



Smithsonian

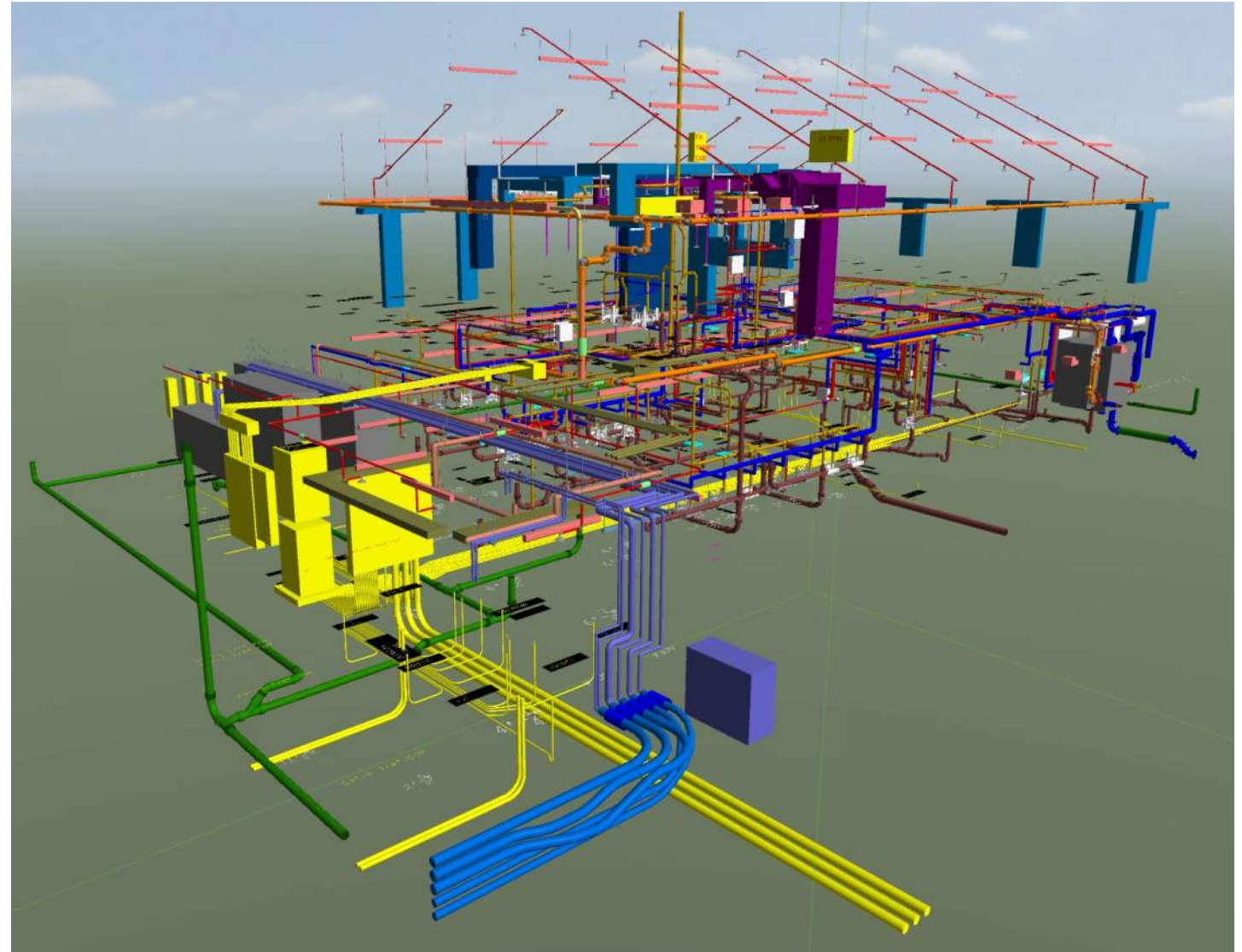
*Office of Planning, Design, and Construction*

# 2024 Architect Engineer Construction (AEC) Symposium

Building Information Management (BIM)

April 24, 2024

- **BIM Overview**
  - Data Progressing
  - LOD
  - Goal
- **Documentation & Resources**
  - BIM Templates & Guidelines
  - Space Naming & Asset Data
  - Construction Specification
  - Available Information Resources
- **Tools & Capabilities**
  - 3D Digital Capture
    - Matterport
    - Point Cloud (Laser Scanning)
  - Drone
  - 3D Review / Coordination
- **Q&A**

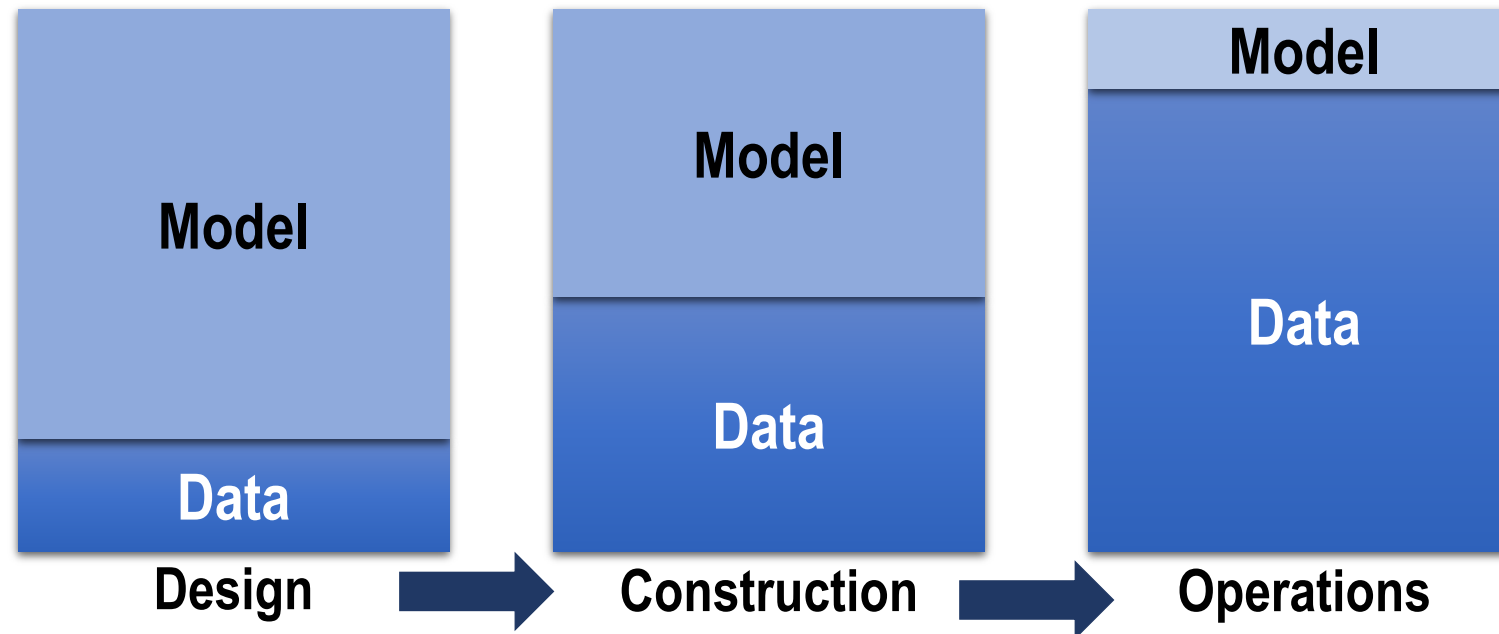


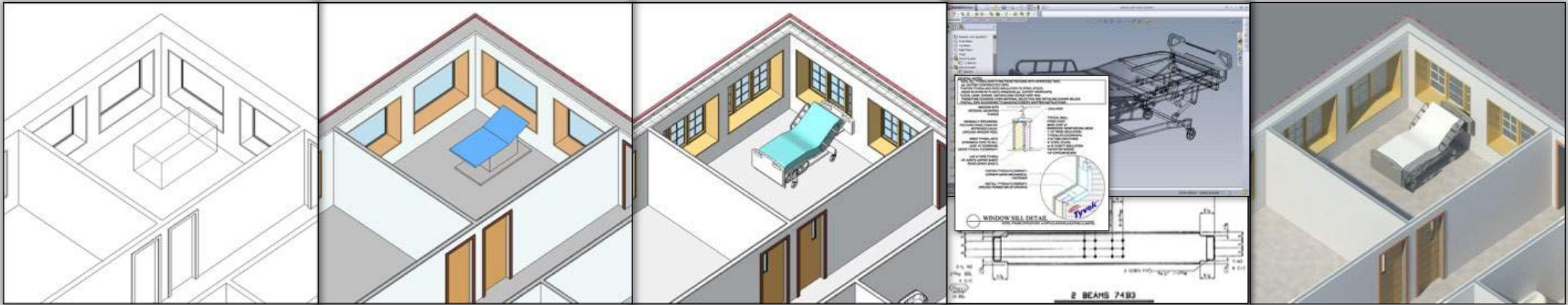


Building Information Modeling, aka BIM:

- It's a **process**, not a technology or software.
- A **digital** representation of both the **physical** and **functional** characteristics of a facility.

As the BIM evolves through design, construction and operations the value of the model decreases and the information increases. The model and information are typically in separate locations. For Operations, the required information lives in BAS and/or CMMS (Tririga) systems.





LOD 100

Concept

LOD 200

Design  
development

LOD 300

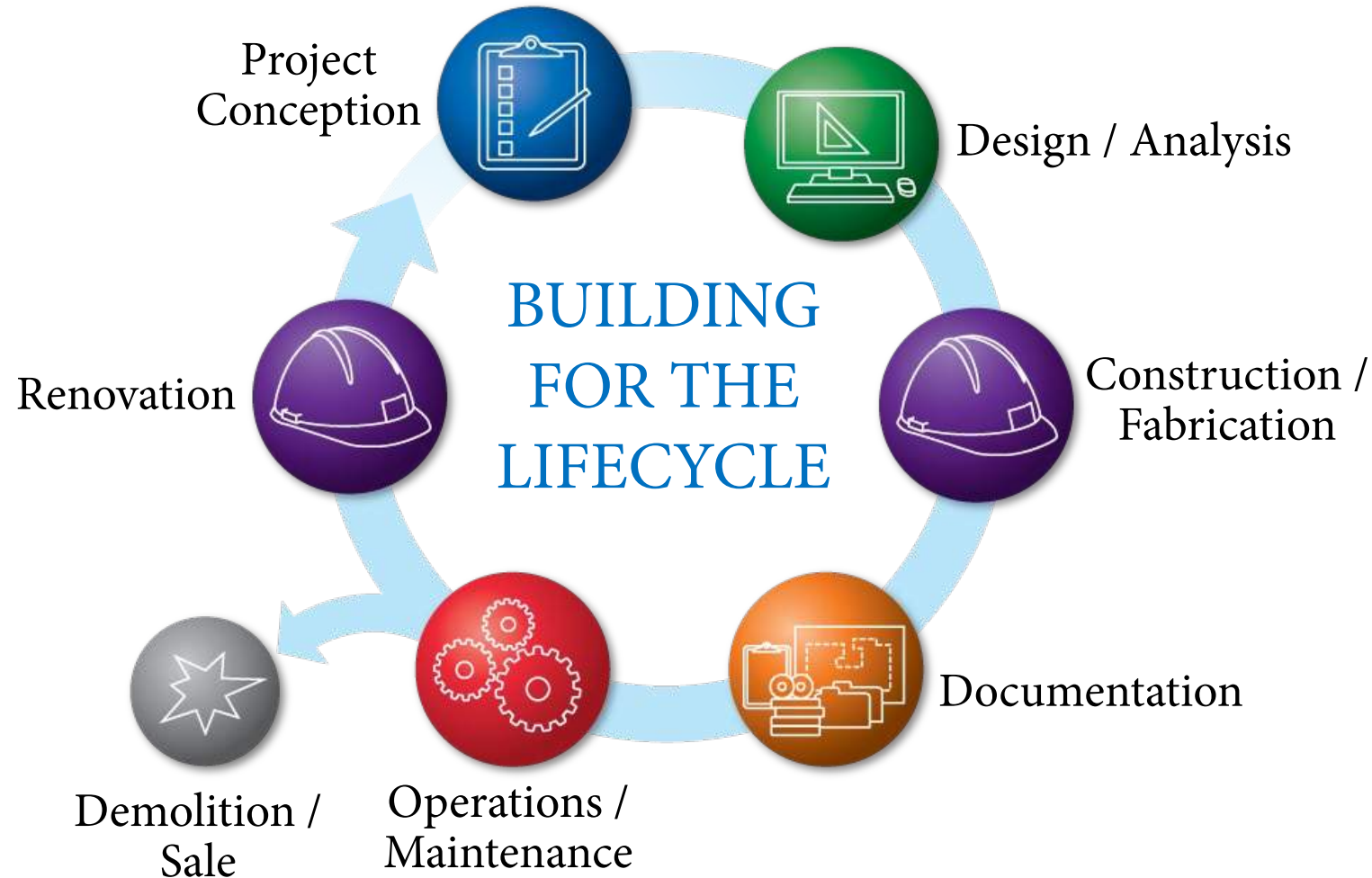
Documentation

LOD 400

Construction

LOD 500

Facilities Management  
(As-Built)



**Goal: Not to impede or interfere with creativity of design but to leverage information for improved management and long-term life of the building**



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# **BIM Documentation & Resources**



## Architect-Engineer Information Center

### Codes and Standards

- [Smithsonian Gardens Soils Management Plan](#), September, 2021.
- [NMNH Supplemental Design Standards](#), October, 2016.
- [Smithsonian Design Standards Vol. 1 - Design Guidelines & Technical Sections](#), October, 2021.
- [Smithsonian Design Standards Vol. 2 - Smithsonian Specifications](#), October, 2021.
- [Smithsonian Design Standards Vol. 3 - Appendices](#), October, 2021.
- [Folklife Festival Design Guide](#), November, 2013.
- [Space Guidelines](#), September, 2003.
- [Smithsonian Mall-wide Exterior Sign Program](#), May 4, 2002.
- [Smithsonian Institution Fire Protection & Life Safety Design Manual](#)
- [Space Naming Guidelines](#)
- [SF Facility Asset Data Spreadsheet](#)

For SI Security Design Criteria, please contact the project design manager or COTR.

› Smithsonian Facilities CAD Guidelines and Standard Files

› Smithsonian Facilities BIM Standards and Templates

› Accessibility

› Metrication

› Sustainability

› Best Practices

[Home »](#)

[A/E Special Conditions »](#)

[Codes and Standards »](#)

[Construction Specifications »](#)

[Construction Cost  
Estimating »](#)

[SD 410 Process - I-Manage »](#)

[Fee Preparation Worksheets »](#)

[Contractor Performance  
Assessment Reporting  
System »](#)

[Contractor Resources »](#)

[Contact Us »](#)

Google search:  
“Smithsonian A/E Center”

Or

Full url:  
<https://www.sifacilities.si.edu/codes-standards>

BIM Standards and Templates

## Architect-Engineer Information Center

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Assessment Reporting  
System »](#)

[Contractor Resources »](#)

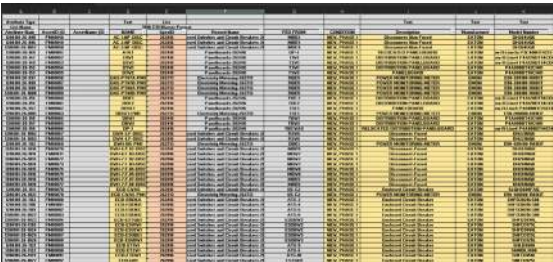
[Contact Us »](#)



### Space Naming Guidelines



### SF Facility Asset Data Spreadsheet





## Architect-Engineer Information Center

### Construction Specifications

All construction specifications must be developed in the 50 Division Construction Specification Institution (CSI) MasterFormat System using the MasterSpec® System. MasterSpec® is a product of The American Institute of Architects (AIA) and is produced and published for the AIA by ARCOM. In addition, the documents below are specification sections that have been tailored to meet specific requirements of the Institution and should be used when required by a particular design.

- Construction Specification Institute (CSI)
- ARCOM

A title page for the specification book with the required signature block for the Associate Director of OPDC and containing a statement of conformance with the Smithsonian Directive (SD) 410.

- Construction Specification Cover Sheet
- Division One, Small Project
- Division One, Large Project
- Section 01 3250 BIM Requirements
- Section 01 7832 Operation and Maintenance Data Requirements
- Section 01 9113 Commissioning

Use this MS Word guide specification for all projects, selecting either Large or Small project format. Careful editing is required by the Design Manager and/or the Architect-Engineer Design Team. For projects at NZP contact the Resident Engineer for assistance in developing a customized set of Supplementary Conditions.

#### Fire Protection and Life Safety

The following guide specifications have been approved by OSHM for use on Smithsonian projects and their use, where appropriate is mandatory. In addition, the Smithsonian Institution Fire Protection & Life Safety Design Manual is provided as a resource for designers to supplement the minimum standards provide by building and fire codes and thus provide an enhanced level of fire protection and life safety for Smithsonian facilities, collections, occupants, and operations.

[Home »](#)

[A/E Special Conditions »](#)

[Codes and Standards »](#)

[Construction Specifications »](#)

[Construction Cost Estimating »](#)

[SD 410 Process - I-Manage »](#)

[Fee Preparation Worksheets »](#)

[Contractor Performance Assessment Reporting System »](#)

[Contractor Resources »](#)

[Contact Us »](#)

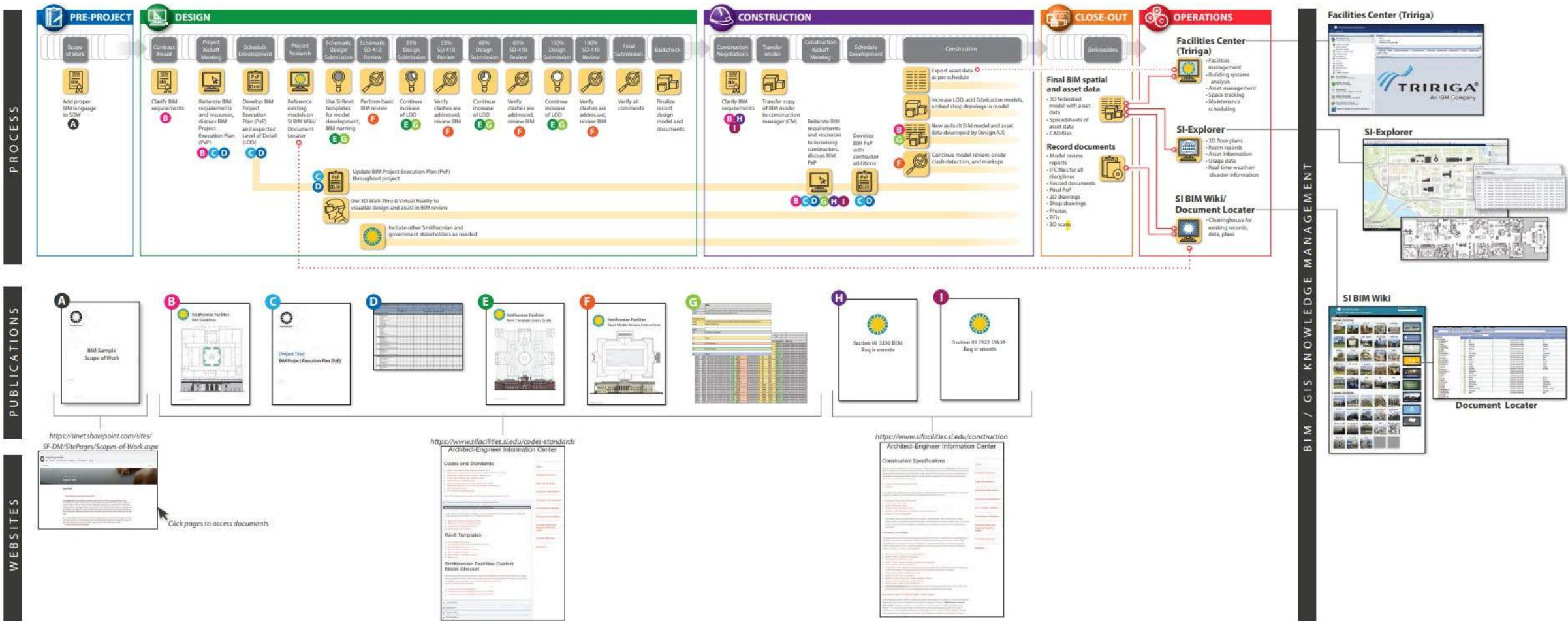


### Section 01 7823 O&M Data Requirements

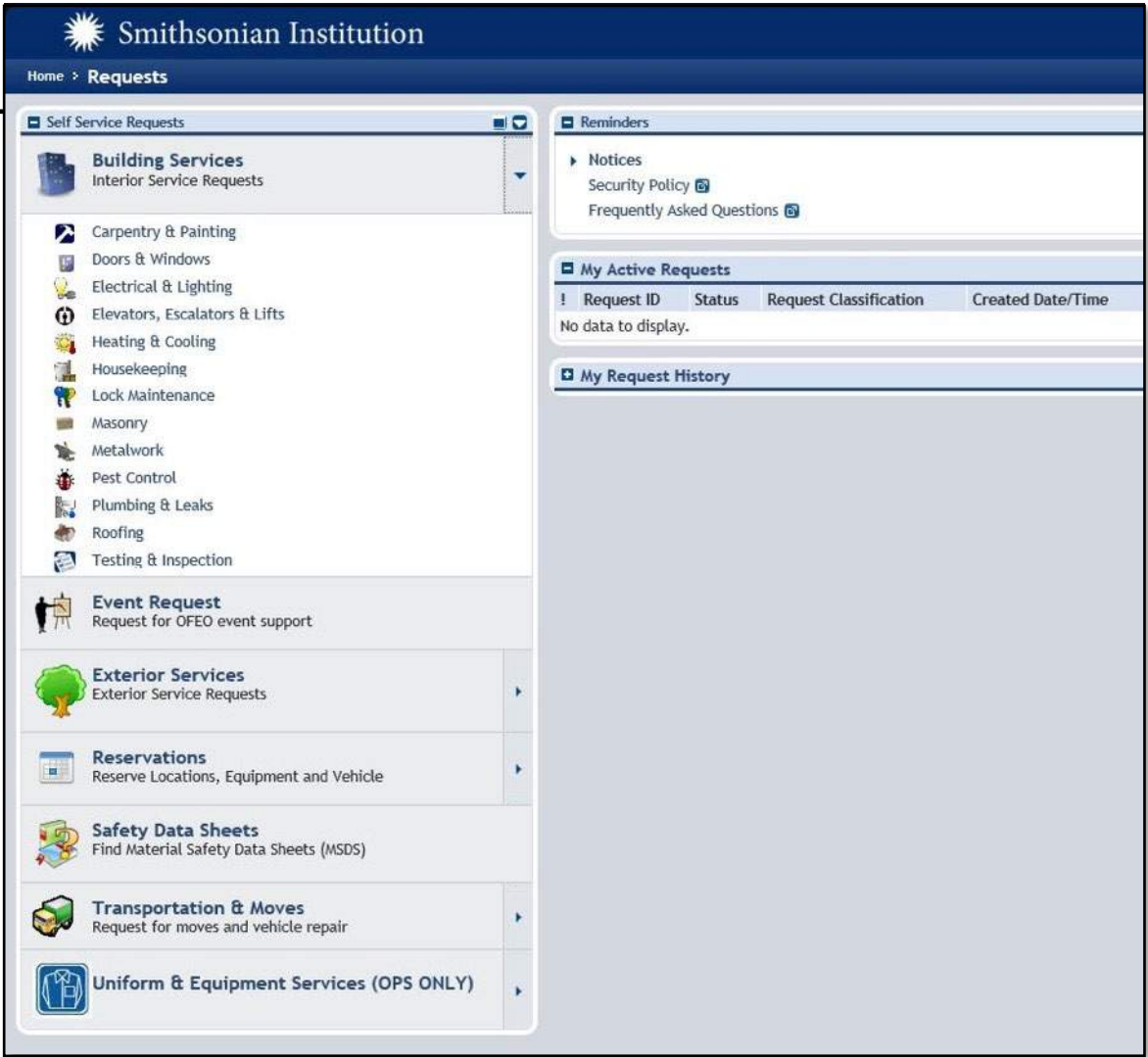
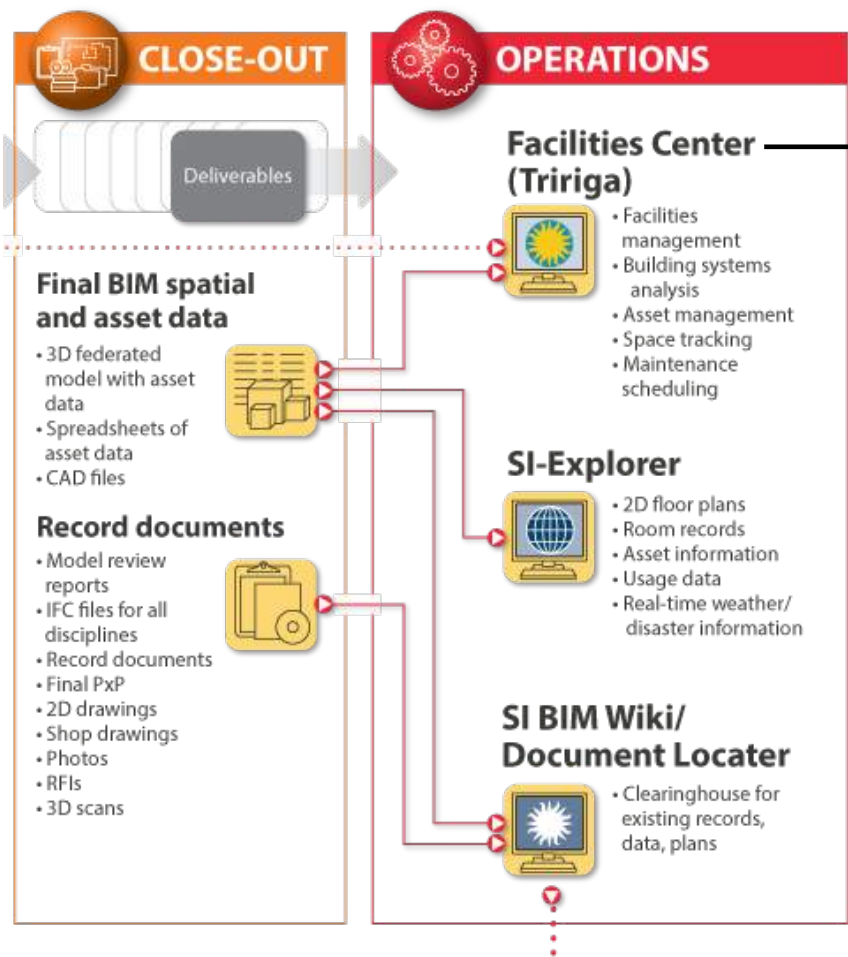


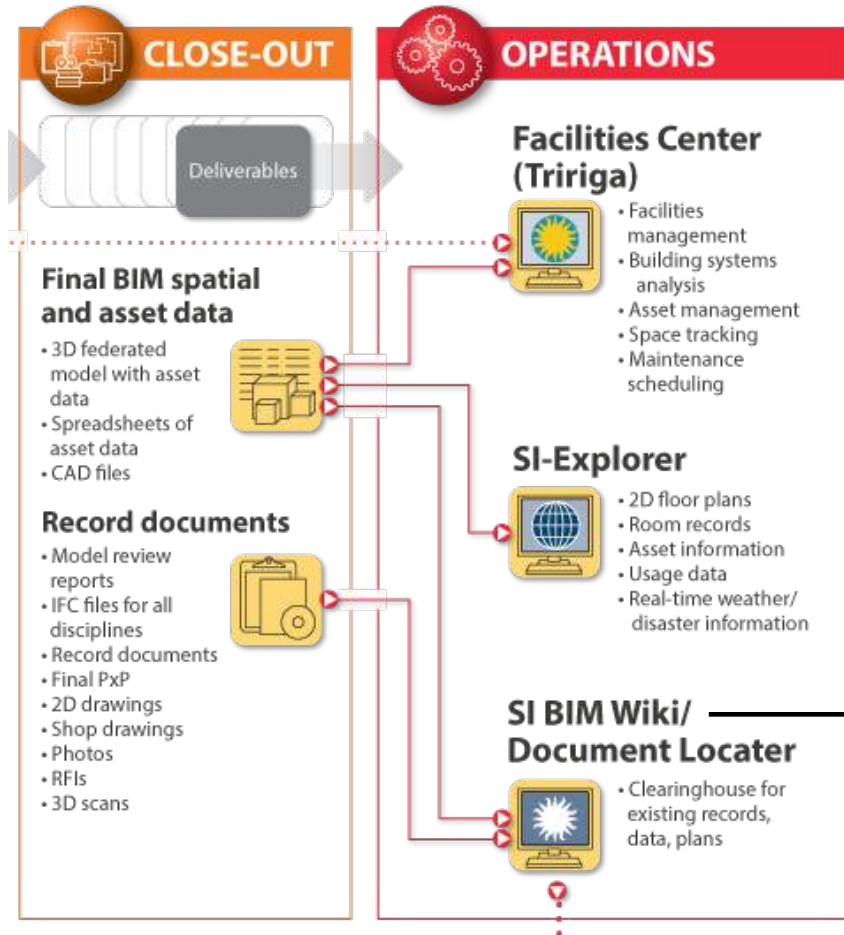
### Section 01 3250 BIM Requirements

## Smithsonian Review Process with Integration of BIM



[SF-BIM Integration Flowchart](#) (Click to Download)





## Smithsonian Facilities Information Warehouse

### Quick Links

Integrated Facilities Teams  
Project Handbook  
Project Lessons Learned  
2D Floorplans (SI Explorer)  
Digital Records (Document Locator)  
Facilities Help

### Museum Trust



Files Tools Help Back Forward Folders Logout

Locator: SEARCH OPTIONS ADVANCED SEARCH Address: BIM Models/Documents

Files and Sub-Folders Select Action

Name	Version	Checked Out By	Modified	Floor	Property Name
AIB	1		05/20/2014 02:23:49 PM		AIB
SIB	1		05/20/2014 02:23:56 PM		SIB
Hirshhorn	1		05/20/2014 02:24:08 PM		Hirshhorn
NASM Mail	1		05/20/2014 02:24:18 PM		NASM Mail
NMAI Mail	1		05/20/2014 02:24:27 PM		NMAI Mail
Quad	1		06/17/2014 03:53:19 PM		Quad
Freer Sackler	1		06/17/2014 03:53:30 PM		Freer Sackler
African Art	1		06/17/2014 03:53:44 PM		African Art
NMAH	1		06/17/2014 03:53:51 PM		NMAH
NMNH	1		06/17/2014 03:54:00 PM		NMNH
Remick	1		06/17/2014 03:54:08 PM		Remick
DWRC	1		06/17/2014 03:54:23 PM		DWRC
NMAAHC	1		06/17/2014 03:54:35 PM		NMAAHC
Anacostia	1		06/18/2014 11:16:03 AM		Anacostia
NASM Dulles	1		06/19/2014 02:32:28 PM		
_Reports	1		06/30/2014 09:56:40 AM		
NMAI Suitland	1		11/19/2014 01:27:27 PM		
NZP-DC	1		01/23/2015 10:27:30 AM		NZP-DC
NZP-VA	1		01/23/2015 10:27:45 AM		NZP-VA
STR-Tupper	1		01/23/2015 10:28:05 AM		STR-Tupper
STR-Gamboa	1		01/23/2015 10:28:28 AM		STR-Gamboa
STR-BCI	1		01/23/2015 10:28:43 AM		STR-BCI
STR-Bocas del Toro	1		01/23/2015 10:29:22 AM		STR-Bocas del Toro
STR-Naas	1		01/23/2015 10:29:45 AM		STR-Naas
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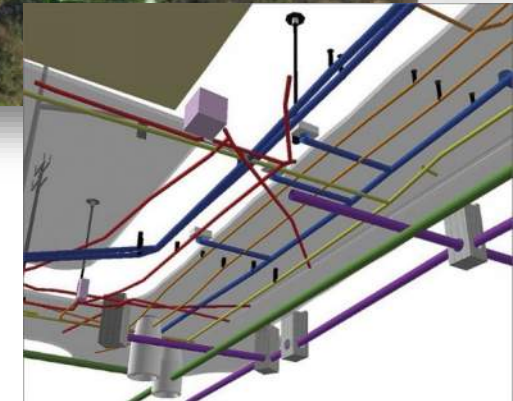
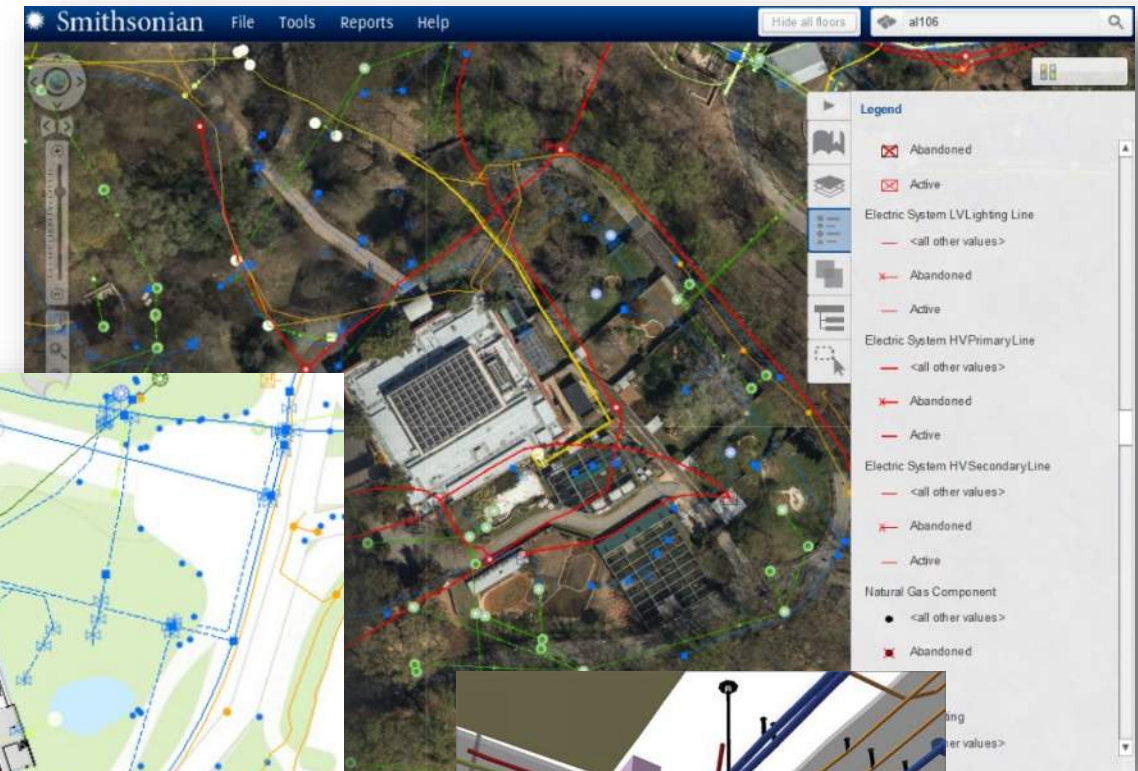
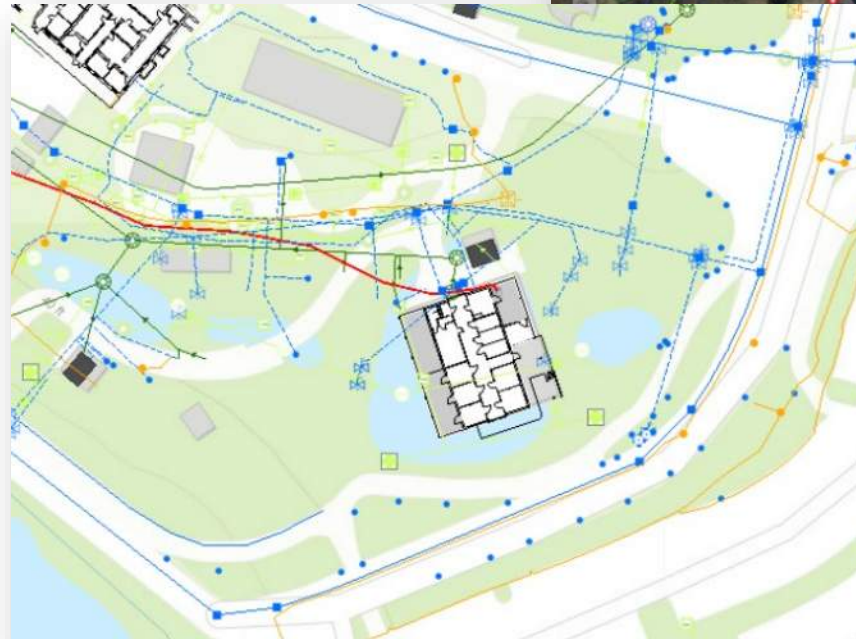
Page 1 of 2 Displaying 1 to 25 of 43 items

STR-Galata (797) STR-Gamboa (800)

\* For Existing / As-Built BIM Models, 3D Data Capture, and/or Drone info please contact your Design Manager (DM)

- SI's Portfolio of Underground Utilities owned or leased by the Smithsonian.
- Layers symbology use the American Public Works Association (APWA) Color Code.

APWA UNIFORM COLOR CODE	
WHITE :	Proposed Excavation
PINK :	Temporary Survey Markings
RED :	Electric Power Lines, Cables, Conduit and Lighting Cables
YELLOW :	Gas, Oil, Steam, Petroleum or Gaseous Materials
ORANGE :	Communication, Alarm or Signal Lines, Cables or Conduit
BLUE :	Potable Water
PURPLE :	Reclaimed Water, Irrigation and Slurry Lines
GREEN :	Sewer and Drain Lines
KNOW THE COLOR CODE!	





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**Tools &  
Capabilities**

- Historic Preservation
- Pre-Project Planning
- Capture / Verify Existing Conditions
- Construction Coordination
- Capture / Verify As-Built Conditions
- Facility Management



**Matterport Pro2  
3D Camera**

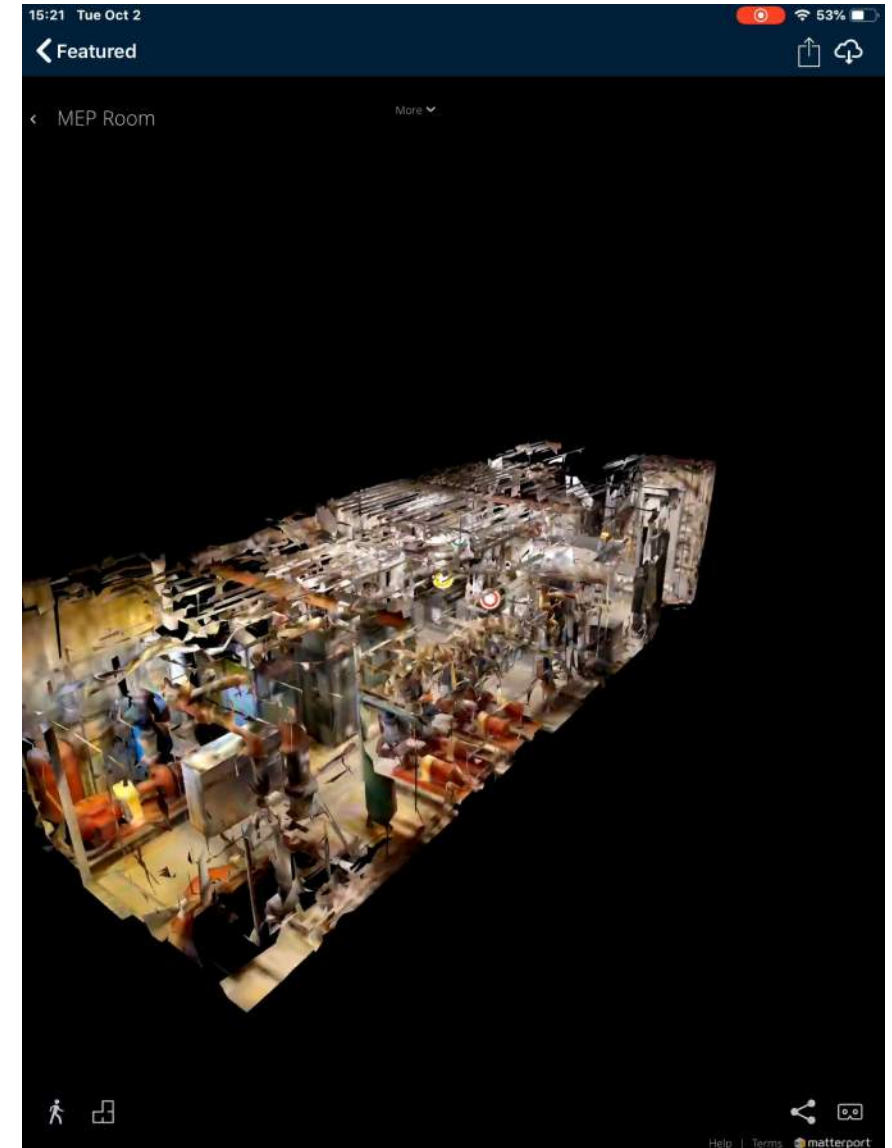


**Matterport Pro3  
3D Camera**

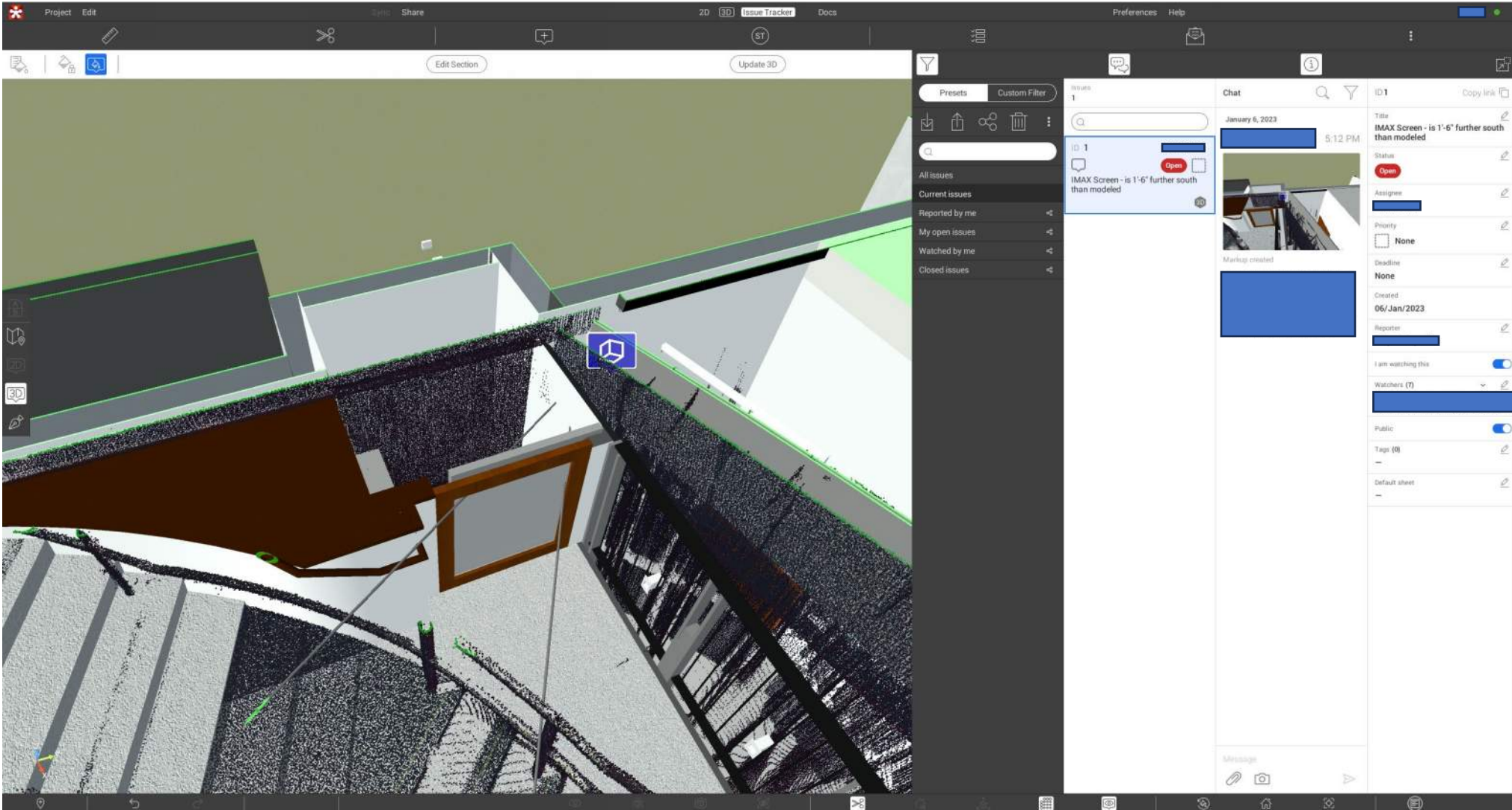


**Leica BLK360**

- What is Matterport™
  - Cloud Based (requires a license to access)
  - Utilizes 360 Degree Photogrammetry or Lidar Scanner
- Capabilities
  - 3D Showcase
  - Measurements
  - 2D Photography
  - 360 Degree Photospheres
  - Colorized Point Clouds (.xyz)
  - High Resolution Floor / Ceiling Plan Image (.jpg)
  - 3D Mesh (.obj)
  - Video Walkthroughs



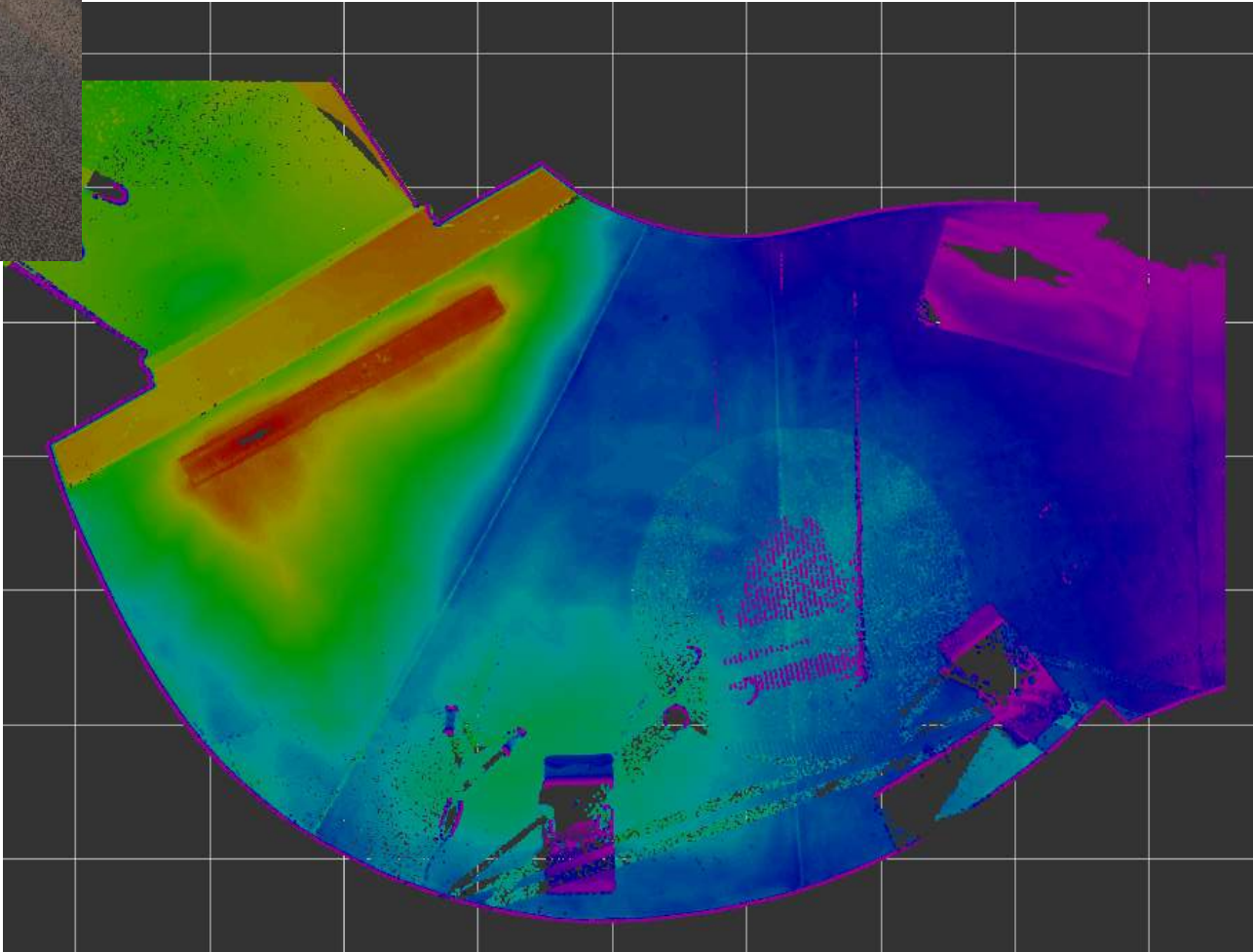
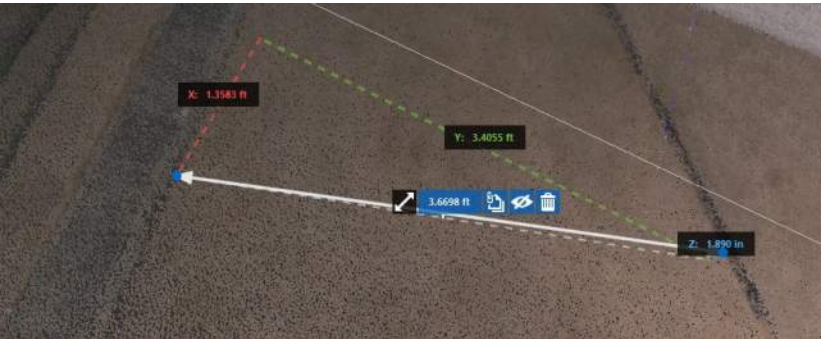
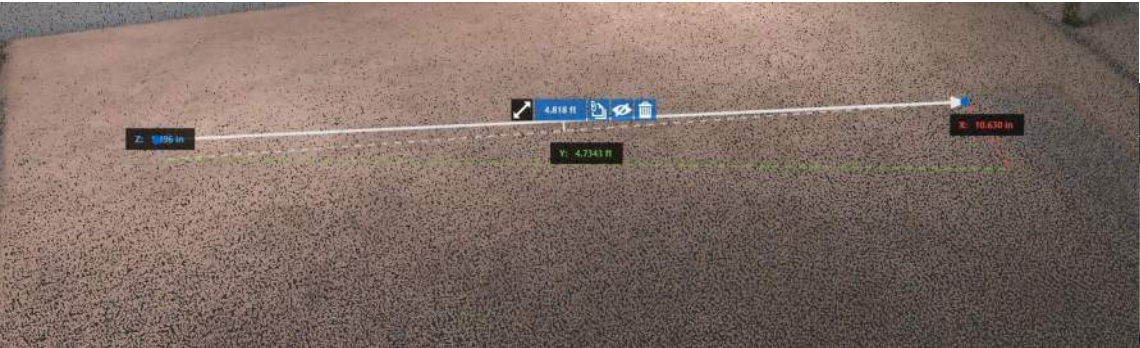
## Coordination



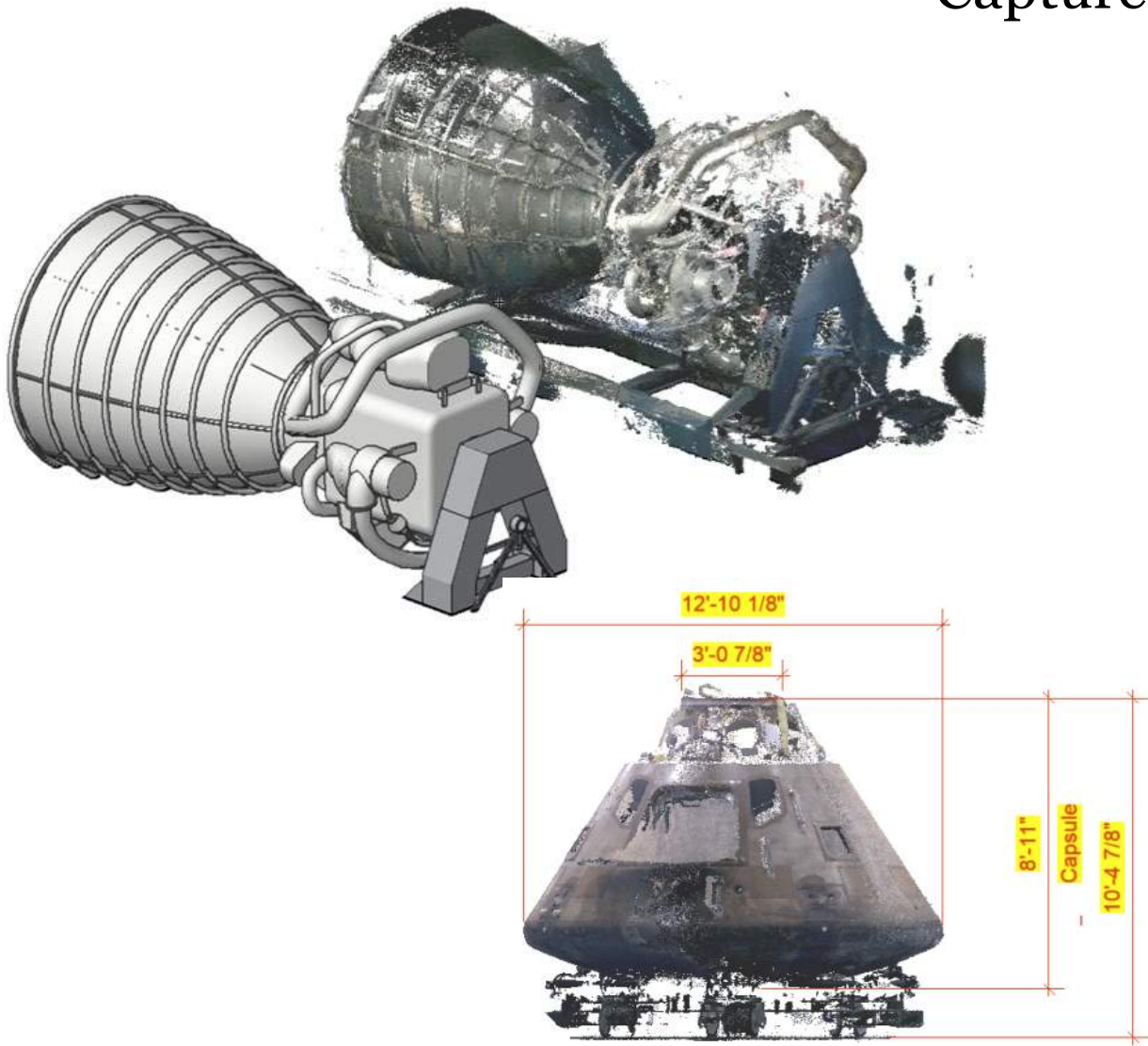
## As-Built Verification



## Slope Analysis - ADA Compliance



Capture Artifacts



# 3D Digital Data Capture – Historic Preservation

Create Digital Repository of data to maintain Historic Information prior / during to Construction projects.

[Architectural History](#) | [Architectural History & Historic Preservation \(AHHP\) \(si.edu\)](#)



## Architectural History

AHHP maintains a growing library and files archived in the Smithsonian Institution Archives. These are important resources in writing the history of Smithsonian buildings. We do independent research to support design and construction projects, and manage research contracts with specialty preservation firms to undertake Determinations of Eligibility for the National Register of Historic Places and to add Smithsonian buildings and sites to the National Register as they become eligible. To date we have five National Historic Landmark buildings, and over forty other buildings that are individually on the National Register of Historic Places or contribute to national, state or locally eligible historic districts.

Historic resources are found in Washington, DC along the National Mall or in the downtown area, at the National Zoological Park, across the Anacostia River, in New York City, Smithsonian Environmental Research Center in Edgewater, Maryland, and at the Front Royal, Virginia location of the historic Ramoth Station and now the home of the Smithsonian Conservation Biology Institute. AHHP uses architectural history to help ensure conservation of significant spaces, finishes and features when work is undertaken.

AHHP uses the highest level of documentation, such as the Historic American Building Survey administered by the National Park Service to photograph and record aspects of our buildings. Often this is in conjunction with capital improvement projects to record "before" conditions as part of the historical record of change. Historic Structure Reports are commissioned for major buildings such as the Smithsonian Castle, Arts and Industries Building, Carnegie Mansion, Renwick Gallery, with others planned in the future.

- Historic Resources and Structure Reports
- Historic American Building Surveys
- Digital Documentation Projects



Hirshhorn Sculpture Garden Virtual Walkthrough



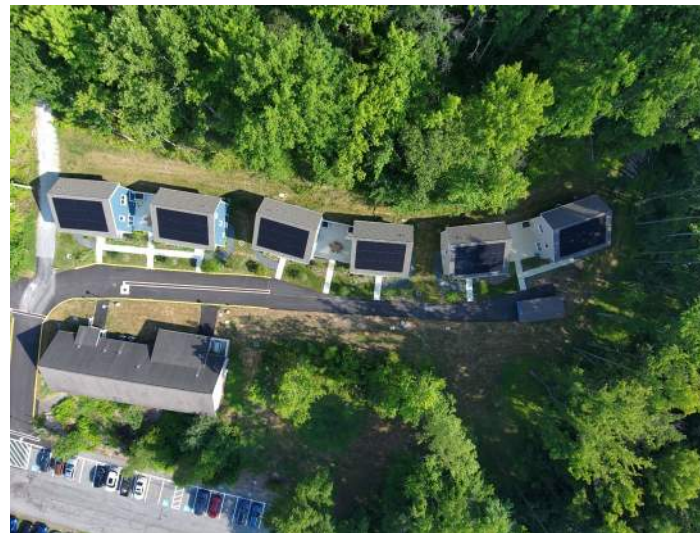
National Air and Space Museum Restaurant Addition Virtual Walkthrough



## Baird Auditorium



## SERC – Misc. Projects



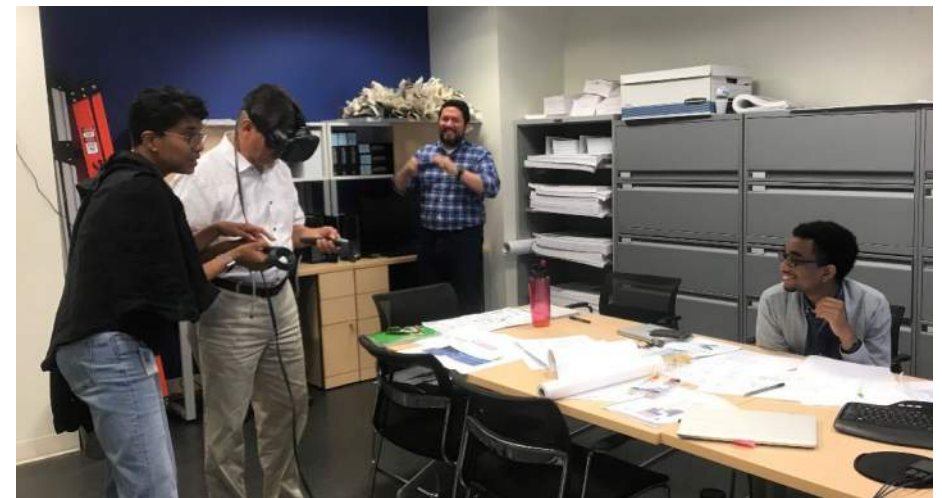


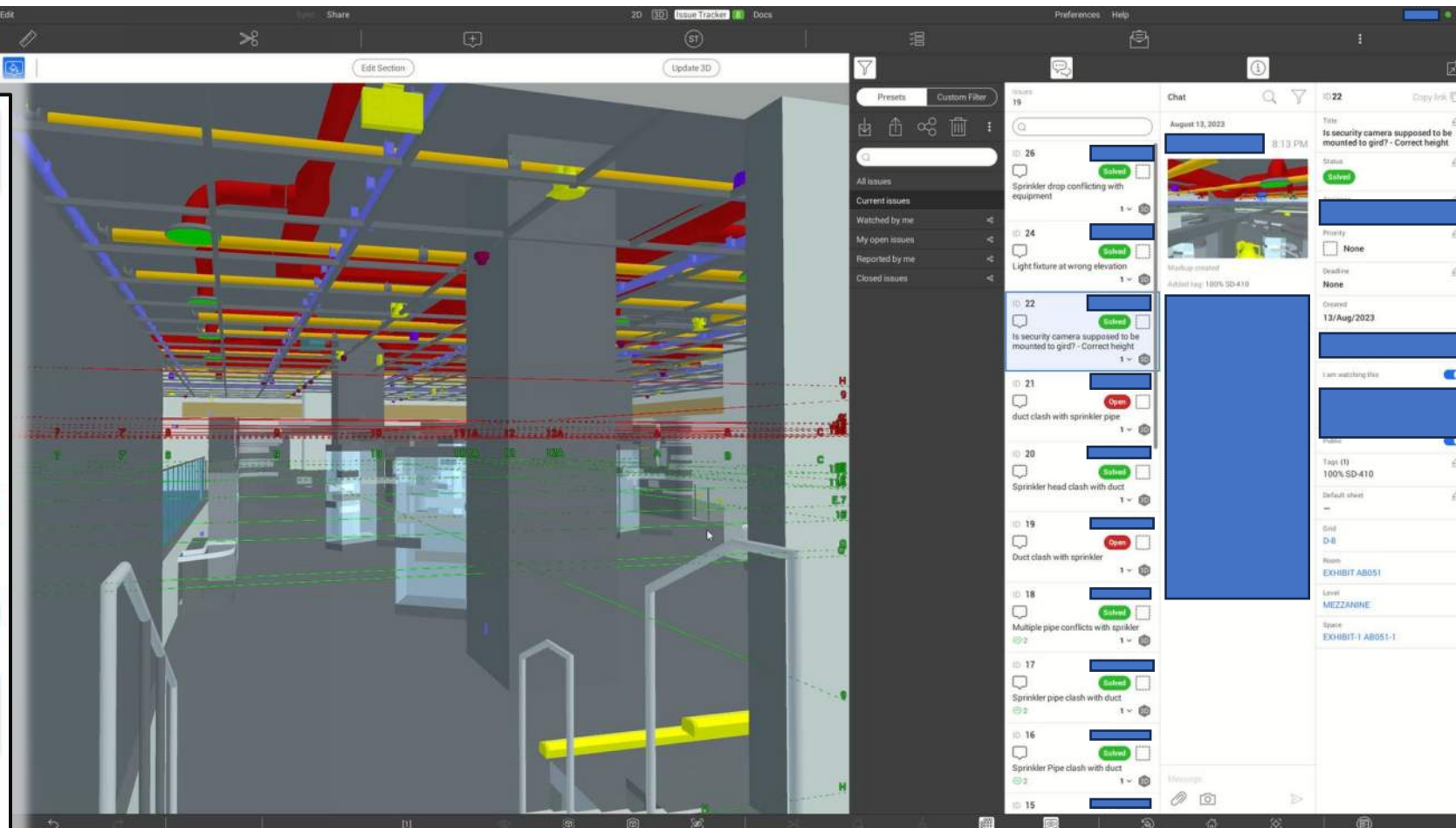
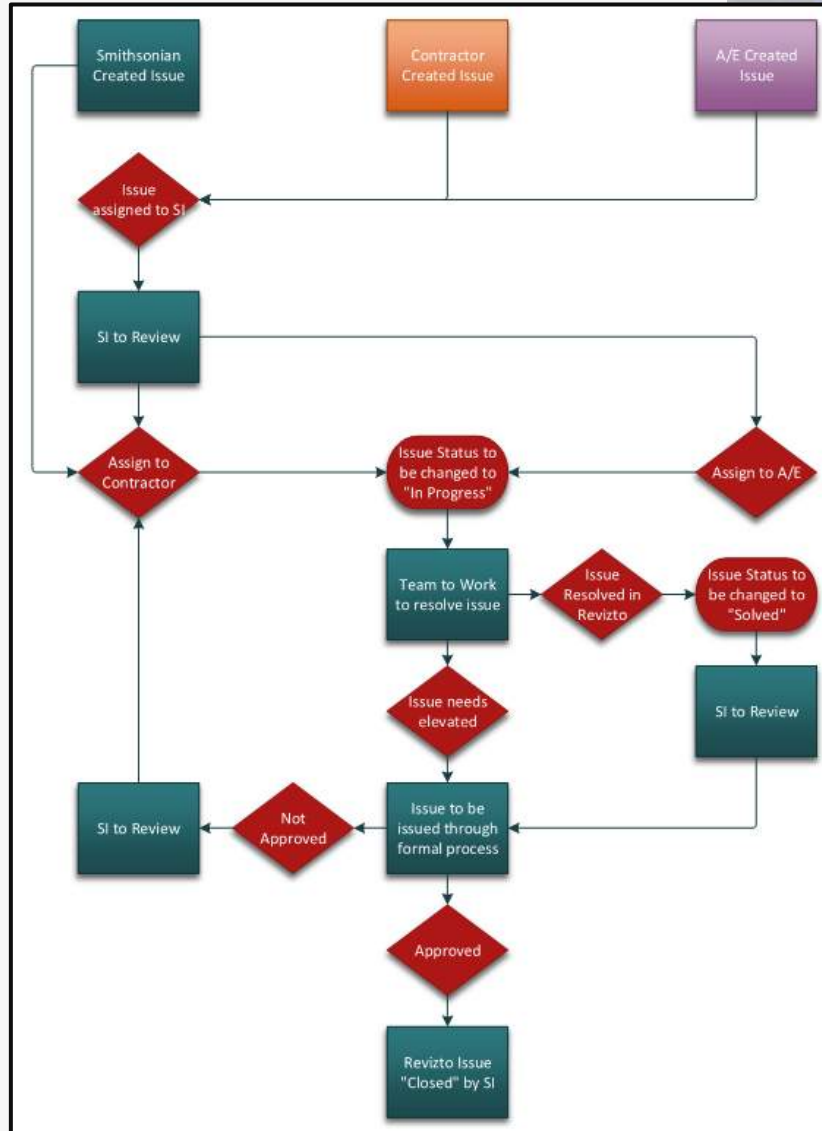
## Programming & Concept Design

- 3D models allow rapid design explorations and updates based on stakeholders feedback
- Multiple design options are created within the same 3D model to optimize the process
- Photorealistic renderings, perspective views, and 3D sections quickly convey design intent

## Design Development & Documentation

- BIM worksharing capability allows multiple team members to work in the same 3D environment expediting the design and documentation process

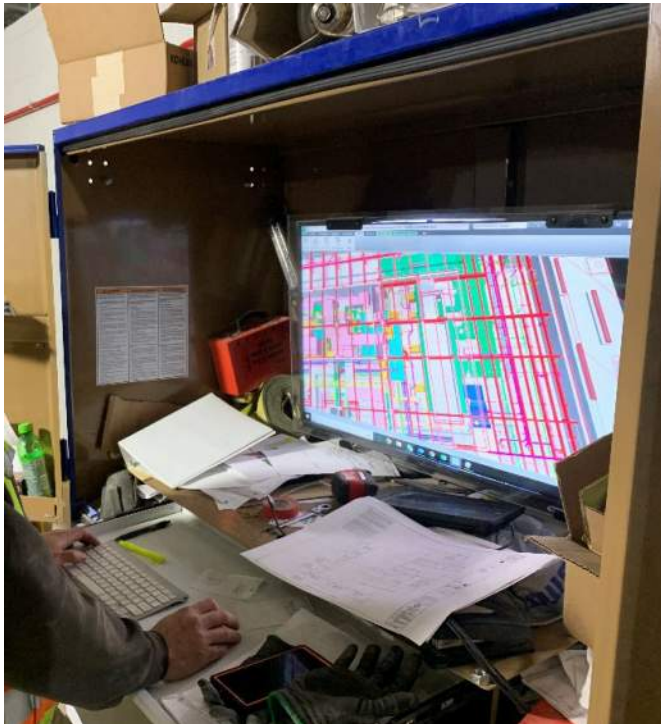




- Engage directly with Design and/or Construction Teams
- Address Major & Typical Design Issues
- These issues track during the design Phase – Can be rolled into Construction Coordination.



- Mobile App includes every feature
- Bring models out to field to verify Built Conditions
- Add photos directly into Issue Tracker





# Thank You!

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**Mike Carrancho – Chief of Engineering and Design - [CarranchoM@si.edu](mailto:CarranchoM@si.edu)**

**Billy McReynolds – Project Manager – [McReynoldsW@si.edu](mailto:McReynoldsW@si.edu)**