

Agenda

About CDL

Enterprise Innovation Committee (EIC) Charter

AI-driven Innovation in CDL

Photo Documentation for Site Activities / Progress

Site Capturing Process

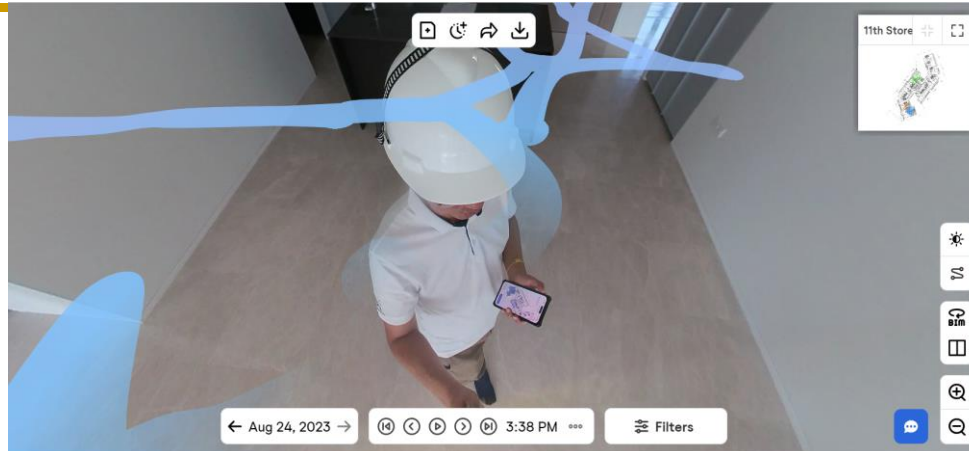
Correspondence & Rectifications

Virtual TOP Process & Observations

Case Study at City Square Mall



Photo Documentation for Site Activities / Progress



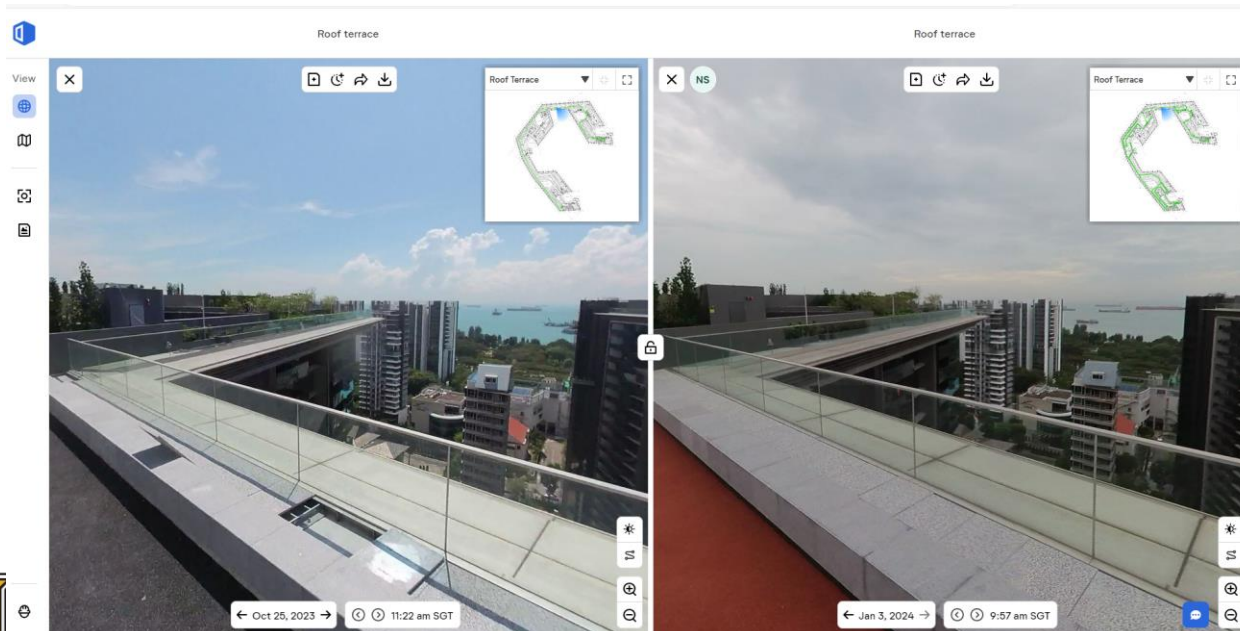
CDL's Site Supervisor carrying out 360 capture

What is the Tech Behind?

1. Use **Simultaneous Location and Mapping (SLAM)** to identify the Person (Walker) on site
2. Using **Computer Vision** to carry out **3D reconstruction** of captured 360-degree raw images of the site
3. Uses **semantic segmentation** to classify raw images into construction-specific segments which can be counted & tracked

Benefits / Advantages

1. **Time & Cost savings** on documentation and progress tracking
2. **Validate and records/stores** construction work accurately and quickly
3. **Enhance inspections** for maintenance & repair



360 capture at Amber Park's 600m sky jogging track

Site Capturing Process

Outcomes / Learnings



2D floor plan
Construction drawings



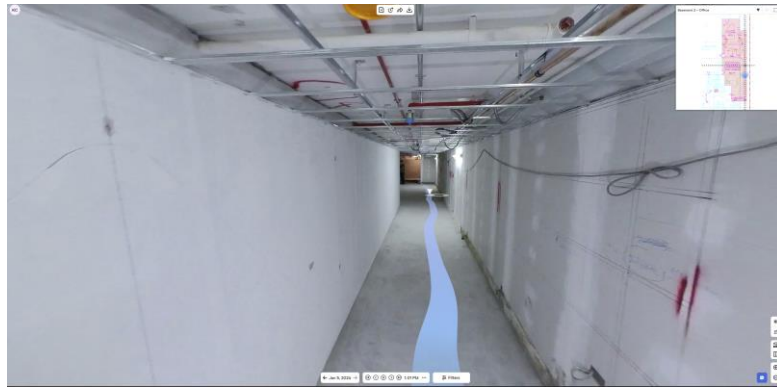
360 camera
Insta 360 or Ricoh camera



Walk
Just need to do site walk

1. 2D floor plan and 360 camera required
2. Vendor assists with photo capture -> pretty straightforward
3. No pre-start up requires -> walk at leisurely pace with equipment on site
4. Battery life lasts ~ 90 mins. Depending on the extent of the area to be captured, additional camera or power bank attachment might be required

Site Capturing Process / Measurements



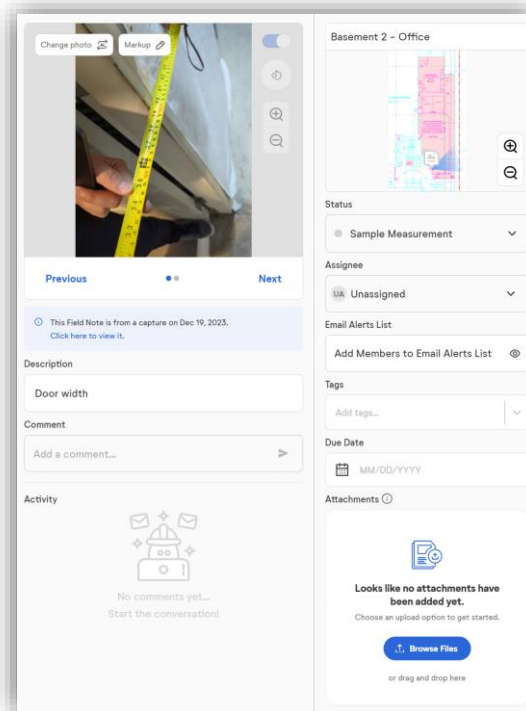
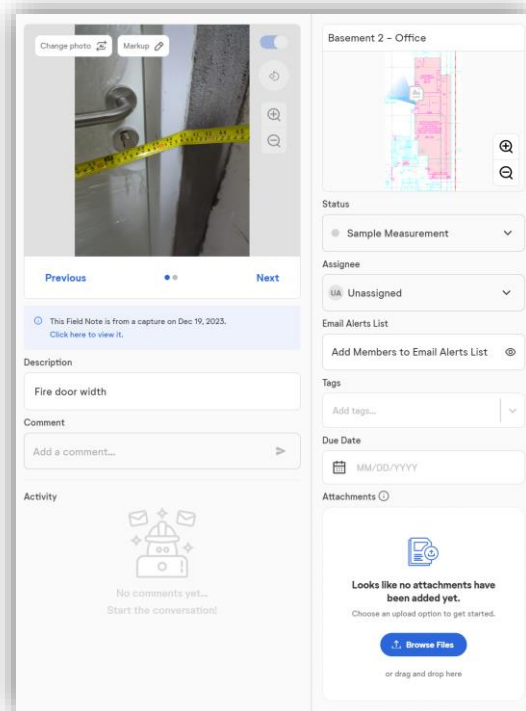
Areas with ample lighting levels



Areas with low lighting levels

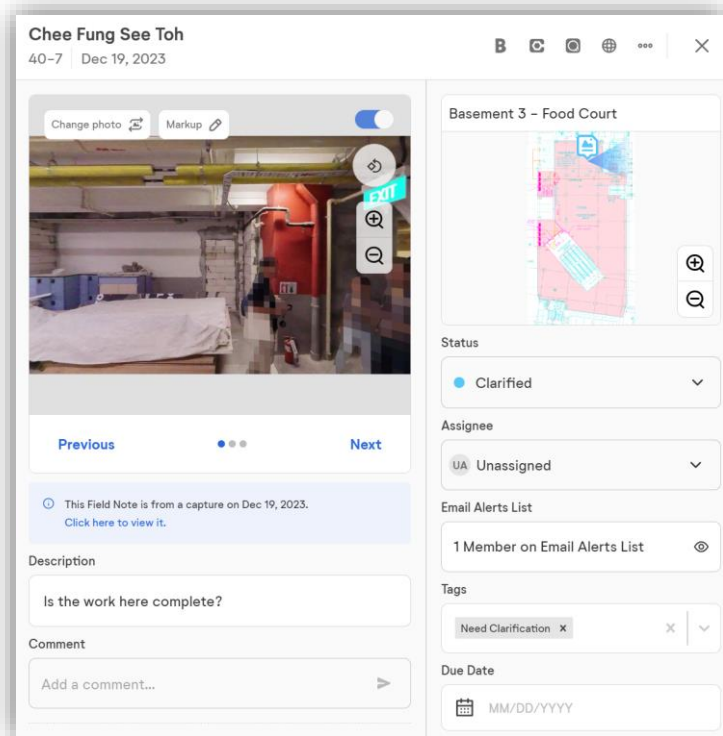
Outcomes / Learnings

1. Photography at areas with low lighting levels might not too clear -> walk at slower pace. Additional lighting source might be required for such areas
2. Requires to have someone assist in measurement
3. AI automatically detect the location and pinned the location of the measurements

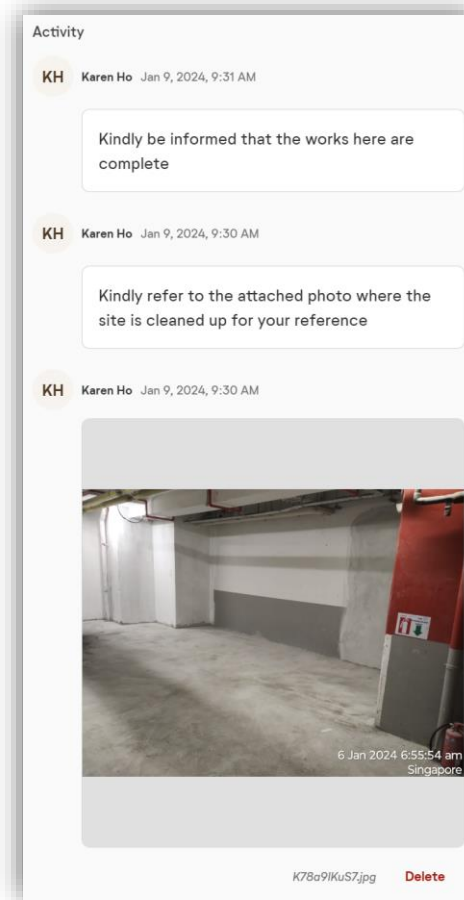
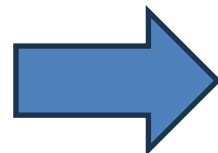


Correspondence & Rectifications

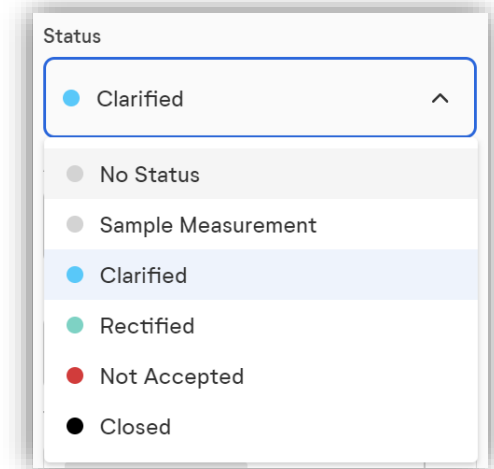
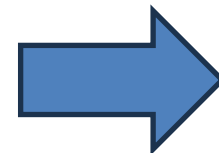
In Collaboration with:



Rectification questions from Officer



Respond from QPs online with attachment on proof



Status to monitor and track status/pending works



Virtual TOP Process & Observations

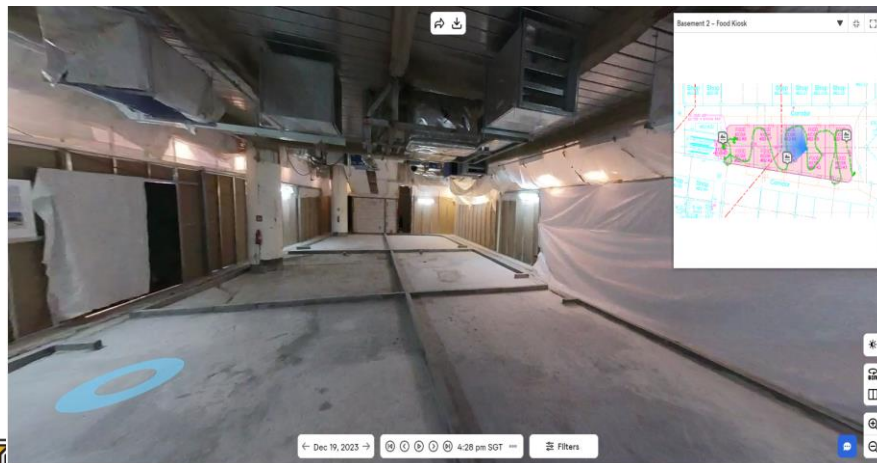


Conventional	Remote TOP with 360 reality capture
Preparation and construction stops for the entire site	Construction stops only for the areas required for capture and resume right after capture is completed
Numerous stakeholders' involvement	Only representative from QPs and contractors are assigned to do capture. The result can be viewed remotely before submission
Coordination requires between officers, QPs, contractors and clients	Less coordination required. QPs and contractors capture when is ready. Officer may review at their own time
Comments and rectification requires longer process	Single platform to respond and comments. Easier to track, manage comments, rectification etc
Owner may have no full transparency on the status	Cloud based solution. Owner able to monitor status or keep track on progress





CDL, Architect and Contractor carrying out 360 capture



Submission of 360-degree photo platform for virtual TOP to BCA

Improved Method

1. The new workflow piloted allows the BCA inspector and project team to **access the site virtually** through the 360-degree photo platform.
2. Sample measurements photos can be prepared to show compliance to the codes and requirements before the virtual checks for TOP.
3. This process is **much faster** as compared to physical inspection and manually taking measurements across the building site.
4. The **quality of the inspection is further ensured** as the inspection comments are digitally recorded and tracked for closure.

Benefits / Costs

1. **Reduce coordination** for physical site walk for the various project parties and BCA.
2. Saved **significant manhours for Main Contractor and Architect.**