

INTRODUCTION

Delivering projects efficiently and maintaining their schedules are every good contractor's main focus. But, how can contractors adapt to travel, social, and workplace restrictions while meeting project timelines, especially when the project requires an in-person inspection by a governmental entity or authority having jurisdiction(AHJ)? One solution is virtual inspections. When project inspections cannot be conducted in-person due to travel bans, social distancing requirements, or other restrictions, video is a great real-time substitute. They streamline the inspection process to help maintain project momentum. Virtual inspections offer many other advantages, including:

- **Efficiency.** Allows design team to quickly evaluate RFIs in the field and provide solutions in real time.
- **Cost savings.** Multiple people from design team and Owner's team can participate in virtual inspections more frequently without the cost of traveling to the project site.
- **More productivity and better quality.** Because they are easier to schedule, the inspections can happen more frequently, ensuring proper installations, which avoids rework of incorrect installations.

THE CONCEPT

The primary tool for conducting virtual inspection is video calls. Project personnel can use a video camera (on a cellphone or tablet) to walk through the construction site, providing close-up views of critical areas. They can be used for:

- Preparing punch lists and monitoring work progress
- Performing pre-final and final inspections
- Performing commissioning activities with third-party agents.

PREPARATION

A virtual inspection requires collaboration among project personnel to ensure all necessary information is being provided to the inspector. The process includes a pre-determined walkthrough plan and communication protocol to ensure the observer/inspector's questions or concerns are addressed in the video call, which is easily adaptable to the streaming platform most comfortable for the inspector.

Personnel. Prior to any walkthrough, these team members should get together to develop a virtual inspection walkthrough plan, ensure all equipment and software works properly, and pre-determine the walkthrough path. Personnel should include:

- **Camera captain.** Navigates the hard hat-mounted or handheld camera device
- **Safety escort.** Maintains a safe path for the camera captain, confirms proper lighting, and ensures a safe walkthrough for all participants
- **Punchlist recorder.** Assists with capturing data and notes.

Drawings. Prior to the inspection, all drawings need to be converted to PDF's to share on screen with the remote inspector if requested. Draw an inspection route of the facility and provide it to the inspectors before the video call. Placing numbered flags throughout the facility helps the inspector direct the camera captain to a particular location. PDF markup software can be used to update the camera's location on the drawing in real time for the remote inspector's use.

Equipment. You want your virtual inspection process to provide the same level of technical expertise and insight as an in-person inspection, in a safe, flexible, and efficient way. The video call can be achieved using any typical live meeting platform that allows audio-video sharing and recording, such as Microsoft Teams, Zoom, etc. Make sure the inspector is comfortable with your preferred meeting software. Use a mobile device such as a smartphone, iPad, or other tablet with reliable cellular service (4G/5G) or a strong Wi-Fi connection to stream high-quality live video of the project to the inspectors.

CHALLENGES TO ADDRESS IN TRIAL RUN

Conducting a trial run is important for mitigating any challenges before the live virtual inspection. Everyone's time is important, and you want your inspector to be focused on your client's facility, not frustrated with connection issues, poor video quality, and troubleshooting. Plan a trial run far enough in advance of the video call so the team can trouble-shoot the following:

- **Connectivity.** Ensure the camera captain has strong Wi-Fi and/or cellular connectivity throughout the entire walkthrough. Slower and or weaker connectivity may not provide the speed and clarity required to complete the inspection.
- **Camera stability.** Test whether a hard-hat mount or a monopod provides the clearest and steadiest view of the project details. Review the hard-hat mount with a safety professional to ensure it complies with all safety policies and procedures. Make sure the camera captain uses slow movements. Fast movements can disorient the viewer and make them feel dizzy.
- **Video export.** Record the trial run and export the file to confirm the format is of acceptable quality. Ask if the inspection agency requires the video to be in a particular format.
- **Lighting conditions.** Test different lighting techniques, including handheld flashlights and lighting stands, if necessary, to provide adequate lighting during the walkthrough. Consider a laser pointer to identify areas of concern.
- **Site preparation.** Identify project hot points or hidden areas where the inspector might ask for a detailed review. Remove acoustic ceiling tiles and open access panels ahead of time. Place ladders at convenient locations throughout the project site so the team can quickly access above-ceiling conditions when requested.

INSPECTION DAY BEST PRACTICES

Start the virtual inspection by walking the inspectors through the drawings and the camera captain's intended path to confirm it is acceptable to them. Inform the inspectors you would like to record the meeting and get their permission to do so. Once the inspection is complete, distribute the recording and any documentation to the inspection agency and to the project team.

NEXT STEPS

Once your project team masters the basic workflow of virtual inspections, consider the following options to enhance user experience:

- Consider using Dynamics 365 Remote Assist with a Microsoft HoloLens for a more immersive video experience with 3D context, as well as elastration capability.
- Consider using a 360-degree camera. Software applications like OpenSpace allow you to upload 360-degree photos to cloud data storage and tie them to floor plans within 15 minutes. This immediate access allows a remote inspector to conference with the project team and generate inspection issues directly into an issue tracking program such as BIM 360.
- Research the use of platforms such as ScopeAR for developing virtual training applications deployed with a Microsoft HoloLens.
- Incorporate livestream drone video for site and skin inspections.

The COVID-19 outbreak pushed construction to a new reality where virtual and remote solutions are the go-to strategy wherever possible. The construction industry can adapt quickly to the new reality and take the right safety measures in a timely and responsible manner.

About Vaughn Construction

Vaughn Construction is a Texas-based construction company that specializes in new construction, renovations and additions to civic, healthcare, education and research facilities. The privately-held company has offices in Austin, Bryan/College Station, Dallas/Fort Worth, El Paso, Houston, Lubbock, San Antonio, and the Texas Medical Center (Houston). For additional information, visit www.vaughnconstruction.com.