

BUILDING INFORMATION MODELING

WHAT CAN IT DO FOR YOUR SCHOOL?

WHAT IS BUILDING INFORMATION MODELING? (BIM)

BIM is a tool for Virtual Design and Construction (VDC)

B I M

- ▶ **B:** The act of building. Includes Architecture, Engineering, Interiors, Construction, and Facility Maintenance and more.
- ▶ **I:** Information is at the core of BIM. Graphical representations become more than just visualization with the addition of information.
- ▶ **M:** The Model is the medium of BIM. It connects the information to the visualization.

V D C

- ▶ Is the management of BIM during the design and construction process.
- ▶ Provides a Common Data Environment (CDE)
- ▶ Includes BIM technology and additional tools such as drones, cameras, laser scanners, etc.

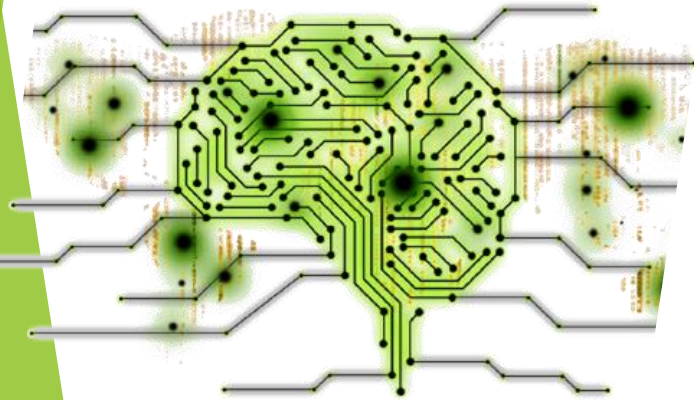


BIM AND VDC IS ALL ABOUT...

People



Process



Technology

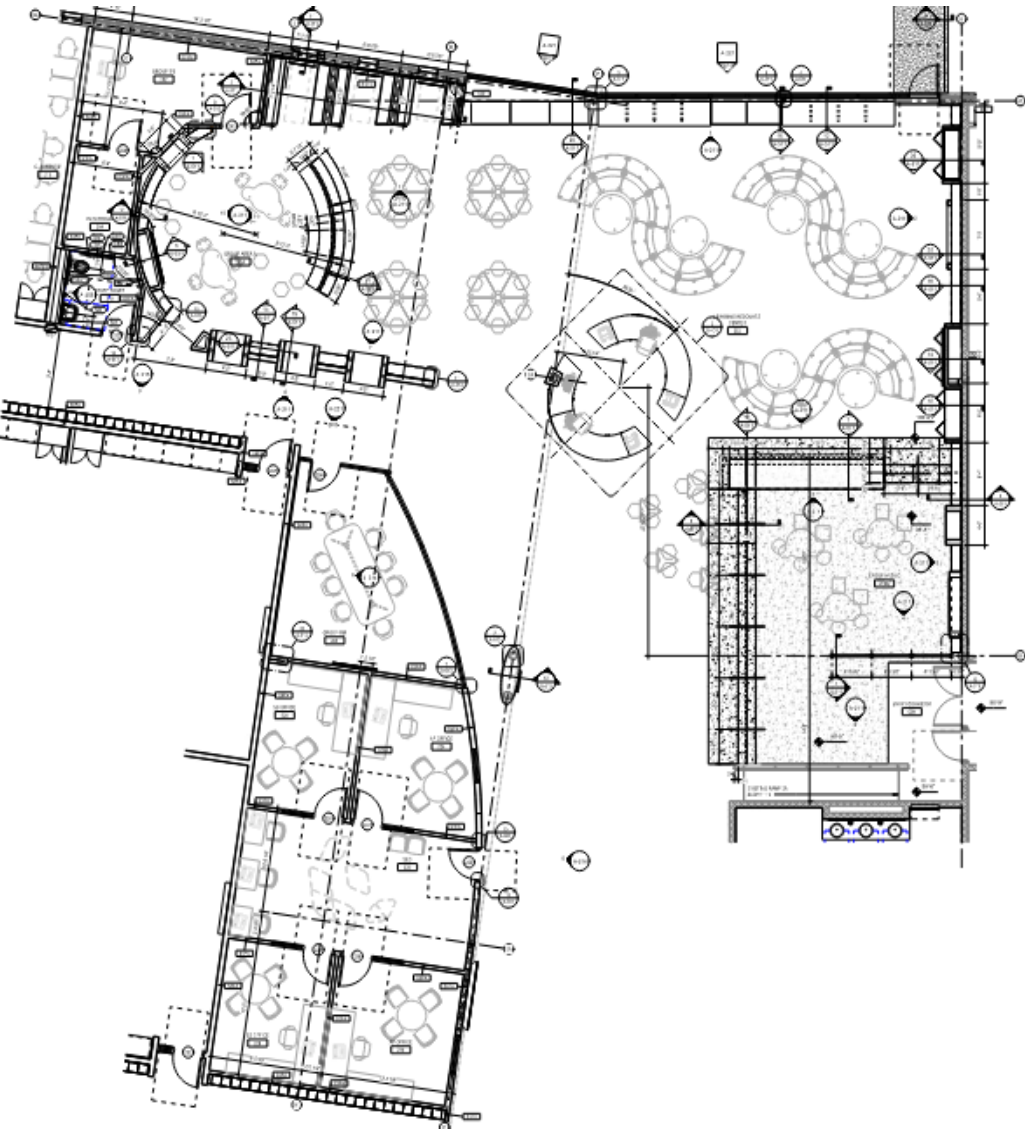
BIM IS PEOPLE

BIM is a Collaborative Environment. Who is BIM?

- ▶ **Users:** BIM allows the people who use the space, to understand spatial relationships by seeing the space in 3D instead of 2D drawings.
- ▶ **Stakeholders:** Get community support for referendums with visualization tools: renderings, walk and fly-thrus
- ▶ **Design and Construction Teams:** can share information quickly and coordinate

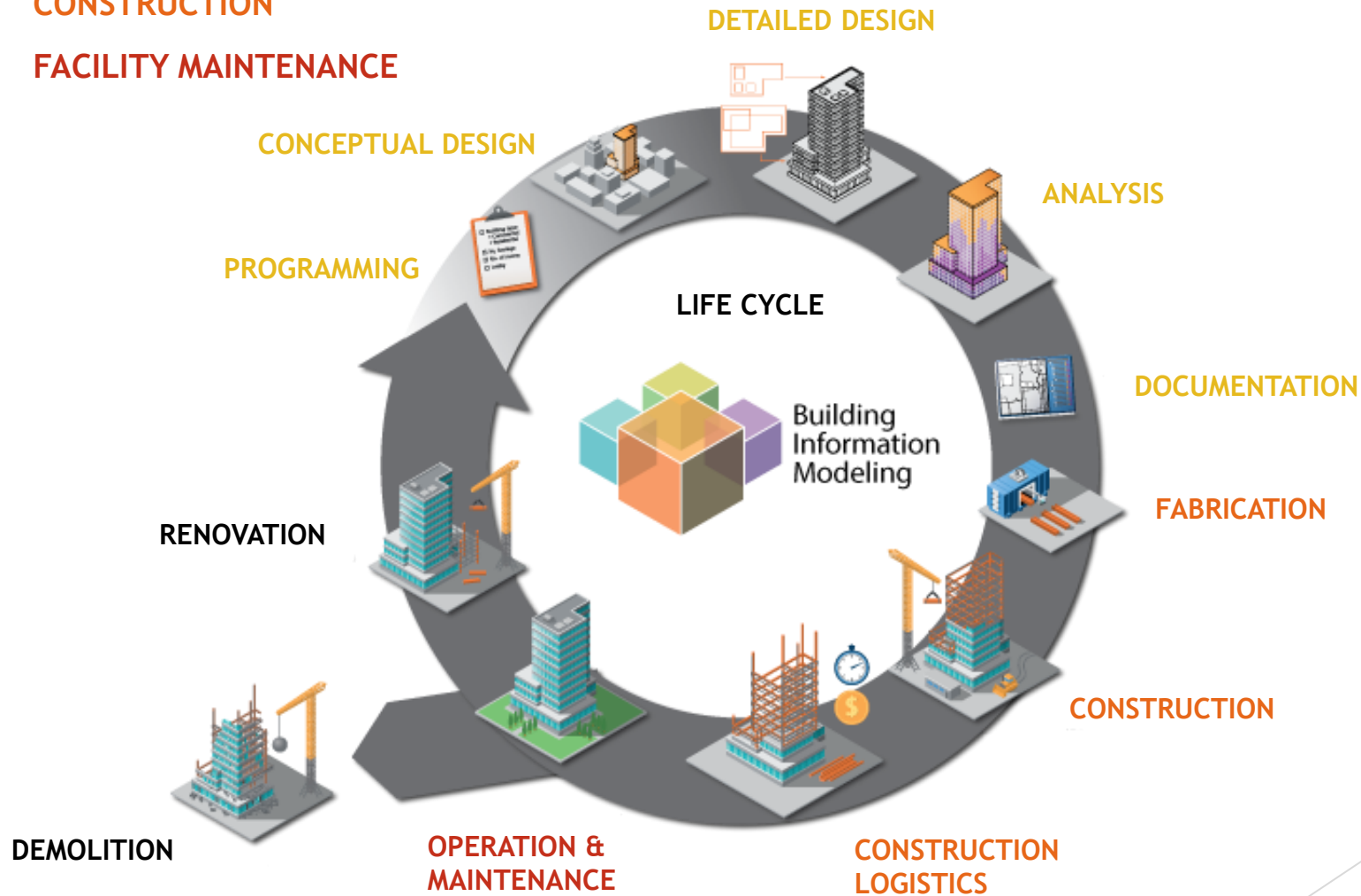
BIM is the key to Communication to all involved in a project, providing one true information source in the Common Data Environment (CDE)

Plan VS Image

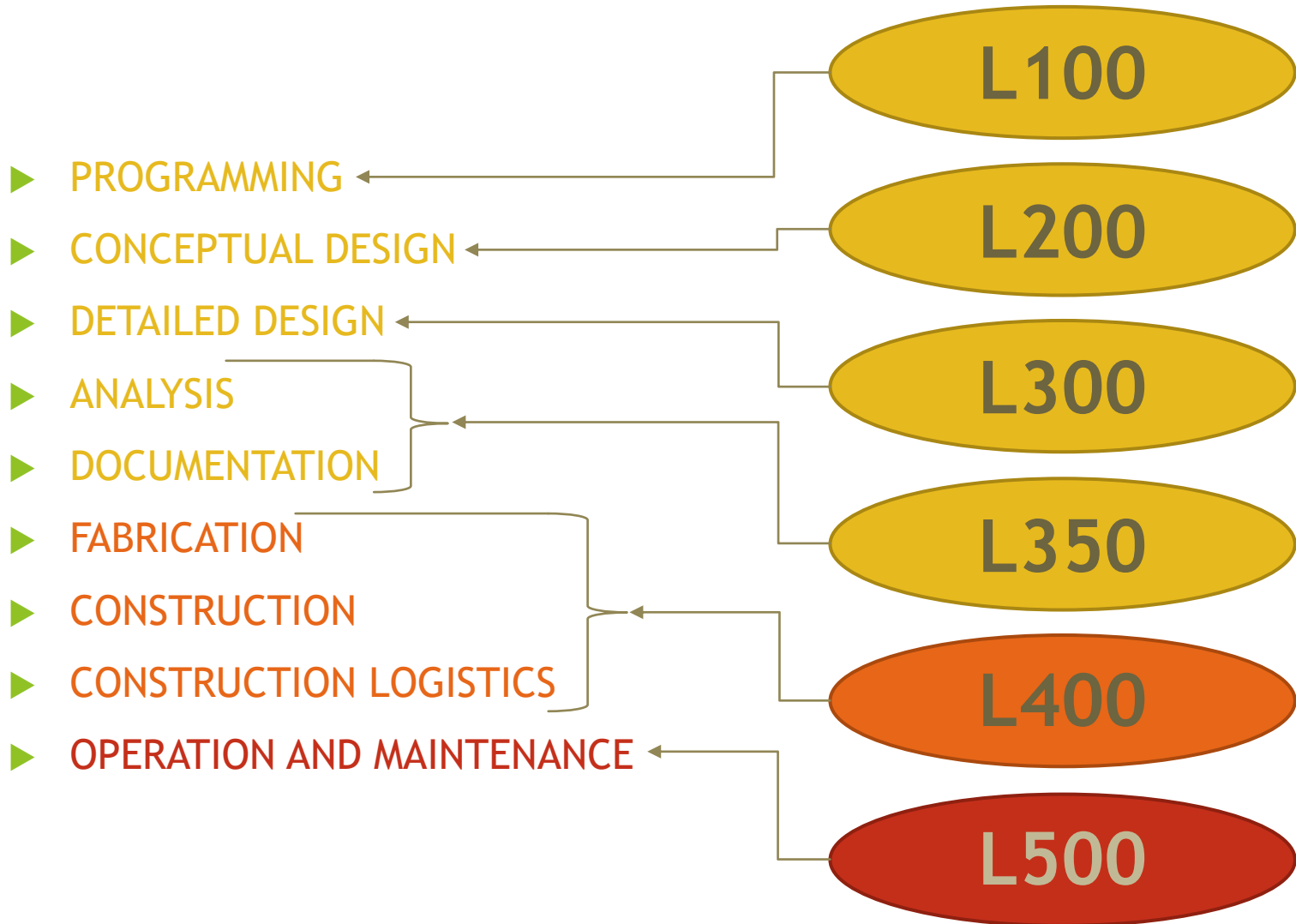


BIM IN THE PROCESS OF VDC...

- ▶ DESIGN
- ▶ CONSTRUCTION
- ▶ FACILITY MAINTENANCE

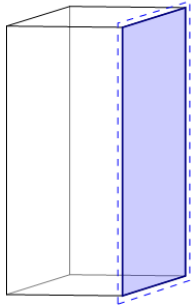


BIM: LEVEL OF DEVELOPMENT (LOD)



WITH BIM, A WALL IS MORE THAN A LINE ON PAPER

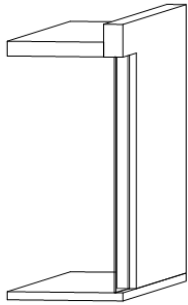
L100



WALL SECTION AS
CONCEPTUAL MASS

ROUGH SIZE AND
LOCATION

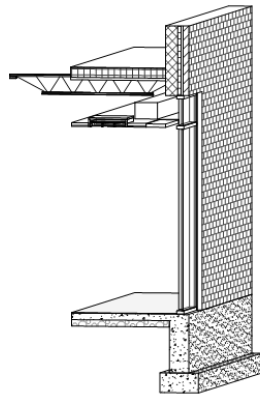
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WALL SECTION IN
SCHEMATIC DESIGN

MASSING WITH
FENESTRATION

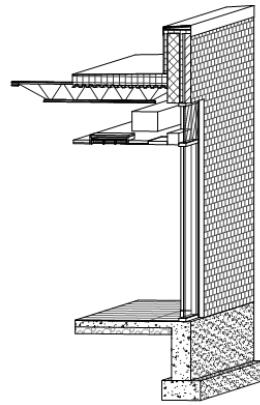
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WALL SECTION IN
DESIGN DEVELOPMENT

IDENTIFIED SYSTEMS
AND GENERAL
MATERIALS

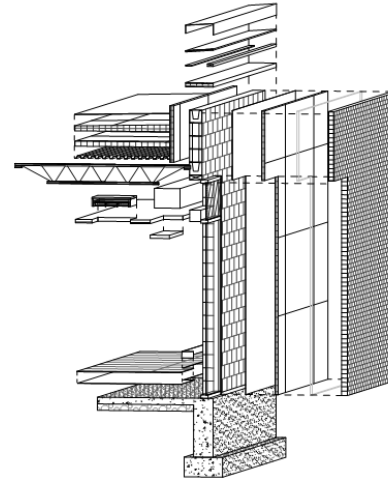
L350



WALL SECTION IN
CONSTRUCTION
DOCUMENTATION

DEFINED SYSTEMS
AND MATERIALS;
COORDINATED
ACROSS DISIPLINES

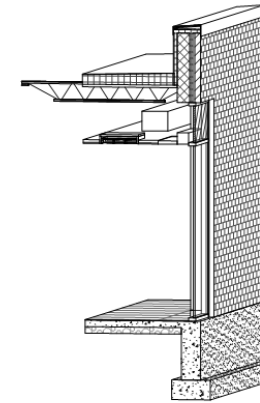
L400



WALL SECTION IN
CONSTRUCTION

FABRICATION AND
ASSEMBLY; FIELD VERIFIED
COORDINATION OF
TRADES

L500



WALL SECTION
AS BUILT

REPOSITORY FOR
OPERATION,
MAINTENANCE, AND
WARRANTY
INFORMATION

CONTRACTS: BIM EXECUTION PLAN

- ▶ AIA Document E203-2013, G201-2013, and G202-2013
- ▶ What is expected in a typical contract
- ▶ Additional services

BIM

.operate.construct.design.plan

PROJECT EXECUTION PLANNING GUIDE

VERSION 2.1
RELEASED - MAY 2011

...e™ Project
...oundation
...stry Institute
...ate University Office of Physical Plant
...or Achieving Construction Excellence
...by
...puter Integrated Construction Research Program
... Pennsylvania State University



CHARLES PANKOW

BIM TOOLS

▶ BIM Modeling Software

▶ AEC Collection

▶ Revit, AutoCAD, Navisworks, Civil 3D, 3DS Max, FormIt Pro, InfraWorks, Insight, Dynamo Studio, etc.

▶ Archicad

▶ Vectorworks

▶ Information and Model Management Software

▶ BIM360

▶ Solibri

▶ Procore

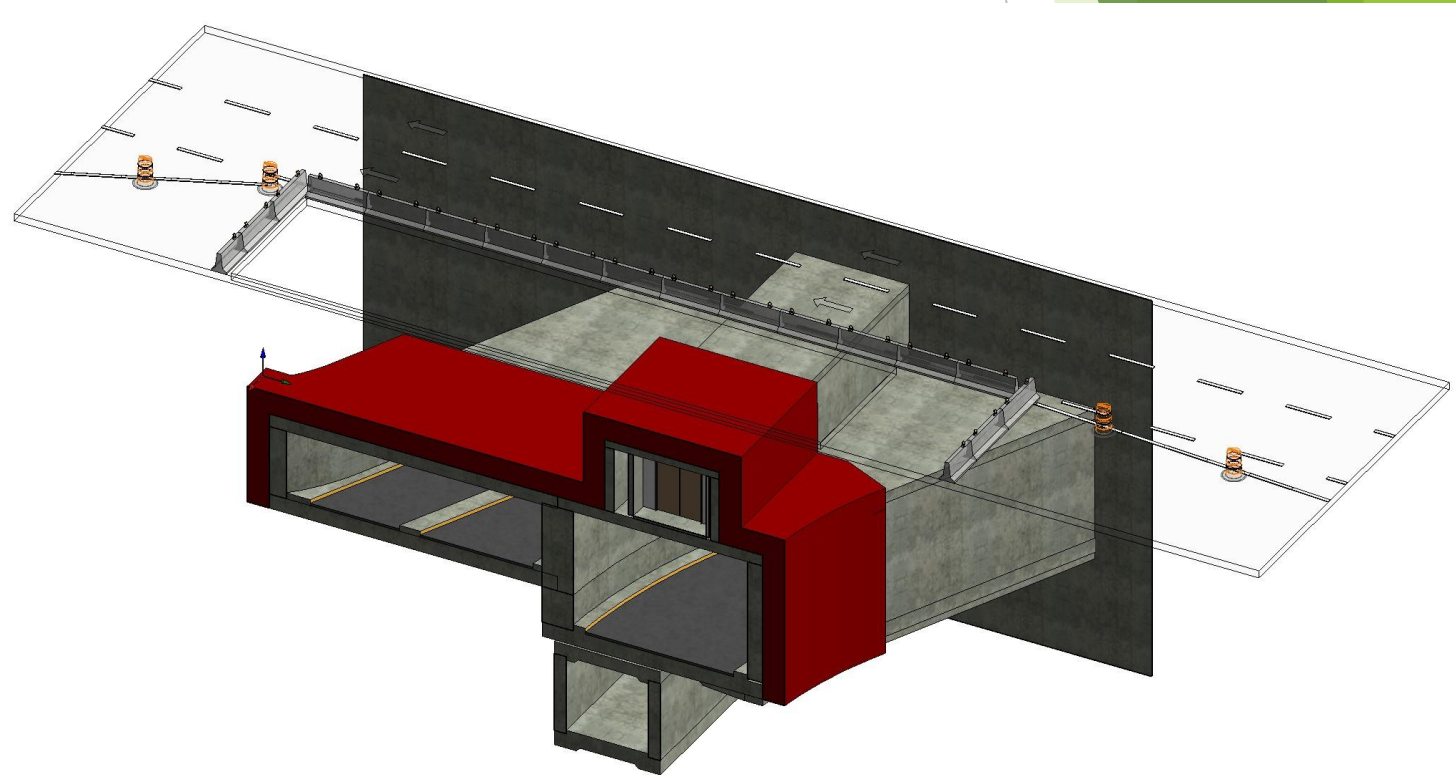
▶ PlanGrid

▶ Visualization Software

▶ Enscape

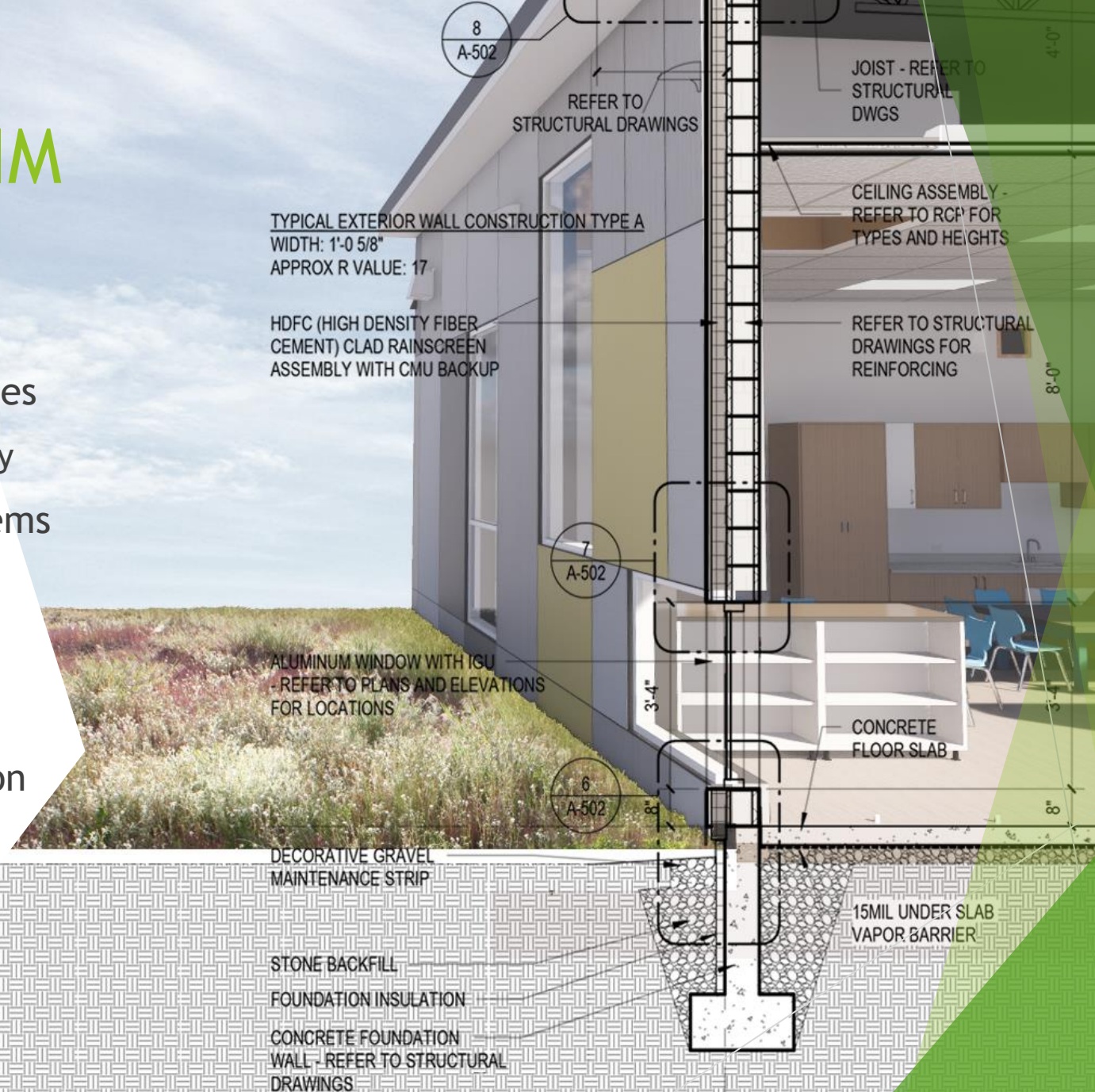
▶ Fuzor

▶ Twinmotion



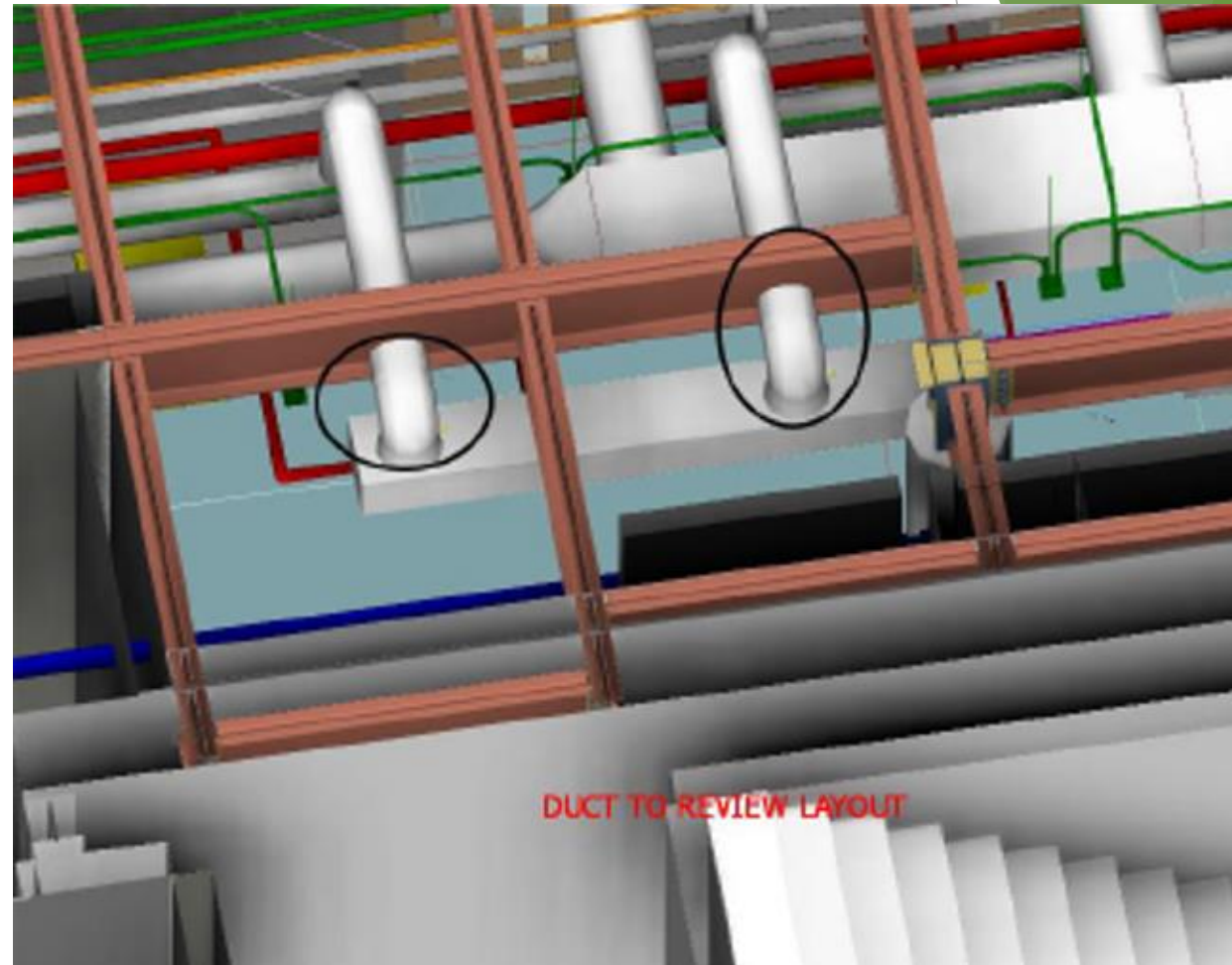
BENEFITS OF BIM

- ▶ Clear Visualization of Spaces
 - ▶ Walk-thru Spaces Virtually
- ▶ Coordinated Building Systems
 - ▶ Clash Detection
- ▶ Better Cost Estimates
 - ▶ Material Take-offs
- ▶ Information in One Location
 - ▶ Less Confusion



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BIM IN ACTION - REALITY CAPTURE

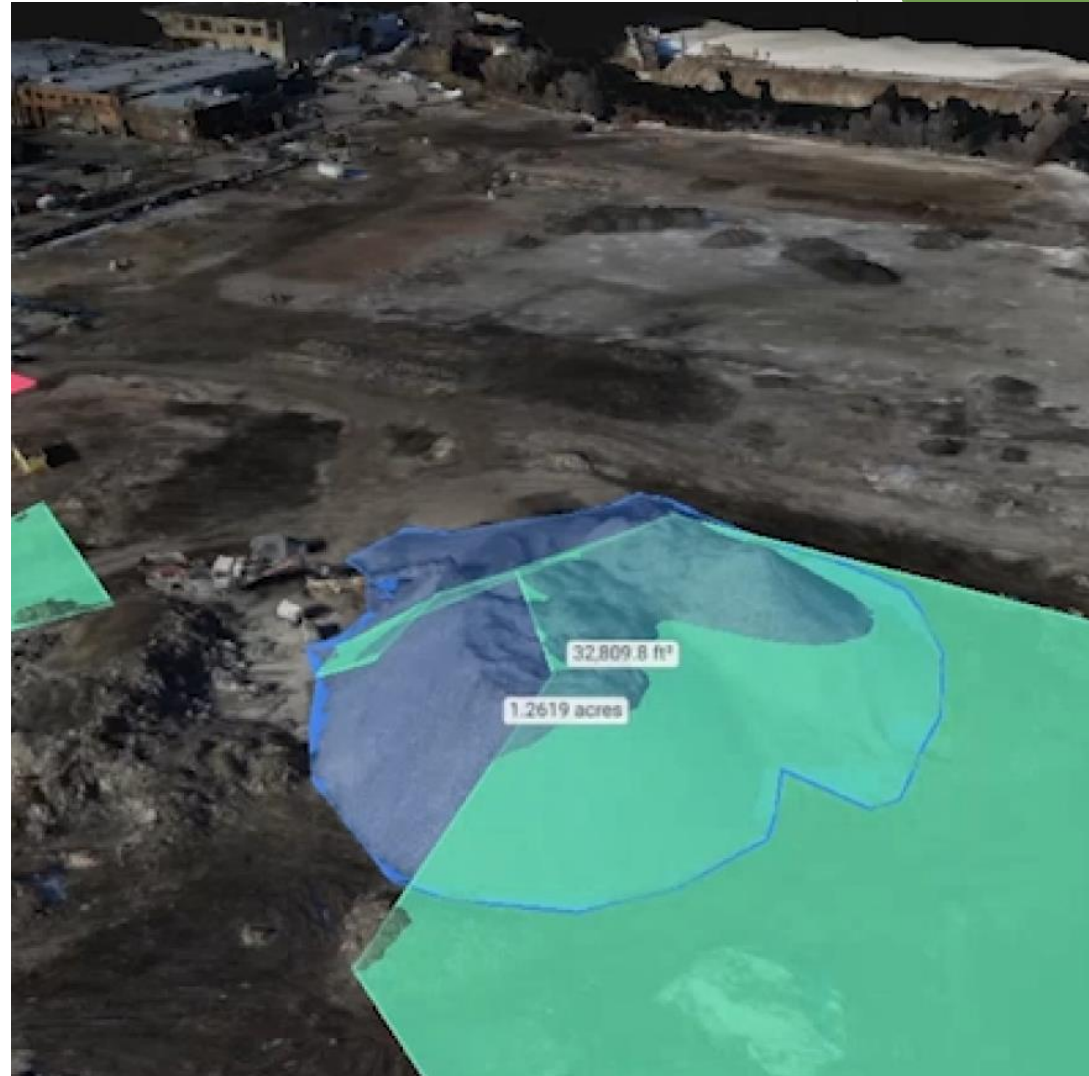
- ▶ Site Verification

- ▶ Drone Survey

- ▶ Pix4D
 - ▶ PropellerAero
 - ▶ DroneDeploy
 - ▶ Skycatch

- ▶ Photogrammetry

- ▶ 3D Laser Scanner
 - ▶ 360 Cameras
 - ▶ Drones
 - ▶ LiDAR Scanners



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BIM IN ACTION - 4D AND SEQUENCE ANIMATIONS

- ▶ 4D
 - ▶ A combination of the 3D model and the project schedule
- ▶ Sequence Animation
 - ▶ Animated review of a critical process or situation



BIM IN ACTION - SCHEMATIC DESIGN

- ▶ getting to "realistic" imagery faster



BIM IN ACTION - DESIGN DEVELOPMENT

- ▶ Design Development - confirming user expectations



BIM IN ACTION - DESIGN DEVELOPMENT

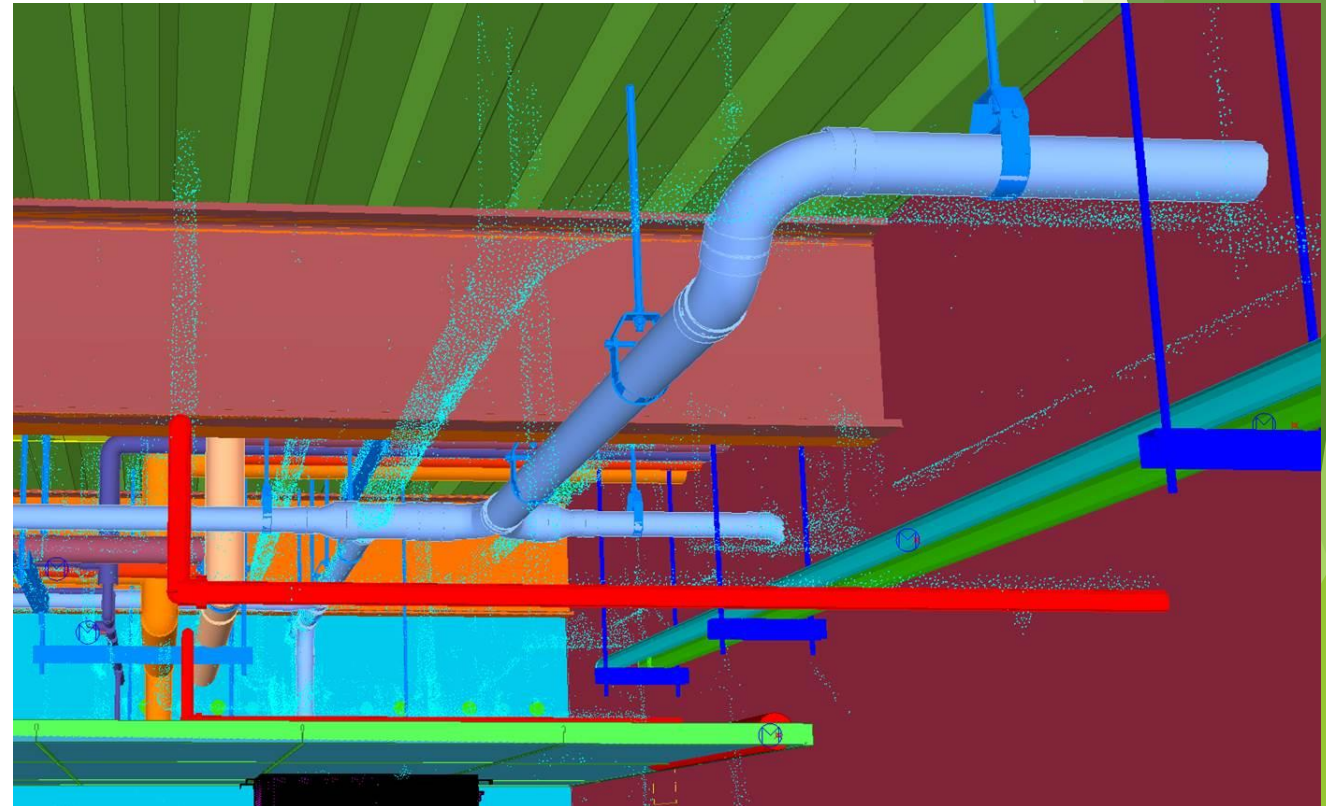
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BIM IN ACTION - CONSTRUCTION PHASE

► Construction Phase - Pre-con Systems Coordination

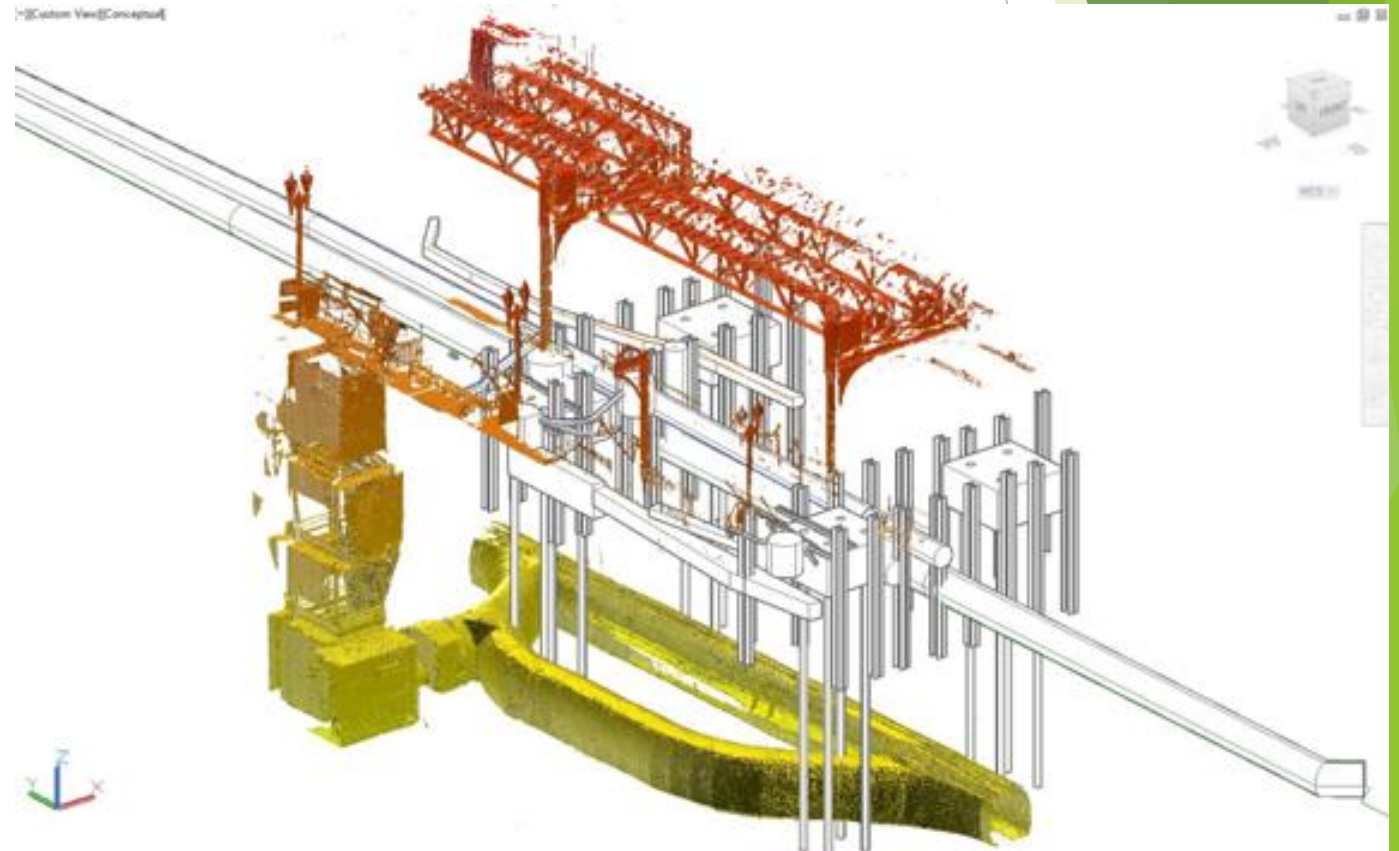
Combining multiple sub-contractor 3D models with the design model allows the team to mitigate congested layouts virtually before fabrication and mobilization



BIM IN ACTION - CONSTRUCTION PHASE

► Construction Phase - Resolving Issues

Laser scans and BIM models can resolve challenges cheaper and faster than traditional methods



BIM IN ACTION - CONSTRUCTION PHASE

- Construction Phase - Monitoring Progress

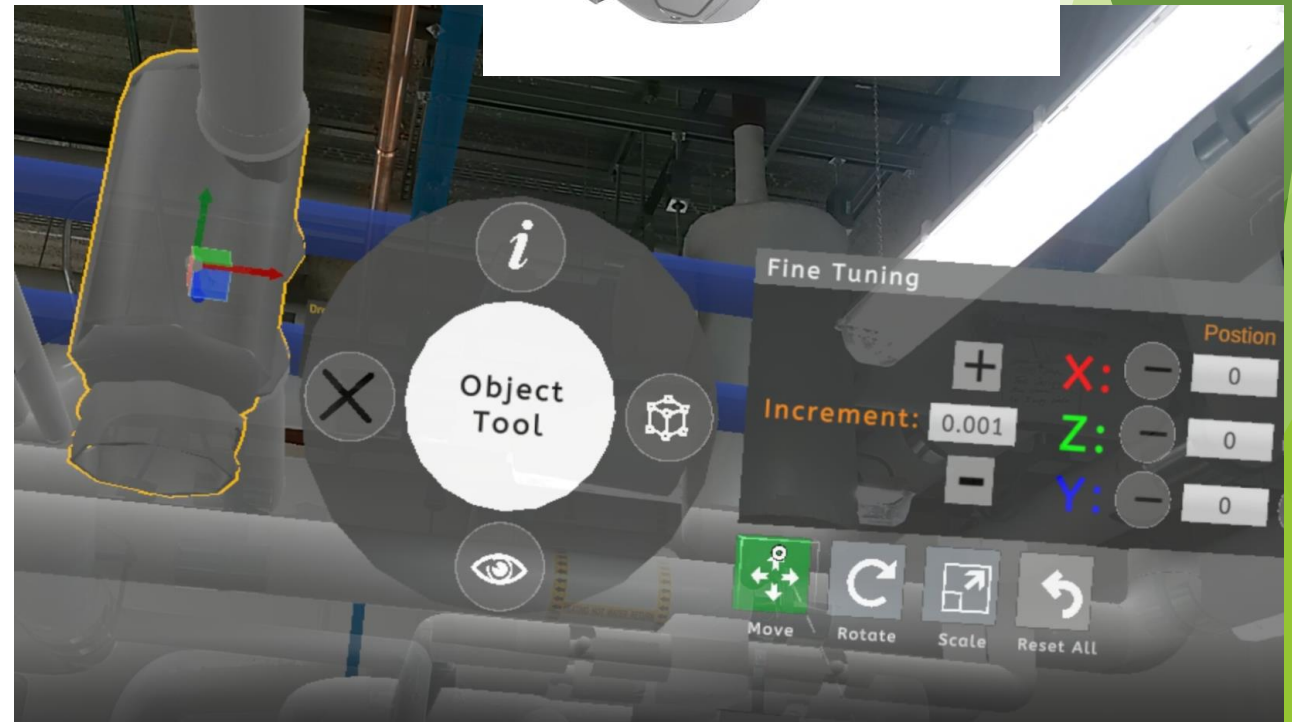
Drones allow us to monitor project progress throughout construction and at important milestones



BIM IN ACTION - FACILITIES MANAGEMENT

► Facilities Management

Using Augmented Reality (AR) with tools like the Microsoft HoloLens and software like VisualLive, facilities managers can view information about critical systems and components with a simple virtual click



BIM IN ACTION - WALKTHROUGH

- ▶ User Experience and Understanding

[Enscape Web](http://enscape3d.com)
[\(enscape3d.com\)](http://enscape3d.com)