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Augmented Reality in Construction

Whiting-Turner's Journey



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National Institute of Building Sciences

Provider Number: G168

Augmented Reality in Construction

1-TU-4A-1

Matt Vanture

Tuesday, January 8, 2019, 3:30:00 PM - 4:00:00 PM





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Credit(s) earned on completion of this course will be reported to **AIA CES** for AIA members. Certificates of Completion for both AIA members and non-AIA members are available upon request.

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Questions related to specific materials, methods, and services will be addressed at the conclusion of this presentation.





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Course Description

Vast amounts of time are committed to planning a construction project, no matter the size. Once planning is complete, ensuring it is installed per the plan takes many forms. In the field installation we have used processes from drawings and a tape measures all the way to multiple scans of the building at intervals through the job. These efforts can be wildly time consuming and may even miss some items. Advancements in technology allow new options like Microsoft's augmented/mixed reality solution, HoloLens. With this AR hardware and BIM tools used for planning a job, Whiting-Turner can QC a space by just by observing it through these devices. This allows teams to save time on schedules, money on reduced rework and ensure the plan created is the one executed.





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Learning Objectives

At the end of the this course, participants will be able to:

1. Learn how much waste can be eliminated by using AR vs traditional QC workflows.
2. Identify process for QA/QC of coordinated models into the field
3. Understand best practices for safely using AR in the field.
4. Learn ROI for using AR in construction





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About the Speaker

Matt Vanture is an experienced VDC Manager with a demonstrated history of working in the construction industry. He is a manager and skilled power user in Revit, Navisworks, Synchro, BIM 360 products, and SketchUp. He enjoys finding ways to involve Dynamo, Power Shell and other automations in his workflows. He has a strong operations focus and passion for moving what is learned by the 3D pre-construction process to the field. Vanture is a regular guest lecturer at the University of Florida and Georgia Institute of Technology [Georgia Tech] for BIM and VDC as well as a National Science Foundation advisory board member. He graduated with a Bachelor of Science focused in Construction Management from University of Florida





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Challenges

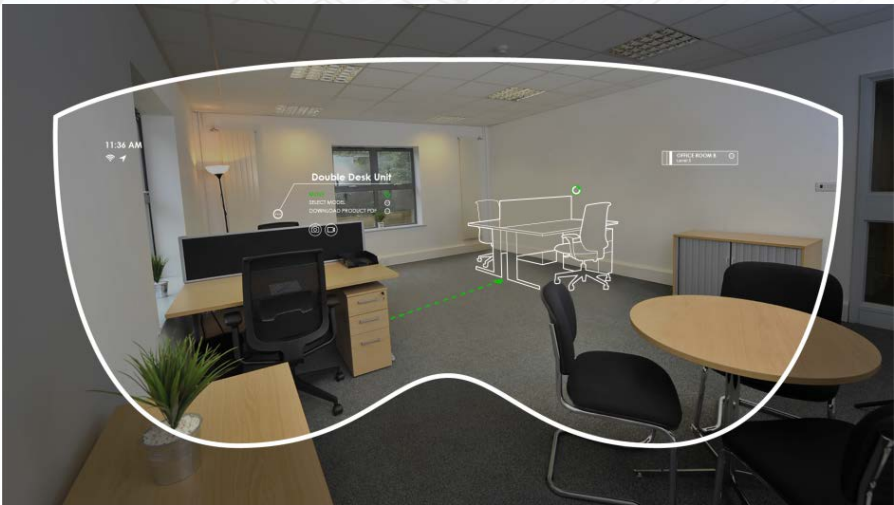




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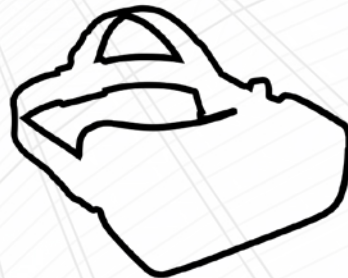
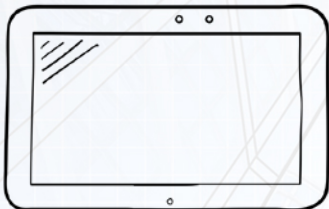
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AR || MR || VR

PHYSICAL



IMMERSION



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Timeline



2012



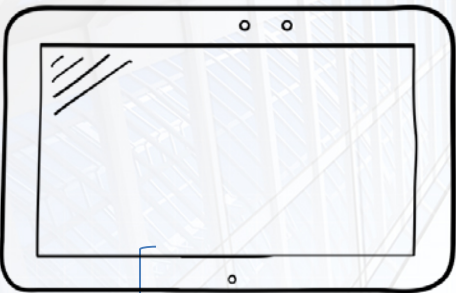


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2015





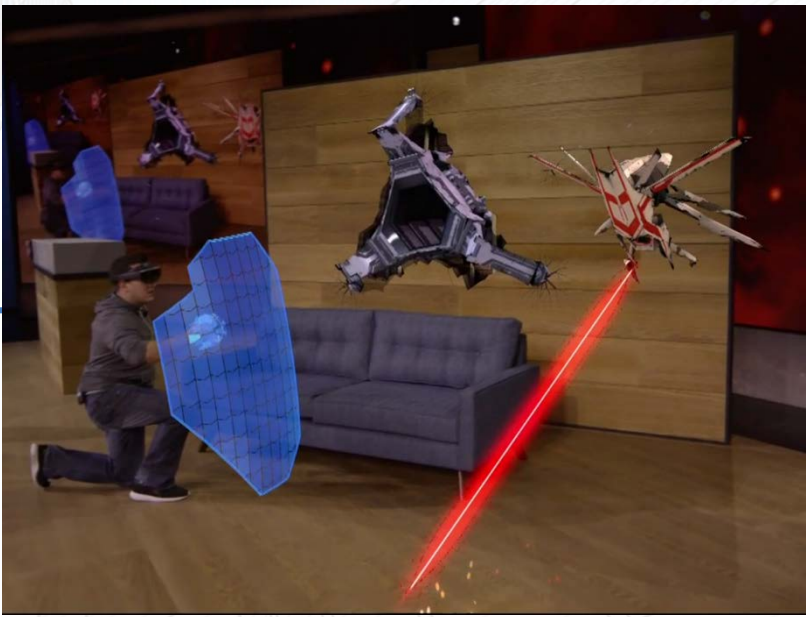
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2016





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2017





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2018



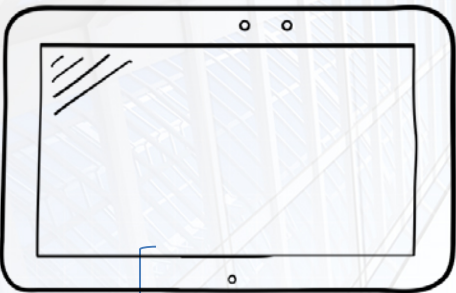


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2015





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 **AUTODESK®
REVIT™**

 **AUTODESK
CIVIL3D**

 **SketchUp**

 **unity**

 **UNREAL
ENGINE**

 **FUZOR**

ENSCAPE™



2015

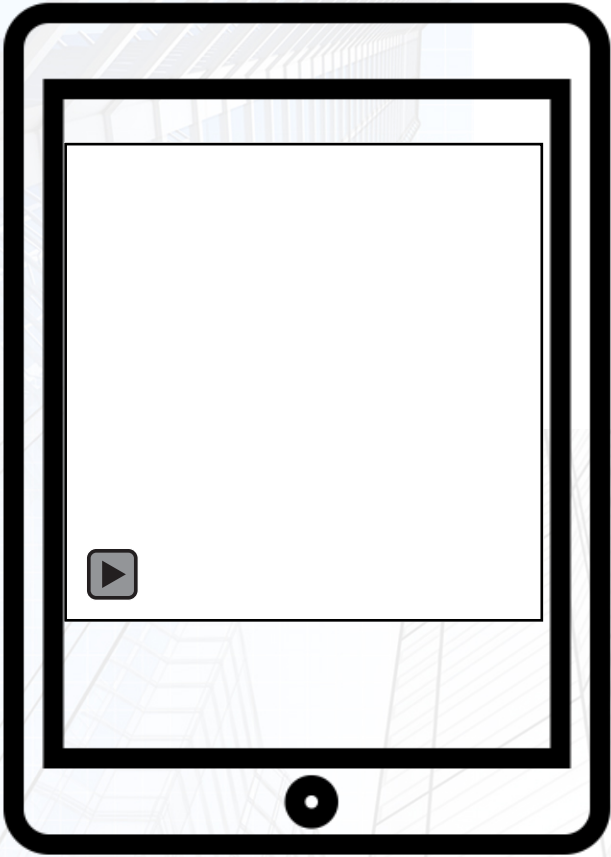


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2017



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2018





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2018

Meta

DAQRI



magic
leap



Microsoft
HoloLens



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2018

VZ
VISUALIVE3D



HOLOVISION 3D



Trimble Connect



SketchUp Viewer



Connected Mine



Trimble SiteVision EEP



Trimble Operations Beta





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Future Initiatives

Augmented Reality in Construction
Overlaying the coordinated models on the current real world site conditions for the purpose of comparing intent with actual conditions in real time.



Use Case #1: QA/QC

How do we KNOW these MEP systems are installed matching their coordinated location?

- Tape Measure
- Plans
- Trust
- TIME



AR can help to identify potential issues immediately after installation, reducing their cost and schedule impact.




FAQ

Do you need to be tech savvy to use it?
No, but you will need one tech savvy person to set up once per session (Site VDC Manager). Once the models are aligned on site any PM, Superintendent or Foreman can use it.

How does this tech work?
Matching control point in field (the two together, slight adjustment needed to keep alignment with from control point).


How quickly can it be?
1-2 hours from desk to field

What is its accuracy?
Realistic accuracy is 1"

What will this cost?
HoloLens + Head Hat: \$3300+
HoloLens Software: \$6000+
Example of PM

Use Case #2: P

Help teams coordinate align expectations a



HoloLens Safety Plan

Augmented Reality in Construction
Overlaying the coordinated models on the current real world site conditions for the purpose of comparing intent with actual conditions in real time.



Risks

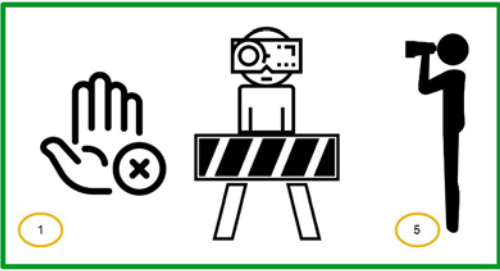
There are potential risks using an AR headset that can be easily avoided by doing just a few things. Many of the risks are similar to normal conditions one is exposed to on a jobsite and require appropriate attention. Risks include:

1. Slips/trips
2. Falls
3. Running into objects
4. Falling objects
5. Struck by/caught in between equipment
6. Exposure to processes such as welding, and motion sickness or vertigo.



The following should be addressed prior to use:

1. Stop work in the area or use the headset in an area barricaded from work
2. Walk the area prior to use for poor housekeeping, slip/trip items, and remove unnecessary items
3. Don't use the headset where there are any fall potentials
4. Don't use the headset where there are any suspended loads
5. Use a spotter when walking
6. Some users could potentially suffer vertigo when moving through an area and seeing AR objects. It would be recommended a user start from a seated position to ensure this will not occur prior to walking through an area.





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HoloLens Implementation



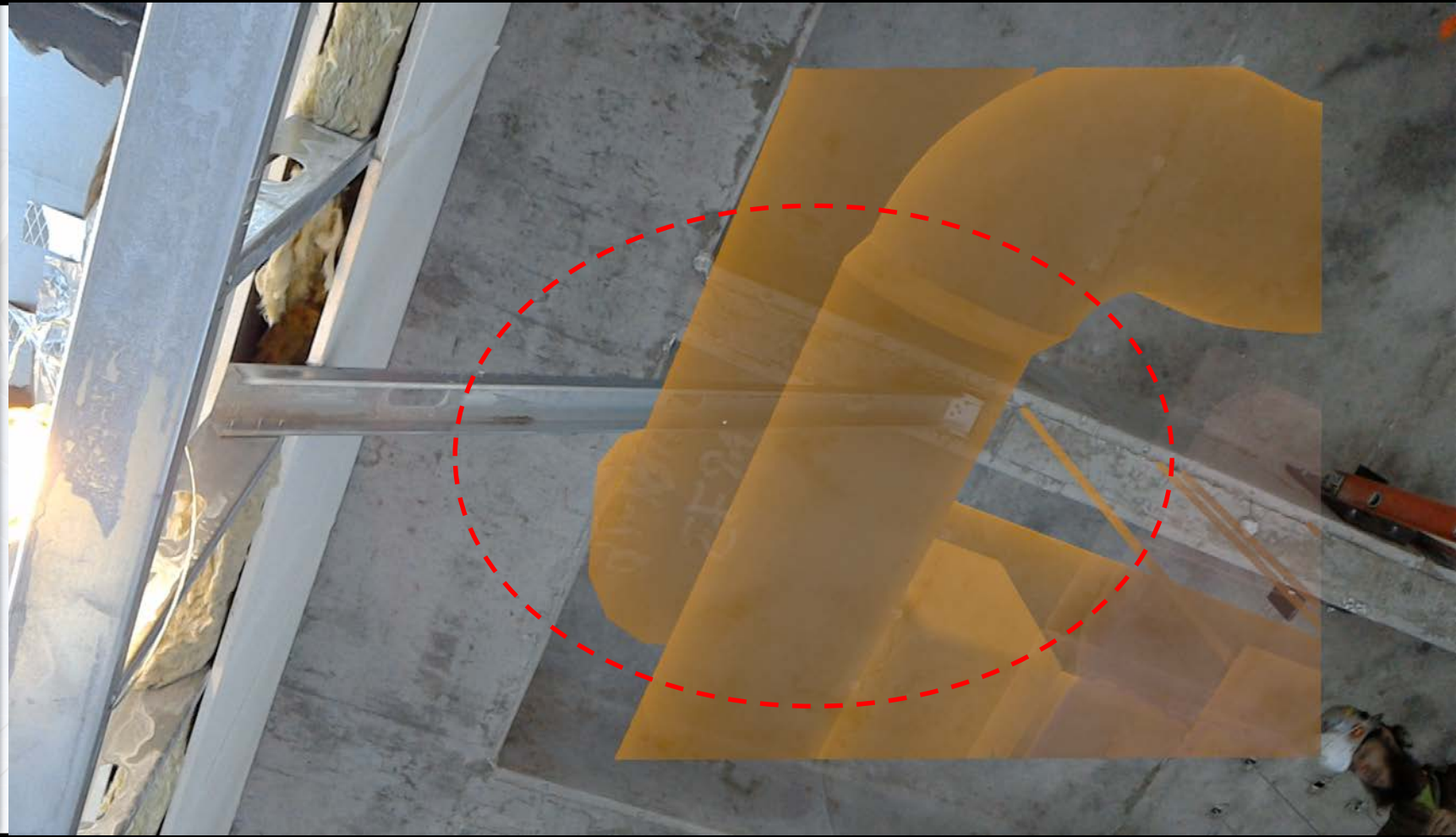


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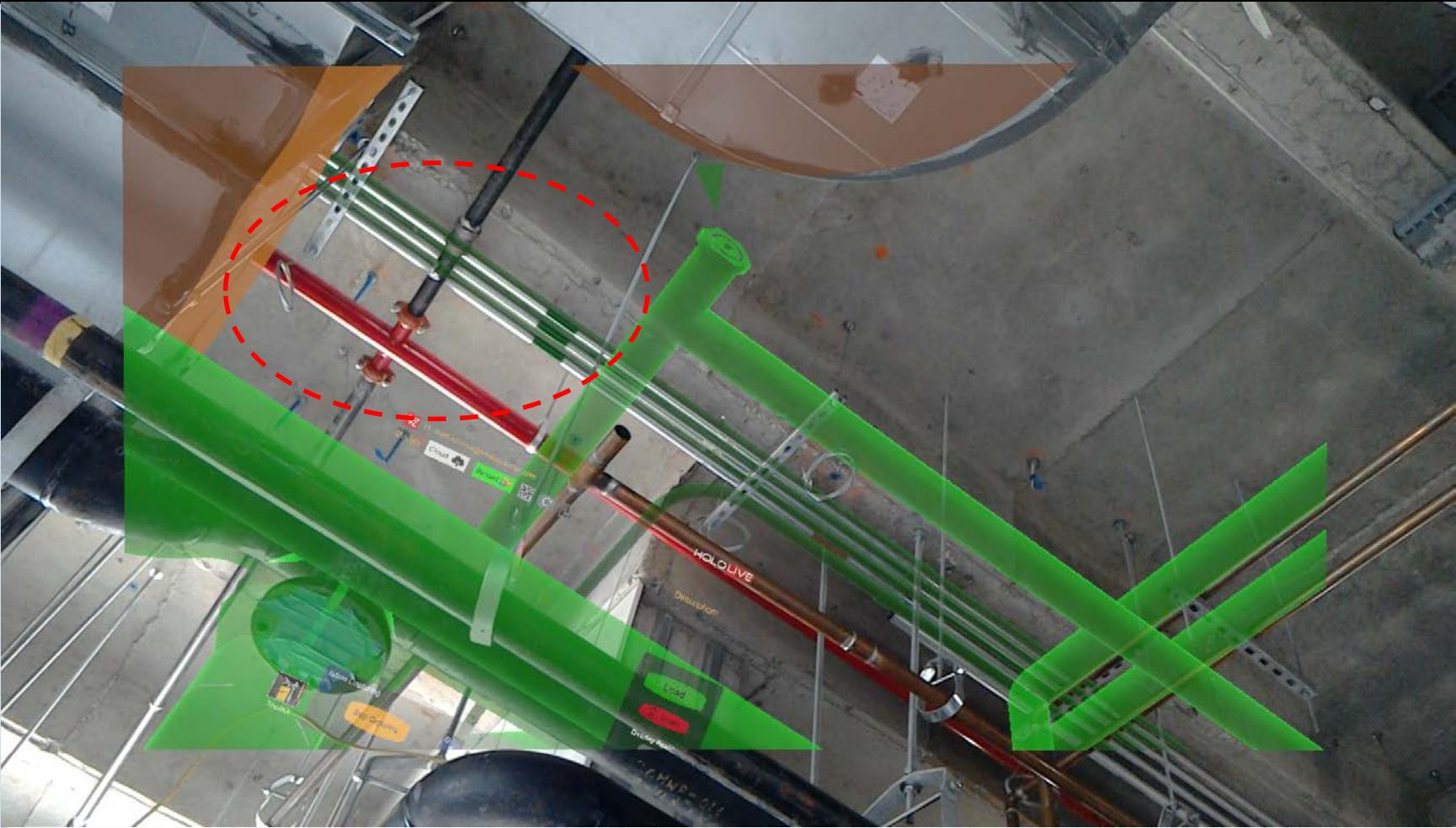


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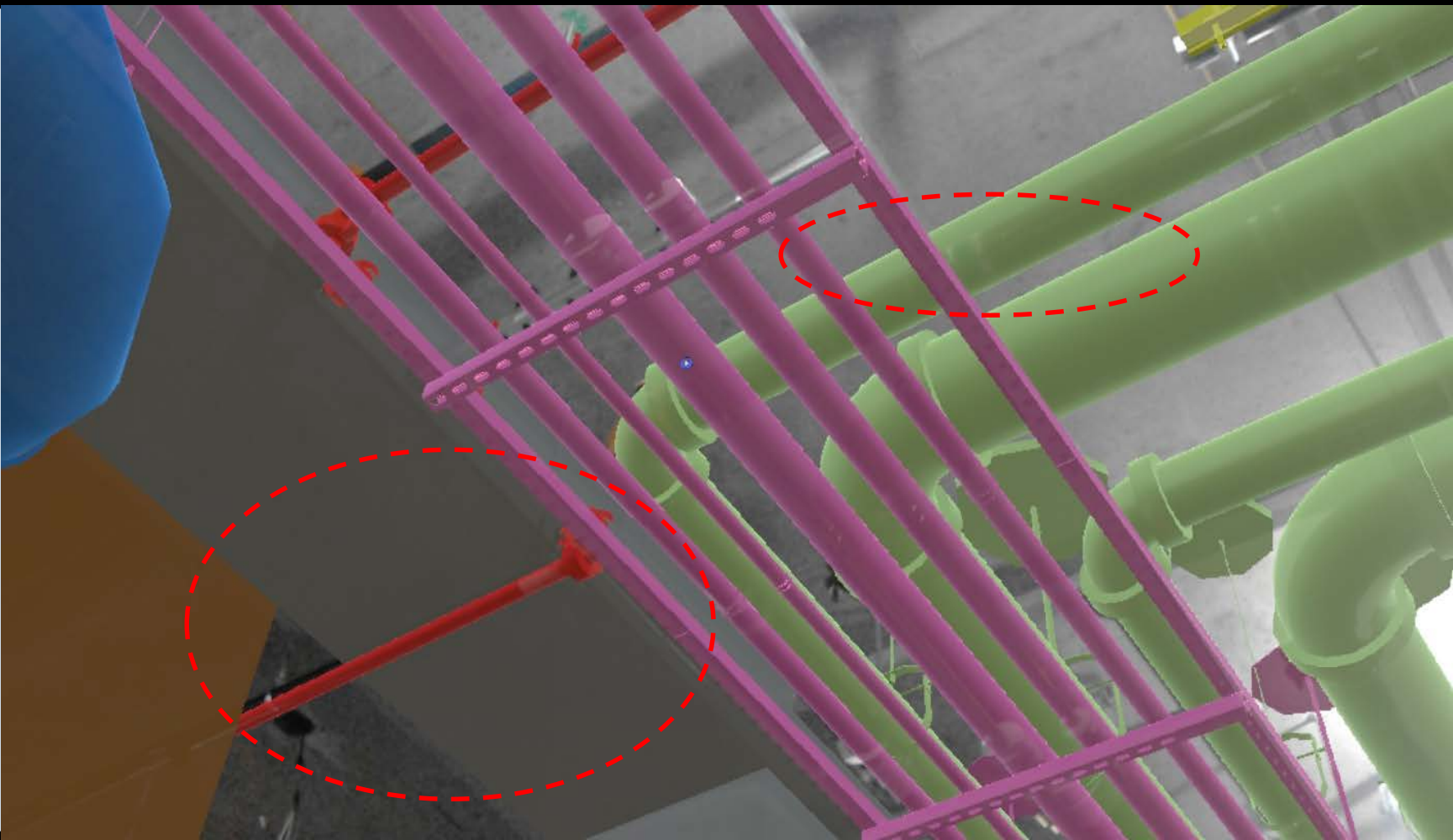


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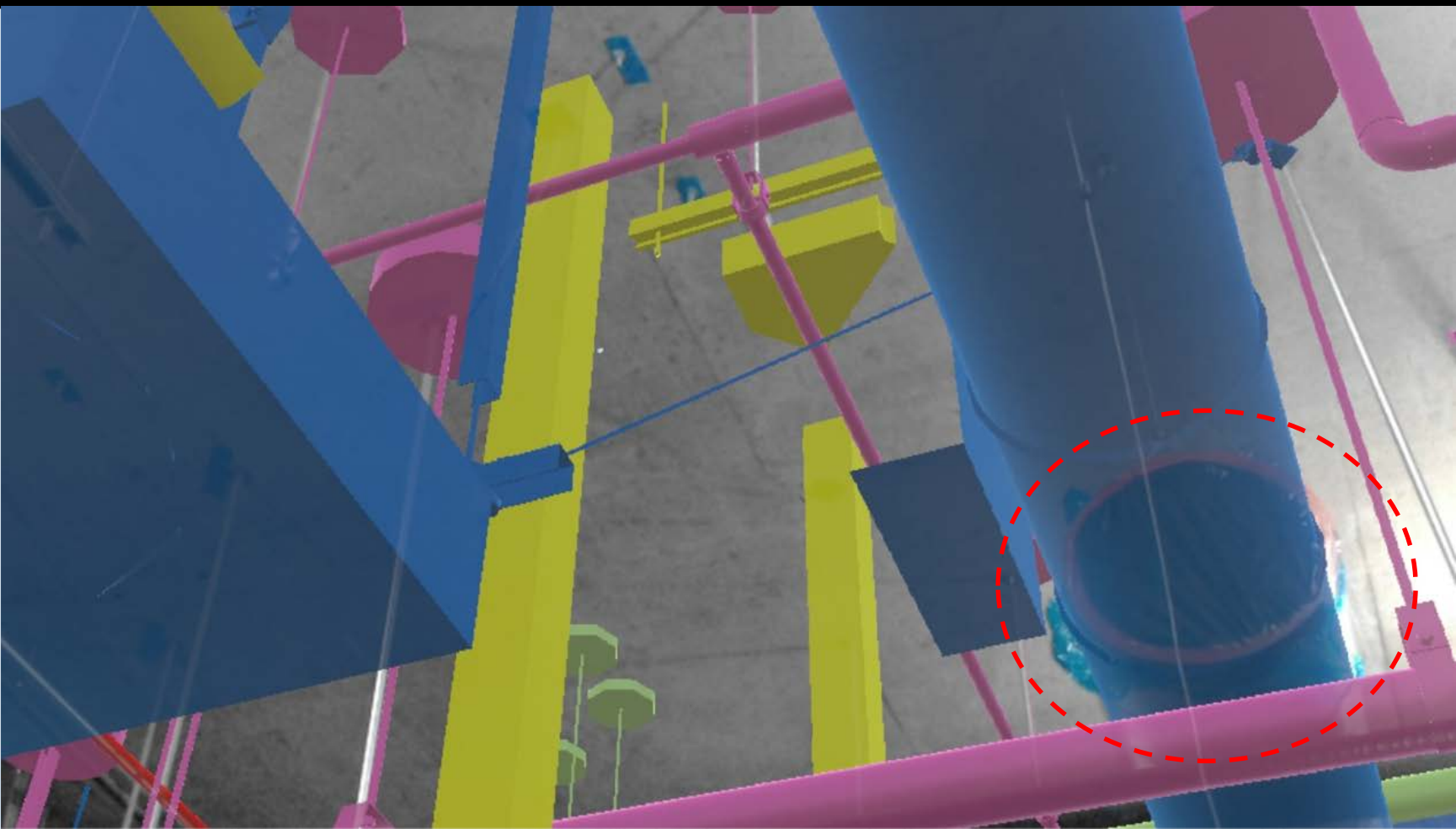


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AR Tech to keep and eye out for:



New Hololens in
2019



Visual Live continued
development



Magic Leap One AR
gear



DAQRI



Trimble Partnership
with MS





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This concludes The American Institute of Architects Continuing Education Systems Course



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