow all safety rules and regulations while on-site.

For example, wear a hard hat, bright neon vest, etc.

The camera is generally safe, but not "intrinsically safe" for hazardous situations such as high temperatures, chemical factories, etc.

The camera's **operating temperature** is 50º to 90º F (10 to 32° C).

The camera is a ***delicate*** piece of machinery - handle carefully!

Scanning Objects

While Matterport is designed to scan interior spaces, you can also use it to **scan objects such as statues, vehicles, and complicated MEP rooms.**

You can then export the registered, colorized point cloud or OBJ file into other programs and do your normal BIM modeling process. Learn more about exporting.

Learn how to scan objects.

Explore some examples of objects scanned with Matterport:

Wall Street Charging Bull

Custom Painted Semi Truck

DPM Motors Monaco

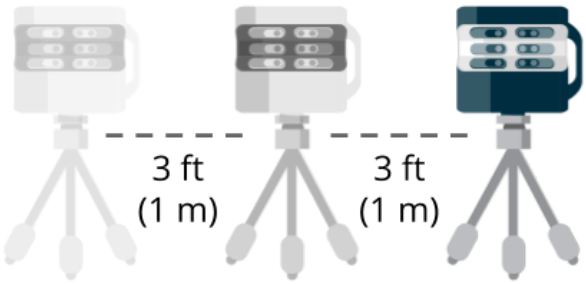
Eastside Fire & Rescue 83

Heavy Occlusion

Heavy occlusion refers to **areas with many objects that can obstruct light**.

Instead of the camera, imagine a lantern on top of the tripod — if the area is heavily occluded, your lantern will cast a lot of shadows. A typical example of heavy occlusion is an MEP (mechanical, engineering, plumbing) room with lots of pipes and tanks.

While these places can be difficult to scan, the 3D data you gain from them is great for BIM. Follow these tips to scan heavily occluded areas:

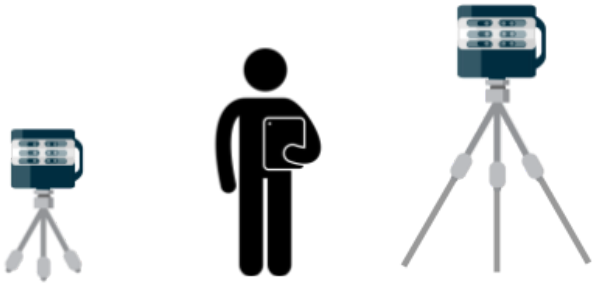


Shorten the distance between scans.

Place scan positions 3 ft (1 m) apart.

Take scans at other heights
in addition to eye-level.

- Low scans at 3 ft (1 m)
- High scans at 8 ft (2.5 m)



You can **hide these extra scans** with Workshop after you upload. Learn how. If you only care about the 3D data (point cloud or OBJ file), then hiding scans is unnecessary.

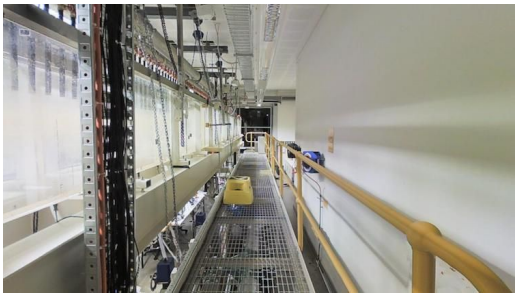
Keep the tripod stable at all times. Occluded areas can be a tight squeeze for both you and the camera. However you place the tripod, **keep it stable** so it doesn't fall.

Hide and then tap Scan. Normally it's easiest to walk behind the camera as it rotates. However, this won't work in occluded areas because they are a tight squeeze. Instead, hide behind a tank or other large object and then initiate the scan from your iPad.

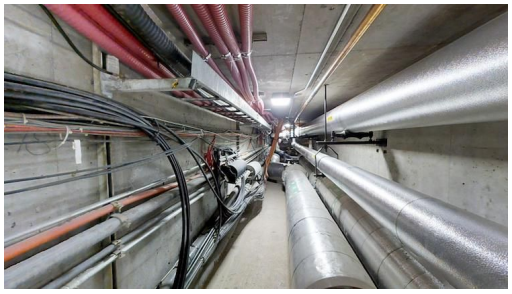
Examples of heavily occluded areas scanned with Matterport:

Large Mechanical Plant

MEP Room



Hydraulics Lab at Edith Cowan University



Tunnel System in the University of Oregon

Rotortug Hybrid Tugboat

Mechanical Room, Aurora Yacht

Anchorage Brewing Company

612Brew Craft Brewery

Upload the Model

When you're done scanning, upload to Matterport Cloud for processing. Learn more.

Uploading

Wait until you return to the office, home, or a coffee shop to upload. Your WiFi connection will be more stable and it won't use the mobile data on your tablet.

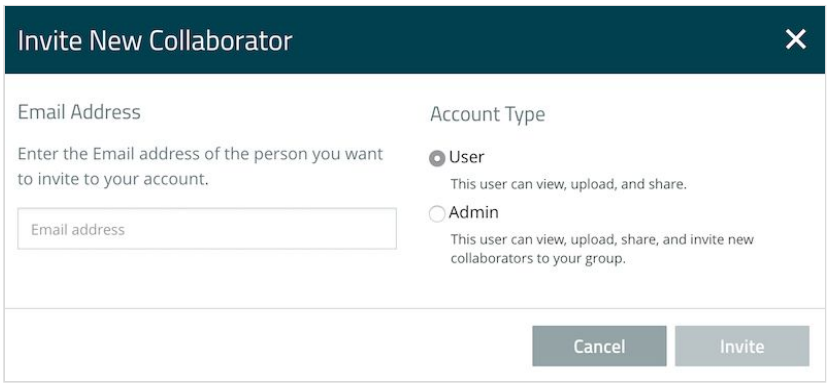
Keep the app open in the foreground while it is uploading. If you switch to other iPad apps uploading will pause.

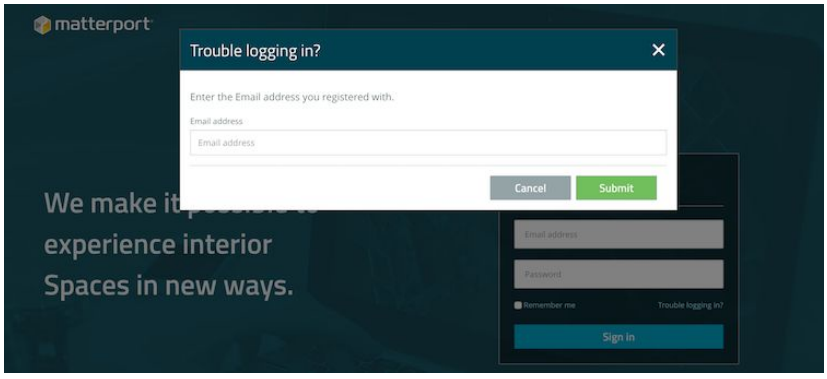
Accounts

You can scan as much as you want with a camera and an iPad. However, to upload a model **you need a Collaborator account on Matterport Cloud**.

If you don't have an account, ask your organization's admin to create one for you.

If you lost your invite, ask the organization admin to resend the invite. You can also reset your password on my.matterport.com.



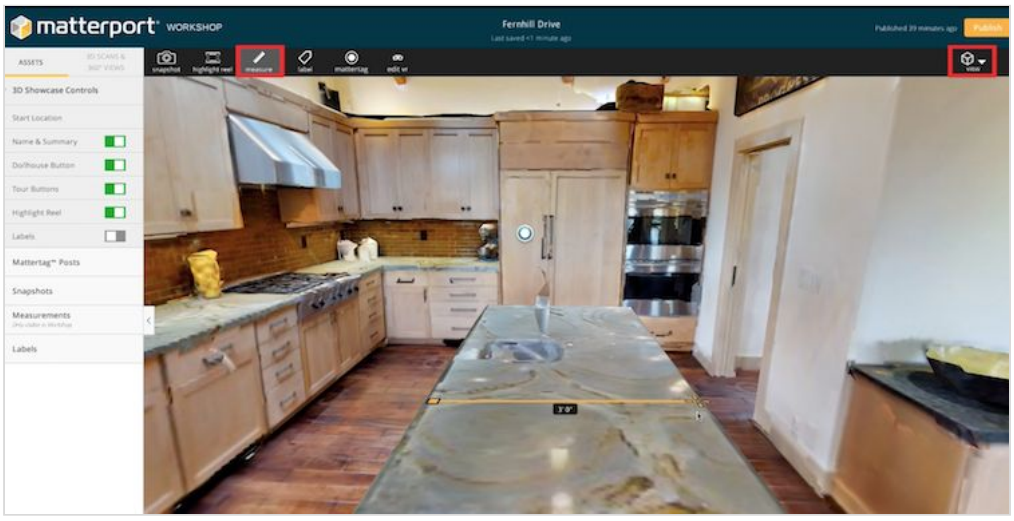


Edit

Basic Tips

Once you've uploaded the model, there's a lot you can do on the backend with Matterport Workshop to **enrich the Matterport Space to make it a useful, long-term resource**.

Matterport Workshop is a **SaaS (software as a service)** product that you can open once you have access to Matterport Cloud (my.matterport.com).



Watch a video for a brief overview of Workshop

5

Read the 5 most important tasks in Workshop

Learn everything that's possible with Matterport Workshop

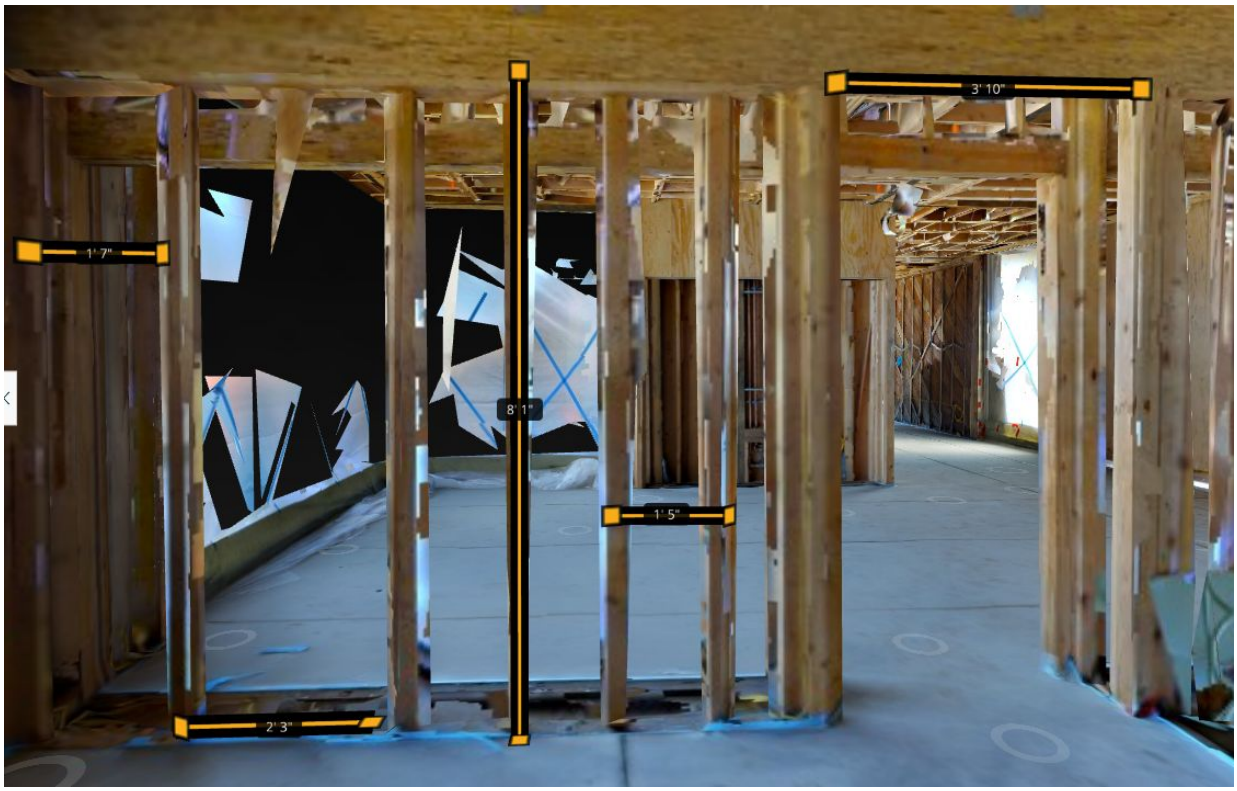
Visit support.matterport.com for additional tips and tricks.

Take Measurements

Measurements are one of the most useful things you can get from a Matterport Space.

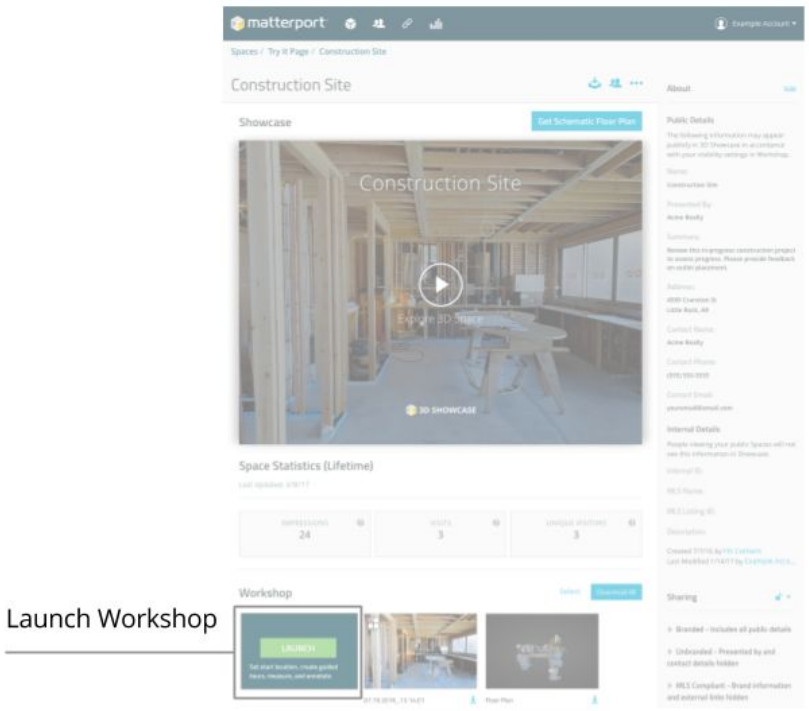
With Matterport, you can **scan now and measure later**. This is especially useful if:

- The person who needs measurements is far from the job site
- The jobsite is in a remote location
- The measurement is difficult to take in person. For example:
    - A very long measurement (such as an entire room)
    - Items on the ceiling (hard to reach)
    - A measurement in a dangerous area (dangerous for humans)



For the most accurate measurements, download the point cloud, import it into Revit, and then measure there.

Measurements on the point cloud are **guaranteed to be 99% accurate**. Learn more.



First, **login to Matterport Cloud** and open Workshop.

Next **use the measure tool** to set the start and end points for a given dimension. Learn more.

Saving measurements requires you to be a **Collaborator with Editor access** for that Space.

You can measure even without a Matterport Cloud account. First set the Space to Public. Then share the Matterport Cloud link with the person who wants to measure. They can open Workshop and take measurements but **cannot save their changes**.

To open Workshop, make sure you're sharing the correct Matterport Cloud link. For example,

https://my.matterport.com/models/SxQL3iGyoDo	Link to Matterport Cloud (and Workshop) for editing. Notice **models** in the URL.
https://my.matterport.com/show/?m=SxQL3iGyoDo	Link to 3D Showcase for viewing. Notice **show** in the URL.

Create a Visual Punchlist

Documenting what's been built is only the first step. The next task is verifying that it's being done correctly, and **identifying what needs to be fixed** in a punchlist style format.

A key advantage to a Matterport Space is that the stakeholder can do initial verification and create a punchlist **remotely without actually going on-site**.

For the person who'll be fixing what's on the punchlist, the immersive and visual nature of a Matterport Space makes it easy to identify exactly where the issue is.

See an example ▸

Each item on your visual punchlist is actually a tag called a **Mattertag™ Post**. These tags are visible in 3D Showcase (web player) to anyone who can open the Space.

To create these tags, you'll need a Collaborator account in Matterport Cloud with **edit access to the Space.** This is so you can open Workshop, create tags, and save changes.

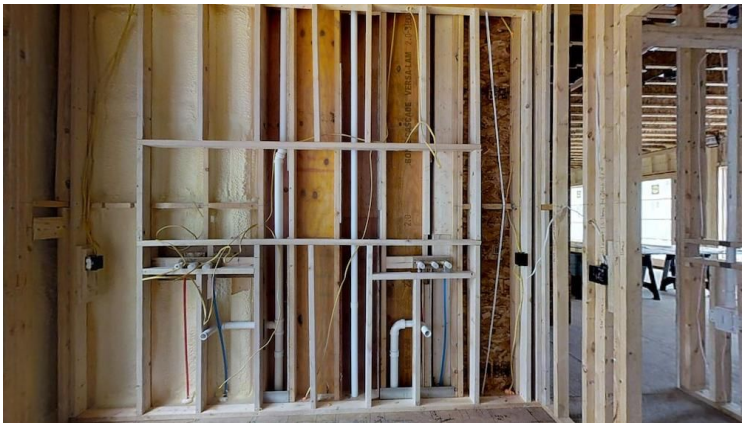
Learn more about Mattertag Posts.

Finally, in addition to text you can also add a link to a Mattertag Posts. Links can go to:

- Online project management systems like Procore
- Other CAFM software
- External resources (extended documentation)
- Other Matterport Spaces

You can also create your punchlist in other software and then **link to specific spots in the 3D Space** where the issue is. Learn more.

Photos & Snapshots



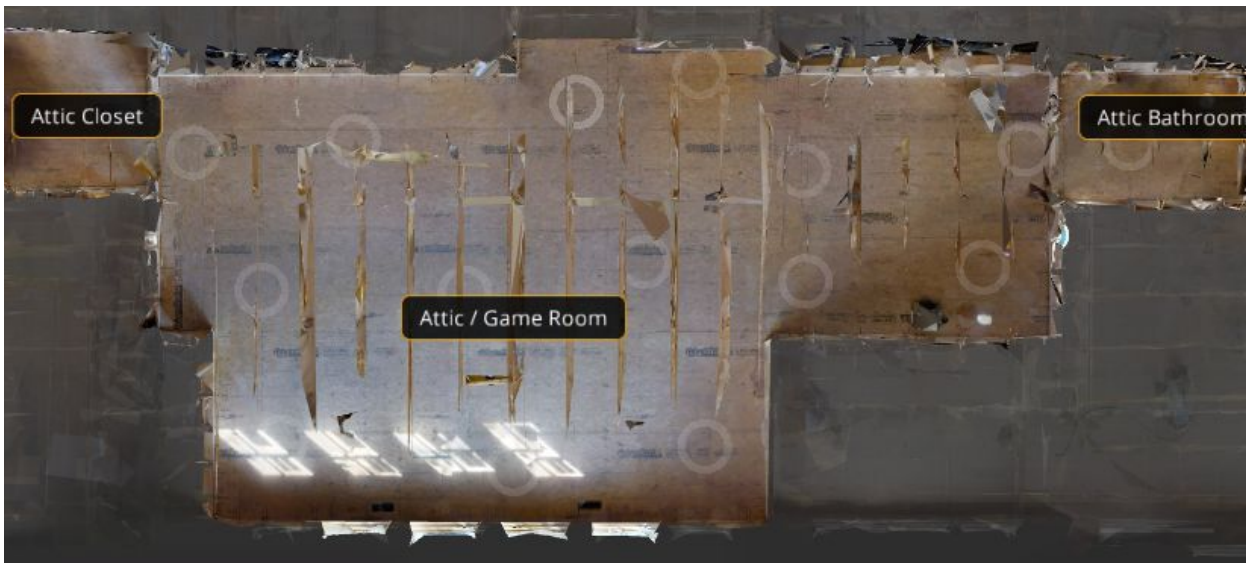
When sharing a link to the entire Matterport Space isn't possible or feasible, you can also take Snapshots of key points.

First take Snapshots in Workshop, and then download them from Workshop or Cloud. You can download Snapshots as JPG files, and then use them however you want.

Labels

While it's easy to tell what a room is when there's walls and furniture, it can be **hard to tell while it's still under construction**. This is especially confusing for someone new to the project who doesn't know the original plans for the site.

Make things clearer by adding room labels in Workshop. Labels can be seen in Workshop and in 3D Showcase.



Share

General Tips

[Basic management workflow]

[Everything to know about sharing and managing your Spaces]

Visit support.matterport.com for additional tips and tricks.

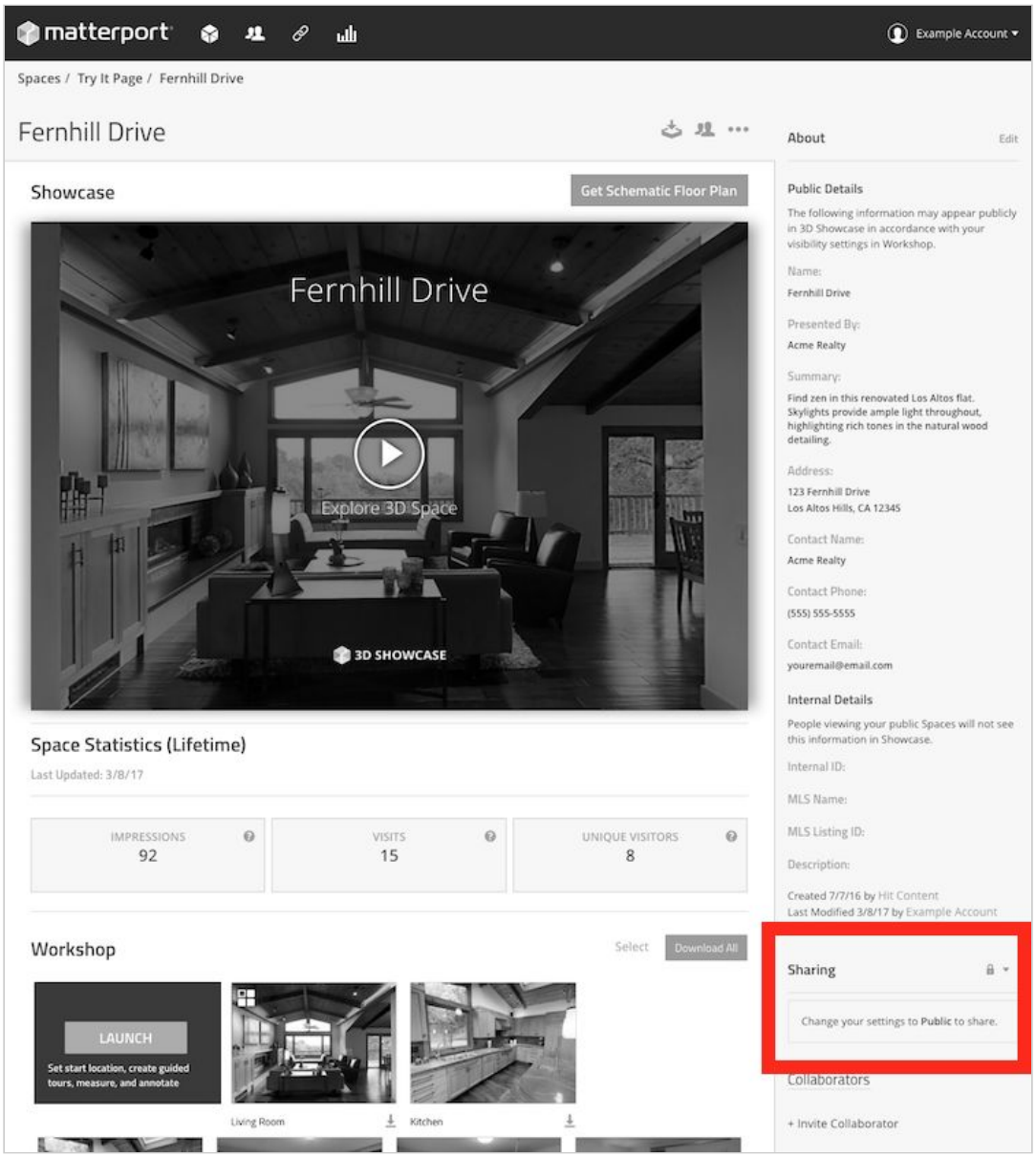
Manage Privacy & Collaborators

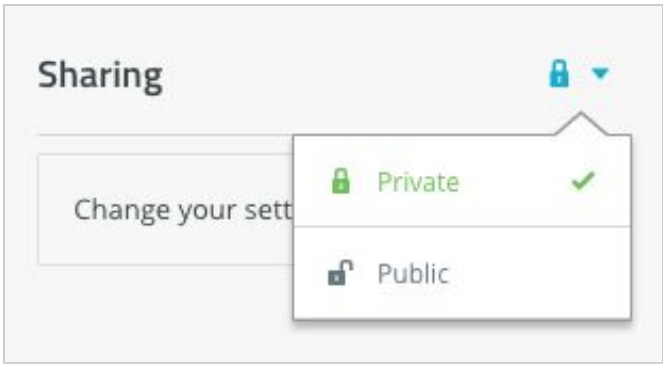
There's several options depending how comfortable you are sharing the Matterport Space.

If you have **light security requirements**, then just set the Space to be **Public**. Then **share the link** with whoever needs to see the Space. Learn more. You can also embed the Space on a website or an online project management tool like Procore.

Once you share the link with someone, they can share it with whoever they want — anyone with internet access can explore the Space in 3D Showcase. However, the Space is not indexed and will not appear in search engine results. If you trust the people you're sharing with (or you're not worried about leaks) then this is the best option.

Finally, another benefit to setting a Space to Public is that **anyone can open Workshop and take measurements**. However, they cannot save their measurements.


matterport
Example Account
Spaces / Try It Page / Fernhill Drive
Fernhill Drive
Showcase
Get Schematic Floor Plan
Fernhill Drive
Explore 3D Space
3D SHOWCASE
Space Statistics (Lifetime)
Last Updated: 3/8/17
IMPRESSIONS
92
VISITS
15
UNIQUE VISITORS
8
Workshop
Select
Download All
LAUNCH
Set start location, create guided tours, measure, and annotate
Living Room
Kitchen
About
Edit
Public Details
The following information may appear publicly in 3D Showcase in accordance with your visibility settings in Workshop.
Name:
Fernhill Drive
Presented By:
Acme Realty
Summary:
Find zen in this renovated Los Altos flat. Skylights provide ample light throughout, highlighting rich tones in the natural wood detailing.
Address:
123 Fernhill Drive
Los Altos Hills, CA 12345
Contact Name:
Acme Realty
Contact Phone:
(555) 555-5555
Contact Email:
youremail@email.com
Internal Details
People viewing your public Spaces will not see this information in Showcase.
Internal ID:
MLS Name:
MLS Listing ID:
Description:
Created 7/7/16 by Hit Content
Last Modified 3/8/17 by Example Account
Sharing
Change your settings to Public to share.
Collaborators
+ Invite Collaborator


Sharing
Change your sett
Private
Public

For stronger security, **set the Space to private**.

When someone else needs to explore the model, an Admin must invite them as a new Collaborator on Matterport Cloud. They'll need to set up an account (email address and password) and login to view the Space.

You (the person who uploaded the Space) can invite the Collaborator to have the following permissions for your Space:

- **No access** — the person will not know it exists
- **View only** — can explore with 3D Showcase only
- **Editor** — can also edit details and save changes in Workshop

Learn more about permission levels.

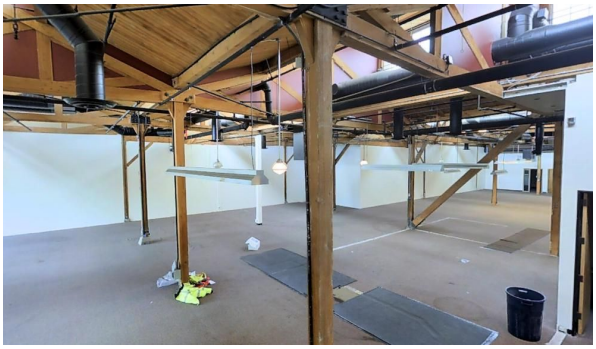
Admins **always have access to all Spaces** within the organization's account.

For additional security questions, please contact us at aec@matterport.com.

Download the Point Cloud

Along with measurements, downloading the point cloud and exporting into another program is one of the most useful things you can do with Matterport.

First, **download some sample point clouds** and play around with it yourself.



Commercial Space Multi-Height Scan

Explore Matterport Space

Download Point Cloud

MEP Room

Explore Matterport Space

Point Cloud Resolution & Accuracy

For a given flat surface, point clouds have a resolution of **2 cm per point**. This resolution is the same whether you are scanning inside or outside.

Measurements on a point cloud are **guaranteed to be 99% accurate**.

In addition, **objects smaller than 1 in (2.5 cm)** in any dimension may not appear. This also applies to **very shiny** or **very dark objects** since not enough light is reflected back to form a 3D mesh.

Points clouds are **automatically registered and colored** for your convenience.

Get a Point Cloud for your Space

Because point cloud files can be big (around 1 to 2 GB), generating a point cloud from a given Matterport Space is currently a **beta feature**.

To request a point cloud for a given Space, please fill out this form.

Point clouds are given to you in **XYZ** file format.

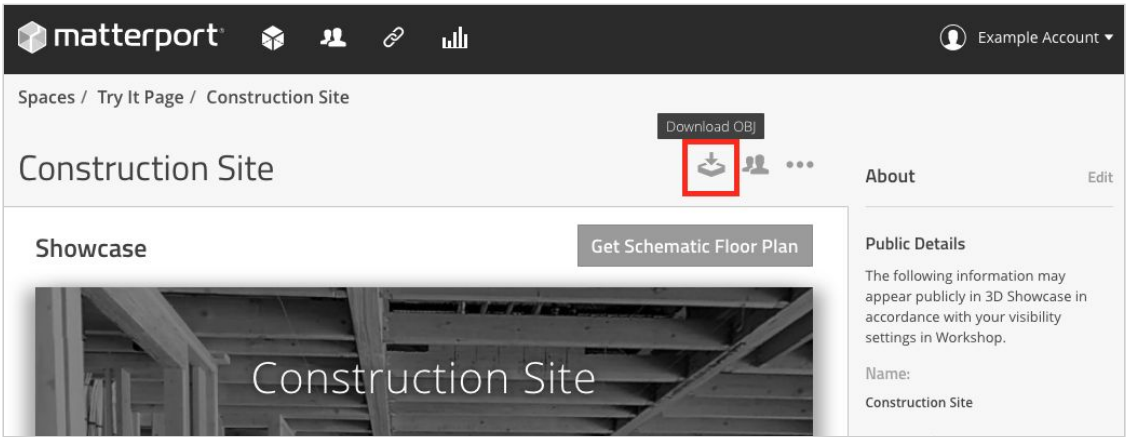
> Learn more about point clouds in Revit.

You can also import the point cloud into other products in the Autodesk family like:

- ReCap 360
- AutoCAD
- Navisworks

Download the OBJ File

For a simpler solution, you can also download the OBJ file and import into other 3D modeling programs like SketchUp or Meshlab.



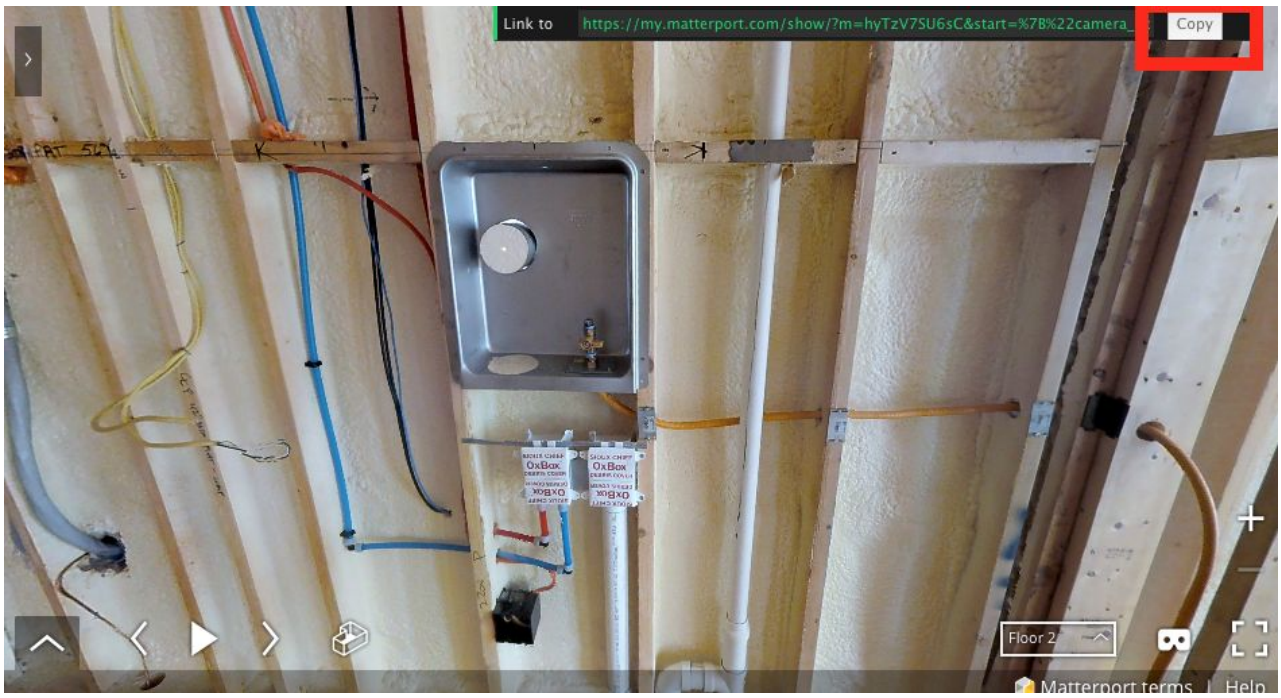
Link to Specific Spots in the Space

Construction sites can be big. But the issues of discussion can often be small and focused. Therefore, whenever you raise an issue you'll want to **point to the very specific place where you see the problem.**

First open the Matterport Space in 3D Showcase. Click your mouse to move to the location of the issue. Click, hold, and drag the mouse to change your viewpoint.

U

Tap the U key on your keyboard.



Tap **Copy** to copy this long URL to your computer's clipboard. This is a link to this **exact scan position and viewpoint** within the 3D Space.

Paste this URL into an email or an online project management software such as Procore.

Remember to set the Matterport Space to **Public** or to make sure the person you're sharing with is a Collaborator with view-only or editor access on Matterport Cloud.

Customize 3D Showcase

While 3D Showcase is a great experience on its own, you can customize it even more.

For example, if your stakeholders are not good at English, you can have the **user interface for 3D Showcase** appear in a different language.

Just add an extra parameter to the end of the URL before you share the link or embed on your website. For example,

French	https://my.matterport.com/show/?m=9fiQE49p3et**&lang=fr**
Spanish	https://my.matterport.com/show/?m=9fiQE49p3et**&lang=es**

This will translate the **3D Showcase UI — help, tooltips, terms of service, etc**. User generated content (name and description, Mattertag™ Posts, Labels, Snapshot names, etc) remain in the language that you input.

To translate **user generated content**, you'll need to edit another Matterport Space. Just duplicate the model in the Capture app and upload again (no additional processing fees). Then create your Mattertag Posts and other Workshop edits over again, this time in the target language.

You can add more URL parameters to further customize the UI. Learn more.

Finally, if you're a software developer you can use the **Matterport 3D Showcase SDK** to integrate a Matterport Space even deeper with your web application. Email developer@matterport.com to learn more.

Contact Us

Visit matterport.com/aec to learn more about Matterport and the architecture, engineering, and construction industry.

Email aec@matterport.com with any specific questions.

Visit support.matterport.com for general tutorials, FAQs, and to contact our support team.

Join our community to see more cool stuff we're doing.

Join the discussion on our forums. Just log in with your my.matterport.com credentials.