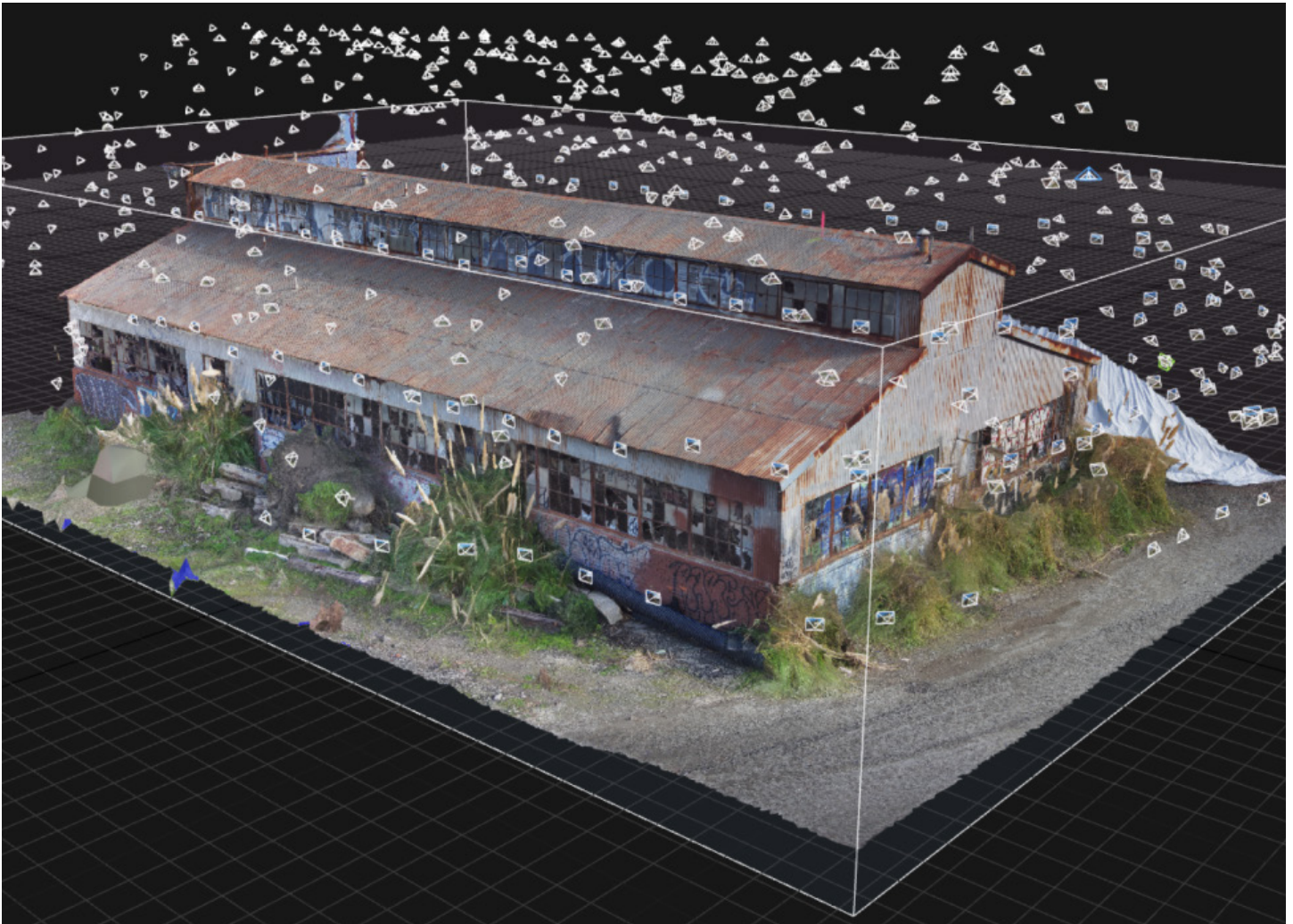# SKYDIO 3D Scan™

Software Manual for Skydio 2 Enterprise

> ⚠️ **WARNING:** *PLEASE READ ALL DOCUMENTATION PROVIDED WITH YOUR SKYDIO 2 INCLUDING BUT NOT LIMITED TO THE SAFETY & OPERATING GUIDE FOUND HERE:* **www.skydio.com/getstarteds2e**.

Updated: **October 13, 2021**
Version: **15.10**

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Skydio 3D Scan™

Skydio 3D Scan™ is first-of-its-kind adaptive scanning software seamlessly incorporated into Skydio Autonomy™. 3D Scan automates data capture of any scene with comprehensive coverage and ultra-high resolution, allowing crews to spend less time training pilots and more time performing higher quality inspections.

Skydio adaptively maps the scene and uses intelligent flight planning to build a live 3D model. With an augmented reality (AR) and AI-driven workflow, the drone plans a path to autonomously capture all surfaces using your specified settings. To create high-definition reconstructions, upload the images to a third party photogrammetry provider.

Skydio 3D Scan operates with no reliance on prior maps, magnetometer readings or active internet connectivity. Choose your 3D Scan mode, specify the area or structure to scan, and Skydio 3D Scan does the rest.

Skydio 3D Scan combines advanced autonomy and photogrammetry software to capture high-resolution photos of structures, bridges, and energy infrastructure. There are multiple different capture modes available with Skydio 3D Scan.

3D Capture

Efficiently scan complex structures with 3D Capture. Skydio assesses the scan volume and generates autonomous and adaptive flight patterns to ensure every angle of the structure is captured. Capture data can be used for inspection or to generate high-fidelity 3D models.

3D Capture is best for scanning structures such as bridges, transmission towers, architecture, machinery, telecommunications towers, and vehicles.

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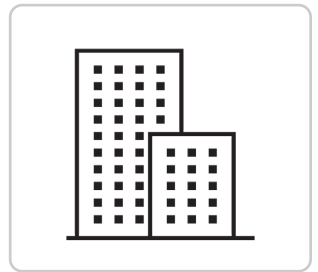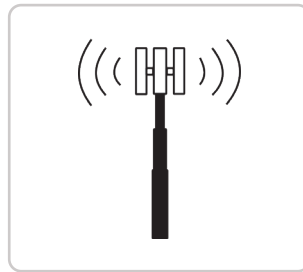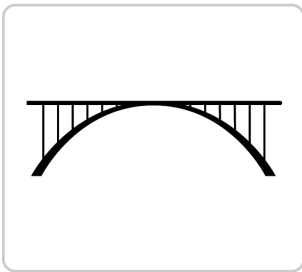
2D Capture

Rapidly cover large areas with 2D Capture scans. 2D Capture is a planar scanning capability that captures imagery for orthomosaics and digital terrain models. This mode supports traditional capture patterns, but has superior obstacle avoidance and uses the 3D Surface Engine to obtain accurate localization even in GPS-denied environments.

2D Capture
2D Capture is best for wide, flat area mapping. Use 2D Capture when you need a 2D orthomosaic map of areas such as accident sites or farmland. Recommended for scans of smaller, more precise areas.

2D GPS Capture
2D GPS Capture gives you the ability to preplan your flight using a top-down map view. Navigate to the scan location on the map and place area bounds to outline the area. Your drone will fly in a lawnmower pattern to capture the scene. Use 2D GPS Capture when you need to scan large areas such as rail yards or large construction sites and when you expect to use more than one battery.

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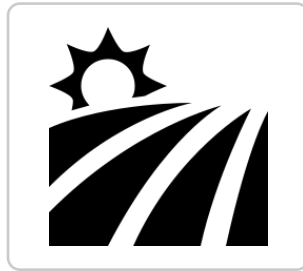
Safety Guidelines

Keep your fingers away from moving propellers at all times.

Use caution around reflective surfaces (still water, mirrors, etc.) and small obstacles (thin branches, utility lines, ropes, chain link fencing, etc.)
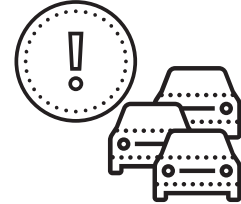
Skydio does not avoid moving objects or cars.

Skydio is not weatherproof – don't fly in rain, snow, fog, high winds, etc.

Before flying over water, ensure your drone has GPS lock. Launch and land your drone over a dry surface.
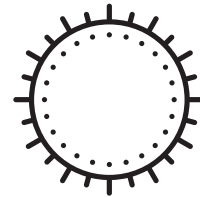
Don't fly in low-light conditions or in poor visibility.

Clean all of the cameras so Skydio can see clearly.

Check your propellers for damage before flying.

Follow all civil aviation authority regulations, as well as any applicable local and federal laws.

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FLYING SAFELY

Pre-Flight

- Ensure that all of the camera lenses are dust and smudge-free prior to flight.
- Inspect the battery magnets and connections for damage and debris prior to flight.
- Inspect propeller blades for nicks, cracks, or other visible damage prior to flight.
- Inspect the chassis for damage and debris prior to flight.
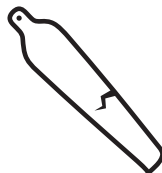- Remove the gimbal retaining clip from the front-facing camera.
- Ensure any Battery Saver or Low Power modes are disabled on your mobile device. These modes may interfere with Skydio 2's ability to communicate with the device and negatively impact your flight experience.

Environment

- Do not fly in precipitation, fog, or snow.
- Ensure flight environment has good visibility. Skydio 2 can only fly in normal daytime conditions.
- Do not fly in extremely hot temperatures above 104°F (40°C).
- Do not fly in extremely cold temperatures below 23°F (-5°C).
- When flying in temperatures below 32°F (0°C) ensure your batteries are pre-warmed to 50°F (10°C) prior to takeoff.
- Avoid windy weather conditions, or gusts above 25 mph (40 km/h). Your drone will automatically Return to Home when it estimates winds above 25 mph (40 km/h).
- Do not fly over bodies of water more than 30 ft (3 m) across.
- Do not fly around objects less than .5 in (1.27 cm) in diameter such as thin branches, utility lines, ropes, netting.
- Do not fly around objects in motion such as cars, boats, balls, animals, or other drones.

Warnings

- Fly cautiously around people.
- Avoid transparent or reflective surfaces, windows, or mirrors greater than 23 in (58 cm) wide.
- Avoid moving obstacles, cars, and animals.
- The pilot in command (PIC) is responsible for managing altitude, range, and battery level and monitoring in-app messages and alerts.
- Avoid flight in low-light conditions.
- Avoid flight in low-light conditions.
- Alert messages will display if Skydio determines the environment is not safe for flight.
- When instructed to do so, immediately fly your Skydio to the safest area and land.
- Flying at high altitudes may significantly increase the time required to return and safely land.
- Propeller blades are sharp—handle with care.
- Skydio should not be used or handled by a person under the age of 18.

Regulations

- Follow all civil aviation, such as the FAA or your countries regulatory agency, rules and regulations.
- You are responsible for your Skydio at all times. When operating your Skydio drone check **knowbeforeyoufly.org** / B4UFLY / CASA-verified before flying.
- Do not fly in an environment where the use of the device is not authorized or restricted.
- **Keep your Skydio drone within visual line of sight at all times**, unless you have received express permission to fly beyond visual line of sight from a civil aviation authority such as the FAA.

> ⓘ *Go to **https://skydio.com/safety** and **https://skydio.com/support** for more information and helpful tips, videos, and articles.*

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Getting Started

Before you fly, read the **Skydio 2 Enterprise App Operator Manual** to learn how to fly Skydio 2 and understand the full Skydio 2 Enterprise feature set. Ensure both Skydio 2 and the Skydio Controller are fully charged, and your controller is paired to your drone. For more information about those features and Skydio 2, visit **skydio.com**.

> ⚠️ *Follow the **Skydio Safety and Operating Guide** when flying 3D Scan — avoid thin branches, thin wires, and large glass/ reflective panes.*

Equipment and Software

To fly 3D Scan you will need:

Hardware

- Skydio 2
- Skydio 2 Batteries
- Skydio 2 Controller (optional but strongly recommended, included in Pro Kit)
- 2x UHS Class 3 microSD cards (minimum 128 GB)
- Android or iOS mobile device with 1 GB available storage

> 📝 ***NOTE: We strongly recommend flying 3D Scan with the Skydio 2 Controller*** *to provide more precise control and extend the connection range. Find more information in the **Skydio Controller User Guide**.*

Software

- Skydio Enterprise app (Android or iOS)
- Skydio Autonomy Enterprise Foundation™ (AEF) software add-on
- Skydio 3D Scan™ software add-on

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SD Cards

Skydio 2 requires UHS Class 3 (U3) or faster microSD cards to complete 3D Scans. Skydio cannot scan without properly formatted microSD cards.

1. Media Card
2. Logs Card

> 📝 **NOTE:** *We test with and recommend using **SanDisk Extreme PLUS** (128GB and 256GB).*

Installing SD Cards

If you purchased an Enterprise Pro Kit directly through a Skydio Sales Representative, both the Media Card and Logs Card come pre-installed.

If you obtained your drone online and later purchased 3D Scan™, you will need to purchase a second SD Card and install both cards yourself.

1. Remove the battery from the bottom of Skydio 2.

2. Flip the drone over and locate the Media Card slot. To the right of this, you'll notice a black cover blocking access to the Logs Card. You will need to remove this. Carefully and slowly pull the bottom of the cover toward the camera. This will expose a plastic placeholder for the Logs Card. Gently push inward to dislodge the plastic insert.

3. Insert your SD cards.

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Formatting SD Cards

To format your Media Card or your Logs Card, follow the steps below:

1. Open the Skydio Enterprise app and connect to your Skydio 2.

2. Navigate to the **INFO** tab.

3. Select your Skydio 2 from the **Devices** list, then select **Manage Data**.

4. Select Format Media Card or Format Logs Card, depending on which card needs to be cleared.

> **NOTE: You must format the Logs Card within the Skydio Enterprise app to fly 3D Scan**. *Formatting cards permanently deletes all flight data and/or media from your drone.*

Controls

Move through the scan workflow using the Skydio Controller. The workflow pane will collapse when you are prompted to manually fly and the app will display available Controller shortcuts. Find more information in the **Skydio Controller User Guide**.

1. **Left Paddle:** Adjusts camera gimbal tilt

2. **Right Paddle:** Minimizes/maximizes the workflow pane

3. **Left Shoulder Button (L):** "DONE" and other controls

4. **Right Shoulder Button (R):** "BEGIN" and other controls

5. **Left Joystick:** Controls vertical movement (throttle) and drone rotation (yaw)

6. **Right Joystick:** Controls horizontal movement

7. **Return to Home Button:** Skydio 2 will fly in a straight path to return to the Launch Point

8. **Launch/Land Button:** Skydio 2 will takeoff and land in its current position

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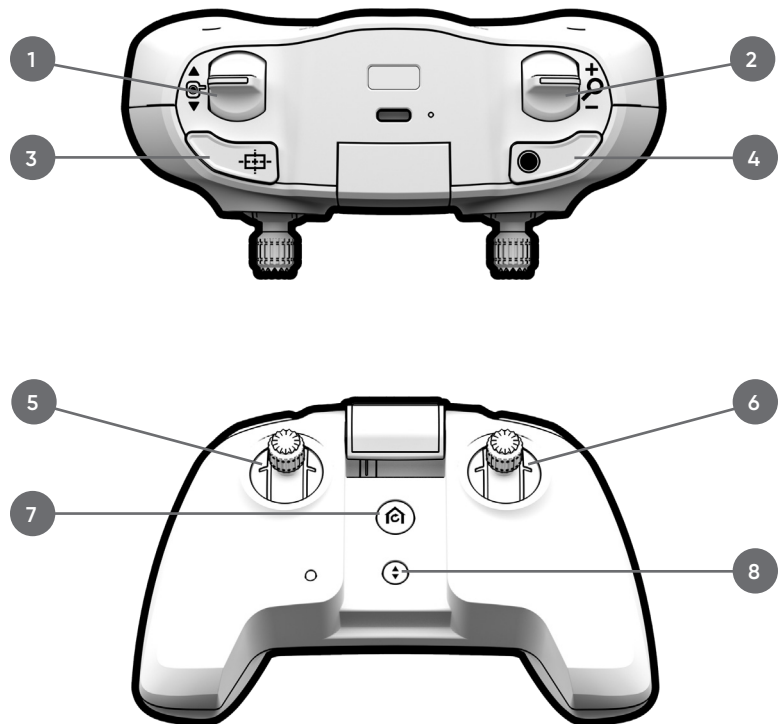
How to Enable 3D Scan Mode

Change Vehicle Mode

Before starting a 3D Capture or 2D Capture, the drone must first reboot to enter the 3D Scan Mode. Skydio will remember your operating mode through power cycles, so you will only have to do this when switching between 3D Scan and other Flight Skills.
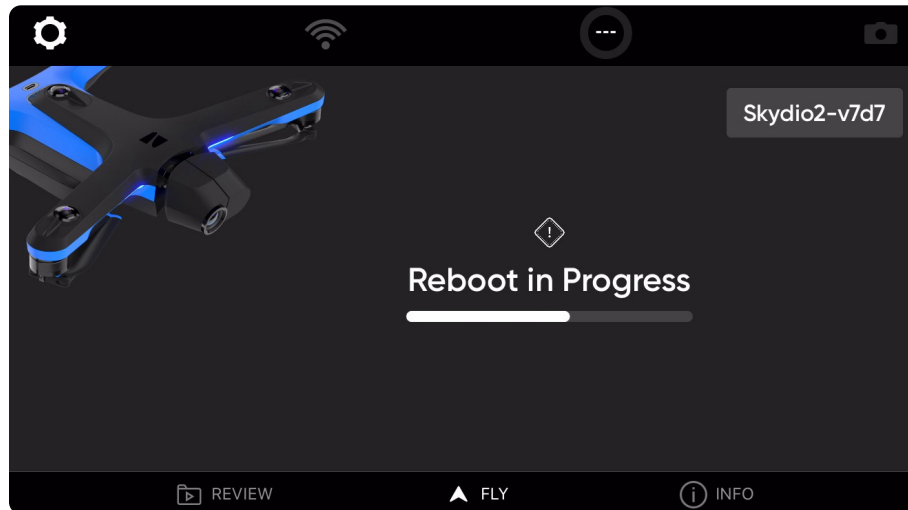
STEP 1: Enter 3D Scan mode

To change operating modes, you must enter 3D Scan while on the ground and connected to the drone.
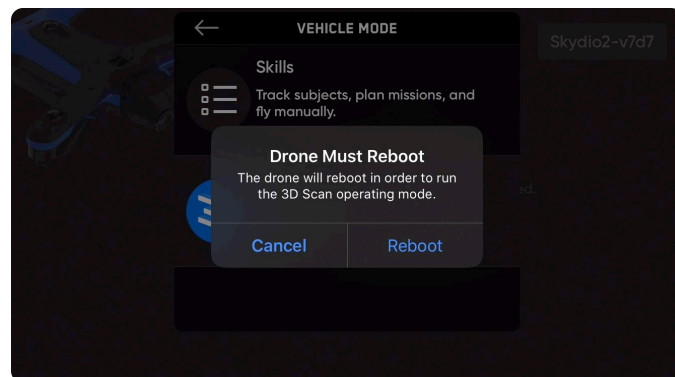
Navigate to **Device Settings** ⚙ > **Drone** > **Vehicle Mode** > **3D Scan**.
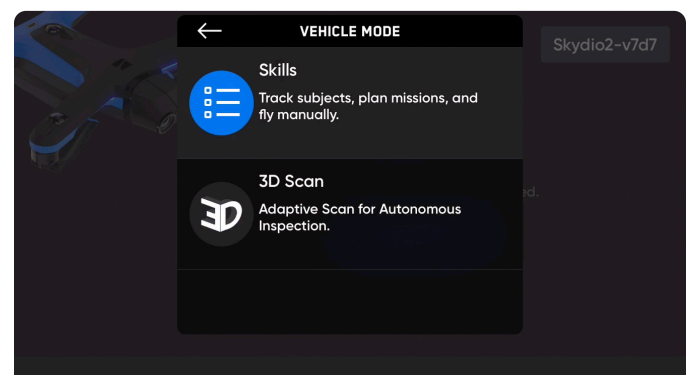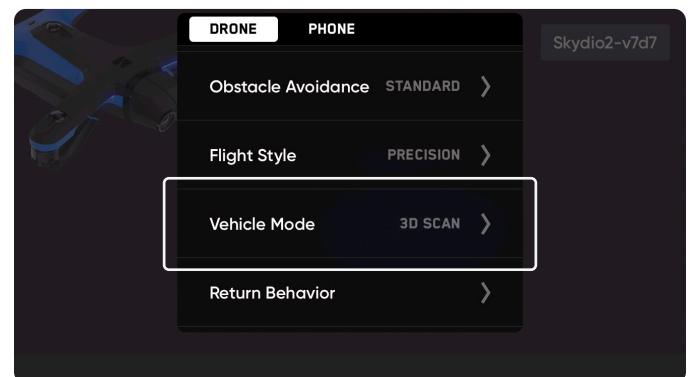
STEP 2: Drone automatically reboots

Select **Reboot**—Skydio will automatically restart. This should take about one minute.

After rebooting, Skydio will reconnect to your controller and mobile device.

STEP 3: Begin flight

After Skydio has finished entering 3D Scan, you are ready to fly! Ensure your Logs Card has been formatted before starting a scan. If you have not yet done so, a notification will display in the app. See the above **SD Card** section in **Getting Started** on page 5 for instructions on how to format.

Press **Start Scan** and select **Agree** to the disclaimer, acknowledging that you will comply with all relevant laws and FAA regulations.

> *NOTE: You must **exit 3D Scan to regain access to Flight Skills**. To exit, first land the drone. Navigate back to the Device Settings Menu and change the Vehicle Mode to Skills.*

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3D Capture Workflow

Before you fly

- GPS will be required for scans higher than 65 ft (20 m).

- If needed, you can move backwards and re-do any steps in the workflow. Doing so will reset the steps you have already completed and discard any media that has been captured. You will not be charged for discarded media.

> 💡 **TIP:** *If you wish to capture the same structure with different GSD across various sections, or if you have a very large structure to scan, try breaking your scan into multiple smaller scans. For best results, launch as close as possible to the section of the structure you are scanning.*

## STEP 1: Select Scan Mode

Select 3D Capture as the Scan Mode. Tap Begin on the screen or use the right shoulder button on the Controller.
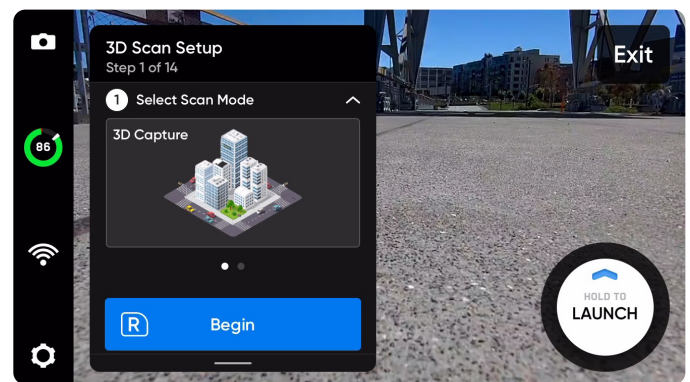
STEP 2: Name Scan Site

After selecting Begin, you may optionally rename your scan. The default scan name is composed of the scan mode you select followed by a UTC timestamp. Renaming the scan will replace the scan mode.

Ex: 3D_Capture__2021-05-20T19-50-55.135854+00-00
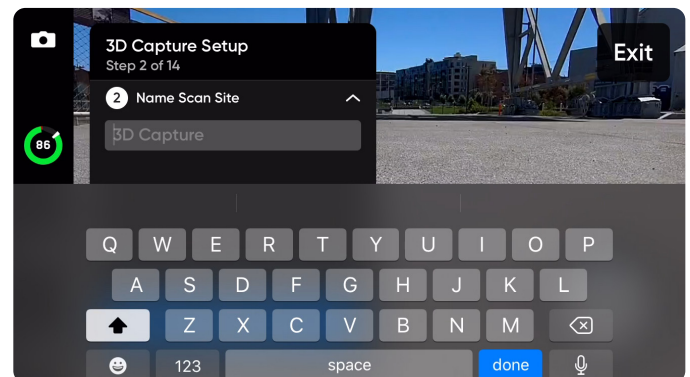
> ℹ️ *Scan names must use American Standard Code for Information Interchange (ASCII) characters. Spaces, Unicode characters such as à, é, â, ü, ö, ä and the following symbols will be converted to underscores (_) in the scan directory name: < > : ; \ | / ? * & $ { } ` ' " Visit **https://skydio.com/support** for more information.*

STEP 3: Launch

Select and hold the **LAUNCH** button to begin your flight. The drone will automatically climb to 16 ft (5 m) and hover.
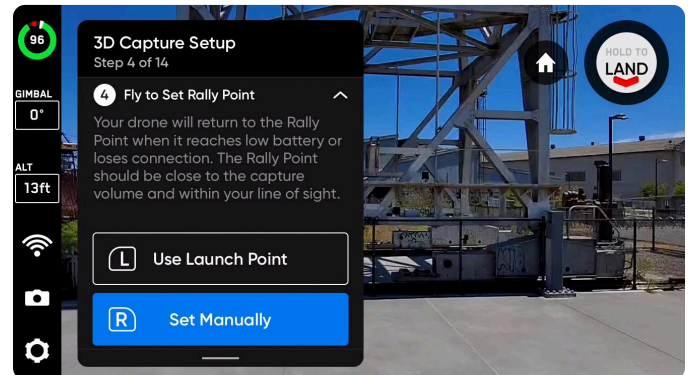
STEP 4: Set Rally Point

Once the scan completes, you will have the option to return to the Rally Point. Additionally, when the battery level is low or the drone loses connection, Skydio will return to the Rally Point.

To set your Rally Point, select one of the following options:

- **Use Launch Point** – drone will return to the launch location instead of a manually set Rally Point.

- **Set Manually** – allows you to use Skydio Controller to manually pilot the drone to a new location.

Tips for setting a Rally Point:

- The Rally Point should be in your line of sight with a clear path to the Launch Point.

- Set your Rally Point close to the scan region so that the drone can safely and easily return to that point autonomously. Even if you change position during the scan, the drone will always have a point to return to safely without obstruction.

- Choose a location that is safe for landing.

STEP 5: Set Scan Floor

The Floor defines the bottom of the 3D volume you wish to scan. It will also define the bottom of your scan in the **Visual Geofence** and the **Edge Model Viewer**.

There are two ways to begin setting the Floor:

- **Use Launch Height** starts the Floor at 6.5 ft (2 m) below the launch height. If taking off from the ground, this ensures that the ground is included in your scan.

- **Set Manually** starts the Floor at the current height of the drone.
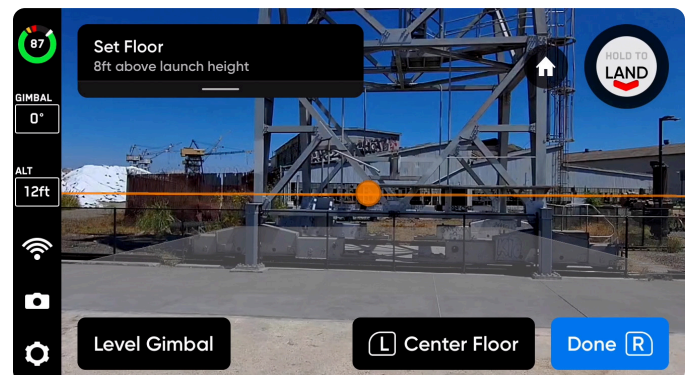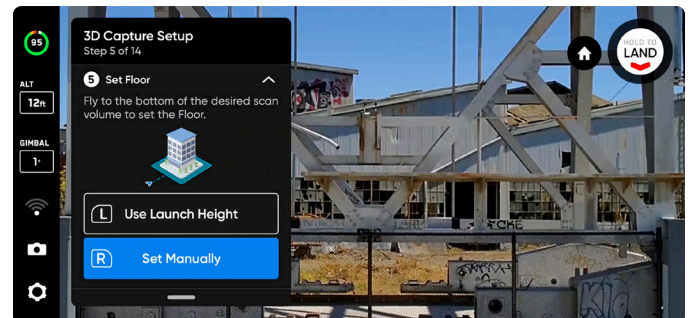

Once selected, adjust the Floor as desired:

- Pilot the drone and the Floor will automatically move with the drone as you fly

- Drag the orange Floor AR to the desired height

The Launch Height is represented by a light gray AR plane.

Use the Controller shortcuts to navigate the setup process:

- **Done** – Sets the Floor in your desired location and proceeds to the next step

- **Center Floor** – Moves the location of the Floor to the current altitude of the drone

- **Level Gimbal** – Moves the camera gimbal pitch to 0°

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STEP 6: Set Scan Ceiling

The Ceiling defines the top of the 3D volume you wish to scan. It will also define the top of your scan in the **Visual Geofence** and the **Edge Model Viewer**.

Press R to begin. The workflow pane will collapse to show a full-screen view of the green Ceiling AR. The Ceiling needs to be set above both the Floor and the structure you are scanning.

Adjust the Ceiling as desired:

- Pilot the drone and the Ceiling will automatically move with the drone as you fly
- Drag the green Ceiling AR to the desired height

Use the Controller shortcuts to navigate the setup process:

- **Done** – Proceeds to the next step
- **Center Ceiling** – Moves the location of the Ceiling to the current altitude of the drone
- **Level Gimbal** – Moves the camera gimbal pitch to 0°
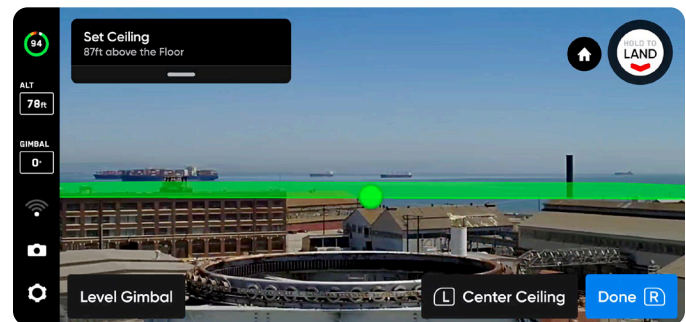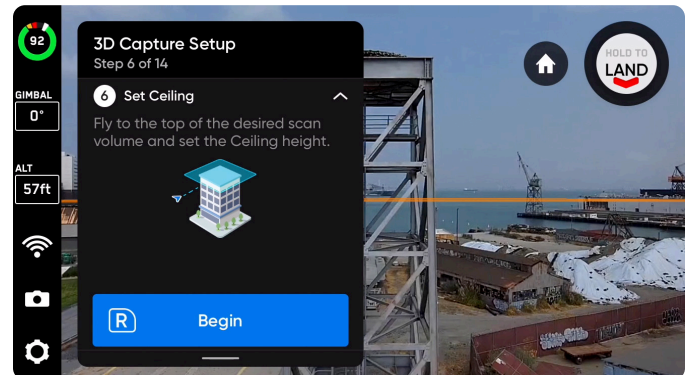
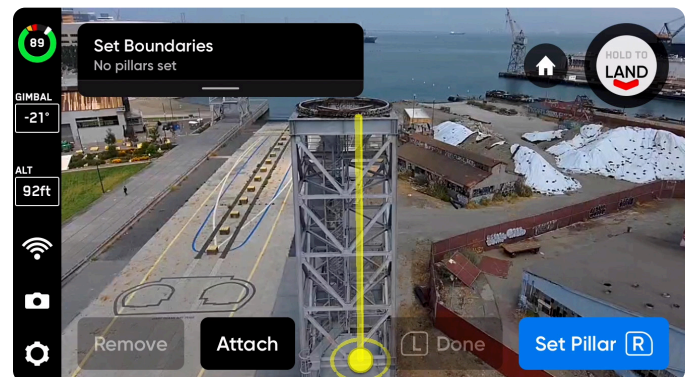## STEP 7: Set Lateral Pillar Boundaries

Set AR pillars to encompass the structure to be scanned. These pillars define the lateral bounds for the **Visual Geofence**. It will also define the lateral area of your model in the **Edge Model Viewer**.

A minimum of three pillars must be set to create a 3D volume.

There are two options when setting pillars:

Fly to the desired location and use the right shoulder button to select **Set Pillar**. Continue placing pillars to encompass the entire structure. By default, pillars are attached to the drone. The edges of the polygon defined by the pillars must not cross each other.

- **Set Pillar** – Adds a new bounding pillar
- **Remove** – Removes the previous bounding pillar
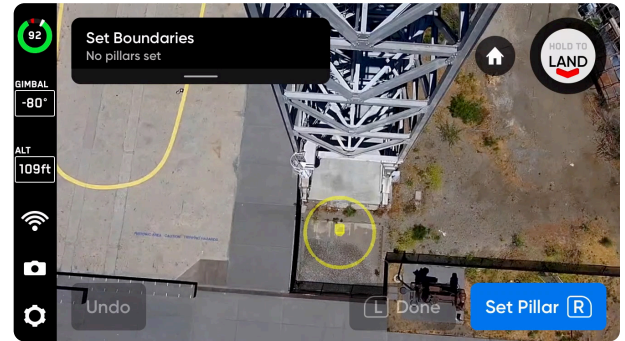- **Done** – Completes this step and finalizes pillar placement

> 💡 **TIP:** Try adjusting the angle of the gimbal for a better view of where you are placing pillars.

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SCANNING WITH 3D CAPTURE / 3D CAPTURE WORKFLOW

Drag Pillars by holding the base of the yellow AR Pillar on-screen. This selects the active pillar and enables dragging. You may continue to set pillars by dragging or reconnecting the pillar to the drone by selecting "Attach."

- **Set Pillar** – Adds a new bounding pillar

- **Done** – Completes this step and finalizes pillar placement

- **Attach** – Reconnects the pillar to the drone

- **Remove** – Deletes the previous bounding pillar

ⓘ   *Only the current active pillar may be dragged.*

Fly to place pillars

Drag to place pillars

13   **Skydio 3D Scan** - Software Manual for Skydio 2 Enterprise

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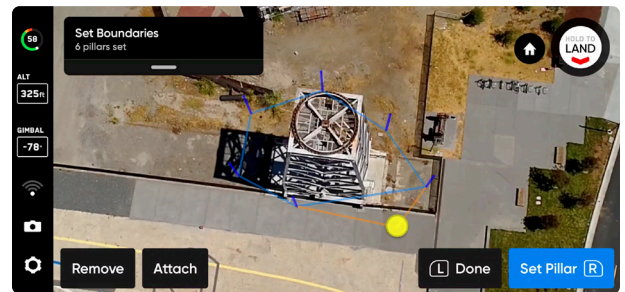
STEP 8: Set Visual Geofence

Enables a strict geofence around the scan volume. The Visual Geofence uses the drone's visual navigation system to always enter and exit the 3D volume from the same location.

Skydio will honor the Visual Geofence during the Explore phase and the scanning process, as well as when transitioning between the two. For more details, read the **Visual Geofence** section.

To set the Visual Geofence, independently toggle strict or default geofence settings: **Ceiling, Floor,** and **Lateral**. By default, Skydio will remain within the scan distance of the boundaries.

Enabling a strict geofence means each geofence blocks flight outside of the scan volume along that bound. The drone will continue to enter and exit the scan volume through the same location.
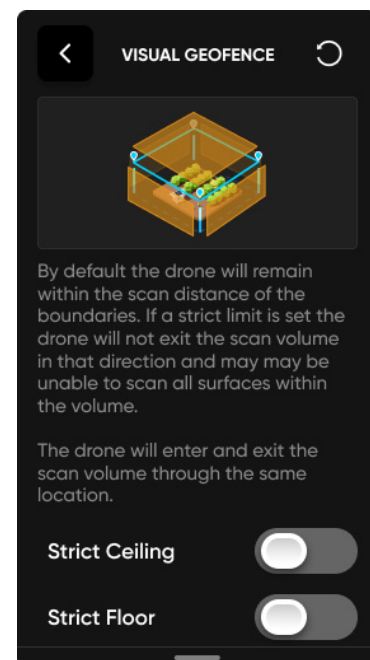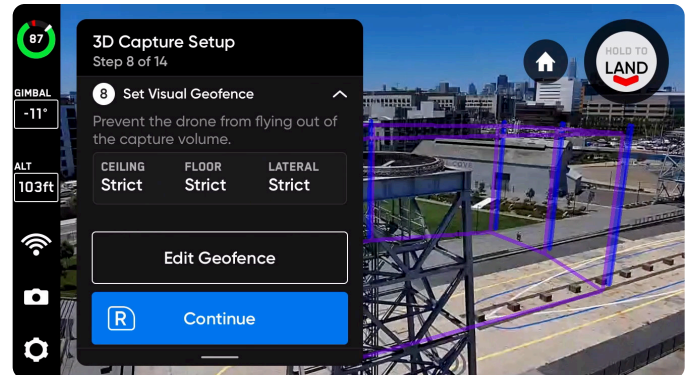
> 📝 **NOTE:** Skydio will skip image capture locations that are located outside any of the toggled geofence boundaries. This may result in gaps in coverage.

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STEP 9: Set AR Observer

The AR Observer allows you to set the point of view from which you can observe an augmented-reality view of the scan progress. When you set your AR Observer point, the drone will take a static image from that position. The AR drone will follow the white lines, which denote the planned flight path and image capture locations. The purple AR lines show the Lateral Pillar Bounds.

Toggle 🔲 to switch between the static AR Observer image and the drone's camera feed at any time during the scan.

There are two ways to set the AR Observer:

- **Review Suggestion** means Skydio 2 will fly to the ceiling of the pillar closest to the takeoff position. The drone will then face the structure (the centroid of the AR polygon-prism). **We recommend selecting this option.**

- **Set Manually** allows you to manually pilot the drone to your preferred vantage point, using the Skydio Controller. If you choose to manually set the location of the AR Observer, ensure you are choosing a spot that provides you with the best situational awareness for monitoring the scan's progress. **For best performance, fly no more than 10m from the scan volume, tightly frame the structure and keep the gimbal pitch level or looking down toward the structure.** Fill the frame vertically or horizontally.
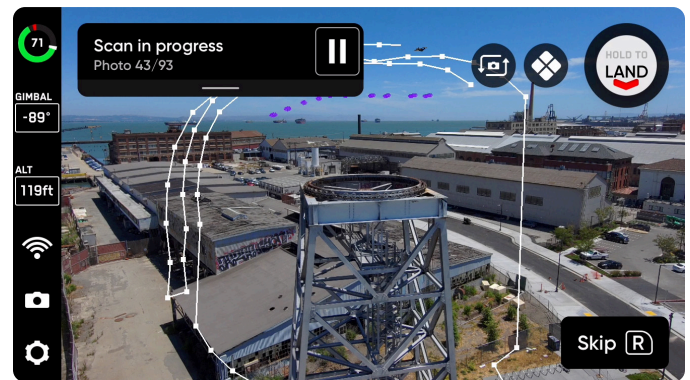
> 📝 **NOTE:** The AR Observer point is used to reorient the drone after completing a battery swap and resuming the scan. Ensure the drone has a clear path between the Launch Point, Rally Point (if set manually) and AR Observer point. If you experience relocalization failures after battery swaps, try using the suggested AR Observer position rather than setting it manually.

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STEP 10: Explore

The drone will briskly and autonomously fly around the scan volume to build an internal model of the structure being scanned. Select **Edit Settings** to adjust the speed at which your drone completes the Explore Phase. The minimum speed is 1.1 mph (1.8 km/h) and the maximum speed is 5.6 mph (9 km/h).

Skydio uses this internal model to intelligently predict overall scan time and number of capture points needed to complete the scan. The explore phase should be a small fraction of the total scan time, and a rough time estimate is given.

> **TIP:** Tap ⊗ in the top right corner to toggle the AR Coverage Mesh.

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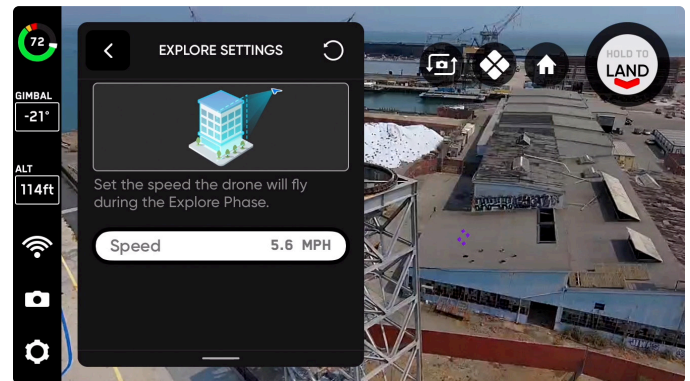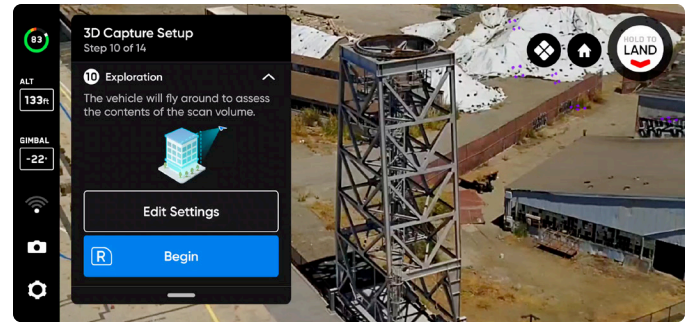
STEP 11: Review or Edit Settings

View a summary of your scan settings, plus estimates for the total scan time, number of batteries needed and total number of photos. You must have at least five photos to begin a scan. Review your current settings and make any edits before the scan begins. Editing scan settings will impact the total flight time, number of photos and the required number of batteries. See **3D Capture Settings** for more guidance.

Settings persist across scans of the same scan mode. Select the Reset button in the top right corner to restore settings to defaults.

Once your settings are finalized, you may select **Begin Scan** and Skydio will begin autonomously scanning the structure.
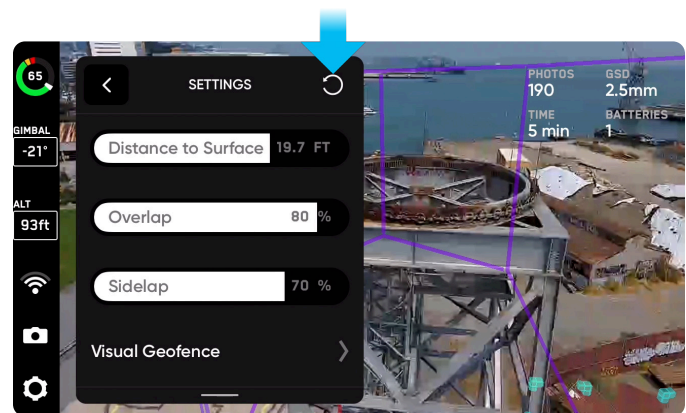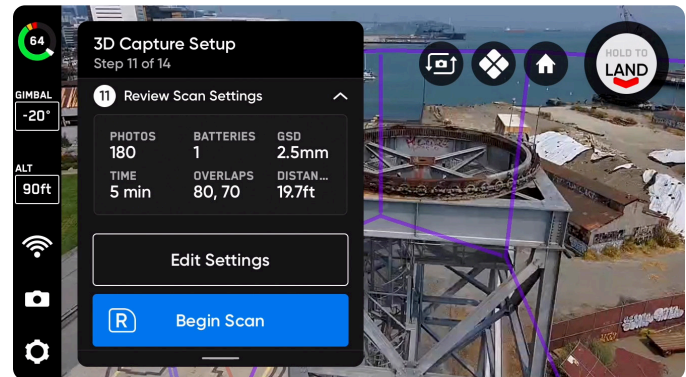
STEP 12: Scan

Optionally toggle on the AR Coverage Mesh ⊗ during your scan to monitor the photo coverage progress of the scan. Learn more about this feature in the **AR Coverage Mesh** section on page 20.

Your scan may require using several batteries to complete. For more information, see **Scanning with Multiple Batteries** on page 42.

You may pause at any point during your scan. Use the left shoulder button or tap the ⏸ icon in the workflow pane to pause scanning. Skydio will display how many photos have been captured. While paused, you have the option to manually capture photos using the right shoulder button. To resume autonomous scanning, use the left shoulder button or press the ▶ icon. Use the right shoulder button during a scan to Skip the next capture point.

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STEP 13: Manually Capture Photos (optional)

Once your scan completes, you will be given the option to manually capture more photos of the scene or details of specific areas of interest. The purple AR outline on-screen shows the Lateral Pillar Bounds. Use the right shoulder button to take a photo. Manual photos will show up in the scan folder and in the Edge Model Viewer alongside the autonomously captured photos.

Obstacle Avoidance set to Standard—and cannot be changed— when Skydio 2 flies autonomously. If you are manually piloting the drone, you have the option to adjust your obstacle avoidance setting within the Device Settings menu.
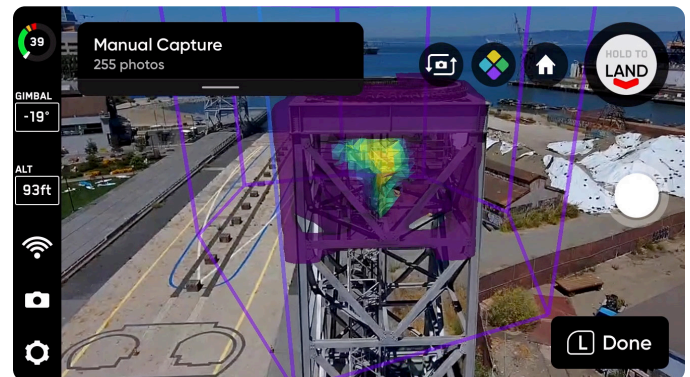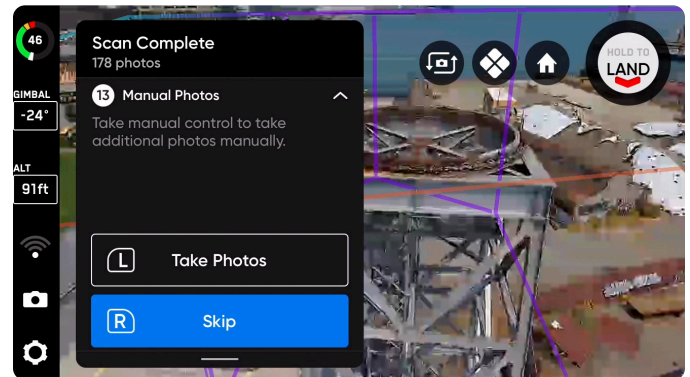
NOTE: *Manual photos may be captured at any time by pressing pause. You may also optionally enable interval mode to have the drone take photos at different time intervals (ex: capture a photo every 5 seconds).*

CAUTION: *Skydio obstacle detection does not detect moving objects and is disabled during landing. Review the Skydio Safety and Operating Guide for more information.*
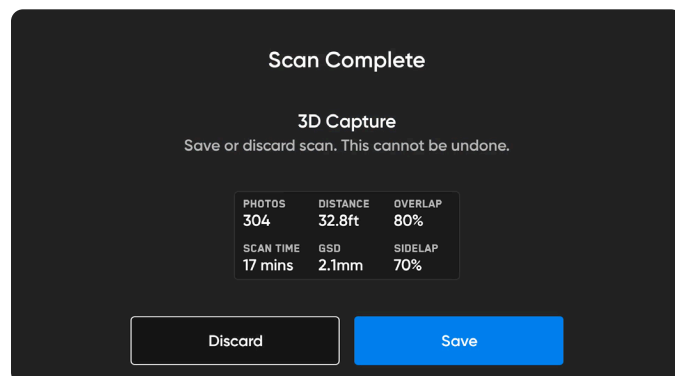
A0137

STEP 14: Scan Complete

Once the scan completes, you will have the option to either start a new scan or Return to Launch or Return to Rally if a manual rally point was set.

Starting a new scan will prompt you with an option to save or discard the scan you just completed. If you Return to Launch or Return to Rally and the path is clear, Skydio will obey the geofence and fly in a straight path to the chosen point. If Skydio cannot find that path due to obstacles, you will be able to take control and manually pilot your drone.

After landing, you will see a summary of the most recent scan and the option to save or discard the scan you completed. Select **Save** and wait for the drone to process your scan. This is an important step to ensure your media is grouped by scan and can be viewed in the Edge Model Viewer.

Once processing is complete, select **Finish**.

Scan Complete

3D Capture
Save or discard scan. This cannot be undone.

PHOTOS	DISTANCE	OVERLAP
304	32.8ft	80%
SCAN TIME	GSD	SIDELAP
17 mins	2.1mm	70%

Discard Save

Processing Scan

Please leave the drone on. This may take a few minutes.
Processing photo 150 of 304 (44.4%)

⚠️ **CAUTION: Do not remove the battery or power off during post-flight tasks**. *Doing so will result in loss of data. Do not power off or disconnect from the drone until you return to the Begin Flight screen.*

A0137

AR Coverage Mesh

The AR Coverage Mesh allows you to monitor the photo coverage progress of your scan. Tap the 🟣 icon to display real-time AR photo coverage of your scan.

Ensure coverage of key areas and enable the AR Coverage Mesh:

- • During the Explore phase
- • Live while scanning
- • When viewing the scan in the AR Observer
- • During manual capture

Yellow indicates minimal coverage and purple indicates full coverage based on your chosen overlap settings.
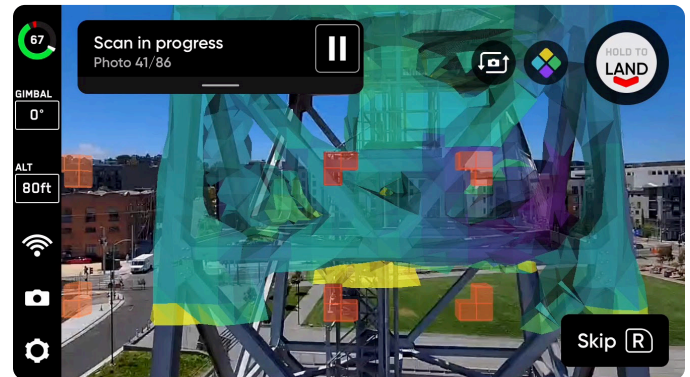
AR Coverage Mesh toggled on during scan
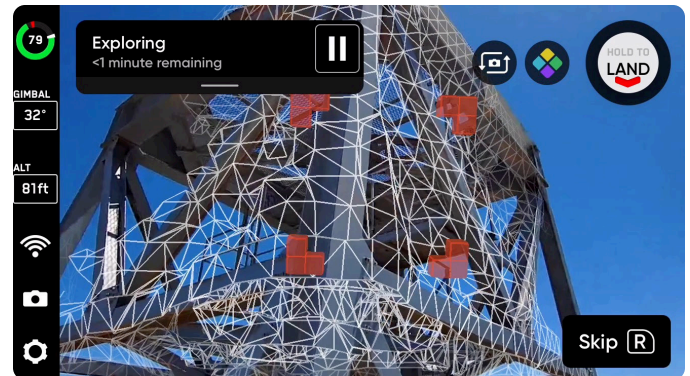
AR Coverage Mesh wireframe toggled on during Explore

NOTE: *Images are not captured during the explore phase, but the coverage mesh will show the low-poly map building process.*

A0137

Visual Geofence

The Visual Geofence gives you the ability to further constrain the drone to a safe flight area while scanning autonomously. By default, the drone will remain within an area defined by the scan volume and the scan distance.

The Visual Geofence uses the drone's visual navigation system to always enter and exit the 3D volume from the same location without the use of GPS. Skydio will honor the Visual Geofence during the Explore phase and the scanning process, as well as when transitioning between the two.

This setting gives you the ability to toggle on or off three independent visual geofences: Ceiling, Floor, and Lateral. When enabled, each geofence blocks flight outside of the scan volume along that plane. If an image capture point is located outside of a toggled fence boundary, Skydio will not fly there and instead skip those capture points.

- **Strict Ceiling** uses the maximum height geofence
- **Strict Floor** uses the minimum height geofence
- **Strict Lateral** uses the lateral (pillars) geofence

> (i) *For example, when scanning a bridge, toggle the Ceiling geofence to avoid flying over the bridge deck; if you are scanning close to private property, toggle the Lateral geofence to avoid flying over the property.*

A0137

2D Capture Workflow

Before you fly

- GPS will be required for scans higher than 65 ft (20 m).

- If needed, you can move backwards and re-do any steps in the workflow. Doing so will reset the steps you have already completed and discard any media that has been captured. You will not be charged for discarded media.

STEP 1: Select Scan Mode

Select 2D Capture as the Scan Mode. Tap **Begin** on the screen or use the right shoulder button on the Controller.
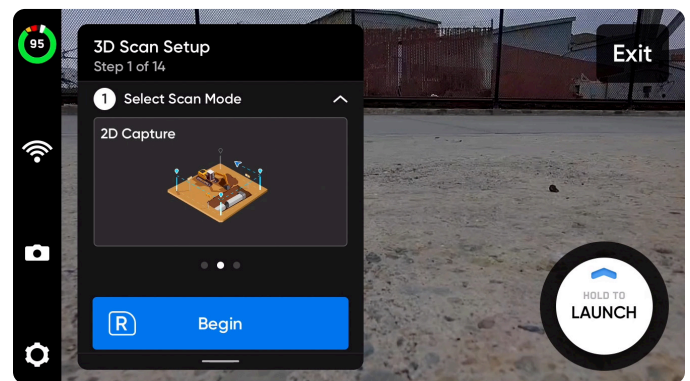
STEP 2: Name Scan Site

After selecting Begin, you may optionally rename your scan. The default scan name is composed of the scan mode you select followed by a UTC timestamp. Renaming the scan will replace the scan mode.

Ex: 2D_Capture__2021-05-20T19-50-55.135854+00-00
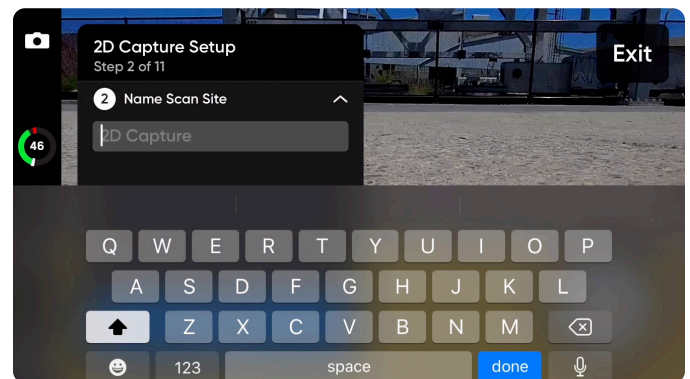
> ℹ️ *Scan names must use American Standard Code for Information Interchange (ASCII) characters. Spaces, Unicode characters such as à, é, â, ü, ö, ä and the following symbols will be converted to underscores (_) in the scan directory name: < > : ; \ | / ? * & $ { } ` ' " Visit https://skydio.com/support for more information.*

STEP 3: Launch

Select and hold the **LAUNCH** button to begin your flight. The drone will automatically climb to 16 ft (5 m) and hover.
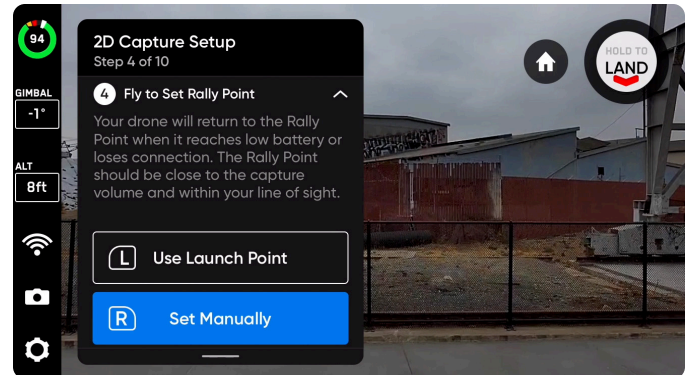
A0137

STEP 4: Set Rally Point

Upon completing the scan, you will see an option to have the drone return to the Rally Point. Additionally, when the battery level is low or the drone loses connection, Skydio will return to the Rally Point.

To set your Rally Point, select one of the following options:

- **Use Launch Point** – drone will return to the launch location instead of a manually set Rally Point.

- **Set Manually** – allows you to use Skydio Controller to manually pilot the drone to a new location.

Tips for setting a Rally Point:

- The Rally Point should be in your line of sight with a clear path to the Launch Point.

- Set your Rally Point close to the scan region so that the drone can safely and easily return to that point autonomously. Even if you change position during the scan, the drone will always have a point to return to safely without obstruction.

- Choose a location that is safe for landing.

STEP 5: Set Scan Floor

The Floor defines the bottom of the area you wish to scan. It will also define the bottom of your reconstructed model in the **Edge Model Viewer**.

There are two ways to begin setting the Floor:

- **Use Launch Height** starts the Floor at 0 ft (0 m) below the launch height.

- **Set Manually** starts the Floor at the current height of the drone.

Once selected, adjust the Floor as desired:

- **Pilot the drone** and the Floor will automatically move with the drone as you fly

- **Drag** the orange Floor AR to the desired height

The Launch Height is represented by a light gray AR plane.

- **Done** – Sets the Floor in your desired location and proceeds to the next step

- **Center Floor** – Moves the location of the Floor to the current altitude of the drone

- **Level Gimbal** – Moves the camera gimbal pitch to 0°

A0137
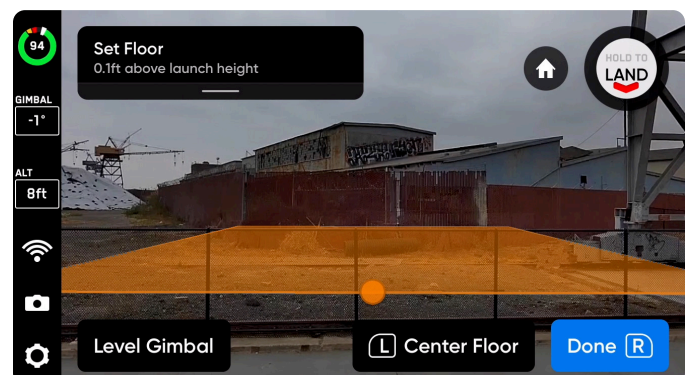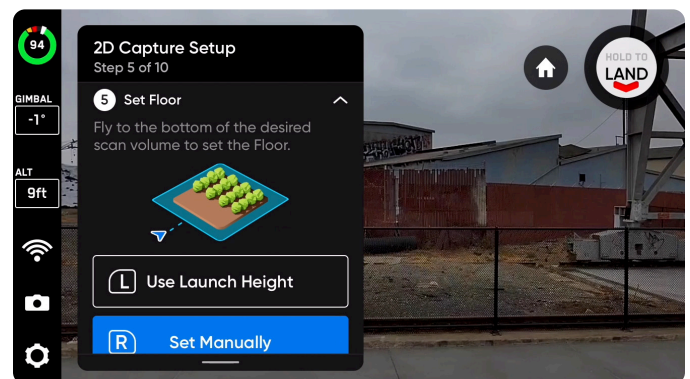
STEP 6: Set Lateral Pillar Boundaries

Set AR pillars to encompass the area to be scanned. The pillars bound the area laterally. It will also define the lateral area of your reconstructed model in the **Edge Model Viewer**.

A minimum of three pillars must be set to create an area boundary.

There are two options when setting pillars:

Fly to the desired location and use the right shoulder button to select **Set Pillar**. Continue placing pillars to encompass the entire structure. By default, pillars are attached to the drone. The edges of the polygon defined by the pillars must not cross each other.

- **Set Pillar** – Adds a new bounding pillar
- **Remove** – Removes the previous bounding pillar
- **Done** – Completes this step and finalizes pillar placement

Drag Pillars by holding the base of the yellow AR Pillar on-screen. This selects the active pillar and enables dragging. You may continue to set pillars by dragging or reconnecting the pillar to the drone by selecting "Attach."

- **Set Pillar** – Adds a new bounding pillar
- **Done** – Completes this step and finalizes pillar placement
- **Attach** – Reconnects the pillar to the drone
- **Remove** – Deletes the previous bounding pillar

Drag to place pillars
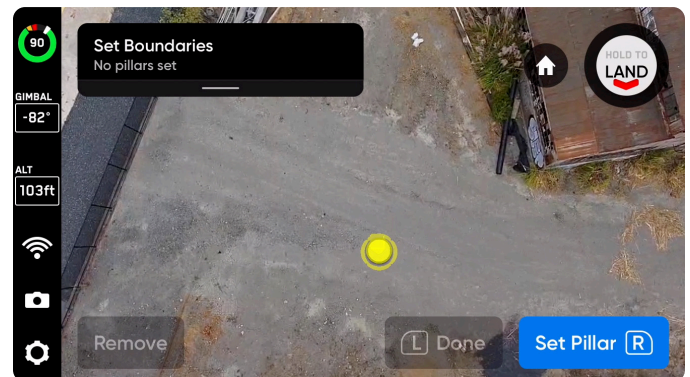
Fly to place pillars

> 💡 **TIP:** *Try adjusting the angle of the gimbal for a better view of where you are placing pillars.*

> ℹ️ *Only the current active pillar may be dragged.*

A0137

STEP 7: Set AR Observer

The AR Observer allows you to set the point of view from which you can observe an augmented-reality view of the scan progress. When you set your AR Observer point, the drone will take a static image from that position. The AR drone will follow the white lines, which denote the planned flight path and image capture locations. The purple AR lines show the Lateral Pillar Bounds.

Toggle 📷 to switch between the static AR Observer image and the drone's camera feed at any time during the scan.

- **Review Suggestion** means Skydio 2 will fly to the ceiling of the pillar closest to the takeoff position. The drone will then face the structure (the centroid of the AR polygon-prism). **We recommend selecting this option.**

- **Set Manually** allows you to manually pilot the drone to your preferred vantage point, using the Skydio Controller. If you choose to manually set the location of the AR Observer, ensure you are choosing a spot that provides you with the best situational awareness for monitoring the scan's progress. **For best performance, fly no more than 10m from the scan volume, tightly frame the structure and keep the gimbal pitch level or looking down toward the area**. Fill the frame vertically or horizontally.
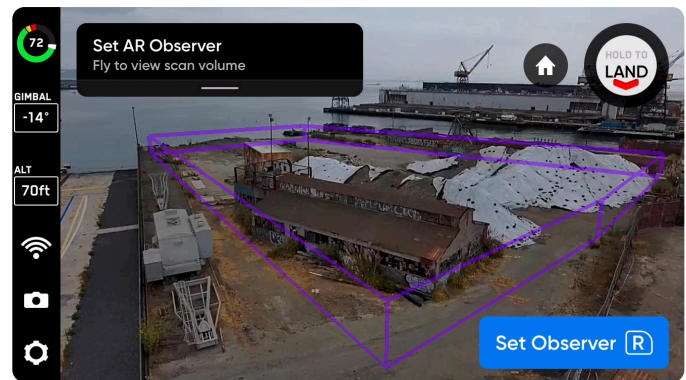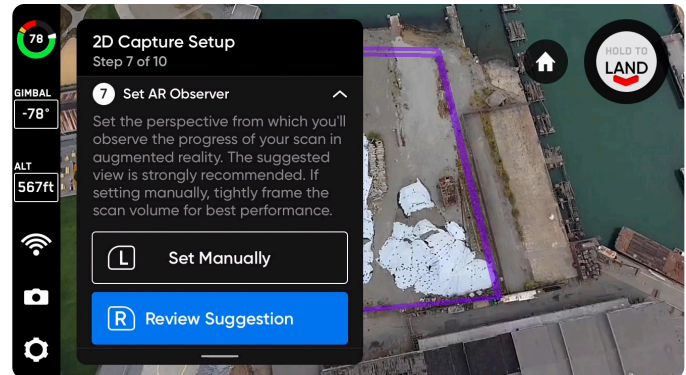
> 📝 **NOTE:** The AR Observer point is used to reorient the drone after completing a battery swap and resuming the scan. Ensure the drone has a clear path between the Launch Point, Rally Point (if set manually) and AR Observer point.

A0137

STEP 8: Review or Edit Settings

View a summary of your scan settings, plus estimates for the total scan time, number of batteries needed and total number of photos. You must have at least five photos to begin a scan. Review your current settings and make any edits before the scan begins. Editing scan settings will impact the total flight time, number of photos and the required number of batteries.

Scan settings persist across scans of the same scan mode.
If you plan to fly higher than the Height slider allows, simply fly to your desired altitude and select **Set Height to Current.**

In a 2D Capture, the Height is relative to the Floor you set.

> ⚠️ *Do not set your Height Ceiling below your desired scan altitude as this will impact GSD.*

Select **Edit Settings** and tap the Reset button in the top right corner to restore settings to defaults. This will not reset the Crosshatch or Perimeter. To restore the Crosshatch or Perimeter settings to default, tap either Crosshatch or Perimeter and select the Reset button in the top right corner of the screen.

> ℹ️ *The camera gimbal pitch represents the angle below the horizon.*
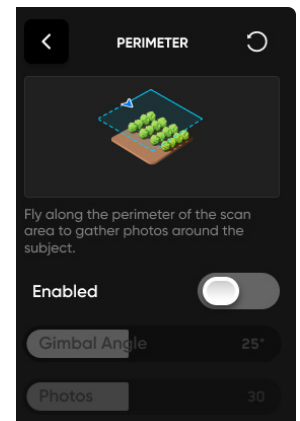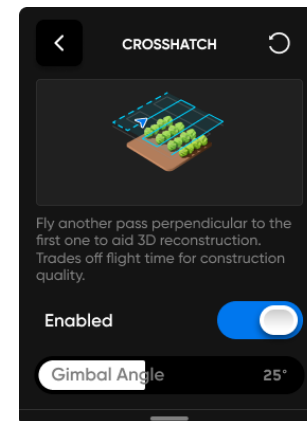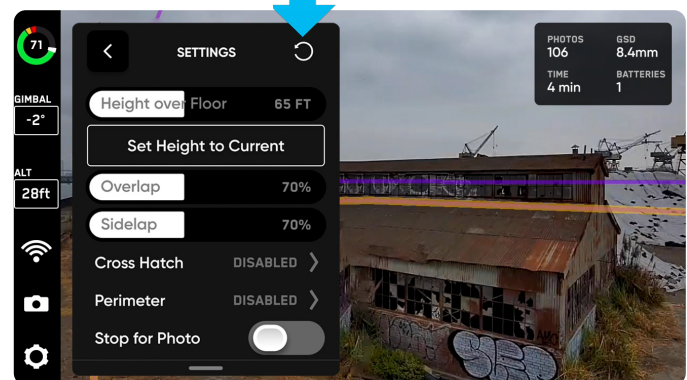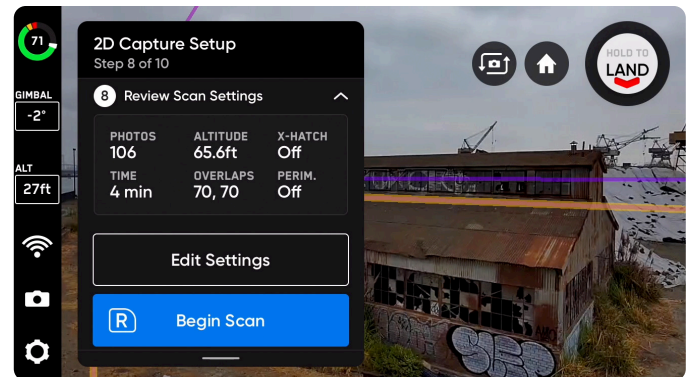
STEP 9: Scan

Your scan may require using several batteries to complete. For more information, see **Scanning with Multiple Batteries**.

You may pause at any point during your scan. Use the left shoulder button or tap the ⏸ icon in the workflow pane to pause scanning. Your drone will display how many photos have been captured. While paused, you have the option to manually capture photos using the right shoulder button. To resume autonomous scanning, use the left shoulder button or press the ▶ icon. Use the right shoulder button during a scan to **Skip** the next capture point.

A0137

STEP 10: Scan Complete

Once the scan completes, the drone will automatically fly to the launch location upon completing the scan. You will have the option to either start a new scan or Return to Launch or Return to Rally if a manual rally point was set. Starting a new scan will prompt you with an option to save or discard the scan you just completed.

After landing, you will see a summary of the most recent scan and the option to save or discard the scan you completed. Select **Save** and wait for the drone to process your scan. This is an important step to ensure your media is grouped by scan and can be viewed in the Edge Model Viewer.

Once processing is complete select **Finish**.

Scan Complete
2D Capture
Save or discard scan. This cannot be undone.

PHOTOS	ALTITUDE	X-HATCH
251	65.6ft	On
SCAN TIME	OVERLAPS	PERIM.
20 mins	70, 70	On

Discard   Save

Processing Scan
Please leave the drone on. This may take a few minutes.
Processing photo 170 of 251 (61.0%)

⚠️ **CAUTION: Do not remove the battery or power off during any post-flight tasks**. *Doing so will result in loss of data. Do not power off or disconnect from the drone until you return to the **Begin Flight** screen.*

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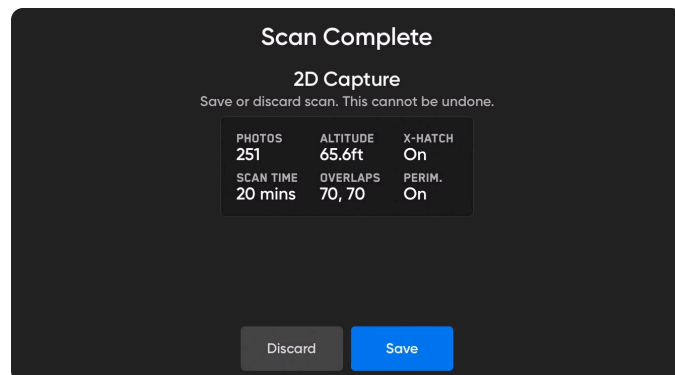
2D GPS Capture Workflow

Before you fly

- GPS is required in this scan mode.

- If you will be scanning in locations that do not have an internet-enabled Wifi connection, **you must import the map beforehand**. Read the [Download Maps section of the Skydio 2 Enterprise Operator Manual](#) for more information.

- Previously downloaded maps will automatically load when you select 2D GPS Capture as your scan mode.

- If needed, you can move backwards and re-do any steps in the workflow. Doing so will reset the steps you have already completed and discards any media that has been captured. You will not be charged for discarded media.

STEP 1: Select Scan Mode

Select 2D GPS Capture as the Scan Mode. Tap **Begin** on the screen or use the right shoulder button on the Controller.
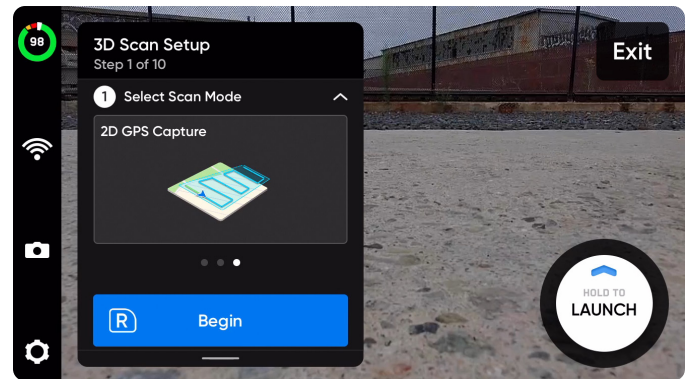

> **NOTE:** You must download the map beforehand if you are flying in locations that do not have an internet-enabled Wifi connection.

STEP 2: Name Scan Site

After selecting Begin, you may optionally rename your scan. The default scan name is composed of the scan mode you select followed by a UTC timestamp. Renaming the scan will replace the scan mode.

Ex: GPS_Capture__2021-05-20T19-50-55.135854+00-00
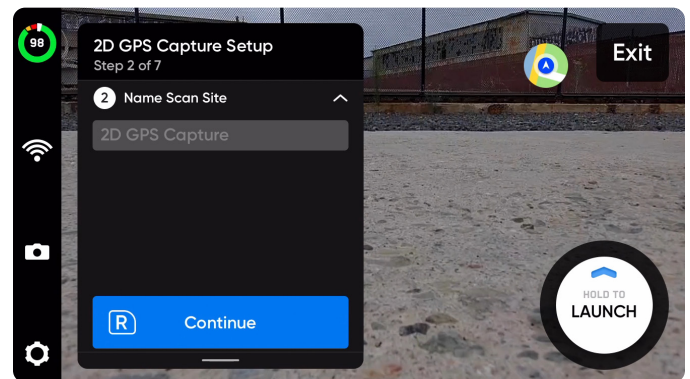
> Scan names must use American Standard Code for Information Interchange (ASCII) characters. Spaces, Unicode characters such as à, é, â, ü, ö, ä and the following symbols will be converted to underscores (_) in the scan directory name: < > : ; \ | / ? * & $ { } ` ' " Visit https://skydio.com/support for more information.

A0137

STEP 3: Set Boundary Points

By default, a 328 ft x 328 ft (100m x 100m) polygon will automatically appear on your screen. Adjust the boundary points by dragging the green dots to surround the area you wish to scan.

- Move the entire polygon around the map using the arrows ✛

- Add more boundary points by tapping the plus (+) on the white lines

- Press and hold a boundary point to remove it

Previously downloaded maps will automatically load when you select 2D GPS Capture as your scan mode.
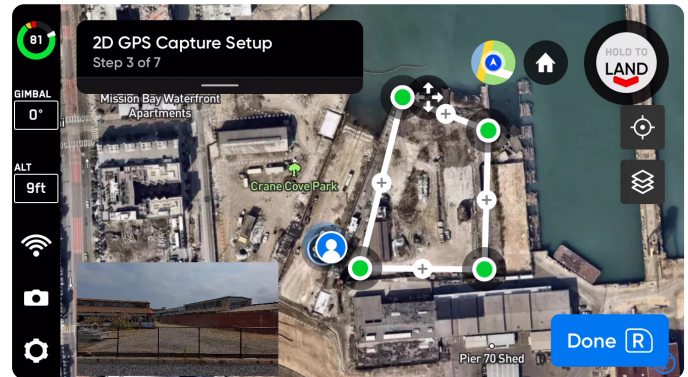
By default, GPS coordinates are visible on the map view. When enabled, coordinates are shown for the:

- Launch Point
- Crosshair
- Location of the drone

To enable or disable GPS Coordinates on the map view:

1. Navigate to **Device Settings** > **Phone**

2. From the Phone menu, select **On Screen Display**

3. Tap to toggle Coordinates on or off

A0137

STEP 4: Review or Edit Scan Settings

View a summary of your scan settings, plus estimates for the total scan time and total number of photos. You must have at least five photos to begin a scan.
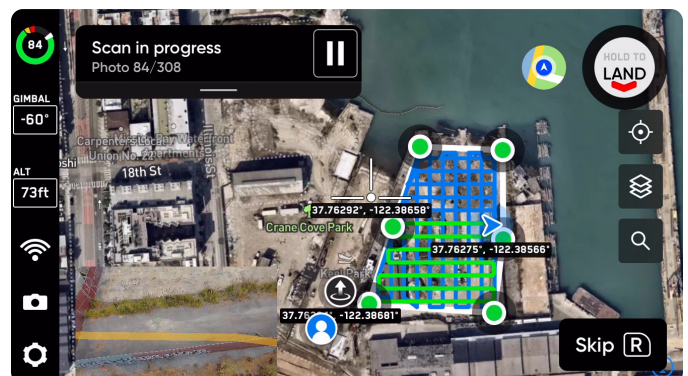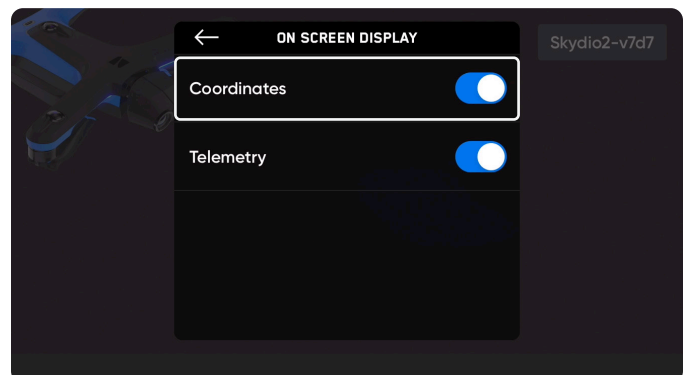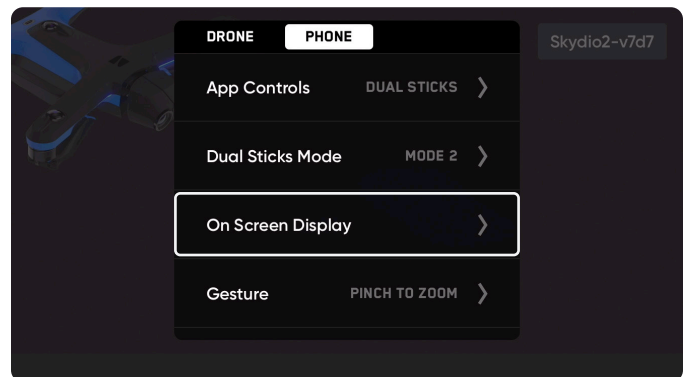
Scan settings persist across scans of the same scan mode.

The blue line shows the path the drone will take during the scan. This will refresh to show an updated version of the planned flight path when you adjust settings, such as enabling Crosshatch or Perimeter.

Select **Edit Settings** and tap the Reset button in the top right corner to restore settings to defaults. This will **not** reset the Crosshatch or Perimeter. To restore the Crosshatch or Perimeter settings to default, tap either Crosshatch or Perimeter and select the Reset button in the top right corner of the screen.

In a 2D GPS Capture, the Height is relative to the launch.

Editing the scan settings will impact the total flight time, number of photos and the required number of batteries.

If you enable the **Perimeter** setting, you have the option to specify the number of photos taken. By default, Skydio will capture 36 photos when the Perimeter is enabled. You may specify a minimum of 20 photos and a maximum of 80 photos.

Tap the Reset button in the top right corner to restore the Crosshatch or Perimeter settings to defaults.

> 📝 **NOTE:** *The camera gimbal pitch represents the angle below the horizon.*
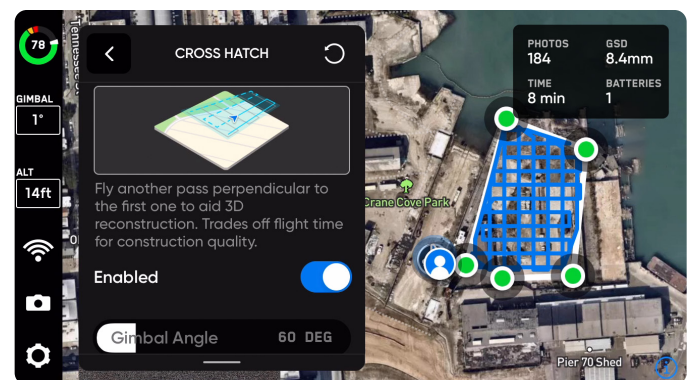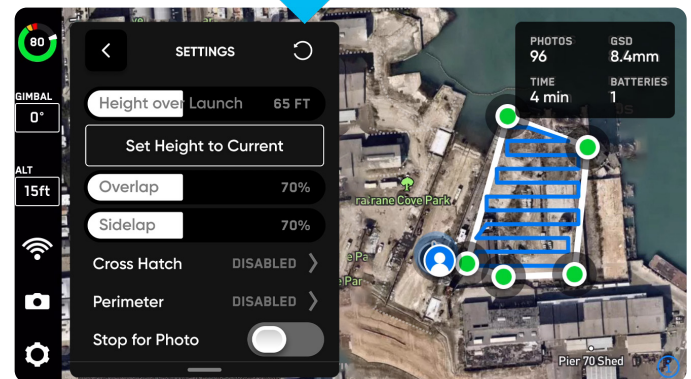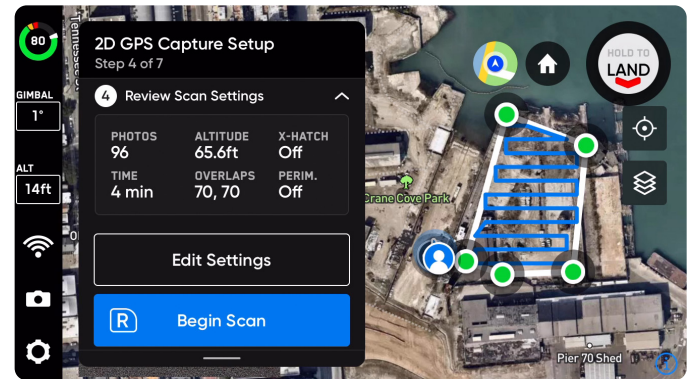
Crosshatch enabled
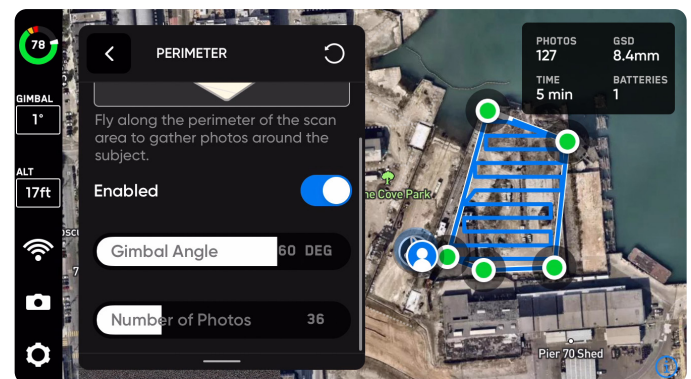
Perimeter enabled

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STEP 5: Launch and Begin Scan

The planned flight path will turn from blue to green as the scan progresses. In the bottom right of your screen, you will see a picture-in-picture (PiP) view of the drone's live camera feed. Switch between the map view and the live camera feed by selecting the [icon] in the top right of the screen.

You may pause at any point during your scan. Use the left shoulder button or tap the [icon] icon in the workflow pane to pause scanning. Skydio will display how many photos have been captured. While paused, you have the option to manually capture photos using the right shoulder button. To resume autonomous scanning, use the left shoulder button or press the [icon] icon. Use the right shoulder button during a scan to Skip the next capture point.

Your scan may require using several batteries to complete. For more information, see **Scanning with Multiple Batteries**.

A0137
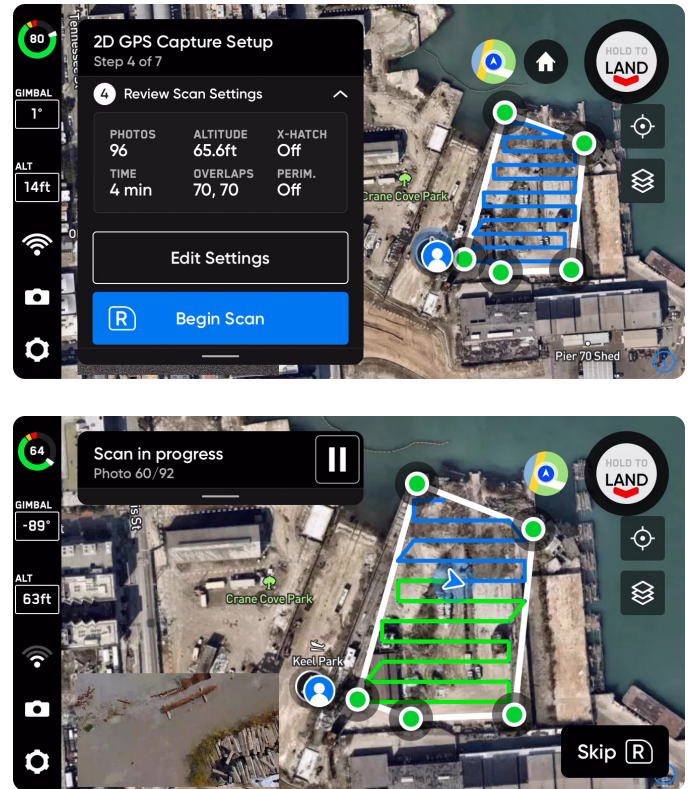
STEP 6: Scan Complete

Once the scan completes, the drone will automatically fly to the launch location upon completing the scan. You will have the option to either start a new scan or Return to Launch.

Starting a new scan will prompt you with an option to save or discard the scan you just completed. If you Return to Launch, Skydio will first fly laterally until it is above the Launch Point and then move vertically to reach it.

After landing, you will see a summary of the most recent scan and the option to save or discard the scan you completed. Select **Save** and wait for the drone to process your scan. This is an important step to ensure your media is grouped by scan and can be viewed in the Edge Model Viewer.

Once processing is complete select **Finish**.

⚠️ **CAUTION: Do not remove the battery or power off during any post-flight tasks**. *Doing so will result in loss of data. Do not power off or disconnect from the drone until you return to the* **Begin Flight** *screen.*

A0137
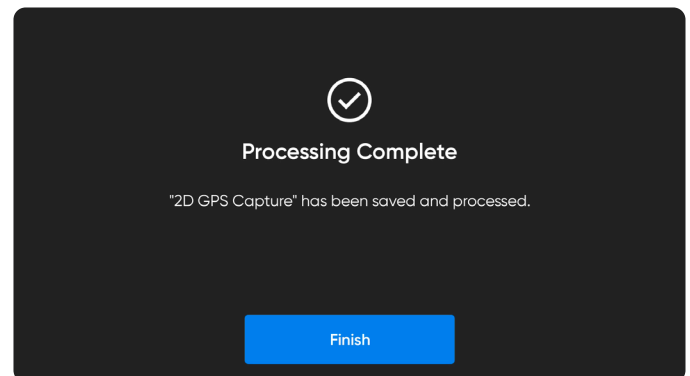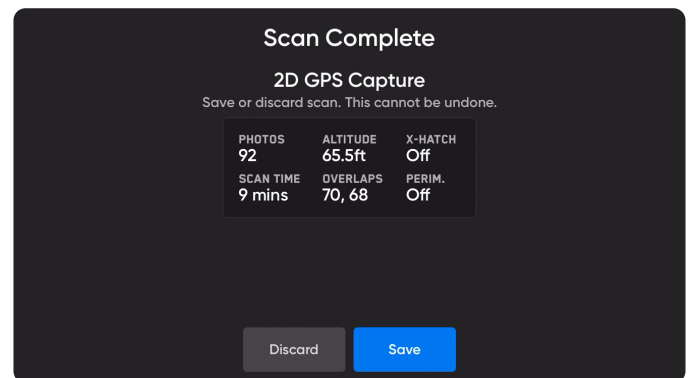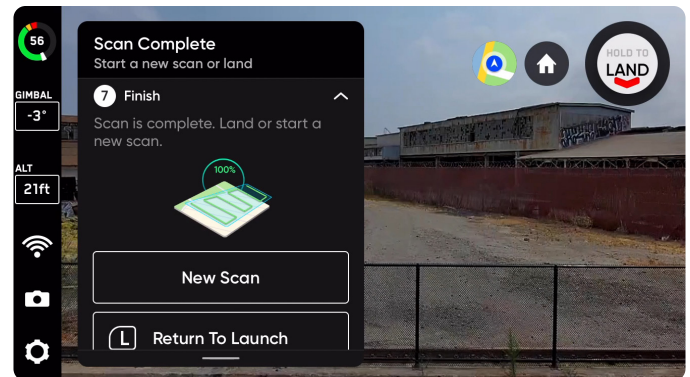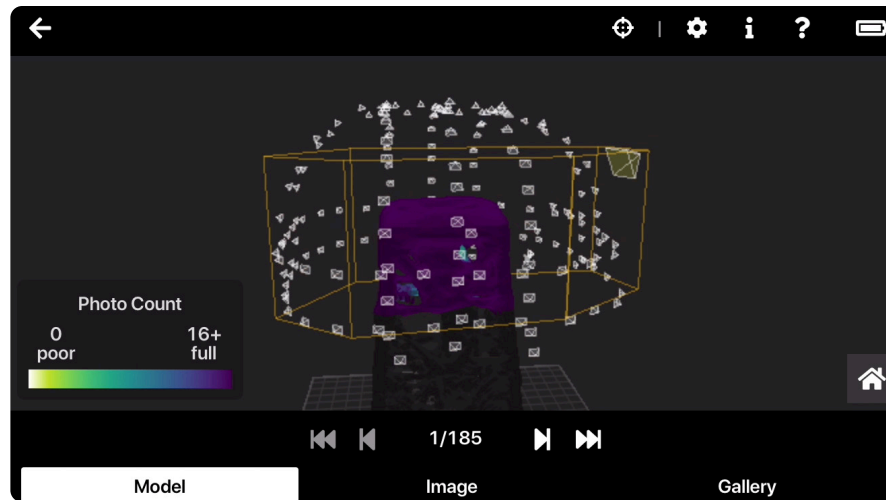
Edge Model Viewer

The Edge Model Viewer promptly generates photosets and enables intelligent photo browsing in the field for real-time inspection and decision-making. Use this tool to preview scans directly in-app or on a laptop after a flight.

Accessing the Edge Model Viewer

To open the Edge Model Viewer **within the Skydio Enterprise app**, follow these steps:

1. Navigate to the **REVIEW** tab in the bottom left. Wait a moment while the scan thumbnails sync in the Skydio Enterprise app.

2. Tap on the scan you would like to view. The Edge Model Viewer will automatically open with this scan loaded.

To access the Edge Model Viewer **on a laptop or other mobile device** follow the steps below:

1. Make sure you are connected to the drone's WiFi. In your web browser, navigate to http://192.168.10.1/viewer

2. Select a scan from the dropdown menu. Click **X** in the top right to close the scan selection window.
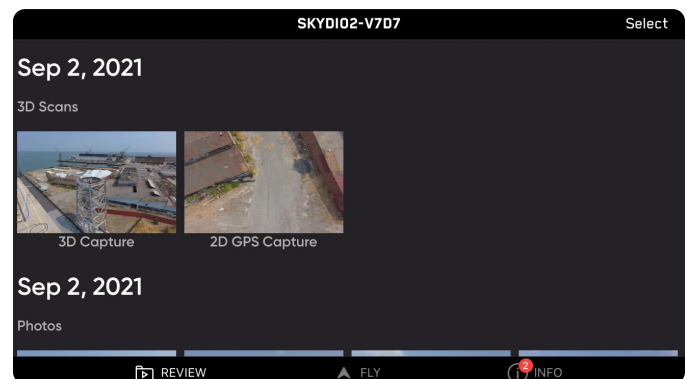
> ⓘ *If you are having trouble loading the Edge Model Viewer, turn off LTE data to ensure your device connects to the drone's wifi.*

Navigating the Edge Model Viewer

Once the scan loads, you will see three separate tabs at the bottom of your screen. On larger screens, these tabs appear as resizable windows:

- **Model** previews a 3D reconstruction of your structure or area. The Edge Model Viewer will begin in this tab by default

- **Image** shows the individual image associated with the selected capture point

- **Gallery** shows all photos taken during the scan. When using the Inspect Tool, the Gallery will show all images containing that specific point

Web browser view

Zoom in and out by pinching with two fingers. Drag to navigate around the model. While dragging you will see green, blue and red colored axes which mark the pivot point. Double-click on the model to center the view on that point.

Use the arrows at the bottom of the screen to navigate through individual images and capture points on the model. Any time the active thumbnail changes, the image gallery will update to that view. Select the Help **?** menu for a breakdown of the navigation controls.
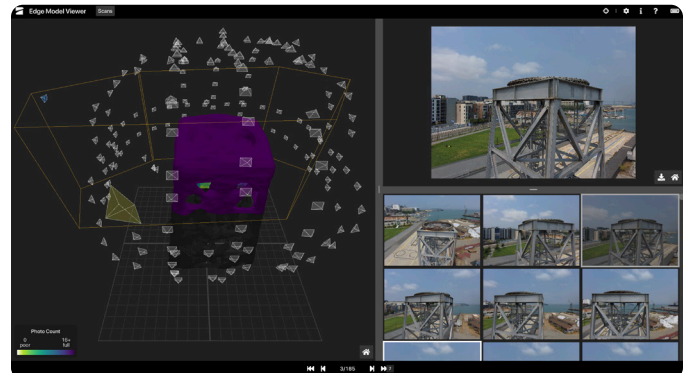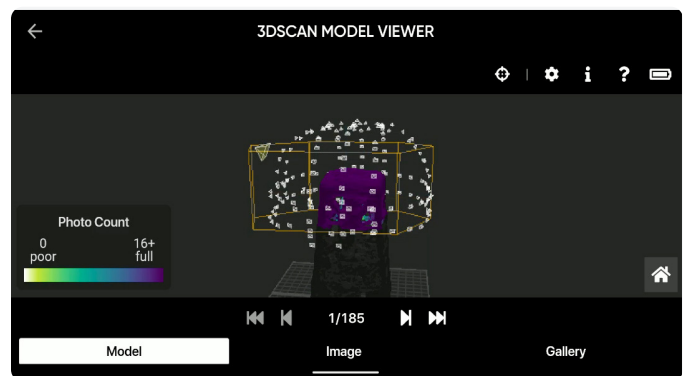
Android mobile view
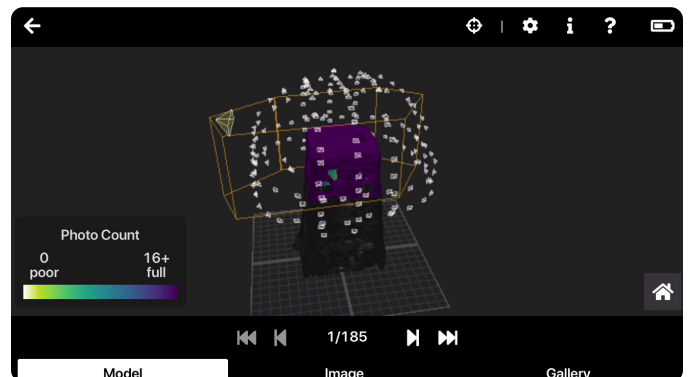
iOS mobile view

Capture Points

Select individual capture points to view photos. Once selected, the frustum will turn blue to denote you have already viewed that point.

A0137
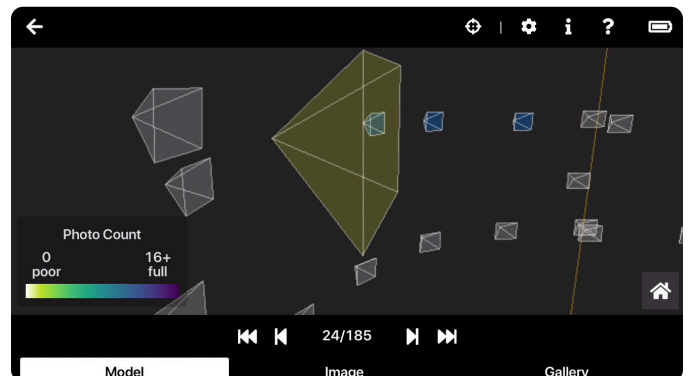
Coverage Heatmap

You'll notice a coverage heatmap over the structure. This indicates how many photos were taken at each location. The photo count defines the coverage mesh colors in relation to the number of photos taken. Minimum and maximum photo numbers scale with your scan's overlap settings. Yellow indicates minimal coverage and purple indicates full coverage.
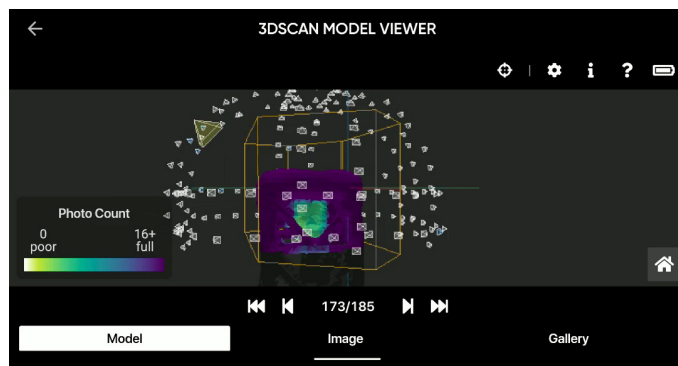
Toolbar

In the top right of the screen, there is a toolbar with the following icons:

Inspect Tool

Allows you to pick any point on the model and filter for all images containing that specific point.
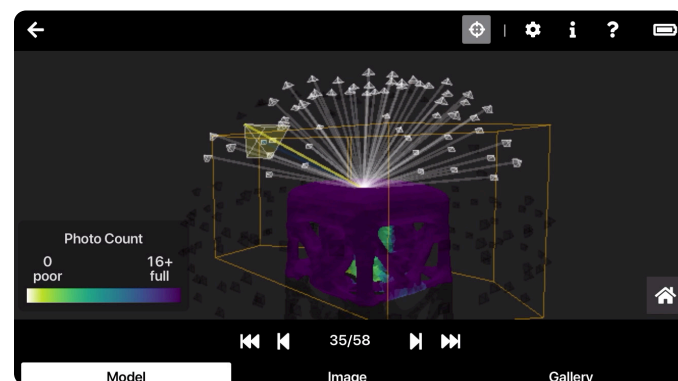
A red marker will appear on both the model and photo to show your current placement. Use this tool in the field to review the settings and angles you chose and see where images are spatially located in relation to the model.

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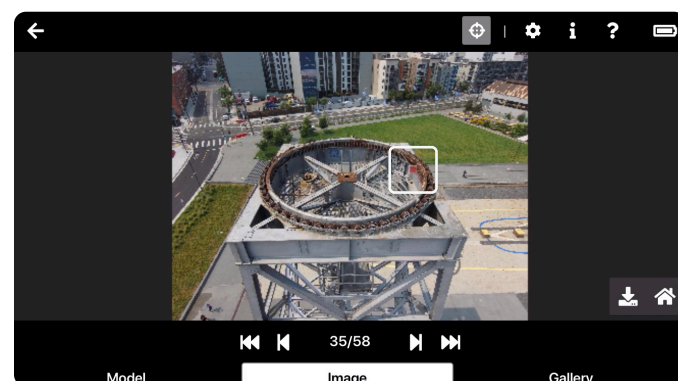
Info

Summarizes information about the scan, the model and the image that is currently selected. This includes data such as the date and time of the scan, image size, and scan name.

To copy any of this information to your clipboard, press the   icon to the right.

Info	×
Scan	
🏷 3D Capture	⎘
🕐 Sep 02, 2021, 01:27 PM	⎘
# 84f5f27a924d40778cc31743e6d7d8ba	⎘
Model	
🔷 3D Coverage	⎘
# 9236c638-a387-4c18-94fd-aaca6d93f062	⎘
📄 coverage_within_params.gltf	⎘
Capture Point	
🕐 01:19:39 PM	⎘
📄 S1012955.JPG	⎘
# 5dcd4c940af749eb8c57ae5b46f5a12e__534383919	⎘
⌐ 4056px w × 3040px h	⎘
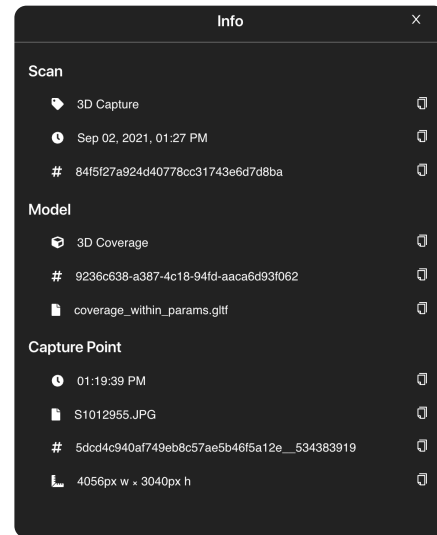
Help ?

Outlines directions about controls and how to navigate the Edge Model Viewer.

Expand ⌐⌐

Enters fullscreen.

Battery 🔋

Indicates the battery level of your Skydio 2.

Downloading Images ⬇

In the Gallery panel, find the image you wish to download. Once selected, navigate to the Image panel and select the ⬇ icon. Photos download as **.JPG** files and include scan information such as the time, scan name, and dimensions. You will have the option to rename your photo.

> 📝 **NOTE:** *Renaming downloaded images is unavailable for iOS.*

Home 🏠

Resets to default view.

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Edge Model Viewer Settings

Locate the following settings by clicking the ⚙ icon in the top right of your screen.
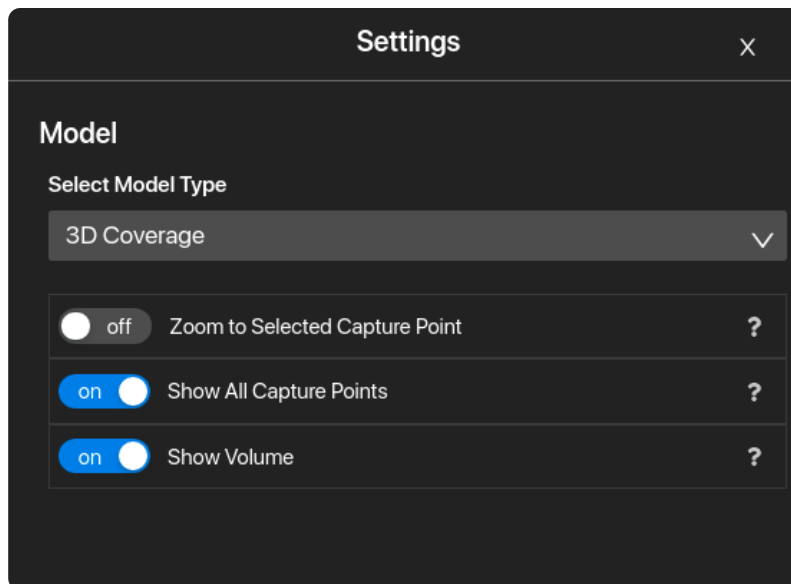
Select Model Type

- **3D Coverage** – Shows a photo coverage map that matches the in-flight AR Coverage Mesh. This is the only option for 3D Capture.

- **2D Coverage** – Highlights the idealized plane at the bottom of the scan volume. This is the only option for 2D Capture.

Zoom to Selected Capture Point

Automatically aligns the 3D view with the active capture point.

Show All Capture Points

Shows all capture points. When toggled off, this hides other points and shows only the active camera selected.

Show Volume

Adds a yellow prism around the structure to denote the user-defined scan volume.

Scan Settings

Photo Settings

Based on the available lighting conditions, your drone will automatically adjust photo settings to ensure it captures the best quality images. You will see in-app notifications alerting you if there are problems with the lighting conditions.

For consistency with reconstructions, Skydio recommends leaving all photo settings set to default. If needed you do have the ability to adjust the following:

- Photo Interval*
- Off / 1s or 2s** / 5s / 10s
- HDR On/Off
- JPG / JPG+DNG***
- White Balance
- Shutter Speed
- Exposure

When Photo Interval is enabled your drone will continuously capture photos at the specified time interval until the setting is disabled or the flight ends. Available in the Manual Capture step of a 3D Capture.

*** The fastest interval photo setting when capturing in raw DNG is two seconds. You may capture a photo every one second when capturing in JPG mode.*

*** DNG photos are not displayed in the media tab of the Skydio Enterprise app or Skydio Cloud and may be retrieved directly from the microSD card.*

DNG must be enabled for each independent 3D Scan and your settings will NOT persist. DNG photos can only be captured when 'Stop for Photo' is enabled. If you enable DNG capture this will automatically toggle Stop for Photo.

A0137
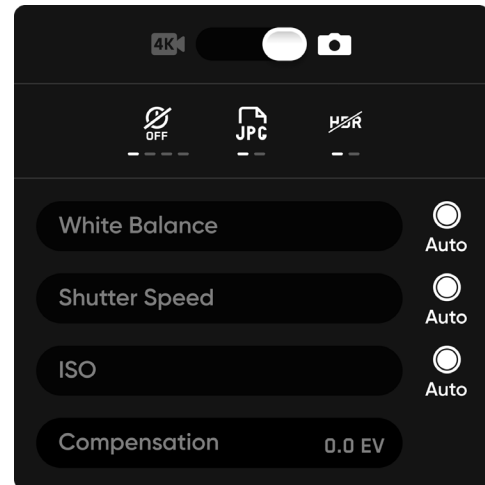
3D Capture Settings

Settings will persist between scans and between flights. If you would like to restore settings back to default, select the reset button in the top right on the workflow pane during the Review or Edit Settings steps of a scan.

Overlap Percentage

Overlap between photos along a path. The default overlap is 80%; high overlap is recommended for complex scenes.

Sidelap Percentage

Sidelap between two adjacent flight paths. The default sidelap is 70%; high sidelap is recommended for complex scenes.

Scan Passes

Organizes the capture path into three continuous slices, **Z**, **Y**, and **X**.

The Z slices are completed first and resemble orbits at fixed heights going around the structure. By default, the camera gimbal angle is set to 15°. Use the **Z Gimbal Pitch** slider to adjust the camera angle at which the drone will capture photos while orbiting. Increased gimbal pitch results in capturing less sky and more photos of the surrounding area and structure itself.

> (i) *The camera gimbal pitch represents the angle below the horizon.*

Adjusting the Z Gimbal Pitch is useful in situations where:

- You want to capture the ground in every photo for improved reconstructions
- You intend to leverage third party reconstruction software and want to minimize the number of photos containing sky
- You need to include the ground in your photos to capture Ground Control Points (GCP) at your scan site

If you are using the Z Slice to efficiently capture large, relatively simple vertical surfaces (e.g., facades), we recommend leaving the default Z Gimbal Pitch. If you have **only** the Z Slice enabled, we recommend adjusting the Z Gimbal Pitch to zero.
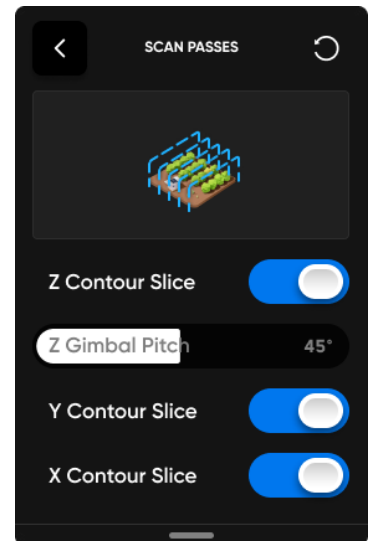
> (i) *Toggle on only the Z scan pass for faster scans around structures that do not need to be viewed from above or below.*

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The Y and X slices follow and resemble a cross hatch pattern.

We recommend leaving all three slices enabled. You have the option to independently toggle each of the scan slices as needed. If all three slices are disabled, you will be unable to start the scan.
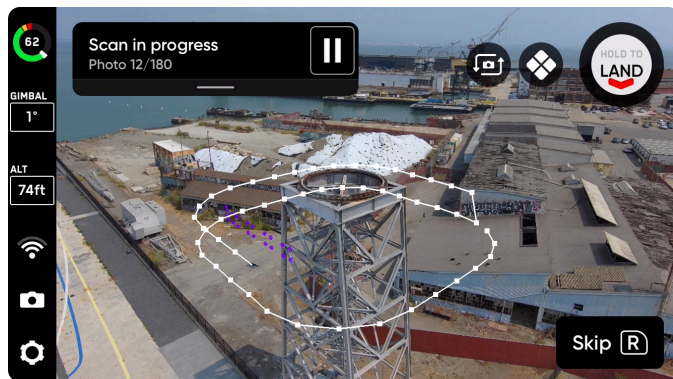
Z Slice

Y Slice

X Slice

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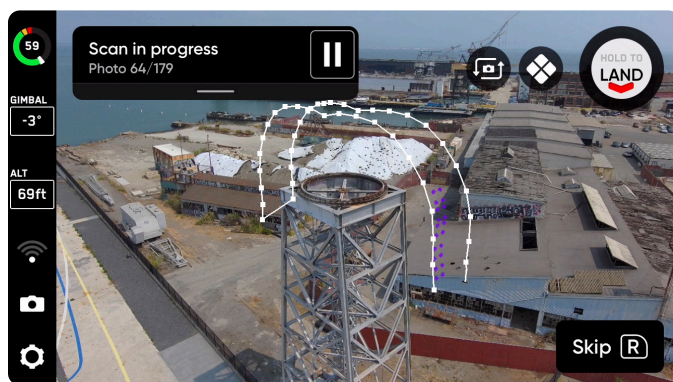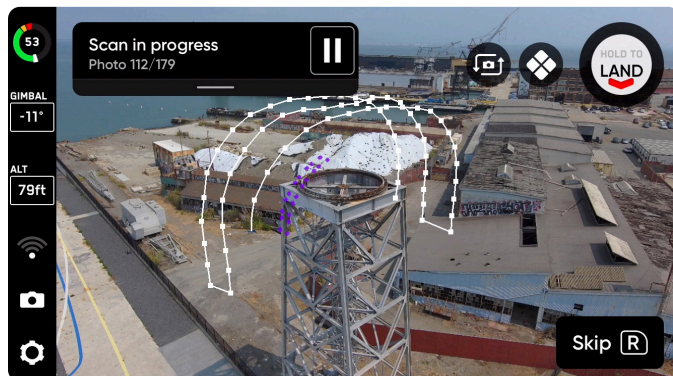
Distance to Surface

Determines how close the drone will fly to the structure or area being scanned. Smaller distance to surface (closer) means more photos taken and higher resolution, but an increased total scan time. The Distance to Surface corresponds directly to Ground Sample Distance (GSD) which defines the distance between two consecutive pixel centers on the ground. For example, a one-millimeter GSD would suggest that the distance of the two consecutive pixel centers in the photo reflects one millimeter on the ground.

> ℹ️ *The minimum surface distance is 1.5 m for 3D Scan. The maximum surface distance is 8 m for 3D Scan.*

GSD at various fixed Distance to Surface

DISTANCE TO SURFACE (M)	DISTANCE TO SURFACE (FT)	GSD (MM)
1.5	4.92	0.63
2	6.56	0.84
2.5	8.20	1.05
3	9.84	1.26
3.5	11.48	1.47
4	13.12	1.68
4.5	14.76	1.90
5	16.40	2.11
5.5	18.04	2.32
6	19.69	2.53
6.5	21.33	2.74
7	22.97	2.95
7.5	24.61	3.16
8	26.25	3.37

Stop Vehicle at Photo

By default, the drone will fly through image capture points without stopping for smooth and efficient flight. Skydio will automatically set the best speed to capture photos based on your scan distance and lighting conditions, while ensuring your images remain crisp and clear.

Toggle on **Stop vehicle at photo** if you would like your drone to stop before capturing a photo at each capture point. The drone will still accelerate between capture points. Enabling this setting significantly increases the amount of time and batteries required to complete your scan.

> **NOTE:** DNG photos can only be captured when 'Stop for Photo' is enabled. If you enable DNG capture this will automatically toggle Stop for Photo.

A0137
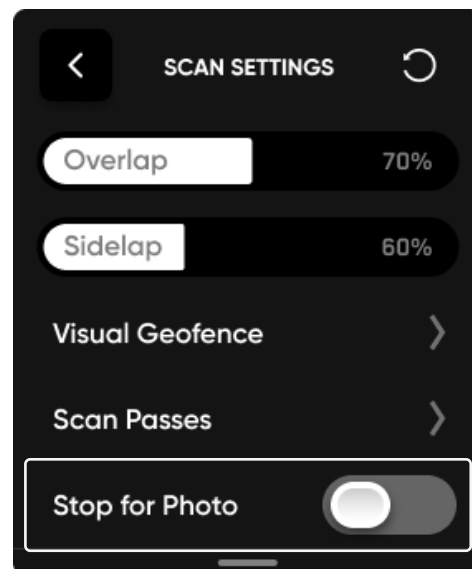
Suggested 3D Capture Settings

Default settings are optimized for 3D reconstruction.

If your main objective is to create a 3D reconstruction using a third party photogrammetry software, review the table below for example settings.

Example 3D Capture Settings for Reconstructions

INDUSTRY	USE CASE	OBJECTIVE	EXAMPLE GSD	SCAN PASS	OVERLAP/SIDELAP
Construction	Progress monitoring and asset inspection	Asset damage, misalignment, as-built vs. design	2 mm	Z, Y, X	80/70
Transportation	Bridge inspection	Cracks and delamination in concrete, bolts, nuts, connection points in weight bearing areas	1 mm	Z, Y, X	80/80
Utilities	Distribution	Transformers, conductors, insulators, static wire, pole quality/damage	1 mm	Z	80/75
Telecommunicatons	Cell tower with complex antenna array	RAD Centers, connection points, access ladder conditions	1.5 mm	Z, Y or X	85/80

> **NOTE:** Reference the **GSD at various fixed Distance to Surface** table within the 3D Capture Settings section.

If your objective is only to capture highly detailed imagery (without later processing), you can decrease the overlap and sidelap percentages (e.g. 30/30) to significantly speed up scan time.

Use Case Example: Key Requirements for Transmission & Distribution Inspection Images

DISTANCE TO SURFACE	Set to achieve up to 0.5 centimeter precision (GSD)
OVERLAP/SIDELAP	30%/30% overlap/sidelap from multiple angles of the tower infrastructure

2D and 2D GPS Capture Settings

Settings will persist between scans and between flights. If you would like to restore settings back to default, select the reset button in the top right on the workflow pane during the Review or Edit Settings steps of a scan.

Height

The most important setting for 2D Captures. Lower height means more photos taken and higher resolution, but an increased total scan time. In a 2D Capture, the Height is relative to the Floor you set. In a 2D GPS Capture, the Height is relative to the launch. The Height corresponds directly to Ground Sample Distance (GSD). Set the Height higher than the slider options by piloting the drone to your desired height and tapping the **Set Height to Current** button.

> **NOTE:** GPS will be required for scans higher than 65 ft (20 m).

GSD at various fixed Heights

HEIGHT (FT)	HEIGHT (M)	SKYDIO 2 GSD (MM)
5	1.5	0.632
8	2.4	1.011
12	3.7	1.558
15	4.6	1.938
20	6.1	2.568
30	9.1	3.851
40	12.2	5.135
50	15.2	6.419
75	22.86	9.629
100	30.5	12.838

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Cross Hatch

Capture oblique images by enabling the Cross Hatch setting. When enabled, Skydio will capture in a rotating lawn mower pattern. This increases the number of photos but provides better oblique imagery for reconstruction. Instead of capturing top-down (nadir), the camera gimbal angle is adjustable to capture images at an angle for more detailed reconstruction. The camera gimbal angle is set to 60° by default.

When disabled, the drone will capture photos in a nadir (top-down) lawn mower pattern.

> ℹ️ *The camera gimbal pitch represents the angle below the horizon.*

Overlap Percentage

Overlap between photos along a path. Recommended default is 70% for complex scenes. For an example use case, review the **Suggested 2D Capture Settings**.

Sidelap Percentage

Sidelap between paths. Recommended default is 70% for complex scenes. For an example use case, review the **Suggested 2D Capture Settings**.

Perimeter

Scan 3D volumes by traversing the 2D perimeter at multiple heights and taking pictures inward. This will take place at the end of the scan, and the additional inward photos will improve reconstruction. This is a good setting to enable when scanning vertical structures like tall buildings or towers.

Adjust the Gimbal Angle slider to your desired camera angle.

Stop for Photo

By default, the drone will fly through image capture points without stopping for smooth and efficient flight. Skydio will automatically set the best speed to capture photos based on your scan distance and lighting conditions, while ensuring your images remain crisp and clear.

- 2 m distance = 0.3 m/s photo speed
- 4 m distance = 0.56 m/s photo speed
- 8 m distance = 1.12 m/s photo speed

Toggle on **Stop for photo** if you would like Skydio to stop before capturing a photo at each capture point. The drone will still accelerate between capture points. Enabling this setting significantly increases the amount of time and batteries required to complete your scan.
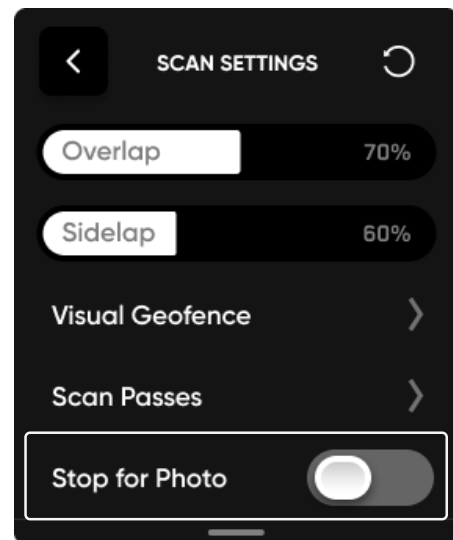
> 📝 **NOTE:** *DNG photos can only be captured when 'Stop for Photo' is enabled. If you enable DNG capture this will automatically toggle Stop for Photo.*

Suggested 2D and 2D GPS Capture Settings

Default settings are optimized for 2D orthomosaic generation in 2D Capture. Your GSD will adjust based on your altitude settings. Higher overlap and sidelap percentages result in longer scans and a greater number of photos. You have the ability to adjust these settings before the scan begins.

> **NOTE:** *If your goal is to create a high fidelity reconstruction, increase your overlap and sidelap percentages. If you do not plan to create a model of your scan, lower overlap and sidelap percentages will suffice.*

Use a 2D Capture when you wish to scan:

- Areas that can be scanned in one battery or less
- Areas at heights closer to the ground, e.g. < 65 ft
- Areas that are not represented on the basemap because the GPS satellite/map data is out of date, or missing entirely
- Smaller areas such as roadways, small buildings or construction sites, where GPS satellite/maps are not high enough resolution for accurate flight planning
- Areas without connectivity where you may not have been able to download maps in advance
- Areas that may be more complicated than basic polygons, such as intersections where trees may be encroaching

- Areas that are indoors or in particularly challenging environments where GPS is not reliable or not available
- Areas where the Floor height is above ground level (i.e. scanning a roof)

Use a 2D GPS Capture when you wish to scan:

- Areas that require more than one battery to scan, where preplanning before launch is significantly faster than planning via AR pillars
- Large areas that you wish to scan at greater heights above ground, e.g. > 65 ft
- Large areas that are well represented on GPS satellite/basemaps
- Large areas that you may scan repeatedly

Example 2D Capture Settings

| INDUSTRY	USE CASE	OBJECTIVE	EXAMPLE GSD	CROSS HATCH OR PERIMETER	OVERLAP/SIDELAP
Construction	Site survey, stockpile volumetrics	Site progress, volumetrics, terrain model	10 mm	Cross hatch	75/70
First responder	Large collision scene reconstruction	Crumple damage, skid marks, weapons, broken glass	1 mm	Cross hatch	80/75
Transportation	Road grading and survey	Cracks and delamination in concrete, road damage, erosion, site survey, terrain model	10 mm	Off	75/70

> **NOTE:** *Reference the **GSD at various fixed Heights** table within the 2D Capture Settings section.*

Scanning with Multiple Batteries

Using computer vision, Skydio can resume scans across multiple battery changes without reliance on GPS.

We recommend flying scans that require no more than 4 batteries. During the Review Scan Settings step, you will see a scan summary which includes the total scan time and estimated number of batteries. If your total number of batteries is greater than 4, consider adjusting your settings or split the volume into separate scans.
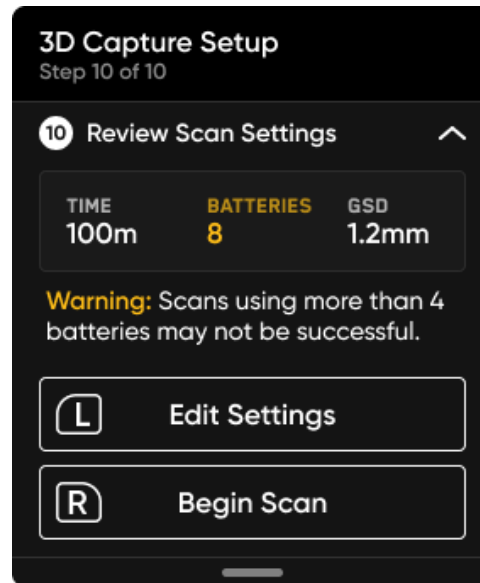
> ⚠️ **CAUTION:** *Wait to remove the depleted battery until all post-flight tasks are complete. Do not remove or swap out the Logs Card or Media Card between flights of the same scan. Removing either card when replacing a depleted battery will result in your drone being unable to resume the scan.*

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How to Change Batteries Mid-Scan

When the battery has about 18-25% charge (or 3 minutes of flight time) remaining, your drone will follow **Low Battery procedures** and return to the Rally Point. You will have the option to Land Now or Take Control to reposition your drone for landing.

To change batteries mid-scan:

1. Land your drone and save the current scan.

2. Wait to remove the depleted battery until all post-flight tasks are complete.

3. Power off your drone, remove the depleted battery and replace.

4. Power on your drone and wait as Skydio automatically connects.

5. To successfully resume a scan after replacing the battery, **the drone must take off from the exact same position and orientation between each flight**. Taking off in a different location or orientation will result in errors when attempting to resume your scan. We strongly recommend taking off from the Skydio case.

After replacing the battery, take off to begin your flight. You should see an option to either continue the scan or begin a new scan. Select **Continue** when prompted to resume a scan.

- If you are completing a 3D Capture, ensure your drone has a clear path between the Launch Point, Rally Point (if set manually) and AR Observer point. After it reaches the AR Observer point, the drone will honor the geofence and fly in a straight line path, only adjusting to avoid obstacles.

- If you are completing a 2D Capture, ensure your drone has a clear path between the Launch Point, Rally Point (if set manually) and AR Observer point. After it reaches the AR Observer point, the drone will first fly vertically, then laterally to reach the next capture point.

- If you are completing a 2D GPS Capture, your drone will fly vertically to the scan altitude then resume.

GOOD – *Place at the center of the case logo facing forward in the same spot every flight.*

BAD – *Do not place the drone askew or in a different location from where you took off in the previous flight.*

⚠️ **CAUTION: Do not power off until all post-flight tasks are complete**. *Do not remove the Media Card or the Logs Card between flights of the same scan. Removing either card when replacing a depleted battery will result in your drone being unable to resume the scan.*

📝 **NOTE:** *While you should always select **Save** before completing a battery swap, Skydio will automatically save your scan before removing the depleted battery.*

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Accessing Scan Data

Retrieve valuable contextual data about scans after your flight. To access the photos off of your device, you must remove the microSD card from your drone. Use any **microSD or SD card reader** to view and copy your full-resolution photos to your personal computer.

There are two different folders on your Media Card:
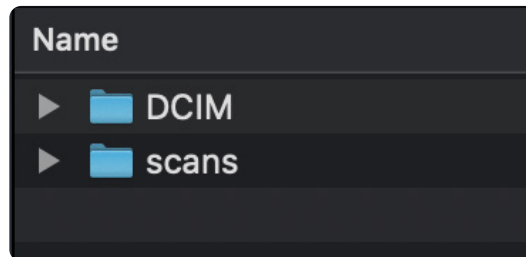
Digital Camera Images (DCIM) Folder

The DCIM folder holds a subfolder titled **100SKYDO** which houses low-resolution video files (.LRV) of your scan. You will not need these files to create 3D reconstructions.

Scans

Locate your individual scans within this folder. Folders are titled by scan name followed by a UTC timestamp. For example, 3D_Capture__2021-05-20T19-50-55.135854+00-00.
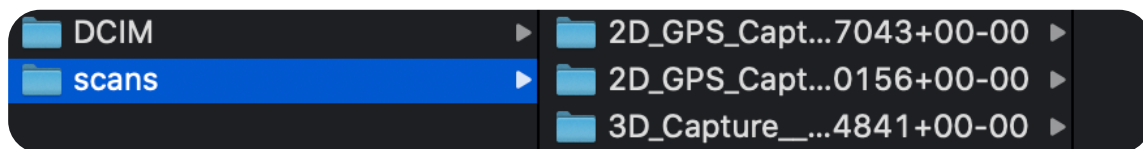
> ℹ️ *Scan directories only support American Standard Code for Information Interchange (ASCII) characters. Spaces, Unicode characters such as à, é, â, ü, ö, ä and the following symbols will be converted to underscores (_) in the scan directory name: < > : ; \ | / ? * & $ { } ` ' " **Do not rename scan directories**. Visit https://skydio.com/support for more information.*

After selecting the scans folder, you will see a few different types of files inside.

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Photo Files

There are two different photo file extensions you can use in 3D Scan™.

Joint Photographic Experts Group (.JPG)

A JPG file is a digital image format containing compressed image data. **These are the images you captured during your scan**. You will need these files for creating reconstructions in photogrammetry software programs.

Digital Negative (.DNG)

A DNG file is a RAW image format file, meaning it is not compressed and retains all original photo data. A DNG file is larger than a JPG file since it stores image data. If you enabled DNG capture during your scan, you will need these files for creating reconstructions in photogrammetry software programs.

> 📝 **NOTE:** *DNG photos are not displayed in the media tab of the Skydio Enterprise app or Skydio Cloud and may be retrieved directly from the microSD card.*

Scan Files

Capture_Report.html

Includes a report with the summary of your scan details. Click this to view a webpage that outlines the following information:

- Scan ID
- Time and date
- GPS location
- Scan setting details (scan mode, overlap, sidelap, scan passes etc.)
- Scan area
- Number of pillars set
- Number of batteries used
- Total flights and flight time
- Total number of images (captured manually and autonomously)

> 💡 **TIP:** *Save this webpage as a PDF for further team collaboration and to easily refer back to the settings you used during a specific scan.*

Coverage_within_params.gltf

A standard file format for 3D models. This is the model shown in the Edge Model Viewer.

Scan_output.pbuf

This file contains serialized metadata about your scans. You will not need this to create 3D reconstructions, but it is used to enable the Edge Model Viewer. **Do not delete this file**.

3D Reconstructions

You must use a third party provider such as DroneDeploy or Bentley to create 3D models of your scans.

To create a 3D model, save the JPG files from the scan onto your personal computer. For details on how to acess your photos through Skydio Cloud visit **https://skydio.com/support**.

Next, upload these files to your preferred photogrammetry software program to create your model.

To locate the JPG images of your scan, follow these steps:

1. Place your Media Card in any microSD or SD card reader and insert into your personal computer.

2. Locate the card reader in your files.

3. You'll see two folders, DCIM and scans. Open scans.

4. Each folder is a different scan. Locate the scan you wish to reconstruct.

> **NOTE:** *Folder titles include the scan name followed by a UTC timestamp. For example: scans/Scan_Name__2021-06-02T19-50-55..135854+00-00*

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Lost Connection, Low Battery & Environmental Factors

Lost Connection

If Skydio loses connection to the Skydio Controller or mobile device during a scan, it will continue scanning for about one minute.

If it is unable to reconnect, the drone will move through a series of steps:

1. After waiting 60 seconds, the drone will first return to the **scan starting point.**

2. If it still doesn't reconnect in the next 30 seconds, the drone will return to the **Rally Point.**

3. If it still doesn't reconnect after another 30 seconds, the drone will return to the **Launch Point.**

The drone will then hover at the Launch Point until it reconnects. If it does not reconnect, **the drone will eventually run out of battery and auto-land.**

Low Battery

When the drone reaches a low battery level (about 3 minutes of flight time remaining), it will automatically return to the Rally Point. If no Rally Point is set, your drone will automatically return to the Launch Point.

You will then be prompted to land. If the battery reaches a critical level the drone will auto-land.

You may pause this autonomous action at any point using the left shoulder button on your Controller.

If you are manually piloting the drone when it reaches a low battery level, Skydio will land in place.
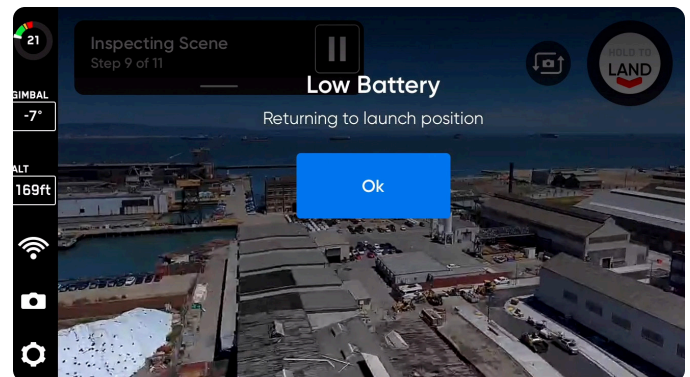
Environmental Factors

Skydio should not be flown in temperatures below 23°F (–5°C) or above 104°F (40°C). Do not let your drone sit in direct sunlight when on the ground or when processing post-flight tasks.

If it is too hot or too windy, the drone will return to the scan start point. You then have the option to take over and pilot the drone home.

Based on the available lighting conditions, Skydio will automatically adjust photo settings to ensure it captures the best quality images. You will see in-app notifications alerting you if there are problems with the lighting conditions. The drone will continue flying for 20 seconds, and if conditions do not clear then it will return to the Rally Point.
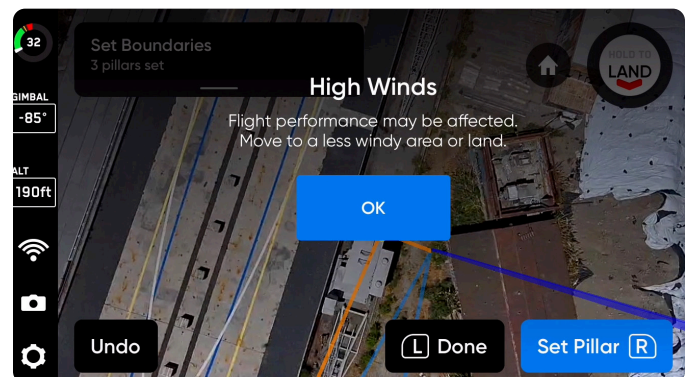
Tips & Best Practices

- Do not remove or swap out the Logs Card between flights of the same scan. Removing either card when replacing a depleted battery will result in your drone being unable to resume the scan.

- Keep your drone and app up-to-date. Visit **Updating your Skydio 2** for update instructions.

- Do not let your drone sit in direct sunlight for extended periods of time and use caution when flying in hot or cold temperatures.

- **If you are flying using DroneDeploy then you must exit 3D Scan to regain access to Flight Skills.** To exit, first land the drone. Navigate back to the Device Settings Menu and change the Vehicle Mode to Skills.

- GPS will be required for scans higher than 65 ft (20 m).

- Ensure there is enough space on both your Media Card and your Logs Card before starting a 3D Scan.

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